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Final Evaluation of the Lead Market Initiative

Final Report

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Executive Summary

The emergence of the Lead Market Initiative

An economy driven by innovation that addresses the most pressing societal challenges has become a defining part of EU policy. The strategic role that innovation can play gained prominence under the Lisbon agenda given its positive contribution to both growth and jobs and has since been placed at the heart of the Europe 2020 vision. However, an important part of delivering a more innovative Europe was greater more strategic support for overcoming market barriers and creating an innovation friendly environment for business.

The lack of key incentives and conditions to spur on innovation and to help launch new products was an important consideration and at the heart of this was a *demand side deficiency* that discouraged entrepreneurial foresight and investment. The remedy for reversing this trend was to propose coordinated efforts that would align a combination of demand side policies in favour of the creative outputs of businesses and accordingly gear up the Internal Market for more innovative successes.

As part of this agenda, it was recognised that targeting specific, innovative a /Cs6 cs183.4aTpl7a /9(ierm1 Tf8 283mc

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close cooperation of industry stakeholders. Four different categories of policy instrument were prioritised including:

- **Legislation** proposals (new legislation or modifications) and regulatory measures to coordinate regulation that will foster innovation and remove regulatory burdens and obstacles to innovation;
- Promotion of the use of **public procurement** to foster the uptake of innovative products and services;
- Development of more consistent **standardisation, labelling and certification** to encourage the diffusion of innovative practices and facilitate the development of lead markets;
- Other **complementary actions** to support the impact of the above instruments including business and innovation support services or financial support instruments for supply side activities.

The role and purpose of the Final Evaluation

This Final Evaluation will help to put in place a tested framework for assessing the overall concept of the Lead Market Initiative and the specific Action Plans of each of the six lead markets. In doing so, it will be able to build on earlier work, such as the Mid-term Progress Report and the supporting report by Prof. Jakob Edler et al proposing a 'Monitoring and Evaluation Methodology for the EU Lead Market Initiative'. It will also make use of the considerable amount of new material gathered in the exercise to help monitor progress.

In order for this exercise to examine the overall Initiative, while at the same time paying sufficient attention to the detail of the different actions in each market, a layered approach to the analysis at three different levels has been adopted. This includes:

- At the most general level, a review of overall progress, which presents a quantitative baseline of market performance, a descriptive mapping of progress of all actions and a review of developments in the Member States;
- At the next level, an overview of progress in each of the four areas of policy namely legislation, standards, labelling and certification, procurement and complementary actions;
- At the most detailed level, an examination of particular actions of different kinds from the six different markets.

Performance of the six selected markets

To develop the evidence base for a quantitative ba

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Clearly, recent economic conditions must be taken into account but further investigation is also required. The number of patent applications also appears varied. Apart from ehealth which experienced steady growth, the remaining sectors moved erratically towards increased numbers since the beginning of the Initiative (renewable energy, sustainable construction, recycling) or declined (biobased products and protective textiles). Overall, at this stage, it appears too early to assess causality between the impact of the LMI and market growth.

The biobased products sector responded well to the Initiative and, with the inception of the Ad-hoc Advisory Group, produced numerous sector wide recommendations which have targeted areas for further strategic development. A key achievement, which will underpin the future sustainability of the sector, is the development of European level standards. With the co-operation of the European Committee of Standardisation (CEN), several new standards have been produced that will support the sector to work towards common innovative product goals. This will enable the industry to adhere to concrete environmental assessment and labelling criteria as well as meet the expectations of public procurers. However, going beyond the successful implementation of many of the Action Plan activities, several policy barriers that restrict growth remain in place. If the industry is to achieve sector wide competitiveness on a par with other regions such as the U.S. and China, stakeholders have requested that the European Commission appropriately align and develop the sector through its broader innovation, agricultural and research policies.

> The European Union needs an agricultural policy to promote the production of renewable raw materials for all industrial uses… To this end, it is necessary to develop political instruments that could secure access to sustainable renewable feedstock that are balanced between bioenergy and bio-based products.
>
> Ad-hoc Advisory Group for Biobased Products (2011) Financing Paper

With eHealth, barriers have also been encountered. Despite analyses demonstrating the importance of new EU legislation to encourage market growth, political willingness to make this possible has yet to be achieved. And, it is unfortunate that it was not possible to develop a public procurement network. However, where the LMI has been effective is in the area of complementary activities through funding for the development of new technologies. These new technologies have taken on board existing standards and have thereby combined demand and supply side activities. This has contributed to cooperation between Member States and the growing Europeanisation of the eHealth market.

In terms of protective textiles, much progress has been made in the area of public procurement. After a successful call for proposals, the ENPROTEX network was established which has taken very useful steps to encourage innovative procurement. Much, however, depends on the successful dissemination and take-up of the approaches developed. This market is also characterised by a successful interaction with industry associations.

The recycling sector's most notable achievement has been the revision of the Waste Framework Directive. Importantly, this will provide the market with a necessary framework with the introduction of, amongst other things, end-of-waste criteria, which will reduce market barriers, encourage innovation and leads to more harmonization and standardisation on an EU-level. Other Action Plan activities such as complementary actions for supporting research have been realised but a notable absence was the emergence of a procurement network or further developments in the

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area of standardisation. On the whole limited co-ordination took place between activities and there is still scope for a co-ordinated approach to demand-side issues.

In the renewable energy area, the LMI has not been the main driver for implementing activities. Whilst important parts of the Action Plan have been implemented, such as the introduction of the Renewable Energy Sources Directive that will encourage demand side developments through binding targets, the LMI has remained invisible from stakeholders. As such, in areas such as standardisation and public procurement, limited movement has taken place. The evaluation team have concluded that there has been no LMI in the renewable energy sector, but that the case remains for a co-ordinated demand side approach.

The Action Plan of the sustainable construction LMI has been almost completely implemented and presents the clearest example of the benefits of addressing a well structured set of interrelated demand-side issues. Along with helpful supporting regulatory studies, there have been reforms to the Energy Performance of Buildings Directive, which should contribute to smoothing out complexities in this area. Moreover, two focused public procurement networks were established which have developed innovative procurement practices and seen through innovative procurement projects to implementation. In the area of standards, sustainability assessments has been strengthened. However, many of the actions require a significant degree of follow-up, in some cases, such as the strategy to facilitate the up-grading of skills and competencies in the construction sector, involving major developments at national and local levels. It is also necessary to engage the industry more fully in future developments.

> Whereas most previous EU policy initiatives have focused on supply-side measures which tried to push innovation, demand-side measures give markets a greater role in "pulling" EU innovation by providing market opportunities. Initial steps have been taken under the EU Lead Market Initiative but a bolder approach associating the supply and demand sides is needed.
>
> European Commission
> Innovation Union (2011)

The growing importance of EU demand side policy

The LMI has been implemented in the context of a developing and dynamic innovation policy agenda. The goals of Europe 2020 have shaped Flagship Initiatives that include an important element of demand side policies. These documents also contain a number of new ideas and approaches and have launched a further debate that is highly significant for building on the potential of the. Innovation is being promoted in new ways such as the strengthening of Innovation Partnerships relating to certain sectors and a realignment of the way that the Competitiveness and Innovation Programme relates to the Framework Programme for research and development. At the level both of policy and implementation, therefore, the context in which the LMI has operated until now is undergoing significant change.

Brief Summary of Overall Findings

In addition to the detailed findings on each of the six targeted lead markets, a number of overall conclusions are presented, together with commentary on and cross-cutting themes. These include :

- The LMI should be understood as a set of pilot actions aiming to shift the basis of an important area of policy. Its major strength was targeting interrelated policy areas for promising markets that would not otherwise be picked up by other policy frameworks.

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- The LMI fell short of the ambition of the Aho Report, which had raised expectations. The scope of the Action Plans was necessarily more restricted, especially given the limited nature of the budget available. Furthermore, the Initiative involved experimenting with various new procedures.

- The six markets initially chosen as targets continue to show a marked potential for further growth.

- Varying degrees of success were achieved in relation to the different Action Plans.

- It is important that there should be follow-up to the results achieved under the Action Plans. In particular the full impact of the work of the procurement networks will only be felt, if there is effective dissemination and take-up of the initial results.

- The co-ordination with the Member States via the EPG-sub group has faced difficulties. For various reasons going back to the inception of the Initiative, the framework for Member States interaction was not sufficiently developed.

- Engagement with industry was generally more successful than with Member State authorities. The use of demand side policies to target certain markets is growing at national level, but developments in the Member States can best be described as being in parallel to those of the Initiative.

- For the markets targeted, the fact that the LMI operated at a European level brought added value, though this would not necessarily be the case for all markets. Regulation stemming from European legislation and the benefits to be derived from public purchasing from more than one Member State are significant factors in all cases.

- Examples of good practice are provided in case studies annexed to the evaluation report.

In terms of a continuation of approaches similar to the LMI in the emerging policy frameworks:

- There are significant differences between each of the current lead markets and follow-up for these and any new targets needs to respond to these differences. The possibilities for each of the current markets are briefly summarised in the conclusions of the main report.

Recommendations

24 recommendations are made in total. These may be summarised as follows :

- A co-ordinated approach to the demand-side stimulation of innovation ought to continue to have an important place in innovation policy, while the links with supply-side measures should continue to be strengthened.
- There are significant advantages to be found in pursuing demand-side stimulation of innovation by focusing on specific markets with the potential to become lead markets.

- These considerations should influence the development of successor initiatives to the LMI. There continues to be a case for separate initiatives in some markets, but even where demand-side

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measures are mainstreamed into broader policy frameworks, maintaining the coherence and interaction of 'lead market actions' will make their overall contribution more effective.

- The full intervention logic of LMI-type measures needs to be elaborated so that objectives at all levels are evident and transparent. This should be supported by a clearer specification of the longer-term results and outcomes anticipated and by an effective monitoring of progress.

- Effective follow-up of actions requiring further developments that formed part of the LMI is essential for the credibility of the Initiative. Further action in the Bio-based products market is particularly urgent, but is also needed in the e-health, protective textiles, and sustainable construction areas.

- The case for demand-side actions, especially relating to public procurement, remains strong in the 'busy' policy areas of recycling and renewable energy.

- The initiative would have had greater impact, particularly in the procurement area if it had had a dedicated budget. Furthermore, while much can continue to be done within a restricted budget, many of the follow-up actions identified require more substantial funds.

- A balanced approach to support for the procurement of innovation needs to be developed across all phases of the innovation cycle.

- It really is essential to engage the Member States in the LMI or similar processes. At a minimum, this should involve a clear definition of action that has to be taken at a national level to complement EU action.

- The lead market approach also makes sense at a national level and in certain circumstances, at a regional level. A greater engagement of Member States that have so far not adopted demand-side stimulation of innovation might be achieved through its inclusion in Structural Fund guidelines and in the elaboration of Cohesion policy.

- The effective engagement with industry has been one of the successes of the LMI. There are many lessons to learn from the methods adopted, but perhaps the most important to develop would be the structured interaction between purchasers and suppliers, both within and beyond the public procurement framework.

- The promotion of end-user interaction with research - from the shaping of objectives to the detail of the work undertaken and its subsequent application – is a major advantage of the lead market approach, providing positive links between the demand-side and supply-side. This should be exploited further.

Introduction 1

This document contains the Draft Final Report submitted by the Centre for Strategy & Evaluation Services (CSES) LLP on the Final Evaluation of the Lead Market Initiative. This first chapter provides a summary of the overall approach to the evaluation.

1.1 Resume of Assignment Aims

Adopted in December 2007, the Lead Market Initiative (LMI)[1] for Europe is an important component of the European Union's strategic aim to promote greater innovation in Europe that formed part of the Lisbon agenda and is now a central feature of Europe 2020[2].

The Lead Market Initiative aims to foster the emergence of 6 specific lead markets that are important in both economic and social terms and that are likely to become very significant on a global scale. The Initiative is doing this through a relatively new approach that concentrates on the factors influencing the demand conditions in these markets and that requires the active co-operation of the Member States. In fact, a major test of the eventual effectiveness of this initiative is the responsiveness of the Member States, industry and other stakeholders to the action plans established by the Commission.

The markets that are targeted in the Initiative are : bio-based products, eHealth, protective textiles, sustainable construction, recycling and renewable energies. Six action plans are in operation over a period of 3-5 years; they consist of a mix of demand-side policy measures in the fields of legislation, standardisation and labelling, public procurement and complementary activities (mainly involving support from the existing Competitiveness and Innovation Programme – CIP - and the Research Framework Programme 7 – FP7). The initiative as a whole is in the third year of its full implementation.

The Commission Communication[3] that launched Lead Market Initiative envisaged that a final evaluation report on the first cycle of the LMI would be presented in 2011. The purpose of the current exercise is to prepare this report. In doing so, it will be able to build on earlier work, notably the annexes to the initial Communication, the Commission Staff Working Document[4] of September 2009 presenting a Mid-term Progress Report and the supporting report by Prof. Jakob Edler et al[5] proposing a 'Monitoring and Evaluation Methodology for the EU Lead Market Initiative'. It will also make use of the considerable amount of material gathered in the exercise to identify the target lead markets and subsequently to monitor progress.

In examining the achievements of the LMI, the evaluation is considering the progress that has been made in implementing the defined actions for each of the 6 lead markets in the areas of legislation, smart public procurement, standardisation, labelling, certification, support delivery and calls under CIP and FP7. It is also examining progress in reducing identified obstacles in the market, the extent of the commitment of the public and private stakeholders (notably the Member States), and finally any

[1] "A lead market initiative for Europe" - COM(2007)860 - 21.12.2007

[2] Europe 2020 - A European strategy for smart, sustainable and inclusive growth – formally adopted by the European Council on 17 June 2010

[3] Communication from the Commission 'A lead market initiative for Europe' COM(2007) 860 final of 21.12.2007

[4] Commission Staff Working Document 'Lead Market Initiative for Europe. Mid-term progress report' SEC (2009) 1198 final of 9.9.2009

[5] Prof. Jakob Edler, Prof. Luke Georghiou, Dr. Elvira Uyarra, Deborah Cox, Dr. John Rigby, Yanuar Nugroho, Manchester Institute of Innovation Research, University of Manchester 'Monitoring and Evaluation Methodology for the EU Lead Market Initiative A Concept Development', March 2009

discernable impact in terms of market growth, employment rate, turnover, number of patents/trademarks etc.

The evaluation, however, is not restricting itself to a summative appraisal of what has been achieved by the LMI so far. The LMI is still in a state of development and its real impacts can only be expected in 5-10 years from now. The purpose, therefore, is to continue to make a formative input into the development of the Initiative and comment on such issues as how far there has been success in prompting developments in Member State policy-making in this area, especially in the form of changes in institutional, economic and information frameworks and including the involvement of elements of civil society and how learning has been supported and whether this has led to a change of culture in the Member States. In particular, the evaluation will seek to identify instances of good practice in these areas and highlight lessons that can be learned, including the possible transfer of good practice into other areas of demand-side policy.

The objectives of this assignment may therefore be stated as :

- To create an overview of the actions that are being implemented under the action plans and the current and expected progress in their implementation
- To assess the commitment of stakeholders in implementing the activities of the action plans (public and private stakeholders as well as of the Member States)
- To assess the level of alignment between existing or new activities by Member States and those of private sector stakeholders, building on an assessment of new demand-side policies by the Member States
- To measure the level of policy coordination, both within and outside the European Commission, attained by the LMI.
- To assess the rationale, implementation and achievements of the LMI as a whole and of selected actions.
- To assess the impact of the LMI in reducing identified obstacles in the markets.
- To assess the discernable economic impact of the LMI in areas such as market growth, employment rate, turnover etc.

In addressing these objectives the evaluation is able to build on the partial coverage of the first three objectives in the Mid-term Progress Report and also to make use of the methodology proposed at that time for achieving the other objectives. Overall, however, it will be important to keep in mind the aim of

further consideration of the issues during the Inception period led to a refinement of the initial set and the inclusion of a few additional questions. The key evaluation questions that are under consideration in the evaluation are therefore as follows :

Relevance & Coherence

- Was it appropriate for the EU (Member States and the EC) to support this initiative? Was the initial rationale well-founded? What arguments were used and were these correct?
- How has the Initiative related to the policy and actions of the Member States?
- How has the Initiative related to other EU policy measures, especially in areas relating to innovation ?

Effectiveness

- Were the stated objectives correctly specified?
    - Were objectives sufficiently specific in to allow effective management, evaluation etc.?
    - Was there a clear logic relating the overall objectives and the specific action plans of the 6 LM?
    - To what extent are any positive changes brought about by the activities evaluated (e.g. the development of better 'demand-side' policy or the reduction of barriers and obstacles) or are any likely to be so?
- Was the implementation process effective?
    - How effective were the LMI activities as a mechanism and means to achieve each of their stated objectives? How successfully have the action plans been implemented? What, if anything, could be done to render them more effective as a means of achieving these objectives?
    - What evidence is there of progress against the initial growth projections in each of the markets?
    - How has the governance structure operated? Has it encouraged participation and engagement on the part of Member States, industry and other stakeholders?
    - How committed have the stakeholders been in implementing the activities of the action plans?
    - Can examples of good practice be identified in specific policy areas?
    - Could they possibly be adapted and transferred to other demand side policies?
    - Were there any 'unintended' effects?
- Was the implementation process transparent?
    - Were information and the related services well-prepared, effectively distributed and did they reach their target audience?
    - What was the relevance/take-up for different types of actors - EC, MS, other bodies, firms etc?

- Did the Initiative attract sufficient interest from the innovation community?
- Were there gaps or uneven distribution in terms of e.g. sectoral, thematic and geographical coverage?

Efficiency

- Were the policy instruments available to the Initiati

Introduction 1

- **Chapter 3: The Evidence Base** – outlines the results of the investigation of the evidence on developments in the targeted lead markets and provides an evidence base against which further progress can be assessed.

- **Chapter 4:** ***Performance in each of the Lead Markets*** – provides an assessment of the developments that have taken place in each of the lead markets separately.

- **Chapter 5: Overall** ***Findings*** – looks at cross-cutting elements and themes, including the relationship between the Lead Market Initiative and developments at a national level.

- **Chapter 6:** ***Conclusions and Recommendations*** – Summarises the conclusions from the evidence presented and sets out a series of recommendations arising from the evaluation.

- **Annexes** – contains a mapping of the progress achieved in the Action Plans for the 6 markets and a series of case studies .

Background & Methodology 2

This chapter of the Report examines the methodology that is being applied in the study. It starts with a clarification of the issues being addressed and a brief overview both of the development of the Initiative and the broader context within which it is taking place, before going on to outline the specific approach that has been developed to the evaluation process.

2.1 The Nature of the Lead Market initiative

Definition

The Lead Market Initiative is a measure that has identified a set of markets with the potential to become 'lead markets' and established them as a focus for urgent and co-ordinated action through ambitious action plans, in order rapidly to bring visible advantage for Europe's economy and consumers.

Formally, the concept of lead markets as used by the Commission is as follows :

> *A lead market is the market of a product or service in a given geographical area, where the diffusion process of an internationally successful innovation (technological or nontechnological) first took off and is sustained and expanded through a wide range of different services*[6]*.*

This characterisation of lead markets will serve as a fundamental reference point in the course of the evaluation. However, the concept as used in the LMI derives from a wider debate in the innovation policy community and academics researching the area and this context is of some importance in assessing the relevance of the Initiative.

The Origins of the Lead Market Initiative

We should first comment on the core idea and the key components that make up initiatives of this kind.

Beise and Cleff (2004)[7] made an important contribution to the debate on lead markets, examining the conditions that give competitive advantage to regions in their commercial exploitation of innovations prior to their adoption elsewhere. They define a lead market as a regional market which has the attributes to take hold of an innovation and increase the probability of its successful international expansion. A recent OECD (2010)[8] study has further elaborated on this position by making it clear that lead users who demand and are willing to pay for and use innovative products, are central to 'pulling innovation' within new markets, prior their subsequent diffusion beyond their original borders. Interestingly, in some cases the innovation may have originated within another geographical region (or firm) before the lead market conditions take it forward outside of the area where it was first created.

A key advantage of supporting lead markets is that by seeking to attain the status of being a global market leader, a particular region or country will enhance its international competitiveness. To do this,

[6] Commission Communication 'Implementing the Community Lisbon Programme: A Policy Framework to Strengthen EU Manufacturing - towards a more integrated approach for Industrial Policy' COM (2005) 474 final

[7] Beise, M. and Cleff, T. (2004) "Assessing the lead market potential of countries for innovation projects", *Journal of International Management*, 10(4), pp. 453-477.

[8] OECD (2010) Demand-side innovation policies

domestic competition and conditions needs to be strengthened through targeted policies in order to yield optimal innovations in the context of ever-changing preferences. Not only will this have the benefit of raising the profile of lead markets as attractive investment locations, but will also lower prices for end users (European Commission, 2006)[9].

The role of demand side policy to spur on lead markets

As such, although highly critical, the innovation itself (or its level of technological superiority) is not the sole attribute driving the expansion of the market. The demand side conditions must also be primed and geared up for the efficient operation of innovative business. The successful adoption of the innovation is therefore dependent upon the active influence of government, business and consumers to provide the correct lead market framework which in turn has the potential to positively shape the conditions within international markets (OECD, 2010).

Appropriate governance and the right mix of policies are consequently central to the promotion of lead markets. According to Edler (2009) demand-side innovation policy instruments are a series of public interventions which aim to increase the demand for innovations, to improve the conditions for the uptake of innovations, and/or to improve the articulation of demand in order to drive forward the innovation and encourage its diffusion[10].

Consequently, an innovation may be supported and develop within a national context under the auspices of a specific regulation, standard or the result of a governmental procurement need defined by public sector actors. The subsequent diffusion of the innovation across borders is thus contingent upon the lead or leverage of the demand side framework which not only drives the innovation but then facilitates its adoption internationally. To be successful, the demand side framework needs to be carefully considered if the innovation, as well as the necessary market requirements, is to be imposed upon another national context.

The INNO Policy Trend Chart 2009[11] noted the rising prominence of the debate and actual demand side policy programmes to support innovation policy within certain countries. Research correspondents in Finland, Germany, France, Ireland, the Netherlands, Norway, Spain, Sweden and the UK all mentioned that there was a strong and current debate as well as policy examples of linking the two types of policies (demand and supply-side). Other European countries had either not begun or were just beginning the debate whilst others again had not related demand side aspects to other policies.

A look at some of the recent major national policy documents since the INNO Policy Trend Chart confirms the development that demand side innovation is receiving recognition on the policy agenda. In the Irish Innovation Taskforce Report 2010[12] a key recommendation is to develop a procurement model (supported by pilot Flagship projects) that would meet specific public needs which would in turn stimulate the development of innovative solutions with export potential through collaboration between MNCs, SMEs and HEIs. In the Finnish document, Demand and User Driven Innovation Policy (2010)[13] a

[9] European Commission (2006). 'Chapter 6: The "Lead Markets" approach to innovation poliy' *European Competitiveness Report 2006*. Luxembourg, Office for Official Publications of the European Communities.
[10] Edler, J. (2009) 'Theme 5: demand policies for innovation in EU CEE countries'. Paper presented at the workshop Innovation for Competitiveness INCOM Prague / 22-23 January 2009.
[11] Cunningham, P. (2009) Inno Policy Trend Chart 'Demand-Side Innovation Policies'
[12] Cliath, A.B. et al (2010) Innovation Ireland. Report of the Innovation Task Force
[13] Ministry of Employment and Economy (2010) Demand and User Driven Innovation Policy

concrete action plan specifies a way forward for delivering a wide range of activities to support demand side policy for innovation including preparing recommendations for taking innovation into account when preparing regulations. In the Netherlands, a report from the Agency of the Ministry of economic Affairs on demand-led innovation policy[14] reviews the theoretical basis and practical applications of the approach highlights the increasing attention being paid to it across Europe. In the UK, the Annual Innovation Report (2011)[15] emphasises the importance of standards (and accreditation) to support innovation, and in particular to increase the speed of taking innovative products to the market, and commenting on how this has been informing policy making.

Public Procurement

Public procurement features heavily as a key demand side policy tool and has been widely utilised by various countries over a number of decades to support innovation. The study of this field is extensive and includes the work of Uyarra and Flanagan (2009)[16] who mapped out the various types of approaches to public procurement. First of all, regular procurement is the process whereby public sector organisations buy ready-made goods for which no R&D is required but can incorporate stringent criteria for innovative products. Secondly, public technology procurement or innovative procurement is when the public sector procures a product that 'does not exist yet' but has the potential to be developed by a company in a reasonable time frame based on new research and development work[17]. Thirdly, the public sector may offer R&D through procurement stages to develop a particular product which is often regarded as pre-commercial procurement. In this case, the financial risk of developing a particular product is overcome through government funding but there is no guarantee that the product developed by the beneficiary company will be selected for procurement at a later stage of the process.

This third type of procurement has been noted as being fundamental for the quality and extent of innovation particularly in countries such as the US where the government takes on the role of 'lead customer' through programmes such as the Small Business Innovation Research programme which provide R&D funding. In fact, the SBIR has played an instrumental role in supporting the expansion of a number of key technology companies and other businesses including Sun Microsystems, Apple, Federal Express and Costco[18] . Academic research has illustrated that over a ten year period SBIR funded companies generated five times as many new jobs as non SBIR-funded firms[19].

Established in 1982 and coordinated by the Small Business Administration, the SBIR is composed of 2.5% of the total extramural research budgets of a large number of federal agencies which are reserved for contracts or grants to SMEs. In 2010, that represented over $1Billion in research funds. Over half the awards are to firms with fewer than 25 people and a third to firms of fewer than 10. Companies first compete for Phase I funding, which allows six months in which to demonstrate the feasibility of the

[14] AgentschapNL, Dutch Ministerie van Economische Zaken, Landbouw en Innovatie (2011), 'Marktgericht innovatiebeleid'
[15] Department for Business Innovation and Skills The Annual Innovation Report (2011)
[16] Uyarra, E. and Flanagan, K. (2009) Understanding the Innovation Impacts of Public Procurement
[17] Edquist, C. 10.0

concept. Only Phase I successes can then apply for Phase II funding, which provides 24 months of additional funding to continue full R&D development and testing of the product or idea[20]

innovations may be limited or the regulatory environment may even be counter-productive. This area of research had produced a number of examples including a study by Aghion et al. (2002) which uncovers an inverted U-shaped relationship between competition and innovation whereby innovation rises as the level of competition increases, but then falls as competition becomes very intense[27].

As a means to better inform policy-making, the UK government has issued a five point checklist to help regulators promote innovation[28]. This includes considering how regulation may impact on beneficial innovation activity in order to avoid outcomes which are innovative but do not produce better outcomes overall; considering how the interaction of the stock of existing regulations may affect innovation so as to prevent unintended consequences; favouring regulations that are outcome focused and technology neutral in a bid to prevent technology lock-in which may inhibit further innovation; considering how the implementation of regulation and enforcement can promote innovation by taking on board front line knowledge to prevent precluding certain innovative approaches; and considering the timing and effects of regulation on innovation through delivering the appropriate frequency of regulatory reviews. At an EU level, The 2010 Industry Policy Communication discussed the initiative to conduct 'fitness checks' of EU legislation, including checks on issues relating to industrial competitiveness (from 2011 onwards).

In a study focusing on Single Market regulation and innovation in the medical devices industry, Steg and Thumm (2001)[29] identified a number of important factors for innovation in the design of the New Approach Directives 90/385 EEC 'Active implantable Devices and 93/42 EEC Medical Devices'. The regulatory frameworks included a number of key attributes including that they were limited to essential requirements' to protect health and safety in order to offer technological flexibility. To assess conformity, harmonised standards were used which are voluntary and again offer flexibility; and rather than prescribing a single model, a range conformity assessment procedures were offered to best fit the firm and product. The key advantage of this approach noted by firms was that the directives made possible better market access to European markets and that a product launch could be undertaken across Europe without the requirement of going through multiple product testing and registration processes.

Standardisation

Despite the parallel perception that they can be a constraint, standards are increasingly perceived as dynamic tools to disseminate innovation[30]. Standards emerge through voluntary processes, with the assistance of a recognised body, which aims to develop technical specifications in a given area (which are broad in scope) and are based on consensus amongst industry players as well as other key stakeholders and public authorities. Surveys of innovating firms find that standards are a source of information that can help their innovation activities[31]. Peter Swann's (2010) review of the available literature illustrates that:

- Standardisation helps to build focus, cohesion and critical mass in the formative stages of a

[27] Aghion, P., Bloom, N., Blundell, R., Griffith, R. and Howitt, P. (2002) "Competition and Innovation: An inverted U relationship", NBER Working Paper No 9269.
[28] BERR (2008) Helping regulation to promote innovation
[29] Steg, H. and Thumm, N. (2001) Single Market Regulation and Innovation in Europe's Medical Devices Industry
[30]

market (e.g. Krechmer 1996a[32]; Swann and Watts, 2002[33]).

- Standardisation of measurements allows innovative producers to demonstrate to the satisfaction of the customer that products are as innovative as they claim to be (e.g. Tassey, 1982[34]; Swann, 1999[35]).

- Standardisation codifies and diffuses state of the art technology and best practice (e.g. Krechmer 2000[36]; Blind and Grupp, 2000[37]).

- Open standards are desirable to enable a competitive process of innovation-led growth (e.g. Krechmer, 1998[38]; Swann, 1990[39]).

Standardisation can also strengthen the practical dissemination of innovation by being integrated into publicly funded R&D results (even though there is relatively limited awareness of this). If R&D results become available through standards, then there is a high chance of them being implemented as they have emerged by consensus and cooperation through industry stakeholders. Other actors will also have engaged in the process, such as public administration and research groups, which would have again helped to transfer and exchange knowledge as well as to integrate inputs from heterogeneous sources[40].

In addition, standardisation can be used in tandem with public procurement to strengthen the innovative pull of this process. Amongst other things, Blind (2009) has made the case that using standards can secure the interoperability of the purchased innovation with existing infrastructure; standards increase competition and therefore the innovative push by firms; standards prevent lock-in into particular technologies; they enable innovations to meet environmental and health and safety requirements; newly released standards in procurement criteria enable firms to innovate; and standards create a spill-over effect on innovation procurement processes in the private sector.

[32] Krechmer K. (1996a) "Technical standards: Foundations of the future", *StandardView*, **4**, 4-8

[33] Swann G.M.P. and T. P. Watts (2002) "Visualisation Needs Vision: The Pre-Paradigmatic Character of Virtual Reality" in S. Woolgar (ed.) *The Virtual Society? Technology, Cyberbole, Reality*, Oxford University Press

[34] Tassey G. (1982a) "Infratechnologies and the Role of Government", *Technological Forecasting and Social Change*, **21** (2), 163-180

[35] Swann G.M.P. (1999) *The Economics of Measurement: Report for ,MS Review*, Department of Trade and Industry, 9th June

[36] Krechmer K. (2000) "The Fundamental Nature of Standards: Economics Perspective", paper to the *International JA Schumpeter Conference*, Manchester, June 29 - July 1

[37] Blind K. and H. Grupp (2000) "Standards Statistics as New Indicators for the Diffusion of Technology", Paper presented to the *International JA Schumpeter Conference*, Manchester

[38] Krechmer K. (1998) "The Principles of Open Standards", *Standards Engineering Society: World Standards Day Paper Competition*, 2nd Place

[39] Swann G.M.P. (1990) "Standards and the Growth of a Software Network: A Case Study of PC Applications Software", in J. Berg and H. Schumny (eds.), An Analysis of the IT Standardisation Process, Amsterdam, Elsevier Science Publishers

[40] Knut Blind(2009) Standardisation: a catalyst for innovation

By illustrating the potential contribution of standards to the EU 20/20 Strategy, CEN (the European Committee for Standardisation) and CENELEC (the European Committee for Electrotechnical Standardisiation) have emphasised the point that many firms are increasingly using standards to increase their competitive edge. CEN and CENELEC therefore aim to identify and anticipate new technologies and channel such innovations through the dissemination of standards to business[41]. A dedicated joint working group STAIR (Standardisiation, Innovation and Research) has also been created to provide strategic advice on synchronising standardisation with innovation and research. This aims to raise awareness of the benefits of standardization in the research and innovation process, to transfer research results and outcomes of innovation activities into standardisation and to exploit fully the functions of standards for research and innovation activities as a way to increase the competitiveness of the EU Member States (Lisbon agenda)[42].

These themes have also been evident in EU policy documents. With banner heading of "More Standards for Europe and faster", a 2011 Communication from the Commission[43] set out a number of actions relating standards to innovation, such as an announcement that the Commission will demand that European standards for innovative products and services will be quickly elaborated and adopted. There has also been practical implementation measures. Six pan-European Networks have been funded by the European Commission[44] to bring together consumer associations, market experts, companies and policy makers to achieve more successful exploitation of existing standards in Europe. The STEPPIN (**ST**andards in **E**uropean **P**ublic **P**rocurement lead to **In**novation) project[45] explored how referencing open standards in European public procurement processes can foster innovative business solutions amongst bidding companies.

Complementary actions (use of supply side measures to strengthen demand side activities)

In order to make innovation policy more efficient and have a high impact, the recent OECD (2010) report, already referred to, has also underscored a number of examples of where governments have combined demand and supply polices to address the entire innovation chain.

One of the examples used to illustrate this point is the Danish Programme for User Driven Innovation 2007 to 2010. This programme offers companies, which are supported through grants, opportunities to gain access to consumer needs, behaviour and preferences (and less on learning of the experiences of the consumers themselves with a particular product). Importantly, this empowers the user of innovative products within the innovation process itself. To obtain a grant, the company must examine user needs in new ways such as introducing new methods or building on competencies. The programme is focused on areas where Denmark has a strong business specialisation or addressing societal or public welfare needs. Ultimately, the aim is to develop innovations which are successful and meet the users demands and requirements and upgrade the competency of employees participating in the innovation process.

[41] CEN and CENELEC(2010) European Standardisation an the EU 2020 Strategy
[42] CEN and CENELEC(2010) STAIR-Innovation – An integrated approach for Standardisation, Innovation and Research.
[43] Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee 'A strategic vision for European standards: Moving forward to enhance and accelerate the sustainable growth of the European economy by 2020' COM(2011) 311 final
[44] 'DEPUIS', 'INNOVAFUN', 'BIOHEALTH', 'EUROMIND', 'STAND-INN' and 'STEPPIN'
[45] http://standards.eu-innova.org/Pages/Steppin/default.aspx

Moreover, multiple programmes continue to match the supply of R+D funding and funding bodies with the appropriate demand side policies. For example, the Finnish programme Demand and User Driven Innovation works alongside the Finnish Funding Agency for Technology and Innovation (Tekes) in a bid to integrate user and demand side criteria and activities into funding requirements to appropriately encourage the business and research communities.

2.2 The Development of a Lead Market Initiative at a European Level

At the Hampton Court Summit on 27 October 2005, Heads of State and Government decided to give higher priority to the key issues on which Europe needs to act to address the challenges of globalisation. First among these issues were research and innovation.

The Commission then asked a group of four high-level experts, chaired by former Prime Minister of Finland Esko Aho, to assess the situation and make proposals to boost Europe's research and innovation performance. The group issued its report on 20 January 2006, entitled 'Creating an Innovative Europe' It recommended a 'pact for research and innovation' driven by a package of synchronised and simultaneous efforts that hinged upon strong political support at European and national levels.

A key challenge, which the report sought to address, was the ''demand side deficiency'' in Europe which had become a barrier to investment in research and innovation. Despite the notable success of the Single Market, Europe continued to be characterised by a fragmented and uninspired market place for innovative companies in comparison to the more dynamic large national markets of major competitors. More specifically, the report referred to "Post-regulatory fragmentation, complex standardisation procedures and disjointed public procurement that lead to a lack of market scale which reduces the rate of return on introductions of innovative goods and services to the market''.

A key remedy proposed was the creation of a reinvigorated business environment for *lead markets* that stimulates innovation. Importantly, demand side support was recognised as a platform for helping firms enter the dynamic virtuous circle of growing demand, reduced manufacturing or service costs, reduced prices, further growth in sales and a subsequent new cycle of innovation. Key steps to create lead markets included:

- a harmonised regulatory environment across the EU favourable to innovation and based on early anticipation of needs;

- ambitious use of standards-setting powers to demand high technical performance levels and a reorganisation of the process such that agreement on new standards is reached quickly and efficiently;

- use of public procurement to drive demand for innovative goods, while at the same time improving the productivity of Europe's large public service sector. Public authorities therefore need to become intelligent customers as well as coordinating or aggregating demand to create sufficiently large orders to make innovation worthwhile;

- a cultural shift which celebrates innovation, using the media and other means to encourage citizens to embrace innovative goods and services.

The Lead Market Initiative

Background & Methodology 2

Following the Aho Report, in 2007 the Competitiveness Council invited the European Commission to develop an initiative on lead markets. The Lead Market Initiative (LMI) was the response and was launched in 2007. A basic feature of this Initiative was its thematic approach, since different categories of products and services may face different problems and require different responses. It was decided that the first step of the process would be the identification of a small number of promising markets (six in total). The selected markets were the result of an in-depth analysis and an intense stakeholder consultation that focused on a set of specific criteria:

- Driven by societal demand instead of technology push
- There should be of strategic societal and economic interest
- The added value of concerted, targeted but flexible policy instruments
- A sufficiently broad market segment
- 'No picking of winners'

In contrast to 'traditional' policy measures that have aimed to promote the development of particular sectors, the Lead Market Initiative concentrates on conditions on the demand side, rather than assisting with technological development or other supply considerations. The policy explicitly aims to avoid

Background & Methodology

Background & Methodology 2

It is important to appreciate that LMI has not had a separate budget to support the implementation of the actions defined. The action plans aim to prioritize and better coordinate the work and actions of the Commission, the Member States and industry in order to achieve the objectives set in the tight timeframe of 2008-2011. This includes making use, with better targeting of already existing provisions, notably under the CIP and FP7.

The scope of the LMI, the selection of the six markets and the action plans were approved in the Competitiveness Council of May 2008 (mainly composed of the Ministers for European Affairs, Industry and Research from the Member States).

As the Mid-term Progress Report comments, the global economic outlook has changed fundamentally, since the Lead Market Initiative was launched. The continuing financial and sovereign debt crisis has depressed expectations and restricted the scope for action on the part of many public authorities. Nonetheless the pressing societal challenges faced by Europe and its citizens continue (climate change, CO_2

two key targets relate strongly to the LMI namely that 3% of the EU's GDP (public and private combined) is to be invested in R&D and innovation (which of course is a supply side rather than demand side policy) and in terms of climate change and energy, green house gas emissions should be 20% (or even 30% if the conditions are right) lower than in 1990 and that 20% of energy should be based on renewables.

The strategy has been underpinned by seven flagship initiatives. Again, whilst all initiatives relate to the LMI to varying extents, four are of direct relevance, namely Innovation Union; A Digital Agenda for Europe; An Industrial Policy for the Globalisation Era; and Resource Efficient Europe.

Under the priority of smart growth, Innovation Union (2010) has refocused innovation and R&D policy towards addressing societal challenges (such as climate change, resource efficiency, health and ageing) and ensuring that business take full advantage of these markets whilst enabling the public sector to enhance the potential of business to bring solutions to the market. In particular emphasis is placed on strengthening the European Research Area to focus on societal challenges; to improve the framework conditions for business to innovate including demand side policies; to launch European Innovation Partnerships (such as building the bio-economy by 2020) which will build links with EU and national levels to speedily develop the necessary technologies to meet societal goals; to strengthen EU funding instruments to support innovation (such as structural funds, CAP, R&D framework programme); and to support knowledge partnerships between business, research, innovation and education including through the European Institute for Innovation and Technology.

As part of the Rational for Action for the Innovation Union (R*f*A), demand side policy has been singled out (amongst other issues) as an area to be explored and exploited. By recognising that the fragmentation of European markets is a barrier for developing innovation, the R*f*A builds on the findings (that supported the emergence of the LMI) that public procurement, regulation, standardisation and other complementary areas are critical for 'pulling' innovation to the extent that demand pull factors can be greater than technology push in driving innovation. A range of benefits are identified including the positive impact that regulations have in enhancing the international competitiveness of new products, the way that standards can help share innovative knowledge between market actors to create new markets and the use of public procurement to provide a significant market capable of stimulating innovation and reconfiguring the innovative activities of business in order to address key societal challenges.

The recent Green Paper 'From Challenges to Opportunities: Towards a Common Strategic Framework for EU Research and Innovation funding' (2011) supports Innovation Union's key research goals. In particular, a Common Strategic Framework is put forward as a means to develop coherent (supply side) objectives for all research funding initiatives including FP7, CIP and EIT. This will include efforts to make funding more easily available, a simplified and standardised set of framework rules, flexibility of funding for both SMEs and the innovation cycle, tackling societal challenges, developing key enabling technologies and encouraging the emergence of a unified European Research Area.

Again under the priority of smart growth, A Digital Agenda for Europe (2010) aims to provide social benefits from a Digital Single Market based on fast and ultra fast Internet and interoperable applications, with access to all citizens by 2013 and with the development of higher internet speeds and broader subscription to fast internet connections. To support this agenda the EU will use research and innovation funds to support the development of ICTs and innovative SMEs as well as ICT innovation across all business sectors, provide a stable legal framework that stimulates investments in high speed

internet, exploit the opportunities presented by Structural Funds, develop an efficient spectrum policy, support a true single market for online content and services with a balanced regulatory framework and promote internet uptake by all European citizens.

These activities are to be supported by demand side policies. Appropriate regulation is seen as key for developing innovative and leading internet businesses particular for developing services, creating suitable market conditions and supporting commercial transactions. The development of standards are seen as key to enhance product innovations and interoperability between applications and are recommended for integration within public procurement strategies to increase market competitiveness and reduce technology lock-ins. In addition, the Internal Market should be better exploited to spur on innovation through the alignment of polices amongst public authorities in relation to public procurement, standardisation and regulation. Finally, eHealth and eGovernment are promoted as vehicles to improve service delivery whilst driving down costs.

Under the priority of sustainable growth, an Industrial Policy for the Globalisation Era (2010) has been designed to work alongside the Innovation Union. Some of the key goals of this policy are to produce a modernised industrial policy to maintain a diversified and competitive industrial base and support manufacturers' moves towards greater energy and resource efficiency, to develop a horizontal approach to industrial policy through various policy instruments (public procurement, regulation and standards setting), to promote technologies that reduce natural resource use, to promote the internationalisation of SMEs, to review regulations to support greater resource efficiency such as recycling and promote standards that provide leverage for European competitiveness and the uptake of Key Enabling Technologies. Actions in number of sectors were announced in this Industrial Policy including actions relating to construction, chemicals, bio-based products, Key Enabling Technologies and space. Some of these were lead markets.

The recommended use of demand side measures is reiterated throughout the document. Improved regulation is recommended to increase the competitiveness of business though the introduction of smart regulation, as is the use of impact assessments and evaluations. The 'think small first principle' for regulation from the Small Business Act is also underscored with particular reference to initiatives which support SME innovation and internationalisation. It is recommended that the Internal Market should be enhanced through the use of standards which will facilitate the introduction of innovative goods and reduce production costs. Although a supply side policy, R&D will help develop Key Enabling Technologies such as Industrial Biotechnology which will meet societal challenges. In addition, regulation should be used to support the transition of business towards greater energy, carbon and resource efficiency.

Again under the priority of sustainable growth, Resource Efficient Europe aims to develop a resource efficient and low carbon economy by decoupling economic growth from resource and energy use, reduce CO_2 emissions, enhance competitiveness and improve energy security. In particular, financial instruments (Structural Funds, RDPs, R&D framework programme) will be mobilised with a focused strategy to target resource efficiency, green public procurement will be enhanced to reduce resource and energy consumption, the transport sector will be decarbonised, renewable energies and supporting infrastructures in the Internal Market will be promoted, legislation and standards will promote energy savings (such as eco-innovation) and a vision of structural and technological changes is mooted to reduce energy, carbon and resource use and meet societal goals such as biodiversity targets, while addressing climate change and improving food security.

In addition, complementing the priorities of Europe 2020 is the Single Market Act (2011). This provides an action plan to strengthen and relaunch growth within the Internal Market including removing barriers and addressing market fragmentation in the context of the development of services, innovation and creativity. Initiatives referred to within this document include improved intellectual property rights to encourage investment in innovative services and products and the introduction of a single patent and unified system for litigation. To improve consumer confidence and rights, the European Commission will propose an ecological footprint initiative on products. The use of standards will be promoted, included a review of the legislation governing the standardisation system, in order to help remove barriers to the Internal Market. Finally, the public procurement legislative framework will be modernised which will help to drive demand for innovative goods that meet societal challenges and provide improved access to SMEs.

Supporting the Single Market Act (as well as Europe 2020) is the recent Green Paper on the Modernisation of EU Procurement Policy (2011). The Green Paper underscores public procurement as a key instrument to improve the demand side policy conditions to enable business to innovate, to support the shift towards a resource efficient and low carbon economy through Green Public Procurement and to improve the business environment especially for SMEs. Complementary to this, the paper outlines how EU procurement policy could contribute to addressing societal goals. As well as contributing to the improved performance of the public sector, other areas should be targeted including climate change, protection of the environment and stimulating innovation. It is therefore proposed that current public administration practices could be reviewed to consider adopting pre-commercial procurement, enabling firms to innovate over and above tender specifications, and focusing on the Life Cycle Assessment of products rather than simply the lowest costs.

Implications for the LMI

The development of this busy policy agenda ha

Table 2.2: Actions for Detailed Examination

	Legislation	*Public Procurement*	*Standardisation, Labelling, Certification*	*Complementary Actions*
Recycling	**Action 1. Adopt the Waste Framework Directive**			
Renewable Energy	**Actions 1, 2, 3 & 5 : Adoption and implementation of the RES Directive**			
Sustainable construction		**Action 5: Establish a network between public authorities in charge of procuring sustainable construction**		
Protective textiles		**Action 3 : Establish a network between public authorities in charge of procuring**		
Bio-based products				

e-Health - *Action 1: Launch pilot actions under the CIP:* A series of complementary actions have been developed to support the work of the LMI in the regulatory, procurement and standardisation areas. Of their nature these tend to be more diverse than the actions taking place in the other areas and in the eHealth area, four projects were launched under the first call of the Competitiveness and Innovation Programme's ICT Policy Support Programme (CIP ICT PSP) that was published in 2008.

epSOS (Smart Open Services for European Patients) is the project that will be the focus of special attention. Its objective is to make available patient summaries and ePrescriptions in real life settings, across the national borders of 12 Member States.

This and related actions grew out of the original eHealth Action Plan (2004) but the LMI provided an important political momentum and continuity, since the eHAP only envisaged actions until 2010.

Protective textiles - *Action 3: Establish a network between public authorities in charge of procuring:* Public authorities are very important customers for a range of articles making use of protective textiles. This includes the acquisition of personal protective clothing for fire-fighters, emergency services, police forces, the military sector and health care professionals in public hospitals. In certain product groups public purchases attain 100% of purchases. However, there is certainly scope for developing public procurement procedures to promote the greater use of innovative solutions.

The ENPROTEX network was established after a successful response to a call for proposals for a network of public purchasers in different LMI areas, published in November 2008. It focuses on protective clothing purchased for use by fire-fighters and has begun work on developing guidelines for authorities purchasing such equipment.

Recycling - *Action 1. Adopt the Waste Framework Directive :* The adoption of the Waste Framework Directive (WFD) was a critical element in the framework for the further development of recycling across Europe at the time of the launch of the LMI. It was a basic regulatory development on which much else depended. It simplified and repealed the prior Waste Framework Directive (2006/12/EC), the Hazardous Waste Directive (Directive 91/689/EC) and part of the Waste Oils Directive (75/439/EEC) and established a number of basic concepts and targets, clarifying, for instance, the distinction between 'waste' and 'non-waste', and 'recovery' and 'disposal'.

The WFD, establishes a 'waste hierarchy' setting a priority order for policy on waste prevention and management. The order is as follows:

Prevention

Preparing for re-use

Recycling

Other recovery e.g. energy recovery

Disposal

The Directive was adopted by the Council on 21st October 2008 and continues to provide a significant part of the basis for LMI actions in the recycling area.

circulated to officials from all Member States. Although the response to this survey was rather limited (only 10 countries responded), the information generated did provide a consistent picture and useful basis for some of the subsequent interview discussions with national officials.

The main insights gained, however, were undoubtedly from the interview programme with various stakeholder groups. The structure of this programme can be summarised as follows :

Table 2.3 Evaluation Interview Programme

Sector	No of completed Interviews
Commission Staff directly responsible for the LMI	12
Commission Staff indirectly supporting the LMI	3
EPG sub group	10
Industry / associations	6
Project members	24
Standardisation bodies and experts	4
Technology organisations / research experts	13
Total	**72**

Those chosen because of their involvement in particular actions were mainly selected because they were associated with one of the actions for special investigation.

The original intention had been to conduct around 70 interviews, though the initial lists were eventually expanded to a number just over 100. However, this evaluation has encountered a relatively high number of refusals to participate, mainly because those approached felt that they were not in a position to say very much about the Initiative as such. The eventual number of interviews was therefore 72.

In addition to formal interviews and discussions, there have been a large number of more informal contributions through contacts with people able to provide written information etc. The opportunity was also taken to attend a number of conferences and meetings associated with LMI actions and similar areas.

It should be mentioned that there was an issue in designing the interview programme arising from concerns about data security that meant that the names and contact details of people involved in various working groups could not be divulged. This imposed a constraint on the initial selection of interview targets, although this was mitigated by the fact that information about those involved in some of the actions was freely available on project web sites. More generally, however, it revealed a more fundamental problem for the conduct of evaluations, raising questions about the accountability of certain people involved in public policy initiatives. It will be seen that this issue also had other implications for the conduct of the LMI.

The Evidence Base 3

This chapter presents the work undertaken to develop the evidence base for the Lead Market Initiative. It consists mainly of a comparison of the data on the baseline situation at the beginning of the Initiative with the evidence of developments since. It is also intended to contribute to on-going monitoring of developments in the targeted markets.

3.1 Introduction

The evaluation aims to comment on the impact of the LMI on the targeted markets and especially on the obstacles that have been identified and addressed. As part of this, economic impacts in particular should be considered, such as growth in employment, turnover growth etc., although it should be appreciated that many of these longer term impacts are hardly evident so soon after the launch of the Initiative.

The literature review undertaken at an early stage in the evaluation led to a better understanding of the initial projections for the development of the targeted markets and of the expectations relating to the monitoring of performance developed in the Edler et al study and the Mid-term Progress Report. At the same time it was established that very few data on LMI performance have otherwise been collected on a systematic basis by the Commission.

The review of formal statistical sources highlighted the problems in most cases of matching lead markets to NACE or PRODCOM codes. Even CPV (common procurement vocabulary) codes presented difficulties. Consequently, it has not been possible to identify statistical data from Eurostat or national statistical offices that could characterise developments in these markets with any degree of precision. However, given the importance of establishing a good data framework for the current evaluation and for any future monitoring of the markets concerned, it was important to provide a systematic account of any current information that is available on the lead markets, as part of the overall evaluation exercise. Secondary sources, it turned out, are more promising than published statistics, especially in the form of market studies that are a result of the widespread interest in the sectors concerned. The, problem, however, with this kind of secondary data is that the definitions of the sector concerned rarely match exactly the definitions used for the LMI.

Developing the evidence base for the Initiative

The aim in the work carried out was to develop an evidence base against which performance assessments can be made. In this way, it is intended to add substantially to current and future evaluation frameworks by reinforcing, and providing further evidence on, the data for the original baseline and where possible showing more recent developments. It is also intended that the framework for monitoring processes will be strengthened and the systematic use of indicators facilitated. The aim therefore is considerably wider than assessing any evidence of impact from the LMI that is already evident.

Starting with the work conducted prior to the Communication on the Initiative and that done for the Progress Report, a structured analysis was conducted that aimed to clarify definitions and classifications, characterise the information that is currently available on markets (but also identify the important information gaps and obstacles) and review the indictors that may form part of an on-going monitoring system, including those identified by Edler et al that can be readily used. This exercise

included a review of statistical definitions for the relevant sectors and the extent to which NACE and PRODCOM codes apply and analysis of statistics available of market structures and dynamics, investigation of particular sources of information on patent and trademark registrations (the TED database) and a review of data available from business organisations.

It turned out that as well as problems with the use of NACE and PRODCOM databases, there were also problems with trademark data. OHIM (Office for Harmonization in the Internal Market) database make use of use the NICE classification of business activities. Typically these are too broad for any meaningful characterisation of trademark registrations in the targeted markets. For example, class 24 covers 'textiles and textile goods', but protective textiles constitute only a small proportion of this category (1 %). Estimating the number of trademarks for protective textiles on the basis of class 24 applications or registrations would not be a valid procedure.

However, as will be seen, other sources of market data have been more helpful and it has proved possible to derive some useful indications of developments in public procurement notices and patent applications. For public procurement data are available from the online version of the notices in the European journal - Electronic Daily (TED). Similarly the World Intellectual Property Organization (WIPO), a specialised agency of the United Nations is a helpful source of information for the indicator for patent applications.

3.2 The Anticipated Results of the LMI

In order to comment on the progress that has been made in the six lead markets, it is necessary to examine what the situation was before the Initiative, but also what the expectations were at the time that the Initiative was launched.

In the Explanatory Paper on the European Lead Market Approach - *"A lead market for Europe"* [46] (Annex II) - the Commission focused on the turnover and employment of the six selected markets and estimated the expected growth over the period up to 2020. It also estimated the extent to which growth in these important variables could be attributed to the Lead Market Initiative- . The estimations are set out below in the following two tables:

[46] European Commission (2007): A lead market initiative for Europe Explanatory Paper on the European Lead Market Approach: Methodology and Rationale - Annex II.

Table 3.1: Expected market growth of the identified emerging market areas (2006 – 2020)

Market areas [71]	Volume	Volume	Growth	Growth share	Cumulated
[redacted]					

Table 3.2: Expected job creation in the identified emerging market areas (2006 – 2020)

Market areas [71]	Jobs	Jobs	Growth in jobs	Growth in jobs
[redacted]				

It should be said that certain qualifications to these estimates were expressed even as they were being presented. The Explanatory Paper commented on the difficulties in assessing and monitoring the development in the six identified markets in the following terms:

> *'The concrete quantitative impacts of the LMI on the GDP and on employment are difficult to calculate, given the large range of imponderability, externalities and intricate interaction of various factors, on which the development of these market segments depends.'*[47]

It is important therefore that the qualified nature of the anticipated results of the initiative be appreciated.

Beyond the main output and employment indicators, further work by Edler et. al. in 2009[48] on a monitoring and evaluation methodology for the LMI supported the development of the Mid-term

[47] European Commission (2007): A lead market initiative for Europe Explanatory Paper on the European Lead Market Approach: Methodology and Rationale - Annex II. Page 29.

Progress Report and established a fairly long list of possible indicators for monitoring developments in the lead markets. Given the problems of capturing *'early, weak signals'* of development in the lead markets in the form of turnover and employment statistics, it was proposed that a broader range of indicators should be used to highlight other aspects of the developing markets.

Following on from this discussion,, the Mid-term Review, also from 2009[49], proposed the use of six indicators (with one additional indicator for the bio-based and recycling market initiatives) to monitor and describe the development in the lead markets. These were:

- Volume of turnover and employment
- Volume/size of public procurement contracts (TED database)
- Volume of patent applications (European Patent Office database)
- Volume of trademark applications (Office of Harmonisation of Internal Market database)
- Number of new companies created (Member states statistical offices)
- Volume of exports for bio-based products and recycling

There was, however, no attempt at the time of the Mid-term review to estimate either initial or anticipated values for these variables. This was left for future analysis, although in the case of the work by the Edler et. al., with a warning of some of the conceptual and practical difficulties in achieving robust estimates of the indicators highlighted.

Data issues

The review of data sources for the current evaluation has revealed that there are indeed considerable problems in characterizing even the baseline for measuring the impact of the LMI. A fundamental problem lies in the definitions of the lead markets. These are, by definition, new departures, often from within well-established sectors. In most cases with products of this kind, the collection of statistics has simply not caught up with the new significance of the sector or sub-sector. An examination of formal statistical sources shows that it is generally not possible to match the relevant (lead) markets to NACE or PRODCOM codes or even to common procurement vocabulary (CPV) codes. Often the definitions used in official statistics (from both Eurostat and national statistical offices) are too broad and cover too wide a scope to allow the lead markets to be identified. Such data will not give an accurate picture of the situation in the six markets.

A different approach based on secondary data sources has therefore been used for the final evaluation. Data relating to the developments in turnover and employment are primarily drawn from market studies and those on patent applications and public procurement are from the TED database and the WIPO[50]. It proved difficult to find data on trade mark applications and on start-ups in the six markets.

[48] Edler et al. (2009): Monitoring and Evaluation Meth

As suggested in the Edler et al. report, the EU-based TED database[51] has been used to generate data on public procurement for the six markets. The research has been done in the database's archive by applying a range of filters or search terms to the search so the best possible match between market and CPV codes was obtained. This method ensures that every tender containing these terms is found, though it also means that a number of product groups in the area of the six markets are excluded from the search. Thus, it is important to note that the figures for public procurement in the six markets should be considered as being indicative rather than exhaustive.

Also as suggested in the Edler et al. report, a search in the archive of the European Patent Office (EPO) has been done to find data on patent applications within the six markets. This was most easily done by the website of the World Intellectual Property Organization (WIPO), which is a specialised agency of the United Nations[52]. Using the Patentscope search service makes it possible to access easily the archive of the EPO in the time period from 1977 to 2009. The European data has then been compared with U.S. data, and for the U.S. patent applications, a search has been done in the database archive of the U.S. Patent and Trademark Office (UPSTO). The search has been done by applying a range of filters or terms to the search to capture the relevant patents applications. The precise terms used are indicated in the relevant sections on the specific markets. This method makes sure that every application containing these themes is found. It also means that a number of product groups and patent applications in the area of the six markets are excluded from the search. Furthermore, this method implies the risk that an application is included twice if it comprise two or more of the filters/themes. Thus, as was the case with the public procurement, it is important to note that the figures for patent applications in the six markets should be considered as being indicative rather than exhaustive. In some cases the search in the EPO and UPSTO has been supplemented with patent data from other sources that were relevant to the literature review.

It is in this context that the next sections should be read. Section 3.3 presents an overall summary of the findings for the six markets, while the following sections provide in depth reviews of the developments in each of the lead markets separately.

3.3 Data on the Lead Markets

3.3.1 Bio-based Products

The lead market Bio-based products is of high strategic and societal interest because of its potential impacts on sustainability and the protection of the environment, human health and in supporting rural development and strengthening of industrial competitiveness.

According to the report of the Taskforce on bio-based products[53], there is a wide range of bio-based products:

- Fibre based materials (i.e. for the construction sector or car industry)
- Bio-plastics and other bio-polymers

[51] Tender Electronic Daily (TED)

[52] The name of the web site is: www.wipo.int

[53] EC (2007): Report of the Taskforce on Bio-Based Products, Composed in the preparation of the Communication "A Lead Market Initiatve for Europe"

- Surfactants
- Bio-solvents
- Bio-lubricants
- Ethanol, other chemicals and chemical building blocks
- Pharmaceutical products including vaccines
- Enzymes
- Cosmetics

Bio-based products cover a broad range of intermediate products, product components, and ready-made products. These include bio-based plastics, bio-lubricants, bio-fibres for textiles, composite materials for construction and automotive, chemical and pharmaceutical building blocks, organic acids, amino acids, and enzymes. Biological raw material from plants, trees, and waste are renewable in the short term (less than 10 years), as opposed to fossil material (renewable in 10 million years)[54]. Bio-based products provide superior greenhouse gas performance compared to traditional products made from petroleum feedstocks. In fact, many biobased products are carbon negative on a lifecycle basis by sequestering atmospheric carbon within the product itself[55]. For instance, increasing the use of bioplastics that are usually more biodegradable (starch-based) than conventional plastics could provide greenhouse gas savings in the EU in 2020 of 9-27 million tons of CO_2[56].

The total market or markets for bio-based products globally and within the European Union (EU) are difficult to estimate. Generally there is a strong tendency to focus on markets where bio-based products can substitute for products based on other raw materials and the possibilities to estimate the extent of markets for these new bio-based products are limited. Thus, since the sector is expected to change over time as bio-based products evolve, it is extremely difficult to make an exhaustive definition or a list of bio-based products and to identify corresponding data. Consequently the information presented will provide a rather indicative overview.

Overview of literature and gaps

This section addresses some of the difficulties that relate to the demarcation of the market for bio-based products and the general problem that the different definitions for bio-based products that are used in the literature lead to a plurality of conceptions of the market. This highlights the importance of having a methodological approach that considers the potential statistical pitfalls.

There is a wide range of different definitions regarding bio-based products[57]. The report of the Taskforce uses the following:

[54] EC Enterprise and Industry (2009): Taking Bio-based from Promise to Market – Measures to promote the market introduction of innovative bio-based products

[55] Biotechnology Industry Organization (2010): Biobased Chemicals and Products – A New Driver of U.S. Economic Development and Green Jobs

[56] EC (2007): A Lead Market Initiative for Europe – Explanatory Paper on the European Lead Market Approach: Methodology and Rationale

[57] See for instance :

> *'Bio-based products refer to non-food products derived from biomass (plants, algae, crops, trees, marine organisms and biological waste from households, animals and food production). Bio-based products may range from high-value added fine chemicals such as pharmaceuticals, cosmetics, food additives, etc., to high volume materials such as general bio-polymers or chemical feedstocks. The concept excludes traditional bio-based products, such as pulp and paper, and wood products, and bio-mass as an energy source'.*

In this context, "bio" refers to "renewable biological resources" and not exclusively "biotechnology". While advances in life sciences and biotechnology are a major driver for optimising biomass production and for bio-product innovations, there are also other technology drivers, such as chemistry, nanotechnologies, etc.

However in the studies conducted by OECD[58] and McKinsey & Company[59], the concept of biotechnology is used. In the McKinsey report, the definition of bio-based products refers to industrial products made from biological feedstock and/or biotechnological products, which does not fully overlap with the definition used in the Taskforce report. The OECD operates with a broad definition of biotechnology:

> *'The application of science and technology to living organisms, as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services'*

This means that it is of utmost importance to be aware of the reference base on which the statistical data in the field of bio-based products/biotechnology are founded, since the collected data vary considerably according to the selected definition. In the Edler et al report the following NACE codes are suggested - 21.1: Manufacture of basic pharmaceutical products and 22.2: Manufacture of plastics products. However these are rather rough indicators, since bio-based products only account for a small share of these NACE codes.

In fact, it has been concluded that in most cases it is not possible to match lead markets to NACE or PRODCOM codes or even to common procurement vocabulary (CPV) codes and data for the market are best based on market studies[60].

- European Commission (2007): Report of the Taskforce on Bio-Based Products, Composed in the preparation of the Communication "A Lead Market Initiative for Europe"
- OEDC (2009): Biotechnology Statistics
- McKinsey (2009): Presentation of J. Riese at DSM.
- European Commission (2009): Lead Market Initiative for Europe – Mid-term progress report, Commission Staff Working Document

[58] OEDC (2009): Biotechnology Statistics

[59] McKinsey (2009): Presentation of J. Riese at DSM.

See http://www.dsm.com/en_US/downloads/sustainability/white_biotech_mckinsey_feb_2009.pdf

[60] Notably :

- Institute for Prospective Technological Studies (2007): Consequences, Opportunities and Challenges of Modern Biotechnology for Europe
- European Commission Communication (2005): European Industry - A Sectoral Overview – SEC, 1216 final of 5.10.2005, and "Technical Update – 2006"
- McKinsey & Company (2006): Industrial Biotechnology – Turning Potential into Profits', Presentation at the 3rd annual World Congress on Industrial Biotechnology and Bioprocessing, Toronto

The issue of the availability of statistical data is raised in the IPTS report, where it is confirmed that access to relevant data is limited in the field of modern biotechnology products and processes[61]. The Communication from the European Commission agrees, saying that it is not an easy task to get exact data describing the impact of biotechnological products, but also that estimates show that the industry sectors that may pick up biotech inventions are very sizeable. This is an important point. In itself, the biotech industry is not big, but its inventions are used in other industries both in terms of novel products and improved production methods[62]. Consequently the common approach in the literature is to assess the market size and the number of employees in the sector by estimations and underlying assumptions. The most widely used sources are the McKinsey study presented in 2006[63] and the Festel study from 2010[64]:

The McKinsey study estimated that biotechnology accounted for 7 percent of global sales in the chemical industries in 2005 and approximately $ 77 billion in value. McKinsey predicted that by 2010 biotechnology would account for 10 percent of sales within the global chemical industry and $ 125 billion in value. By 2020 McKinsey projects that biotechnology will account for 20 percent of the global chemical sector, which implies an estimate for the volume of the market of $ 250 billion.

The study conducted by Gunter Festel is also a central source for estimating the market size in the area of biotechnology. The study is based on data from CEFIC (The European Chemical Industry Council). It estimates a total global sales of products made by biotechnological processes in 2007 at € 48 billion, or 3.5 percent of total chemical sales. The study projects that sales of products made by biotechnological processes in 2017 should reach around $ 442 billion, or 15.4 percent of total chemical sales.

Performance data

Based on the proposal of the Mid-term Review, the statistical assessment of bio-based products is based on the following four indicators:

- Volumes of turnover, export and employment
- Patent applications

- Festel, G. (2010): Industrial biotechnology: Market size, company types, business models and growth strategies, Industrial Biotechnology
- Nusser, M., Hüssing, B., Wydra S. (2007): Potenzialanalyse der industriellen, weissen Biotechnologie, Frauenhofer ISI
- USDA (2008): US Biobased Products Market Potential and Projections through 2025.
- Nieuwenhuizen, Peter J., David Lyon, Julia Laukkonen and Murray Hartley (2009): A rose in the bud? Anticipating opportunities in industrial biotechnology.

[61] Institute for Prospective Technological Studies (2007): Consequences, Opportunities and Challenges of Modern Biotechnology for Europe

[62] Commission Communication (2005): European Industry - A Sectoral Overview – SEC, 1216 final of 5.10.2005, and "Technical Update – 2006" available at:
http://ec.europa.eu/enterprise/enterprise_policy/industry/com_2005/sec_2005_1216.pdf
http://ec.europa.eu/enterprise/enterprise_policy/industry/doc/sec_overview_update06.pdf

[63] McKinsey & Company (2006): Industrial Biotechnology – Turning Potential into Profits', Presentation at the 3rd annual World Congress on Industrial Biotechnology and Bioprocessing, Toronto

[64] Festel, G. (2010): Industrial biotechnology: Market size, company types, business models and growth strategies, Industrial Biotechnology

- Enterprise start-ups
- Public procurement

These elements have a determining role in shaping expectations and perceptions of the potential of bio-based products and provide a basis for monitoring performance.

Volumes of turnover, exports and employment:

The valuation of the markets in the main two studies - McKinsey Festel - is based on different definitions

Figure 3.1: Market growth and job creation for bio-based products/biotechnology[66]

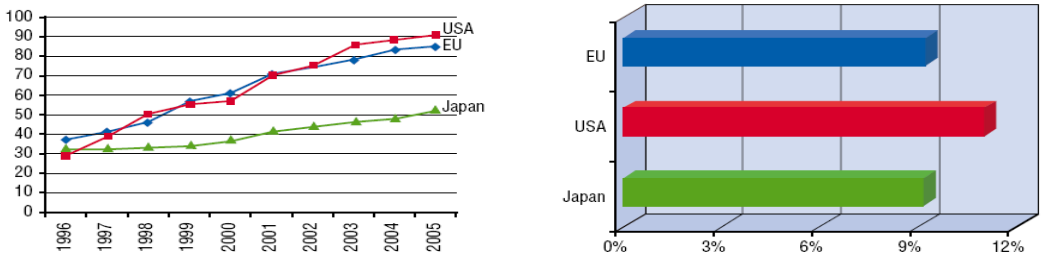
The next section elaborates on the situation of the biopharmaceutical market which is a significant component of all bio-based products. The section also contains a list of examples of the production and market development of other bio-based products

The case of the biopharmaceutical market (1996 – 2005)

The case of the biopharmaceutical market shows an impressive and strong development in biopharmaceuticals in the EU over the period 1996-2005, indicating the vast potential that this product segment has.

Figure 3.2 illustrates that in the ten years between 1996 and 2005 an average of six new biopharmaceutical products per year have been launched in the EU, accounting for about 9% of pharmaceuticals launched in this period. Overall, in 2005, about 85 biopharmaceutical products were available in the EU, more than twice as many as in 1996 making up about 9 % of all pharmaceuticals.

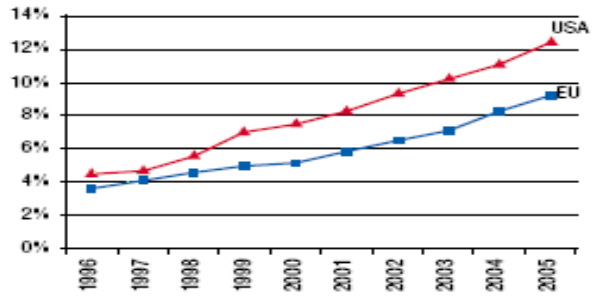
Figure 3.2: Accumulated numbers of biopharmaceuticals launched (left panel) and the share by numbers of biopharmaceuticals out of all pharmaceuticals launched between 1996 and 2005 (right panel), by region



Source: Institute for Prospective Technological Studies (2007): Consequences, Opportunities and Challenges of Modern Biotechnology for Europe

The combined pharmaceutical market in 2005 of the United States of America (USA), EU and Japan was about € 372 billion (about 80% of the worldwide market), with the EU having a share of 33%. Biopharmaceuticals in the USA, EU and Japan together represented a market of € 38.5 billion in 2005, about 10% of the corresponding pharmaceutical market. The EU has a market share of about 30%, almost similar to the market share for pharmaceuticals. The biopharmaceutical market in the EU seems to be more dynamic than the pharmaceutical market in general, with average annual growth rates (23%) twice as high as for pharmaceuticals (11%). Accordingly, overall, the shares of biopharmaceuticals in the turnover of pharmaceuticals are increasing, indicating the growing importance of biopharmaceuticals from an economic perspective (figure 3.3). The average turn-over per marketed biopharmaceutical in the EU has tripled over the last 10 years and, in 2005, reached a value of € 133 million per year.

Figure 3.3: Share of turnover of biopharmaceuticals out of all pharmaceuticals, by region



Source: Institute for Prospective Technological Studies (2007): Consequences, Opportunities and Challenges of Modern Biotechnology for Europe

In other market segments, the market shares for bio-based products are still very low. Europe has a few small companies specialised in bio-based products and several major chemical companies developing bio-based applications[68]. Table 3.3 below lists a range of examples of production and market development for bio-based products.

Table 3.3: Examples of production and market development for bio-based products (different product segments)

- At an EU level, 50,000 tons of bio-plastics were produced in 2005 which represent a limited market share (0.1%). Although bio-plastics are presently "niche markets", a dynamic market growth is forecasted. Market shares in the order of 1-2% by 2010 and 2-4% by 2020 are projected. In regard specifically to packaging plastics, it is estimated that in 2010 there was a potential market share of 5% of the total use of packaging plastics. Large supermarket corporations are currently giving increasing attention to the use of bio-based packaging materials. According to the industrial organisation European Bioplastics, the EU market consumption is expected to rise from a level of € 260 million in 2008/2009 to € 769 million in 2020 (without EU policy measures) and € 2.5 billion in 2020 (with EU policy measures) The market for biodegradable and bio-based plastics has been estimated at € 35 million in 2010 and is expected to rise to a level of € 333 million in 2020. These estimations are based on a market study by BASF.

- According to Fuchs Petrolub AG, the European market for bio-lubricants is expected to increase from a level of € 137 million in 2010 to a level of € 277 million (assuming a low legislative level) and € 420 million (assuming a high legislative level).

- The European Industrial Hemp Association estimates a market volume of € 315 million in 2010 for bio-composites and by assuming a high legislative level in 2020, the market volume of bio-composites could reach a volume of € 830 million.

- Packaging, healthcare sector disposables, detergents, hygiene products, cosmetics and paints represent areas in which bio-based products could potentially reach a substantial market share. These are sectors which are strongly influenced by health and environmental concerns. The sales in the EU in these areas were roughly about € 250 billion in 2005 and the healthcare sector in particular is expected to grow due to the ageing of

[68] EC Enterprise and Industry (2009): Taking Bio-based from Promise to Market – Measures to promote the market introduction of innovative bio-based products

the population. The total European market (EEA) for soap, detergents and similar products amounts to about € 30 billion. 30-50% of the products include enzymes which are bio-based. Enzymes make it possible to reduce water and energy consumption in washing. The EU is a leading producer of enzymes. There is a potential of increasing the use of enzymes in food, pulp and paper and textiles production.

- The current market share of bio-solvents in the EU is about 1.5%. However, bio-solvents produced from vegetable oils and from starch will progressively replace petrochemical solvents. One of the principal factors for their increased consumption is EU legislation concerning the reduction of volatile organic compound (VOCs) emissions in the context of the air quality policy. Some estimations point at a potential share of approximately 12-40% of the solvents market.

- Results obtained show that with a growth rate in the order of 40-50% yearly for 2000-2010 (i.e. factor 20 to 40 growth between 2002 and 2010), and 6-12% yearly for 2010-2020, growth rates of bio-based polymers are substantial; providing strong evidence that this is an emerging business. Bio-based polymers will continue to penetrate the polymer market.

- Europe has become the leading region for the development and production of enzymes. Around 64% of all enzyme companies are located in the EU, and the main enzyme producers by volume are in Denmark, where Danish companies account for almost half of worldwide enzyme production. Because enzymes play a crucial role for applications in many other industrial sectors, this sector represents significant potential for the EU in terms of escalating global leadership in the area of biobased products and processes.

Sources:

European Plastics, BASF, Roquette Fréres S.A., Fuchs Petrolub AG, The European Industrial Hemp Association

EC (2007): Report of the Taskforce on Bio-Based Products, Composed in the preparation of the Communication "A Lead Market Initiatve for Europe"

Institute for Prospective Technological Studies (2005): Techno-economic feasibility of Large-scale Production of Bio-based Polymers in Europe

Cleverconsult (2010): The Knowledge Based Bio-Economy (KBBE) in Europe: Achievements and Challenges

Patent and trademark applications:

An accepted indicator for the technological development in the EU is the number and share of patent and trademark applications. The competitiveness of the EU in developing modern biotechnology patent applications depends among other things on the EUs capacity for conducting research, generating new knowledge and converting it into new products and processes.

As recommended in the Edler et al. report, the approach of this study regarding patent applications has been to search the archive of the European Patent Office (EPO). This is most easily done by the web site of the World Intellectual Property Organization (WIPO), which is a specialised agency of the United Nations[69]. Using the Patentscope search service makes it possible to access the archive of the EPO from 1977 to 2009 and search for patent applications that contain references to one of eight relevant product groups[70]. For the US patent applications, a similar search has been conducted in the database of

[69] The name of the web site is: www.wipo.int

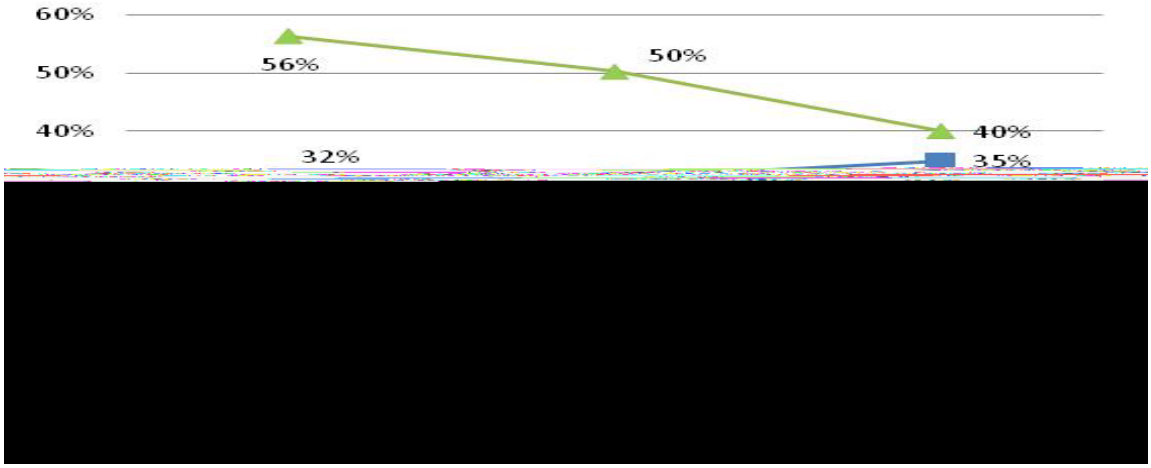
[70] For bio-based products the following eight filters have been applied for the search in the EPO and UPSTO: Bioplastics; Biopolymers; Biosurfactants; Biosolvents; Biolubricants; Bioethanol; Biopharmaceuticals; Enzymes

the United States Patent and Trademark Office (UPSTO).

The report from the Institute for Prospective Technological Studies (IPTS) also uses data from the European Patent Office (EPO) and shows that the share of biotechnology patent applications in the EU-25 has increased from a share of 32% in the period 1995-1997 to a share of 35% in the period of 2002-2004, and at the same time, the USA share of biotechnology patent applications has decreased.

Within the global situation, however, Figure 3.5 above shows bio-based patent applications in the US are considerably higher in numbers than the total number of applications in Europe.

Figure 3.6: Share of patent applications



Source: Institute for Prospective Technological Studies (2007): *Consequences, opportunities and challenges of modern biotechnology for Europe*

In the case of bio-based products, research and innovation have reached a stage where products are ready for market introduction, but renewable raw materials are only used in certain product categories. Although Europe plays a leading role in research and science, it is less successful in converting the science-based findings into commercially valuable products. At the same time, markets have long been recognised as important drivers of innovation and, more recently, as a target for innovation policy.

There is some evidence on this commercialisation process. Table 3.5 shows the different levels of activity in western European countries, in relation to patenting, the number of firms active in the biotechnology sector and the availability of venture capital. A composite index has then been calculated. Denmark with the score of 13.65 is by far the country with the highest score on the commercialisation indicator. Sweden has the next highest level scoring 9.72 on the commercialisation indicator.

Table 3.5: Index values of commercialisation indicators used for performance clustering

	BT patents pMC	BT firms pMC	Venture capital pMC	Average commercialisa-tion indicator
	2001-2003	2001-2004	2002-2004	2001-2004
Austria	4,14	4,04	11,00	5,53
Belgium	5,99	5,85	4,68	4,76
Denmark	14,88	12,64	19,83	13,65
Finland	4,39	13,80	4,24	6,47
France	3,39	3,50	5,09	3,46
Germany	5,90	3,78	5,01	4,24
Greece	0,51	n.a.	n.a.	0,44
Iceland	20,86	n.a.	n.a.	18,05
Ireland	2,80	7,61	1,16	3,34
Italy	1,08	0,77	0,88	0,79

Some of the three commercialisation indicators could not be calculated for some countries (Greece, Iceland, Luxembourg, Portugal and Spain) due to missing data. Accordingly, care should be taken with the interpretation of the composite indicators for these countries. With respect to the composite indicator, countries can be differentiated into those scoring above the European median and those scoring below the median value of 4.14.

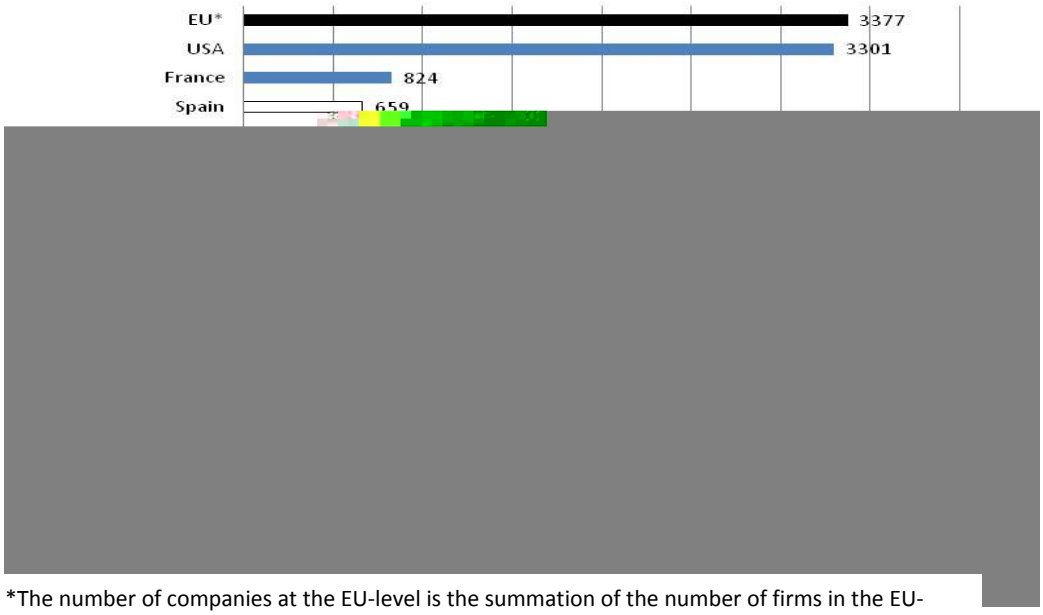
Enterprise start-ups:

The number of new companies is a good indicator of the dynamics and development of the sector for biotechnology, as the rate of new company start-ups gives an insight into the market potential of the sector.

It is not possible to obtain statistical data from official sources on the formation of new enterprises in the bio-based market, as understood in the LMI context, because of the difficulties in identifying the appropriate firms within the current statistical categories. However, there are some approximations.

Data from the OECD statisent stC .4(-4a i5cr 0.08TJ0f5o)-225 T m4a(the bi6i688a3(s i)-7.5(totheevere 7.7618i6[(Fi69 T

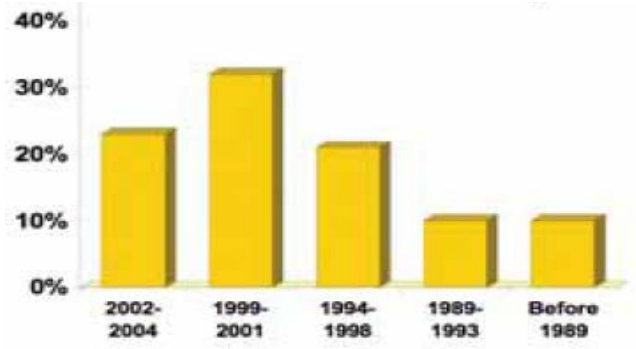
Figure 3.7: Number of biotechnology firms, 2006



*The number of companies at the EU-level is the summation of the number of firms in the EU-countries that are listed in the figure, thus it is an underestimation of the true number, because it only includes the numbers for the EU countries for which data was available.

Figure 3.8 shows the number of biotechnology firms increasing steadily over the period from 1989, as the number has risen from an annual level of 217 companies founded before 1989 to a level of 517 in the period from 2002-2004. There are 728 firms identified in the data in total. The figure also shows that a falling rate of new firm formation in the 2002-4 period. This should warn against uncritical extrapolations of growth rates.

Figure 3.8: Share of founded companies in biotechnology



Source: Critical 1 (2006): Biotechnology in Europe: 2006 Comparative Study

The Critical I data for Europe presented in figure 3.8 include Norway and Switzerland. It should be noted that according to Critical I's definition, only the dedicated biotechnology industry[71] is represented, whose primary commercial activity depends on the application of biological organisms, systems or processes. Suppliers and research organisations that are only partly involved in biotech are excluded.

Public procurement

An important consideration for the LMI is the extent to which public procurement of bio-based products is developing. As suggested in the Edler et al report, the TED database[72] can be used to generate data on calls for tender for bio-based products. The research has been done in the database's archive by applying a range of filters to the search[73].

This method makes sure that every tender containing these themes are found, but it also means that a lot of product groups in the area of bio-based products are excluded from the search, because the terms used in the search did not appear in the call documents. Thus it is important to note that the figures in figure 3.9 should be considered as being indicative rather than exhaustive.

Table 3.6 TED public procurement calls 2006 - 2010

		2006	2007	2008	2009	2010
Bio-based products	Number of tender calls	454	428	407	393	466
	Index of tender calls	100	94	90	87	103

The search in the TED database on bio-based products showed a slightly erratic increase in the number of calls over the period 2006 -2010, with a significant increase in the last year in the period. (from an index of 87 to 103). This contrasts with the steady increase in the index for all sectors over the last five years, illustrated graphically in the figure below.

[71] Dedicated biotechnology R&D firms, a subset of this group, are defined as firms that devote 75% or more of their total R&D to biotechnology R&D.

[72] Tender Electronic Daily (TED)

73 These were: Microbiological cultures; Biochemical analyzers; Enzymes.

Figure 3.9: Index of tender calls in the TED database comparing bio-based products and all sectors.

- As has been seen, the market size and the number of jobs are difficult to estimate in the area of bio-based products/biotechnology because of the difficulties of defining the sector. However there have been estimations projecting huge increases in both the market size and the number of jobs. These figures are estimated in the two most widely referred to studies - by McKinsey and Festel respectively. They are not comparable as they use different assumptions, but they give a rough indication of the potential of the sector.

- The total number of patent applications fell steadily from 6.296 in 2006 to 4.559 in 2009, but the EU share of patent applications in biotechnology has increased from a world share of 32% in the period from 1995 to 1997 to a share of 35% in the period from 2002 to 2004. The U.S. index of patent applications has higher index values than the European, but shows a similar tendency.

- Data from the OECD statistical database has showed that by there were 3.377 biotechnology firms engaged in the EU – a higher number than for the USA. Also there is a tendency towards an increasing number of start-ups.

- A search in the TED database showed that public procurement has increased steadily in the last five years for all sectors, and that public procurement for bio-based products has generally decreased from 2006 to 2009 and increased significantly from 2009 to 2010.

3.3.2 eHealth

The eHealth industry is vast and comprises a broad range of products and services. eHealth leverages electronic processes and communication to manage healthcare information. It involves simplifying processes related to information, communication and transactions within and between patients, care institutions and professionals by utilising information and communications technologies (ICT). It can include health information networks, electronic health records, telemedicine services, and personal wearable and portable communicable systems for monitoring and supporting patients. To narrow the scope of the market, a definition was proposed by the eHealth Industry Stakeholders Group[74] reporting to the i2010 Sub-group on eHealth[75]. Their definition of the eHealth market appears to be the standard definition used in reports on eHealth and consists of the four following major market applications:

- Clinical information systems (CIS)

    - Specialised tools for health professionals within care institutions. Examples are radiology information systems, nursing information systems, medical imaging, computer assisted diagnosis, surgery training and planning systems.

[74] The Industry Stakeholders Group includes the following representative organisations: COCIR (European Coordination Committee of the Radiological, Electromedical and Healthcare IT Industry), IHE (Integrating the Healthcare Enterprise), EHTEL (European Health Telematics Association) and the Continua Health Alliance.

[75] i2010 is the EU policy framework for the information society and media. It promotes the positive contribution that information and communication technologies (ICT) can make to the economy, society and personal quality of life. The i2010 Sub-group on eHealth advises the Commission on the implementation and development of the i2010 strategy for eHealth. The group reviews the effectiveness of i2010 and gives advice on possible improvements and adjustments, using benchmarking to monitor i2010 implementation and policy evolution.

- Tools for primary care and/or for outside the care institutions such as general practitioner and pharmacy information systems.

- Telemedicine systems and services, including homecare personalised health systems and services, such as disease management services, remote patient monitoring, teleconsultation, telecare, telemedicine, and teleradiology.

- Integrated regional and national healthcare information networks (IHCIN) and distributed electronic health record systems and associated services such as e-prescriptions or e-referrals.

- Secondary usage non-clinical systems (SUNCS)

  - Systems for health education and health promotion of patients/citizens such as health portals or online health information services.

  - Specialised systems for researchers and public health data collection and analysis such as bio statistical programs for infectious diseases, drug development, and outcomes analysis.

  - Support systems for clinical processes not used directly by patients or healthcare professionals such as supply chain management, scheduling systems, billing systems administrative and management systems, which support clinical processes but are not used directly by patients or healthcare professionals.

EHealth produces and services have numerous benefits for the organisations and individuals that make use of them. Benefits include improving coordination and integration of healthcare delivery, facilitating public health initiatives and empowering individuals to better manage their own health and participate in their healthcare plans. They can also utilize technology effectively to save time, decrease costs, reduce administrative and medical errors, and improve customer experiences.

Overview of literature and gaps

Because of the size and variation within the eHealth sector, the Mid-term Progress Report mentioned that "the components of the eHealth lead markets cannot be identified and quantified by making use of the European industry sector classification NACE, the product classification PRODCOM or the Harmonised System of trade statistics." This underlines the point that even though there seems to be a standard definition for eHealth, the sector is still difficult to identify because of its sheer scope. Rather than relying on statistical data from Eurostat or national statistical offices, the evaluation has considered a series of market studies[76].

[76] Notably :
- Capgemini Consulting (2010): Business Models for eHealth Final Report
- European Commission (2007): eHealth Taskforce report 2007 – Accelerating the Development of the eHealth Market in Europe
- European Commission (2007): A lead market initiative for Europe Explanatory Paper on the European Lead Market Approach: Methodology and Rationale - Annex II
- Datamonitor (2007): Healthcare Technology Telehealth's Increasing Role in Healthcare
- Datamonitor (2007): 2007 Trends to watch: Healthcare Technology
- Health Information Network Europe (HINE) Report (2006): European eHealth forecast

The scope of the eHealth market also makes it difficult to find adequate information on trademark applications. This is because the eHealth sector is not only too broad to be categorised by one type product or service but it is also too narrow to derive trademark data from those relating to the entire medical industry. When following up the recommendations on obtaining trademark data in the Edler et al. report, it was found the methodology suggested could not be applied to eHealth. It was suggested that the market be broken down into its four defining parts, but when this is done little to no data are available.

One explanation of why finding adequate information on patent and trademark applications in the EU is so difficult is the fragmentation of the industry. The eHealth market in Europe suffers from the fragmentation of public demand and shortage of funding which in turn leads to a lack of exchangeability of products and services[77]. The setting of different requirements by individual buyers at local, regional and national levels, the limited cooperation between procurers and between procurers and suppliers to develop solutions applicable across different Member States are major barriers for the deployment of interoperable eHealth solutions across the European Union.

Similarly, there are major difficulties in obtaining information on the number of eHealth start-ups, although it has been noted in several reports that the European eHealth industry has a leading position in an emerging field. Personalised health systems, medical equipment and several sectors of integrated eHealth solutions have been suggested by the eHealth Taskforce report from 2007[78] as being areas where the EU has an advantage. The report suggests that two main areas are significant: telemedicine/homecare and clinical information systems in the primary healthcare sector. Those companies which have potential for success in these fields include both large European-based companies with specialised eHealth solutions that are world leaders in their fields and the estimated 5,000 European small and medium-sized enterprises (SMEs) that operate in various sub sectors of eHealth.

Performance data

In view of the difficulties in identifying appropriate data, the statistical assessment of eHealth is based on the following four indicators:

- Volumes of turnover
- Volumes of employment
- Patent applications
- Public procurement

These elements have a determining role in shaping expectations and perceptions of the potential of eHeath sector and provide a basis for monitoring performance.

[77] EC (2007): eHealth Taskforce report 2007 – Accelerating the Development of the eHealth Market in Europe
[78] EC (2007): eHealth Taskforce report 2007 – Accelerating the Development of the eHealth Market in Europe

Volumes of employment, size and turnover:

In 2009, the EU health and social services sector[79] employed almost 10%[80] of the total workforce[81]. The number of people employed in this sector is increasing faster than employment in the overall economy (8.9%), making it one of the fastest growing sub-sector of services[82]. Annex II from 2007[83] estimates that jobs dependent on new products and services in the eHealth industry equaled 250,000 in 2006 and were projected to reach 275,000 in 2010. By 2020, it was estimated that 360,000 jobs will be dependent on the eHealth industry. This estimate[84] is based on workers directly involved in the ICT for the Health Industry. Annex II from 2007 also estimates that around 20 million Europeans employed in the health sector can be positively affected by eHealth solutions.

The EU health sector corresponds to almost 9% of gross domestic product (GDP). Health spending is rising faster than GDP and it is estimated to reach 16% of GDP, or €7.25 trillion, by 2020 in OECD countries[85]. Research from 2007 has suggested that the health ICT industry has the potential to be the third largest industry in the health sector with a global turnover of €50-60 billion, of which Europe represents one third or €16.7-20 billion[86]. However, typical European investment levels in healthcare ICT remained static for a long time at around 1% of total revenue despite efforts to justify higher expenditures[87], and reached an average of 2% around 2006[88].

The eHealth industry, covering all four areas mentioned above, was estimated to be worth close to €21 billion in 2006 in the EU-15 [89]. Datamonitor's 2007 report on *Trends to watch: Healthcare Technology* predicted an 11% increase by 2010. If such a rate continued until 2020 the market volume would reach over €30 billion. This is the basis of the data used in the Annex II from 2007[90] on eHealth market turnover. However, more recent data, from an analysis undertaken by Capgemini Consulting in 2010, states otherwise[91]. According to their data, the European eHealth market was estimated at €14.269 billion in 2008 and is projected to reach €15.619 million by 2012, with a compounded annual growth rate of 2.9%. By using the data from 2008 and compounding the annual growth rate to the year 2020 it can be determined that, based on Capgemini Consulting's data, the market would reach just over €20 billion. This illustrates a vast difference in market volume compared with what was estimated in the 2007 Annex II.

[79] The NACE classification (rev.2 from 2008) groups health and social services under the heading Q 'Human health and social work activities'. Distinction between the two components is not available.
[80] Eurostat Labour Force Survey and Commission services computations
[81] The total workforce (persons aged 15 years or older that are either employed or unemployed) in the EU-27 for 2009 equaled 239.1 million, according to the European Union Labour Force Survey – Annual Results 2009.
[82] The Council of the European Union (2010): EPC-Commission joint report on health systems
[83] EC (2007): A lead market initiative for Europe Explanatory Paper on the European Lead Market Approach: Methodology and Rationale - Annex II
[84] Estimated by the Information Society and Media Directorate-General (DG INFSO)
[85] PricewaterhouseCoopers (2006): HealthCast 2020:Creating a Sustainable Future
[86] EC (2007): eHealth Taskforce report 2007 – Accelerating the Development of the eHealth Market in Europe
[87] Deloitte & Touche (2000): Market Analysis on the emerging European Health Telematics Industry
[88] HINE Report (2006): European eHealth forecast
[89] HINE Report (2006): European eHealth forecast
[90] EC (2007): A lead market initiative for Europe Explanatory Paper on the European Lead Market Approach: Methodology and Rationale - Annex II
[91] Capgemini Consulting (2010): Business Models for eHealth Final Report

When looking at the current and future market size of the four specific markets identified by the eHealth Industry Stakeholders Group, large differences can be seen in the market structure from 2008 to 2012. Capgemini Consulting has concluded that in 2008, SUNCS accounted for 71.6% of the total eHealth market in Europe. CIS represented about 13.5%, while IHCIN accounted for about 5%. Finally, telemedicine accounted for only 0.9% (see table below).

Table 3.7: Financial quantification of individual markets in 2008

Individual Market	Composition in 2008 (%)
Clinical Information System (CIS)	71.60%
Secondary Usage Non-clinical Systems (SUNCS)	22.50%
Integrated Healthcare Information Network (IHCIN)	5.00%
Telemedicine	0.90%

Source: Capgemini Consulting (2010): Business Models for eHealth Final Report

Figure 3.10 below shows the shift in market compositions between 2008 and 2012, in particular showing a major move from SUNCS to CIS. This suggests that eHealth systems are being targeted more towards supporting the operational processes of healthcare professionals. In addition to this data, Capgemini Consulting[92] has also identified an expansion of the IHCIN market, resulting from an increasing demand for data sharing networks among healthcare organisations. Together, CIS and IHCIN are expected to be responsible for about 80% of eHealth market growth from 2008 to 2012. Finally, the market for telemedicine will continue to be small but increasing steadily. A report by Datamonitor from 2007 predicts the telemedicine homecare market will grow at a five year compound annual growth rate of 56%, compared to only 9.9% growth in the clinical market. The Datamonitor report, *Healthcare Technology Telehealth's Increasing Role in Healthcare*, expects that overall the global telemedicine market will exceed $8 billion by 2012.

[92] Capgemini Consulting (2010): Business Models for eHealth Final Report

Figure 3.10: eHealth market compounded annual growth rate (2008-12) per sector

Source: Capgemini Consulting (2010): Business Models for eHealth Final Report

A country analysis conducted by Capgemini Consulting shows that France, Germany, Italy, Spain and the United Kingdom are the principal European eHealth markets. The analysis in figure 1.3 shows that from 2008 to 2012 all national eHealth markets will experience some form of growth in this area[93]. The future for eHealth within the EU looks bright as all evidence, thus far, suggests that development within the sector will continue.

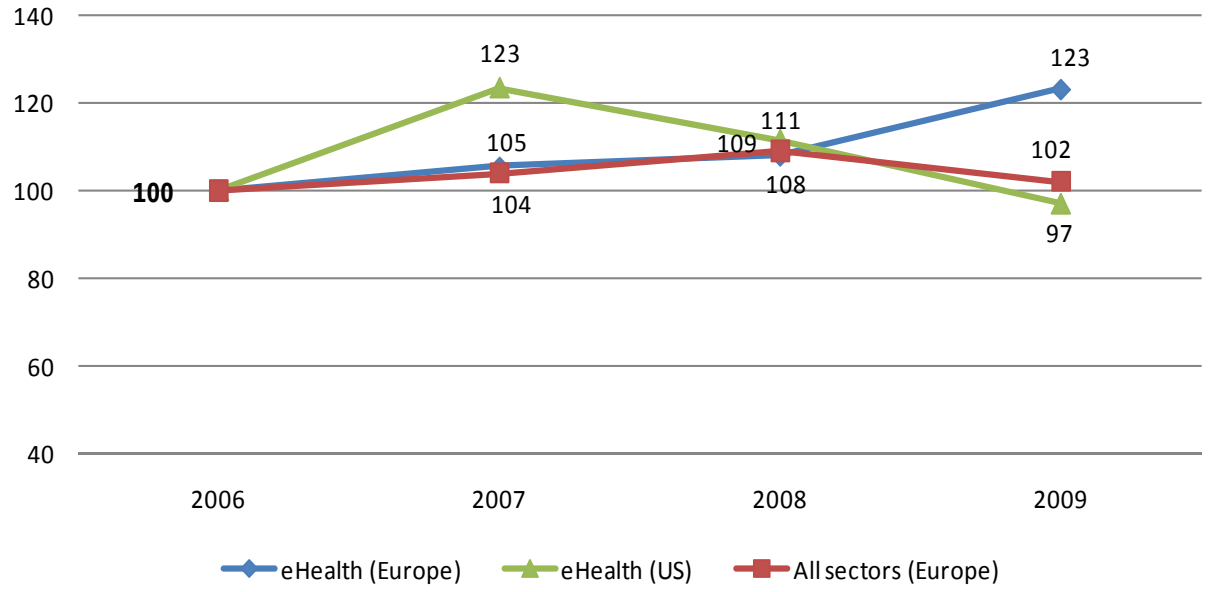
Figure 3.11: **Total eHealth market 2008 and 2012 by country**

Source: Capgemini Consulting (2010): Business Models for eHealth Final Report

[93] The findings have been extracted from the Jansen and Admiral *eHealth: Market Assessment* deliverable prepared for the European Commission.

Patent applications:

The Edler et al. reportAs recommended in the Edler et al. report, the approach of this study regarding



Public procurement:

Again the TED database was used to generate data on public procurement for eHealth[96].

It is important to note that the TED database has a limited number of filters to choose from and the filtering effects of the search method can exclude a lot of product groups in the area of eHealth from the search. The results should therefore be considered to be indicative rather than exhaustive.

Table 3.9 TED public procurement calls 2006 - 2010

		2006	2007	2008	2009	2010
eHealth	Number of tender calls	464	510	399	257	255
	Index of tender calls	100	110	86	55	55

The search in the TED database on eHealth showed that public procurement had increased from index 100 in 2006 to index 110 in 2007, which was almost in line with all sectors for the same period. However, the index decreased steadily from 2007 until 2009; falling from a high of 110 to a low of 55. From 2009 to 2010, the development has been steady hovering around 55. Public procurement in eHealth from 2007 to 2010 has decreased considerably compared to the steady increase in public procurement for all sectors, as is evident in the graph below.

[96] The filters applied were: Medical software development services; Medical software package ; Medical information systems ; Medical computer equipment.

- A search of the Tenders Electronic Daily (TED) database showed that public procurement for eHealth dropped steadily from 2007 to 2009 and been much lower than procurement in general.

- Difficulties with data on trademark applications and enterprise start-ups meant that it was not possible to generate any meaningful values for these indicators.

3.3.3 Protective textiles

The lead market Protective textiles surely has some interesting prospects. Increasing concerns about security and safety promote a strong demand for products that perform better and there are underlying societal drivers for the market for technical textiles and for intelligent personal protective clothing and equipment (PPE).

PPE is required in a number of situations including[99]:

- Professionals and workers operating in hazardous environments or dangerous situations such as the security and emergency services;
- Hospitals, for effective hygiene and comfort of patients and healthcare workers, providing protection from bacterial contamination and providing new functionalities;
- Sport and outdoor activities to protect from injuries and/or extreme climatic conditions;
- Defence and military personnel, to protect soldiers from enemy and environmental threats.

For military and civil security personnel, there is a growing demand for better performing clothing and equipment that is able effectively to isolate users from dangerous environments and to provide reliable NRBC (nuclear, radiation, biological, chemical) protection. In this respect, high levels of excellence in textile and multidisciplinary research are crucial if there is to be a quick response to security needs with high quality products and innovation capacity. A European textile industry able to ensure reliability of supply and confidentiality related to military products is of strategic interest to the EU's security as well as in building a competitive European technological and industrial base for defence.

Another important driver is the steady development of new health and safety requirements, making it necessary to develop new innovative products and to ensure their reliable quality. The new Community strategy for 2007-2012 on health and safety at work sets out the need to identify situations of exposure and to design preventive solutions and innovative technologies to deal with new risks[100]. In addition, Europe's labour force is increasingly more qualified and skilled and attaches more importance to the proper management of risks at the workplace, demanding comfort and aesthetics in addition to protective properties.

[99] Observatory Nano (2010): Briefing no. 7 – Nano-enabled Protective Textiles
[100] Commission Communication (2007): Improving quality and productivity at work – Community strategy 2007-2012 on health and safety at work

Overview of literature and gaps

A review of formal statistical sources in the market for protective textiles has again highlighted the problems of matching protective textiles to NACE or PRODCOM codes or even common procurement vocabulary (CPV) codes and the emphasis in the enquiries has therefore been on market studies.[101]

As the market for PPE cannot be delineated by traditional international statistical classifications, the only available source for estimating the market is Euratext (European Apparel and Textile Confederation) which is also used in the European Commission taskforce report.[102] For an objective evaluation of the LMI for this market, it is clear that relying on market data stemming from the concerned industry confederation could compromise the validity of the figures. However the literature review suggests that there is a general consensus about using the Euratext estimation.

Performance data

Based on available evidence from among those proposed in the Mid-term Review[103], the statistical assessment of protective textiles relates to the following four indicators:

- Volumes of turnover,
- Volumes of employment
- Patent applications
- Public procurement

These elements have a determining role in shaping expectations and perceptions of the potential of PPE and provide a basis for monitoring performance.

Volumes of turnover and employment

The EU-25 market for the industrial textile applications is estimated to have been worth € 39.4 billion in 2006. According to the taskforce report, this should be considered as a conservative estimate since there was no clear understanding of the size of the new Member State market for industrial applications[104]. The share of the market for technical textiles for intelligent personal protective clothing and equipment (PPE) in 2006 was 20.2 % of the total market for industrial textile application, according to Euratex. This equates to around € 8 billion for the manufacturing segment of PPE.

[101] The following are the main studies considered :
Observatory Nano (2010): Briefing no. 7 – Nano-enabled Protective Textiles
European Commission (2007): Report of the Taskforce on Protective textiles, Composed in the preparation of the Communication "A Lead Market Initiatve for Europe"
European Commission (2007): A lead market initiative for Europe Explanatory Paper on the European Lead Market Approach: Methodology and Rationale - Annex II

[102] EC (2007): Report of the Taskforce on Protective textiles, Composed in the preparation of the Communication "A Lead Market Initiatve for Europe"

[103] EC (2009): Lead Market Initiative for Europe – Mid-term progress report, Commission Staff Working Document

[104] EC (2007): Report of the Taskforce on Protective Textiles, Composed in the preparation of the Communication "A Lead Market Initiatve for Europe"

In the Explanatory Paper (Annex II), the EU market volume of PPE in 2006 was estimated to be € 8.8 billion[105]. Based on Euratex data, the taskforce report estimates that the manufacturing segment for protective textiles in the EU has a market volume of € 8 billion plus an additional turnover of € 1.5 - 2 billion corresponding to service operations (work wear and healthcare) related to PPE. It is not clear why the market volume is estimated at € 8.8 billion in the Annex II. The estimation seems to be a half-way point between the value of manufacturing output (€ 8 billion) and the amount if the service element is also included (€ 9.5-10 billion).

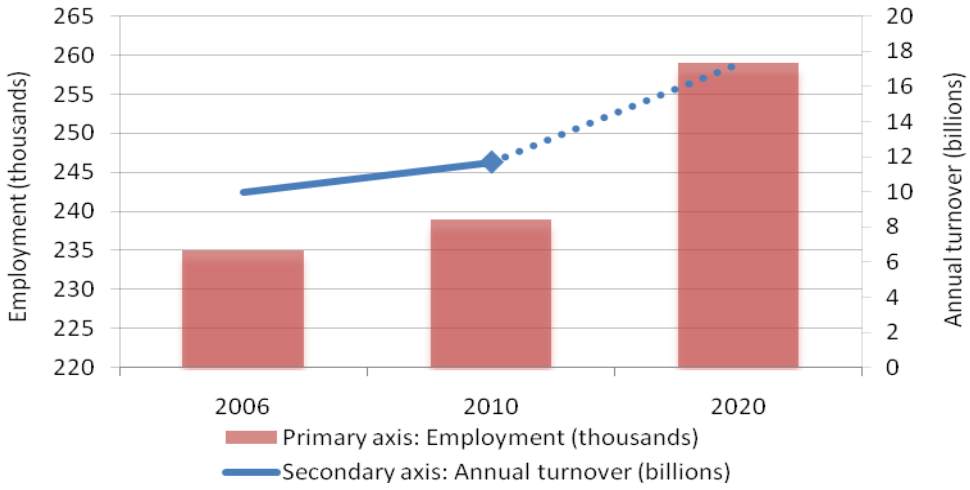
In this statistical assessment, it is suggested that € 10 billion (including service operations) be used instead. For one thing this gives a consistent and transparent definition of PPE and clarifies the basis of the estimated figure. Secondly it is clear that a significant part of the economic value creation in the market is related to the service industry element, ensuring distribution and correct use as well as professional maintenance and care. This is critical for preserving protective functionalities and ensuring optimal performance over the whole life-cycle of the products.

As suggested in the taskforce report, the market for PPE products is expected to grow steadily in the short term. There is a positive upward trend underpinned by favourable economic conditions, a rising awareness of personal protection and some catch-up demand in the new Member States[106]. Consequently by assuming a similar growth rate of 4 % as the one suggested in the Annex II, the projections regarding the market size of protective textiles with the inclusion of service operations would arrive at € 11.7 billion in 2010 and € 17.3 billion in 2020. This could even be considered a conservative growth rate, as another report expects the PPE market to grow by 7.6 % in the period from 2012 to 2016[107].

In Annex II the estimated number of jobs in protective textiles in 2006 was 205,000. However it is stated in the taskforce report[108] that the total number of employees working for the production of PPE can be estimated to be 195,164. By adding the employment figure of 40,000 people that are directly related to "in service" PPE products[109], this gives a total number of jobs of approximately 235,000. In Annex II, the expected job creation is based on the assumption that labour productivity will grow by 3 % on a yearly basis. By applying a similar assumption for job creation but including service operations, this gives the figures of 239,000 jobs for 2010 and 259,000 for 2020. The development of the market and employment for protective textiles is illustrated in figure 3.14 below:

[105] European Commission (2007): A lead market initiative for Europe Explanatory Paper on the European Lead Market Approach: Methodology and Rationale - Annex II
[106] European Commission (2007): Report of the Taskforce on Protective Textiles, Composed in the preparation of the Communication "A Lead Market Initiatve for Europe"
[107] Observatory Nano (2010): Briefing no. 7 – Nano-enabled Protective Textiles
[108] European Commission (2007): Report of the Taskforce on Protective Textiles, Composed in the preparation of the Communication "A Lead Market Initiatve for Europe"
[109] Including jobs that are concerned in the sector of knitted fabrics

Figure 3.14: Market growth and job creation for protective textiles



The value of the extra-EU market doubles that of the European one, offering possibilities to increase EU exports substantially. The new EU Member States in Eastern Europe and Ukraine, Russia and Asia are the fastest growing areas; though the access to markets in Asia is constrained, particularly where there is public procurement. If access to such markets is improved, EU exports could grow by 50% over the next 5 to 10 years. The EU-25 exports of PPE amounted to more than € 3 billion in 2006, which represented an increase of 6.6 % as compared with the previous year[110].

Patent and trademark applications

Again a search Again, as recommended in the Edler et al. report, the approach of this study regarding patent applications has been to search the archive of the European Patent Office (EPO). Using the Patentscope search service makes it possible to access the archive of the EPO from 1977 to 2009 and for the protective textiles three filters were applied.[111]As For US patent applications, a similar search has been conducted in the database of the United States Patent and Trademark Office (UPSTO). Applying this search method does mean that it is possible some relevant patent applications are not included, but the results are still strongly indicative of the performance of the sector overall.

Table 3.10 Patent Applications in Europe and U.S. (2006 – 2009)

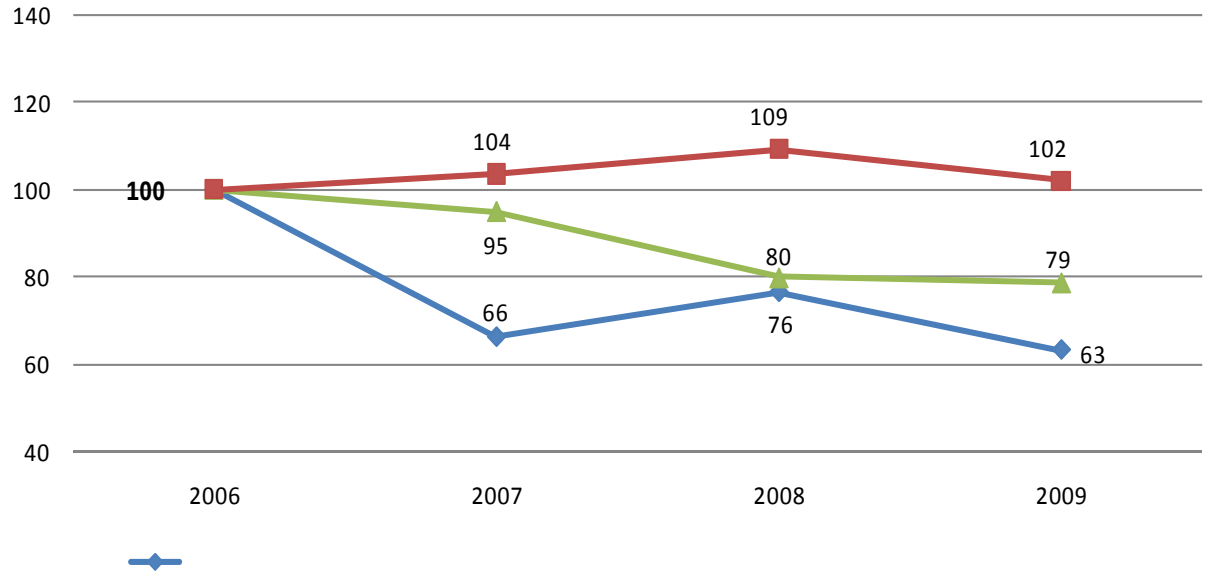
		2006	2007	2008	2009
Protective textiles (Europe)	Number of patents	68	45	52	43
	Index of patents	100	66	76	63
Protective textiles (US)	Number of patents	259	246	207	204
	Index of patents	100	95	80	79

Source : World Intellectual Property Organization, United States Patent and Trademark Office

[110] European Commission (2007): Report of the Taskforce on Protective Textiles, Composed in the preparation of the Communication "A Lead Market Initiatve for Europe"
[111] The filters used were : Protective textile; Protective clothing; Safety clothing.

Patent applications for protective textiles in Europe have varied considerably since 2006 and were at a relatively low level in 2009, the last year for which there are data. The performance in 2009 looks even worse when compared to the index for all sectors, as is seen in Figure 3.15. Patent applications for protective textiles in the U.S. have been steadily decreasing from 2006 to 2009. Although the recession has clearly had an impact on all patent activity, this effect in markets in general is nowhere the decline seen in protective textiles. There clearly has to be additional explanations. One factor frequently mentioned by industry sources is that the basic technology being applied in a number of 'innovative' developments is already quite old. There is a backlog of developments that have yet to be brought through into real applications. This may have acted to constrain new technological developments. It should also be noted that the absolute number of patent applications relating to this market is rather small both for Europe and the U.S., when compared with some of the other lead markets.

Figure 3.15: Index of patent applications comparing protective textiles and all sectors



The search for protective textiles in the TED database's archive made use of four filters.[113] It showed that public procurement in this market has increased erratically since 2006.

Table 3.11 TED public procurement calls 2006 - 2010

		2006	2007	2008	2009	2010
Protective textiles	Number of tender calls	305	357	330	296	294
	Index of tender calls	100	117	108	97	96

Figure 3.16 shows the patterns in graphical form. Overall from 2007 to 2010, the index value for protective textiles has been lower than for all sectors, where there has been a steady progression in the number of calls published.

Figure 3.16: Index of tender calls in the TED database comparing protective textiles and all sectors

- In the taskforce report an employment figure of 195,164 for PPE has been suggested, and by adding the 40.000 jobs that are related to the service industry, this gives an overall employment figure of approximately 235,000 jobs.
- By searching the EPO and the UPSTO it is clear that the number of patent applications for protective textiles fell significantly in 2007. In the following period from 2007 to 2009, there was a reasonably steady development with a small increase from 2007 to 2008, and a small decrease from 2008 to 2009. Comparing the index for protective textiles with all sectors points to a huge gap meaning that the growth in patent applications is remarkably lower for protective textiles than for all sectors. Patent applications for protective textiles in the U.S. have been steadily decreasing from 2006 to 2009.
- Searching the TED database shows that public procurement calls in the market for protective textiles has decreased from 2006 to 2010 and has been lower than for all sectors, where there has been a steady progression in the number of calls published.

3.3.4 Recycling

As world economies continue to expand, natural resources are being increasingly depleted, energy is becoming a key issue, and proper and effective waste management is also an increasing challenge. Moving towards sustainable patterns of consumption and production is the cornerstone of sustainable development and central to policy in this area at an EU and national level.

Recycling is a key component of modern waste management. It is the third component of the "reduce, reuse, recycle" waste hierarchy and plays an underpinning role by reducing waste going to disposal, reducing consumption of natural resources and improving energy efficiency. Thus, this lead market is of high strategic and societal interest. Furthermore, the recycling market is characterised by big variations across different countries within the EU. Some countries have a long tradition of recycling, while for others it is a new market.

In 2007, the Commission of the European Communities estimated that the waste management and recycling sector in the EU had a turnover of over €24 billion, and provided over 500,000 jobs[114]. This economic picture becomes less clear, however, when differences in definitions and estimated growth potential are considered. For example, in two studies of the EU's eco-industries from Ernest & Young and ECORYS, waste management and recycling are defined as part of the eco-industry. These studies divide the eco-industry into two main groups which have to do with pollution management and resource management. A different definition is presented in Edler et al.'s report from 2009. Here the recycling market is statistically defined as NACE code 37 (recycling) which has two sub codes: NACE Code 37.1 (Recycling of metal waste and scrap) and NACE code 37.2 (Recycling of non-metal waste and scrap)[115]. Finally, according to a study from Cascadia from 2009, recycling is defined to include

[114] European Commission (2007): A lead market initiative for Europe Explanatory Paper on the European Lead Market Approach: Methodology and Rationale - Annex II. See also: Report of the Task Force on Recycling, 2007: Accelerating the Development of the Market for Recycling in Europe.
[115] Edler et al. (2009): Monitoring and Evaluation Methodology for the EU Lead Market Initiative. A Concept Development.

collection, processing, remanufacturing, and end markets[116]. This illustrates some of the demarcation difficulties associated with finding statistical data on the recycling sector.

The next section addresses some of the difficulties relating to the demarcation of the recycling market and the general problem that arises from the different definitions of the market that are used in the literature. This situation leads to a plurality of conceptions of the recycling market and highlights the importance of having a methodological approach that considers the potential statistical pitfalls in an assessment of the recycling market.

Overview of literature and gaps

As indicated in the introduction, there is a wide range of different definitions regarding the recycling sector. Use has been made of a number of different studies in clarifying these issues and in obtaining data.[117]

In the studies by Ernest & Young and ECORYS the focus is on the eco-industry, which includes the recycling sector. According to Ernest & Young and ECORYS, the eco-industry is defined by two main categories:

- *Pollution management* includes nine eco-industries: solid waste management and recycling, waste water treatment, air pollution control, general public administration, private environmental management, remediation and clean up of soil and groundwater, noise and vibration control, environmental research and development, and environmental monitoring and instrumentation.

- *Resource management* includes five eco-industry sectors: water supply, recycled materials, renewable energy production, nature protection and eco-construction (where recycled materials are the primary concern[118]).

According to the ECORYS study from 2009, industries dealing with recycled materials operate in four different business areas. These are production of equipment and specific materials, provision of operational services (including monitoring), provision of management services, and innovation and technological development[119]. However, according to Edler et al., this definition is not appropriate. This is because data on turnover within the eco-industry is based on environmental protection expenditures, which do not exist for resource management. Thus, Edler et al. suggests a definition based on NACE code 37.

[116] Cascadia (2009): Recycling and Economic Development. A Review of Existing Literature on Job Creation, Capital Investment, and Tax Revenues.
[117] These include :
Ernest & Young (2006): Study on Eco-Industry, its size, perspective and barriers to growth in an enlarged EU.
ECORYS, October 2009: Study on the Competitiveness of the EU eco-industry. Final report – Part 2.
Edler et al. (2009): Monitoring and Evaluation Methodology for the EU Lead Market Initiative. A Concept Development.
Friends of Earth (2010): More Jobs, Less Waste. Portential for Job Creation through higher rates of recycling in the UK and EU
[118] Ernest & Young (2006): Study on Eco-Industry, its size, perspective and barriers to growth in an enlarged EU.
[119] ECORYS (2009): Study on the Competitiveness of the EU eco-industry. Final report – Part 2.

NACE 37 characterises recycling as the processing of used or unused, sorted or unsorted, waste and scrap into secondary raw materials which can then be used by other sectors as an intermediate good. Note that it does not extend to the production of new final products, nor does it include the re-use of products (when no real transformation process is required). Recycling, under this definition, therefore involves a number of treatment stages, such as sorting, crushing, mechanical reduction, stripping, separation and cleaning which may be followed by further treatments to prepare raw materials for use by other sectors. These activities are classified as the recycling of waste and scrap.

It seems reasonable to use the statistical NACE code definition, but with NACE rev 2 recycling does not appear as a NACE code anymore[120]. In short, this means that it is of utmost importance to be aware of the sources on which the statistical data in the field of recycling are based, as the data collected vary according to the selected definition of the sector. This is why the demarcation of the sector is discussed throughout the review. In figure 3.17 the scope of the recycling sector according to different definitions is summed up.

Figure 3.17: Business areas in recycling

Source: Friends of Earth, 2010: More Jobs, Less Waste

[120] Comment from Unite B4 on the Inception Report from CSES 2011.

The difficulties getting current and comparable data are recognised by the Commission in the Thematic Strategy on the Prevention and Recycling of Waste. Here an account is presented of different initiatives for improving the spread of knowledge and the quality of the information available. These include:

- The Waste Data Centre - established and hosted by Eurostat.
- The European Topic Centre on Sustainable Consumption and Production (ETC/SCP) - a consortium of eight professional organisations under contract with the European Environment Agency.
- Publications such as the State of the Environment Report (SOER) by the EEA and the Environmental Policy Review, published by the Commission. These increasingly include reporting on waste and resource related issues.
- The European Platform on Life Cycle Assessment (LCA), launched by the Commission in 2005 and providing a range of information and on-line support tools.

These initiatives have improved the quality of information and the availability of statistics on the generation and treatment of waste. However, there are still knowledge gaps which need to be addressed. In particular, indicators to monitor progress and statistics on the flows (import and export) of waste within the EU and at the global level need to be further developed[121].

Performance data

In view of the data availability in the recycling market and the proposals in the Mid-term Review, the statistical assessment of the recycling sector is based on the following indicators[122]:

- Volumes of turnover, employment and export
- Public procurement
- Volume of patent applications
- Size structure

These elements are again highly significant in shaping expectations and perceptions of the potential of the recycling sector and provide a basis for monitoring performance.

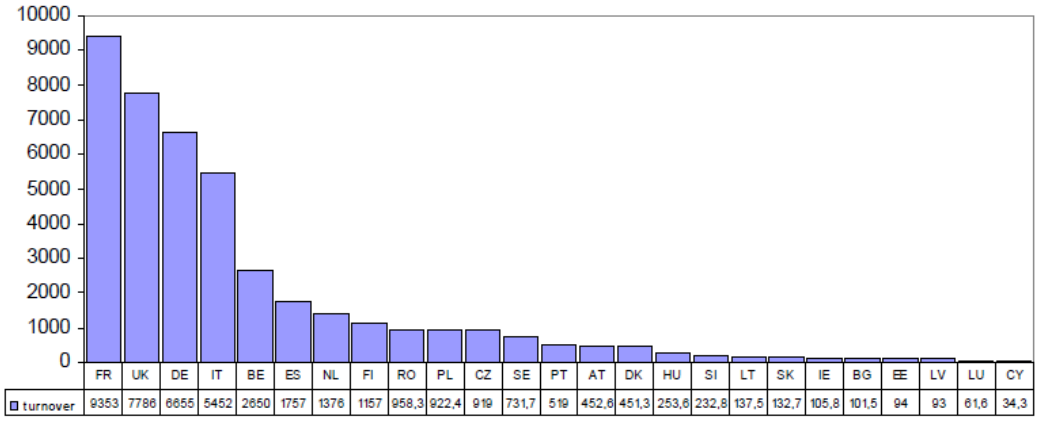
Volumes of turnover, employment and exports:

Looking at the European market for the recycling industry, a study by ECORYS in 2009 found that in 2006 the recycling industry in the EU generated a total turnover of € 42.4 billion, which was an increase

[121] Commission Staff Working Document (2011): Accompanying the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the Thematic Strategy on the Prevention and Recycling of Waste.
[122] Originally there were four indicators but it has not been possible to find data on Trademark applications nor has been possible to locate data on foundation of companies, this is why this indicator has been replaced by a short description of the size structure of the recycling sector.

of 23.4 billion compared with the sector's total turnover in 2001[123]. The turnover was largest in the EU15 countries with France, the UK and Germany as the top 3 countries (see figure 3.18).

Figure 3.18: EU Recycling industry: turnover by country, 2006



	FR	UK	DE	IT	BE	ES	NL	FI	RO	PL	CZ	SE	PT	AT	DK	HU	SI	LT	SK	IE	BG	EE	LV	LU	CY
turnover	9353	7786	6655	5452	2650	1757	1376	1157	958,3	922,4	919	731,7	519	452,6	451,3	253,6	232,8	137,5	132,7	105,8	101,5	94	93	61,6	34,3

Source: ECORYS 2009: Study of the Competitiveness of the EU eco-industry. Part 2

A study on the EU's eco-industry by Ernest & Young in 2006, estimated that the recycling sector had a turnover of € 24.3 billion in 2004. This resulted in a turnover in 2006 of € 25.5 billion[124], which means that the difference in estimated turnover between the two studies is €16.9 billion. This is quite a discrepancy. Ernest & Young make their own calculations based on production value data whereas the ECORYS data are based on estimates from EUROSTAT.

In comparison to the European data on turnover, data from a United States report by Cascadia in 2009 found that the recycling industry accounted for about 2% of the US' € 15.6 trillion[125] GDP in 2007. This means that the recycling sector in the United States accounted for approximately € 312 billion in 2007. The estimate of 2% is the same for 2009, according to another report from Canaccord Genunity in 2010[126]. The latter report also estimated that the market for e-waste on a global scale will amount to € 16.8 billion[127] by 2014, rising from an estimated € 11.1 billion[128] in 2009. This points to the global potential of the recycling market[129].

[123] ECORYS (2009): Study on the Competitiveness of the EU eco-industry. Final report – Part 2.
[124] This estimated is calculated by applying a 3% growth rate as suggested by the German Federal Ministry for Environment, Nature Conservation and Nuclear Safety in European Commission (2007): A lead market initiative for Europe Explanatory Paper on the European Lead Market Approach: Methodology and Rationale - Annex II.
[125] Corresponding to $12.36 trillion and to get the numbers in Euro instead of dollars the amount in $ has been multiplied by 1.3.
[126] Canaccord Genuity (2010): Recycling is the Color of Money. Playing the recycling "mega-cycle".
[127] Corresponding to $12.9 billion and to get the numbers in Euro instead of dollars the amount in $ has been multiplied by 1.3.
[128] Corresponding to ($8.5 billion) to get the numbers in Euro instead of dollars the amount in $ has been multiplied by 1.3.
[129] E-waste is electronic waste e.g. computers, mobiles and televisions.

It is expected that the recycling sector will still grow in volume within Europe, given the fact that consumption has not diminished over the last decade. However, in some segments the percentage of waste that is recycled is already very high, leaving not much room for further improvement. In the old EU15 Member States, more than 40% of municipal solid waste is recycled, but recycling only accounts for around 10% of the municipal solid waste treatment in new Member States. Outside of Europe, the economic growth regions, such as the BRIC countries, are becoming important markets for the recycling industry. Thus, it is expected that the recycling value chain[130] will be increasingly organised on a global scale. As client (manufacturing) sectors move business outside of Europe, parts of the recycling value chain will also follow. The processing and delivery activities are especially affected as processing plants move to the Middle East or BRIC countries. Collection and sorting remains a predominantly locally organised business. As a consequence of the global relocation process, international trade of 'waste' is expected to increase.

Comparing these findings with the turnover estimates in Annex II reveals a gap in relation to the future turnover perspectives for the recycling sector. The turnover estimate for recycling for 2020 in Annex II, based on a single sub-sector, is estimated to be € 36.0 billion. This is lower than the total turnover of € 42.4 billion in 2006[131], if the broader definition from by the ECORYS study is used. The gap between the numbers becomes even more evident if the 3% annual growth rate, estimated by the German Federal Ministry for Environment, Nature Conservation and Nuclear Safety, is applied to the turnover estimated by ECORYS in the period from 2005 to 2020. According to this calculation, the total turnover for the recycling sector in 2010 amounted to 47.3 billion and in 2020 the amount will be €63.5 billion.

In relation to employment, a study from Friends of Earth from 2010 estimated that 1.2 million direct jobs are associated with collecting, disposal and recovery of waste. The study, calculates that the recycling sector had a 7% growth in employment in the period from 1999 to 2004[132]. These findings correspond to the results from the Cascadia report on Recycling and Economic Development from 2009. It found that the recycling sector in the United States from 1967 to 2000 experienced an annual employment growth rate of 8.3% and in 2001 the United States' recycling sector was employing approximately 1.1 million people[133]. Furthermore, in the Commission's Thematic Strategy on the Prevention and Recycling of Waste, similar growth rates are found. Growth in recycling sector jobs globally was estimated to be 9% in the 2004 to 2006 period and 7% between 2007 and 2009[134].

Furthermore, in the Friends of Earth report it is estimated that employment in the recycling sector will rise from 1.2 million in 2004 to reach 1.24 million by 2010, and then fall slightly to a stable level of about

[130] Collecting-sorting-processing-delivery

[131] ECORYS (2009): Study on the Competitiveness of the EU eco-industry. Final report – Part 2.

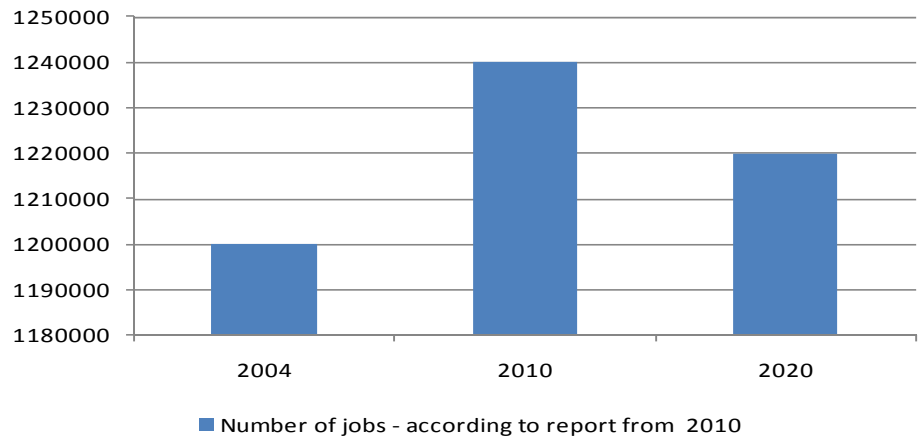
[132] Friends of Earth (2010): More Jobs, Less Waste. Portential for Job Creation through higher rates of recycling in the UK and EU

[133] Cascadia (2009): Recycling and Economic Development. A Review of Existing Literature on Job Creation, Capital Investment, and Tax Revenues.

[134] Commission Staff Working Document (2011): Accompanying the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the Thematic Strategy on the Prevention and Recycling of Waste

1.22 million in 2020. These assumptions are based on a 50% recycling rate corresponding to the Waste Framework Directive's targets for 2020 (see figure 3.19).

Figure 3.19: Number of Jobs in waste management and recycling



Source: Friends of Earth, 2010: More Jobs, Less Waste

The Friends of Earth report also considers a different scenario, where the whole EU27 have achieved a 70% recycling rate in 2020 (compared to 2004). This would mean an addition of 321,700 new direct jobs in the recycling sector, so the total employment ends at approximately 1.54 million. This assumption seems realistic since, for example, the recycling rates for packaging waste in the EU in 2008 was already 61% (see table 1.1).

Table 3.12: Packaging waste treatment (% of total packaging waste)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Recycling	51	53	54	54	56	55	57	59	61
Energy recovery	7	7	8	13	11	12	12	13	12
Disposal	42	40	38	33	33	33	31	28	27
Note:2000-2004 EU15, 2005-2007 EU27 Source: EEA 2009, ESTAT 2010 (data received from EUROPEAN COMMISSION - EUROSTAT Unit E 3: Environment Statistics, January 2011)									

As progress is being made in regard to accelerating the development of the recycling market through demand-side policies and initiatives, the report from Cascadia finds that employment rates are higher

for recycling on a per-ton basis than for the solid waste disposal industry, by a factor of 10[135]. This means that as more tons of waste are recycled more jobs are created at a higher rate than if the waste was going solely for disposal.

Comparing these findings with the job estimates in Annex II[136] reveals a gap in the future employment perspectives of the recycling sector. This is because the number of jobs estimated in recycling for 2020 in the Annex II is 535,000. Even if a more conservative annual growth rate of 0.5% is used on the employment estimate from ECORYS, as suggested by Ernest & Young in 2006, the number of jobs in 2020 is somewhat higher than the 535,000 estimated in Annex II. With a 0.5% growth rate applied to the 1.2 million jobs in 2006, the estimated employment in 2020 would be 1.28 million. It seems reasonable to speculate that the definition applied in the studies by Friends of Earth and Cascadia are broader and more comprehensive than the one used by the Commission in 2007 (Annex II).

Economic growth and globalisation have led to a worldwide increase of waste transport across borders. Typically data on shipments of waste cover only notified waste, which is mainly hazardous waste. The so-called "green-listed waste", which includes non-hazardous waste, can be exported under a lower level of control to EU and OECD countries for recycling purposes. However, the collection of statistical data for the shipment of "green-listed waste" is particularly difficult since copies of shipment documentations are not always required by the authorities concerned[137].

According to PORCCOM data in 2007, 9.8 million tons of recovered paper was exported. In 2009, 13.2 million tons was exported, with 70% going to China, which means an annual growth rate of 16%. In 2010, it seems that several EU mills ran out of recovered paper[138].

Furthermore, the price of secondary materials (waste materials) is highly influenced by the price of raw materials and thus, by overall economic development. There are clear signs of increasing demand and the price for raw materials and markets is increasingly affected by global players such as the US, Russia, China, India and South America. Recycling is therefore, an area of growing strategic importance in international trade balances, since it reduces dependency on raw material prices.

Public procurement

The TED database has been used to generate data on public procurement within the recycling sector. The research has been done in the database's archive with the relevant PCV codes[139], identified by

[135] Cascadia (2009): Recycling and Economic Development. A Review of Existing Literature on Job Creation, Capital Investment, and Tax Revenues.
[136] European Commission (2007): A lead market initiative for Europe Explanatory Paper on the European Lead Market Approach: Methodology and Rationale - Annex II
[137] Commission Staff Working Document (2011): Accompanying the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the Thematic Strategy on the Prevention and Recycling of Waste. See also: EUROSTA (2010): Environmental Statistics and account in Europe.
[138] Commission Staff Working Document (2011): Accompanying the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the Thematic Strategy on the Prevention and Recycling of Waste
[139] Included PCV codes: 45213270 (Construction work for recycling station under main category Construction and Real estate), 90514000 (refuse recycling services under main category Construction and Real estate and main category Environment and Sanitation), 90715270 (Recycling Plant site Investigation under main category

applying a filter ("recycling") to the search. This method ensures that every tender containing the term "recycling" is found. However, some tenders that are not primarily concerned with recycling are also included in the search results. For example, tenders relating to simple waste collection are included. It is important to note therefore that the data for this exercise should be considered as indicative rather than exhaustive.

Table 3.13 TED public procurement calls 2006 - 2010

		2006	2007	2008	2009	2010
Recycling	Number of tender calls	215	200	238	345	364
	Index of tender calls	100	93	111	160	169

The search in the TED database on recycling showed that public procurement, in general, has increased during the last five years with a slightly drop from 2006 to 2007. The search also showed that from 2008 and onwards the public procurement in recycling is increasing more than public procurement in general. This indicates that there is strong development in the recycling area.

Figure 3.20: Index of tender calls in the TED database comparing the recycling sector and all sectors.

Patent Applications

TableOnce more, as recommended in the Edler et al. report, the approach of this study regarding patent applications has been to search the archive of the European Patent Office (EPO). This is most easily done by the web site of the World Intellectual Property Organization (WIPO), which is a specialised agency of the United Nations[140]. Using the Patentscope search service makes it possible to access the archive of the EPO from 1977 to 2009 and for recycling two filters were applied.[141] For US patent applications, a similar search has been conducted in the database of the United States Patent and Trademark Office (UPSTO). Applying this search method does mean that it is possible some relevant patent applications are not included, but the results are still strongly indicative of the performance of the sector overall.

Table 3.14 Patent Applications in Europe and U.S. (2006 – 2009)

		2006	2007	2008	2009
Recycling (Europe)	Number of patents	216	186	122	225
	Index of patents	100	86	56	104
Recycling (US)	Number of patents	107	125	168	105
	Index of patents	100	117	157	98

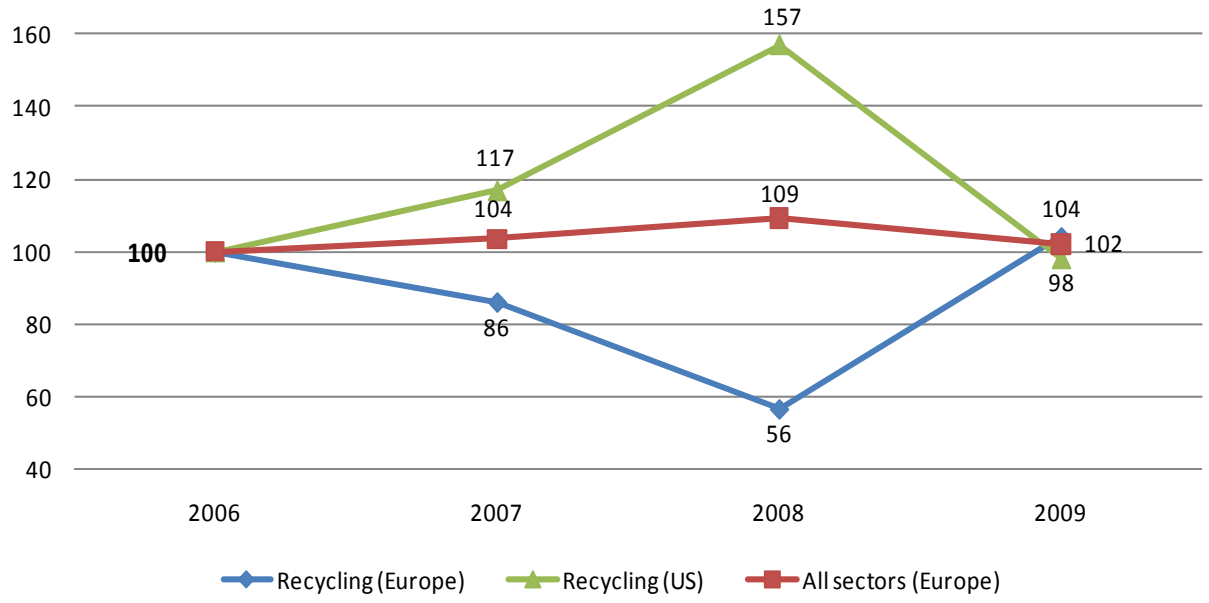
Source: World Intellectual Property Organization, United States Patent and Trademark Office

The development of applications for recycling has been dramatic for Europe as well as for the U.S. In Europe there was a remarkable drop in the number of applications from 2006 to 2008 and an equally noteworthy recovery in 2009. The development in patent applications has been the opposite in the U.S. which experienced increasing figures from 2006 to 2008 and a sudden drop from 2008 to 2009. Comparing the index for recycling in Europe with all sectors in Europe, two different development paths can be seen. This means that the growth in patent applications is remarkably lower for recycling than for all the sectors up till 2009, when the number of applications within recycling reached the level for all sectors (see figure 1.5). However, it should be noticed that the drop for all sectors between 2008 and 2009 is a historical decrease ascribed to the economic downturn, since the number of applications for all sectors has been increasing from 1977 to 2008. It should also be noted that the absolute number of patent applications relating to this market is rather small both for Europe and the U.S., when compared with some of the other lead markets.

[140] The name of the web site is: www.wipo.int

[141] For Recycling, the following two filters have been applied for the search in the EPO and UPSTO: Recycling waste, Recycle material. Each term was put in quotation marks, which ensures that they are all treated as a single search termthe following keywords have been used for the search.

Figure 3.21: Index of patent applications comparing recycling and all sectors.

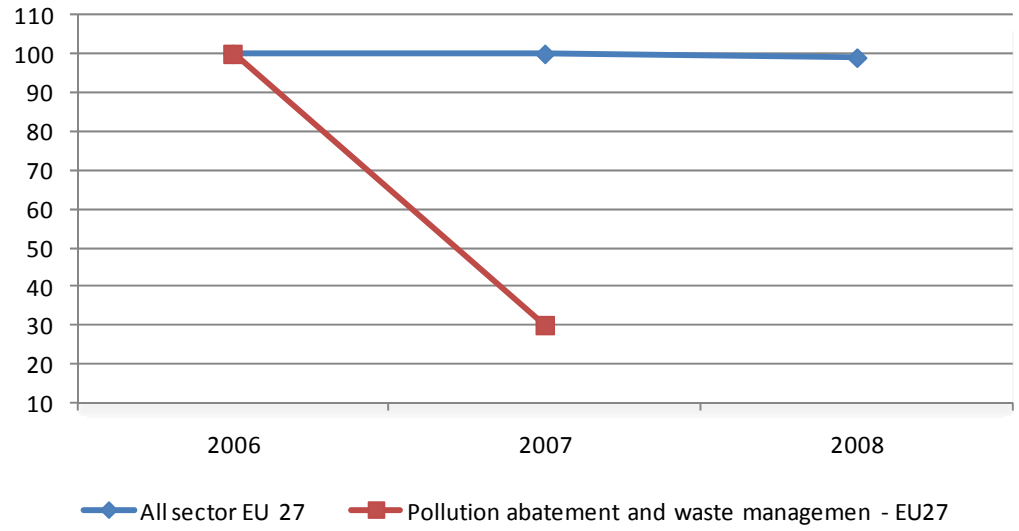


A development path such as the one for recycling above, called for further research on statistical data of patent applications for recycling. A search of patents by technology in OECD Stat has been done, focusing on 'Pollution abatement and waste management'[142] for the EU27, which is the most accurate technology field for recycling within the database[143]. Comparing the findings from the EPO with data from OECD, however, shows a similar development. A dramatic decrease in recycling patents is seen compared to the general development in patents between 2006 and 2007 (see figure 3.22).

[142] Pollution abatement and waste management cover "air pollution abatement, water and wastewater treatment, and solid waste management" techniques.

[143] The data from OECD Stat covers patents granted while the data from WIPO covers applications, which can explain the differences in index value. However, it still makes sense to compare the two sources of information since we are looking at a development pattern.

Figure 3.22: Index of patent applications comparing recycling and all sectors.



Note Data for 2008 and 2009 are not available.

Source: OECD.Stat, Mach 2011

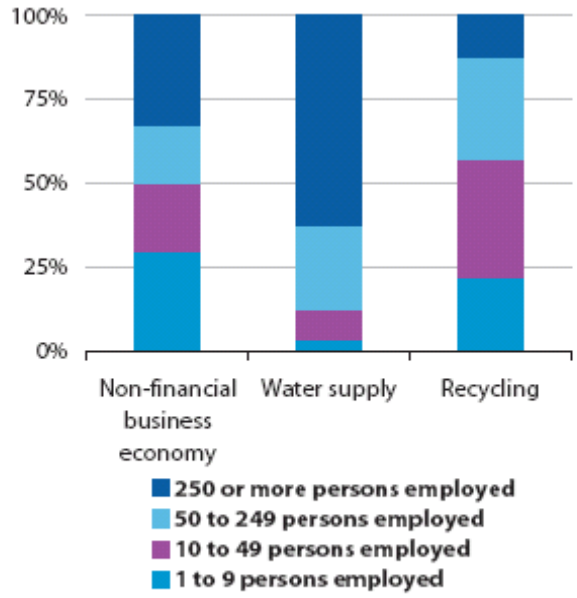
Size structure

There is a lack of data on enterprise foundations for the recycling market. However, in this instance it is possible to provide a short description of the size structure of the sector, allowing an appreciation of the dynamics of the sector.

The Recycling sector is made up of over 60,000 companies in the EU. Of these, 3% are large, 28% are medium and 69% are small[144]. The recycling sector is thus characterised by a significant presence of small and medium sized enterprises. This is the opposite size structure of the waste management sector, which is characterised by a few large firms[145] (see figure 1.5). Recycling enterprises are typically local firms, whereas the waste management enterprises are often international companies. However, according to the Ernest & Young report in 2006, some mechanical waste sorting and recycling processes are increasingly done on an international scale, since the most technologically advanced processes demand a large investment, substantial fixed costs and a higher minimum scale of operation.

[144] European Commission (2007): A lead market initiative for Europe Explanatory Paper on the European Lead Market Approach: Methodology and Rationale - Annex II. See also: Report of the Task Force on Recycling, 2007: Accelerating the Development of the Market for Recycling in Europe.
[145] Ernest & Young (2006): Study on Eco-Industry, its size, perspective and barriers to growth in an enlarged EU. And Eurostat, European Business 2009 – Facts and figures, chapter on water supply and recycling.

Figure 3.23: Recycling, collection and distribution of water (NANCE Division 37 %41): Share of employment by enterprise size class, EU-27, 2006



Source: Eurostat (SBS)

Source: Eurostat, European Business (2009): Facts and figures, chapter on water supply and recycling

Key findings

The key findings for recycling can be summarised as follows:

- While the recycling sector's turnover was originally estimated to be € 24.0 billion in 2006, on the basis of the 2009 study by ECORYS, which uses a broader definition of the sector, the evaluation team believes that a better baseline figure is € 42.4 billion. Using this estimate, the total projected turnover in 2010 is € 47.3 billion, and € 63.5 billion in 2020, applying an annual 3 % growth rate as suggested by the German Federal Ministry for Environment, Nature Conservation and Nuclear Safety.

- Comparing these estimates with turnover data from the United States' recycling sector shows that the recycling sector is a market with high strategic and economic potential. When taking future development expectations into consideration, the outlook for the recycling sector is further strengthened. This is because the sector is expected to growth within the EU because of consumption and technological developments.

- With regard to employment, the recycling sector within the EU was estimated to have employed 1.2 million in 2006, which corresponded to the employment level in the United States. Furthermore, the employment development was expected to show an increase between 2006 and 2010 and then fall between 2010 and 2020, to end at 1.22 million in 2020.

- Exports for the recycling market are expected to increase. From 2007 to 2009 the export of recovered paper increased with 16% per year from 9.8 million tons to 13.2 million according to PRODCOM.

- With regard to public procurement, the review found that the recycling sector experienced a high increase between 2008 and 2010, compared to the general development in public procurement within all sectors. In general, this indicates a strong development in the recycling area.

- The number of patents applications decrease dramatically between 2006 and 2008 to a level well beneath the level for all sectors. Recycling patents had a noticable increase in 2009 to the same level as all sectors. The dramatic swing for patent applications for recycling is supported by data from OECD that show the same development within patents granted between 2006 and 2007. The development in patent applications in Europe has been the opposite to the U.S. that has experienced increasing figures from 2006 to 2008 and a sudden drop from 2008 to 2009.

3.3.5 Renewable Energy

Sustainability has been on the world's agenda, at least since the Kyoto Protocol in 1997 and has moved steadily up the policy agenda. Renewable energy sources have been ascribed a leading role in reducing the emission of greenhouse gasses and replacing traditional energy sources such as coal and fossil fuels with sustainable alternatives. The demand for renewable energy is policy driven to a significant extent. An example of this is to be found in data from the European Patent Office, which show that a surge of patenting activity in clean energy technologies coincided with the adoption of the Kyoto Protocol in 1997. Furthermore, in March 2007 the European Council set a binding target of a 20% share for renewable energy in EU energy consumption by 2020. This target offers producers a huge opportunity to develop while cutting production costs. Renewable energy is therefore a market of high strategic and societal importance.

The renewable energy sector covers a wide range of products, technologies and processes from actual production (i.e. solar cells) to design and management activities. This presents a challenge in regard to statistical data. However, some attempts have been made to define the sector.

Renewable energy is referred to by the European Commission as "energy that can be derived from regenerative energy sources like wind, solar, biomass, biodegradable waste or feedstock, geothermal, wave, tidal and hydropower."[146] Annex II has extended this definition to include: "…[renewable energy] transformed into electricity, heating/cooling or transport fuels (biofules)."[147] In the European Commission DG Environment report from 2006, a somewhat more precise definition is attempted:

> *"Renewable energy is the production of equipment, technology or specific materials, or design, construction, installation, management or provision of other services for the generation,*

[146] Communication from the Commission to the Council, the European Parliament, the European economic and social Committee and the Committee of the regions, A Lead Market Initiative for Europe, 2007. See also: http://ec.europa.eu/enterprise/leadmarket/renewable_energies.htm

[147] EC (2007): A lead market initiative for Europe Explanatory Paper on the European Lead Market Approach: Methodology and Rationale - Annex II. P.73.

collection or transmission of energy from renewable sources, including biomass, solar, wind, tidal, or geothermal sources." [148]

However, this definition still covers a broad range of intermediate products, product components, and ready-made products and no NACE codes corresponding precisely to the renewable energy sector are available[149]. As with other markets, research has primarily relied on secondary sources.

Overview of literature and gaps

As already indicated, there are different definitions relating to the renewable energy sector, although often have common elements. In term of arriving at a clear definition, the 2006 report on the structure and characteristics of Eco-industry by DG Environment is important.[150] This study is regarded as especially relevant because it is one of the first and most comprehensive studies of EU eco-industry including renewable energy and it builds on an earlier study from 2002[151]. Furthermore, it uses the same definition as the OECD and Eurostat, established in the OECD publication "The Environmental Goods and Services Industry: Manual for Data Collection and Analysis" in 1999.

The eco-industry is defined as:

'Activities which produce goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. This includes technologies, products and services that reduce environmental risk and minimise pollution and resources'

Within this, the renewable energy sector is defined as:

'…the production of equipment, technology or specific materials, or design, construction, installation, management or provision of other services for the generation, collection or transmission of energy from renewable sources, including biomass, solar, wind, tidal, or geothermal sources.'

These definitions have guided the review during the evaluation of a number of studies statistical sources.[152]

[148] European Commission DG Environment report (2006): Eco-industry, its size, employment, perspectives and barriers to growth in an enlarged EU, p.17

[149] Edler et al. (2009): Monitoring and Evaluation Methodology for the EU Lead Market Initiative. A Concept Development.

[150] European Commission report (2006): Eco-industry, its size, employment, perspectives and barriers to growth in an enlarged EU

[151] Analysis of the EU Eco-industries, Their Employment and Export Potential," ECOTEC for the European Commission, 2002.

[152] The most significant are :
Employ-RES research study conducted on the behalf of the European Commission DG Energy and Transport (April 2009): The impact of Renewable Energy Policy on Economic Growth and Employment in the European Union.
European Commission (2007): A lead market initiative for Europe Explanatory Paper on the European Lead Market Approach: Methodology and Rationale - Annex II.
ECORYS (October 2009): Study on the Competitiveness of the EU eco-industry. Final report – Part 2.

Performance data

Again with renewable energy, it has been difficult to match the lead market to NACE or PRODCOM codes and the approach adopted has been pragmatic, meaning that the definition closest to that used in the DG Environment's report from 2006 has been applied.

Based on the proposal of the Mid-term Review, the statistical assessment of bio-based products is based on the following four indicators:

- Volume of turnover
- Volume of employment
- Public procurement
- Patent applications

Volumes of turnover and employment

According to Annex II, the European renewable energy sector in 2006 had a € 25 billion turnover; a number that was expected to growth to € 79 billion in 2020 assuming a 20% share of renewable sources[153]. A more recent study from ECORYS estimates that the total turnover of the renewable energy sector in 2006 accounted for around € 52.6 billion. The same study also estimates that the sector has an annual growth rate of 10%, which results in a total turnover of around € 77 billion for 2010 and around € 199 billion for 2020[154]. According to the European Renewable Energy Council's web statistics, the renewable sector in 2009 had € 70 billion in turnover – an increase from € 15 billion in 2006. This equates to an annual growth rate of 67% in the 2006 – 2009 period (see figure 1.1)[155].

Furthermore in the Mid-term Progress Report, the renewable energy sector is estimated to have had a turnover of € 58 billion in 2005, which led to an estimate of total turnover in 2006 of € 62.9 billion[156]. The data in the Mid-term Progress Report are based on a study from DG Energy and Transport, where the turnover for 2010 and 2020 are estimated at € 64.8 billion and 99.1 billion; which correspond to an annual growth rate of 3%. It should be noted that the estimates are based on a business as usual scenario, which means renewable energy policy actions as in the current situation.

In table 3.15 the estimated turnover by the different studies are summarised.

Table 3.15: Turnover (billion Euros) renewable energy sector according to different studies

	2006	2010	2020
Annex II	25.0	34.6[157]	79.0

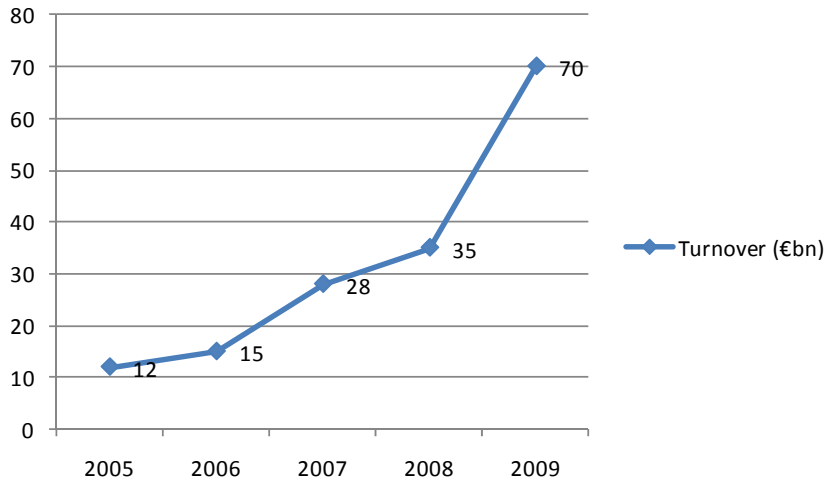
[153] EC (2007): A lead market initiative for Europe Explanatory Paper on the European Lead Market Approach: Methodology and Rationale - Annex II
[154] ECORYS (2009): Study on the Competitiveness of the EU eco-industry. Final report – Part 2.
[155] The data in figure 1.1 for EREC is found at: http://www.erec.org/statistics/turnover.html
[156] The annual growth rate of 8.5% estimated in Annex II is applied to the 2005 figure (58 billion) to get the 2006 data (62.9 billion).
[157] Own calculation based on annual growth rate of 8.5% estimated in Annex II.

ECORYS	52.6	77.0	199.0
EREC	15.0	76.0[158]	171.7[159]
Mid-term Progress Report	62.9[160]	64.8[161]	99.1[162]

The different studies would appear to use different definitions of the renewable energy sector. However, examination of the detail of the definitions suggests that they are fairly similars[163]. One possible explanation is suggested by the comment by the Commission services that employment data from Annex II only includes figures for the biofuel sector. If the same applies to the turnover data, this could be why the data from Annex II differ so much from data from other studies. It should be noted, however, that this does not explain the 2006 turnover figure estimated by the European renewable Energy Council.

[158] Own calculation based on the total turnover 2009 (70.0 billion) applied the in Annex II estimated annual growth rate of 8.5% (76.0 billion).
[159] Own calculation based on the total turnover 2009 (70.0 billion) applied the in Annex II estimated annual growth rate of 8.5% (171.7 billion).
[160] Own calculations based on an annual growth rate at 8.5% estimated in Annex II. The annual growth rate of 8.5% is applied to the 2005 figure (58 billion) to get the 2006 data (62.9 billion).
[161] Employ-RES research study conducted on the behalf of the European Commission DG Energy and Transport (2009): The impact of Renewable Energy Policy on Economic Growth and Employment in the European Union.
[162] Employ-RES research study conducted on the behalf of the European Commission DG Energy and Transport (2009): The impact of Renewable Energy Policy on Economic Growth and Employment in the European Union.
[163] European Renewable Energy Council includes the following areas to define the sector: bio energy, geothermal energy, hydropower, ocean energy, photovoltaic, solar thermal, solar thermal electricity and wind energy. Whereas, ECORYS defines the sector by: hydro, biomass, wind, geothermal energy, solar power and solar thermal. Finally, the study from DG Energy and Transport defines the renewable energy sector by the following categories: 1) RES-Electricity (E) capacity and production data: hydropower (large (>10 MW) and small (<10 MW)), photovoltaics, solar thermal electricity, wind energy (onshore, offshore), biogas (including landfill gas, sewage gas and gas from animal slurries), solid biomass, biodegradable fraction of municipal waste, geothermal electricity, tidal and wave electricity, 2) RES-Heat (H) capacity and production data: grid and non-grid connected biomass (including wood, agricultural products and residues), renewable municipal solid waste, biogas, solar thermal (grid and non-grid), geothermal (grid and non-grid - incl. ground coupled heat pumps),ad 3) RES-Transport (T): biodiesel, bioethanol, advanced biofuels.

Figure 3.24: Annual Turnover of the Renewable Energy Industry in the EU (2005-09)



Source: EREC 2011

Data in Annex II also contains figures for the growth share in renewable energy attributed to the LMI. This is estimated as the difference between achieving the goal of a 20% share in 2020 and the share of renewable energy in 2020 if the policy has no impact (see table 3.16).

Table 3.16 Expected market growth (billion Euro) Renewable energy

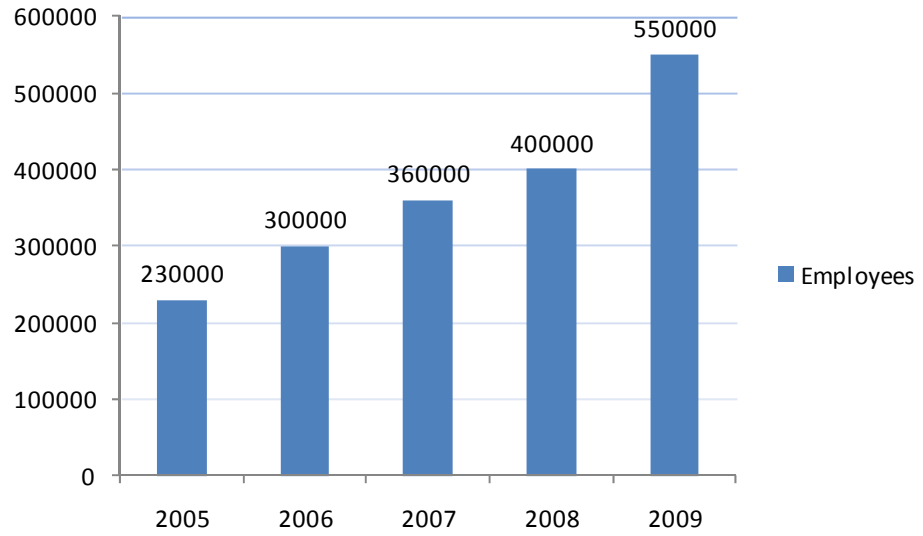
	Volume of the new markets products/services in the EU in 2006	Volume of the new markets products/services in the EU in 2020	Growth in volume resulting from market development and policy initiatives, 2006-2020	Growth share attributed to the Lead Market Initiative and related policies in 2020	Cumulated growth share attributed to Lead Market Initiative and related policies, 2006-2020
Based on Trends to 2030 - Update **2005**	25.0	79.0	54.0	38.0	266.0
Based on Trends to 2030 - Update **2009**	25.0	79.0	54.0	21.0	150.0

According to the latest information (Trends to 2030 – Update 2009), the share of renewable energy in 2020 in the absence of a policy impact will be 14.8%, corresponding to a market volume of € 58 billion[164]. The additional benefit would therefore be €21 billion (instead of 38 billion) and the cumulative benefit would be in the region of € 150 billion (see table 3.16). Thus, according to the latest information, the cumulated growth attributed to the LMI is reduced compared to the first estimate in 2007.

However, there are considerable differences between energy technologies and also between countries. For example, the wind sector enjoys growth rates of 25% per year while the solar photovoltaic sector has had growth rates of 40% in the last year[165]. A development there also is reflected in public procurement data (see later section).

According to the Annex II, the renewable energy sector in 2006 employed 300,000 and is expected to employ 634,000 in 2020[166]. The sector is estimated to have an annual growth rate of 5.5%, which leads to an estimated employment of around 372,000 in 2010. However, according to a more recent study from 2009 the sector employed 450,000 in 2006 [167], which results in an employment of around 557,000 in 2010 when the estimated annual growth rate of 5.5% is applied. If these figures are supplemented by data from the European Renewable Energy Council's web statistics, the development in employment for the renewable energy sector in the period 2006 – 2009 shows that the estimated 634,000 employees in 2020 was almost achieved by 2009 (see figure 3.25). The figures from the European Renewable Energy Council also show that the sector experienced an annual growth rate of 22% between 2006 and 2009.

Figure 3.25: Jobs provided by Renewable Energy Industry in the EU (2005-2009)



[164] DG Energy (2010): EU energy trends to 2030 – Update 2009.
[165] EC (2009): Lead Market Initiative for Europe – Mid-term progress report, Commission Staff Working Document.
[166] EC (2007): A lead market initiative for Europe Explanatory Paper on the European Lead Market Approach: Methodology and Rationale - Annex II
[167] ECORYS (2009): Study on the Competitiveness of the EU eco-industry. Final report – Part 2.

Source: EREC 2011[168]

If the annual growth rate of 5.5% is applied to the figures from the European Renewable Energy Council, the employment in 2010 is estimated to be approximately 580,000 and the number for 2020 is around 991,000[169] (see table 3.17).

Lastly, based on a study from DG Energy and Transport from 2009, the total employment in 2005 is estimated to be around 1.4 million, a figure that increases to 1.47 million in 2010 and 2.3 million in 2020[170]. Such a development accounts for an annual growth rate of 3% (see table 1.3)[171].

Table 3.18: Expected job creation Renewable energy

	Jobs depend on the new products/services in the EU in 2006	Jobs depend on the new products/services in the EU in 2020	Growth in jobs resulting from market development and policy initiatives 2006-2020	Growth in jobs attributed to LMI and related policies 2006-2020
Based on Trends to 2030 - Update **2005**	300.000	634.000	334.000	304.000
Based on Trends to 2030 - Update **2009**	300.000	634.000	334.000	164.000

According to the latest information from DG Energy (EU Trends to 2030 – Update 2009), the share of renewable energy in 2020 in the absence of energy policy impacts will be 14.8%, corresponding to an employment figure of 470,000[175]. The cumulative benefit of the LMI would thus be 164,000 instead of 304,000 (see table 3.18).

As the literature review reveals, there are big discrepancies in the employment levels estimated in the renewable energy sector, which might be explained by the use of different sector definitions. However, as mentioned earlier, comments from the Commission services suggest the 2006 figures in Annex II are too low since they only include employment data for the biofuel sector. Still this explanation does not account for the 2006 figure from EREC since they include the electricity, heating and cooling and transport sectors based on the following renewable energy areas:

- Bio energy
- Geothermal energy
- Hydropower
- Ocean energy
- Photovoltaic
- Solar thermal
- Solar thermal electricity
- Wind energy

Also, employment data from Germany alone shows that in 2006 231,000 people were employed in the renewable energy sector[176], which further indicates that the estimated 300,000 in 2006 for the EU27

[175] DG Energy (2010): EU energy trends to 2030 – Update 2009.
[176] ECORYS (2009): Study on the Competitiveness of the EU eco-industry. Final report – Part 2.

seems an underestimation. On the other hand, the employment estimate from the Mid-term progress report seems overestimated since the renewable energy sector worldwide employs 1.5 million, a number that is expected to increase to 4.5 million by 2020.

Public Procurement

The extent of public procurement in the market for renewable energy was again estimated through a selective search of the TED database.[177] This method makes sure that every tender containing these themes are found, but it also means that a lot of product groups in the area of renewable energy are excluded from the search. Thus, it is important to note that the figures should be considered as being indicative rather than exhaustive.

Table TED public procurement calls 2006 - 2010

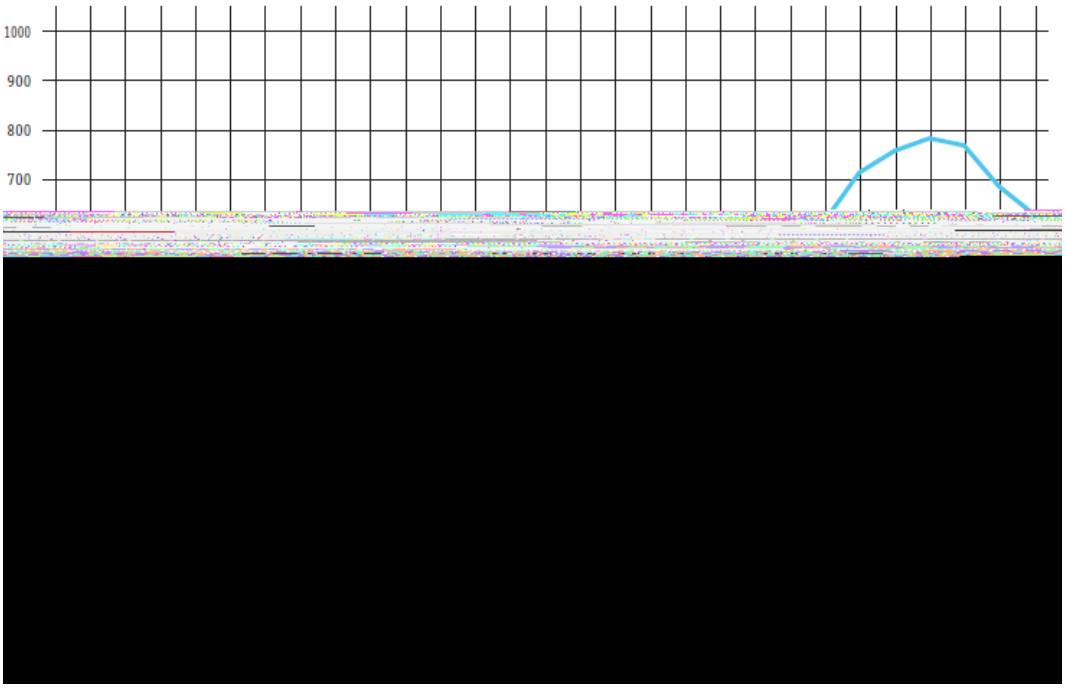
		2006	2007	2008	2009	2010
Renewable energy	Number of tender calls	102	161	209	234	348
	Index of tender calls	100	158	205	229	341

According to the TED data, public procurement within the renewable energy sector has experienced a dramatic increase from 2006 to 2010 compared to the development in public procurement in all sectors. Furthermore, in contrast to other sectors there was a steady increase year-on-year throughout the period. More detailed research has shown that the solar sector in particular has experienced a positive development since the procurement within the sector had an annual growth rate of 119% between 2006 and 2010. A development that is also reflected in the turnover for the renewable energy sector is the solar photovoltaic sector's growth rate of 40% in the last year[178]. The situation is clearly seen in Figure 3.26.

[177] There was no data available for biomass, biodegradable waste, wave, tidal and hydropower. Thus, the data include geothermal energy, wind power and solar energy. The search terms used were : 'Geothermal'; 'Wind power'; 'Solar; Biomass'; 'Biodegradable waste'; 'Wave energy'; 'Tidal power'.
[178] EC (2009): Lead Market Initiative for Europe – Mid-term progress report, Commission Staff Working Document.

Figure 3.26: Index of tender calls in the TED database comparing renewable energy and all sectors.

Figure 3.27: Growth rate of claimed priorities patenting for the selected CETs



Source: UNEP, the European Patent Office (EPO) and the International Centre for Trade and Sustainable Development 2010

The six leading countries with actors innovating and patenting CETs are Japan, the United States, Germany, the Republic of Korea, the United Kingdom and France. Aside from geothermal, concentration in all CETs is relatively high. Notably, the top six countries account for almost 80% of all patent applications in the CETs reviewed, each showing leadership in different sectors[182].

As recommended in the Edler et al. report, the approach of this study regarding patent applications has been to search the archive of the European Patent Office (EPO). Using the Patentscope search service makes it possible to access the archive of the EPO from 1977 to 2009 and search for patent applications that contain references to one of seven relevant product groups[183] . For the US patent applications, a similar search has been conducted in the database of the United States Patent and Trademark Office (UPSTO). Applying this search method does mean that it is possible some relevant patent applications are not included, but the results are still strongly indicative of the performance of the sector overall.

[182] UNEP, the European Patent Office (EPO) and the International Centre for Trade and Sustainable Development: Patents and clean energy: bridging the gap between evidence and policy. Final report

[183] For Renewable energy, the following seven filters have been applied for the search in the EPO and UPSTO: Geothermal; Wind power; Solar; Biomass; Biodegradable waste; Wave energy; Tidal power. Each term was put in quotation marks, which ensures that they are all treated as a single search termthe following keywords have been used for the search.

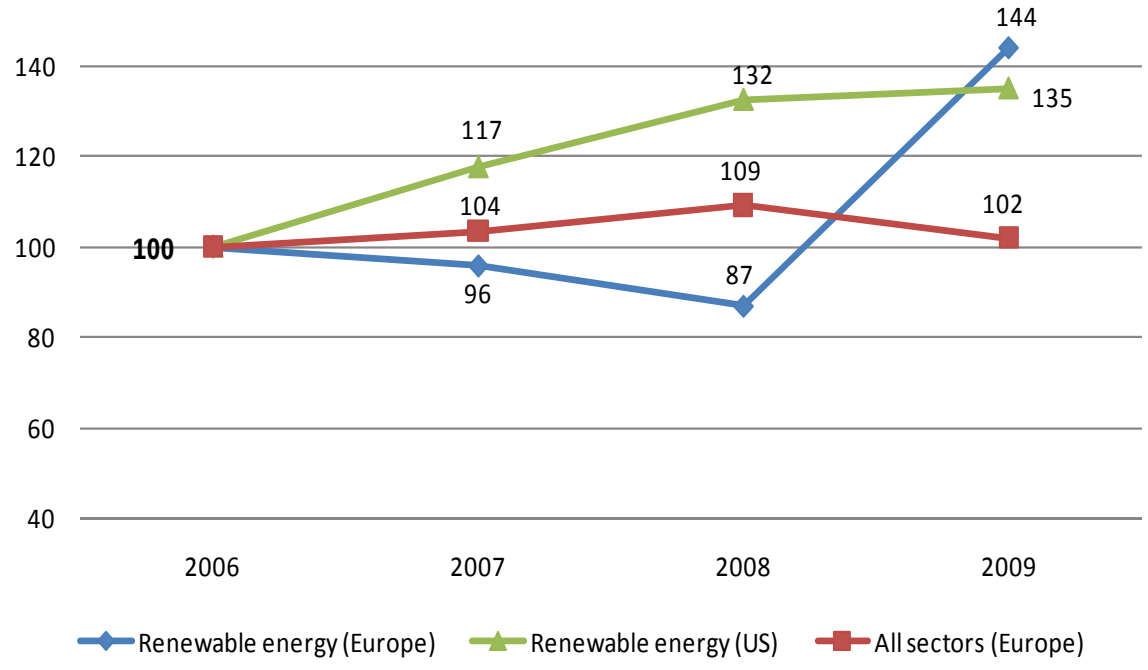
Table 3.19 Patent Applications in Europe and U.S. (2006 – 2009)

		2006	2007	2008	2009
Renewable energy (Europe)	Number of patents	8,433	8,080	7,329	12,139
	Index of patents	100	96	87	144
Renewable energy (US)	Number of patents	9,146	10,745	12,109	12,339
	Index of patents	100	117	132	135

Source: World Intellectual Property Organization, United States Patent and Trademark Office

In Europe there was a fall in the number of patent applications from 2006 to 2008 and the rate of applications fell below that for all sectors, but from 2008 to 2009 there was a surge in the number of applications in both absolute and relative terms. From having an index value below the index value of all sectors in Europe, the index of patent applications in Europe reached a level above all sectors and the U.S. in 2009. In the U.S. the development in the index of patent applications has been far steadier and has been increasing since 2006.

Figure 3.28: Index of patent applications comparing renewable energy and all sectors.



Further research reveals that the biggest annual growth rates in patent applications between 2008 and 2009 are found within biodegradable waste, geothermal, biomass and tidal power, which has experienced growth rates of between 32% and 88%. Furthermore, this increase is noteworthy since it

appears at a time where the number of patent applications for all sectors is decreasing as a result of the general economic downturn.

Key findings

The key findings for the renewable energy sector can be summarised as follows:

- In regard to turnover for the renewable energy sector, the literature review has shown very big variations in estimates. The most pessimistic estimate for turnover in 2010 is 34.6 billion, which is found in Annex II[184], whereas the most optimistic estimated turnover is given in a study by ECORYS[185], where the turnover for 2010 is estimated to be € 77 billion. In Annex II the annual growth rate for the sector is estimated to be 8.5%, which results in a projected turnover in 2020 of € 79 billion, assuming a 20% share of renewable energy sources. In the study from ECORYS an annual growth rate of 10% is estimated, which would result in a total turnover of € 199 billion for 2020. These different expected annual growth rates show how difficult the development within the renewable energy sector is to predict. As the literature review also reveals, there are big internal growth potentials in the sector since, for example, the wind sector has experienced growth rates of 25%, while the solar photovoltaic sector has experienced an annual growth rate of 40%[186].

- Such discrepancies in estimated turnover lead to the speculation that the different studies use different definitions of the sector. However, the literature review shows that this does not seem to be the case since the studies use fairly similar demarcations of the renewable sector. A possible explanation of the differences can be found in comments by the Commission services that the employment data for the renewable energy sector may be solely based on data for the biofuel sector. If this assumption also applies to the figures for turnover, this could explain the differences.

- With regard to employment, the literature review has revealed very different estimates. According to Annex II[187], the renewable energy sector in 2006 accounted for a total employment of 300,000 and is estimated to increase to 634,000 in 2020. It has not been possible to get updated or accurate employment data since the discrepancies between the varying studies are very high, although the studies all appear to agree on the estimated annual growth rate - 5% to 5.5%.

  The starting point is more of a problem, with estimates for the number of jobs in 2006 that vary from 300,000 to 1.47 million. The 300,000 figure used in Annex II appears to be an underestimation arising because the figure is based only on employment data for the biofuel sector. This is clear in that employment data from Germany alone show that in 2006 231,000 people were employed in the renewable energy sector[188]. On the other hand, the 1.47 million mentioned in the Mid-term Progress Report[189] based on a study by DG Energy and Transport in 2009 seems to be an

[184] EC (2007): A lead market initiative for Europe Explanatory Paper on the European Lead Market Approach: Methodology and Rationale - Annex II.
[185] ECORYS (2009): Study on the Competitiveness of the EU eco-industry. Final report – Part 2.
[186] DG Energy (2010): EU energy trends to 2030 – Update 2009.
[187] EC (2007): A lead market initiative for Europe Explanatory Paper on the European Lead Market Approach: Methodology and Rationale - Annex II
[188] ECORYS (2009): Study on the Competitiveness of the EU eco-industry. Final report – Part 2.
[189] EC (2009): Lead Market Initiative for Europe – Mid-term progress report

overestimation. This is because the renewable energy sector worldwide employs 1.5 million, a number that is expected to increase to 4.5 million by 2020.

Somewhere in between are the estimates from the European Renewable Energy Council. According to the Council, the 300,000 employees in 2006 is correct but from 2006 to 2009 the sector has experienced an annual growth rate of 22%, which results in a total employment of 550,000 in 2009. If it is estimated that the employment figure is 550,000 in 2009, then it would seem plausible that the number of jobs reached in 2020 will be higher than the expected Annex II figure of 634,000 jobs in 2020[190].

- Public procurement in the renewable energy market had a remarkable increase over the period 2006 to 2010 and is by far the leading market in terms of the overall level of public procurement. In 2009 to 2010 especially, there was a sharp rise in the index from 229 to 341. Further research showed that the solar sector in particular has experienced a positive development, since the procurement within the sector has an annual growth rate of 119% between 2006 and 2010.

- In relation to patent applications, there was also a remarkable development in the renewable energy sector. Although the increase in the number of patent applications within the sector was well below the level for all sectors in 2007 and 2008, there was a major surge in 2009 both relatively and absolutely, thus reaching a higher index value than all sectors and greater than that in the U.S. Further research reveals that the biggest annual growth rate in patent applications between 2008 and 2009 are found within biodegradable waste, geothermal and biomass plus tidal power, which has experienced growth rates between 32% and 88%. Furthermore, this increase is noteworthy since it appears at a time where the number of patent applications for all sectors is decreasing as a result of the general economic downturn.

3.3.6 Sustainable Construction

Sustainable construction can be seen as a dynamic combination of developers, investors, the construction industry itself, professional services, industry suppliers and other relevant parties who all aims to achieve sustainable development, seing construction in a broader environmental, socio-economic and cultural context. The market embraces a number of different aspects of construction such as design and the services associated with the management of buildings and constructed assets, the choice of materials, and the optimization of building performance and also interaction with urban and economic development and management. Different approaches to sustainable construction may be followed according to the local circumstances. In some countries, priority is given to resource use (energy, materials, water, and land use), while in others, social inclusion and economic cohesion are the more determining factors[191].

Overview of literature and gaps

Sustainable construction is a specific section of the whole construction market and encompasses the whole value chain starting from construction materials, the construction sector itself and numerous value adding services. Consequently, it is extremely difficult to align a meaningful characterization of the

[190] This would mean a modest increase of 84,000 jobs corresponding to an annual growth rate of 1%.
[191] European Commission (2007): Report of the Taskforce on Sustainable Construction, Composed in the preparation of the Communication "A Lead Market Initiatve for Europe"

market for sustainable construction with particular NACE codes[192]. As in other sectors,there has had to be recourse to market studies [193].

The 2010ECORYS report on the Sustainable Competitiveness of the Construction Sector [194]

demolition activities also produce one of the largest waste streams even though a large part of it is recyclable[195].

Performance data

In view of the difficulties in identifying appropriate data, the statistical assessment of sustainable construction is based on the following four indicators:

- Volumes of turnover
- Volumes of employment
- Patent applications
- Public procurement

These elements have a determining role in shaping expectations and perceptions of the potential of the sector for sustainable construction and provide a basis for monitoring performance.

Volumes of turnover and employment

Based on the assumption that the market for sustainable construction has a share of 5% of the total market for construction, it is estimated in the Annex II that the market volume of sustainable construction was € 24 billion in 2006. Furthermore, Annex II projects a market volume of € 87 billion by 2020, which gives an annual growth rate of 9.6%. The underlying assumption for the projections is an annual growth rate of 5% in new construction and 3% in renovation. It is unclear how these relate to the stipulated growth rate of 9.6%, which seems to be excessive. The ECORYS report[196], suggests that the total EU construction market will grow by 70% from 2006 to 2020, giving an annual growth rate of 3.9%.

Scrutinising the estimations in Annex II raises other questions regarding the underlying assumptions. First, it is unclear how Annex II arrives at the estimated market volume of € 24 billion. It is assumed that the share of sustainable construction in the total market for construction is 5%, but to arrive at € 24 billion would imply that the overall size of the EU construction market was € 480 billion in 2006[197]. In the taskforce report[198], the overall size of the EU construction market in 2004 is reported as € 1,305 billion which is almost three times higher than € 480 billion. By assuming an annual growth rate of around 7%[199], the figure in the ECORYS report arrives at approximately € 1,880 billion in 2004 and at € 2,153 billion in 2006 for the overall construction market. Clearly there are some major discrepancies between the estimated figures, even though both sources base their estimations on data from EUROSTAT.

Applying the same estimation of €1,305 billion in 2004 as the one used in the taskforce report and an annual growth rate of 3.9% gives an overall market volume for the construction sector of €1,409 billion in 2006. By retaining the assumption that sustainable construction has a share of 5% of the total

[195] European Commission (2007): Report of the Taskforce on Sustainable Construction, Composed in the preparation of the Communication "A Lead Market Initiatve for Europe"
[196] ECORYS (2010): FWC Sector Competitiveness Studies – Sustainable Competitiveness of the Construction Sector
[197] 480*0,05 = 24
[198] European Commission (2007): Report of the Taskforce on Sustainable Construction, Composed in the preparation of the Communication "A Lead Market Initiatve for Europe"
[199] In the report two figures for the overall market for sustainable construction are mentioned: 2002 = € 1642 billion and 2007 = € 2317 billion. This gives an annual gr

construction market, the estimated market value for 2006 is € 70 billion. With the same fixed annual growth rate for the following years, the market volume for sustainable construction amounts to € 82 billion in 2010 and € 120 billion in 2020.

The 500,000 jobs in 2006 for sustainable construction estimated in Annex II follows from the underlying assumption that one employee generates on average € 100,000 per year. Annex II then estimates that the market volume in 2006 amounts to € 24 billion, but this is not consistent with the figure of 500,000 jobs, which would only be a reasonable estimate with a market volume of € 50 billion. However, the

ecological and social approach. This considerations might be expected to lead to changes in the target of measurements made of the sector.

- **The focus on initial costs:** many key decisions are taken on the basis of the lowest costs instead of quality, safety and environmental criteria and life-cycle costs. With actual tendering practices and the separation of the budgeting functions within the public sector, there is little incentive to propose solutions with a higher quality which match the customer's requirements, but this could change, not least following on from initiatives like the LMI and lead to a broader base within the construction sector.

- **The high proportion of small contractors working in a traditional way:** This group of market actors consists of a few large players and many micro and small businesses. The owners of these businesses look for job opportunities in their local areas and are often not inclined to invest time in innovation. Their main concern is to ensure order books for the next 6 to 12 months. This economic reality has an impact on the effectiveness of planning and design activities, and on training requirements and ultimately on the potential size of the market.

- **The fragmentation of the supply chain:** The supply chain is composed of many actors: (a) material suppliers, (b) producers of construction materials, (c) architects, engineers and designers, (d) contractors, (d) product distributors (e) service providers. There is a concern about the difficulty to integrate chosen specialists contractors and suppliers into efficient project teams and an effective supply chain. The knowledge generated in the process design and construction is often lost after the handing over of the project. Long term relationships may partly overcome this difficulty but there might be a concern to achieve a correct balance between competition and cooperation. Again these considerations act as a constraint on the potential size of a lead market within the sector.

Public Procurement

Public procurement represents a significant share of the construction sector market and the public sector, purchasing 40% of the total production value, is a major client[201]. In the area of sustainable construction, Green Public Procurement provides a framework for action with respect to environmental criteria. However, public clients rarely take up the opportunities available, especially for construction works falling outside of the scope of the EU public procurement directives. This might be because of legal uncertainties linked to the specific context of construction, to a lack of knowledge about environmental matters, to insufficient political and managerial support and to budgetary constraints.

Table 3.20 TED public procurement calls 2006 - 2010

		2006	2007	2008	2009	2010
Sustainable construction	Number of tender calls	706	869	948	1072	1130
	Index of tender calls	100	123	134	152	160

[201] European Commission (2007): Report of the Taskforce on Sustainable Construction, Composed in the preparation of the Communication "A Lead Market Initiatve for Europe"

The search in the TED database on sustainable construction showed that public procurement has increased considerably from an index of 100 in 2006 to 160 in 2010, placing growth in sustainable construction calls for tender noticably higher than all sectors in the period from 2006 to 2010. This is a clear indication that public procurement in the area of sustainable construction has received a lot of attention recently.

Figure 3.30: Index of tender calls in the TED database comparing sustainable construction and all sectors.

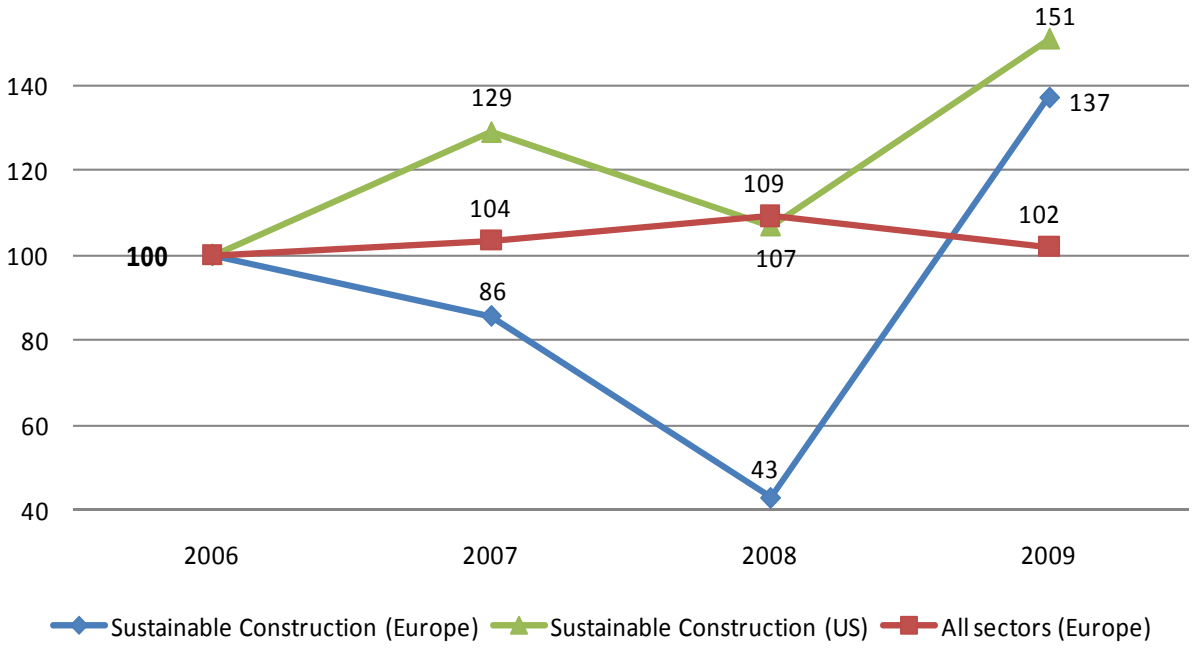
Table 3.21 Patent Applications in Europe and U.S. (2006 – 2009)

		2006	2007	2008	2009
Sustainable construction (Europe)	Number of patents	35	30	15	48
	Index of patents	100	86	43	137
Sustainable construction (US)	Number of patents	59	76	63	89
	Index of patents	100	129	107	151

Source: World Intellectual Property Organization, United States Patent and Trademark Office

Figure 3.31 below shows that the level of patent applications for sustainable construction in the period from 2006 to 2009 has been quite unsteady for Europe and the U.S. In 2009 the index for patent applications for sustainable construction increased significantly, especially in Europe from an index level of 43 in 2008 to an index level of 137 in 2009. However, prior to that, the level of patent applications decreased markedly in Europe over the period 2006 to 2008, while patent applications in the U.S. rose from 2006 to 2007 and fell again from 2007 to 2008. Comparing the index for sustainable construction in Europe with all sectors in Europe points to some clear differences between patent applications in the area of sustainable construction and that of applications overall. While the index of patent applications for all sectors has steadily increased from 2006 to 2008, showing a small drop from 2008 to 2009, the index for sustainable construction is more erratic, initially declining markedly and then recovering. It should also be noted that the absolute number of patent applications relating to this market is rather small both for Europe and the U.S., when compared with some of the other lead markets.

Figure 3.31 Index of patent applications comparing sustainable construction and all sectors



Key findings

The key findings of the study can be summarised, as follows:

- Scrutinising the estimates in Annex II of the market size of sustainable construction leads to the conclusion is that they are not reasonable. First, the estimate of € 24 billion in 2006 should be questioned and replaced, it is suggested, with an estimate of the market volume in 2006 of € 70 billion. Secondly, the future projections of Annex II must be regarded as too high and an annual growth rate of 3.9% used instead of the initially estimated annual growth rate of 9.6%. There are uncertainties related to the market for sustainable construction, and different interrelated factors can influence the market such as how sustainable construction is defined, the focus on initial costs, the high proportion of contractors working in a traditional way and the fragmentation of the supply chain.

- The 500,000 jobs in 2006 estimated in Annex II is said to depend on the underlying assumption that one employee on average generates € 100,000 per year. The jobs figure would then only be correct if the initial market volume in 2006 were € 50 billion. Retaining the basic assumption as a means of estimating employment in the market leads to revised figures of 700,000 jobs in 2006, 820,000 jobs in 2010 and 1.2 million jobs in 2020.

- The EPO and UPSTO archives show that the level of patent applications for sustainable construction in the period from 2006 to 2009 has been quite unsteady for Europe and for the U.S. In the latest year available (2009) the index for patent applications for sustainable construction in Europe increased significantly. However, this was after a considerable fall over the period from 2006 to 2008.

- The TED database shows that public procurement in the market for sustainable construction has increased considerably from and index of 100 in 2006 to 160 in 2010, placing increases in sustainable construction calls for tender noticeably higher than the increase across all sectors over the same period.

3.4 Current Perspectives for the Lead Markets

In order to establish an overview of where the lead markets stand after the detailed consideration of the individual markets in the last section and to facilitate assessments of any further progress, this current section first presents a summary of the changes needed in the figures for turnover and employment and then proposes a slightly extended set of indicators for each market on the basis of the information presented earlier. This set corresponds to those variables proposed by Edler et al. in the earlier work on methodology, modified to take account of data availability.

Examination of data at the level of the six markets has revealed that certain adjustments need to be made in both the initial baseline and in the estimates of likely future developments in the markets. These primarily relate to the values attributed to the turnover and employment variables in the initial characterisation of the lead markets. In fact, in some cases quite substantial revisions appear to be necessary both in relation to the market baseline in 2006 and to the growth expected up to 2020.

A summary of the proposed modifications to turnover estimates are first set out: These are as follows :

Table 3.22: Expected market growth in the six Lead Markets (billion Euro) – update 2011

	Market volume 2006 according to Annex II	Market volume 2006 (literature review 2011)	Market volume 2010 according to Annex II	Market volume 2010 (literature review 2011)	Market volume 2020 according to Annex II	Market volume 2020 (literature review 2011)
Bio-based Products	19.0	19.8	28.0	27.6	57.0	51.1
eHealth	21.0	13.5	23.3	15.1	30.0	20.1
Protective Textiles	8.8	10.0	10.3	11.7	15.2	17.3
Recycling	24.0	42.4	N/A	47.3	36.0	63.5
Renewable energy	25.0	62.9	34.6[203]	64.8	79.0	99.1
Sustainable Construction	24.0	70.0	N/A	82.0	87.0	120.0

[203] Own calculation based on annual growth rate of 8.5 % estimated in the Annex II

Similarly the figures relating to employment have to be revised :

Table 3.23: Expected job creation in the six Lead Markets – update 2011

	Jobs 2006 according to Annex II	Jobs 2006 (literature review 2011)	Jobs 2010 according to Annex II	Jobs 2010 (literature review 2011)	Jobs 2020 according to Annex II	Jobs 2020 (literature review 2011)
Bio-based Products	120,000	120,000	190,000	190,000	380,000	380,000
eHealth	250,000	250,000	275,000	275,000	360,000	360,000
Protective Textiles	205,000	235,000	210,000	239,000	228,000	259,000
Recycling	500,000	1,200,000	N/A	1,240,000	535,000	1,220,000
Renewable energy	300,000	300,000	372,000[204]	372,000	634,000	634,000
Sustainable Construction	500,000	700,000	N/A	820,000	870,000	1,200,000

From table 3.22 and 3.23 it is clear that the estimations established after examination of currently available data differ in important respects from the estimations in the Annex II. In making the estimations that the evaluation team proposes to use, the following issues have arisen :

- **The demarcation of the lead markets:** A basic issue is the definition of the sectors. Given the problem with matching the lead markets to NACE or PRODCOM codes, there is considerable scope for different approaches to the definition of the relevant sectors in the various market studies that provide the main alternative source of data. The estimation of the market size is then very sensitive to the precise way that the markets have been defined.

- **Growth rate assumptions:** There are different expectations and assumptions in Annex II and the market studies considered regarding the projected size of the markets. It is usual for estimates of the future size of markets to be based on the assumption of a single growth rate over the period, but differing assumptions are made about the growth rates to be used. As a result of the data review various growth rates have been changed e.g. the annual growth rate for sustainable construction has been adjusted from a level of 9.6 % to 3.9 %.

- **Calculation methods:** Other assumptions feed into the calculation method and some of these have been challenged. For instance, the estimates in Annex II for bio-based products are based on the assumption that the exchange rate is fixed at 1.3 USD/EUR over the whole period of 2006 to 2020. This is certainly questionable and it is proposed that the exchange rate be adjusted.

[204] Own calculation based on annual growth rate of 5.5 % estimated in the Annex II

- **The link between turnover and employment:** For the majority of the lead markets, there is no direct link between turnover and employment estimates. The exception is the lead market for bio-based products, where for want of any direct estimates, it is assumed that market growth is directly reflected in employment growth. So for bio-based products, the share of employees in the sector for bio-based products is assumed to be equal to the market share of the sector for bio-based products. This is not a very robust assumption, implying for instance that there will be no increase in labour productivity in the sector, but it is the best available basis for an estimate.

It will be apparent from these comments that the basic data for the lead markets is still very provisional. The evaluation team believes that it has been possible to make some improvements, but would still recommend that the figures be treated with more than usual caution.

On the basis of what is possible, however, and taking the revised figures for turnover and employment on board plus incorporating the data identified on patents and public procurement levels in the markets, it is possible to derive a core set of indicators for each market. The data for these indicators have already been presented in the previous section, but the following tables set them out in a clear and accessible form:

Table 3.24 Core indicators – bio-based products

Bio-based products						
Indicator	**2006**		**2010**		**2020**	
		Index		Index		Index
Turnover (€ billion)	19.8	100	27.6	139	51.1	258
Employment	120,000	100	190,000	158	380,000	317
Patents	6,296	100	4,559*	72*		
Public procurement	454	100	466	103		

* 2009

Table 3.25 Core indicators – eHealth

eHealth						
Indicator	**2006**		**2010**		**2020**	
		Index		Index		Index
Turnover (€ billion)	13.5	100	15.1	112	20.1	149
Employment	250,000	100	275,000	110	360,000	144
Patents	384	100	473*	123*		
Public procurement	464	100	255	55		

* 2009

Table 3.26 Core indicators – Protective Textiles

Protective Textiles						
Indicator	**2006**		**2010**		**2020**	
		Index		Index		Index
Turnover (€ billion)	10.0	100	11.7	117	17.3	173
Employment	235,000	100	239,000	102	259,000	110
Patents	68	100	43*	63*		
Public procurement	305	100	294	96		

* 2009

Table 3.27 Core indicators – Recycling

Recycling						
Indicator	**2006**		**2010**		**2020**	
		Index		Index		Index
Turnover (€ billion)	42.4	100	47.3	112	63.5	150
Employment	1,200,000	100	1,240,000	103	1,220,000	102
Patents	216	100	225*	104*		
Public procurement	215	100	364	169		

* 2009

Table 3.28 Core indicators – Renewable energy

Renewable energy						
Indicator	**2006**		**2010**		**2020**	
		Index		Index		Index
Turnover (€ billion)	62.9	100	64.8	103	99.1	158
Employment	300,000	100	372,000	124	634,000	211
Patents	8,433	100	12,139*	144*		
Public procurement	102	100	348	341		

* 2009

Table 3.29 Core indicators – Sustainable Construction

Sustainable Construction						
Indicator	**2006**		**2010**		**2020**	
		Index		Index		Index
Turnover (€ billion)	70.0	100	82.0	117	120.0	171
Employment	700,000	100	820,000	117	1,200,000	171
Patents	35	100	48*	137*		
Public procurement	706	100	1,130	160		

* 2009

Although to varying degrees, it is anticipated that all the lead markets will see significant growth in both turnover and employment, with the exception of recycling where growth in turnover is not expected to be accompanied by a corresponding growth in jobs.

The highest increase in turnover is expected for bio-based products increasing from an index level of 100 in 2006 to an index level of 258 in 2020. The lead markets protective textiles and sustainable construction are expected to follow a broadly similar path, although from substantially different bases, both reaching index 117 in 2010, and in 2020 reaching 173 and 171 respectively. The last three markets eHealth, recycling and renewable energy are expected to rise by approximately 50 % reaching an index level of about 150 in 2020. Overall, the total market volume for these six lead markets is expected to rise from € 218.6 billion in 2006 to € 371.1 billion in 2020, representing an increase of € 152.5 billion.

When looking at employment, the market for bio-based products is expected to have increased significantly to an index level of 139 in 2010, with a further rapid increase up to an index of 317 in 2020. The job market for renewable energy is also expected to increase considerably from index 124 in 2010 to index 211 in 2020. The employment level for sustainable construction has been calculated on the basis of the assumption that one employee generates € 100.000 per year on average, thus the index for employment directly reflects the index for turnover, resulting in index 117 in 2010 and 171 in 2020. For eHealth the increases in the level of employment almost correspond to the increases for turnover with index 110 in 2010 and 144 in 2020. The two lead markets protective textiles and especially recycling show the lowest level of development regarding employment – protective textiles is expected to increase to index 110 in 2020, whereas recycling is expected to maintain the status quo from 2006 to 2020. Overall, total employment in the six lead markets is expected to grow from 2.8 million in 2006 to 4.1 million in 2020, representing a job rise of 1.3 million jobs.

Public Procurement

As one of the potential drivers of the lead markets, the volume of public procurement is quite significant for their development over the period under consideration. The level of announcements of calls for tender has clearly been affected in the period considered by the recent adverse economic conditions and reductions in public expenditure in particular. However, these considerations do not really explain the somewhat erratic movements in the number of calls in the different markets seen over the period 2006 to 2010. It has not been possible to investigate the reasons for this variation in any depth, and at

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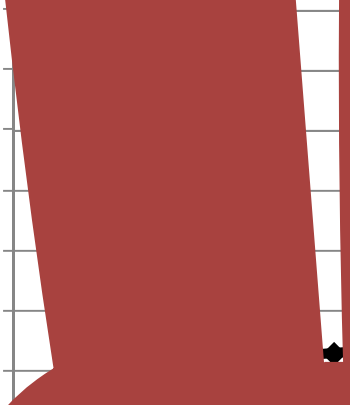


Bio-based products and protective textiles both have an index value below the index value for all sectors. The index for bio-based products has been a bit lower in the period from 2006 to 2010 than is the case for protective textiles. However while the index for protective textiles has decreased steadily over the whole period, the index for bio-based products shows a recovery, rising from an index of 87 in 2009 to 103 in 2010.

The index of tender calls for the last lead market, eHealth, shows that even though there was an increase in 2007, the market then experienced a steady decline from index 110 in 2007 to 55 in 2010.

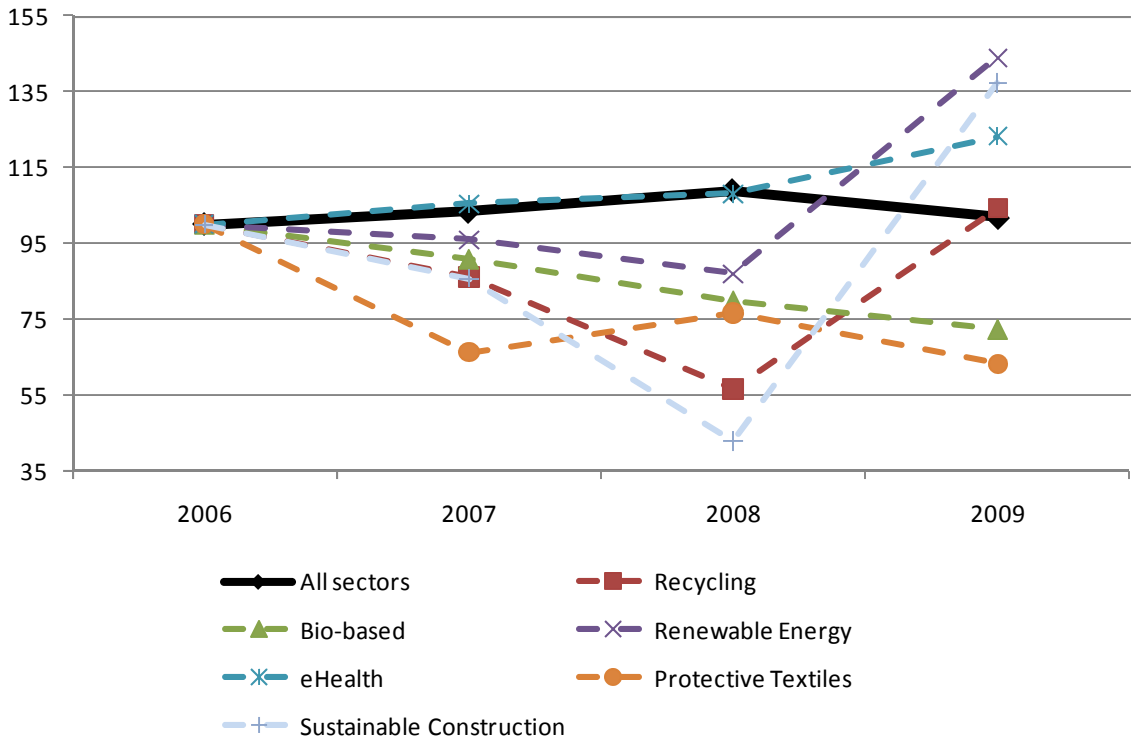
Patents

The number of patent applications generally declined over the period 2006 to 2008 and this pattern can also be observed in relation to the lead markets, with the exception of eHealth. 2009, the last year for which data are available, did see something of a recovery, especially in the case of renewable energy and sustainable construction. It should, however, be noted that there are considerable variations in the absolute numbers of patents associated with the different lead markets. Renewable energy and bio-based products are areas where there are many thousands of patent applications, while there are only tens associated with protective textiles and sustainable construction each year.

Figure 3.33 shows an index of patent applications comparing the development of each of the six lead markets with the development of all sectors. For each market, the relevant patent applications that contain the product groups listed for each of the lead markets have been identified. It will again be recalled that it is possible that not all relevant patent applications have been included, and the results should not be considered to be comprehensive, but rather an indication of movements covering a large part of the market.

It will be seen that for all sectors, the index increased from 2006 to 2008 - from a starting value of 100 to 109 in 2008. From 2008 to 2009, there was a small drop from 109 to 102, which is a remarkable reversal of a long term trend - the number of patent applications for all sectors had previously steadily increased over a period of 20 years.

Figure 3.33: Index of patent applications



Source: WIPO Database, March 2011

Three of the lead markets saw quite significant increases in patent applications in 2009. For renewable energy, the index value of patent applications from 2006 to 2008 was below the level for all sectors, but between 2008 and 2009 the pattern changed. Further research reveals that the biggest annual growth rates in patent applications in 2009 are to be found in biodegradable waste, geothermal and biomass and in tidal power; growth rates between 32% and 88% were experienced This increase is particularly noteworthy since it appears at a time when the number of patent applications for all sectors decreased as a result of the general economic downturn. Sustainable construction has also experienced a dramatic increase from index 43 in 2008 to index 137 in 2009. A less dramatic, but still impressive increase is found in recycling where the index moves from 56 in 2008 to 104 in 2009.

eHealth differs from the other lead markets and has increased quite steadily from an index of 100 in 2006 to 123 in 2009. In contrast, bio-based products and protective textiles decreased, the former to an index of 72 in 2009, while protective textiles had a small increase from an index of 66 in 2007 to 76 in 2008, after which the index value decreased again to a level of 63 by 2009.

In each case it has been possible to compare the number of patents applied for in Europe with those applied for in the United States. In general the US data shows a similarly erratic pattern in the numbers of patent applications across the different sectors, although not always in the same direction in any particular year. Broadly similar tendencies are observable, though the absolute numbers of applications are generally higher in the US, but with comparatively favourable performances for Europe in recycling .

The assumed effects of the LMI

In the initial characterisation of the lead markets, there was some consideration given to the possible impact of the Initiative itself in promoting the markets' development. In the figures given in Annex II, it was thought that 20 % of the anticipated growth in the markets could be attributed to the Initiative, with the exception of renewable energy, where the estimation is not based on the 20 % growth assumption, but on whether the Commission's target of a 20 % share of renewable energy sources in total energy will be reached by 2020. Political developments in this sector have great consequences for the market and for employment prospects. If a 20 % share of renewable energy is realised, then, according to the Annex II, the sector of renewable energy could grow to as much as 70 %.

The estimates given were said to be conservative, not least because of all the uncertainties in identifying and measuring impacts. For instance a positive impact on exports was not taken into account and a high increase in labour productivity was assumed, depressing the expected employment benefits.

It is certainly too early to comment on the effects of the Initiative on the size of the respective markets and the associated employment in 2020. Even nearer to this date, it will be difficult to attribute causality, especially to measures designed to improve the market environment. Furthermore, it has been seen that there is little evidence of the Initiative having much of an effect on the demand-side instruments, as indicated by procurement announcements, for instance.

Furthermore, in terms of the possible causes of change, it is not at all clear, which of the actions listed in the various Action Plans can definitely be attributed to the LMI, rather than other policy developments. The scale of the contribution is also such that it looks as if the ambition that was associated with early thinking on the Initiative continued to influence expectations about likely impacts, even after the limited 'pilot' nature of the Initiative was determined.

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The following sections take the evaluation to the next stage, by providing an assessment of the effects of the policy interventions, in the form of an account the actions undertaken in each of the six lead markets separately. Evidence for this assessment has largely been drawn from the interviews that have been conducted. The findings are broadly arranged in line with the evaluation questions that have been defined. This analysis will an important input into the overall assessment provided in the following chapter.

4.1 Introduction

The examination of the evidence base has provided information on the ways that the six targeted lead markets have been developing since the Lead Market Initiative was launched. This provides an important context for the overall evaluation, but it is only a first step. It is now necessary to begin a more detailed consideration of the effects of the policy actions undertaken under the Initiative. Here other forms of evidence come into play, notably in the form of information derived from the interview programmes and the survey of the Member States.

This assessment of the action programme of the Initiative begins with an overall account of how far the Action Plans for each of the six lead markets have actually been implemented. This is then followed by an examination of the effects of these actions in each market in turn, particularly when judged against the main evaluation criteria. This more detailed analysis, together with the data from the evidence base then provides the grounds for the assessment, to be found in the next chapter, of the overall orientation and achievements of the Initiative, including an examination of cross cutting issues, such as the effectiveness of the different policy tools and the extent of the engagement of the Initiative with developments in the Member States.

4.2 The Implementation of the Action Plans

At an early stage in the evaluation, an attempt was made to ascertain what had been the main developments since the Mid-term Progress Report, in relation to the Action Plans that were drawn up for each of the markets. Given the large number of actions overall, it was felt that the best way to obtain an overview of the progress across the Action Plans was conduct a mapping exercise and to present the results of this investigation in a schematic form. This is presented as Annex A.

In general, the Initiative has made very good progress with putting in place the actions defined in the Work Plan, in accordance with the pre-defined timescales. However, it should be noted that, because of the short time horizon for the Initiative, most actions were defined in terms that made meeting the initial objective reasonably straightforward. Follow-up and broadly-based implementation are a different matter. Some actions, for instance, were defined as making progress towards a certain goal. In addition, several actions involved initiatives that were not primarily influenced by the LMI, but were in the course of development anyway.

Despite this qualification, our analysis has shown that there has been substantial progress in implementing the main programme brought together in the LMI. This has happened at different speeds in the 6 different markets, often depending on the sensitivity of the sector, and the political willingness of the Member States, industry and other stakeholders to make progress.

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The following table provides an overview of the implementation of the six Action plans:

Table 4.1 Implementation of the LMI Action Plans

In the case of eHealth, for example, all actions were initiated according to the roadmap, but the majority are still ongoing. Legislative measures have been adopted, but there are problems with action 13, which concerned the introduction of an Electronic Health Insurance Card, where there are political sensitivities. In protective textiles and bio-based products, all actions - except one in each case - have been implemented as defined, but further action is required to have a major impact. Similarly, in the area of sustainable construction, all the actions are nearing completion.

In public procurement, the LMI saw the first ever application of EU funding (from the CIP) to establish networks of public procurement organisations. However, the budget available has meant that networks have only been put in place in protective textiles and construction. In addition, there have been actions to facilitate procurement in other areas, such as in e-health, where there have been opportunities for

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The diversity of complementary actions makes them particularly difficult to compare. Some, such as those in the e-Health area, have been important in driving the whole Initiative in that particular market and in fact in establishing the case for the regulatory and standards development that were also envisaged, but where it has been difficult to reach agreement. In other cases, advantage has been taken of developments that were under way elsewhere, such as the exploitation of IPR guidance developed under the CIP by the protective textiles sector. Some, however, have been laying the foundations for further work. In sustainable construction, the development of an EU-wide strategy to facilitate the up-grading of skills and competencies in the construction sector will require widespread action on the ground across the Member States, if it is to have any major effect. In this regard the mechanisms for follow-up are of particular interest. Again in the sustainable construction area, there is the prospect of a Communication on the Sustainable Competitiveness of the Construction Sector later this year, which could pick up a number of issues raised in the LMI work.

4.3 Bio-based Products

Background

The bio-based products sector was aptly selected for the LMI. Not only does the sector contribute to a number of societal goals, but its innovative potential can be dramatically improved through the development of demand side policies. In particular, the elaboration of industry standards could be swiftly undertaken and would drive other related policy activities that would lead to the expansion of the market. However, the bio-based products sector has hit a number of barriers. A range of key recommendations produced under the LMI remain to be implemented and without these being in place the sector's envisaged growth and innovative potential is questionable. However, the European Commission is currently preparing a number of groundbreaking policies including the Bio-based Economy Communication and Action Plan that could provide the necessary breakthrough. Industry stakeholders are therefore eager for the European Commission to take up their recommendations and jointly to fulfil the ambitions of Europe 2020.

The 2007 Commission report[205] on accelerating the development of the market for Bio-based Products in Europe makes clear that the term bio-based products refers to non-food products derived from biomass (plants, algae, crops, trees, marine organisms and biological waste from various sources). Bio-based products may range from value added fine chemicals (such as pharmaceuticals, cosmetics and food additives) to high volume materials or building blocks (such as general bio-polymers or chemical feedstocks). However, the concept excludes traditional bio-based products, such as pulp, paper and wood products, as well as biomass designated for energy production purposes.

The prime rationale for developing the lead market for bio-based products is that the sector can significantly contribute to sustainable production and consumption. The main reasons for this are that bio based products can be used as an alternative to oil based products (which are associated with rising costs and negative environmental impacts), can help to mitigate climate change (given that the cultivation of renewable resources helps to sequester CO_2) and may offer innovative properties that have advantages over other products. These elements, and their corresponding policy and consumer

[205] European Commission (2007) Accelerating the development of the market for Bio-based Products in Europe

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environments, are the predominant factors which are driving (and have the potential to further drive) demand and growth for the sector.

Industry stakeholders have been particularly active in this area of the LMI and, with the aforementioned background in mind, are upbeat about the prospects for the sector. However, despite this positive outlook, they have linked the promising sector-wide growth with the full implementation of the policy recommendations produced under the LMI, which they see as indispensable. With their paper on an EU Public/Private Innovation Partnership, entitled 'Building the Bio-Economy by 2020'[206], the EU-Renewable Raw Materials-Group have highlighted the possibilities for the sector but on the basis that important developments take place. The report presents an analysis of the current market situation (2010) for certain commercially available product groups alongside two market forecasts (2020). The first market forecast highlights the volume growth without the recommended EU policy measures being in place; whilst the second illustrates the volume growth with EU policy recommendations being implemented. Interestingly, the second forecast illustrates that major gains for specific market segments can be brought about if the policy recommendations from the Lead Market Initiative are taken forward. For example, for bioplastics (in relation to shortlife/disposable applications) the current EU market consumption is 110,000 tonnes; the estimated consumption by 2020 without implementing EU policy measures is 310,000 tonnes; whereas with implementing EU policy measures the figure is 1,280,000 tonnes.

In terms of the market characteristics, there are already a number of bio-based products on the market

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Progress has also been made within the US in relation to product labelling and certification. Working in tandem with the Bio Preferred Programme, the Biobased Product Labelling Programme aims to assist public procurers to increase the purchase of biobased products. Under the scheme, products are categorised and must comply with minimum levels of Renewable Raw Material standards (e.g. adhesive and mastic removers must meet a 58% threshold where as for diesel fuel additives a 90% threshold must be met) and for those products for which biobased content has not been established the threshold is 25%[211] (critiques have been made though that the 25% threshold covers the 'bottom end of the biobased product market' and that broader product sustainability criteria than simply RRM standards are often taken into account in the EU).

At the same time, appropriate polices for ensuring industry access to biomass raw materials appears to be relatively developed or favourable in key competitor countries. Again within the US, the policy landscape provides incentives through matching and annual payments for farmers to sell materials for use by the biobased products and other sectors under the Biomass Crop Assistance Programme[212]. In addition targets have been set to increase the share of biobased product production from biomass from 5% (2001) to 25% (2030)[213]. Alternatively in China, feedstock prices are regulated and are reportedly held below international levels and are sometimes even frozen[214].

In contrast, as underscored by biobased product stakeholders, access to biomass in Europe is in a less favourable position given that the current overarching policy framework champions the use of biomass for the bioenergy sector. The 2009 Renewable Energy Directive lays down legally binding targets for the EU as a whole to reach a 20% share of renewable energy by 2020 with the development of the bioenergy sector being a key ingredient. Under this policy, bioenergy usage has been projected to progress particularly rapidly with, for example, (for the heating and cooling sector) a 50% growth up to 2020 in energy produced from this source[215]. In concert, the CAP provides direct payments to support the agricultural and forestry industry to develop biomass for energy providers and encourages the use of bioenergy for rural industry and areas. As a result, it has been noted by stakeholders that there isn't a level playing field for accessing biomass between the bioenergy and bio based product sectors which subsequently dampens the potential growth of bio based products.

A recent industry study has reflected upon this dilemma. The study illustrates that despite the fact that the innovative and environmentally progressive properties of biobased products are well proven, subsidies for energy crops (and other supporting measures) distorts competition for accessing biomass between bioenergy and other industries[216]. Consequently, this makes the industrial use of biomass commercially unattractive. Similarly, a recent position paper focusing specifically on hemp and flax production has noted that despite growing demand and interest from the automotive and bioplastic industry (as a result of multiple innovative and environmental advantages supported by LCA data) the cultivation of hemp and flax have been decreasing in the last few years because of a counterproductive

[211] http://www.biopreferred.gov/WhatLabelMeans.aspx
[212] http://www.fsa.usda.gov/FSA/webapp?area=home&subject=prod&topic=bcap
[213] EuropaBio & ESAB Industrial or White Biotechnology: A Driver of Sustainable Growth in Europe
[214] Ad-Hoc Advisory Group for Bio-Based Products (2011) Financing Paper
[215] European Commission (2011) Communication from the Commission to the European Parliament and the Council 'Renewable Energy: Progressing towards the 2020 target 2011'
[216] M. Carus & D. Carrez (2011) Level playing field for biobased chemistry and materials

and costly policy framework. As well as mentioning the policy favouritism for bioenergy, the paper illustrates the negative effect of unprotected competition from low cost imported exotic fibres from third countries which are associated with low social and environmental standards and lack sustainability certification[217].

The biobased product industry have further buttressed the critique of the absence of a level playing field for accessing biomass through the concept of 'cascading utilisation'. Given the backdrop that competition is taking place between sectors for highly demanded resources, this viewpoint makes clear that better resource efficiency could be achieved if biomass was first used for (single or multiple) bio based product uses and then finally burned as an energy source at the end of the cycle. Purportedly, this approach would also have positive impacts on green employment growth, environmental protection, economies of scale and strengthening value added production.

Moreover, bottlenecks persist in Europe in terms of providing funding and investments into key areas such as establishing large scale biorefinery pilot and demonstration plants (which are critical for developing and testing new and innovative products). At the same time, progress in this area has been noted in other regions. The Chinese government has been keen to support projects for bio-based products which are funded by a national high-tech R&D programme (e.g. Chinese bio-PDO 1,3-propanediol production capacity for 2010 exceeds the West). In South Korea, government funded research institutes are developing technologies to produce chemical raw materials from biomass as well as scaling up R&D for biochemical production technologies. The U.S. Department of Energy is co-financing commercial demonstration of an integrated biorefinery system for amongst other things biobased chemicals and substitutes for petroleum based feedstocks and products. Consequently these countries are increasingly being perceived as attractive investment locations with strong governmental support infrastructures.

In response to this backdrop, the bio-based product industry and stakeholders have commented that Europe needs to learn quickly from these experiences in a bid to catch up. A precondition for achieving this is effective coordination between Europe's national governments, companies, associations, consumer groups and European institutions. In particular, the bio-based product community have asserted that the entire set of recommendations developed under the LMI have to be speedily fleshed-out and implemented through concrete policy and legislative initiatives, if the full potential of the sector is to be realised. These activities would then build upon the LMI policy actions that have already been implemented or are ongoing. These have been driven forward with the support of the European Commission in the fields of standardisation, SME product innovation (including awareness raising), and initial EU Eco-labelling and Green Public Procurement (GPP) activities.

Action Plan

The Action Plan for bio-based products is composed of 12 individual actions that make use of the four LMI demand side instruments, namely regulation, public procurement, standardisation and complementary measures. Overall, despite the limited resources dedicated to support the LMI, there has been significant progress with the implementation of Action Plan activities with all actions

[217] European Industrial Hemp Association (2011) Despite growing demand from automotive and (bio)plastic industries the European Natural Fibre Sector is suffering from the wrong policy framework

producing tangible results (except, as will be explained below, actions 3 and 6a). In particular, the progress with a concrete agenda to develop industry standards (that set-out the environmental and other credentials of biobased products) is a welcomed development for improving market conditions and provides a critical link to advancing public procurement and communication efforts. Yet under the LMI, numerous industry recommendations have been produced which remain to be implemented. This has resulted in calls for further progress and the development of broader EU-level political and financial support to enable the industry to achieve its goals.

In order to support appropriately the development of LMI activities, action 1 proposed the establishment of an Ad Hoc Advisory Group (composed of experts from Member States, industry and national and European organisations). The Ad Hoc Advisory Group was tasked with developing recommendations that directly support Action Plan activities as well as recommending policies to support broader market conditions that go beyond the initial vision of the Action Plan. As well as successfully launching this group with the active involvement of appropriate and wide ranging stakeholders, a landmark industry report was published in November 2009 entitled 'Taking Bio-Based from Promise to Market'. This outlined 44 recommendations for action in the fields of legislation, procurement, standards, labelling and certification, and financing and funding of research.

Moreover, the Ad Hoc Advisory Group has recently prepared two additional documents relating to recommendations for communication and the financing of the sector. Including the recommendations from all three reports, there are now over 60 recommendations which the Ad Hoc Advisory Group has advised the European Commission to implement via various policy initiatives.

The main purpose of the communication document is to strengthen the awareness of consumers and stakeholders of the benefits of purchasing biobased products as well as the development of trusted technical guidelines (for industry) and labels (for consumers) verifying the performance of such products. Amongst other things, it is recommended that Life Cycle Assessment be enhanced within communication activities, labelling schemes should be harmonised and that public awareness campaigns should be initiated to improve to improve bio-literacy[218].

The financing paper provides a series of recommendations to remove bottlenecks to advancing financial support for the bioeconomy. The paper makes a strong case for the development of a range of activities to stimulate the sector including coordinated research for pilot and demonstration projects, improving access to finance for SMEs, attracting new investors, increasing the scale of risk capital, improving tax incentives or state aid and widening industry access to Structural Funds and Rural Development Programmes. In addition, the importance of improved access to biomass is reaffirmed and a proposal has been put forward to provide financial incentives to improve logistical capabilities to collect biomass residues[219].

With regard to developing appropriate legislation and policies, action 2 focused on producing an analysis of current legislative conditions relating to different steps in the production and supply chain. This supported the development of 17 recommendations endorsing legislative activities relating to promoting market development, product-specific legislation, legislation relating to biomass and

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international issues. The Ad Hoc Advisory Group noted achievements already made in this area (such as the revision of the Waste Framework Directive, Construction Products Directive and the revision on the Regulation on Eco-labelling). Yet according to the Ad Hoc Advisory Group there are multiple outstanding areas to be completed such as legislation and policy linked to CAP reform for accessing renewable raw materials (in sufficient quantity, quality and at competitive prices) and for developing incentives for the conversion of production plants and industrial processes into biobased.

In relation to public procurement, actions 3 and 4 targeted this aspect (the majority of stakeholders noted that the development of an appropriate EU-wide procurement framework is a relevant strategy to stimulate demand for the sector). However, action 3 which aimed to establish a network of public procurerers did not get off the ground as a result of the failure of submitted proposals to meet the threshold for funding in response to a CIP call (the deadline for which was February 2009). Consequently, the aim of the Action Plan in this area, supported by the Ad Hoc Advisory Report recommendation on the exchange of information and experience through public procurement networks, remains to be accomplished.

Action 4, encouraging Green Public Procurement for bio based products, has been linked to more positive developments. Launched in 2008, GPP is a voluntary policy instrument (under DG Environment) which provides GPP guidelines that aim to inform National Action Plans. Member States and public authorities can therefore determine their own implementation targets. This has resulted in varying responses from Member States with some countries (such as the Netherlands) legislating for up to 100% of procurement processes promoting sustainable products and others less so. Under this policy, certain achievements have been noted by the Ad Hoc Advisory Group including the inclusion of the terms 'renewable raw material, biodegradable, recyclable' in some of the GPP tool kit documents (these express a preference for biobased products in tender specifications). A specific example is the 'Food and Catering' services toolkit which advises on the use of cutlery, crockery, glassware and tablecloths which are renewable or based on renewable raw materials[220]. The inclusion of this aspect into the GPP tool kit was supported by progress on standards through CEN and the results of a Life Cycle Assessment for compostable cutlery based on bioplastics[221](and also by the production of an inventory of biobased firms and products[222]). It has therefore been noted that these criteria go beyond simply RRM requirements and reflect the 'top end of the biobased products market'. However, the Ad Hoc Advisory Group have recommended that within the GPP framework continued efforts should be made to encourage all Member States to give preference to bio based products in line with best practice. In addition, it also recommended that a list of biobased product groups should be developed (with the corresponding minimum level of biobased content) that should be published in a Commission Recommendation to support the work of contracting authorities.

In terms of standardisation, action**s** 5a, 5b, 5c and 5d have focused on driving forward developments in this field. Standards are perceived as key for the removal of barriers for the uptake of bio-based products by industrial downstream users and on consumer and public procurement markets. They include the development of industry standards, developing a common methodology for Life Cycle

[220] http://ec.europa.eu/environment/gpp/pdf/toolkit/food_GPP_product_sheet.pdf
[221] Razza, F. Fieschi, M. and Innocenti, F. D. (2008) Compostable cutlery and waste management: An LCA approach
[222] http://www.bio-based.eu/iBIB/

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Assessment, labelling and information to consumers and a methodology for information about the sustainability of biomass production.

Action 5a has been instrumental in identifying and elaborating new European standards and has been highly welcomed by stakeholders (more detailed information is provided in the section below and the text box). The European Commission submitted two Mandates to the European Committee for Standardisation (Mandate 52/2008 for the programming of standards for all types of bio-based products and Mandate 53/2008 for the elaboration of pre standards for bio-lubricants and bio polymers). CEN accepted the mandates and integrated the work into existing Technical Committees and Working Groups out of which various outputs have already been realised and further developments are in the pipeline. As will be explained, the development of standards is perceived by the industry as a central activity for organising production towards common goals as well as strengthening the development of labels and procurement practices which can facilitate further demand. The Ad Hoc Advisory Group supports the further development of work in this area. This includes the development of European and international standards for all biobased products to verify their performance claims in areas such as biodegradability, biobased carbon content, Renewable Raw Materials content, recyclability and sustainability.

Action 5b, developing a common methodology for Life Cycle Assessment, has culminated in the production of an LCA good practice guidance handbook (coordinated by DG Environment, DG Research and the Joint Research Centre). The first edition of the International Reference Life Cycle Data System (ILCD) handbook was published on 12th March 2010 by the European Platform on Life-Cycle Assessment to help policy-makers and businesses assess the environmental impact of products as well as guarantee quality assurance. Under Mandate 52/2008, the current standards determining LCA were assessed as well as recommending that LCA umbrella standards (as well as in other areas) should be developed for all types of biobased products which would improve product certification and labelling. The Ad Hoc Advisory Group has recently recommended the use of LCA to support communication of all bio-based products by taking on board aspects of LCA which are well standardised (such as the percentage of RRM) as well as potentially addressing areas which require further standardisation (such as the water footprint over the lifecycle). Further industry recommendations have also been made including that all products (covering bio-based and non-biobased) should undergo LCAs to ensure comparability and a level playing field.

Action 5c related to labelling and information to consumers. Legislation for the European Eco-label in relation to biolubricants was first developed in 2005 and was later revised in 2009. Ecolabel criteria are not based on one single factor, but rather on studies which analyse the impact of the product or service on the environment throughout its life-cycle. In relation to biolubricants, various minimum RRM thresholds have been established since 2005 (such as 50% for hydraulic oils and 45% for greases[223]). Under the 2009 revision, biolubricant criteria has been reviewed and changes will be published from mid-2011. These developments have been supported through the introduction of an industry self-commitment via the work of the European Committee for Standardisation (CEN) relating to requirements on technical, ecological and RRM (the requirement is for 25% RRM content or more) standards. The Ad Hoc Advisory Group has acknowledged this achievement but has recommended that

[223] DG Environment (2005) European Eco-label application pack for lubricants

further work in this area continues such as harmonising labelling across Europe for new biobased products and developing the EU Eco-label further.

Action 5d aimed to develop a methodology for information about sustainability of biomass production. The Joint Research Centre and projects under the European Framework Programmes have initiated work in this field which includes the PROSUITE, Global-Bio-Pact, and LCA to Go projects.

The PROSUITE project will provide tools to assess the economic, environmental and social dimensions of technologies in a standardised and comprehensive way. The new tools, to be shared as free, open source software, will help SMEs, industry and decision makers to compare options and make better, more sustainable choices. To support this, PROSUITE will develop a coherent, scientifically sound methodology for the sustainability assessment of current and future technologies, taking into account their entire life cycle. The PROSUITE freeware tools will be applicable both to well-developed technologies, and to ones that are just emerging[224] (the project kicked-off in November 2009 and the tools will be available from 2012).

A number of key outputs have recently emerged under the various PROSUITE work packages. Under the first work package, the research aimed to identify the decisive sustainability features and technology parameters (and to identify ones which have been overlooked) of emerging technologies including a case study on biorefineries. Various projected economic and environmental impacts are linked to biorefinery production including recommendations for developing suitable technologies to use agricultural waste instead of crops in order to limit biomass dependency and land usage. Furthermore, under other work packages, a range of social indicators and criteria are identified for future testing and selection for sustainability assessments for case studies and software. In addition, guidelines have been produced to identify under which circumstances synthesis of (economic, social and environment) indicators is desirable and a need has been identified for developing user friendly tools for a common sustainability assessment approach.

The main aim of the Global-Bio-Pact project (Global-Bio-Pact Global Assessment of Biomass and Bioproduct Impacts on Socio-economics and Sustainability) is the development and harmonisation of global sustainability certification systems for biomass production, conversion systems and trade in order to prevent negative socio-economic impacts (the project started in Feb 2010 and will end in January 2013). Emphasis is placed on a detailed assessment of the socio-economic impacts of raw material production (which is often absent within impact assessments) and a variety of biomass conversion chains. Furthermore, the project investigates the impact of biomass production on food security, the interrelationship of global sustainability certification systems with the international trade of biomass and bioproducts, whilst also considering the public perception of biomass production for industrial uses[225].

As an example of the kind of work that is being undertaken under work package 2 (which focuses on general impact assessment of biomass production and conversion chains) one of the reports addresses the subject of socio-economic impact of biomass feedstock. As well as reviewing appropriate socio-economic indicators, the impact of biomass production is assessed in terms of the gender dimension. In addition, there is an examination of five case study sources including second generation biofuels and

[224] http://prosuite.org/web/guest/about#what_prosuite
[225] http://www.globalbiopact.eu

products from lignocellulosic material in Europe and North America. Under work package 8, which will elaborate recommendations on sustainability certification schemes, an assessment of existing socioeconomic principles, criteria and indicators for biomass production and conversion has been produced. This has been achieved through a review of selected standards relating to sustainability initiatives and certification schemes.

The FP7 project "LCA to GO" (Boosting Life Cycle Assessment Use in European Small and Medium-sized Enterprises: Serving Needs of Innovative Key Sectors with Smart Methods and Tools) commenced in January 2011 and has a 48 month duration. The aim of the project is to develop sectoral methods and free web tools for monitoring the environmental impacts of selected sectors including bio-based plastics . These sectors have been chosen as the manufacturers show a high interest in making clear to customers the environmental benefits of their products. The project will develop Selected Product Category Rules in order to provide robust LCA guidance for SMEs. The web-tools, being compatible with ILCD data and other external sources, will be made available as open source software, to be adapted to other sectors. A broad dissemination campaign will be implemented and includes a mentoring programme for 100 SMEs. RTD and dissemination activities will be complemented by policy recommendations and liaison with standardisation activities[226].

The complementary actions, 6a, 6b, 6c and 6d have also been making progress. They include a range of activities to assess public perceptions and raise awareness of the biobased products industry, the development of a searchable database of existing European demonstration plant facilities and a supply side measure to support biorefinery research in relation to utilising non-food plants.

Action 6a aims to conduct an information campaign (to increase the visibility of bio-based products and their benefits) via different media with a focus on SMEs. This action has not yet started but will commence at a later stage as result of the recent production of the communication and awareness raising document by the Ad Hoc Advisory Group which is mentioned above. The LMI mid term progress report also notes that to be successful the information campaign requires European standards for measuring biobased content and the environmental impact of products (which are in place or in progress); an agreement on a suitable and informative product label; and an overview of the market availability of biobased products[227]. The previous two items require further development.

In addition, the CIP funded BIOCHEM project (February 2010 to Jan 2013) aims to support SMEs to overcome barriers to biobased product innovation through the provision of a business support toolbox. The tool box provides a range of services including bio-based market information, online partnering with relevant organisations, individual audits, coaching and business planning. The project consortium partners include innovation agencies, venture and public funding bodies and programme consultancies[228]. To date, the BIOCHEM project has been overwhelmed with responses from SMEs but more financing is required to address this high level of interest.

[226] http://cordis.europa.eu/fetch?CALLER=FP7_PROJ_EN&ACTION=D&DOC=1&CAT=PROJ&RCN=97146
[227] European Commission (2009) Lead Market Initiative for Europe Mid-term Progress Report
[228] http://www.biochem-project.eu/

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Action 6b implemented a Eurobarometer survey to determine public perception towards bio based products. The outcome of the survey illustrated growing public support for the development and uptake of related products.

Action 6c mapped bio-refineries in Europe at pilot plant or demonstrator scale. This was supported by FP 7 funding and was carried out by Europa Bio and Commission expert groups (COMP-BIO-NET and KBBE-NET). The website provides a searchable database of existing European pilot and demonstration facilities as well as research, policy and regulatory developments[229]. The website is useful in promoting the production of biobased products and providing information on the current availability of industrial infrastructure. However, the European Association for Bioindustries (Europa Bio) which supported the development of the website have commented that there has been poor dissemination of the database across the industry and it has yet to reach its potential for supporting companies (precise statistics on the number of companies using the website are not available).

Action 6d was supported by FP7 funding for biorefinery research. In order to complement the development of the demand-side framework, a call for proposals was launched in autumn 2008 to directly fund projects on bio-refineries and related technologies. This led to support for three projects (EuroBioRef, SUPRABIO and BIOCORE) which inter alia will develop second-generation biochemicals from ligno-cellulose (wood, straw, etc). This is a vital instrument to produce larger amounts of bio-chemicals at a lower unit cost. It will also enable biorefineries to use non-food plants and trees for industrial purposes, thus decreasing the risk of conflicts between food and non-food production in agriculture and forestry.

Evaluation

Evaluation findings have arisen mainly from interviews with biobased products stakeholders and officials, but also documentary evidence.

Relevance and Coherence : The LMI was of prime importance for the improved organisation of the emerging bio-based products sector. This is predominantly reflected in the inception of the Ad Hoc Advisory Group which is composed of a broad group of representatives from the biotech industry, national governments (Ministry of Environment, Ministry of Agriculture) and innovation and research communities. Although comments have been made that other organisations could have been included, on the whole the grouping is felt to be relevant and representative. Further to this, the emergence of the Ad Hoc Advisory Group has provided the momentum to collectively identify key challenges, establish a coherent industry position and map-out relevant policy areas for development under the LMI.

The LMI objective of advancing demand side policies has been regarded as essential for progress in the market. This focus has provided a framework to highlight some of the necessary prerequisites needed to overcome bottlenecks, stimulate rapid growth and to complement the development of supply side activities.

[229] http://www.bio-economy.net/

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In terms of aligning LMI activities with policies in Member States, progress has been made with a small but growing number of relevant countries. For example, coordination has been noted between the German Ministry of Research and the LMI in the frame of the 'Bio-Oekonomie Rat' initiative and discussions on how to take actions forward for the sector have been delivered with the German Ministry of Economic Affairs and German Ministry of Agriculture. Co-operation has been fostered with the French government and the Belgium government recently expressed an interest. The Dutch Ministry of Economic Affairs, Agriculture and Innovation has developed a clear policy towards the Bioeconomy. The Italian government has been active with regard to the building of pilot and demonstration biorefinery plants. Furthermore, some national bodies and associations such as the French Biobased Agro Chemicals Association have noted co-ordination with biobased product sector interests and national government.

However, interest from a significant number of Member States and coherence between the LMI and their activities remains to be established. In addition, potential national level industry stakeholders from some less focused countries did not participate actively in the Ad Hoc Advisory Group. One response to this would be that the bio-based products lead market is still in its infancy in some Member States and perhaps eventually a stronger response will emerge over time. A further interesting development is that in the UK (which is a key player in the market) although efforts had been made up to 2010 to support biobased products (which culminated in a cross government bioeconomy strategy) the arrival of the new government has resulted in staff reductions. Consequently, the UK biobased products sector now lacks a specific governmental focus or sponsor.

There are also serious concerns from stakeholders that the bio-based product lead market lacks standing within other EC policies. Principally, this relates to two key areas. To begin with, as mentioned, the sector has emphatically requested CAP reform, along with reconsidering how bioenergy targets could take into account other sectors which rely on biomass, in order to facilitate access to biomass on a level playing field with other industries. Not only would this secure biomass at competitive prices and at a sufficient quantity and quality but would also reduce distortions for exports based on renewable raw materials within third countries. Secondly, appeals have been made that the European commission's initiative to develop a Knowledge Based Bio Economy (KBBE) should hinge upon a more concerted effort in developing applied research leading to the commercialisation of bio-based products. In other words, more targeted funding is needed for demonstration and pilot biorefinery plants and other ground breaking commercial initiatives as well as improving broader financial conditions. Industry stakeholders agree that reforms in these two areas would be potential springboards for generating the envisaged growth for the sector as outlined in the EU-RRM-Group market forecasts for 2020.

Whether or not further support for the sector will be forthcoming is currently not known. This largely rests on the outcome of a number of ongoing policy developments. The Flagship Initiative for A Resource Efficient Europe (under the Europe 2020 strategy) is currently fostering the development of a Bio Economy Communication and Action Plan. The current DG Research and Innovation consultation which is informing this process appears open to encouraging the emergence of a bioeconomy based on the sustainable use of biological resources that will replace oil based resources[230]. A key element supporting the Action Plan will be the emergence of a European Innovation Partnership that will aim to

[230] http://ec.europa.eu/research/consultations/bioeconomy/consultation_en.htm

enhance research and innovation developments and complete the European Research Area for the bioeconomy sector[231]. In addition, a further EIP under DG AGRI will support the development of the CAP and will focus on agricultural productivity and sustainability. Some of the aims of this EIP are to enhance resource efficiency, deliver a safe and steady supply of biomaterials and mitigate climate change[232]. Finally, as previously mentioned, DG MARKT is supporting a consultation which has been framed by a Green Paper on the Modernisation of Procurement Policy. The proposed reforms include targeting societal goals such as driving innovation and combating climate change. One option for consideration is whether procurement procedures should focus on assessing tenders based on LCA rather than simply the lowest costs[233].

Industry stakeholders are therefore keen to highlight the current opportunities for the European Commission to act. However, if coherent policy support is to be provided to the bio-based products sector, a number of conditions need to be met for it to function at an optimum level. This includes embedding the concept of 'cascading utilisation' for biomass management within a number of key policy areas that impact on the bioeconomy, including the CAP; matching this with an appropriate funding and financial framework for R&D and business and processing infrastructure; and stimulating demand through EU-wide procurement markets, amongst other things.

Policy coherence at an international level has been initiated particularly through co-operation with the US. This includes development of relations through the Lighthouse Project with industry and the US Department for Agriculture (which focuses on bio-based product activities in the areas of standardisation, certification and labelling) and via bilateral meetings with the American Society for Testing and Materials. ASTM experts also participate in the technical meetings of CEN Working Groups which has resulted in the emergence of comparable standards. Nevertheless, unlike the relationship between CEN and ISO which is underpinned by the Vienna Agreement, there is no basis for the mutual recognition of standards between the two bodies.

Despite these developments, bio-based product stakeholders have pointed to the perceived widening gap between the EU and the delivery of certain policies in competitor regions that is improving the economic performance of the bio-based product industry outside of Europe. A number of comments were made along the lines that there is limited consideration given to the interrelationship between taking the sector forward in Europe and the apparent increase in the scale of external markets (in the US and China). This has been evidenced through a number of key performance indicators such as number of employees, number of demonstration plants etc.

Moreover, although only tentatively suggested at this stage, another institutional concern raised is that DG Research and Innovation is likely to play a much bigger role in terms of the future governance of innovative initiatives for the sector and there is a worry that the market based focus previously provided by DG ENTR may become diluted.

However, DG Research and Innovation will in fact play a critical role in supporting the sector under KBBE. This covers research to develop new and improve existing essential biorefinery processes. In

[231] http://ec.europa.eu/resource-efficient-europe/pdf/resource_efficient_europe_en.pdf
[232] http://ec.europa.eu/research/innovation-union/pdf/innovation-union-communication_en.pdf
[233] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0015:FIN:EN:PDF

particular, it will help to move from the 1st and 2nd generation of biorefineries towards the 3rd and 4th generations making use of diversified raw materials including different crops, grasses, forest and agricultural waste by turning celluloses and lignin into different chemical building blocks for the integrated manufacturing of different bio-based products. A joint call on biorefineries has been initiated supported by a budget of about €52 million.

DG Research and Innovation will therefore provide a significant stimulus for developing the supply side. To ensure that policy coherence is achieved, the demand side initiatives as developed by the Ad Hoc Advisory Group and worked upon by different Commission Services will need to be linked to the supply side activities. By complementing one another, these initiatives will be able to take into account the increasing demand for bio-based products autonomously expressed by the market.

Effectiveness : For the most part, the Action Plan has been perceived to be appropriately focused and effective and to contain the correct type of initiatives to address the key demand side challenges which the sector faces. Although there have been some suggestions of possible modifications in order to address other aspects (such as particular product groups) and to have greater focus on critical themes (such as communication) overall it has been seen as containing the right type and a reasonable balance of activities.

When looking at the delivery of the Action Plan, the above section clearly indicates that despite the limited resources dedicated to the LMI, the majority of actions have produced tangible outputs which have helped to structure and organise the sector as well as leading to specific useful outputs. In particular, those in relation to standards have been appreciated, but also those in the fields of public procurement, legislation, communication developments and complementary actions. However, in terms of judging whether the LMI has contributed to the growth of the sector or removed barriers to growth, the consensus view is that it is much too early to raise this question and a wide range of other recommendations need to be implemented. A positive perspective is that the LMI created a paradigm shift in focusing on the horizontal market conditions and this has definitely improved the future chances of the market, as well as raised its profile, but there is limited evidence as yet for linking the LMI to improved growth.

Action 5a, which is addressed in more detail below, represents a key achievement for the sector. This individual action has been delivered through effective coordination between the European Commission, CEN and stakeholders and has produced (and is on the path to producing more) necessary and well-received industry standards.

Action 5a : Elaborate New European Standards for Bio Based Products
The action was designed to elaborate new European standards for bio-based products in cooperation with stakeholders and CEN. *Relevance:* The EC has identified that there is a lack of suitable European standards for bio-based products. These are required to enable the industry to develop products on the basis of common performance goals including the share of RRM content, biodegradability and the evaluation of environmental impact. The vision is that by meeting shared standards, consumers,

businesses and public procurers will be reassured of their environmental credentials. Standards will therefore feed into improved procurement practices, consumer information, certification and labels, which will enhance the uptake of biobased products over and above oil based products.

Effectiveness: Under the Mandates to develop biobased standards issued by DG Enterprise and Industry, CEN working groups, which were headed up and composed of industry stakeholders, have to date facilitated the production of three key documents. The first under Mandate 52/2008 has identified a programme for the development of future standards for a range of key product groups. The second and third under Mandate 53/2008 have provided recommendations for terminology and characterisation of biopolymers and bioplastics as well as recommendations for terminology and characterisation of bio-lubricants and bio-based lubricants. With the support of DG Enterprise and Industry, these standards have already facilitated the inclusion of products under the Ecolabel in relation to biolubricants and under the GPP in relation to bioplastics.

Efficiency: There have been some comments that the CEN standardisation process is slow and procedurally complicated (although CEN have asserted that improvements have been made in this area). However, further developments are in the pipeline. Under Mandate 53/2008 further standards will be produced to declare and determine biobased carbon content in relation to bioplastics. In addition, CEN has recently accepted two new Mandates on (a) the development of various horizontal standards and other standardisation deliverables for bio-based products as a follow-up of the received CEN Report on the programming mandate and (b) the development of European standards for bio-surfactants and bio-solvents.

Utility, Sustainability & Value-added: The work in this area is perceived as critical by industry players. Comments have been made that standards for the biobased products sector have brought structure to a chaotic market place. Moreover, although it is too early to assess initial impacts, it has been noted that industry has begun to align itself with these developments.

Importantly, further strategic links have been made with other demand side policies namely public procurement, labelling and LCA which will help to sustain future initiatives and growth for the sector. Given that DG Enterprise and Industry has been able to directly coordinate these efforts, significant value added has been provided by the LMI in this area.

on a par with its international competitors. However, in certain areas the EU has limited influence to deliver the type of results needed to address certain recommendations, for example in the area of taxation which is a Member State responsibility.

The large number of recommendations that have been produced under the LMI were the result of how the Ad Hoc Advisory Group was organised and managed. The Group contains a wide range of stakeholders who have each demanded multiple reforms and sometimes optimistic expectations have not taken sufficient account of the realities of European political processes. At the same time, the production of the long list of recommendations has been a useful exercise to inform and direct the European Commission to the areas that require support and to generate effective co-operation and a common position among stakeholders.

However, to remain effective and to retain the momentum, greater focus is now required. Rather than aspiring to implement all recommendations in one push, the most important recommendations need to be selected for action first from the larger list. This process should take into account overlapping recommendations.

One of the evaluation questions has asked for an assessment of the extent of LMI policy co-ordination. With this in mind, it is fair to note that DG ENTR has co-operated effectively with the Ad Hoc Advisory Group and CEN in the development of standards and in addition with the outputs generated with the assistance of DG Environment in relation to the GPP and the Ecolabel (although this might have been developed further).

However, currently there is a certain amount of inertia and a lack of prioritisation for issues of concern to the biobased products sector and this is clearly felt by the stakeholders. To address this gap, a new and significant impetus is required from across the Commission if the sector is to be established with an internationally commanding position. The sector fulfils multiple Europe 2020 policy objectives. A number of flagship initiatives, EIPs and policies will shortly come into fruition which in principle support the positive environmental, economic and social benefits which the growth of the sector can provide. The European Commission has therefore initiated developments which now present Europe with a major opportunity, and this now requires an urgent response.

With regard to the development of communication and labelling activities, LCA, gathering public research data, biorefinery and demonstration plant research as well as other complementary activities, the majority of stakeholders saw them as necessary developments and encouraged more progress and funding for these activities in the future. However, at this stage a large number of such activities have only been recently completed or have yet to be finalised which meant that stakeholders could not provide very detailed answers regarding their effectiveness and impact. Evaluation and communication of these activities is therefore required so that stakeholders can engage with and assess the performance of this work. In addition, a small number of comments were made that communication could have been enhanced overall so that stakeholders could track the progress of the LMI. Whilst this area could have been improved, more stakeholder commitment is also needed in monitoring the various project and research websites.

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Some of the work carried out by the EU-RRM -Group will also be effective for future market analysis and monitoring. Namely, this will build upon the previously mentioned market predictions for 2020 which extrapolate market growth on the basis of the implementation of all policy recommendations. However, to realise this objective, EUROSTAT product group trade thresholds will need to be met (this figure is roughly €40 million) in order to establish specific NACE/PRODCOM-codes for bio-based products. Hence, for the moment, the EU-RRM-Group market analysis remains the best tool to estimate trends for 2020, but if a number of recommendations that encourage growth come into force, a more detailed picture to assess market performance will be achievable through EUROSTAT.

Efficiency: Questions have been raised regarding the efficiency of the LMI as well as potentially declining momentum. Industry representatives made the case that significant effort went into establishing the Ad Hoc Advisory Group, producing the recommendations and then developing industry standards. Yet since this surge of activity, stakeholders consider that the initiative has lost momentum somewhat. Little more has been produced and it is difficult to see where recommendations have been followed up (although as mentioned above its clear that certain outputs have been or will be produced but as yet have not been communicated fully). At the same time, comments have been made that the Ad Hoc Advisory Group took some time to emerge and could have been more efficient in producing the recommendations (the LMI commenced in Dec 2007 and the recommendations were published in November 2009).

In terms of funding for the biobased products sector (such as bio-refineries), the current perspective is that funding is not particularly visible, is difficult to access, fragmented and more readily available and efficiently delivered in countries outside of Europe. One response is that more effort could be made to access Structural Funds and Rural Development Programmes. Nonetheless, the perception is that EU funding is not particularly well designed for targeting the requirements of the bio-based products sector. This point was illustrated in a recent case where after assessing bio-based production locations, a company opted for Malaysia over France as a result of the extent of funding available.

Utility, *Sustainability and Value Added:* The LMI for biobased products has played a central role in better organising an emerging sector, identifying challenges and instigating the development of a programme to provide responses to the barriers within the market place. Indeed, the Action Plan has delivered to varying extents outputs across all four LMI policy areas (regulation, standardisation, public procurement and complimentary actions) and this has been achieved with limited resources allocated to the LMI overall. In particular, DG Enterprise and Industry has supplied strong policy coordination to support the development of industry standards which has helped to structure the market place and product development. Moreover, the production of standards provides key linkages to enhance other important aspects of demand side policy such as public procurement processes, LCA and product labels. These are important elements for tapping into industry, consumer and government markets. Continued work in this area is fundamental for ensuring that the bio-based products LMI retains its momentum and enhances its chances of sustainability and growth.

It has been noted that EU level governance does provide significant value added for the sector in terms of raising the profile of the industry, generating cohesion, identifying barriers etc. However, limited value added has been realised as a result of the failure to deliver a broad range of critical recommendations. Opportunities have now emerged to successfully position the sector within a

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number of groundbreaking policies. The question that remains is whether the European Commission will provide the leadership and impetus to shape these policy processes to enable the sector to establish an internationally commanding position.

In many ways, it appears, the LMI in the bio-based products area has delivered success and momentum beyond the scope of the Initiative. But this presents its own challenges.

4.4 e-Health

Background

The eHealth market produces healthcare goods and services that rely on ICT technologies - from IT systems for health records to electronic tools for health diagnosis. This is a growing market, with strategic economic and societal importance.

The health sector as a whole in the EU employs almost 10% of the total workforce and corresponds to almost 9% of GDP. The eHealth industry is a significant part of this: in the EU 15, it was estimated to be worth close to €21 billion in 2006. Research has suggested that the health ICT industry has the potential to be the third largest industry in the health sector with a global turnover of €50-60 billion, of which Europe represents one third. It also has strong potential for encouraging innovation and leveraging other market segments such as pharmaceuticals and medical devices.

In relation to the societal importance of the market, the future of health systems is, as is well known, one of the greatest challenges facing Europe. Its ageing population means both that health treatment is in higher demand and that the cost is being borne by a relatively smaller active population. Without significant reforms, including the better use of eHealth, expenditure on health is expected to increase from 9% of GDP at present to around 16% by 2020. These trends will put serious pressure on Europe's social models and public finances. eHealth can reduce the cost of health provision, and therefore promoting the uptake of eHealth by the market can alleviate this problem. In addition, eHealth can improve the quality of health care, therefore improving the quality of life for all, and particularly for older people who rely more on health treatments.

As with the other LMI markets, the Initiative has adopted actions relating to four types of public intervention: legislation, procurement, standardisation and complementary measures such as funding. The objective of those actions is to improve the conditions faced by the eHealth industry. These actions form a roadmap of policy recommendations for the period 2008- 2010, which was developed in cooperation with an EC-wide task-force including representatives from DGs SANCO, EMPL, JLS, COMP, MARKT, REGIO and RTD, and coordinated by DG INFSO.

The actions relating to legislative measures have focused on analysing the current legislative framework that applies to eHealth, in order to assess whether any changes are needed to improve the regulatory environment faced by companies, with a particular focus on telemedicine and data protection, and also on the possible introduction of an EU-wide Electronic Health Insurance Card, although in this case progress has been stalled because of political sensitivities. The measures also include two actions directed at consumer education (informing consumers about eHealth), through studies and funding for organisations that disseminate information on eHealth. The direct results from these actions have been:

publishing the analysis of the legislative situation and a discussion of that analysis with Member States representatives.

The actions on public procurement aimed to promote networking between public procurers in the Member States, raising awareness and involving public procurers in the design of EU funding. The direct results have been: the creation of opportunities for procurers to meet and network and the publishing of guidance and analysis on procurement.

Standardisation measures have focused on creating common standards, so that eHealth systems and products can be used in different EU countries. Interoperability is, of course, a major consideration in almost all IT systems and the actions used as their starting point the Commission's Recommendation on interoperability of eHealth, which asked Member States to work towards a harmonisation of standards in eHealth (although the adoption of the Recommendation is an LMI action, the drafting took place before LMI, and is therefore not strictly an LMI action in itself). The other actions encouraged Member States to follow the Recommendation, namely using a roadmap, networks and funding. Direct results have included: pressure on Member States to agree on standards; creation of opportunities to meet and network.

Complementary actions have included both funding measures and exchange of best practice via monitoring and networking. The funding measures have channelled funds from existing EU funding mechanisms such as the Competitiveness and Innovation Programme (CIP) and the current Framework Programme for research (FP7) into eHealth, and have raised awareness of the existing opportunities to obtain loans from the European Investment Bank (EIB). The programmes funded have either contributed towards the deployment of new technologies in eHealth or promoted networking between eHealth stakeholders. These actions have in some ways been complementing the standardisation measures; in particular, the funding programmes have been used to promote the interoperability of eHealth across different EU countries. The direct results have been: Increased investment in eHealth technologies and a rise in interoperability of eHealth.

Evaluation

This section now provides an assessment of the LMI activities in eHealth, based particularly on the interviews conducted and the documentary evidence. The comments are organised in relation to the main evaluation criteria that have shaped the approach adopted throughout this evaluation exercise.

Relevance: The Commission Communication[234] launching the Lead Market Initiative identified five criteria for choosing the target markets. eHealth clearly meets the criterion of there being a growing demand in this market. With an ageing population and innovation in medicine there is growing demand for health services and products and services assisting their management. In this, there is still potential for greater use of ICT , so there is room for the market to grow. With a very significant share of GDP in Europe, eHealth clearly meets the "Broad market segment" criterion. Similarly, eHealth is of "Strategic societal and economic interest": Firstly, it can play a key role in reducing the costs of healthcare and alleviate pressures on the welfare system. Secondly, it is an important part of a sector which represents

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one tenth of the economy. Finally, eHealth can improve the lives of patients and of the growing share of elderly people in the population.

The targeted markets were also intended to be ones where there could be clear added value and where 'concerted and targeted, but flexible policy instruments' could be applied, In the eHealth market, there are different types of obstacle slowing down its development, including the fragmentation of the European market, through different social security systems and a lack of interoperability, and a lack of legal certainty, for example in relation to the protection of personal data. There is a clear value-added in addressing these barriers by finding a European solution.

There is a question of whether it is possible to support this market without distorting it, since the avoidance of 'picking winners' is an important part of the LMI conception. However, if technological advances are sufficiently developed for it to be clear which technologies should be supported, policymakers do not have to make choices that will potentially distort the market. This appears to be the case in eHealth.

Coherence : In relation to the coherence of LMI and other policy instruments at national level, the LMI (as a whole, not only eHealth) was designed as a separate initiative, rather than building on existing national initiatives. Therefore there is a feeling in some Member States that the LMI should have been designed to take more account of similar national policies, particularly those addressing the same sectors. However, given the diversity (and in a number of cases, absence) of the national approaches, this would have been difficult and Any deficiencies in this area could be mitigated by effective coordination mechanisms to ensure coherence between EU and national policymaking. This issue will be addressed again under "efficiency" below.

Effectiveness : Effectiveness concerns whether an intervention is meeting its objectives, and whether it is doing so in a direct and transparent way. In relation to the actions to improve the legislative framework, the Commission has been active in offering analysis and proposals in this area and networking opportunities have been provided to allow the Member States to discuss them, but this has been slow to translate into any concrete measures. No new initiatives have been started, and there no initiatives planned for the near future. There is however a limit to how much the Commission can contribute, in the absence of political willingness at national level to move forward. It is possible that the studies and networking could over time lead to changes in EU legislation. However, for the moment, these actions have not met their objective.

Actions 13 and 15 are concerned, not with legislation as such, but with consumer protection and education and perhaps these two actions should have been included under complementary measures. So far, no concrete initiatives have been initiated to meet those goals. Some initiatives that preceded LMI did do so, namely the support for the Continua Health Alliance and the eHealth web portal, but it appears that LMI has not significantly added to these initiatives.

In procurement, there is no network of eHealth procurers, similar to those operating in relation to textiles and construction and actions have focused on fostering networking via an online forum and on providing guidance to procurers on how to improve their processes. This represents a more limited basis for generating an impact than would have been available with a network and it is unfortunate that there was no suitable network proposed in response to the call under the CIP., especially in view of the

substantive issues that arise in the procurement of IT systems and the potential for stimulating innovative approaches. It is perhaps not surprising that interviews showed that national government officials have not been greatly influenced by LMI actions in this area, such as the guidance issued on eHealth.

The LMI actions in the field of standardisation consisted of building on the Recommendation on Interoperability to ensure progress in standardisation, by providing support and guidance to Member States and ensuring that Member States were meeting regularly to discuss this topic. The Recommendation itself required Member States to produce standards, but the LMI did put pressure on the Member States to make faster progress. As with procurement, it is difficult to assess the extent of the impact, but interviews appear to show that it has been low. Nonetheless, due to the synergy between the standardisation actions and the funding actions, the effectiveness may have been higher since the funded programmes helped to meet some standardisation objectives.

With the complementary actions, the objective was to use other types of policy intervention to develop the eHealth market and the actions here have been the subject of a more detailed investigation that will be presented separately. The analysis will show that their effectiveness has been high.

Looking at eHealth as a whole, the analysis has shown that effectiveness has been high for some complementary actions, but only moderate for standardisation measures and low for legislative measures and public procurement. In addition, our interview and survey programme showed that both industry and government officials have not so far seen any concrete improvements that can be attributed to LMI activities in eHealth. Among the interviewees, some thought that there are likely to be improvements in the future but it is too early to see them now, while others thought that the Initiative is unlikely to lead to any useful results.

In particular, some interviewees noted that the LMI could be useful to keep a “watching brief” and to simply follow the progress made in policymaking in eHealth, but that it should not claim to be more than that. In contrast, other interviewees thought that the LMI could play a useful role, but for that it would need to have “more teeth” and include initiatives that went beyond guidance, networking, and channelling of EU funds that already existed prior to the Initiative.

The initial conclusion on effectiveness is therefore that LMI actions appear to have had a positive but rather limited direct impact on the eHealth market.

However, in providing a coherent structure for policymaking in the sector, the LMI has been able to increase synergies between existing policy instruments, and also to support a better planning of which policy interventions are needed at each stage. All the actions under LMI for eHealth are either based on very soft instruments that will only have a small direct impact on the sector, or are interventions that would have taken place anyway. However, the LMI provided a structure in a period when there were no alternatives and has helped to develop a coherent perspective on the issues facing the sector.

There is therefore a discrepancy between the stated ambitions of LMI in eHealth, and what it is actually delivering. While the LMI has used terminology that suggests an ambitious initiative, that could significantly help develop the eHealth sector, in practice its role has been more modest,

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The discrepancy causes a number of problems. Firstly, it creates coordination problems, as Member States' officials working in this field are either irritated by what they see as unwanted EU intervention in this area, or unwilling to spend time on an Initiative which they see as ineffective. Secondly, it reduces transparency, as LMI is not seen for what it is. Thirdly, it could lead to a waste of resources if any resources are directed towards actions that the LMI is unlikely to achieve (although there is no evidence of this at present).

To minimise these problems, it would be useful to keep in mind that LMI in eHealth is above all a strategy, rather than a set of concrete measures. The gains have been made in bringing about this coherence across different initiatives. This issue will be addressed further under "coordination".

Coordination : In eHealth, the main mechanism for coordination with national officials and other stakeholders is the i2010 eHealth subgroup. This advisory group already existed prior to LMI; it was created in 2005, as part of the Commission's i2010 initiative, and its goal is to give advice to the i2010 high-level group on eHealth policies. The group is composed of national government officials in charge of eHealth or telecommunications, industry representatives, health authorities, associations of doctors and citizens and patients groups. The LMI has been using this subgroup as the main way to coordinate with stakeholders, and to implement the actions involving networking, exchange of best practices, putting pressure on Member States to progress with standardisation and discussing possible EU legislative initiatives.

On the one hand, these coordination mechanisms are well organised, and have enabled the Commission to involve the relevant government officials in the LMI process. Indeed, a great part of the actions consists of creating networks and events with that goal. However, at the same time, our survey and interview programme have shown that there is dissatisfaction with the coordination mechanisms in all areas of LMI, including eHealth. There are two main reasons for this.

A first reason is that there have been difficulties in communication within Member State administrations. Various departments and a large number of individuals could potentially be involved, many of them usually focusing on domestic matters rather than European co-ordination. Communicating across them poses a significant problem and although the Commission had made sure that its contacts in the ministries of health were involved in the LMI, the information has not always circulated to other ministries.

A second reason arises from a communication failure on the Commission side. The LMI in eHealth has been useful mainly as a way to ensure that all actions under eHealth are coordinated, but this is different from the way in which it presents itself. Member State officials working in this field are therefore either irritated by what they see as unwanted EU intervention in this area, or, once they realise that the results of LMI in eHealth are more modest than what the Commission rhetoric would indicate, are unwilling to spend time on an Initiative which they see as ineffective.

To address this problem, it would be more realistic to present LMI as a mechanism for coordinating developments in thinking on a key set of issues in this area, and for ensuring that these discussions are well in step with national initiatives.

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Efficiency : as with other areas of LMI, the funding available for spending on eHealth is very small, since part of the goal of the LMI was to achieve progress via improvements in policymaking but without significant investment being needed. It is therefore difficult to draw conclusions on cost-efficiency, but it could be said that the modest results in areas other than the complementary measures are in line with the low costs involved.

Value-added : Policy initiatives at EU level for eHealth can promote EU cross-border co-operation, which has several benefits such as those arising from economies of scale. The actions under complementary measures have been particularly useful in generating these benefits.

On the other hand, health is primarily an area of national competence and this explains why not much progress has been made in the areas of legislation and standardisation. There appears to be little willingness at a national level to have further integration in health matters in general. However, there is clearly a market for ICT-based services and products in the health sector and in this area obstacles to the operation of a single market should be addressed.

Particular attention has been paid in the eHealth area to the complementary actions under the Competitiveness and Innovation Programme (CIP), and in particular to the epSOS project

eHealth Complementary Actions : epSOS and related activities

Four calls for proposals have been made under the Competitiveness and Innovation Programme's ICT Policy Support Programme (CIP ICT PSP), to support the development of new technologies in eHealth :

epSOS (Smart Open Services for European Patients), launched in 2008, aims to create a pan-European ICT framework to make it possible to share patient information, such as patient summaries and ePrescriptions, across national borders of Member States. The first epSOS project ended in 2010, but is now being continued by a second pilot, "epSOS 2", which extends epSOS to other services such as 112 emergency services and patient access to their health data. It also includes more countries.

Calliope, launched in 2008, is a network made of national health administrations, competence centres, and EU level professional organisations that aims is to promote the development of an EU-wide strategy on eHealth. In particular, it has led to the creation of a roadmap for eHealth interoperability for Member States.

RENEWING HEALTH, (REgioNs of Europe WorkINg toGether for HEALTH), launched in 2010, is assessing telemedicine services – technologies that allow patients to manage their own treatment from outside the hospital - across nine regions in Europe.

There was no successful bid for a thematic network of procurers from both public and private sectors, under the CIP **'Learning Together'** call.

Relevance : The LMI is primarily a demand-side initiative, which promotes the development of markets by improving the conditions that they face, rather than by providing funding. Funding

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actions have however been appropriate because they allow LMI to combine demand-side and supply-side policy interventions. This combination can lead to important leverage effects, since the funding is coupled with incentives to both national policymakers and enterprises.

In this case, funding has not only had the supply-side effect of promoting development of the industry, but also a demand-side effect, promoting the Europeanisation of the eHealth market. This is achieved by making different countries work together in this field and by creating common infrastructures and standards, which eliminate obstacles to cross-border trade. In addition, there are positive synergies between the funding and standardisation measures, since part of the funding was used to promote the interoperability of eHealth systems.

Coherence : the nature of the action means that there is no unintended overlap with similar funding programmes at national level and there are positive synergies between the funding measures and the standardisation measures.

Effectiveness : Our research and interviews show that the three programmes resulted in concrete progress for the areas concerned. Although there were some delays (at present the project is approximately five months behind schedule), EpSOS has made significant progress in creating a common ICT framework for patient information that can be used in several EU countries, thus expanding the market for such services. There has therefore been added investment in this area, both from the EU budget and from the participating Member States (the project required 50% co-financing). That investment successfully led to innovation. In addition, the common infrastructure increases interoperability in eHealth, contributing directly towards the dismantling of the main barrier to cross-border exchanges.

Similarly, the project Renewing Health has led to added investment, through co-funding for nine regional authorities, to fund the assessment of telemedecine technologies in eHealth This assessment is an integral part of the deployment of that technology – and to the Europeanization of eHealth - involving regions in nine different countries. Calliope has also been successful in meeting its goals of promoting networking and producing a roadmap for further progress in eHealth.

Efficiency : The method of funding has meant that a previously existing CIP feature has been given further focus and definition. Our judgement is that this has increased the efficiency of EU expenditure, although some participants in epSOS 2 consider that the funding available is not sufficient, given that the project has now been extended to more countries.

Sustainability : EpSOS will continue via a call for EpSOS 2, and Calliope will continue under the eHealth governance initiative. The programmes are therefore being extended in time. The changes brought about by the activities, in terms of greater interoperability, are self-sustaining.

Value-added : Each of the programmes could only have been started at EU level, because they all involve cooperation between the Member States. They are leading to an expanded market. The European value-added is clear.

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It appears that the results of LMI actions on eHealth have been mixed. On the one hand, progress was made towards greater interoperability of eHealth in Europe, mainly through a practical approach of channelling CIP funding into projects that increase interoperability, and to a much lesser extent also to pressure by the LMI on Member States. On the other hand, virtually no progress has been made in the areas of legislative action, and procurement. In addition, most of the progress that was made in the area of interoperability was due to a supply-side measure, funded by a programme that already existed prior to the LMI.

There are several reasons for these mixed results: firstly, health is an area which has mainly remained a national competence, so the extent to which the EU can influence it is very limited – this is particularly the case in the area of legislation. Secondly, LMI has only been in place for two years, so it is possible that it will have more positive impacts at a later stage. Thirdly, given the limited EU powers in this area and the lack of resources allocated to LMI, the impact cannot be expected to be large. The practical approach in Action 1 has however been very successful. The funding programmes have contributed towards dismantling the barriers that currently hinder cooperation and trade between Member States in eHealth, therefore tackling one of the main obstacles to the development of this market.

This successful example shows the advantages of combining supply-side measures with demand-side measures. By integrating CIP funding for eHealth into LMI, it was possible to amplify the leverage effect of EU funding and ensure that it led to greater cooperation and interoperability between Member States. On the other hand, this success also underlines the need for more progress eventually in the procurement area, in order to ensure that the solutions developed are actually taken up.

It has been argued by some of the respondents to the survey and interviewees that the LMI in eHealth should have “more teeth”. However, that would imply increasing EU responsibilities in the area of health, which would go counter the wishes of most Member States. While the case can be made for some additional legal initiatives at an EU level, substantial changes in the legal framework are unlikely. Therefore it is argued that the LMI in eHealth is currently contributing to the development of this sector in the correct way, by using the instruments that exist at EU level in this field.

In addition, it has been acknowledged that the LMI in eHealth has been effective in its co-ordinated approach to a distinct set of policy issues. From that angle, it is possible to consider that it has had considerable success, increasing the effectiveness of different actions, by raising their visibility, mobilising more resources (namely, CIP funding) and increasing the synergies between the different policy interventions. .

4.5 Protective Textiles

Background

The textile industry as a whole has been an important part of the industrial history of many regions across Europe and continues to be a focus for considerable activity and employment. However, in a global economy, it is clear that there have been and will continue to be intense competitive pressures on the sector. Clearly a major part of the strategic thinking across the industry is the consideration that competitive advantage may be sought from enhanced design and production techniques and in advanced textile applications, particularly where there are very specific and demanding requirements.

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The markets for various kinds of protective textiles are a particular example where these considerations apply.

As indicated in the chapter on the evidence base, there are a number of difficulties in characterizing the market for protective textiles. The estimates that are provided, based partially on industry sources, indicate that in 2006 there was a market (including service operations) worth around € 10 billion. Projections suggest that currently this could be of the order of € 11.7 billion. Similar calculations provide an employment estimate of 235,000 in 2006 that was expected to rise by around 4,000 by the current period.

The Action Plan for Protective Textiles envisaged 10 actions. In terms of legislation, a central consideration for this market is the Personal Protective Equipment (PPE) Directive[235], which was adopted in 1989 under the "New Approach". A broader revision of the "New Approach" legislative framework has been conducted and there has been a specific action in the Action Plan relating to improving surveillance and enforcement following the adoption of the Regulation[236] and Decision[237] which provide a conformity and market surveillance framework. This action had a broader context than the PPE legislation, but was an important development in establishing clear procedures that apply to the PPE Directive. The revision of the PPE Directive itself was subsequently launched and has progressed with an Impact Assessment study that is currently being completed. A proposal for the revision of the existing Directive is expected for early 2012.

Protective Textiles is one of the markets where a network has been established between public authorities in charge of procuring (action 3). ENPROTEX has been in operation since September 2009 and involves a consortium of three public procurement bodies from the UK, the Netherlands and Belgium. This network also has responsibility for setting-up an information and training platform for buyers and users of protective textiles (action 2).

Actions 4 and 5 were concerned with the development and use of standards for innovative products and services (both formal and informal standards). The main impact so far is that the LMI has raised the profile of PPE standards and standardisation is again high on the agenda of industry, including standards for related services. The CEN PPE sector forum resumed its activities in 2009, held meetings in June 2010 and February 2011 and has another one scheduled for November 2011. The forum is exploring how to coordinate standardisation-related matters for ongoing research projects in this field funded by the EC.

The Action Plan for Protective Textiles is relatively ambitious in seeking to promote developments in the knowledge base, devising a strategy for an anticipatory approach to products and markets and encouraging the development of clusters and other forms of local collaboration (incubators, open

[235] Council Directive 89/686/EEC of 21 December 1989 on the approximation of the laws of the Member States relating to personal protective equipment

[236] Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93

[237] Decision No 768/2008/EC of the European Parliament and of the Council of 9 July 2008 on a common framework for the marketing of products, and repealing Council Decision 93/465/EEC

innovation platforms) involving purchasers and users. It also aimed to exploit IPR awareness actions taking place under the CIP to promote sectoral IPR awareness, with detailed guides circulated in multiple EU languages. In relation to the knowledge base, there are a number of projects being supported under FP7 that cover a wide range of the technical features of protective equipment; among others these include multifunctionalisation, targeted protection (laser, sea, dynamic cooling systems), active protection and the life-cycle of protective garments. The ENPROTEX project has undertaken a mapping of existing and emerging solutions as the basis for a more active take-up. There has also been progress with the development of a strategy for an anticipatory approach to products and markets. Based on industry discussions relating to the LMI in different fora, a comprehensive road map for the protective textiles lead market has been developed. It was published in April 2009 and is being up-dated in conjunction with industry. There are also ongoing parallel actions to encourage the development of clusters and other forms of local collaboration in co-operation with regional and national authorities. Under FP7, an ERANET in the field of advanced textiles – Crosstexnet, was set up in November 2009 and, although pursuing a wider agenda than that of the LMI in protective textiles, this network provides a useful basis for engaging regional authorities in research programming related to the textile sector. Two joint calls have been published.

In general, then although a number of the actions are open-ended, in formal terms, the plan for Protective Textiles is close to completion.

Evaluation

Our assessment of the LMI activities in Protective Textiles, from the interviews conducted and the documentary evidence points to an active programme, supported and indeed driven to some extent by the industry. The comments are organised in relation to the main evaluation criteria.

Relevance and Coherence : this is clearly a market with some global potential, in which public purchasers play a very significant part. It not only has potential in its primary focus, but since innovations in specialised domains such as military or security equipment often spill over into markets for consumer goods, it represents a real potential for a market that can eventually be rather extensive. Its choice as a target market was somewhat innovative itself, motivated in part by the increasing social concern for those who work in dangerous environments and it represents a good example of the way that the Commission can provide a lead with this sort of initiative.

The actions chosen for the Action Plan form a coherent package, although it is curious that a revision of the PPE Directive was not explicitly included in the initial action targets. This market has benefitted as one of those in which there is a procurement network, since this is helping to promote coherence in developments, particularly as a result of debates with suppliers.

Effectiveness : the selection of protective textiles, as the target sector within the textile industry was particularly appropriate for the demand-side approach envisaged by the LMI, since a large proportion of this type of textiles is purchased through public procurement in circumstances where there is particular attention to the technical qualities of the equipment purchased.

Actions taken appear to be closely related to parallel activities at a Member States level, although it has not been possible yet to gauge the extent of this effect. Interviews with industry representatives

suggest that encouragement of a more systematic approach to the exploitation of research results is welcomed and the strategic importance of establishing lead markets within the textile sector is very much appreciated. The active involvement of industry representatives is a major factor in this relatively cohesive market, where, after a few initial difficulties arising from the Initiative's focus on purchasers as opposed to suppliers, the developments appear to have been warmly embraced. This consideration bodes well for the future effectiveness of the Initiative.

It needs to be noted that manufacturers are not the only active participants in the supply chain and that fire brigades often rely on a number of service providers for washing and repair services, and in some instances for the hiring of equipment. Accommodating this feature of the market requires a slightly different approach to procurement that has implications for other sectors, so addressing it in this context serves a wider purpose.

Similarly, the emphasis placed on Forward Commitment Procurement (FCP) within the ENPROTEX project is helpful in promoting this particular approach to encouraging innovation through public procurement. FCP replicates practices within private sector supply chains, but also definitely operates within the existing public procurement framework, meaning that it can be adopted without any need for modifications in procedures. The use of prior information notices, for instance, to provide advanced notification that innovative solutions are to be encouraged, illustrates this approach of adapting existing instruments. Highlighting the FCP approach is in effect promoting the dissemination of good practice in a way that has lessons for other markets.

At the same time, the Initiative has helped to highlight issues that are particular to the protective textiles market. The strengthening of the end-user perspective has helped to raise the profile of the significant need for better co-ordination of research activities. The efforts in much textile research, for instance, to develop smart textiles making use of electronics need to take into account - in the protective personal equipment context – the parallel developments with breathing apparatus and achieve co-ordinated solutions.

Developments relating to standards are still under way and stakeholders' comments on their effectiveness are mixed. On the one hand, the Initiative has stimulated the CEN PPE sector forum to resume its activities and the new standard to define care instructions for industrial laundries has been welcomed. On the other, many stakeholders expressed some concern about the speed with which standards are revised and argued that they can even act as a break on developments. Given the importance of comfort and manoeuvrability for wearers of protective equipment, for instance, it is increasingly urgent that standards formulated when wearers were almost exclusively male, are adjusted to take account of the many females now working in the emergency services.

A significant difficulty identified is in relation to the geographical spread of the activities being undertaken. The active membership of the ENPROTEX Network, for instance is slowly extending from its initial focus primarily on the UK, the Netherlands and Belgium. The involvement of organisations new to acting at a European level is a factor in the speed at which these developments can take place and it appears, for instance, that language issues have posed a problem at certain stages. The success with which a wider network is launched at a conference scheduled for 8th and 9th June 2011, will be a major factor in determining whether or not the ENPROTEX network can become self-sustaining.

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Similarly, it is not clear how far the concentration on applications relating to fire services can be easily extended to other areas where protective textiles are needed.

Protective Textiles Procurement Action : Establishing a Network of Public Authorities Responsible for Procuring

The ENPROTEX network was established after a successful response to a call for proposals in 2008. ENPROTEX seeks to promote the innovative use of protective textiles through public procurement processes, particularly in relation to the fire and rescue services. The core partners of the project are : the Department of Communities and Local Government, DCLG (UK), the Belgian Ministry of the Interior, IBZ (BE) and the Dutch national Disaster Response Agency LFR

networking of these authorities had to start from a relatively low base. There was also some disruption, as the original co-ordinating organisation was phased out of the project and replaced by the current co-ordinators.

There are still some effects of the initial difficulties. For instance the project web site, which is intended to serve as a significant instrument for disseminating information and promoting networking still has a number of features under development in May 2011.

The ultimate impacts of the project will very much depend on how effectively the results are communicated.

Sustainability : while it is difficult to fault the objectives of the project, the sustainability of what it is trying to achieve will depend in the longer run on its ability to promote the take-up of the approach that it advocates by a wider group of purchasing authorities. The intention is to launch a Public Procurers' Network at a conference organised for 8th and 9th June 2011. And the longer term sustainability of the developments promoted by the project will depend to a large extent on the success of this launch.

Utility & Value-added : Since the project is very much directed towards involving end-users in the research and development process in a broad sense, in principle, it represents a significant development in moves towards a better orientation of research effort. As such it is directly meeting the utility criterion.

To the extent that the project is ultimately successful, it will add significantly to the value of EU research in the protective textiles area by promoting the more rapid take-up of technology that largely exists already. There is also an argument that by promoting an approach at a European level that values innovative solutions, the developments are more likely to encourage a response from suppliers.

Summary : the project has addressed one of the central themes of the Lead Market Initiative in a very specific area. It is creating the conditions for a more active take-up of existing technology in protective equipment for fire fighters, by promoting new approaches, notably in the form of Forward Commitment Procurement. The effectiveness of the project, however, will very much depend on how successful is the planned launch of a wider a Public Procurers' Network.

Efficiency : The package of actions that made up the Action Plan for Protective Textiles appears to have been well-structured and calculated to enhance impact. The effectiveness of the actions depends to a large extent both on the efficiency of the ENPROTEX network and on the dissemination achieved through European industry associations and while there are encouraging signs in relation to both these dissemination vectors, a lot remains to be seen.

The effectiveness of the response on the part of the Commission to the issues that need addressing in the sector appears to have been mixed. The stakeholders report excellent support from those most closely involved in the Initiative and also from DG Research in supporting research projects that are making a contribution from the supply side. However, it is slightly surprising that revision of the PPE

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Directive has not had a higher profile in the Action Plan and the lack of engagement with the Initiative by the broader range of Commission services has been a matter for comment by some stakeholders. Greater input from DG EMPL, for instance, on some of significant issues for the market relating to Health and Safety regulations would have been welcome.

Generally, particularly because of the industry support, the Initiative has been able to proceed with a relatively restricted call on public resources. Funding issues do not appear to have posed any problems so far and this market has been able to make good use of funds available from other sources, with several FP7 projects of relevance for developing the knowledge base and CIP funding supporting work on IPR matters and cluster development. As the need for further and more extensive dissemination activities arises, however, there is likely to be a greater requirement for dedicated funds.

Utility, Sustainability & Value-added : the narrowly targeted nature of this market in contrast to some of the others involved in the LMI, has helped it to focus on clear needs and this in turn has helped to maintain the engagement of the suppliers. This factor is also of considerable importance for the longer term sustainability of the work that has been undertaken, but following the logic of the demand –side character of the measure, the main considerations over the longer term are whether or not the work of the ENPROTEX network can be carried through into actual procurements and whether it can be extended, so that a much more substantial body of procuring authorities from across Europe can be brought into its ambit.

There is clear European value-added from the Initiative in this area, which arises from the identification of a series of issues facing most public authorities across Europe and the clear scope for leveraging good practice so as to achieve a demand for more innovative equipment from more innovative enterprises and in the process strengthening the Single Market in this area. Even the announcement effect has been important in this context of a developing Single Market. A number of the manufacturers operate across the EU and it is important for these larger companies to know that demand is now more likely to arise in several countries for PPE incorporating advanced features. These companies are likely to watch further developments closely and make their investment decisions accordingly

Overall, there is clear progress being made as a result of the implementation of the Action Plan for this relatively well focused market, within a sector whose future is still of considerable importance for the European economy. There is a welcome engagement from the industry with the Initiative and some initial steps to strengthen the previously rather weak co-ordination of purchasing authorities. A lot will depend on the extent to which the good practice identified can be more effectively disseminated on the purchasing side.

4.6 Recycling

Background

In the analysis of the recycling market, a major point of focus has been the legislation that has established a framework for much of the other activity. The adoption of the revised Waste Framework Directive (WFD) in 2008 was a critical element for the further development of recycling across Europe at the time of the launch of the LMI. It has simplified and repealed the prior WFD (2006/12/EC), the Hazardous Waste Directive (Directive 91/689/EC) and part of Waste Oil Directive (75/439/EEC) and

established a number of basic concepts and targets clarifying, for instance, the distinction between "waste" and "non-waste", and "recovery" and "disposal".

In order to build on the greater clarity in the market as a result of the WFD, the Action Plan for recycling included a series of actions to promote greater awareness of recycling technologies among purchasing authorities, to adopt guidelines on state aid for eco-innovation and waste management, to promote research and development in recycling, to establish an observatory on eco-innovation in the field of recycling and to launch a series of studies, for example, a study to understand more about how standards are being used in the sector and another study on market conditions in the recycling area.

Recently, the Commission has published a Communication[238] on the implementation of the Thematic Strategy on Waste Prevention and Recycling as adopted in 2005. One of the main objectives of this Strategy was to move towards a 'recycling society' using waste as resource. This report analyses the main actions achieved to implement the Strategy, the main results obtained, the obstacles and challenges to increase waste prevention and recycling and the main perspectives in the coming years for the waste and resource sectors. It also identifies some priority areas and a consistent framework for future actions. Although this development was not specifically one of the listed actions of the Initiative, it does illustrate the 'horizontal' approach typical of the LMI and is one of the most recent statements of this theme in relation to recycling.

As seen in the chapter on the evidence base, estimates of the size of the recycling market in Europe are a matter of some interpretation and we believe that an alternative estimate of € 42.4 billion should be substituted for the figure provided in Annex II of the initial Communication for the turnover value in 2006. This may have increased to something nearer € 47 billion currently. Similarly there are difficulties in providing an accurate estimate of employment in the sector. The Communication Annex II gave 500,000 for 2006, but we regard this a considerable underestimate, proposing the figure of 1.2 million. In any event it appears that employment in the sector is large, not least driven by the increased targets for recycling.

Based on interviews with Commission and Member State officials, representatives of the public and private sector and environmental agencies, the following conclusions have been drawn.

Evaluation

Relevance & Coherence : Amongst other issues, the revised WFD provides a further clarification and differentiation of the waste hierarchy**,** introduces new definitions such as the end-of-waste status and by-products, further specifies the classification of treatment operations (R1) and changes requirements for the preparation of waste management plans. The producer responsibility is extended in order to strengthen the re-use and prevention as well as recycling and other recovery of waste. In addition, the Directive sets out more stringent provisions for authorisation and registration and new recycling targets which have to be achieved by 2020. Given, the position of such legislation, it is difficult to argue anything other than that this piece of legislation is central to any action in the sector. It is therefore

[238] Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the Thematic Strategy on the Prevention and Recycling of Waste, COM(2011) 13 final of 19.1.201.

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providing clear guidelines.

Utility, *Sustainability & Value-added:* By having a more clarified understanding of recycling in the EU, following from a comprehensive discussion on the end-of-waste criteria, this could lead to a policy that could be self-sustaining. The revised WFD with the introduction of the end-of-waste criteria could lead to a reduction in market barriers, as it leads to more harmonization and standardization on an EU-level. Recycling involves more technical processes than land filling and incineration so innovation is needed to establish effective and efficient handling processes. Recycling is also more labour intensive than land filling or incineration and requires more highly educated employees since the handling processes are more complex and technically demanding. Thus, the WFD has large implications for innovation potential.

The WFD does represent a major step in establishing 'a framework', but it has to be followed up, not least through the setting of standards, in order to further improve and promote the quality of recycled materials, not least to make it easier to export and import recycled materials. This is therefore a continuing story.

Among the Member States there are differences regarding the relation of the revised WFD to the policy and actions of the Member State in the field of recycling, e.g. new Member States have high levels of land filling and have not developed strong recycling policies compared to older Member States such as Germany. It has to be remembered that legislation in the area of recycling is highly interrelated with other regulations.

An interesting comment from DG Environment in the Commission was that prior to the Lead Market Initiative, environment policy had not consciously recognised the significance of demand-side factors in stimulating the development of the necessary technology. The Initiative helped to raise the profile of this element in a complex policy mix and, in effect, the approach has been 'mainstreamed' and is integrated into a broader range of policy.

Effectiveness: A relatively large number of actions were envisaged for the recycling lead market and a number of them have been carried through to completion or are at least well under way. Others, as will be seen, were not realised for one reason or another. Taken together, the actions that have been followed through are significant for the future of the market, but the absence of a public procurement network or another LMI driver appear to have meant that the opportunity has not been taken to have a co-ordinated development of demand-side conditions for recycling sector.

It was intended that the promotion of good policy practice across Member States would be supported through the Pro-Inno Europe initiative, as part of the implementation of the ETAP (Environmental Technologies Action Plan. However, it was not possible to establish an active network and exchanges of information are mainly conducted through national experts on recycling practices in the Technical Adaptation Committees. There are problems in this area arising from the various recycling infrastructure systems in the different Member States, and this will inhibit the effectiveness of any such network.

In the area of public procurement, a call for proposals for the establishment networks in support of the LMI was launched in 2008, under the Competitiveness and innovation programme (CIP). However, no proposal dealing with the recycling sector was submitted which may indicate a lack of awareness of

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public procurers in this area about the Lead Market Initiative. The failure to establish such a network was unfortunate, both because there are particular procurement issues to be addressed in the area in some Member States, such as the use of concessions and also because the opportunity was lost to develop a particular LMI focus within the range of other actions that could act as a driver of developments in this sector. Developments relating to green public procurement are of course relevant here and, as well as the Communication on this issue from the Commission, there have been many initiatives undertaken at a national and regional level, so that here is plenty of good practice to be communicated more widely.

Compliance with legislation and the use of standards are a major issue and a study was launched to evaluate compliance with Essential Requirements. Most companies (about 65%) appear to use CEN standards, other companies have developed their own internal procedures not based on the CEN standards (about 12%) and some other companies (about 24%) have no procedures yet. The results of a 2009 survey indicated slow progress in monitoring and the enforcement of provisions at the level of Member States. Except from occasional communication, company support and awareness rising, most enforcement efforts are focussed on the heavy metals content of packaging. Only four Member States have implementation measures and an enforcement procedure for all three Essential Requirements, namely the UK, France, the Czech Republic and Bulgaria. However, none of these Member States has set up systems to assess the effectiveness of the enforcement mechanisms. A number of Member States pointed out to a lack of knowledge on ways to implement and enforce the Essential Requirements and welcomed the exchange of information on these aspects. At the same time, the industry is in favour of integrating the CEN standards into daily company practice.

Building on the 2009 study results, a follow up contract was launched in 2010 to assess the impacts resulting from this current state of implementation, monitoring and enforcement and identify solutions in collaboration with relevant stakeholders. In addition the contract aims to collect and disseminate best practice in implementation and enforcement of the Essential Requirements with a view to facilitating learning and supporting implementation and enforcement where it is not strong enough.

There is an issue relating to fair competition between public and private enterprises in the sector that needs monitoring. This should include consideration of how the market for public procurement is evolving, and if private enterprises are treated fairly.

Efficiency: Generally more information is needed to make general conclusions in this area, but initiatives have been started in order to enhance efficiency in the recycling market.

A study entitled "Optimising Recycling Markets" was launched in early 2008 by DG Environment. This focused on market conditions in the recycling area. The final report outlines the policy options that would be best for removing barriers in markets for recycling. The report has fed into the Communication on waste and recycling markets that was presented to the Environment Council (March 2nd – 3rd, 2009).

All these initiatives are adding to an understanding of the operation of the market. However, it is not clear that they have gained extra momentum as a result of their inclusion in a programme of actions that were intended to reinforce each other.

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Utility, Sustainability & Value-added: To realize the potential of the recycling sector, increases in recycling standardization activity is important, improving and promote the quality of recycled materials and making it easy to export and import them. Furthermore, it is important to keep in mind that waste and the handling of waste cannot be regarded as an isolated business. This is because the possibility of recycling is partly determined in the production or design phase of the products life-cycle. Thus, the actions taken should be seen in relation to each other. From the interviews it has been indicated that more coordination and corporation in the field of standardisation and elsewhere is needed to ensure that the full potential of the recycling sector is realised.

In the future, the need for cross border cooperation in innovation will increase in line with technological development. For example, as waste handling processes get more complex and technologically demanding cross border cooperation gains in importance since national waste handling plants are no longer an economic solution. This is especially the case for the handling of metals. The actions have not really addressed these future needs.

The overall position of the LMI in the recycling market is that a series of actions have been taken that could help the exploitation of the market opportunities created by the adoption of the Waste Framework Directive or a least help to better understand how this might be achieved. However, the perception arising from the interviews and documentary evidence is that the chance to develop a co-ordinated approach to these interrelated issues has not been taken, in contrast to the situation in other lead markets. As these issues become mainstreamed in environmental policy, it may still be useful to identify a potential driver of developments that can continue to maintain the profile of demand-side issues. An effective procurement network could be one such driver.

4.7 Renewable Energy

Background

Renewable energy refers to energy that can be derived from regenerative energy sources like wind, solar, biomass, biodegradable waste or feedstock, geothermal, wave, tidal and hydropower. These sources can be used for generation of electricity, heating/cooling or as transport fuels (bio-fuels). In 2010, the European renewable energy sector was estimated to have a turnover of between €35 and 77 billion[239]. This is expected to increase rapidly by 2020 (€79 billion under the more conservative estimate to up to € 99 billion). It provided jobs for an estimated 372.000 people in 2010 and this figure is expected to reach 634,000 in 2020. The European Council in March 2007 set a binding target of a 20% share of EU energy consumption for renewable energy by 2020 and this provides a substantial basis for the expected high growth rates of the sector in the coming years.

The development of renewable resources is held back by three factors. First, given that the external costs of energy use (e.g. greenhouse gas (GHG) emissions, air pollution, security of supply) are not fully reflected in energy prices, demand for renewables, which on the whole have low external costs, is sub-optimal. Second, important learning curve effects are evident in several technologies which could lead

[239] Estimates differ between Annex II of the LMI document and more recent studies (2009) of DG TREN and ECORYS consultants.

to lower prices. These are exploited more slowly than other technologies on account of current low levels of demand. Finally, the fragmentation of renewables support systems in the EU and the existence of administrative and market barriers means that the potential of the EU internal renewable market is not fully exploited. While some of the above factors apply to all renewables equally, there are also significant differences across different market segments, notably in terms of the barriers in the Internal Market, which need to be addressed.

As with the other LMI markets, the Initiative adopted actions relating to four types of public intervention: legislation, procurement, standardisation and complementary measures.

Actions 1-7 and 12 of the Action Plan concerned the legislative measures and tools for the promotion of the renewable energy sector. The adoption and implementation of the Renewable Energy Sources Directive (2009/28/EC)[240], replacing the Renewable Electricity Directive, represents the key development and the most important demand side driver for the sector.

The Directive sets:

- Binding targets for the share of renewable energy in energy consumption in each Member State by 2020. In total renewable energies should have a 20% share of EU consumption in that year compared to 8.5% in 2005.
- An "indicative trajectory" for progress including a 10% target for renewable energy in transport
- Accounting rules for counting renewable electricity in transport towards the 10% renewable target in the transport sector
- An obligation for Member States to produce National Renewable Energy Action Plans by 2010
- A system of "cooperation and flexibility mechanisms"
- Provision for a Member State to "statistically transfer" to another Member State credits for renewable energy consumed on its territory.
- Rules for the import of renewable electricity from third countries.
- Goals for simplification of the administrative procedures with which renewable energy producers must comply.
- Goals for the use of renewable energy in construction
- Reinforced access to the grid in relation to infrastructure development and priority or guaranteed access.
- Requirements for Member States to report on the general implementation of the Directive.
- Requirements for the Commission to report in 2010 on ways to improve the financing of renewable energy and the coordination of projects that involve several Member States.

[240] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF

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Based on the information available, all 27 Member States have submitted actions plans and the Commission has established a mechanism for monitoring progress towards set targets[241]. According to the 2010 Commission Communication[242] the review of Member States plans shows that the RES Directive approach has started to pay off. The regulatory framework and the Member States' commitments have been catalytic in driving forward renewable energy development resulting in renewable energy constituting 62% of 2009 energy generation investments.

According to the action plan document, while the RES Directive is part of the actions being promoted by wider developments in energy policy and consequently its adoption was not at all driven by the LMI, the Initiative potentially could have a substantial impact in signalling to industry an intention to promote demand for renewable energy technology and hence in encouraging investment as a means of maintaining competitiveness and gaining worldwide leadership.

However, the evaluation team's discussions with industry and Commission officials indicate that the LMI has not assumed such a role. In practice; it remains pretty much invisible from the point of view of the stakeholders. The main reason is that, following the launch of the SET plan and the Renewables Energy Sources Directive in the period 2008-2009, the Commission Services decided not to give profile to the LMI on top of the other Community initiatives so as not to confuse stakeholders. Consequently, the stakeholders contacted express a very limited –if any – awareness of the Initiative and did not recognise any contribution that it had made in the policy making process.

Action 12 of the Action Plan referred to the development of a bio-fuel sustainability regime in the new renewable energy legislative framework. This has been integrated into the RES Directive that sets specific criteria and minimum requirements. The sustainability scheme became operational on 5th December 2010 and a first report on the operation of the methods adopted[243] has been submitted.

The second area of legislative measures included in the LMI action plan concerns the simplification of administrative barriers for the development of renewable energies. According to EPIA, administrative burdens (planning and other authorisation procedures) may represent up to 40% of the total cost of installation in the case of photovoltaics[244]. The RES Directive sets requirements for the simplification of procedures to be included in the Member States' action plans.

Additional activities in this direction are taking place in the context of the implementation of the Intelligent Energy Europe programme under the CIP. A search in the database using the keywords "administrative burden" indicated 7 ongoing projects targeting the reduction of administrative burdens[245] in the area of renewable energies. Related actions aiming to increase awareness among national and local administrations are included in more than 30 projects supported.

[241] http://ec.europa.eu/energy/renewables/reports/doc/2011_list_renewable_energy_targets.pdf

[242] http://ec.europa.eu/energy/renewables/reports/doc/com_2011_0031_en.pdf

[243] http://ec.europa.eu/energy/renewables/reports/doc/sec_2011_0129.pdf

[244] Information provided by EPIA

[245] http://ieea.erba.hu/ieea/page/Page.jsp?op=project_list&searchtype=3

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Furthermore, in relation to that, a public consultation is currently on-going in relation to the permit granting procedures for energy infrastructure projects[246].

According to the Action Plan, standardisation measures should have focused on the development of standards for different components in the wind and solar sectors. However, the feedback provided by industry indicates that the process for the development of standards through CEN and CENELC is rather complicated and slow and has not kept pace with the technological developments in the sector. The photovoltaics associations (EPIA) referred to the parallel efforts of industry at the international level in the development of more standards for the photovoltaics sector.

Relating to public procurement, the LMI Action Plan provided for the creation of a network of public procurement authorities. However, no proposals were submitted in this area indicating limited interest. This specific action was subsequently dropped from the Plan.

The complementary actions in the renewable energies sectors concern mainly the implementation of the Strategic Energy Technology Plan to accelerate the availability of renewable energy technologies and ensure the leading role of EU industry. The objective was to bring together public and private resources at the national and EU level.

The formation of the European Industrial Initiatives (EIIs), which aim to integrate the efforts of the public and private sectors represents the main activity. At this stage seven European Industrial Initiatives have been launched by industry (against an initial target of six) covering the areas of wind, solar (photovoltaics and concentrated solar power), bio-energy, carbon capture and storage, electricity grids and sustainable nuclear fission. Implementing plans for the period 2010-2012 have been developed in all seven sectors setting priorities and key performance indicators and identifying relevant sources of finance. These include a combination of private and public sources from European (FP7, CIP, EERP[247], and NER300[248]) and similar national schemes together with the use of the loan or equity facilities of the European Investment Bank (EIB) in the case of demonstration projects and the development of infrastructures. The European Commission Task Force on financing low-carbon energy produced a compendium of possible sources of finance[249].

Further to that, the Action Plan included some additional complementary actions:

[246] http://ec.europa.eu/energy/infrastructure/consultations/20110430_infrastructure_projects_en.htm

[247] Energy Efficiency Programme for Recovery (EERP) supports Offshore wind energy and Carbon capture and storage infrastructure projects, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52010DC0191:EN:HTML:NOT

[248] The NER 300 programme was established under the Emissions Trading Directive 2003/87/EC. It supports the demonstration of CCS and innovative renewables at commercial scale

[249] http://ec.europa.eu/energy/technology/set_plan/doc/2009_comm_investing_development_low_carbon_technologies_en.pdf

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- publication of a guide on how to establish collaborative working schemes in the supply chain of renewable energies, general provision of contractual, management and insurance rules and good practice guides for SMEs

- a study on the future qualifications and skill needs to uptake innovation in renewable energy and to enable its fast implementation

The first action was dropped since it was not thought to be feasible, while for the second action, no information has been made available concerning its status.

Evaluation

The evaluation of this part of the LMI has been hampered by reluctance on the part of most of those nominally involved to respond to requests for information. The basic problem is that although many of the actions listed in the initial Action Plan have in fact been followed up, this has been within other policy frameworks, with little or no reference to the Lead Market Initiative. All those concerned therefore have hardly been aware of the distinctive LMI dimension, or have not been aware at all, and are unable to contribute to any assessment of the effects of the Initiative. In effect, there has not really been a Lead Market Initiative in the renewable energy area, in spite of the potential for demand-side stimulation of innovation in a market which is large, which is growing rapidly and where there continues to be scope for innovation in the face of many technological challenges.

There are questions about whether the LMI approach in this area was flawed in design and would inevitably fail or rather whether it has not succeeded because of a lack of effort. For this reason, it is useful to consider the elements of the initial Action Plan against the standard evaluation criteria.

Relevance & Coherence: While technological development does play a role in achieving parity with more conventional sources of energy, it is clear that developments in the sector are demand driven and linked with the policies and measures at the European and Member State levels that address the existing market and other failures. The RES Directive has set a clear legislative framework with specific long term objectives that industry considers to be crucial. There are suggestions that the current balance of demand and supply measures is not right and that greater attention should be paid to supporting the development of technological capacity. The SET is clearly a step in this direction but the level of EU funding for technological development remains a very small fraction of the total.

The Renewable Energies sector includes a number of sub-sectors (wind, solar, bio-fuels, CCS, sustainable nuclear fusion, grid technology). Each of them has different levels of technological and market development and different dynamics but together they represent an important and increasing share of the EU industrial base.

Similarly, RES clearly fulfils the criterion of “Strategic societal and economic interest”. The increased role and use of renewable energies is fundamental for reducing EU greenhouse gas emissions – in line with EU international commitments – and strengthening energy security by reducing the level of dependency from third countries. At the same time there is a clear economic interest in the market given the increasing size of the industry and number of employees occupied.

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The targeted markets should also be the ones where there could be clear added value and where 'concerted and targeted, but flexible policy instruments' can be applied. While the legislative framework for RES represents the key driver of the sector, administrative barriers and further developments in technology are also seen to be important factors in achieving a Lead Market role. In contrast, other elements of the Action Plan, namely standardisation and public procurement appear not to be priorities from the point of view of stakeholders.

Overall, the judgement of the evaluation team is that there is a coherent case for a lead market in Renewable Energy that could support the broader range of policy efforts addressing energy issues, as well as promoting the development of a sector or sectors with global significance and potential. However, we have seen little evidence that this objective is being pursued.

Effectiveness : The objective of LMI intervention in RES is to promote the development of this market via improvements in legislation, public procurement, standardisation and complementary measures. Concerning legislation, the adoption of the Renewable Energy Sources Directive has brought important changes in the legal framework and drives the developments in the sector. However, all discussions indicate that the LMI has had no role or contribution in the implementation of the Directive, neither at the EU level nor at the national level.

In the area of procurement and standardisation, the envisaged actions were either not implemented or have not so far brought any results. This is particularly debilitating as far as the lead market approach is concerned, since these are precisely the areas where the approach can make distinctive, additional contributions and it has failed to do so.

Among the complementary actions, the SET-Plan has been formally established and the implementing plans for the EIIs are already in place. As in the other areas, the role of the LMI in this context is questionable. The stakeholders do not recognise any role for the Initiative in terms of setting strategic objectives or facilitating the partnership among the public and private sector.

The conclusion is that the LMI has made no discernable contribution to any of the developments related to the RES market. All activities appear to have taken place outside of the LMI framework. No monitoring mechanisms have been in place to ensure the implementation of the Action Plan as such and only a limited contribution has been made to the co-ordination of activities. In a crowded agenda for renewable energy, it appears that the LMI has been squeezed out.

Efficiency : it seems that there has been little input into the development of the LMI in this area and so no basis or reason to assess the efficiency with which actions have been carried out.

Value-added : There has been little added-value from the attempt to place certain key developments in this sector within the LMI framework. Policy initiatives such as the RES Directive or the SET-plan that appear to be the most important for the sector do not benefit from the LMI in any respect. At the same time, in the areas of standardisation and public procurement – where a distinctive contribution could have been made by the LMI, especially in terms of the issues that arise in relation to the procurement rules of the Utilities Directive, the low priority accorded to these issues and the lack of development has meant that there has been next to no additional contribution by the LMI.

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Thus, while the Action Plan does represent a comprehensive document bringing together the relevant

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This Report is also of great value in providing information on the statistical characteristics of the sector. The overall turnover of the European construction industry was about € 2.317 billion in 2007, representing an increase of more than 40% compared to 2002. The sector can be divided into three sub-sectors - construction as such (NACE 45) representing 74 % of the total, manufacturing of building materials (12 %), and professional construction services (14 %). Overall in 2007, employment in the construction industry in Europe was about 19.7 million people, an increase of more than 16% since 2002. In the period 2005-2007 the construction industry saw significant growth in many EU countries and especially in countries such as Spain, Poland, Ireland and Cyprus. The recent financial crisis however has had serious implications for the sector. The EU27 index of production for construction fell 14.2% between the first quarter of 2008 and the third quarter of 2009. Employment fell sharply, particularly in Spain, Ireland, the Baltic countries, Romania, Hungary, Denmark and Bulgaria. On the other hand, a few countries like Poland, Slovakia and Sweden have maintained a steady level of activity, mainly fuelled by extraordinary public investment in large scale civil engineering projects.

The size composition of the industry is also worth a brief mention at this point. Again the report on the Sustainable Competitiveness of the Construction Sector provides valuable information. The industry overall is characterised by a high number of small companies (with less than 50 employees). In 2007 firms of this size in construction activities (NACE 45) accounted for about two thirds of sectoral value added. Most construction enterprises including engineering and architectural services and even building material producers serve a local market. The picture is however complicated. Large players often play a prominent role, especially in public procurement markets and can have a marked influence on practices across the sector. There are also considerable differences in size structure across the Member States.

The Action Plan for sustainable construction envisaged 11 actions in total. In relation to legislation and regulation, a screening of national building regulations was completed in February 2011 and a study of cumulative administrative costs and benefits of regulation was completed in May 2011. The anticipated Communication on the Sustainable Competitiveness of the Construction Sector is likely to address these and other issues that need follow-up.

The recasting of the Energy Performance of Buildings Directive resulted in Directive 2010/31/EU, which was adopted in May 2010. Although work on this Directive has to be seen in a broader context, the LMI's highlighting of this issue can be seen to have been a useful point of focus in an area of some regulatory complexity.

The establishment of a network of public authorities in charge of procuring sustainable construction has been achieved in the SCI network, co-ordinated by ICLEI, an organisation with a broad local authority membership. In addition, the Low Carbon Building (LCB) Healthcare network provides a platform for public procurement stakeholders that wish to stimulate innovative low-carbon building solutions for the healthcare sector. This initiative is particularly interesting in carrying a pilot innovative procurement project through to an actual procurement process (see case study B.3). Guidance has also been developed on a procurement award criterion that takes account of Life Cycle Costing. This work is being taken up by the SCI Network and has applications beyond this particular market.

In the standardisation area, the action to widen the scope of European codes for construction design was completed in October 2010, in the sense that CEN has a Working Group that prepared the

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document "*Strategies for Meeting Construction Performance Requirements*", though the potential for further extension of the codes was deemed to be limited, at least until the Construction Products Regulation is implemented. More generally, the LMI can be seen to have stimulated the CEN activities in the construction area and to have promoted a greater degree of cross reference. In relation to methods and benchmarks for the assessment of sustainability performance, projects funded under an FP7 call in September 2008 are contributing a knowledge of sustainability assessment.

The Construction Products Regulation proposal was adopted in March 2011, although negotiations were difficult, particularly on obligations relating to the presence of hazardous substances in construction products and the simplification of procedures for small manufacturers in specific cases.

The complementary actions in this area address a series of pragmatic considerations, including the needs of SMEs, an EU-wide strategy to facilitate the up-grading of skills and competencies in the construction sector and issues relating to insurance. In all cases, studies have been conducted that have produced interesting results and for SMEs a guide on the advantages of voluntary schemes that promote sustainable construction has been published. However, although these actions have formally been completed, they all require further follow-up or implementation at a national level. The anticipated Communication on the Sustainable Competitiveness of the Construction Sector may again provide a way of taking the issues forward.

Generally, 9 out of the 11 actions in the Action Plan for sustainable construction have formally been completed and the other two actions concern projects that continue into 2012 and 2013, but that are well under way. In this sense the Action Plan can be judged to have been implemented, as intended. In fact, this part of the Initiative represents an interesting model, as a case where progress has been sought and achieved with a neat package of inter-related measures. However, in most cases there is still some way to go before the actions can be said to have led to clear impacts in the market for sustainable construction. Follow-up action is required, for instance, in relation to the screening of national building regulations or the up-grading of skills and competencies or the proposals on construction insurance. The major issue therefore is how to build on the steps that have been taken.

Evaluation

Evidence arising from interviews and documentary research relating to the sustainable construction market has led to the following assessment.

Relevance & Coherence : A major problem in promoting sustainable solutions in the construction sector is that there is a complex range of environmental issues that have given rise to multiple initiatives, regulation and standards. One of the merits of the LMI approach in this area is to have devised a relatively basic programme of inter-related actions that have been able to act as a focus for achieving important changes. Some, however, from the industry side have seen this as not adding greatly to developments that were under way in any case, involving too many studies rather than concrete actions or as venturing into areas, such as sustainability labels, where there are already initiatives developing in the market.

Again, given the range of the construction market and its importance in environmental terms, much of the action has echoes at a national level, sometimes with explicit reference to the LMI at an EU level.

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However, the general indications are that the national responses in terms of building a globally competitive position for sustainable construction are relatively restricted.

The coherence or rather co-ordination, with other EU policy measures relating directly to construction is thought to be good, but a problem is perceived in relation to the wider range of policy developments that affect the construction industry, again because of the complexities of the issues addressed.

Effectiveness : the choice of actions is thought to be appropriate and very much in line with the logic of the Initiative. The emphasis on working through agencies on the purchasing side, where possible, is also seen ultimately to be an important additional dimension brought by the LMI. However, first of all, on occasions this has required involving people and groups who have not previously been engaged at a European level and it has taken time for them to understand the context and the procedures and secondly it has meant that it has not always been possible to engage effectively with the supply side and its expertise.

Confronting these difficulties however is seen to be worthwhile, if they can promote the engagement of end users in determining the course of innovative developments. It is appreciated that there is a long way to go – perhaps much longer than has so far been appreciated, but it is felt that a good start has been made to creating a better understanding on the part of purchasers of what is already possible and how they can stimulate further innovation in the future.

Similarly, there are many difficulties in moving forward in the complex areas of legislation relating to sustainable construction and of standards. Both areas require the involvement of many stakeholders, but the diversity of perspectives can make progress very difficult to achieve. Nonetheless, the LMI is thought to have contributed in areas identified in the Action Plan, especially in highlighting the need for solutions that are consistent across regulatory requirements.

Given that in the sustainable construction area, a good part of the Action Plan has been achieved, an important consideration is now to communicate effectively what is available and promote its take up. The need for training and up-skilling, for instance, is considerable, both on the part of procurers and of suppliers and their staff. Increasingly this will need the purchasers and suppliers to work together, especially at a national level.

The success in launching a public procurement network with a broad base is, in contrast to some of the other lead markets, an important indication of the longer term effectiveness of actions in this area. An active procurement network presents the possibility of a more effective communication of good procurement practice to an ever wider circle of national and local procurement authorities. It also helps to drive change in other areas, through the identification of regulatory issues that need addressing and prompting the development of new standards and the revision of existing standards.

It is worth at this point considering the action that is being given special consideration in this market - Action 5: Establish a network between public authorities in charge of procuring sustainable construction:

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European level, first because existing technical solutions to sustainability issues are to be found over a wide area and it is thus possible to promote solutions originating in other countries and secondly because there are common problems to be faced in the use of a procurement framework and culture that has been established at a European level.

A major challenge is an engagement with suppliers. Over time the initial strong emphasis on the purchasers will have to be modified to accommodate a more effective engagement with construction firms. However, this will not be easy. The industry is extremely diverse, as has been pointed out, and we have encountered some hostility on the part of suppliers to the very notion of the Initiative, largely on the basis that it can have little additional effect and risks alienating those who perceive it as unnecessary interference. However, if a basis has indeed been created for a real dialogue between purchasers and suppliers on substantive matters, the experience in other markets covered by the Initiative suggests that it could be very productive.

Efficiency : there is some evidence that creating synergies with national demand-side measures is proving difficult, even in that small number of countries where national measures have been developed with reference to the actions at an EU level. One immediate problem is that the markets selected as offering important potential at a national level are likely, with good reason, to be different from those that have been selected at an EU level. Clearly generic lessons can be transferred, but in a busy innovation agenda developing at both national and EU levels in many countries, it is often difficult to raise the profile of even well-founded lessons from experience in demand-led initiatives.

There have been divided opinions on the funding for actions under the Initiative. Some believe that the existing arrangements have been satisfactory and should even be viewed positively, on the grounds that the problems addressed have been largely organisational and have not required major funding. What funding has been available has been appropriate or has represented a more focused and productive use of money that would otherwise have been spent on less interesting projects. However, especially those who look to the future, point out that rolling out effectively what has been achieved initially, such as bringing about the wider engagement of purchasing authorities and establishing adequate training programmes, is likely to be more expensive, even if a large part of it will be covered by national and local budgets. In general, however, the view, so far, is that efficient and even creative use has been made of the limited resources that have been available to the Initiative.

Utility, Sustainability & Value-added : The actions taken in the sustainable construction area are seen to be proportionate and usefully providing an important degree of focus on specific problems in what is essentially a pilot project, but as a counter-part, they are also seen to be necessarily limited in scope in an area – sustainable construction - where there is much to be done. In this qualified sense, they are seen, at least from the purchasers' side, as meeting important needs. However, many of the measures taken require a significant degree of follow-up, in some cases, such as the strategy to facilitate the up-grading of skills and competencies in the construction sector, involving major developments at national and local levels. The anticipated Communication will be a significant next step in addressing many of the issues and potential solutions that have been identified, but the ultimate sustainability of what has been done will depend on a good response from a wide range of stakeholders, particularly policy makers at a national level. Effectively engaging with the suppliers in the industry will also be a major challenge within this process.

Overall Findings

5

This chapter moves the analysis to another level in that it seeks to draw significant themes from the detail of the previous two chapters and consider the main cross-cutting elements in the Initiative, while also addressing some of the central questions of the evaluation.

5.1 Introduction

We have seen that the Lead Market Initiative began with a call in the Aho Report for a major re-orientation of innovation policy at a European level, in particular, making use of new demand-side tools. However, from the beginning the approach adopted was necessarily partial. First of all there was emphasis on encouraging developments specifically relating to demand-side measures, without a great deal of reference to the supply side and certainly without the co-ordinated approach to both sides that is now widely thought to be appropriate[251]. Secondly, the focus on a relatively small number of specific markets inevitably gave the Initiative a partial character and, thirdly, the restricted budgetary base and limited involvement of the Member States meant that the real ambition for the Initiative could never be commensurate with the vision articulated in the Aho Report.

It is important to be clear about the real aims and objectives of the Initiative in order to fairly assess it against the evaluation criteria. It will therefore be necessary to return to this issue at the end of this chapter. However, before doing this, an examination of related issues is required, particularly as far as the nature of the instruments used by the Initiative are concerned, and the extent of Member State involvement. These issues are considered in the following sections

5.2 The Selection of the Six Markets

It is not appropriate for the final evaluation to conduct a complete review of the process by which the six lead markets were selected. This process was explained in the initial Communication launching the Initiative and was also covered by the Mid-term Review. However, there are questions, particularly as far as the European value-added of the Initiative is concerned, that require a brief consideration of this issue.

The Competitiveness Council of 4th December 2006 that invited the Commission to present an initiative on lead markets stated that the Initiative should be based on a broad stakeholder consultation for defining a valid approach for fostering emergence of markets with high economic and societal value. An extensive consultation process did in fact take place, initially involving more than 30 industry-led European Technology Platforms (ETP) and on the 8 INNOVA Panels, with a second round of consultations with ETPs and Europe INNOVA Panels to assess various markets in a series of workshops, expert groups and questionnaires. A series of criteria had been developed during the course of this process for indentifying the target markets. These were listed as :

- Demand driven instead of technology push: (a strong market potential)
- Broad market segment:
- Strategic societal and economic interest
- Added value of prospective, concerted and targeted, but flexible policy instruments:

[251] See, for instance, the approach to lead market developments as considered in the OECD report (2010) 'Demand-side innovation policies'

- No "picking of the winners"

The question of whether or not it was appropriate to promote these markets at a European level appeared to have been answered implicitly rather than explicitly, but there are both conceptual and practical issues here that have implications for any future developments.

It should be recalled that the initial focus of debates on lead markets was at a regional level. As has been seen in the first chapter, following Beise and Cleff (2004), the Commission initially referred to them as 'the market of a product or service in a given geographical area'. It is still perfectly possible that regional or national authorities could identify a specific sector as one where the region or country has certain characteristics that give it competitive advantage and that they seek to enhance this advantage in order to create a sector that develops a leading position internationally and eventually globally. The lead market approach in this context is one where demand conditions locally are part of the circumstances that give the industry competitive advantage. This conception of lead markets continues to have relevance and relates, for instance to the concept of Smart Specialisation that is an important feature of current Cohesion policy.

Given this background, it is relevant to ask in what ways does it make sense for a lead market policy to be developed at a European level. There are several situations, where this is the case :

- *Mainstream, broadly-based markets :* – where both demand and supply are broadly based (for instance, for everyday products and services) and policy affects consumers and producers in most Member States and hence, where the effective operation of the Single Market is particularly significant.
- *Markets with a wide societal interest :* markets where addressing societal concerns can benefit from a European dimension, either because legislation needs to be adopted at a European level or because co-operation between Member States can lead to more effective solutions.
- *Markets with critical levels of demand on a European scale :* markets where demand in one Member State is not sufficient to support specialised producers and where consequently the operation of the Single Market is again significant.
- *Legislation at EU level :* where regulation, first of all, plays an important part in determining the nature and extent of demand (considered further in section 5.3 below) and, secondly, where this regulation is largely determined at a European level
- *Large public sector demand :* a consideration that applies at any level. The public sector needs to account for a significant proportion of the total demand if the demand-side policy instruments are to have a major impact.

Description of these situations makes it clear that there are many markets that have a potential to be significant globally where it would not be appropriate for them to be promoted at a European level in initiatives like the LMI. Equally, it is generally clear that the markets actually chosen have a significant European interest. Most of them have relevant legislation decided at a European level. Where standards are involved, these too generally require an agreement at a European level. And, for instance in the case of protective textiles, demand from across several European countries is often an important contribution to achieving the scale required to encourage the development of innovative solutions. Nevertheless, if future initiatives move onto concerted action in relation to other markets, it will again be necessary to demonstrate the case for undertaking this at a European level.

Before leaving this issue, though, there is a further question of why services were not included in the markets selected and whether traditional industry has been given a privileged position. This perception is not entirely accurate. Recycling has a large service element and ehealth primarily concerns applications of IT systems. In addition, the service sector is important within construction (architects, designers, consultants, IT specialists etc) and even in protective textiles where services relating to the cleaning and leasing of garments form an important segment of the market. However, given the acknowledgement of the significance of innovation in the service sector, it is perhaps surprising that there has not been specific consideration within the LMI of the particular issues that can arise with stimulating demand for innovative services.

5.3 The Instruments of the Lead Market Initiative

As has been seen, the principal instruments deployed in the Lead Market Action Plans, have been the use of the regulatory framework, public procurement, the development of standards and a series of 'complementary actions' The Aho Report had initially called for actions on regulation, standards, public procurement, intellectual property and fostering a culture which celebrates innovation. The LMI focused on the first three areas, with only limited reference to intellectual property and to fostering an innovation friendly culture, under the heading of 'complementary actions'. This approach is perhaps more focused but also rather more instrumental in the way that it has been developed, concentrating on putting certain specific policy developments into place. The separate elements of this approach will each be considered in turn.

Regulation

The creation of an appropriate framework for enterprise to flourish has long been one of the main objectives of Enterprise policy. The EU's current Entrepreneurship and Innovation Programme, for instance, was specifically designed to address, among other issues, 'an unfriendly business environment and administrative burdens that restrict the development of entrepreneurship'. The pursuit of a better environment for business is clearly advantageous for innovative businesses as much as for businesses in general and possibly more so. Similarly, innovative enterprises are likely to benefit in the larger context of the Internal Market, from a reduction of barriers to entry to transnational markets and particularly the facilitation of cross-border trade. Efforts in this direction, such as the Action Programme for Reducing Administrative Burdens and its follow-on actions, which has identified regulatory simplifications that could save businesses over € 40 billion, are clearly welcome.

However, in the more specific context of lead markets, as well as measures to simplify regulatory regimes, there are also measures that can prompt innovatory developments by providing a clear direction and by serving to reduce policy and technical uncertainty. In a number of areas where environmental concerns are prevalent, for example, the confirmation by the public authorities that certain levels of environmental performance are to be required provides certainty for suppliers and certain objectives in terms of improved performance. In these circumstances extra regulation can be more beneficial than a reduction in regulation.

At times, the two elements can be brought together and new legislation can both establish certainty for forward planning and also simplify or codify complex and sometimes contradictory regulations that have grown up over a period of time.

The objectives for action on regulation are therefore relatively complex and a number of the elements identified can be seen in the LMI Action Plans. The adoption of the Waste Framework Directive was an example for the recycling lead market of legislation providing certainty and direction (see case study B1 for an illustration). It up-dated the 2006 Waste Directive, which codified earlier legislation, but in defining basic concepts relating to waste management and laying down waste management principles such as the "polluter pays principle" and establishing the "waste hierarchy", the Directive completed the process of establishing for a number of years to come a clear framework that provides certainty for suppliers. The Renewable Energy Sources Directive and the Construction Products Regulation had a similar role for the Renewable Energy and Sustainable Construction lead markets respectively. All three pieces of legislation were important elements in other policy frameworks and it cannot be said that the LMI greatly assisted their adoption. Nonetheless, as important reference points for developments in the respective markets their inclusion in the Action Plans was clearly justified.

There are questions here, however, about the scale of the ambition in the Initiative and the timeframe over which regulatory changes could be envisaged. Much of the legislation explicitly referred to was already in the pipeline, in most instances as part of other policy developments, and arguably, the LMI could have been more assertive in targeting regulatory changes that were more closely related to the objectives of the LMI, even over a longer time horizon. As it was, there were actions in the different markets that reviewed existing legislation, such as the screening of eHealth legislation (action 9) and the analysis of the impact of bio-based legislation and policies. These actions now require further follow-up, suggesting that a longer time frame might have been appropriate.

Public Procurement

When the LMI was being initially planned, investigations revealed that few practical tools existed to stimulate the public procurement of innovation. There were a number of handbooks, best practice guides and event discussing the issues, and some Member States were exploring how to copy SBIR model frpm the USA, but in general, the LMI was venturing into new terroitory and in fact piloted a new tool.

It has been seen that actions promoting the encouragement of innovation through public procurement have been focused on three projects. These projects are developing procurement networks in three areas: sustainable construction in general, protective textiles for fire services and sustainable procurement in the health service. In launching these networks, the LMI was able to draw on the Competitiveness and Innovation Programme, which had a provision under the 2009 EIP Work Programme for a budget of € 2.75 million for ‘Public Procurement Networks in Support of the Lead Market Initiative.

Each project has its own strengths, but there are a number of common themes. Developing the ability of users to articulate their needs better and have an influence on the type of research that is being conducted is of great importance in increasing the economic returns on research funding in the EU and the networks potentially can make a major contribution to meeting this objective in the areas in which they operate. Increasing the confidence of often isolated procurement officers across the large number of purchasing authorities in Europe is an important step towards encouraging innovation. There is always the temptation to avoid risk associated with new solutions, by adopting a conservative procurement policy and the operation of peer group pressure encouraging a different approach is an important factor in changing the culture of procurement authorities. Each of the networks has done

valuable work in establishing the means whereby purchasing authorities can communicate and co-operate with each other and they have developed information and guidance showing how to adopt more innovative approaches and illustrating the benefits. These facilities now need to be taken up and used by many more authorities, if they are to have a major effect, but the important first steps have been taken. In addition each of the projects has undertaken some mapping or identification of potentially interesting technologies and research results and of the relevant authorities that could be targeted by future work.

A significant issue, given the experience of these networks, is the nature of the innovation encouraged through procurement. Both the SCI-Network and ENPROTEX have chosen to put most of the emphasis on encouraging the greater take-up of existing technology rather than encouraging fundamentally new solutions, requiring new basic research. None the networks have specifically encouraged pre-commercial procurement, mostly preferring to highlight approaches such as Forward Commitment Procurement and none of them appear to have looked at issues such as the use of concession arrangements as a way of encouraging risk spreading and as a form of procurement in a broad sense that may be more suitable for encouraging innovation. Clearly there are lead market approaches that are making use of pre-commercial approaches. Examples have been cited in Flanders and in Hungary, but these are outside of the Initiative as such.

There is also provision for a second generation of networks, under a procurement item in the 2011 EIP Work Programme for reinforcing the procurement of eco-innovation and for the creation and development of 'trans-national networks of public procurers to form "buyers groups" to create critical mass in purchasing major new technologies and innovations in particular in areas relating to major societal challenges and/or priority areas'. The main challenge for those building on the work of the LMI procurement networks is clearly now to communicate what has been done and involve many more purchasing authorities. Success in this area will very much determine the ultimate impact of what began with networks. The further support for these developments and its greater scale – some € 15 million and a further € 2million for eco-innovation procurement – are clearly going to assist the movement in this general direction.

It is noticeable, however, that the recent higher profile of procurement as an instrument for promoting innovation, in the form of additional funds and in policy pronouncements such as the Commission Communication on pre-commercial procurement[252], is in a policy context that has gone beyond the Lead Market Initiative to address new policy agendas, notably those stemming from the Innovation Union and Europe 2020. As a result there is a temptation to see the public procurement instrument as a stand-alone tool, with limited reference either to applications in particular markets or to application in co-ordination with other demand-side policy measures. This may reduce its effectiveness.

Furthermore, it appears that there are technical problems in the funding of various measures. Pre-commercial procurement in the strict sense involves the funding of research and has to be supported by the research budget. More general support for procurement and approaches such as Forward Commitment Procurement fall under the enterprise and innovation budget (part of the CIP). This situation can not only give rise to co-ordination difficulties, but allows the danger to arise of an

[252] Commission Communication "Pre-commercial Procurement: Driving innovation to ensure sustainable high quality public services in Europe", COM(2007)799.

unbalanced pattern of support for promoting innovation through public procurement across the innovation cycle. It underlines the need for a consistent approach to promoting all forms of innovation through public procurement.

Standardisation

The use of standards can be a significant way of promoting more innovative products and services, but, on occasions can also be an obstacle. Standards are often important in making legislative provisions more concrete and in facilitating the implementation of new legislation. In many cases, compliance with standards indicates conformity with legislative provisions. To this extent, standards reinforce the beneficial effects of regulation referred to above, by providing technical certainty and setting objectives for suppliers to achieve. They can also reinforce the promotion of innovation through procurement, when purchasing authorities

However, standards can also act as a break on innovation, if they do not keep up to date with developments and exclude new and better solutions. Changing standards takes time, because they involve broadly-based consultation and agreement. Some would say that this is no bad thing, it if means getting the right result than a quick one. There is clearly a balance to be struck.

The LMI acted as a stimulus to the development of standards in a number of areas - in sustainable construction and protective textiles and particularly in the bio-based sector. In the protective textiles area, the CEN PPE sector forum resumed its activities in 2009 as a result of the LMI and work by CEN on construction performance requirements was also the direct result of the LMI. The LMI's role in promoting the elaboration of new European standards for bio-based products was part of the very significant developments in that area unleashed by the Initiative (see case study B4). In 2008 the Commission issued two standardisation mandates for bio-based products: Mandate 52/2008 for the programming of standards for all types of bio-based products and Mandate 53/2008 for the rapid elaboration of pre-standards for bio-lubricants and biopolymers. These have led to developments that are certainly significant for the industry, but it is also interesting in the current context that the action is very much seen as part of a broader set of the co-ordinated developments that are required.

Progress has also been made in the eHealth area. A mandate (403) has been issued by the Commission with the aim of providing a consistent set of standards in eHealth and initial work has been completed. The LMI has helped to communicate a sense of urgency for the development of eHealth profiles. With recycling, the initial ambition was rather more restricted. The aim was to improve knowledge about standards used and this led to a study being launched to assess the situation. Similarly, in renewable energy there was reference in the Action Plan to adopting minimum energy performance standards and labelling measures for priority product groups, but there has been no particular action specifically associated with the LMI.

Overall, therefore, the standardisation actions that have been most productive appear to have been those that have been well integrated into the broader set of actions for the particular lead market.

Complementary Actions

Complementary actions, of their nature, have been more diverse in kind than the other actions. A generally common element was the development of supply-side measures that could usefully

complement the demand side activities, especially in the form of specific types of research. The Initiative was able to co-operate effectively with DG Research in a number of the markets and shape the terms of research calls under FP7.

In relation to protective textiles, a research topic targeting the personal protective equipment and clothing sectors was included under the 2nd call of the Nanotechnologies, Materials and new Production technologies (NMP) theme in FP7 and 7 research projects have been running in this area since 2009 with an approximate EC contribution of €21milion. In the bio-based area, a joint call invited proposals for research on biorefineries and related technologies and FP7 has now funded research on three large collaborative projects on biorefineries and related technologies[253]. There is also an ongoing commitment to promoting ICT developments within the health theme of FP7. The study 'Monitoring National eHealth Strategies: Lessons learned, trends and good practices' is gauging the extent of ICT activity in health. Support from FP7 extended to the encouragement of cluster development. Crosstexnet, an advanced textiles ERANET was set up in November 2009 after a call for proposals under FP7 and is intended to lead to developments of this kind through an improvement of the coordination of national and regional research programmes in the field of textiles .

Protective textiles was also able to take advantage of parallel work highlighting issues of IPR enforcement in the textile industry and there have been a number of examples of practical support, providing the basis future action, such as the mapping of bio-refineries across Europe and, in the case of sustainable construction the highlighting of areas that could act as a constraint on the other actions, such as problems with insurance arrangements or the availability of appropriately skilled labour.

The eHealth lead market has seen particularly interesting developments under the complementary actions in that they have constituted the driving force for the main developments of the Initiative for this particular market. Three eHealth-related projects have been launched under the Competitiveness and Innovation Programme's ICT Policy Support Programme. Both demonstrated the possibilities for European co-operation in this area and identified the main obstacles for future progress.

Additionally, complementary actions have been initiated with the Enterprise Europe Network, disseminating information on innovative actions in public procurement and technology brokerages, often in cooperation with regional innovation support organisations.

5.4 Case Studies

In addition to the broad examination of the instruments, the results of which are summarised in the preceding section, there has been consideration of a series of case studies during the course of the evaluation that illustrate by reference to specific examples issues that have arisen in relation to each of the instruments used in the LMI.

The case studies are annexed to the report (annexes B1 – 6. They concern the following topics :

Case 1 : The Waste Framework Directive - Waste Management in the Flemish Region

Case 2 : PIANOo - An Integrated Approach to Innovatory Public Procurement in the Netherlands

Case 3 :The LCB HEALTHCARE project – carrying procurement principles into practice

[253] EuroBioRef, SUPRABIO and BIOCORE

Case 4 : Biobased Products – The Elaboration of New European Standards

Case 5 : The epSOS project -combining supply-side and demand-side initiatives to promote innovation

Case 6 : The Lead Market European Research Area Network (LEAD ERA)

In the first case, the Waste Framework Directive (WFD) is considered, as a central point of reference for the recycling market and hence for the Lead Market Initiative in the area. The WFD was created with the purpose of turning the EU into a recycling society. The case uses the example of the revised WFD to show how regulation can have a critical effect in determining market conditions and directly promoting the recycling industry. It focuses on the action plan of OVAM (the Public Waste Agency of Flanders), which in implementing new measures in line with the Directive, is intending to improve further on the already good Flemish track record. Its action programme intends to reduce further the amount of final waste by prevention, environmentally responsible consumption and the re-use of products, but also by promoting selective collection and an active programme of recycling. This provides an important signal for the market for recycling in the region and a clear example of how regulation in pursuit of important social objectives can also have a stimulating effect on innovatory sectors.

Public procurement is an important instruments for demand-side promotion of innovation and, through its networking projects, the LMI has identified a series of practices that can help purchasing authorities encourage more innovative responses to their needs.

The fifth case considers how a supply side activity can be used to complement and enhance LMI demand side actions. The epSOS programme illustrates how investment in new eHealth systems not only improved technological innovation but also made use, and developed the effectiveness, of existing standards. The LMI action addressed a clear technological gap in the market in terms of the digitisation of patient data for EU wide use. Secondly, epSOS complemented the demand side actions of the LMI in the field of standardisation, by profiling standards that had already been created to support the development of the market. This facilitated the creation of common structures that contributed towards interoperability.

The final case also shows how support for supply side innovation can complement demand side policies, by reference to the LEAD ERA initiative. Projects are underway from the first of three calls for proposals to specifically support the six targeted lead markets. A second call has recently been published.

Of their nature most of these cases, illustrate effective use of LMI instruments. A number of them deserve to be highlighted further as graphic illustration of what the initiative set out to achieve.

5.5 The Resources of the Lead Market Initiative

One of the determining features of the Lead Market Initiative was that it has not had its own budget and has had to rely on the use of Commission and other staff resources and funds from other budgets, where common objectives could be identified. The funding that was dedicated to the Initiative in this way was largely derived from the Competitiveness and Innovation Programme and the Research and Development Framework Programme. As far as the evaluation team have been able to determine, the funds from these sources were as follows :

Table 5.1 – Action Funding

KEY	Legislation	Standardisation	Procurement	Complementary Activities

Sector	Action	Description	Source	Value €M
Ehealth	9	Clarification on Legal Framework (study)	CIP	€2.70
Sust Construction	1	Screening of National Building Regulations	CIP	€2.49
Sust Construction	3	Industrial panel on cumulative administrative costs/benefits.	CIP	€0.19
Biobased Products	5a	Standardisation of Biobased Products	FP7	€3.0[254]
Biobased Products	5d	PROSUITE (Sustainability Assessment)	FP7	€4.78
Biobased Products	5d	LCA to GO (LCA research)	FP7	€3.50
Biobased Products	5d	Global Bio Pact (Sustainable Certification)	FP7	€1.0
eHealth	7	eHealth application guidelines	CIP	€0.79
Recycling	8	Improve knowledge about standards used	DG ENV [255]	€0.15
Sust Construction	6	Assessment of sustainability performances (Super	FP7	€ 1.95

[254] Exact amount not determined

[255] The financial information from DG Environment for all Recycling Actions does not refer to any FP7 or CIP funds which may have additionally supported the action (including action 4, 10, and 12). The reference to DG ENV only includes funds directly used from the DG ENV budget. In addition since, 2009 the funds only relate to the budget from DG ENV Directorate responsible for legislation.

		Building)		
Sust Construction	6	Assessment of sustainability performances (OPEN HOUSE)	FP7	€ 3.50
eHealth	19	Networking among Public Procurers (Workshop)	CIP	€0.13[256]
eHealth	19	Networking among Public Procurers (PRECO)	FP7	€0.40[257]
Protective Textiles	3	Establish procurement network	CIP	€1.0
Recycling	4	Support Exchange of best practice across MS	DG ENV	€3.98
Sust Construction	3	Establish procurement network (SCI Network)	CIP	€0.98
Sust Construction	3	Establish procurement network LCB Health Care	CIP	€0.99
Biobased Products	6c	Mapping of biorefineries	FP7	€0.5[258]
Biobased Products	6d	BioChem Project (SME Innovation Toolbox)	CIP	€2.76
Biobased Products	6d	Biorefinery research	FP7	€52.0
eHealth	1	Pilot Actions (Thematic Network CALLIOPE)	CIP	€0.5
eHealth	1	Pilot Actions (Renewing Health)	CIP	€7.00
eHealth	1	Pilot Actions (epSOS phases 1 and 2)	CIP	€17.99
eHealth	1	Pilot Actions (Thematic Network SeHGovia)	CIP	€0.49
eHealth	1	Thematic Network eHealth Innovation	CIP	€0.50
eHealth	2	Innovation Scorecards (strategy study)	CIP	€0.30
eHealth	2	Innovation Scorecards (study on business models)	CIP	€0.20
eHealth	2	Innovation Scorecards (deployment of services)	CIP	€0.40
eHealth	2	Innovation Scorecards (phase 3)	CIP	€0.48
eHealth	3	Coordination action epractice.eu	CIP	€0.13
eHealth	3	Coordination action epractice.eu (FWC)	CIP	€0.14[259]
eHealth	5	eHealth interoperability HITCH	FP7	€0.5
eHealth	5	eHealth interoperability Smart Personal Health	FP7	€0.40

Recycling	15	Facilitate research on future policy developments	DG ENV	€2.05
Sust Construction	10	Alternative warranty/label schemes related to construction insurance.	Article 49 Council Reg	€0.30

The table illustrates the allocation of funding for project and other activities under specific actions for five LMI sectors).

In terms of biobased products, the funding has been concentrated in the area of standardisation with 4 activities under two different actions being supported. The work under action 5a has been regarded as critical for supporting product development against standardised criteria which will in the future support the growth of the sector. Although the exact impact is not yet know, it is expected that the remaining standardisation activities will also improve and refine developments in this area and are an essential area of investment. In addition, a complementary activity has also been funded but requires additional funding as its services are oversubscribed by SMEs. (Further information is required relating to additional complementary actions).

For eHealth, the funding as well as the weight of the activity has been directed towards complementary activities. In total, 17 activities under 6 actions have been funded. Although this needs to be qualified by the fact that in some cases the activities only partly relate to eHealth or that just one of project components had an eHealth dimension, it is clear that this sector has been allocated the greatest level of funding under the LMI. It is also interesting to note that the funding has been concentrated in R&D activities to support the development of new technologies and these have been key results under the LMI. Under legislation and standardisation, one activity under one action has been supported whilst for public procurement two activities under one action have been sponsored. It has been noted that there has been less impact and progress in these areas and further impetus is required.

Protective textiles has received funding for four activities relating to four different actions, one in the area of public procurement and the others in complementary activities. The relatively small but useful investment in public procurement has produced a focused network which is a key development for promoting innovative products in the sector. The remaining and larger proportion of funding has focused on complementary actions, most significantly on R&D (which has produced some interesting projects), deeper collaboration between developers and users through clusters and also the circulation of IPR guides.

Rather than funding external activities, the recycling sector's key achievement has been developing legislation. There were no funds for a procurement network, for instance, since the recycling call did not receive any proposals that could be funded under the CIP. At the same time, it also useful to note that many of the actions for this sector were not predominantly driven by the LMI but rather other policies. However, the financial information in the table from the budget of DG ENVR indicates funding for procurement and supply side activities and to a lesser extent standardisation. The complementary activities are the area to receive the most funding which will hopefully lead to supply side technology advancements that complement changes to the demand side environment. Given the importance of standards, the comparatively low amount of funding dedicated could be assessed for future initiatives.

With regard to Sustainable Construction, two actions within the policy areas of legislation, standardisation and public procurement have received funding and one complementary activities action

has been supported. The majority of funding has been targeted towards standardisation, followed by legislation, public procurement and complementary activities. Given the essential role in supporting the sector, the public procurement actions (which have produced good practice examples) should facilitate a strong return on investment and would appear to be relevant for future support. The funding in the field of legislation and standardisation has been regarded as useful in terms of initially stimulating activities, identifying areas of complexity and highlighting areas for future development but have made less of an impact. It has been noted that for the complementary activities to have a greater impact they would require greater support at national level.

Generally speaking, where funding has been concentrated so as to target specific policies (apart from sustainable construction) it has tended to produce positive outcomes, even if not in the most dynamic policy area for that particular sector. For complementary activities, as expected, the highest amount of funds have been allocated to R&D which appear (for protective textiles and ehealth) to have produced promising technology developments. Similarly, for biobased products the concentration of funds on standards has produced welcome outcomes with requests to deepen further developments. However, it is also noted that in relation to public procurement, relatively small investments can be made to produce dynamic results to enhance the capacity of the public sector to appropriately procure innovative products.

Interviews with Commission staff and other stakeholders have suggested that the relatively meagre resources for the Initiative have not actually posed a problem, given the nature of the Action Plans adopted. However, it is reasonable to assume that the funding constraint did influence the nature of the actions attempted and reduced the ambition of the Initiative initially. Furthermore, planning of activities was complicated by the budget planning arrangements and timelines. Having to secure approval for funding actions internally within the Commission and from Member States every year, made forward planning difficult. It is also the case that that a restricted budget meant that it was not possible to establish more than three public procurement networks and that the activities of the networks that have been established have been more restricted than would otherwise have been the case. This has certainly acted as a brake on developments with this important element of the Initiative. Furthermore, a number of the actions were preparatory in nature, identifying, usually through studies, more substantial action that is necessary to follow up the initial diagnosis. The study identifying training needs in the construction sector illustrates the point. Further development of the Initiative in whatever form it may take is likely to require more substantial funding that is secure for a 3-5 year period.

5.6 The Involvement of the Member States

Member State involvement in the LMI

The Communication that launched the LMI commented that 'the active participation of Member States (MS) and the private sector, in line with the principle of subsidiarity, ... is essential' and went on to describe a governance structure that included provision for the active involvement of the Member States in the Initiative. This theme is repeated in the Mid-term Review, which also comments on the 'lean governance structure' put in place for the implementation of the LMI. Furthermore, the initial Action Plans, annexed to the Communication, indicated the particular actions where Member States could make a contribution.

Overall Findings 5

It was intended that the co-ordination of the Initiative would be assured through the Inter-services Working Group on Lead Markets within the Commission and a sub-group of the Enterprise Policy Group (EPG) 'on innovation with a focus on the LMI', as far as the co-ordination with the Member States is concerned. The EPG sub-group on innovation meets twice a year and was intended to provide a forum to discuss synergies between lead market activities and national and regional instruments and innovation policies. There were, however, two significant constraints on the ability of the sub-group in carrying out this role that the Mid-term Review highlighted. These arose first from the nature of the domestic responsibilities of the members of the sub-group and the difficulty of co-ordinating diverse activities across a range of different sectors at a national level. And secondly from data protection regulations that appeared to prevent the Commission services from broadly publicising the names and organisations of experts based in Member States that take part in the lead market-specific contact groups. These constraints have continued to cause difficulties for Member State officials and their engagement with the Lead Market Initiative.

As part of the current evaluation, the evaluation team sought interviews with officials from 10 Member States and a survey was circulated to all the officials associated with the EPG sub-group. The interviews were intended to ascertain the views of a cross section of Member States on the Initiative as a whole and their part in it. The survey sought to gauge the extent to which the Initiative has echoes at a national level and to determine if any local effects of EU action are apparent.

The interviews provided an interesting perspective on the Initiative from officials who had followed its development from a Member State perspective. A number of Member States acknowledged that the LMI had influenced thinking on innovation policy in general terms or given additional weight to developments that were already under way and it was seen to be making a useful contribution to raising the profile of demand side measures. But, apart from Hungary where discussions stemming from the LMI on pre-commercial procurement had influenced a pilot project supported by the Structural Funds, it was hard to identify particular ways in which policies or activities had been directly influenced by the LMI. In particular there were problems with the markets chosen. In some Member States, there were some overlaps with policies supporting developments in particular sectors, especially in the context of responding to environmental challenges, but each country had its own priorities and in Slovenia, for instance, the selected sectors were either non-existent or too small in scale to justify specific actions and it was hard to know how to interact with the Initiative. A number also felt that it would have been better if the Member States had been more involved in the original selection or even that after an initial debate, Member States should have developed their own action plans and done what they thought best for their own countries. Now the Initiative is seen to need a re-definition as part of a more global approach in innovation policy, particularly in the context of the proposed innovation platforms or as part of a broader shift towards linking economic and societal objectives in order to solve grand societal challenges while at the same time stimulating economic development.

At a more operational level, although a number of Member States commented on the helpful interactions they had had with Commission staff, it was felt that the framework for Member State involvement had not been sufficiently developed. It was not clear what Member States were supposed to do. The actions undertaken under the Initiative cut across departmental responsibilities and were difficult to co-ordinate. The data protection problems relating to the disclosure of names of other people involved in the Initiative meant that it was difficult to know whom to contact at a national level. Much of the planned activity focuses on developments that the Commission is responsible for and in other areas, although the initial Action Plans had indicated where Member State involvement was

expected, there was no consistent attempt to co-ordinate or support this input, and indeed it is not evident that such moves would have been generally welcomed. This is in contrast to other situations where the Commission and Member States are working together in areas of shared competence. In short, there was not really the basis for the Member States to develop their own initiatives within the overall framework.

In terms of the efficiency with which the Initiative was implemented, some Member States thought that there was a confusion of objectives in the initiative, that the Commission appears to be involved in too many measures in the innovation area and that it might even be better to concentrate on promoting a few areas, such as Key Enabling Technologies, than to pursue multiple objectives. The lack of a clear perspective made it difficult to implement and inefficient. In practical terms, the need to co-ordinate across various Directorates General in the Commission and across various ministries at a national level made it difficult to manage. A dedicated budget might have helped matters, but some felt that this may have raised issues of competition and one Member State stated that it was difficult to get away from the suspicion that the Initiative involved 'picking winners'.

There were also a number of doubts about the value-added of the Initiative. One Member State commented that it was difficult to distinguish between what the LMI is encouraging and what would have happened anyway. On the other hand, another commented that the LMI was playing a useful role in developing policy relating to the link between supporting R&D and the subsequent stage of taking innovations to market. There was also a suggestion that there was a significant potential for the transfer of learning arising from the Initiative, particularly in the context of the Innovation Partnerships.

The response to the questionnaire survey of Member States was rather limited, with only 11 responses being received in total. This in itself might be thought to be indicative of Member State engagement with the process.

Most Member States responding reported that the LMI has had no identifiable impact on national policymaking, though some indicated that an indirect impact might have been possible. Spain mentioned an indirect influence because of the development of certain policy initiatives coincident in time with those of LMI. "LMI has affected indirectly the e2i Spanish strategy because one of its axes is "fostering innovation from the public demand side". The Innovative Public Procurement (CPI) Initiative has also been indirectly influenced by LMI."

Others commented that although there has been no direct influenced from the LMI, it has definitely contributed to fostering the awareness of policymakers of the importance of promoting innovation through demand-side policy instruments and this is being reflected in national policy developments. . In explanation of the disconnection between the LMI and national developments, several respondents pointed to a failure in coordination and communication.. For example, one comment was that "the six lead markets were selected based on criteria set by stakeholders but without involvement of Member States. The resulting sectors all have merit in that they address a societal issue, but they did not match national themes or programmes and did not sufficiently engage the relevant government departments. As the Ministry of Economic Affairs we have no authority over the Ministry of Health and so could not engage them for example in the lead market eHealth."

It added that "for privacy reasons information about the participants in the specific contact groups was never distributed and therefore it was not possible to liaise with them. Also we were never informed of when / where meetings took place."

Other member states commented on the difficulty in engaging with others involved in the LMI at a national level. A lack of resources on both sides added to the problem. Some officials commented that there was definite scope for better co-ordination beyond the structures established for EPG Sub-group on Innovation and the 6 lead market-specific contact groups and this should be extended to co-ordination between the LMI and other EU measures, such as the development of European Innovation Partnerships or the eHealth Governance Initiative which will take forward the eHealth Action Plan..

Parallel developments in the Member States

It has already been indicated that, although not directly linked to the LMI. several Member States are currently undertaking initiatives that are similar in kind, in that they use demand-side interventions to promote the development of certain markets. In the Netherlands, the government coalition agreement in October 2010 brought about a change in innovation and entrepreneurship policy, moving away from subsidies to a credit system. Nine top sectors have been identified for which a team comprising large industry, SMEs, government and academia will develop integrated agendas (R&D, market, legislation, economic diplomacy). This can be compared to a lead market approach in that it will specifically address demand side measures such as public procurement.

As is further illustrated in the case study on procurement support in the Netherlands (Annex B2), the internet-based network for public procurers (Pianoo) exchanges practical experience and arrange market meetings with industry sectors. Pre-commercial procurement has been developed in the Small Business Innovation Research Scheme. Linking supply (FP7) with demand (CIP/LMI), the Dutch authorities hope that this approach will be reflected in the European Innovation Partnerships.

Germany has recently launched a High-Tech 2020 Strategy, an "ambitious cross-policy innovation strategy" which focuses on increasing "the benefits of technological change for people". It focuses on the five areas of climate/energy, mobility, safety, communication and health/food. Forward-looking projects will be identified in each field that formulate socially and globally desirable objectives[265].

In Spain, the New State Strategy of Innovation (e2i) was endorsed by the Government in July.2010. In addition, the Government approved the Innovative Public Procurement (CPI) Initiative, under the umbrella of the e2i on 8th October.2010. The sectoral priorities determined are, firstly, energy and health. Then, other sectors with priority for innovative public procurement are: science industry, green economy, societal welfare, modernisation of public administration and strategic sectors such as defence, ICTs tourism.

In Denmark, although there has not been any use of public procurement specifically as a means of promoting innovation, some ministries, are contemplating different pilots in this field, sometimes with a view to promoting social or environmental objectives.

[265] http://www.hightech-strategie.de/de/350.php

In Finland, "the Action Plan for Demand and User-driven Innovation Policy was adopted in summer 2010[266]. It includes actions relating to Lead Markets (in particular chapter 2.3. of the Action Plan. In Portugal, discussion with all the relevant stakeholders on the scope of the "Innovation Portugal Plan" has reflected the European debate on demand side measures.

In the UK, "the Growth Review aims to identify structural reforms with the potential to improve the business environment and also to examine the barriers to growth that affect specific sectors. The UK Government is initially assessing the potential for action in six sectors, where there are clear opportunities for growth and where government can make a difference. One of these sectors is the Construction Sector which accounts for around 8 percent of GDP. Improved performance by the sector and by the government as a customer will make a contribution to the low carbon agenda, to infrastructure and to the country's prospects for growth.

The UK pointed to the SBRI (Small Business Research Initiative) which has the potential to be taken on board on a European Level. This is similar to the SBIR scheme in the United States, which has been running successfully since 1982. The Netherlands also operates an SBIR (which is referred to in the annexed case B2).

SBRI is a programme that brings innovative solutions to specific public sector needs, by engaging a broad range of companies in competitions for ideas that result in short-term development contracts. The Technology Strategy Board champions SBRI which is now focused on technology development and specific competitions.

It can definitely be seen therefore that the lead market approach and demand-side initiatives more generally are now established in policy in a number of Member States and there is scope for greater co-operation. The question currently is : what form should that co-operation take ?.

[266] http://www.tem.fi/index.phtml?l=en&s=2382

Conclusions & Recommendations 6

6.1 Conclusions

The Lead Market Initiative has been at the forefront of an important shift in innovation policy at a European level, leading moves towards a greater emphasis on the demand-side stimulation of innovation. This approach is now widely recognised as a significant element in innovation policy at regional, national and European levels. The LMI can be credited with raising the profile of these developments.

However, the LMI cannot be said to correspond to the large scale strategic actions called for by the Aho Report. In fact the Report itself had warned ;

> *'The course of action we shall propose is simple but its application is complex and requires a huge act of will and commitment from political, business and social leaders.'*

Judged by the scale of this ambition, it has to be said that the LMI has fallen short and this is reflected in the comments of some of those who have participated in this evaluation. They feel that some of the rhetoric surrounding the LMI raised expectations of quite significant changes in policy that have not been realised. However, a judgement that the Initiative had failed to meet expectations would not be fair, given the way that it was actually constituted in 2007.

It is important for purposes of the evaluation and also for any successor actions taking up the themes of the Initiative that the real nature of the Lead Market Initiative be understood clearly. The following characteristics are significant :

- The LMI has more of the nature of a set of pilot actions than a programme aiming to shift the basis of an important area of policy.
- Its major strength was its potential to focus on a relatively restricted number of inter-related policy issues that are of importance for the development specific promising markets, but that are unlikely to be dealt with systematically in any other policy framework.
- The architecture of the Initiative was rather new. This often meant interacting with a number of groups, some of whom are not used to operating at a European level, and making use of new and untried procedures to achieve developments at both policy and implementation levels.
- The initiative mainly concentrated on areas where the Commission services could have a direct input, without much reference to the Member States. It did nonetheless require a considerable amount of co-ordination across different services of the Commission.
- Engagement with industry was generally more successful than with Member State authorities, although the way that this developed varied considerably across the different markets.
- The Initiative had no budget allocated and only indirect access to relatively modest resources.

These common characteristics underlie all of the Action Plans developed for the six different lead markets. However, thereafter there are significant differences between them, beginning with the number and range of actions making up each of the Action Plans and going on to their overall

orientation and relative emphasis on different instruments, the dynamics of the interaction between the actions, the different drivers of change in each particular lead market and finally the degree of success achieved. It is almost as if each lead market should have been evaluated separately.

Chapter 5 of this Report has detailed the developments in each lead market separately. In contrast, the purpose at this stage is to highlight the overall conclusions prior to drawing up some recommendations.

It has been seen that the degree of success experienced has varied across the different markets. Among the factors explaining this variation is the extent to which a particular development, such as the operation of a procurement network or the enthusiastic involvement of industry has been able to act as a driver for the whole set of actions. However, it is also worth commenting that the success of the Initiative in a particular market has also depended on how 'busy' in policy terms the particular sector is. In the case of renewable energy, there are clearly so many other developments taking place that there has not been room for specific lead market actions. The recycling area has also been 'busy' in this sense and has found it difficult to develop a distinctive lead market contribution, whereas in eHealth, the drawing to a close of the i2010 initiatives meant that the lead market framework offered the possibility of continuity and development and in sustainable construction, the focus on a particular package of actions enabled a distinctive approach to develop. Finally, the less crowded agenda of protective textiles gave space for progress on a number of fronts, while the absence of an alternative framework for a consistent approach to the issues faced in the market for bio-based products has meant that the Action Plan could hardly contain the range of issues that have been addressed. This consideration points to the practical difficulty of pursuing demand-orientated policies in 'busy' policy environments and suggests that a pragmatic solution be found, where a co-ordinated approach to demand and supply-side issues can help address important issues for potential lead markets. This might take the form of 'mainstreaming' demand-side issues, when this is appropriate, particularly where they have achieved enough momentum to ensure that they will not be overlooked. Alternatively, the LMI approach with a specific initiative examining a manageable package of key and inter-related issues, could continue to be a policy instrument that is likely to become more effective as lessons are learned from the current experience.

One further issue should be raised as part of this introduction. It concerns the involvement of the Member States in the Initiative.

In contrast to the successful involvement in a number of the sectors of the relevant industrial representative associations, the engagement of the Member State authorities in the LMI has been relatively restricted. This, in spite of the fact that Member State involvement was seen to be 'essential' right from the beginning. Initially, some Member States expressed reservations about the whole idea and some still regard it as a low priority, but there has been increasing recognition of the significance of demand-side approaches and many Member States now make reference to similar measures in their own national innovation strategies. Some, of course, had such strategies prior to their development at a European level. Furthermore, evidence from interviews suggests that there is now generally a willingness to recognise the need and usefulness of demand-orientated measures.

It appears that the initial reluctance by many Member States to engage with the lead market developments has had some lasting consequences. First, as has been noted, the Action Plans mainly concerned actions by the Commission and although these indicated where Member State input was required, they did not specify what actions the Member State authorities were expected to undertake. It

has often been difficult for them to see how they can contribute. Secondly, data protection considerations have been allowed to inhibit communication between national authorities and the industry representatives involved in the Initiative from their Member State. This has added to the inherent difficulties of co-ordinating disparate activities across a wide range of departmental responsibilities that was commented on in the Mid-term Review and also of developing the new processes and everyday procedures that were necessary to bring about the active engagement of national authorities. In effect, therefore, even in those Member States that were willing to co-operate (and some clearly did not regard the Initiative as a high priority), it has been hard for Member State officials to undertake in an effective manner the everyday co-ordination of actions at a national level that are necessary to support the formal co-ordination carried out through the EPG sub-group. This experience has several important lessons for any future action in this area, particularly when contrasted with the rather more successful mechanisms developed for other parts of the Initiative.

Returning then to the main conclusions of the evaluation, these will be summarised in line with the main categorisation of evaluation issues used throughout this report. In particular direct answers to the main evaluation questions will be provided, although, of course, these will be in summary form, drawing on more detailed evidence in the earlier chapters.

Relevance & Coherence

In relation to the relevance and coherence of the Lead Market Initiative, the questions addressed in the evaluation concerned whether or not the initial rationale of the Initiative was well-founded and appropriate for the EU to support, how far it related to other EU policy measures, especially in areas relating to innovation, and to the policy and actions of the Member States. The following points have emerged :

- The LMI has clearly been addressing a major gap in innovation policy, which is now widely recognised. The initial rationale was well articulated in the Aho Report and is well-founded in the literature.

- Innovation policy at a European level has been undergoing a rapid development, especially since the launch of Europe 2020 and the associated Flagship Initiative 'Innovation Union'. The relevance of demand side measures and especially the lead market approach continues, but could benefit from a more systematic integration into other aspects of innovation policy.

- The emphasis on the demand side was necessary in order to establish the approach and possibly to avoid suspicion that the Initiative involved 'picking winners'. The intelligent incorporation of complementary actions with a supply side character, including the funding of specific types of research, has shown that a more balanced package of demand and supply side actions might well be appropriate in any further LMI–type developments.

- Current Action Plans have not generally addressed issues relating to IPR, as initially suggested by the Aho Report. No-one has suggested to the evaluation team that this was a major omission at this stage, but as these markets develop, particularly on a global scale, IPR issues may become more pressing.

- The six markets initially chosen as targets continue to show a marked potential for further growth.

- The implementation of the Initiative had important flaws, notably in the failure to provide a sound basis for Member State engagement. This situation goes back to the initial interactions on the Initiative between the Member States and the European Commission.

- Developments in the policy and actions of the Member States can best be described as being in parallel to those of the Initiative.

- Industry representatives and other stakeholders have clearly made a more important contribution to the Initiative throughout and in three of the markets (bio-based products, e-Health and protective textiles) have become important drivers. Where it has been possible to engage with purchasers, they too have made a significant contribution and have the potential build on this very positively.

Effectiveness

The issues under consideration in relation to the effectiveness of the Initiative concerned whether or not its stated objectives were correctly specified and whether the implementation process was effective and transparent.

- The establishment of Action Plans was a useful way of defining clear objectives for the task force co-ordinators of each lead market. After 3-4 years, it appears that some of the Action Plans have made better use than others of the Initiative's potential for a coherent and co-ordinated development of demand-side conditions in strategic markets.

- Most of the actions in the Action Plans have been achieved, one way or another and many of the others are well under way. The relative success of the individual Action Plans, however, should be judged by the extent to which the Initiative has managed to generate a momentum among the relevant stakeholders and here there are important differences between the six markets.

- The high level objectives of the Initiative have never been stated in the form of a clear Intervention Logic and consequently there is some mismatch between the perceived promotion of a demand-side approach to innovation policy and the actual processes of the Initiative.

- Budget and other constraints meant that the actual objectives set for the Initiative in the Action Plans were relatively focused and short-term. They were also intended to have a short duration. As a consequence, in many instances the actions led to a better understanding of the problems of the market rather than their resolution.

- Reflecting the nature of the actions, the effects of the intervention were mainly anticipated - in evaluation terminology - as outputs rather than as outcomes. Where calculations of longer term impacts were provided, they are difficult to substantiate and in a number of instances require major revision. In general, the statistical basis for such calculations is very weak, because of the particularly difficult problems in identifying appropriate data in markets that cut across sectoral definitions and it is relatively early to detect any influence of policy developments. Nonetheless, it is clear that all of the markets are significant for their actual and potential growth, independently of any impact of the Initiative.

- Promising results were evident in a number of the activities identified, but ultimate impacts very much depend on the follow-up and dissemination of the results achieved. A useful momentum has been generated, particularly where the relevant industry associations have become engaged.

- A particular issue has arisen for the bio-based products sector. In order for it to emerge as a lead market in Europe, it requires significant co-ordination with other EU policies on the supply side. This particularly relates to accessing biomass on a level playing field with the renewable energy sector and more funding for coordinated technology advancements. Without these being place, further strengthening of the demand side will not be as effective as it could potentially be

- Experience has shown that the promotion of innovation through public procurement can take place in distinctively different ways. In particular, there are different instruments depending on the stage of the innovation cycle that is being targeted. The legal distinction between promoting research in the early stages through PCP and support for promotion of subsequent stages in the cycle may hinder the development of an integrated approach to the stimulation of innovation through procurement across the innovation cycle.

- In many instances, good follow-up will need appropriate budgets, which for some actions will need to be much larger..

- Examples of good practice are provided in the annexed case studies.

- Active engagement of stakeholders was a difficult process to manage, especially the initial balance between purchasers and producers. However, good relations have been established in at least three of the six markets (bio-based products, protective textiles and eHealth) and a good basis established for a better engagement in another (sustainable construction). Again much now depends on the effectiveness with which initial results are communicated.

- There has clearly been a concentration of activities in certain Member States, often reflecting a prior interest in a demand-orientated approach to innovation. This represents an important challenge for any further development of the Initiative

Efficiency

In relation to the efficiency with which the Initiative has sought to meet its objectives, questions considered included whether or not the policy instruments available were appropriate and sufficient, what level of funding was actually dedicated and how it was used and whether the implementation processes were conducted efficiently.

- The absence of a dedicated operational budget clearly restricted the initial scope of the Initiative and subsequently meant that actions were not as effective as they might have been. For instance, the fact that a restricted budget meant that networks of procurement authorities could not be established for four of the markets certainly undermined the effectiveness of this aspect of the Initiative.

- Nonetheless a lot has been achieved with limited resources and the Initiative has benefitted from the co-operation of DG Research in launching complementary research activities under FP7 that are

now well under way. Support has also been deployed from resources available from the Competiveness and Innovation Programme. The details of this support for the Initiative are set out in section 4.2. of the Report.

- Co-ordination with other Directorates General of the Commission than DG Research has not always worked as well. There appears to be a problem in engaging some of the other services of the Commission, for example, in following through issues in regulatory obstacles identified by actions under the LMI.

- The nature of the budgetary arrangements has meant that a lot of the progress has depended on the efforts of Commission officials, particularly the Task Force co-ordinators. All of these officials have other responsibilities and the relative success of the actions in the six different markets reflects this consideration to a significant extent.

- The overall costs of the Initiative have been relatively modest and in some instances actions have been able to build on activities already under way at a national level.

- Resources being devoted to areas covered by the Initiative, under the current Work Programmes of the Framework Programme for research and development and the Competitiveness and Innovation Programme, already reflect the developing innovation framework at a European level. As a result although the developments taking place are similar in nature, they are not specifically directed to promoting actions under the Initiative

Value-added, Sustainability and Utility

Evaluation questions under these headings related to the nature of the added-value of the Initiative, especially at a European level, and the extent to which they met the needs they were designed to address, how sustainable the actions are and how actions of this kind could be improved, so as to increase their utility. It was also of interest to know if LMI activities would lead to a further development of policy and new regulations.

- Where the LMI approach worked, it brought distinctive advantages, not least from being able to address a targeted set of interrelated issues for the market in question. This brought a focus on the central needs of the market in question and was the main added-value of the approach.

- It is important for any future use of the LMI approach that effective targeting of the actions is undertaken in the preliminary phase, as part of the more in-depth pre-evaluation recommended in the Mid-term Review.

- For the markets targeted, the fact that the LMI operated at a European level brought additional advantage, though this would not necessarily be the case for all markets. Regulation stemming from European legislation and the benefits to be derived from public purchasing from more than one Member State are significant factors in all cases.

- Other potential lead markets could well be supported at a national or even a regional level.

- Many of the actions require follow-up to have their desired effect. Some of this will now take place within other policy frameworks (for example, in the case of recycling). In other cases, and notably in that of the bio-based market, there is an urgent need to find a way of responding to the issues that the Initiative has raised.

- For the sustainability of the actions, a lot therefore depends on future policy priorities both at an EU and at a national level and, especially in relation to the procurement networks, on the efforts currently being made to create broader, self-sustaining networks from the embryonic forms already established.

The overall judgement on the LMI is that it has promoted the development of an important new element in innovation policy, provided indications of how co-ordinated demand–side initiatives might operate more extensively at a European level and delivered developments that are of some importance for at least four of the six markets (bio-based products, e-Health, protective textiles, sustainable construction).

The distinctive approach developed ought to find a place in whatever framework emerges, but in order to contribute to the development of this framework, certain conclusions with implications for the nature of potential follow-up should be highlighted. These include the following observations :

- There is a clear advantage in being able to address inter-related issues in regulation, procurement standards and complementary actions as a distinct package.

- A focus on the issues confronted by a specific lead market adds considerably to the benefits of addressing these issues at a more general level.

- Demand-side actions often have to be related to supply-side considerations and a more balanced approach will be necessary in many cases.

- The completion of the initial Action Plans means that there are a variety of follow-up measures necessary that can be implemented in different ways.

- Some of the lead markets (bio-based products and sustainable construction) are likely to have the opportunity to set out future developments in policy documents (such as planned Commission Communications).

- Stakeholders in a number of the lead markets expect follow-up actions.

There are, however, significant differences between each of the current lead markets and in the characteristics of a number of others that might be targeted, in any follow-up action. These differences might suggest varied approaches within the possibilities set out in section 2.3.

For the bio-based- products market, there is undoubtedly continuing scope for a co-ordinated approach to a range of regulatory, standards and operational issues, to which a targeted procurement action could usefully be added. This is the clearest case for a continuation, and in fact reinforcement of the lead market approach as it has operated over the last few years.

Conclusions & Recommendations 6

Sustainable construction has successfully identified a number of areas that need further development, some of them involving more expenditure than previously. Maintaining the co-ordination achieved under the LMI would be an important advantage, but it is easier to see in this case a mainstreaming into other actions, perhaps with a series of 'lead market actions'. eHealth and protective textiles are in a similar situation, in the former case, for a large part, within the obvious framework of the Innovation Partnership on Active, Healthy Ageing.

In the areas where there is a particularly busy policy agenda, notably in the case of recycling and renewable energy, effective integration through mainstreaming is an obvious development, although there is a danger that distinctive demand-side actions will be lost among other actions along with the benefits of cross references between the developments in regulation, standards and procurement. It may be that procurement initiatives in these areas could provide the driver for the development of demand-side elements generally, especially if procurement networks had a remit to raise related regulatory and standards issues. Underlying these comments is a conviction that a coherent demand-side approach could still make an important contribution in both of these areas, in spite of the fact that the LMI in renewable energy never really got off the ground. In both cases, the distinctive demand-side elements would benefit from a more structured interaction with supply-side developments.

6.2 Recommendations

The main recommendations stemming from the previous analysis are as follows :

- A co-ordinated approach to the demand-side stimulation of innovation ought to continue to have an important place in innovation policy, while the links with supply-side measures should continue to be strengthened.

- Although the promotion of lead markets and demand-led innovation policies are closely related, they are not the same thing and may be pursued independently. There is scope for both within innovation policy at a European level.

- There are, however, significant advantages to be found in pursuing demand-side stimulation of innovation by focusing on specific markets with the potential to become lead markets.

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Conclusions & Recommendations 6

- Delivering 'smart regulation' through strengthening the interaction between different services of the Commission in addressing interrelated lead market issues, will continue to be an important issue in whatever framework is developed,

- The full intervention logic of LMI-type measures needs to be elaborated so that objectives at all levels are evident and transparent.

- This should be supported by a clearer specification of the longer-term results and outcomes anticipated and by an effective monitoring of progress. In spite of the statistical difficulties, the current study has elaborated the evidence base further and this should continue to be developed, especially as longer-term impacts from the Initiative become apparent.

- Effective follow-up of actions requiring further developments that formed part of the LMI is essential for the credibility of the Initiative. Further action in the Bio-based products market is particularly urgent, but is also needed in the e-health, protective textiles, and sustainable construction areas.

- The LMI has revealed that the biobased products sector can only emerge as a lead market if biomass and technology constraints are unlocked. This could be addressed in the forthcoming activities of Flagship Initiatives.

- The case for demand-side actions, especially relating to public procurement, remains strong in the 'busy' policy areas of recycling and renewable energy. In whatever framework develops, demand–side promotion of innovation in these markets should be a significant feature.

- The initiative would have had greater impact, particularly in the procurement area if it had had a dedicated budget. Furthermore, while much can continue to be done within a restricted budget, many of the follow-up actions identified require more substantial funds, both within existing and new frameworks. The scale very much depends on the action concerned.

- Communication of the results of projects undertaken as part of the LMI is necessary if the initial actions (that have mainly been limited in their time horizon) are to have their intended ultimate effects. The further development of the procurement networks is a particular example.

- It is also important that future public procurement instruments are linked to, and build on, the public procurement activities undertaken under this Initiative. In particular, a balanced approach to support for the procurement of innovation needs to be developed across all phases of the innovation cycle, This would include pre-commercial procurement, PPI ('public procurement of innovation'), instruments such as Forward Commitment Procurement and, where appropriate, the use of concession arrangements.

- It really is essential to engage the Member States in the LMI or similar processes. At a minimum, this should involve a clear definition of action that has to be taken at a national level to complement EU action.

- This process may be facilitated by an explicit statement of the case for addressing specific potential lead markets at a European level and the more in-depth pre-evaluation of targeted actions recommended in the Mid-term Review.

- It is also important to continue the process of engaging a wider range of Member States in the use of demand-side instruments to promote innovation.

- The lead market approach also makes sense at a national level and in certain circumstances, at a regional level. A greater engagement of Member States that have so far not adopted demand-side stimulation of innovation might be achieved through its inclusion in Structural Fund guidelines and in the elaboration of Cohesion policy.

- The difficulties arising from data protection regulations must be addressed. Arrangements should be made so that those engaged in the development of policy should be able to communicate with other stakeholders and should be publicly accountable for their contributions to policy development.

- The effective engagement with industry has been one of the successes of the LMI in certain markets. There are many lessons to learn from the methods adopted, but perhaps the most important to develop would be the structured interaction between purchasers and suppliers, both within and beyond the public procurement framework.

- The promotion of end-user interaction with research - from the shaping of objectives to the detail of the work undertaken and its subsequent application – is a major advantage of the lead market approach, providing positive links between the demand-side and supply-side. This should be exploited further. For example, a further strengthening of the relationships between purchasing authorities and the major technology platforms would be a useful step in this direction.

- This could be supported by a targeted dissemination of successful research projects to purchasing authorities at local, regional and national levels.

- The annexed case studies illustrate a number of instances where good practice might usefully be taken up elsewhere. Facilitating this process will help the Commission services achive their broader aims.

Mapping of Actions *A*

Lead Markets Initiative – Mapping of Actions – Bio-based Products

Key
Legislation – Pink
Procurement - Blue
Standardisation - Orange
Other – White

Action	Description	How fits with LMI goals	Level of progress	Next steps OR completed (date)	Additional information and initial results
Bio-based products					
Action 1: Establish an advisory group, including Member States and industry	Creating a group of experts and stakeholders in this market, to advise the Commission.	The advice allows the LMI activities in this area to be more efficient.	In 2008, the Commission set up an expert group composed of representatives from national governments, industry and academia, entitled the Ad-hoc Advisory Group for Bio-based Products. It has analysed the current market conditions and how legislation affects the	Completed (2008)	The Ad hoc Advisory Group 2009 recommendations: http://ec.europa.eu/enterprise/sectors/biotechnology/files/docs/bio_based_from_promise_to_market_en.pdf

Mapping of Actions A

			introduction of products made from renewable raw material.		
Action 2: Analyse the impact of legislation and policies	Under this action, the Commission is identifying and assessing all the legislation which impacts on the sector, to find out whether this framework is appropriate or needs modifications.	This action aims to ensure that the legal framework in this sector does not hamper, and on the contrary fosters, its development.	The Ad-hoc Advisory Group assessed the relevant legislation during 2009 and made recommendations.	Completed (2009).	The Advisory Group 2009 recommendations: http://ec.europa.eu/enterprise/sectors/biotechnology/files/docs/bio_based_from_promise_to_market_en.pdf In addition the Ad hoc Advisory Group has produced two further papers. This included a Financing Paper (2011) and Recommendations on Communication (2011). http://ec.europa.eu/enterprise/policies/innovation/policy/lead-market-initiative/files/lmi-financing-wg_en.pdf
Action 3: Establish a network between public purchasers of bio-based products	This action aims to allow Member States' public procurement authorities to meet and exchange their experiences in the field of bio-based products .	This networking should raise the awareness among public procurement authorities of the existing possibilities in terms of bio-based products, therefore leading to a rise in public investment in bio-based products.	A CIP call for proposals36 for the development of public procurement networks was launched in November 2008 with a deadline for the submission of proposals in February 2009. Unfortunately, no	Completed (2008).	N.A. Although unsuccessful the request for a biobased product procurement network still forms part of the Ad Hoc Advisory Group's recommendations. No plans have yet been made though to relaunch the call.

			proposal linked to bio-based products achieved the threshold for funding.		
Action 4: Encourage Green Public Procurement for bio	Encouraging public procurers to give preference to bio-based products. National governments have Green Public Procurement Guidelines, which include criteria that allow bio-based products to be given preference in tender specifications. The European Commission cooperates with Member States and	Leading to a rise in public investment in bio-based products.	To support the introduction and use of GPP the European Commission published a handbook on environmental public procurement. The terms 'renewable raw material, biodegradable, recyclable' are included in some of the GPP tool kit documents (these express a preference for biobased products in tender specifications). A specific example is the 'Food and Catering' services toolkit which advises	Completed (2008).	Green Public Procurement (GPP) is defined as the "process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured." GPP is a voluntary instrument, which means that individual Member States and public authorities can determine the extent to which they implement it. The use of renewable raw materials is specially addressed as part of the core and award GPP criteria for e.g. food and catering services. The GPP 'Food and Catering' toolkit link: http://ec.europa.eu/environment/gpp/pdf/toolkit/food_GPP_product_sheet.pdf Sources of information: "Buying Green! – A Handbook on environmental public procurement", http://ec.europa.eu/environment/gpp/pdf/buying_green_handbook_en.pdf

	stakeholders to set common GPP criteria for endorsement in national action plans.		on the use of cutlery, crockery, glassware and tablecloths which are renewable or based on renewable raw materials.		Green public procurement: http://ec.europa.eu/environment/gpp/index_en.htm Communication COM(2008)400 "Public procurement for a better environment", http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0400:FIN:EN:PDF
Action 5a: Elaborate new European standards for bio-based products	Adoption of standards to reduce barriers to the up-take of bio-based products.	The absence of standards effectively hinders the market uptake of bio-based products, both on consumer markets and in public procurement. Setting them at EU level contributes towards more harmonised standards between the Member States, and therefore reduces the barriers to the expansion of this market.	In 2008 the Commission 2008 issued two standardisation mandates for bio-based products which were accepted by CEN and integrated into technical working groups. See the initial results section. The Advisory Group in 2009 issued recommendations.	Activities have been completed but further developments will shortly follow. See initial results section.	The EC issued two Mandates which were accepted by CEN: **Mandate 52/2008 for the programming of standards for all types of bio-based products:** The programming mandate aims at producing a review of already existing European standards on all types of bio-based products, identifying needed pre- and co-normative research and proposing a work programme for the elaboration of standards which will guide future decisions, including possible future Commission mandates. CEN's indicative timeline is mid-2010. **Mandate 53/2008 for the rapid elaboration of standards for bio-lubricants and bio-polymers:** The standardisation mandate calls for European standards to be developed immediately for bio-lubricants and bio-polymers. Technical Specifications will first be prepared as an interim output and those will later be converted into full European Standards (ENs). The European standards

					should cover the following aspects: ▪ biodegradability (for bio-lubricants only), ▪ product functionality, ▪ impact on greenhouse gas emissions and raw material consumption, ▪ measurement methods, test methods, and Life Cycle Analysis procedures. The following two standardisation documents are available "*Plastics - Recommendation for terminology and characterisation of biopolymers and bioplastics*" and "*Plastics - Determination of the bio-based carbon content*". Another two will be available shortly "*Plastics - Declaration of the bio-based carbon content*" and "Bio-lubricants – Recommendation for terminology and characterisation of bio-lubricants and bio-based lubricants". European Standards are expected later on next year. Also, the Commission received from CEN a report on the Mandate for the programming of standards for all types of bio-based products. CEN recently accepted two new Mandates: (a) the development of various horizontal standards and other standardisation deliverables for bio-based products as a follow-up of the received CEN Report on the programming mandate; and (b) the development for bio-surfactants and bio-solvents of

					European standards together with Technical Specifications and/or Technical Reports as interim outputs.
Action 5b: Develop a common methodology for Life Cycle Assessment (LCA)	Develop a common way of calculating the life cycle cost	As long as there are different ways to calculate the life cycle cost, it will be impossible to make a fair comparison of different products and their real impact on the environment.	The European Commission services (DG Environment, DG Enterprise and DG Research) and the Joint Research Centre developed a guidance handbook for good practice in Life Cycle Assessment. The first edition of the International Reference Life Cycle Data System (ILCD) handbook was published on 12th March 2010 by the European Platform on Life-Cycle Assessment to help policy-makers and businesses assess the environmental impact of products.	Completed (2010)	JRC-Handbook: The publication consists of a series of technical documents which provide authoritative guidance on how to conduct life-cycle assessment (LCA) to quantify the emissions, resource consumption and environmental impact of products. These documents provide detailed technical guidance on all steps of LCA: • General guide for Life Cycle Assessment (LCA) – detailed guidance • General guide for Life Cycle Assessment (LCA) – provisions and action steps • Specific guide for Life Cycle Inventory (LCI) data sets • Framework and requirements for Life Cycle Impact Assessment (LCIA) models and indicators • Review schemes for Life Cycle Assessment (LCA) • Reviewer qualification for Life Cycle Inventory (LCI) data sets and • Analysis of existing Environmental Impact Assessment methodologies for use in Life Cycle Assessment (LCA) (Background document) The main set of documents of the first edition of the ILCD Handbook is available here – see also

					http://lct.jrc.ec.europa.eu/assessment/news-archive/ilcd-handbook-launch . **Joint development** The ILCD handbook was developed by the Institute for Environment and Sustainability in the European Commission Joint Research Centre (JRC), in co-operation with the Environment DG. It is part of the Commission's promotion of sustainable consumption and production patterns. The ILCD Handbook is in line with international standards and has been established through a series of extensive public and stakeholder consultations.
Action 5c: Labelling and information to consumers	Communicate the benefits of bio-based products to consumers, in order to build a positive image.	Increased sales will foster the expansion of the market.	The European Eco-label now also covers bio-based products in various product groups (e.g. lubricants, detergents, plastics). The Advisory Group has issued recommendations in 2009.	Completed through a 2009 revision with the changes expected to be published from mid-2011.	Especially related to labelling and the European ECO-Labelling work, the Commission Decision 2005/360/EC on establishing ecological criteria and the related assessment and verification requirements for the award of the Community eco-label to lubricants was published in 2005. The changes under the 2009 revision will be published from mid-2011.
Action 5d: Develop a methodology for information about sustainability of	Develop a methodology for information about sustainability of biomass	Having a common methodology for determining the sustainability of biomass production.	The Commission's Joint Research Centre and projects supported under the European Framework	Three projects are underway. PROSUITE started in	<u>Relevant EU-RTD-Projects:</u> PROspective SUstaİnability Assessment of TEchnologies (PROSUİTE). The PROSUITE project will provide tools to assess the economic, environmental and social dimensions of **technologies** in a standardised and comprehensive

biomass production	production		Programmes of Research have initiated work on developing a methodology for collecting information about biomass production at farm level.	2009 and will end in 2012. The Global-Bio-Pact project started in 2010 and will end in 2013. The "LCA to GO" project started in 2011 and will end in 2013.	way. The new tools, to be shared as free, open source software, will help SMEs, industry and decision makers to compare options and make better, more sustainable choices. To support this, **PROSUITE** will develop a coherent, scientifically sound methodology for the sustainability assessment of current and future technologies, taking into account their entire life cycle. The PROSUITE freeware tools will be applicable both to well-developed technologies, and to ones that are just emerging (the project kicked-off in November 2009 and the tools will be available from 2012). To demonstrate the methodology and tools, PROSUITE will deliver actual sustainability estimates for 4 technology cases including especially one entitled "***Biorefinery*** **technology to produce energy from organic waste".** Various projected economic and environmental impacts are linked to biorefinery production including recommendations for developing suitable technologies to use agricultural waste instead of crops in order to limit biomass dependency and land usage. Furthermore, under other work packages, a range of social indicators and criteria are identified for future testing and selection for sustainability assessments for case studies and software. http://prosuite.org/web/guest/prosuite;jsessionid=3DD045796B5B941A4060655028D5289E . The main aim of the Global-Bio-Pact project (Global-Bio-Pact Global Assessment of Biomass and Bioproduct Impacts on Socio-economics and

					harmonisation of global sustainability certification systems for biomass production, conversion systems and trade in order to prevent negative socio-economic impacts (the project started in Feb 2010 and will end in January 2013). Emphasis is placed on a detailed assessment of the socio-economic impacts of raw material production (which is often absent within impact assessments) and a variety of biomass conversion chains. Furthermore, the project investigates the impact of biomass production on food security, the interrelationship of global sustainability certification systems with the international trade of biomass and bioproducts, whilst also considering the public perception of biomass production for industrial use. The Global-Bio-Pact project consists of 9 work packages (WP) with a total duration of three years. Two of these WP (WP1 and WP9) consist of management and dissemination activities while the seven other ones are thematic WP. WP2 and WP3 will carry out a general impact assessment of biomass production and conversion chains through 5 five selected case studies. WP4, WP5, WP6 and WP7 consist of specific impact assessments on dedicated topics. Finally, WP8 will elaborate recommendations on sustainability certification schemes. **http://www.globalbiopact.eu/** FP7 project: “LCA to GO” - "Boosting Life Cycle

					Assessment Use in European Small and Medium-sized Enterprises: Serving Needs of Innovative Key Sectors with Smart Methods and Tools". This project will officially start on 1 January 2011. The aim of this "LCA to GO" project is to develop sectoral methods and tools for monitoring the environmental impacts of bio-based plastics, industrial machinery, electronics, renewable energy, sensors and smart textiles. In particular, the project will develop free web-tools to serve dedicated needs of these sectors, addressing the specifics of the technologies and implementing parameterised models, such as calculators for energy-break-even-point of photovoltaics, Product Carbon Footprints (PCF) based on technology parameters of printed circuit boards, and Key Environmental Performance Indicators (KEPIs) for smart textiles. Selected Product Category Rules will be developed to provide a robust LCA guidance for SMEs. The web-tools, being compatible with ILCD data and other external sources, will be made available as open source software, to be adapted to other sectors. http://cordis.europa.eu/fetch?CALLER=FP7_PROJ_EN&ACTION=D&DOC=1&CAT=PROJ&RCN=97146
Action 6a) Conduct an information campaign via different media	Increasing the visibility of bio-based products by emphasizing	Higher involvement in bio-based products by SMEs.	The Advisory Group's recent paper on Recommendations on Communication (2011) will support	The Action will start at a later stage.	N.A. The Action is envisaged to commence in the future given the publication of the Recommendations on Communication (2011).

with focus on SMEs	their benefits.		the formulation of this activity.		
Action 6b) Eurobarometer survey	Find of about public perception of bio-based products.	knowledge of the market is required for effective policymaking.	A regular Eurobarometer survey in 2009 included questions on the public perception of bio-based products. The report was made available in the autumn of 2009.	Completed (2009)	N.A.
Action 6c) Mapping of bio-refineries in Europe	Mapping of existing bio-refineries at pilot plant or demonstrator scale	Promote the establishment of strategically important bio-refinery pilot plants and demonstrators	A mapping has been carried out and the results per country have been published on a web site. The mapping has been made possible with the help of FP7 funding and was carried out in collaboration between EuropaBio and the Commission's two expert groups COMP-BIO-NET and KBBE-NET.	Ongoing activity. See initial results section.	The internet site www.bio-economy.net is online and will be further developed as more information is gathered.

Action 6d) FP7 joint call for biorefinery research	This action consisted of providing funding for the development of new technologies.	The aim is to provide direct support to the market. This is a supply-side initiative, but its inclusion in LMI ensures that there is coherence between the demand-side and supply-side policy initiatives.	In the autumn 2008 a joint call under the Seventh Framework Programme for Research and Technological Development (FP7) was published, which invited the research community to put forward proposals for research on biorefineries and related technologies. Secondly, FP7 has funded research on three large collaborative projects on biorefineries and related technologies (EuroBioRef, SUPRABIO and BIOCORE).	EuroBioRef commenced in 2010 and will end in 2012. Biocore commenced in 2010 and is currently being implemented. SupraBio started in 2010 and will end 2014. (Additionally, BioChem started in 2010 and will end in 2013).	The collaborative projects on biorefineries and related technologies (EuroBioRef, SUPRABIO and BIOCORE) will provide funding to projects aimed at developing inter alia second-generation biochemicals from ligno-cellulose (wood, straw, etc) which is a vital instrument to produce larger amounts of bio-chemicals at a lower unit cost. It will also enable biorefineries to use non-food plants and trees for industrial purposes, thus decreasing the risk of conflicts between food and non-food production in agriculture and forestry. BIOCORE will create and demonstrate a lignocellulosic biorefinery for sustainable processing of agricultural residues (wheat and rice straws), SRC wood (poplar) and hardwood forestry residues, into 2G biofuels, bulk chemicals, polymers, speciality molecules, heat and power. The BIOCORE project is coordinated by INRA, see website http://sia2010.agriculture.gouv.fr/article.php3?id_article=142 The EuroBioRef project has a specific aim to overcome the fragmentation in the biomass industry. As efficiency is the key to the bio-refinery processes, this implies to take decisive actions to facilitate better networking, coordination and

					cooperation among a wide variety of actors. New synergies, cost efficiencies and improved methods will be achieved by involving the stakeholders at all levels: large and small (bio)chemical industries, academics and researchers from the whole biomass value chain, as well as European organisations. Large-scale research, testing, optimisation and demonstrations of processes in the production of a range of products design adapted to large- and small-scale production units, which will be easier to install in various European areas. http://www.eurobioref.org/ SUPRABIO (Sustainable products from economic processing of biomass in highly integrated biorefineries) is a large-scale collaborative research project involving 16 European organisations. The overall objective of SUPRABIO is research, development and demonstration of novel intensified unit operations that can be integrated into economic and sustainable biorefinery options for the production of second-generation biofuels, intermediates and high value products, together with assessment of the outcomes to inform and enable sustainable implementation. http://www.suprabio.eu/ Additionally, the BIOCHEM project is aimed at improving the innovation capacity of bio-based

					chemistry start-ups and SMEs. It provides the development of a business support toolbox for entrepreneurs in order to assess their potential to enter the bio-based products market and to overcome their barriers to innovation. In addition to bio-based market information, individual audits, coaching, and business planning support this toolbox includes this European online partnering and innovation resources system to find the right research and business partners, test facilities and experts everywhere in Europe. It also aims to reach at least 250 companies across seven European countries with these resources. The project consortium partners include innovation agencies, venture and public funding bodies as well as programme consultancies. More information is available on http://www.biochem-project.eu/ .

Mapping of Actions *A*

Lead Markets Initiative – Mapping of Actions - eHealth

Key
Legislation – Pink
Procurement - Blue
Standardisation - Orange
Other - White

Action	Description	How fits with LMI goals	Level of progress	Next steps OR completed (date)	Additional information and initial results
eHealth					
Action 1: Launch pilot actions under the CIP	This action consisted of providing funding for the development of new technologies in eHealth, via the launch of four calls for proposals under the Competitiveness and Innovation Programme.	The aim is to provide direct support to the eHealth market. This is a supply-side initiative, but its inclusion in LMI ensures that there is coherence between the demand-side and supply-side policy initiatives.	Three eHealth-related projects have been launched under the Competitiveness and Innovation Programme's ICT Policy Support Programme (CIP ICT PSP). Both epSOS (Smart Open Services for European Patients) and CALLIOPE (CALL for InterOPErability) were launched in 2008. epSOS ended in 2010 but was followed up by epSOS 2, launched in 2011. The project RENEWING HeALTH (REgioNs of Europe WorkINg	As outlined in the ICT PSP Work Programme for 2011 future support for CIP actions is planned in line with the objectives of the Digital Agenda for Europe (DAE) to encourage actions to empower patients and support the deployment of telemedicine. A thematic network "eHealth	Increased investment in eHealth technologies: due to LMI, CIP funds were used for eHealth. Rise in interoperability of eHealth: Both epSOS and Renewing Health contribute directly towards greater interoperability. The main result of the CALLIOPE project (ended in November 2010) is the proposal for a European eHealth Roadmap aiming to accelerate the deployment of eHealth services and interoperable solutions.

			toGether) was launched in early 2010, and it aims at implementing large-scale real-life test beds for the validation and subsequent evaluation of innovative telemedicine services. In addition, another call had been launched in the area of procurement but was dropped as there were no successful bids.	Innovation", is under negotiation, aimed at building on the work of previous CIP projects and scaling up eHealth services. It is anticipated to begin in early 2011. The Member States driven eHealth Governance Initiative (eHGI), bringing together 25 countries and other key stakeholders, is under negotiation and commenced in early 2011. The EC supports the eHGI through a Thematic Network funded by the CIP ICT PSP and a Joint Action funded by the Public Health Programme. http://ec.europa.eu/information_society/activities/health/docs/policy/ehealth-governance-	

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				initiative/ehealth-gi-110511.pdf	
Action 2: Introduce eHealth Innovation Scorecards/ Benchmarking to monitor eHealth performance in Member States (MS) and facilitate learning	Creating a system for monitoring the progress of eHealth in the Member States.	A monitoring system makes it possible to assess the level of progress of this strategy, so that any necessary changes can be made.	A study on eHealth Benchmarking was published in March 2009.. A study on business models for eHealth, financed by the CIP ICT PSP call, was published in February 2010. The "Monitoring National eHealth Strategies" study explored the status-quo and assessed the progress made by MSs and EEA countries towards realising European eHealth Action Plan goals. The final report has been published 2011.	The 2nd phase of the eHealth Benchmarking study will look at the adoption of ICT and eHealth solutions in hospitals, and is scheduled to be published in 2011.	The studies have provided indications of eHealth performance across the EU and identified best practice. Study on eHealth benchmarking: http://ec.europa.eu/information_society/eeurope/i2010/docs/benchmarking/ehealth_ii_bench_final_report.pdf Study "Monitoring National eHealth Strategies": http://ehealth-strategies.eu/news/new.html
Action 3: Coordination actions including exchange of best practices at i2010 sub-group	This action consists of creating opportunities for networking between eHealth stakeholders in the different Member States.	This contact between stakeholders leads to an exchange of best practices.	The i2010 sub-group meetings and eHealth ministerial / high level annual conferences have been used for the exchange of good practice and informed discussion between national representatives. The i2010 subgroup has also been kept regularly informed about the	The EC has supported the eHGI through a Thematic Network funded by the CIP ICT PSP and a Joint Action funded by the Public Health Programme. This has formalised the initiative and put in place a dedicated	Events and meetings aiming to increase political awareness among Member State Health authorities to focus more on market aspects of eHealth

			progress on the implementation of the eHealth Action plan and the LMI. The eHealth 2009 conference was also used, as LMI was featured throughout the 'Economy' stream. The EC has funded the 'Good eHealth' study, a database of case studies of successful eHealth implementation, and the web site www.epractice.eu is a further way of sharing case studies. A new initiative, eHealth Governance Initiative (eHGI), aiming to set up a High Level group consisting of national representatives at State Secretary level, was launched in 2008. It will enhance European Governance in eHealth and facilitate deployment especially in the field of eHealth interoperability.	operational structure and work programme, bringing MS and representatives of stakeholders together.	

Mapping of Actions A

Action 16: Provide guidance on financing from such funding mechanisms as the EU structural funds and European Investment Bank (EIB) initiatives specific to eHealth domain – workshops, networks etc	Raising awareness of the funding opportunities available for eHealth.	Those funding opportunities support the eHealth market.	A meeting was held with the EIB, a representative of which presented EIB developments at the eHealth 2009 conference in Prague in February 2009. Contacts are ongoing. On structural funds, ICT and innovation feature in the Communication "Regional Policy contributing to smart growth in Europe 2020" (COM (2010) 553).	The EC will maintain contacts with the EIB going forward. For structural funds, in the context of investing in ICT infrastructures for services, the EC will continue to advocate its use, in part, for eHealth services.	The eHealth conference provided excellent opportunity for awareness-raising of EIB funding mechanism. Going forward, also hope to see greater awareness of opportunities to use structural funds for eHealth.
Action 17: Strengthen R&D on ICT for Health in FP7 and in Member State programmes	Increasing the funding for eHealth available from FP7 and national funding programmes.	The aim is to provide direct support to the eHealth market. This is a supply-side initiative, but its inclusion in LMI ensures that there is coherence between the demand-side and supply-side policy initiatives .	This is an ongoing focus of ICT within the health unit of FP7. The total funding for FP7 will be in excess of € 500 million (up from € 200 million under FP6). The study 'Monitoring National eHealth Strategies: Lessons learned, trends and good practices' will gauge to the extent of ICT focus in health (see Action 2).	FP7 is ongoing and ehealth Strategies is online . .	Funding under FP7 has been increased. eHealth strategies studies http://www.ehealth-strategies.eu/
Action 18:	Improve the	Making research in	The CIP Call 3 Pilot A on	Several eHealth	The LMI was a basis for the regions of

Strengthen cooperation between national and community R&D testing and pilots, involve users in RTD actions	coherence between eHealth research in the different Member States.	different countries complementary contributes towards having a more unified market, leading to economies of scale.	telemedicine was launched in 2009 and became operational from January 2010. It will contribute to strengthening the cooperation between national and community R&D testing and pilots. A Regions of Knowledge call was launched in 2010 to support cooperation across Europe of regional 'research-driven cluster', related to the lead market eHealth.	related projects, responding to the Regions of Knowledge call 2010, are currently under negotiation. If successful, they will be launched in early 2011. Building on the work of previous CIP projects, a further Thematic Network is being negotiated which will focus on ways to scale up eHealth facilitated personalised health services A European Innovation Partnership (EIP) on Active and Healthy Ageing, a pilot under EU´s Innovation Union Strategy, will be launched in 2011. It aims to bridge research and innovation with large	Knowledge and CIP Pilot A call on telemedicine which will spread cooperation across regions of Europe.

				scale deployments for a European and global market for innovative products and services related to active and healthy ageing.	
Action 9: Screen existing EU legislation related to eHealth and provide clarification and guidance for applying the legal framework for eHealth products and services	Under this action, the Commission is identifying and assessing all the legislation which impacts on the eHealth sector, to find out whether this framework is appropriate or needs modifications.	This action aims to ensure that the legal framework in this sector does not hamper, and on the contrary fosters, its development.	Two studies responding directly to the Action 9 have been carried out. "Legally eHealth" (March 2008) looked at how EU legislation on data protection, product and services liability, and trade and competition law applies to this field. A study on the Legal Framework for Interoperable eHealth in Europe (September 2009) identified and analysed the legal and regulatory framework for electronic health services in the MSs and for cross-border services when provided via eHealth applications. These issues have also been discussed at meetings of the i2010 sub-group on eHealth, during a special workshop at	A planned European Commission staff working paper on the EU legal framework on telemedicine will be adopted in 2011. It will map existing legislation relevant for telemedicine and identify legal obstacles for the wider deployment of telemedicine. The objective of the paper is to open a debate around this issue.	Publishing of studies. Further debate provided by the Working Paper may help to drive forward developments.

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			the eHealth 2009 ministerial conference in Prague and at the Ministerial Conference in Barcelona, in March 2010.		
Action 10: Analyse possibilities for adoption of a legal initiative for eHealth and telemedicine	This action aimed to find out whether there was a need for new legislation.	This corresponds to the same LMI goal of ensuring that the legislation in this sector does not hamper, and on the contrary fosters, its development.	The Communication on telemedicine for the benefit of patients, healthcare systems and society, adopted on 4 November 2008, addresses *inter alia* issues about legal clarity on existing EU law applicable to telemedicine. The European Commission came to the conclusion that regulation at the EU level regarding Health is in principle applicable also to eHealth.	The Staff Working Paper on the EU legal framework on telemedicine (see Action 9) will further open discussion on the need for a legal initiative for eHealth and telemedicine.	Issuing of Communication. Further debate provided by the Working Paper may help to drive forward developments.
Action 11: Adopt initiative to enforce Personal Data Protection legislation for products and services	This action aims to ensure that the EU legislation on data protection is well suited to the eHealth field, via the creation of instruments that can be applied exclusively in	As above.	In 2007 the Article 29 Data Protection Working Party published Working Document 131 on the processing of personal data relating to health in electronic health records (EHR). The Recommendation on cross-border interoperability of electronic health record systems, adopted on 2 July	Completed (2008)	The Data Protection Directivehas undergone a consultation and a Communication COM (2010) 609 has been published in Nov 2010. This could potentially open possibilities for further legal clarity in the area of health data protection.

	this sector, in conjunction with the Data Protection Directive.		2008, makes an explicit reference to the WP131 and provides guidelines to be followed by MSs in this direction.		
Action 12: Promote knowledge and information dissemination on safe and secure eHealth products and use of existing infrastructure to protect consumers – networks, best practice repositories, hotlines	This action concerns the protection of consumer rights and consumer safety in eHealth.	These activities are not aimed directly at LMI goals, but consumer protection is part of the framework	The EC supports ongoing activities of the Continua Health Alliance in this regard. The EU-funded epractice.eu initiative and 'Good eHealth' study, a database of case studies of successful eHealth implementation, provide a further means of sharing knowledge.	Actions ongoing	Creation of web pages and support for Continua Health Alliance. http://www.continuaalliance.org/index.html
Action 13: Introduce the Electronic Health Insurance Card	This action concerns the creation of an electronic card for health insurance which could be used throughout Europe.	This card would foster cross-border trade in eHealth at EU level.	The process has taken longer than foreseen because of the sensitivity of the issue and no decision has yet been taken on large scale deployment. Nevertheless, cooperation within the EC amongst different DGs has been strengthened to	Work on the Action is ongoing. A possible feasibility test could be carried out through the extension of the epSOS pilot.	No results as yet. The fruition of the action hinges upon greater cooperation between Member States.

Mapping of Actions A

			contribute to the achievement of the objective.		
Action 14: Improve legal clarity regarding medical reimbursement based from the Health Services Initiative	This action aims to ensure that citizens can be reimbursed for accessing cross border health services.	The actions encourages cross border demand for services.	In February 2011 the Council approved the Directive on Cross Border Health. The new directive provides clarity about the rights of patients who seek healthcare in another member state and supplements the rights that patients already have at EU level through the legislation on the coordination of social security schemes. As a general rule, patients will be allowed to receive healthcare in another Member State and be reimbursed up to the level of costs that would have been assumed by the Member State of affiliation, if this healthcare had been provided on its territory.	Action completed.	N.A.
Action 15: Provide citizens with relevant	This action aims to ensure that citizens are	Same as action. 13	No specific new activity has been started by LMI, but the objectives of this action are	The action is ongoing and no changes are foreseen for the	No specific new activity has been started by LMI and further action is not immediately anticipated.

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and up-to-date information on cross-border health services	aware of the possibility to acquire health services in another EU country.		being met by the Commission's Health Portal, and the Commission has also been informing the i2010157 0.71765 scn120.3 159.96 m120.3 236.7 l351.86 l7 l120.3 l7 l19 3 23

			on enhancing procurement of ICT solutions for healthcare. It aims to develop guidelines for decision makers and procurers within public healthcare authorities and care delivery organisations on how to conduct consistent and systematic planning processes when strategic considerations point to the adoption of eHealth solutions and how to transfer the planning to the procurement specifications and process. The study is scheduled to begin in January 2011 and will last for 18 months. The project PreCo (Enhancing innovation in pre-commercial public purchasing processes) raises awareness of pre-commercial procurement. It aims to support public authorities in undertaking pre-commercial procurement actions which		

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			stimulate innovation and citizen participations. The project's 2nd phase focuses on eHealth.		
Action 20: Associate procurers in consultation process for CIP and FP7 calls for proposals	Involving public procurers in the design of LMI actions aimed at them.	This will make the actions more adapted to their needs, and therefore more efficient at meeting their goals.	The online forum (ePractice.eu) and the Workshops (Action 19) have also been used to meet this action's objectives.	.	Actions to support procurers are ongoing.
Action 4: Adopt Recommendation on eHealth interoperability	The Recommendation invites Member States to engage in active cooperation with other Member States and relevant stakeholders to ensure the adoption and implementation of standards that make the cross-border interoperability of electronic	This contributes towards more harmonised standards in eHealth between the Member States, and therefore reduces the barriers to the expansion of this market.	The Recommendation was adopted on 2 July 2008 within the so-called "social package," and was in line with the work programme of the Commission in 2008. The impact of the Recommendation was measured after one year from its adoption.	Completed (2008)	The Recommendation increased the political importance of interoperability for eHealth in Member States which in turn has led to CIP pilots and fed into current policy initiatives such as DAE.

	health record systems feasible.				
Action 5: Favour the application of Recommendation on eHealth interoperability by enhancing cooperation between MS to build coherence in their health systems	Completing the previous action by encouraging cooperation between MS to build coherence in their health systems.	As above.	The i2010 sub-group for eHealth has provided a forum for annual updates. The Publication of the EC-funded report on Semantic interoperability, including a roadmap for required policy steps, also provided stimulus for discussion and action. CALLIOPE, a Thematic Network with a focus on cross-border eHealth Interoperability, also followed the implementation of the recommendation in MSs . The eHealth Governance Initiative will address issues around interoperability (see Action 1). Two projects, HITCH and SmartPersonalHealth, were funded under the ICT Strand of FP7 call 4, on interoperability testing and promotion of interoperability of Personal	Ongoing	DAE builds on Recommendation and takes it further. The interoperability message has been widely understood in that we have also seen additional research projects adopting an approach to conform to interoperability guidelines.

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			Health Systems.		
Action 6: Define required standards, establish review committee to identify focus areas	Assess whether there is a need for more standards.	Setting standards at EU level rather than at the national level.	Mandate 403 aims to provide a consistent set of standards in the eHealth area. Phase 1 has been completed. Working group is now considering the options on how best to take this initial phase to a more operational level in developing eHealth profiles.	Ongoing	The LMI has helped to communicate a sense of urgency for the development of eHealth profiles and to potentially take the standards forward to a more operational phase
Action 7: Issue guidelines for certification of eHealth applications	Assessment of existing technical standards and possibilities to put into place a joint or mutually recognised mechanism for conformity testing and certification.	This contributes towards more harmonised standards between the Member States, and therefore reduces the barriers to the expansion of this market.	The Recommendation on cross-border interoperability of Electronic Health Record (EHR) (2008) invites Member States to explore existing technical standards and possibilities to put into place a joint or mutually recognised mechanism for conformity testing and certification. Under this objective the Thematic Network eHR-Q-TN was successfully launched in February 2009. It is preparing the health community across Europe for systematic and comparable quality	Ongoing	LMI led to the creation of the thematic network, as it was the main policy basis of the call.

			assurance and certification. It will also propose possible roadmaps for sustainable certification.		
Action 8: form expert group to encourage MS to establish a coordinated work programme	Creation of an expert group to support the previous action.	As above.	See EHR-Q-TN above	Ongoing	As above.

Mapping of Actions A

Lead Markets Initiative – Mapping of Actions – Protective Textiles

Key
Legislation – Pink
Procurement - Blue
Standardisation - Orange
Other – White

Action	Description	How fits with LMI goals	Level of progress	Next steps OR completed (date)	Additional information and initial results
Protective textiles					
Action 1: Adoption of the regulation and decision within the framework of the revision of the New Approach to technical harmonisation proposed by the Commission.	This action consisted of revising the legislative framework for the so-called "New Approach" Directives to improve the implementation and enforcement of technical legislation. Its application in the case of the Personal Protective Equipment Directive is of particular interest.	This action contributes towards improving the enforcement of the legal framework in force for this market, although it is not directly aimed at improving the market's performance, and is broader than the LMI.	A Regulation and a Decision relating to a common framework for accreditation and market surveillance were adopted in 2008. Regulation 765/2008 entered into force in January 2010 and Member States are already working together with the Commission in organisational improvements of their market surveillance. The revision of the PPE Directive started following the adoption of the New Legislative Framework. The Impact Assessment is	The Action as originally anticipated has been completed in the adoption of the "New Legislative Framework" (August 2008). However, the implementation of the package is an ongoing process, including measures such as the establishment of national market surveillance programmes. The next step, not	Further details on the implementation are available on the website of the NLF (including a preliminary report from September 2010): http://ec.europa.eu/enterprise/policies/single-market-goods/regulatory-policies-common-rules-for-products/new-legislative-framework/index_en.htm

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Action	Description	How fits with LMI goals	Level of progress	Next steps OR completed (date)	Additional information and initial results
			currently ongoing, with a study conducted by an external consultant that was concluded at the end of 2010 and a public consultation taking place between April and June 2011. The IA is looking into the competitiveness of the sector and draft options for the revision of the existing Directive (alignment with the NLF, scope, requirements,…).	originally foreseen in the action plan, is the revision of the existing PPE Directive. A proposal is anticipated for adoption by the Commission in early 2012. The proposal would be accompanied by an Impact Assessment report.	
Action 2: Set-up an information and training platform for buyers and users of protective textiles	Using the network of public procurers created by action 3 to link buyers and users of protective textiles and to facilitate their access to information on technological developments in the area of protective textiles.	This networking action should raise awareness among public procurement authorities of the existing possibilities relating to protective textile technologies, leading to improved public expenditure on protective textiles. This should eventually lead to a collaborative PPE	The development of the training platform is a long term action, closely linked to the results of actions 3 and 6. The implementation requires further progress under action 3.	Industry action to start once the network created by action 3 is ready to undertake it.	N.A.

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Action	Description	How fits with LMI goals	Level of progress	Next steps OR completed (date)	Additional information and initial results
		innovation platform			
Action 3: Establish a network between public authorities in charge of procuring protective textiles and/or PPE	This action aims to encourage innovation in the public procurement of protective textiles. The network is intended to allow national, regional and local public procurement authorities purchasing protective textiles to meet and exchange their experiences in innovative public procurement practices.	Public sector is a significant purchaser of protective textiles and a crucial customer driving demand for a new generation of PPE products. The network of public procurers of PPE aims to encourage innovation in the methodology for the public procurement of protective equipment leading towards the procurement of more innovative products. It aims, in particular, to overcome market fragmentation and	The project ENPROTEX to set up a public procurement network in this field has been running since September 2009. A consortium of three public procurement bodies from UK, NL and BE has been established. The project will run for 3 years.	A conference devoted to public procurement of PPE will take place on 8-9 June 2011. A roadmap and plan for future developments in fire fighters' PPE will be presented during 2011. Some areas for future action: - Encouraging joint procurement at EU level - Support to contracting authorities getting involved in innovative public procurement (both methodologies and goods)	A first visible result of the public procurement network ENPROTEX is the website in 3 languages (EN, FR, NL) : http://www.enprotex.eu). Stakeholders can find information about the project, documents developed (eg high level options paper), relevant events and establish contacts. The consortium is compiling a directory of PPE procurers in the EU as well as a directory of manufacturers and industry contacts. It has also produced two mind maps: a first one describing current EU-funded research programmes and a second one on issues in PPE research. There were also consultations with industry, in particular with SMEs, and users and trade unions to develop a model for output-based specifications.

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Action	Description	How fits with LMI goals	Level of progress	Next steps OR completed (date)	Additional information and initial results
		negative practices, such as decisions based only on price. It is expected that the network will facilitate the adoption of optimised procurement strategies.			

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Action	Description	How fits with LMI goals	Level of progress	Next steps OR completed (date)	Additional information and initial results
Actions 4 and 5: Support SME involvement in PPE standards and promote, where appropriate, the development and use of informal standards for innovative products and services in these market areas.	Coordinate and encourage standardisation in the PPE field.	This action seeks to accelerate the standardisation process in order to facilitate informed choices by purchasers and users.	The CEN PPE sector forum resumed its activities in 2009 as a result of the LMI, and held meetings on 8 June 2010 and 8 February 2011. The forum consists of a mix of industry, research and standardisation bodies which discuss, coordinate and encourage standardisation in the PPE field. The forum is also linking together actions 5 and 7 in order to coordinate standardisation-related matters for ongoing research projects in this field funded by the EC. Furthermore, a new standard to define care instructions for industrial laundry has been adopted.	More revised, updated or new standards should follow as a result of the work of the CEN PPE sector forum. A first workshop on standardisation linked to R&D projects (EU and national projects) will take place on 16 November 2011. It is expected that the workshop would be the first of a series of regular events on this topic.	The main impact so far is that standardisation is again high on the agenda of industry, including standards for related services. In this context, the adoption of a new ISO standard on qualification labelling for textiles processed in industrial laundries is a concrete example of constructive developments for the textile services industry.

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Action	Description	How fits with LMI goals	Level of progress	Next steps OR completed (date)	Additional information and initial results
Action 6: Devise a strategy for an anticipatory approach to products and markets.	Creating a strategy for the long-term development of the protective textiles market, to underpin LMI activities.	One of the main objectives of LMI is to have a coherent strategy for the development of each lead market.	Two conferences on this topic took place in 2008. A comprehensive road map for the protective textiles lead market was issued in April 2009 at the annual public conference of the technology platform for the future of textiles & clothing. This was based on the result of industry discussions of the LMI in different fora, such as in the technology platform for the future of textiles & clothing and at two conferences on personal protective equipment. Industry has been working on the implementation of the roadmap since 2009 and organised a major conference in February 2011 to take stock of the actions and present new developments.	The mobilisation of stakeholders in order to implement and develop the industrial roadmap is expected to continue beyond the current LMI period. A "flagship for Europe" related to the societal challenges of security and safety is currently under consideration (to be updated after the meeting of the Governing Council of the ETP on 26 May).	The website of the conference that took place in February 2011 contains the summary and conclusions, highlighting key issues and areas for future action: - Public procurement - Transfer of research results to close the gap between supply-side measures and market uptake (for further details: http://www.ppeconference2011.eu/)

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Action	Description	How fits with LMI goals	Level of progress	Next steps OR completed (date)	Additional information and initial results
Action 7: Increase the knowledge base	Increase the knowledge base of industry in the field of protective textiles. Ultimately, the development and integration of new technologies for advanced personal protective systems is expected to lead to significant reduction of work-related accidents including emergency and rescue operations. The research should also reinforce European leadership in terms of quality and innovation.	Being at the forefront of technology and achieving technological breakthroughs is essential for the development of each lead market.	A research topic targeting the personal protective equipment and clothing sectors was included under the 2nd call of the Nanotechnologies, Materials and new Production technologies (NMP) theme in FP7. 7 research projects have been running since 2009 with an approximate EC contribution of €21milion.	R&D projects are running until 2012-2013. The next steps should aim to have a better link between supply and demand-side measures to foster the uptake and rapid transfer of research results to the market.	The projects cover a wide range of technical features of protective equipment; among others: multifunctionalisation, targeted protection (laser, sea, dynamic cooling systems), active protection and the life-cycle of protective garments. Thus, they address entire system solutions for application areas such as work safety, fire fighting or emergency operations. The results of these projects will contribute to an integrated risk management in industrial systems.

Mapping of Actions *A*

Action	Description	How fits with LMI goals	Level of progress	Next steps OR completed (date)	Additional information and initial results
Action 8: Encourage the development of clusters and other forms of local collaboration (incubators, open innovation platforms) involving purchasers and users.	Foster the coordination and development of concentrations of regional industry. The main expected result of the ERANET is an improvement of the coordination of national and regional research programmes in the field of textiles. An additional result of the ERANET could be to raise awareness and mobilise national and regional authorities to address matters related to innovation and in particular to involve them more on the Lead Market Initiative .	Clusters contribute towards the success of R&D as they lead to economies of scale and improve exchanges between companies, technology centres and users.	An ERANET in the field of advanced textiles – Crosstexnet, http://crosstexnet.eu/ was set up in November 2009 responding to a call for proposals under FP7. This is an ongoing action in which support from regional and national authorities is crucial. Efforts will be directed to get those authorities more involved in the protective textiles lead market during the last phase of the LMI and beyond.	Under Crosstexnet, a call for proposals supporting textile R&D was initiated. The deadline for submissions of proposals was extended to 2nd June 2011 due to the high response.	N.A.

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Action	Description	How fits with LMI goals	Level of progress	Next steps OR completed (date)	Additional information and initial results
Action 9: Conduct sectoral IPR awareness and support action under CIP.	Inform companies about intellectual property rights and how to protect them effectively.	IPR is a crucial aspect of business strategy for the textile and clothing sector in general and for protective textiles in particular.	This action covers creating a multilingual guide on IPR issues for the textiles & clothing (and footwear, furniture and leather sectors) and awareness-raising seminars aimed at SMEs in these sectors. IPR awareness and support - multilingual guides (13 languages) have been available since early 2010 and 16 seminars to disseminate their contents have taken place so far. The final seminars took place in early 2011.	The preparation of the multilingual guides is concluded. The document is available at : http://www.ipeuropaware.eu/public_documents/textile_industry.pdf The dissemination seminars were finalised in early 2011.	The IPR guide for the textile sector is available in 13 languages; it is available on CD Rom and at the website of the project Furthermore, 18 seminars took place in 13 participating countries with over 700 participants. The guides offer information about how companies can use IPR to protect the results of their innovation efforts in order to grow and develop in a distinct niche market. Thus, the extensive use of the guides is expected to improve the competitiveness of companies, particularly SMEs.
Action 10: Improve access to markets in third countries, by means of the ongoing WTO/DDA negotiations and bilateral free trade agreements	Actions to improve market access by reducing barriers to exports.	Gaining access to external markets clearly increases the opportunities available for this sector.	Efforts to improve market access take place in the context of the ongoing WTO/Doha Development Agenda negotiations and bilateral ac,		

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Action	Description	How fits with LMI goals	Level of progress	Next steps OR completed (date)	Additional information and initial results
			mandated the Commission to open negotiations. Bilateral free trade agreements have been concluded with Korea, Central America and the Andean Community.	Singapore.	

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Lead Markets Initiative – Mapping of Actions Recycling

Key
Legislation – Pink
Procurement - Blue
Standardisation - Orange
Other - White

Recycling					
Action	**Description**	**How fits with LMI goals**	**Level of progress**	**Next steps OR completed (date)**	**Additional information and initial results**
Action 1. Adopt the Waste Framework Directive	This action consists of adopting a new Directive that will provide a unified legal framework in the area of waste, and replace some of the existing legislation applying to waste	Having one single Directive in this area leads to a simplification of legal requirements and to more legal certainty, which is beneficial for the market.	The Directive was adopted in 2009. Deadline for MS transposition was December 2010.	Adoption of implementing and supporting measures under this Directive and support to MS with the implementation; compliance monitoring of national transposition measures.	n/a
Action 2. Review the relevant waste directives	Under this action, the Commission is identifying and assessing all the legislation which impacts on recycling, to find	This action aims to ensure that the legal framework in this sector does not hamper, and on the contrary fosters, its	A number of Waste Directives have been undergoing review. The European Commission has proposed a revision of EU legislation on electrical and electronic waste on	Formal adoption of the RoHS Directive in second half of 2011; formal adoption of the WEEE Directive end 2011 or beginning of 2012; In	n/a

	out whether this framework is appropriate or needs modifications.	development.	December 3rd, 2008, including new national collection targets, increased recovery and recycling targets and a reinforcement of the producer responsibility principle. The proposal consists of a recast electrical and electronic waste directive (WEEE, COM (2008)/810) and directive placing restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS, COM (2008)/809). Both proposals were debated by the European Parliament and the Council in 2009. The WEEE Directive underwent a stakeholder consultation in 2008 and the RoHS Directive in 2011. The revision addresses technical, legal and administrative difficulties with the existing rules.	2012: launch of a general review of the recycling targets in waste legislation, starting with a study and stakeholder consultations;	
Action 7. Define End-of-Waste Criteria in the Waste Framework	The Waste Framework Directive defines	More legal clarity.	The Joint Research Centre in Seville has been proving background knowledge to go	End of waste criteria on scrap metal namely iron, steel	n/a

Directive	some criteria for determining when treated waste ceases to be considered waste, but it left some of the criteria to be determined later – that is the focus of this action.		towards defining such criteria and associated methodologies.	aluminium has been adopted. Others, for instance on copper, paper and plastic are under preparation.	
Action 3. Inform European procurers on green public procurement.	Foster take-up of green technologies in public procurement.	Governments are a very important client of recycling technologies, so their take-up is key to the success of this market.	As part of the Sustainable Consumption and Production Package, a Communication on Green Public Procurement has been published on July 16, 2008.Since then, National Action Plans have been developed that to varying extents take on board GPP at national level. http://ec.europa.eu/environment/gpp/pdf/national_gpp_strategies_en.pdf Future work will include the development of common GPP criteria for these areas; these criteria may include whether	Review of the SCP Action plan in 2012. It is noted that 9 Member States have so far undertaken communication and dissemination activities in relation to National Action Plans.	N/A

			goods are of recycled origin.		
Action 4. Support the exchange of best practices across Member States	This action consists of creating opportunities for networking between stakeholders in the different Member States.	This contact between stakeholders leads to an exchange of best practices	As part of the implementation of the ETAP (Environmental Technologies Action Plan) and CIP (Competitiveness and Innovation Programme), a call for proposals has been launched in December 2008 (as part of the Pro-Inno Europe initiative), designed to enable exchange and take-up of good policy practice across Member States. The call closed February 12th, 2009. The Budget is 3 M€ for 3 years. To further support this work, actions will be established to identify and encourage take-up of good policy practice in the Working Group on Green Public Procurement and the Working Group on Waste Management and recycling.	Regular exchanges with national experts on recycling practices in the Technical Adaptation Committees.	n/a
Action 5. Establish a network of public procurers	This action aims to allow Member States' public procurement	This networking should raise the awareness among public	A call for proposal for the establishment of Public Procurement Networks in support of the Lead Market	n/a	n/a

	authorities to meet and exchange their experiences.	procurement authorities of the existing possibilities in terms of technologies, therefore leading to a rise in public investment.	Initiative has been launched, funded by the CIP. No proposal dealing with the recycling sector was submitted which may indicate the lack of awareness of public procurers in this area about the Lead Market Initiative. Future activities may include measures for stimulating demand for eco-innovations in recycling, and related technology and equipment. This would include, for example, the promotion of effective public/private procurement actions in Member States, as well as specific funding initiatives to stimulate demand for such eco-innovations, or certification schemes for recycling facilities or specific technologies.		
Action 8. Improve knowledge about standards used	Launch a study to assess the standards that are being used.	Standards play an important role in setting a level playing field for competition	A study is being launched to evaluate compliance to the Essential Requirements. Information provided	WEEE recycling standards are being developed by industry (WEEELabex project), co-financed	

		and it is important to understand how standards relating to recycled plastics are being complied with in practice in Member States.	shows that most of companies (about 65%) are using the CEN standards, other companies have developed their own internal procedures not based on the CEN standards (about 12%) and some other companies (about 24%) have no procedure yet. The study should highlight what is happening in practice as regards recycling standards in Europe and the extent of the use of the CEN standards. Contacts with CEN has been set up.	by the Commission. Mandate to CENELEC on RoHS compliance standards under preparation. Mandate to CENELEC to develop battery capacity marking standards for non-rechargeable batteries launched. Study on the need for additional waste management standards under the WFD launched. Depending on these study results, follow-up studies could be undertaken in 2012.	
Action 6. Boost the resource productivity to create more value with less resources	This action aims to promote resource efficiency, or the ability to produce more with less resources. Where recycling is concerned, this involves	This can lead to more efficiency in the recycling technologies. In addition, this action is also aimed at the wider policy goals of LMI, in this case environmental	The revised Ecodesign Directive provides a framework for setting compulsory minimum requirements and voluntary benchmarks for energy-using products. Mandatory labelling will indicate relevant environmental parameters	Review of the SCP Action plan in 2012 is an opportunity to extend the scope of the eco-design directive to all products; rules on minimum content of recycled materials or recyclability of	n/a

	increasing the recyclability of products and the integration of recycled materials into products.	objectives.	for a wider range of products, including energy-using and energy-related products. EU Ecolabel scheme, which indicates the most environmentally friendly products on the EU market, will be extended to cover a wider range of products and services, such as food and drink products, and made less costly and bureaucratic.	product could be set on the basis of this Directive.	
Action 9. Publish a Communication on Raw Materials	The Communication lays down a number of actions to boost recycling and ease access to recycled materials.	This will further expand the recycling market.	The Communication was published in November 2008.Work will also look at international market aspects with respect to international trade and the flows of recycled materials out of the EU, and the Waste Shipment Regulation. This work will be carried out in close cooperation with the "Raw Materials Initiative", where attention will be given to materials identified as "critical".	New Communication was published in 2010 with future work anticipated.	
Action 10. Set up eco-innovation projects in	Provide funding for recycling	The aim is to provide direct	A call for proposals was launched in April 2008. The	The projects have been selected and	

recycling	technologies.	support to the recycling market. This is a supply-side initiative, but its inclusion in LMI ensures that there is coherence between the demand-side and supply-side policy initiatives.	evaluation of the proposals has now been concluded with 40 projects recommended for funding, with roughly 50% coming from the recycling field. A similar call for proposals was launched in May 2009 and September 2010.	are currently being implemented.	
Action 11. Set up observatory on eco-innovation in the field of Recycling	The aim of the Networked Observatory on Eco-innovation is to collect and analyse information on trends in the area of eco-innovation and provide a strategic knowledge resource for policy-makers, business and finance.	Improve the information available to policymakers, and therefore make the strategy in this field more efficient.	A call for proposals of the Competitiveness and Innovation Programme (Europe INNOVA) was launched to set up observatory and support its activities during the first years and closed in February 2009. The observatory was launched in June 2009, with a grant agreement of €2.0 million over three years.	The project activities and observatory is ongoing. The projects under the first call are being evaluated.	
Action 12. Encourage research and development in	Promoting R&D in recycling, namely via funding.	The aim is to provide direct support to the	Calls for proposals on waste Management and recycling under the 7th Framework	Projects under the call have been implemented.	

Recycling		market. This is a supply-side initiative, but its inclusion in LMI ensures that there is coherence between the demand-side and supply-side policy initiatives.	Programme. The Regions of Knowledge (Capacities programme) launched a call in September 2008 aimed to support consortia of clusters that are thematically linked to the Lead Market Initiative. Future activities may include: Focussed support measures, such as the organisation of events with Member States, industries and stakeholders; such as on the implementation of the Waste Framework Directive, in particular dealing with market related issues; the clustering of funded projects under LIFE, Research or CIP;		
Action 13. Set up guidelines on state aid for eco-innovation and waste management	Set Guidelines to lay down the conditions for authorising the granting of state aid to address areas which lead	This is a supply-side initiative, but its inclusion in LMI ensures that there is coherence between the demand-side and	Environmental guidelines for state aid were published in the Official Journal April 1st, 2008.	Action completed.	

	to a sub-optimal level of environmental protection. The guidelines have specific features that are relevant to promoting markets in recycling.	supply-side policy initiatives.			
Action 14. Improve understanding of market conditions in Recycling	Developing a better understanding of market conditions in the recycling area.	Knowledge of the market fosters the efficiency of policymaking.	A study titled "Optimising Recycling Markets" was launched in early 2008 by DG Environment. This focuses on market conditions in the recycling area. The final report outlines the policy options that would be best in removing barriers in markets for recycling. The report has fed into the Communication on waste & recycling markets that has been presented to the Environment Council (March 2nd – 3rd, 2009). Future activities may include specific studies, such as economic instruments to	Action completed.	

Mapping of Actions A

			promote markets such as the inclusion of the waste and recycling sectors into the ETS.		
Action 15. Facilitate research on future policy developments	Creation of evaluation system for the assessment of work done to date as well recommendations for future policy developments.	An evaluation system makes it possible to assess the level of progress of this strategy, so that any necessary changes can be made.	A Framework Contract was launched by DG ENV for studies to support policy development. This will assist in the reviews of the Thematic Strategies on the Sustainable Use of Natural Resources and on Prevention of Waste and Recycling, due in 2010. Similarly, the revised Waste Framework Directive requires the Commission and Member States to propose strategies for waste prevention by 2011. The evaluation of the Framework Contract took place in March 2009. Studies are likely to be launched later in the year.	A new Framework Contract will be concluded in 2011. Further research will continue to support the implementation of existing policies and new policy developments.	
Horizontal Action: This was not an LMI action, but it has a direct impact on the LMI work in this area	Communication (COM 2011 (13)) on the implementation of the Thematic Strategy on	One of the main objectives of this Strategy was to move towards a	The Communication was adopted in 2011	Completed (2011)	This report analyses the main actions achieved to implement the Strategy, the main results obtained, the obstacles and challenges to increase

	Waste Prevention and Recycling as adopted in 2005	'recycling society' using waste as resource.			waste prevention and recycling and the main perspectives in the coming years for the waste and resource sectors. It also identifies some priority areas and a consistent framework for future actions.

Mapping of Actions *A*

Lead Markets Initiative – Mapping of Actions Renewable Energy

Key
Legislation – Pink
Procurement - Blue
Standardisation - Orange
Other - White

	Description	How it fits with LMI goals	Level of progress	Next steps or completed	Additional information or initial results
Renewable energy					
Actions 1, 2, 3 & 5 : Adoption and implementation of the RES Directive	These actions concerned the adoption of the Renewable Energy Directive, which provides the legal framework for this market, as well as its subsequent implementation.	This Directive was adopted and is being implemented in the frame of the EU's climate and energy policy package. It clearly fosters LMI goals, as it assures the creation of demand for renewable energy through binding national targets.	The Directive was adopted in 2009 and is being implemented. This included : ▪ allocation of the 20% renewables target to the different member states (MS) ▪ the requirement of national action plans to reach the target. Those action plans have been submitted for all MS ▪ the promotion of flexibility through the implementation of a trading scheme in renewable energy	The transposition of the Directive in national legislation is currrently happening and monitored by the EC.	Member states have submitted national action plans and will have to submit progress reports every 2 years. Review of these plans and additional studies have shown that the 20% target for renewables will most probably be achieved. Additional

			(through the use of guarantees of origin) for the consumer market ▪ requirements regarding member state activities for developing qualifications and skills for the renewables sector (this is supported by studies in the Intelligent Energy Europe programme) ▪ the definition of sustainability criteria for biofuels for transport		guidance for transposing the provisions on sustainability criteria for biofuels was given through an EC report in 2010
Actions 4, 6, 7: Remove planning and certification barriers to the uptake of renewable energy, incorporate renewable energy in building codes	Actions 4 and 7 concern ensuring that planning and certification requirements and authorisation procedures do not constitute a barrier to market expansion. Action 6 concerns making building codes	Making the legislative environment favourable to the expansion of this market.	Actions 4 and 7 are covered by the RES Directive. This Directive sets out requirements that MS have to implement. A recast of the Energy Performance of Buildings Directive has been adopted in 2010 ; it focuses on energy performance and energy	In relation to action 6, activities in the Smart Cities and Communities Initiative (in the frame of the SET plan – see action 8) will give attention to both energy efficiency	The transposition of the Directive's requirements regarding simplification of authorisation and certification procedures has been supported by a 'best

	favourable to renewable energy.		efficiency of buildings.	and integration of renewables in buildings, neighbourhoods and cities. A consultation took place in early 2011.	practice' study in the Intelligent Energy Europe Programme
Action 9 A: Establish a network between public authorities in charge of procuring	This action aimed to allow Member States' public procurement authorities to meet and exchange their experiences in the field of renewable energy technologies.	This networking should allow to identify good practices in the field of procurement of renewable energy and promote their application in the EU, and as a result, increase the share of renewable energy purchased by public authorities. .	The implementation of this action was included in the LMI Call for Proposals for the establishment of Public Procurement Networks which was launched in November 2008 and closed in February 2009. No proposals were submitted in this area, which may indicate a lack of awareness of public procurers in this area of the Lead Market Initiative.	Abandoned	In relation to this action, it has to be noted that the Renewables directive also foresaw that member states must increase the use of renewable energy in the construction sector, ensuring that new and refurbished public buildings fulfill an exemplary role
Action 10 and 11: Adopting minimum energy performance standards and labelling	In the frame of the Ecodesign Directive and the Energy Efficiency Action plan	This legislation will lead to more uptake of more energy efficient products	As a result of the EEAP, implementing regulations on energy performance and labelling for 9 priority product	Continue ecodesign and labelling implementing	The adoption of the nine measures has been estimated

measures for priority product groups and ensure that appropriate measuring methods are developed to verify minimum energy performance	(EEAP), minimum energy efficiency definitions and labelling requirements are set out for adoption.	and to the promotion of sustainable construction.	groups have been adopted, covering domestic, commercial and industrial appliances. Measurement methods have been developed and are described in the implementing regulations and in the Official Journal of the EU	revisions for other product groups according to a new working plan (in the frame of the Energy Efficiency Plan 2011)	to deliver several hundreds TWh of energy savings by 2020. Through its recast, the Energy Labelling Directive has been revised.
Action 8: Implementation of Strategic Energy Technology (SET Plan)	The SET plan provides a strategic framework and implementation mechanisms to accelerate the development of low carbon energy technologies. As such, this action concerns the support of the supply of technologies to respond to the renewable energy demand.	The SET plan was not started by LMI, but contributes towards the same goals from a supply-side approach. Including this action in the LMI ensures that the demand-side and supply-side activities are coordinated and that strong synergies are sought.	Implementation of the SET Plan is according to schedule and FP7 calls are now programmed following the priorities set by the SET plan Industrial Initiatives (roadmpas and implementation plans). Industrial Initiatives (risk sharing public private partnering mechanism between EC, member states and industry) have been set up for the major renewables sectors.	Focus in the next months and years will be on the implementation instruments (joint programming, joint calls,…) and financing for the Industrial Initiatives.	Implementation of the SET plan is on track.
Actions 13 &14: Provide guidance on financing from funding mechanisms like the	Contributing to the development of an optimized financing mix for funding of	EU funding opportunities can provide direct support to the	▪ The European Commission Task Force on financing low-carbon energy	Financing of the priority actions in the SET plan Industrial	A communication on 'Investing in the development

Mapping of Actions *A*

EU Structural funds, European Investment Bank ,FP7, and strengthen the coordination and

			renewable." These represent new funding sources in addition to the sources provided through FP7 but which might not be enough to cover the financial needs. To bridge the gap between demonstration and market entrance, increasing attention is given to exploitation plans as integral part of demonstration projects. In addition, in discussions on the successor programme to FP7, the need for an integrative framework for supporting research, demonstration, deployment and market uptake, is acknowledged		ENER
Action 15: Publish and disseminate a guide on how to establish collaborative working schemes in renewable s energies, contractual, management and insurance rules as well	Action cancelled	Action cancelled	Action cancelled	Abandoned	

as Good practice for SMEs.					
Action 16: Propose background information for future qualification needs and develop best practices to facilitate the upgrading of skills and competencies in renewable energies	Ensuring that the workforce has the necessary skills.	The lack of skills could constitute a barrier to the expansion of this market.	The Renewables Directive include requirements regarding member state activities for developing qualifications and skills for the renewables sector. This is supported through a study in the Intelligent Energy Europe programme. From Industry side, some of the European Industrial Initiatives have, already identified their needs in terms of education and training such as solar and wind sector. Education towards entrepreneurship in the renewables sector is part of the Knowledge and Innovation Community InnoEnergy of the European Institute of Innovation and Technology (EIT)	Monitoring of Renewables Directive implementation by member states. Further liaison with the KIC InnoEnergy to assure synergies between various education programmes.	
Action 17:Improve the knowledge on barriers	This action aims at supporting the	Promoting global demand will foster	Since Summer 2010, DG ENER is involved in an IEA	Contributing to finalisation of the	

to disseminate the RES technologies and their implementation all over the world	internationalisation of renewable energy technologies and includes involvement in studies and action plans to promote global demand of renewable energy technologies.	business in the renewables sector	(International Energy Agency) study on 'Accelerating Energy Innovation' Worldwide promotion of low carbon energy technology development and uptake is also addressed by the Clean Energy Ministerial (CEM) in which the EC participates	IEA study and assess implementation of proposed actions. Continuing contribution to relevant activities in the CEM context, for instance on smart grids.	
Action 18: Increase the knowledge on effective barriers of development of a demand for renewable energy	Promote demand for renewable energy.	Addressing potential obstacles to market expansion.	Demand has been created through the Renewables Directive implementation, in particular through its promotion of renewables support schemes. The expectation is that future demand for low carbon energy technologies will continue to increase through policy and societal debate driven actions. The crucial issue to address this demand in a sustainable way is to increase the cost-competitiveness of renewable	The renewables directive will be evaluated. More in depth knowledge on this issue will be gained through studies in the Intelligent Energy Europe programme, in particular addressing non-cost barriers to renewable energy uptake.	

			energy options, which is addressed by the SET-plan.		

Mapping of Actions *A*

Lead Markets Initiative – Mapping of Actions Sustainable Construction

Key
Legislation – Pink
Procurement - Blue
Standardisation - Orange
Other - White

Action	Description	How fits with LMI goals	Level of progress	Next steps OR completed (date)	Additional information and initial results
Sustainable Construction					
Action 1: Screening of national building regulations.	Under this action, the Commission is identifying and assessing how the EU-27 Member States currently regulate sustainable construction, how these regulations are enforced and are complemented by voluntary public-private initiatives, and if the EU could play a coordination	This action aims to ensure that the legal framework in this sector does not hamper, and on the contrary fosters, its development.	A study was carried out by PRC Bouwencentrum – The final report identifies a number of regulatory gaps (e.g. for renovation works, life cycle span of buildings and building services, planning and zoning) and areas of convergence between national and European legislations (e.g. in the ecological and energy fields). It presents a number of recommendation for coordination at EU level and	Completed in February 2011.	In the long term possible initiatives could emerge leading to the development of an EU-wide benchmarking system for national building regulations with respect to sustainable criteria, the definition of EU-wide performance criteria for water conservation and embodied energy of construction materials/products, and

	role to consolidate the national regulatory frameworks.		possible initiatives in support to legislation.		the development of an EU standard for the assessment of building performances.
Action 2: Recasting of the Energy Performances of Building Directive.	Amending the Energy Performances of Building Directive, so as to increase the requirements for sustainable construction.	This will lead to a rise in sustainable construction.	Originally the action was intended to identify the measures which could increase more rapidly the capacity of the construction sector to take on board the requirements of the recast Energy Performance of Buildings Directive (Directive 2010/31/EU) and to move ahead of these requirements at national level, in particular for renovation works. DG ENER put in place on own its own initiative the BUILT UP project (http://www.buildup.eu). In parallel, EU business associations put in place the E2APT Task Force on the theme "Deep Energy Renovation of Buildings Cannot be Overlooked". These initiatives emerged	The Directive 2010/31/EU was adopted in May 2010	See impact assessment which accompanied the Directive's proposal. The Impact Assessment concluded that several aspects of the current EPBD could be improved. These in general refer, firstly, to the revision of some ambiguous wording and, secondly, to each of the main pillars of the current Directive. Within each pillar several options were analysed in relation to their economic, social and environmental impacts and for their implications on subsidiarity and proportionality. See: http://eurlex.europa.eu/LexUriServ/LexUriServ.do?

Mapping of Actions A

			spontaneously with little reference to and in parallel with the LMI.		uri=CELEX: **52008SC2865: EN:NOT**
Action 3: Industrial leader panel on cumulative administrative costs/benefits.	Completing Action 1 with an assessment of the administrative costs of EU - level legislation based on a number of practical case studies	This action aims to ensure that the legal framework in this sector does not hamper, but rather fosters, its development.	A study was carried out by Ramboll. Cases studies were carried out on specific enterprises concerning EU legislation on energy efficiency calculation, the export of low energy prefabricated houses, demolition and site preparation companies, housing associations and EMAS. The final report also mentions positive impacts on the Internal Market relating to the above areas if standards are harmonised and if certain barriers are removed.	Completed in May 2011.	In the medium term, the approach applied in the study could be a valuable tool for future Impact assessment of EU legislation, the new EU's "Fitness check" instrument for smart regulation, and better regulation at national level.
Action 4: Guidance and pilot schemes on award criteria and Life Cycle Costing (LCC).	Development of a promotional campaign for the use of LCC in public procurement. It revolves around applying an LCC	Common methodologies contribute towards more unified practices in public procurement	The experience of this preparatory action could provide a basis for an EU-wide promotion campaign on the use of LCC in public procurement. It is expected that the SCI Network will follow up on this (see Action	The action was completed in January 2010	The SCI procurement network has established a working group on LCC for financial decision-making. It is expected that the network will raise awareness among about 100

	methodological framework. developed in a previous study financed by the Commission in 15 public procurement projects.		5).		contracting authorities.
Action 5: Establish a network between public authorities in charge of procuring sustainable construction.	This action aims to allow Member States' public procurement authorities to meet and exchange their experiences.	This networking should raise the awareness among public procurement authorities of the existing sustainable construction possibilities in terms of innovations and new technologies, therefore leading to a rise in public investment.	Further to the call for proposals ENT/CIP/09/C/, two networks of public procurers in the area of sustainable construction were selected for funding with a contribution of € 1 million each for a period of 3 years. The networks started their activities around September 2009.	The action will be completed in September 2012.	Two sustainable construction procurement networks have been established: SCI Network http://www.sci-network.eu/ and LCB-Healthcare http://lowcarbon-healthcare.eu/, which focuses on sustainable construction in the healthcare sector
Action 6: Framework, assessment method and benchmarks for the assessment of sustainability	Improving the methods for assessing the sustainability of construction.	This will make this strategy more efficient.	A call for proposals for research projects was published in September 2008 (call identifier FP7-ENV-2009-1) with a clear reference to	The action will be completed in 2013	The impact will be felt in the long term. The outcome of the projects will complement and strengthen the EU and

performances.			LMI in the priority areas. The 2 projects selected (Open House and SuPerBuildings) will strengthen knowledge for sustainability assessment as a basis for the development of policy instruments and financial incentives		international standardisation work relating to the development of a framework for the assessment of the environmental, social and economic performance of buildings
Action 7: Widening the scope of European codes for construction design (Eurocodes 2nd generation).	Widening of the scope of the Eurocodes from the current structural design focus to other design criteria related to sustainability.	This will lead to a rise in sustainable construction.	CEN Working Group 206 CEN prepared a document "*Strategies for Meeting Construction Performance Requirements*" which provides a preliminary road map for identifying needs for construction standards.	Action completed in October 2010.	The impact will be medium to long term. Concerning a possible wider use of the methodology of structural Eurocodes for building design, it was established that for the time being the potential could be extended only to design for more comprehensive coverage of safety in case of fire and for energy performance. However, CEN will monitor progress and encourage further consideration when appropriate.
Action 8: Construction Products Regulation	Improved legal framework for simplified	This action aims to make the legal framework in this	A new regulation ("Construction Product Regulation - 305/2011")	Regulation adopted on 9th March 2011	

(CPR) and sustainability requirements.	procedures to obtain the CE marking for innovative construction products, and reduce the compliance costs for small manufacturers or manufacturers having to deal with small scale production.	market more industry-friendly, as well as meeting environmental goals.	repealing Council Directive 89/106/EEC has been adopted. This Regulation lays down basic conditions for establishing harmonised rules on how to express the performance of construction products in relation to their essential characteristics, in particular with respect to the sustainable use of natural resources and innovative construction products.		
Action 9: SMEs guide on collaborative working schemes in construction projects.	Creation of a guide for SMEs on the advantages of voluntary schemes that promote sustainable construction.	This should lead to a rise in sustainable construction.	The action was completed in March 2009 and provided recommendations which could support the wider implementation of collaborative arrangements.	Action completed in March 2009	Medium to long term – some of the recommendations will be considered in the context of the future Communication on the Sustainable Competitiveness of the Construction sector (autumn 2011). The LMI public procurement networks (see Action 5) could possibly ensure a follow-up to the recommendations. The production and

					promotion of the guide could be a catalyst for wider change in the European industry which could in turn provide the basis for regular monitoring.
Action 10: Alternative warranty/label schemes related to construction insurance.	Supporting the promotion of insurance schemes which could stimulate the uptake of innovative and sustainable solutions in construction projects.	Rise in sustainable construction.	The ELIOS pilot project (http://www.elios-ec.eu/)was completed on March 2010. The project team recommended that a European agency for construction insurance be set up together with an EU monitoring scheme. This would involve insurance and construction stakeholders and consolidate knowledge about risk assessment and quality control in construction projects. This monitoring scheme will also look at good practice in the insurance sector.	Action completed in March 2010 (Elios pilot project).	The impact will be over the long term. The Commission is considering the implementation of a 3 years follow up project for an EU monitoring scheme.
Action 11: EU-wide strategy to facilitate the up-grading of skills and competencies in the	Ensuring that the workforce has the necessary skills to undertake sustainable	The lack of skills could constitute a barrier to the expansion of this market.	The Commission undertook an assessment of future needs for skills and competencies in construction enterprises, as	The action has been completed.	The impact will be medium to long term. Some of the recommendations will be considered in the context

construction sector.	construction.		well as an appraisal of existing training systems in the Member states and their ability to respond to changing needs. On that basis, an outline strategy has been developed. In the report on 'Future Qualifications and Skill Needs in the Construction Sector' it was recommended that further intervention is necessary to enhance the sectors competitiveness based on innovation and high quality.		of the future Communication on the Sustainable Competitiveness of the Construction sector (autumn 2011).

Case Studies B

The following case studies are presented as separate documents :

Case 1 : The Waste Framework Directive - Waste Management in the Flemish Region

Case 2 : PIANOo - An Integrated Approach to Innovatory Public Procurement in the Netherlands

Case 3 :The LCB HEALTHCARE project – carrying procurement principles into practice

Case 4 : Biobased Products – The Elaboration of New European Standards

Case 5 : The epSOS project -combining supply-side and demand-side initiatives to promote innovation

Case 6 : The Lead Market European Research Area Network (LEAD ERA)

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