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Bridging the Valley of Death: public support for commercialisation of eco-innovation

Executive Summary

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Executive summary

1 Context

All innovation tends to bring positive externalities - spill-overs - from progress in innovation. Eco-innovation brings a double benefit because the eco-innovations themselves then deliver a positive externality, for example, a reduction in external costs from environmental damage. This double benefit occurs where the cost of environmental harm is not factored into the market pricing of a product purchased or activity undertaken (Rennings, 1999) or where there are other production or consumption externalities – for instance where market prices of energy do not include energy security risks.

As these additional positive externalities from innovation are not included in the rewards for eco-innovators, the level of investment in eco-innovations is judged to be even further below the social-optimal level than the level of innovation activity generally, giving eco-innovation policy the potential to deliver greater benefits.

In addition, in certain areas, environment policy to internalize externalities is not put in place because the means of reducing environmental harm are not available or deemed affordable by decision makers. This prevents policy reaching the socially optimal level of environmental protection. In this case, eco-innovations can lower costs of achieving environmental goals and so enable political agreement of environmental policy. In these cases, eco-innovation policy is needed before or in parallel with environmental policy, to enable the solving of an environmental problem that would not otherwise be tackled. In a similar way, faster eco-innovation allows greater progress with environmental or energy-efficiency policy, for example greater progress in the setting of minimum standards for product efficiency.

Eco-innovation should not be seen only as innovation in manufacturing processes or products: it can include institutional or behavioural innovation. But great environmental, economic and energy efficiency benefits can be found from innovation in products being sold in very large numbers. This study looks particularly at these relatively high volume products.

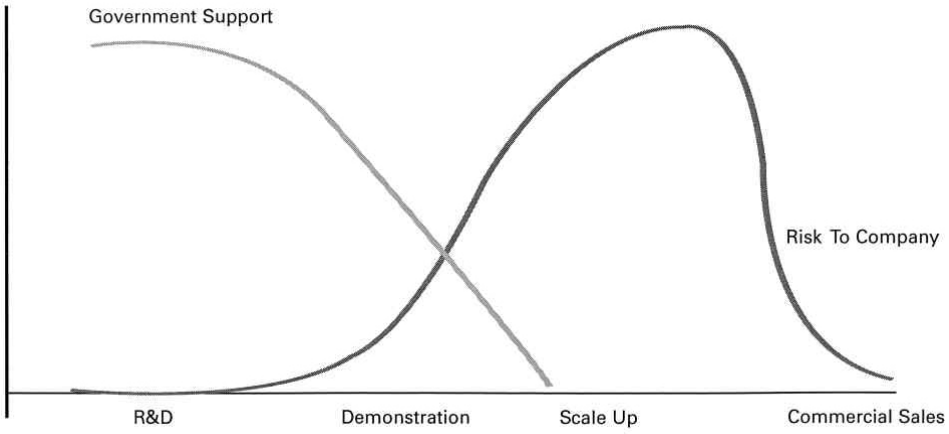
2 Constraints on eco-innovation: commercialisation of innovation and the 'Valley of Death'

We investigated where EU companies saw obstacles to greater eco-innovation. The companies we interviewed did not perceive risking funds on R&D expenditure as their main problem, viewing existing funding opportunities as adequate for them to develop innovations.

Our analysis identifies the most significant problem hindering eco-innovation as the 'chicken or egg' trap that prevents investment: manufacturers wait until there is a demonstrated demand before they develop and commercialise technologies, but buyers wait to see the product on the market before they demonstrate they will buy it (ten Cate et al, 1998). The eco-innovation may well have been developed as a prototype, but reaches a pinch-point at the decision to commercialise, which blocks its development.

This problem arises because companies usually decide to invest in innovation by making a comparison of their likely benefits against the risks of their investment. Particular problems occur at the stage where decision is taken on whether to commercialise an innovation as the risks are greater here than at other stages of innovation. Firstly, the move from a test-series of products to production of commercial volumes of a product requires significant investment. Secondly, this risk coincides with the stage in the innovation process when public support usually ends creating a risk profile (see figure below) that is sometimes known as 'The Valley of Death' for innovations.

Model of risk profile for companies of innovation processes



Source: DTI (2006:13).

It is difficult for firms to share this risk, which has proved to be a major barrier to the development and commercialisation of, for example, energy-efficient appliances. Gustavsberg, a large Swedish manufacturer of sanitary installations, had a product idea for development of an energy-efficient water mixer. Yet, the product development was not initiated before the Swedish National Energy Administration (STEM) investigated the potential market demand for energy-efficient water mixers and organised a technology procurement contest (see section 5.2.1).

These risks also lead to additional difficulties concerning late stage expansion funding. There is often a gap in the financing of small innovative companies in the pre-commercial stage, where they are no longer eligible for public start-up assistance, but the product development process is still too risky to receive sufficient private investments. Research by FUNDETEC indicates that there are too few public instruments operating to leverage private investment and share, or re-shape, risk in a way that makes these enterprises suitable for private investment (FUNDETEC, 2008: 66).

Many banks have desks and departments that are specialised in particular technologies (e.g. biotechnology and information technology). Recently some have developed knowledge on renewable energy technology, but often banks and traditional lenders do not have a desk set up for environmental technology which restricts their willingness to evaluate, and take, financing risks, restricting, or increasing further the cost, of funding (FUNDETEC, 2008).

3. Bridging the Valley: Demand-side innovation policy

In this situation of uncertain future markets, increased supply-side governmental support (e.g. for R&D) will not efficiently mitigate the risks to the company for further commercialisation of the product. Very large supply-side support would be needed to mitigate the significant investment risks of commercialisation directly. So the most efficient policy instruments are those which are able to reduce the market uncertainty, without second-guessing future market demand. These can harness the economic potential of the future market as the incentive to commercialise.

This is one of the roles of demand-side policy measures - defined as: *"all public measures to induce innovations and/or speed up diffusion of innovations through increasing the demand for innovations, defining new functional requirement for products and services or better articulating demand."* (Edler & Georghiou, 2007: 952).

Research conducted in the 1980s shows that public innovation procurement (a form of demand-side instrument) is a far more cost-efficient policy instrument than traditional R&D subsidies to promote innovations (Geroski, 1990). But whilst procurement for innovation was incorporated as an element of the European Commission's Research Investment Plan, and other instruments have been put in place, European action on demand-side instruments to promote innovation has been disproportionately small compared to the rewards. The innovation support polices most often put in place in the EU are supply-side policies (like provision of R&D funding) which mainly assist in the technological development of new products or processes.

Existing EU demand-side innovation policy

EU programmes to promote innovation, including eco-innovation, contain demand-side measures. Of particular note are:

- The Lead Market Initiative (LMI), launched in 2006 to give industries the opportunity to develop niche markets into export products or services in new high-growth markets.

- A '**pre-commercial procurement**' policy to encourage public procurers to share the risk (and reward) of developing and commercialising innovations which fit their needs.

- The Environmental Technologies Action Plan (ETAP) which recognises the importance of improving market conditions.

4. Experiences with past or existing innovation procurement policies

This study sets out to investigate how to best shape procurement policy to promote commercialisation of eco-innovations in the EU, researching past experience with innovation procurement programmes, including interviews with the firms and public bodies involved.

Different roles of procurement policy in innovation

Procurement designed to support innovation, can take many forms. It can: **initiate, escalate, or consolidate** markets (Edler et al; 2005:19). The majority of procurement policy in place – including green public procurement – focuses on purchase of commercially available products, which escalates (expands commercial niche markets) or consolidates markets, in addition to its direct public benefits.

This report focuses on exercises intended to procure innovations which are not yet commercialised – to initiate markets. Market initiation procurement can be divided into categories, depending on the final beneficiary of the commercialised product:

- Direct procurement where the public procurement body purchases the innovation for its own needs. Defence-related innovations or the acquisition of public transport technologies, e.g. high-speed trains, are examples of direct procurement (Edler et al, 2005: 16).

- Co-operative procurement involving joint buying with private purchasers to develop a new market for the technology they will both use (Edler et al, 2005: 16). An example is the procurement of energy-efficient lighting systems in Hamburg.

- Catalytic procurement is public sector action to catalyse the development of a technology, although the innovation will be exclusively used by private end-users.

- **Pre-commercial procurement**, as defined in European Commission policy, is direct procurement with the added characteristic that the public sector invests in the innovation process in return for a share of future revenues from its commercial success. It also involves bundling demand from several different procurers.

In this report, we use the term '**innovation procurement policy**' as a broad term which can cover all forms of market initiation procurement and also includes other public policy interventions to promote commercialisation of innovations through demand-side measures. Innovation procurement policy includes instruments that communicate likely future demand for innovation, even

though this may not involve public purchasing of products or services (the term 'procurement' is used in the wide sense of 'bringing about').

Innovation procurement policy

Our research gathered experiences with innovation procurement policy from within and outside the EU. The most comprehensive experiences come from NUTEK/STEM in Sweden, and from the US Department of Energy – this kind of innovation procurement policy is known as 'technology procurement'. This report has investigated cases covering:

- white appliances (energy-efficient refrigerators, ovens, washing machines and tumble driers), components (high-efficient motors).
- housing (energy-efficient water mixer).
- office blocks (control and monitoring systems, sun shading technology and lighting system).
- public transportation (hydrogen buses).

The most important features of these policies are described below:

- The central component of the policy is the creation of a way to solve the 'chicken and the egg' problem by exchanging information between innovators and potential buyers. A **'buyer group'** is created, gathering together purchasers with an interest in an innovation with environmental characteristics. These buyers set out what they desire from an innovation, in terms of its function, characteristics and price.
- Typically, the **public agent plays the role of a facilitator** of product innovation and product commercialisation. The public body initiating the technology procurement programme purchases neither the innovation process nor the final commercial product.
- The composition of the buyer group is crucial - it must constitute a considerable market share, so that its views on the desires for innovations convince manufacturers that there is a sufficiently large commercial market for their innovation. This **'bundling of future demand'** is a key aspect of the policy – individual buyers acting alone typically do not have the market strength to convince innovators to commercialise products. Bundling public and private sector demand can lead to 'critical mass' that gives technology developers a strong incentive to develop and commercialise new environmental friendly products.
- Usually, the buyer group draws up detailed **technical specifications** describing the innovation that they would want to be available. This goes beyond any solution already on the market, but must be technically possible. The process is informed by discussions with technical experts, manufacturers and innovators about what is feasible. In many cases, innovations which could meet the desired qualities are already known, but not commercialised. The buyer group is either set up as part of a specific project or a stable buyer group is used.

- To provide the incentive needed for innovators and manufacturers to engage in the information exchange, the gathering of information on the potential of innovations is usually set up as a **bidding contest**, in which the prize for the best bid is its selection for future market support. This is similar to procurement, although the 'prize' is not necessarily the purchasing of the innovations. Nor is it necessary for there to be only one 'winner' meeting the technical specification, although usually the best innovation against those criteria is selected. This approach has been used widely, particularly by NUTEK/STEM in Sweden.

- Various policy and market instruments may then be announced for future **support of the market uptake of the new products**. The choice of instrument depends on the problem faced by the innovator and the depth of support needed. For example, it may be enough that the performance of the developed products is documented. Gustavsberg participated for instance in a technology procurement programme with an energy-efficient water mixer and was awarded as winner of the bidding contest. The most important result for the company was the acknowledgement that the product they had developed was the most energy-efficient and of high quality. The fact that the public authorities facilitated the testing and evaluation of the product was of significant importance to the company, as this was an important way for the company to differentiate their product from their competitors' cheaper but less energy-efficient products.

- Even in cases where no innovation has been offered that would meet the specifications, the best product has been supported through public testing and a demonstration programme, allowing market success. In 2003, the Swedish National Energy Administration (STEM) initiated a technology procurement contest for development of a central control and monitoring system for heating, cooling and ventilation in office buildings. Several contributions were made to the bidding contest, but none of the solutions were able to meet all of the requirements. The result was that no winner of the contest was appointed. Instead, it was decided to invite the three best proposed solutions to an evaluation in existing office buildings. Larmia Control AB, a Swedish developer of systems for automation and monitoring of buildings, participated in on-site evaluation of their system, the energy programme Optimizer. The system developed by Larmia is evaluated as being able to bring down energy consumption of heat and electricity by approximately 10 to 20%, depending widely on the existing heating, cooling and/or ventilation system.

- Within some product groups the advance procurement of products that are not yet on a commercial market can mitigate the risks of the product developer. This policy instrument supports companies in the up-scaling of product volume (or product size). An example of **procurement of pre-commercial products** is the City of Copenhagen's purchase of a fleet of hydrogen fuel cell powered vehicles. The purchase of such pre-commercial products entails an excess risk to the procurer of the product. The case of City of Copenhagen shows that the reasons for public bodies to take the risk of purchasing a product with a performance (e.g. in terms of transport) potentially inferior to other products on the market include the support of

the development of the technology, environmental goals and improved public image.

Experiences from a range of technology procurement programmes show that many product manufactures are very interested in participating in innovation procurement programmes, even though the companies have to respond to detailed technical specifications.

Decisive for the companies' willingness to participate is the way in which their participation improves the market prospect of their products. The creation of a 'buyer group' of potential users or purchasers (both public and private buyers) is seen by the manufacturers as an assurance of a potential market. This effect is strong where the buyer group's composition reflects large potential buyers on the market.

In some cases, the process involving the buyer group by itself served to create sufficient market demand by showcasing a previously unknown innovation to buyers – and this led to commercialisation (exemplified by innovation in building sun shading systems described in Section 5.2.3.)

Complying with a bidding process is time consuming and costly. EU-wide bundling of potential demand could increase participation in such processes. The cooperation between public bodies can also reduce the costs for each entity of preparing and carrying out the tendering process.

By coordinating the buyers' needs with the suppliers' capabilities to develop new technologies the classic problem of the 'chicken and egg' can be resolved. The virtue of technology procurement is: "(…) to condense into a much shorter period the complicated exchange of market signals, intervening in a way that accelerates and strengthens - rather than displaces - long-term market relationships" (ten Cate et al, 1998).

Most of the capable potential manufacturers do not need a guaranteed delivery to the buyers of the product (Nilsson, 2003). If the product developers are convinced that the potential buyers will purchase the product and continue to do so, most product developers will be willing to bring the product to the market without sales guarantees. We also found that independent agency testing and evaluation of technologies that match the buyer group's need was a key driver for many companies to participate in the procurement programmes.

5. The value of expanding EU demand-side eco-innovation policy

In our analysis, the primary problem retarding commercialisation of eco-innovations is an information problem – the lack of information for innovators about whether the future market would want their innovation. Experience with existing programmes shows that an innovation procurement policy can have an important role in providing that information, particularly through the formation and support of buyer groups.

Yet we also found that each market is different, with market specific problems. Information measures can be effective at removing some of these problems, like financing constraints (by indicating a more certain market to financiers)

and overcoming market inertia (by demonstrating the success of an innovation to the wider market). A successful demand-side innovation policy should deal with each specific problem and this will require the use of a wider range of policy instruments both to support the operation of the information exchange in the buyer group and incentivise participation.

Current EU demand-side innovation policy appears limited in the way it tackles the 'chicken and egg' problem surrounding commercialisation decisions. Policy instruments which could be used to support commercialisation of innovation – particularly those relating to EcoDesign – do not appear to be structured to tackle this problem.

The implementation of ETAP is currently being evaluated (ECORYS/COWI, 2009). Progress with the Lead Markets Initiative is also being evaluated, to inform future measures and expansion of the initiative, with the review due to be published in the summer of 2009. These evaluations present opportunities to assess the extent to which current demand-side policy is successful in overcoming blocks to commercialisation, and to take on board experience in the EU and outside on the use of wider, deeper demand-side eco-innovation policy.

In a recent evaluation of the Swedish strategies and initiatives for promotion of environmental technology it is recommended to draw upon the Swedish experiences for technology and innovation procurement for setting up new procurement and innovation procurement schemes on an EU level. Clear ambitions and goals should be formulated and the needed resources should be allocated in order to increase the rate of development (Swentec 2008).

Action by the European Commission on innovation procurement policy could have significant added value, compared to similar actions by Member States. These advantages should come from the ability of EU policy to convey information to innovators about a much greater potential market (including export markets). EU action could then send stronger market signals, about the size of the market and about the international possibilities for innovations. There are other advantages:

- The pool of potential buyers to join a buyer group is much greater – allowing easier formation of large buyer groups with significant market power.

- Investments in innovation policy by each Member State are leveraged by the investments from the other participating Member States, with each Member State achieving its innovation goals more effectively, for a smaller investment.

- The European Commission has the ability to co-ordinate, or shape, the policy instruments to support market initiation across the EU, whether proposed by the EU (e.g. labelling) or requiring co-ordination in Member States (incentives) needed to support an innovation procurement programme.

The greater use of demand-side policy instruments, involving the use of buyer groups linked to targeted instruments could fit into the Commission framework for innovation, in particular the ETAP.

The added costs of co-ordinating potential buyers, innovators and supporting policies on an EU scale, rather than a national scale, needs to be considered, and may differ according to the market. Action at the EU level may produce greater information on this issue, particularly if it stimulates more Member State action on innovation procurement policy.

Products suitable for application of greater demand-side eco-innovation policy

The report analyses past experience of innovation procurement and assessed the potential of future policy with stakeholders in specific areas of innovation (chapter 5). To undertake innovation procurement at an international level, it is recommended to start at the component level and with small systems as such technologies are less dependent on existing infrastructure and variations in culture and climate conditions.

Experiences show that technology procurement has been most successful if the following conditions have been fulfilled:

- Products or features are attractive to a large number of motivated buyers.
- Products or features are not already widely available.
- Products are standardised and mass-produced and not custom-designed.
- More than one supplier can compete for the procurement.
- Desired changes in products or processes are not so fundamental that they require long lead times for R&D.
- The technology advances the manufacturers' own strategic goals e.g. reduced energy consumption.
- The manufacturers of the product perceive the potential market as a promising market.
- The product constitutes a considerable potential for environmental improvements.

In markets where the public sector's purchasing power does not constitute a significant part of a potential product markets, e.g. energy-efficient white appliances, the public sector can still potentially play an important role with respect to facilitating the development and market uptake of products with environmental characteristics.

In addition to the areas where innovation procurement has already been applied to achieve environmental goals (first 5 bullets below) we have identified potential application of innovation procurement for 5 further areas (the later bullets):

- White appliances (energy-efficient refrigerators, ovens, washing machines and tumble driers).
- Components (high-efficient motors).
- Housing (energy-efficient water mixer).
- Office buildings (control and monitoring systems, sun shading technology and lighting system).
- Public transportation (hydrogen buses).
- The transport sector (hydrogen powered fuel cell, electric car, electric motors, city buses).

- Wastewater treatment (environmental biotechnology).
- Chemical components (DEHP-free component).
- Healthcare products (e.g. ostormy or continence care products).
- Energy-efficient components (pumps).

Within each of these areas, it is possible to identify specific product functions that would be suitable for the application of technology procurement programmes. In a study made for the Swedish Procurement Group for Commercial Buildings (BELOK) future areas for technology procurement for energy efficiency in commercial buildings are recommended to cover:

- Energy-efficient food stores.
- Energy-efficient catering centre.
- Energy-efficient store lightening.
- Public application of light emitting diodes.
- Energy-efficient medical equipment.
- Energy-efficient climate cooling in offices.
- Energy-efficient office buildings with best indoor environment.
- Technology contest between ESCO on most energy-efficient buildings (Jagemar & Fahlén, 2007).

6. Practicalities of a wider EU innovation procurement policy

We are fortunate to be able to draw on practical experience of innovation procurement policies to understand how best to structure innovation policy to be most effective. The approaches to technology procurement used in Sweden, in the US, by the International Energy Agency DSM and in the Energy+ programme are very similar, and a range of general lessons can be learnt for application of the policy in the EU.

The basic methodology of an innovation procurement policy programme should be structured according to following steps:

1 Preparation of a feasibility study.

2 Creation of a buyer group.

3 Formulation of product requirements.

4 Tendering/discussion process with innovators.

5 Evaluation of innovations.

6 Announcement (and later application) of policy support measures, including spreading of information.

Our research shows that the best way to use innovation procurement policy is by identifying the risks associated with certain product and market characteristics and the application of targeted policy measures to mitigate these risks. It is

stressed that innovation procurement should not be understood as a fixed approach used the same way with respect to all types of innovations. On the contrary, innovation procurement should be seen as a flexible approach to innovation that is tailored to the specific type of product, size of product developer, product characteristics, technological complexity, and needed technological changes.

Instruments forming part of the policy programme

To tackle the market failures that hold back commercialisation of innovations, EU technology procurement policy should draw on an array of measures that combine in the right way on the specific market failures that exist for each area of innovation. The instruments that the policy should draw upon are outlined below.

1 Creation and use of buyer groups

The use of buyer groups to bring about information exchange is the core of the policy. The buyer group's work should be supported by a feasibility study setting out the technical requirements for the desired technology.

Policy instruments to provide incentives for participation in buyer groups may need to be offered in some cases, particularly if it is desired to bring risk-averse public procurers into the buyer group. If this incentive takes the form of a subsidy for purchase of a limited number of future products, the incentive also serves the primary purpose of demonstrating a stronger future market for innovation.

An indication from a buyer group that they would be likely to buy a certain number of products (even if not a promise to do so) is a very effective policy instrument.

2 Pre-announced market support instruments

The central role of the other policy instruments forming part of the innovation procurement policy is to provide advance reassurance to innovators that there will be market support for their innovation if they invest in its commercialisation. To be effective, these support instruments have to be:

- announced and guaranteed before the commercialisation.
- offered to products that meet the technical requirements, or which win the bidding contest.

Where there are several products which may meet those technical requirements, this future support can apply to the products actually sold – by way of a sales subsidy - allowing the market to determine the best product.

Instruments include:

- Testing and verification of the products (often found to be particularly important).
- Publicity campaigns for the best product(s), which could focus around the award of a prize, including promotion at trade fairs and establishment of product demonstration facilities.
- A financial 'prize' when the best product is put on the market.
- Sales support through subsidies for a certain number of products sold, either to the manufacturer or to purchasers (including those purchasers in the buyer group).
- The revision of product labelling classes (e.g. energy labels) to allow the innovative products to differentiate their performance from products already on the market.
- Matching future green public procurement criteria to the technical requirements set up for the product.
- Guaranteed markets – a pre-commitment to purchasing of a certain number of products meeting the technical specifications (including price). This can also take the form of a pre-commercial procurement process.

A new pan-European innovation procurement programme should be based on the experiences of the technology procurement programmes. This suggests that EU innovation procurement policy should draw on a broader range of policy instruments than past technology procurement programmes. This would then be able to target a wider range of areas of innovation.

Requirements for success

- The programme development process should be buyer-driven. The interests of the buyers, their preferences, market perspectives and willingness to buy are decisive for the success of the project.
- The programme developer should interact extensively with potential suppliers. The purpose is to learn about key technology and market issues from the supply side of the market.
- The setting up of a technology procurement programme is also about timing. It is necessary both to find interested buyers and interested manufacturers of the product.

The following factors are some of the other key elements in successful organisation of technology procurement:

- The selection of technology and markets that are suitable for technology procurement.
- A well-prepared preparatory phase.
- High credibility of the organiser of the programme.

- High commitment of the organiser and the buyer group through the whole procurement process.
- Long-term perspective.
- Continuity throughout the programme.
- Combination with other policy instruments and willingness to adjust the approach and involved policy instruments throughout the process.

Practicalities that should to be taken into consideration when forming a new buyer group should be:

- The purchasing power of the buyer group's potential members is important as the buyer group has to make up a promising market. An example of a buyer group that constitutes a significant share of the market is BELOK (the Swedish Procurement Group for Commercial Buildings). In 2007, BELOK's members together owned 17% of the heated area in commercial buildings and the BELOK member's investments made up 32% of the total investment in the commercial building segment (Bertelsen, 2008). However, buyer group members' commitment to the innovation procurement project is also decisive for a successful outcome of an innovation procurement programme.

- The forming of a buyer group should be seen as a continuous process, where new members may be added to the buyer group during the innovation procurement process, increasing purchasing power of the group. The selection of members to new buyer groups has in Sweden largely been based on knowledge of market players and personal networks. Potential members of buyer groups could be identified based on national and pan-European networks.

- STEM's experiences with creating buyer groups show that potential members of the buyer group should be involved very early in the innovation procurement process. In some cases the buyer group members have even made the initial suggestions for the technology procurement. The buyer group members' involvement in early discussions of performance requirements and potential demand for the desired product is very important to steer the process in the right direction.

- For success, the members of the buyer groups need to:
  - have a genuine interest in the development of the product.
  - take personal responsibility for the procurement project.
  - push the process forwards.
  - have a mandate from their employer to make decisions.
  - disseminate information on the project in the organisation where they work.
- As a step in the forming of EU wide buyer groups, it should be analysed to what extent national and regional differences in the EU influence on the potential buyer group members' demand for the desired technology. There are for instance significant differences with respect to the demand for cool-

ing and heating of building between North Europe and the Mediterranean region.

Long-term relationships are important for the sustainability of the project. Some of NUTEK's most successful technology procurement schemes have relied on long-term relationships with buyer groups. The long-term relationship has helped to overcome the initial criticism that the buyer group may have towards the technology procurement approach.

Assessment of Costs, Risks and Legal issues

A clear advantage of innovation procurement policy is the efficiency with which it can leverage the demand to incentivise commercialisation. This does not necessarily demand direct public financial intervention to support the market and should make any public expenditure of funds more effectively targeted at innovations which will have significant market uptake.

The costs to the public authority of the innovation procurement processes are connected with the preparation of the feasibility study, the facilitation of the development of technical specification of the buyer group and promotion of the winning technology. The costs vary significantly according to what kind of technology the procurement contest addresses. Estimated costs of a feasibility study are EUR 50,000 - 100,000. Based on the experience from Swedish technology procurement (in Chapter **Error! Reference source not found.**), full costs of implementation of a project to support commercialisation of an innovation are estimated to EUR 100,000 - 500,000. This can be compared with the costs of supply-side policy.

The procurement of pre-commercial products not only entails costs of preparing and carrying out the tendering process, the unit price of such innovative products is likely to be higher than the unit price of similar, traditional products. Only large cities normally have the resources to purchase pre-commercial products. A funding scheme for incentivising public procurement of pre-commercial products should be established as a branch of innovation/market transformation policy. This would allow small public entities (e.g. municipalities) to participate in programmes aiming at supporting commercialisation of pre-commercial products.

The very nature of supporting innovations is risky as no stakeholders involved in the innovation process can be sure that the innovation will succeed. Some of the projects already undertaken in the world have entailed a market transformation with a significant market uptake of the new product. In other cases, market penetration has been modest and in some cases sales have been very low. The risk must be accepted, it compares well to the risks of successful economic impact from R&D funding - one of the strengths of innovation procurement policy is that it provides market demand led support, rather than the support demanded by suppliers. This increases the likelihood that public innovation support is well targeted and moves innovation policy away from 'picking winners'.

A procuring agency involved in public procurement of innovation has to take risk evaluation into consideration, including evaluation of the likelihood of success of the procurement and the potential impact of the innovation. Based on Edler et al (2005) a model for risk evaluation of public procurement of eco-innovation has been set up, see Table 6.1.

The success of the policy interventions in stimulating wide market uptake depends on matching the interventions to market conditions and the problems facing innovators. This requires detailed assessment, drawing on past experience.

From a legal point of view, there are no obvious barriers to carrying out innovation procurement programmes.

Recommendations

- To achieve the EU's objectives for increased eco-innovation in the EU, the European Commission and Member States should use innovation procurement policy to tackle the blocks retarding commercialisation.

- The European Commission should use upcoming evaluations of the ETAP and Lead Markets Initiative (LMI) to identify the current scope of EU demand-side innovation policy in tackling blocks to commercialisation and how aspects of existing instruments might be used as part of a wider innovation procurement policy.

- The European Commission services should expand their responsibility for the facilitation of EU innovation procurement programmes including the selection of products, the creation and support of buyer groups, and the assessment of products. The Commission services should establish expertise to prepare feasibility studies for potential innovation procurement projects. Particularly in the start-up phase, much effort must be devoted to the creation of a framework for the procurement programme and a multi-year commitment given.

- Buyer groups should be formed under the auspices of the programme drawing upon the public procurement networks set up under the Lead Market Initiative, existing green public procurement networks and other Commission groupings, including the Retail Forum. These groups should include private and public procurers representing a sufficiently large share of the potential future market for an innovation meeting a particular need (e.g. to improve energy efficiency of lighting).

- A European demand-side innovation policy should be based on an analysis of the potential market advantages and specific market failures retarding commercialisation of each area of future demand, carried out by the Commission. Analytical support for buyer groups should make use of the product market and technical analysis and expertise being made available by the Joint Research Centre to support EcoDesign, Eco-label and green public procurement policies.

- The success of an EU innovation procurement policy requires the belief by stakeholders that the policy measures to support the work of the commission services – e.g. incentives, information campaigns, dynamic labelling, and links to green public procurement – will be applied. This requires upfront commitments by the European Commission and Member States to make existing and future policy measures available. This can only take place in a context of greater understanding of the central role of eco-

innovation in meeting medium-term economic, energy and environmental objectives and co-operation between policy makers in these sectors.

- To overcome initial unfamiliarity with the potential benefits of innovation procurement policy that would be likely to reduce participation in buyer groups and from innovators, the Commission should allocate upfront funding to the policy programme to be used, as judged appropriate, to support commercialisation, e.g. for purchase subsidies for a limited number of products, incentivising participation of buyers and innovators. These funds should be leveraged with funding commitments from Member States.