5 TOOLS FOR ENHANCING MARKETS

As has frequently been mentioned previously in this study, there are a number of difficulties which governments face in choosing climate friendly technologies. One of the main barriers is the high initial capital costs of many climate friendly technologies, even when lower operating costs mean that the technologies are less expensive over their lifetime than less environmentally benign alternatives. In addition to the financial barrier, there are a number of institutional and information barriers which governments have to address before the deployment of climate friendly technologies will become more widespread in government facilities.

This section highlights the barriers which were identified in *section 3* of the study and outlines some governments' activities in successfully overcoming them. The intention is to encourage governments to assess the financial and institutional barriers which inhibit them from purchasing climate friendly technologies, and to consider whether other governments' methods of overcoming the barriers could be replicated in their country.

5.1 Financing Technology Purchasing

One of the main barriers to the deployment of many climate friendly technologies is cost. As discussed under *Section 3,* renewable energy technologies are not generally cost-competitive in comparison with natural gas and other fossil fuels. The exception to this is applications in niche markets, where the deployment of PV in remote locations off the main electricity grid is often more cost effective than the cost of grid connection. Apart from renewables, many other climate friendly technologies such as heat pumps, high efficiency windows and lighting, have a higher capital cost than their less efficient alternatives. However, when the savings in electricity use, fuel costs and environmental damage are taken into account, climate friendly technologies can be more cost effective than their alternatives.

For all public sector organisations, constraints on capital spending are an inhibiting factor in making improvements to government buildings, appliances and vehicles. To overcome this obstacle several member countries have implemented successful financing arrangements which have proved to be very successful in involving the private sector in the procurement of climate friendly technologies for government facilities.

5.1.1 Third Party Financing

In the private sector *Third Party Financing* using an Energy Service Company (ESCO) is a well developed technique for a small company to benefit from the financial support of another company to permit an energy related development. The ESCO must in such cases feel confident that they will achieve an attractive return on their own and the developer's investment.

In Canada, for example, the Federal government has formed partnerships with the private sector to minimise its capital costs while at the same time achieving its environmental objectives, and in the US the *Executive Order 12902* on *Federal Facilities* recommends financing options such as Energy Savings Performance Contracting, Rebates, and 3rd Party Financing as attractive options.

Canada

"Federal Buildings Initiative" (FBI)

Scale of Project:

Federal government owns or leases over 50,000 buildings; the Federal energy bill tops CA$ 800 million annually.

Programme Structure: Energy Performance Contracting

Private sector firms design energy improvements for the buildings, install them, pay the capital costs of the work, and train the building maintenance staff to operate the new systems. The private firm is repaid for the work out of the energy savings, i.e. the difference between the original energy operating costs and the new, lower costs.

Energy Savings Achieved:

- *Energy savings worth up to $100 million per year (a reduction of 15-20% on the total energy bill) are expected to be achieved when all possible buildings are improved;*
- *Public Works and Government Services Canada undertook lighting retrofits at 9 buildings. The retrofits, which required an initial investment of CA$ 76,000, yielded annual cost savings of approximately CA$ 185,000;*
- *the programme has been applied to 2,500 buildings so far, representing a private-sector investment of some $200 million and a government operating saving of about $25 million per year.*

5.1.2 Governments' Budgeting Arrangements

Most other IEA/OECD countries do not have such creative arrangements in place for governments to minimise their capital costs. There are, however, a number of measures which stimulate direct responsibility for energy costs, and thereby encourage departments and agencies to make savings. The budget structure in some government departments means that savings in running costs do not flow back to the department which has made the capital investments, but rather to a building leasing company or a department of Public Works. Until changes are made to this arrangement it will continue to be difficult to encourage departments and agencies to make capital investments, even if such investments meet larger energy and environmental goals. Pressure to make such changes in budgeting arrangements from within the organisation would be necessary, and using the support of elected Councillors, for instance, can be a very effective way of forcing changes to happen. Similarly, governments may need to renegotiate building leases to make changes to energy practices. This effort would be worth making when the cost savings and the environmental impacts of changing to climate friendly technologies are properly taken into account. In addition the positive boost which governments could give to the industry by their purchases, could provide the essential encouragement for the industry in expanding its markets and achieving cost reductions for the technologies.

5.1.3 Bulk Purchasing

One of the main criteria for lowering the capital costs of many climate friendly technologies is to achieve economies of scale in their production. By raising product output to mass production level companies can sell their products at a significantly lower price, and will thus increase their competitive position in the market, probably leading to greater deployment of their products. Governments at all levels could help climate friendly technology companies to achieve this by forming purchasing groups to place bulk orders.

In Australia a number of companies have formed a *buyer group* and have pooled their purchasing needs for a specified product and have assessed their requirements over a five year period. The buyer group then called on the production companies to offer them a favourable price for the product, on the basis of the guaranteed sales over the five year period. The billing has been organised separately for each member of the buyer group. This technique could be applied to purchases of climate friendly technologies.

Governments at all levels could cooperate together and with the private sector to form a buyer group, so that central government departments, local governments, hospital management, education authorities, social services departments, etc, could operate as one buyer group for specified products, and could identify their individual needs over a number of years. When grouped together in this way, these orders could provide a manufacturer with a large and guaranteed market over a period of time. For example, central government departments' or local governments' plans for changing the heating systems in their properties, or retrofitting their lighting for energy efficient alternatives, could be grouped together. Such arrangements need not exclude the private sector, and the Swedish experience is that mixed public and private sector groups can work very effectively together.

Sweden's experience in forming *buyer groups* has developed systematically over time. Some buyer groups have failed or have been less effective than was expected because the personal dynamics of the group did not work well. Experience in Sweden has shown that it is easiest to develop a buyer group when the core members already know each other. The individuals may have the same type of responsibilities, for example some of the Swedish projects have involved individuals from a variety of property-owning backgrounds, thus municipally-owned housing companies, housing co-operatives, and privately-owned organisations have grouped together as they have a common interest. In other parts of Sweden the groups formed on the basis of their physical proximity, thus representatives of municipally-owned housing companies in southern Sweden, joined with a group of large insurance companies and with a group of individual privately-owned house holders from outside Stockholm. These buyer groups worked successfully because they had a common interest. In time, such buyer groups could progress to demanding products whose energy efficiency will go beyond those already on the market (see *section 5.2* below).

In some IEA/OECD countries the departmental and local authority budget structures may inhibit this type of arrangement. Overcoming these institutional obstacles to effective bulk purchasing is an important first step towards reducing overall energy costs and contributing to meeting national environmental and energy goals.

In the US utilities across the states run a variety of Demand Style Management (DSM) programmes. Some State agencies have successfully used these programmes to improve the energy efficiency of their buildings at the least capital cost to themselves.

5.2 Market-Pull by Cooperative Technology Development Projects

Cooperative purchasing activities such as the one outlined above can go a stage further. Governments, by acting as a group and therefore as significant bulk buyers, can encourage the technology industry to develop even more efficient products than are available on the market at present. Such a *market-pull strategy* gives a clear indication to industry that certain product specifications are now required. If the manufacturers meet the new efficiency requirements they will potentially have a large market for their product. If the manufacturer meets the government's requirements the unit cost of the product is likely to decrease with large volume sales. In addition, the buyer group may declare a target for improvements to the energy efficiency levels of specified products which must be met by a set date (perhaps in 5 years time), and in the years leading up to this date progressively more stringent values will be specified on an annual basis. To encourage industry to strive for excellence, bonus schemes can be introduced for products which exceed the stated standards

In some IEA/OECD countries government Departments only purchase appliances whose level of energy efficiency is among the top 25% of appliances on the market (e.g. in the US and Switzerland (E2000 label), and the four star rating scheme in Australia), in other countries they purchase products which are at least 10% more efficient than the minimum standard. In these cases the demand for products at the upper end of the market in terms of efficiency will increase and this efficiency standard may well become the norm. However the disadvantage of making demand which are well within the industry's product range is that it fails to push industry into striving for new levels of excellence, and may indeed discourage further efforts to create super-efficient technologies, because an assured market already exists for current products.

5.2.1 Competitions

In Sweden competitions have been launched to invite industry to develop high performance windows, small, energy efficient and quiet washing machines, amongst other products. The advantage of competitions is that it achieves a high profile for the issue of energy performance. The competition itself raises public awareness, and spurs the industry into developing products to meet the competition criteria. In the case of the competition for high performance windows in Sweden, for example, sixteen manufacturers expressed interest in competing, and nine developed prototypes. This in itself was a significant advance on the previous level of interest shown by much of the industry in improving the energy efficiency performance of their product[20].

In the US the *Golden Carrot* programme has worked in a similar way, whereby utilities offer financial incentives to manufacturers to make major advances in energy efficiency and product performance. In the first scheme 24 utilities pooled $30 million in the *Super Efficient Refrigerator Program* (see *section 4.5.1*) and a competition was launched to find the manufacturer who could build the most efficient CFC-free refrigerator at the lowest costs. The winner received guaranteed rebates from the pool to offset the incremental product development cost. Fourteen manufacturers responded to the challenge by submitting proposals, and even though thirteen of these failed to win, several manufacturers have introduced efficiency improvements to their standard commercial models.

5.3 Institutional Issues

5.3.1 Integrated Responsibility in Government Departments

There are different approaches in IEA/OECD member countries on the best way to proceed with improving the environmental performance of governments' operations. In most countries central and local governments have separate Energy and Environment Departments. In the context of climate change this division can be unhelpful. Changing energy use through the increased adoption of climate friendly technologies, as outlined in *section 4*, is a clear contributory factor to reducing global emissions of CO_2. However in central governments, Energy and Environmental Departments generally have different objectives, and an integrated approach in relation to the government's own performance can be lacking.

Some IEA/OECD countries, such as Canada, the US and the UK, have a well developed government strategy for improving the environmental performance of the government as a whole in relation to its buildings, appliance use and vehicles. In some countries this involves direction from the top, with Cabinet level *Green Ministers* and a related structure across government departments to focus responsibility for environmental considerations in all departments' activities although the Environment Department always plays a crucial catalytic role (as in the UK). In other countries (e.g. Switzerland) environmental considerations are taken into account by purchasers from different departments very much on an individual basis. There are advantages to both systems: in the UK the formal structure leads to systematic consideration of the issues, in the Swiss example, enthusiastic individuals may have more scope for making changes and being creative than if they were more closely regulated.

Whichever structure exists in governments the issue of enhancing the market for climate friendly technologies is probably dealt with by the Energy Department, and is not seen as an issue relevant to those government purchasers who are now examining their purchasing policies in relation to other environmental factors such as recycling, packaging, and waste minimisation. For government purchasing strategies in relation to climate friendly technologies to work most effectively, there *needs to be an integrated approach on the part of governments at central and local level*. As outlined in *section 5.1* above, an integrated approach by governments could lead to financially attractive opportunities, such as collaborative agreements to place bulk orders for climate friendly products, thus achieving reduced levels of capital expenditure over a specified period.

5.3.2 Information Dissemination

Information is a fundamental need for any purchaser to make an informed technology choice. Like many other buyers, government purchasers lack the appropriate knowledge about the technologies which are available on the market, where they can be purchased, how they will be maintained, and what advantages they can give in terms of energy savings and environmental impacts. Purchasers will often opt for a new product from a company with which they are familiar, from whom they received good service, and whose products are not noticeably more expensive than their nearest competitor. As mentioned in *section 3.2* the utilities have a very important role in influencing purchasers' technological choices, and their promotional support for a climate friendly technology can be critical to its success.

Information centres, such as the Danish Energy Centre, are excellent media for passing on information about renewable energy technologies, especially when they produce literature on technology options currently on the market, and lists of manufacturers and installers. Such centres are often involved in arranging conferences, exhibitions and producing non-commercial TV spots, and they can also alert potential purchasers to any available subsidies[13]. In Norway the *Green Management Programme (GRIP)* was developed to be the motivator and facilitator of Norwegian business and local authorities in sustainable development, and provides similar

services to the Danish Centre. Switzerland has a network of local Energy Centres, and 70 of these provide consultancy services, mostly free of charge, on the use of renewable energy sources and energy efficient technologies.

In Ireland, workshops for businesses are held to inform them about energy efficient lighting, CHP and energy efficiency in buildings. Greece provides training and education and information dissemination programmes, while both Sweden and New Zealand offer training programmes for installation contractors to allow them to learn about new technologies. Germany has targeted architects and engineers, by introducing a system of fee based incentives for them to offer more services related to energy savings and the use of renewable energy sources. Technicians such as boiler operators, electricians and plumbers are also often among the least well informed of new technological opportunities. Such operators usually have little awareness of wider energy and environmental goals, so reducing energy consumption to limit emissions of greenhouse gases will not be at the top of their agenda. Technology choices are more likely to be made from options offered by existing suppliers.

Targeted information campaigns such as those in the United Kingdom and New Zealand are designed to overcome at least some of these concerns. In the UK the *Energy Efficiency Best Practice Programme* focuses on informing the industrial and commercial sector of technological and practical opportunities for energy conservation measures, and it is developing a Market Transformation strategy which will involve a range of initiatives, including energy labelling, government subsidies and technology procurement in the field of lighting and office equipment.

Information is also an essential tool for making changes, and raising public awareness of an issue can prove useful. In a recent case in Switzerland a local authority was considering the options for local public transport to one suburb. The choice lay between a fleet of replacement diesel buses, a tram, and a methanol bus. The purchasing officer made a life-cycle analysis of the environmental effect of each option at the local and global levels, and also took account of the capital and running costs. The Council deferred its decision, which allowed the purchasing officer time to write articles in the technical press which were then picked up by the local press. The debate has since become a public issue, with Councillors receiving deputations favouring all options. Even though the effect on the climate friendly technology market in this case is as yet unclear as no decision has been taken on the mode of transport to be adopted it demonstrates the effectiveness of information in generating a public debate on an important energy and environment issue. It reveals the importance of allowing active public participation on issues which are at the interface of technology deployment and consumer behaviour.

5.3.3 Training

Adequate training of government purchasers to inform them at regular intervals about the climate friendly technologies which are available, would be an effective means of ensuring that informed choices are made. Such exchanges should also include information about incentive/promotional campaigns which exist in some countries, such as low-interest loans, tax credits etc. which are often not well known or extensively promoted.

Training of building maintenance staff is also an important consideration. After a technology has been installed it will be operated by building maintenance technicians, or in the case of vehicles, by government drivers and bus operators. A number of IEA/OECD countries recognise that car driver behaviour has a significant impact on the fuel efficiency of a vehicle, and have implemented training programmes for government drivers to encourage fuel-conscious driver behaviour, and improve overall fuel efficiency in their car fleets. In the case of building heating

and lighting technologies, if technicians are not fully aware of how to operate the equipment to achieve optimum results it will inevitably fail to perform well, will cause dissatisfaction among the users, and will be dismissed as a technological disappointment. Poor technology performance can do very significant damage to the industry's market position. Austria and Sweden have focussed training exercises on installation contractors, and Germany has targeted architects and engineers in an attempt to overcome these problems. More widespread concentration among IEA/OECD countries on training programmes for technicians could be a very effective and focussed strategy for improving the deployment of climate friendly technologies.

5.3.4 Product Energy Labelling

Many IEA countries have energy labelling schemes in place on energy consuming appliances. In Europe the EU Eco-Label applies to refrigerators, among other non-energy products. In Sweden and the United States government departments and agencies are required to buy computers, monitors, printers and photocopiers, with the *Energy Star* label. The *Energy Star* and *Swiss E2000* labels refers to the power requirements of the machine in the stand-by state, the auto-off feature (the power switches off after a specified time delay), and the facility for automatic duplexing (copying both sides of a document). The levels of efficiency required for a product to gain an *Energy Star* label have now been adopted as the industry standard world-wide, and the label is increasingly being adopted by other governments as their purchasing standard. The reasons for this are two-fold: firstly, the US market is so huge that its requirements do force change, and secondly, the office equipment industry is international and therefore changes in specification are experienced on an international basis.

In Germany the Blue Angel label covers copiers and computers, and Australia has an energy star rating scheme under which government purchasers are required to buy *four-star* rated products. In Canada a variety of energy labelling programmes exist: EnerGuide, PowerSmart and Energy Star, as in the United States.

Energy labels are a valuable tool for enhancing the climate friendly technology market. Products which use less energy to operate at peak efficiency will naturally appear to best advantage when energy consumption labels contrast their performance with that of their competitor products. An energy label clearly provides an explanation of its performance advantage, and this may persuade the purchaser that the product is worth the higher capital cost. Energy labels are also a very useful tool for the purchaser, as they relieve him of making in-depth assessments of every technical specification of the products. This is increasingly important as purchasing in governments is decentralised. By the same token, it is essential that labelling criteria are transparent in the way they are set, are regularly updated and are easily understandable.

Energy labels are only useful, however, when coupled with consumer awareness campaigns. Educational material, advertising etc. are necessary to explain the significance of the label to the customer and the supplier. US experience has shown that labels are ignored by customers and suppliers unless their awareness of the significance of the label has been raised beforehand.

5.3.5 International Cooperation

In the international arena the IEA provides a framework for experts to work co-operatively on a broad range of technologies and related issues, such as marketing. These are operated as Implementing Agreements (IAs). IAs exist which focus on Demand Side Management (of which Annex lll is devoted to technology procurement programmes), and cover the range of climate

friendly technologies: Solar Heating and Cooling, Photovoltaic Power Systems, Buildings and Community Systems, District Heating and Cooling, Heat Pumping Technologies, Alternative Motor Fuels and Electric Vehicles. In addition three energy technology information centres provide advice and information on an international basis: Energy Technology Data Exchange, Centres for the Analysis and Dissemination of Demonstrated Energy Technologies (CADDET), and the Greenhouse Gas Technology Information Exchange (GREENTIE).

CADDET collects, analyses and disseminates information on demonstration projects in energy efficient and renewable energy technologies. Its objective is to provide useful information about demonstrated technologies to help accelerate their uptake in the market place. GREENTIE aims to facilitate the diffusion and exchange of information on technologies to respond to climate change concerns. The GREENTIE database holds information about organisations which have expertise or data on technologies to mitigate emissions of greenhouse gases.

Strategies for supporting the further deployment of climate friendly technologies at an international level are designed to recognise the international dimension of the market for many products. In particular office appliances (copiers, fax machines, printers, scanners) and lighting are generally manufactured by multinational companies. Because of this, multinational consideration of issues such as standards and product labelling requirements are necessary, as one country's isolated demands (except in the US case) for product improvements would be likely to carry less weight than a coordinated request from a number of countries[23]. In addition single country standards risk conflicting with the rules of international trade.

International programmes can best encourage the following:

- international harmonisation of energy efficiency criteria and testing methods of product energy performance;
- provide feedback on product performance, and the impact of energy efficiency programmes;
- sustain the process of continuous product improvement through private and/or public investments in new technology with periodic re-examination of testing and rating methods, as well as regular updating of best practice criteria.

Through the IAs governments can seek to improve the best practice of the industry, and continually examine options and lessons for their own programmes towards improving the market deployment of climate friendly technologies.

6 FINDINGS

Climate friendly technologies offer governments the technological options for reducing their energy use and CO_2 emissions. Reducing energy use in government buildings and vehicles is part of many IEA/OECD member governments' national programmes for meeting international environmental commitments. Government programmes to enhance the markets for climate friendly technologies is one element towards achieving their environmental objective of limiting CO_2 emissions. In addition, as one strand of a market enhancement programme for the technology industry, government purchasing programmes can play an important part.

Government activities to encourage the wider dissemination of climate friendly technologies through its purchasing programmes are important at different stages of a technology's life:

- at the earliest stage to encourage the development of climate friendly technologies;
- by adopting the technology in a demonstration programme;
- by providing the incentives for its uptake: developing the infrastructure of product availability, information dissemination, and affordable prices;
- by providing a boost to the market through large volume purchases.

These conclusions are developed below:

- Governments can encourage the ***development of a technology***. Markets can be driven by national and international activities to promote super-efficient technologies. This has been done very successfully in Sweden for high performance windows (*section 4.3.2)* among other technologies, and in the US's *Golden Carrot* programme for a range of technologies including the *Super Efficient Refrigerator Program (section 4.5.1)*. The competitive mechanism assures manufacturers of a guaranteed market for the products from among the buyer group members, and so industry has responded to this challenge by developing products to meet the demand. Even manufacturers who have not won the prize have continued to market new, highly efficient products which were originally designed to enter the competition.

  International activity is also highly effective in this context. The IEA's Implementing Agreement on DSM (Annex lll) has successfully formed collaborative groups of public and private sector to stimulate manufactures to develop advanced technologies (*section 4.4.1* copiers). Participants in the IAs will not themselves form a large sector of the potential product market, rather they offer their national marketing and promotional skills to find a lucrative market for the new technologies once they are available.

- In the case of well established technologies, governments have an important role in pushing the technology manufacturers to ***refine the product*** to meet more stringent energy and environmental performance standards. In Switzerland, Australia and the US government agencies are required to buy products which fulfil the requirements of the national energy labelling scheme. ***Energy labels*** play an important role in enhancing the market for climate friendly technologies, but only if the demand for products with the energy label is great enough to

encourage the industry to respond. The US government has required its purchasers to buy appliances with the *Energy Star* label, and in the office equipment field this has led to these levels of high efficiency being adopted as the industry standard world-wide (*section 4.4.2)*. The label is increasingly being adopted by other governments as their purchasing standard. This improvement has been possible because the US market is so huge that its requirements can force change, and also because the office equipment industry is international and therefore changes in specification are experienced on an international basis. *Energy Star* is, however, an exception, as most nationally based standards apply to markets which are too small to drive the industry to make fundamental changes to the range of products they produce. ***International collaboration*** is necessary for smaller countries to make a significant impact on manufacturers.

Energy labels are also a useful too for government purchasers, as energy efficient products are easily identified for their own purchasing purposes. In addition, energy labels are useful in governments' information campaigns, as energy efficient products may be easily identified.

- For some climate friendly technologies there is a real need for governments to ***adopt a technology*** and give it a high profile ***demonstration*** platform. Demonstration of technologies in action has been found to be a persuasive tool for influencing purchasers' technology decisions. Governments are in a prime position to use their own facilities to demonstrate climate friendly technologies in operation, and to encourage replication in other institutions and the private sector.

  For a demonstration to be effective the appropriate building and planning regulations need to be in place for technologies such as passive solar design *(section 4.1.1*). Adoption of passive solar design in countries such as Australia and Japan (in schools) has provided architects with a platform to develop the techniques in actual applications. Canada has encouraged demonstration buildings through its *C-2000* programme *(section 4.2.3),* where a C-2000 building is required to use no more than 50% of the energy required to heat, light and power a conventional building. Through this programme industry can see that high environmental and energy efficiency standards can be reached without excessive costs or difficulty. It is too early to see replication of the design of these buildings, but only by encouraging their development can the government hope to achieve wider uptake of the technologies.

- Some technologies need governments to ***provide the incentive*** for the technologies to be adopted market-wide. In the case of alternative fuel vehicles, for example, enhancing their market depends largely on the ***infrastructure*** being in place, and the ***price*** being right. The ease with which conventional vehicles may be converted to use alternative fuels, the availability of electric vehicles, the extent of the infrastructure for repowering the vehicles, and the ability to drive for acceptably long periods of driving between the repowering stops, are critical factors for the development of this market. Governments can play a role in raising awareness of the technologies by using the vehicles in their own facilities, but unless these other factors are met there will be little progress. In addition to the infrastructure, experience in the UK and France of programmes to encourage the use of lead-free petrol and diesel, has shown that if the *price of the fuel* remains lower than petrol, then it will be used. However, when the balance of pricing

changes, consumers will switch to the cheapest fuel, even if it is more polluting.

Similarly programmes in Austria and the Netherlands to encourage solar thermal technologies have been successful when subsidies have reduced the costs to the consumer, governments have led information campaigns to raise awareness of the technologies, and governments have ensured that the technologies are widely available, with well-trained installers and maintenance personnel (*section 4.1.1)*. Photovoltaic technologies have received a similar boost in the US with the government's *One Million Solar Roofs* programme, in Germany with the *1000 Roofs* programme, and in Japan in its *Rooftop PV Programme* (*section 4.1.2)*. Price subsidies coupled with information campaigns and easy availability of the product, were also the key to the successful programmes to replace light bulbs with energy efficient bulbs in Guadaloupe and Martinique;

- ***Information*** is a very important factor in the success or failure of a technology. Lack of information creates another barrier to the deployment of a climate-friendly technology. Governments have a role in regularly informing purchasers both in their own facilities and on a national basis of the technological options available to them, and of the costs and benefits. National level information programmes work most effectively when they are coupled with the promotion of a specified technology (as mentioned above) when the price of the product is accessible and efforts have been made to make it easily available. Information and ***training*** also needs to be given to architects, engineers, estate managers and others responsible for specifying and purchasing the technologies to be used in the public sector, as well as to technical and maintenance staff who will ensure that technologies are used to best effect, and operate at the optimum level.

  Information exchange between purchasers is also a very powerful tool for diminishing the perceived risk involved in adopting new, untried technologies. Information passed between purchasers about climate-friendly technologies helps to promote wider interest in, and take-up of technologies which may otherwise not have been deployed.

- Governments can give a boost to a technology by the ***volume of its purchases***. As major purchasers in the national economy (*section 2*) there is great potential for governments to direct their purchases towards climate friendly technologies, and to have a positive effect on the technology market. .

  Central and local governments, and the private sector, can work together to form ***buyer groups***, as has been shown in Australia, Sweden and in the US *(section 5.1.3)*. The buyer group can then present manufacturers with their technological requirements over a period of years, specifying that separate bills would be required. Manufacturers of established technologies such as CHP, high-efficiency boilers and heating systems, high-efficiency electric motors, low-energy lighting, and low-energy office and domestic appliances would all benefit from bulk purchases. In this way governments will be able to meet their purchasing requirements within their time frame, and technology manufacturers will be assured bulk-orders for a specified period.

  As one of the most significant barriers to the deployment of climate friendly technologies is their capital cost, mechanisms such as bulk purchasing are important for achieving capital cost savings on the part of the purchaser, while

at the same time providing some market security to the industry. This will enable manufacturers to mass produce their product, thus allowing economies in the production costs which will in turn benefit government purchases in the form of lower capital costs. Buyer groups can go a stage further by asking industry to improve the energy efficiency of technologies already on the market, and offering them guaranteed sales if their requirements are met. This has been done very successfully in Sweden and the US, as mentioned above, where competitions to stimulate the development of specified technologies have been successfully organised *(sections 4.3.2 and 4.5.1)*.

While recognising the financial constraints which many governments at all levels are experiencing, there remain options for governments to make the necessary capital investment in technologies to reduce both their operating costs from energy use, and to reduce their CO_2 emissions:

- financing strategies such as ***Third Party Financing***, have been successfully used in the private sector, and can be replicated in the public sector, whereby the private sector invests the capital costs, and is repaid through the ongoing energy savings. Canada, for example, has used this mechanism to good effect in its Federal Buildings Initiative (*section 5.1.1*) and in the US performance contracting is used;

- other governments are unable to make arrangements such as this with private energy companies for their own facilities. There are, however, a number of institutional barriers which governments could overcome to enable departments to benefit themselves from any energy saving measures they make. Budget structures which credit a building leasing company or Public Works department for savings in operating costs realised after a different government department has invested in energy saving equipment, is a severe disincentive for departments to invest in energy saving technologies. Renegotiation of these arrangements will be necessary.

Throughout the IEA/OECD region governments' internal organisation for improving their energy use in their buildings, appliances and vehicles, vary enormously. Some countries have Cabinet level *Green Ministers* and a related structure across government departments to focus responsibility for environmental considerations in all departments' activities (e.g. in the UK). Others however, take environmental considerations into account very much on an individual purchaser basis (e.g. Switzerland). Whichever structure exists in governments the issue of enhancing the market for climate friendly technologies is probably dealt with by the Energy Department, and is not seen as an issue relevant to those government purchasers who are now examining their purchasing policies in relation to other environmental factors. ***An integrated approach*** is needed across governments - central and local - which combines the goal of meeting environmental objectives with the goal of enhancing the markets for climate friendly technologies. Until these are approached as interconnecting issues they will continue to be approached without reference to each other, and a broad range of opportunities will be lost for simultaneously meeting both objectives.

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