

# **Greener Public Purchasing as an Environmental Policy Instrument**

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## 1. Introduction

Governments increasingly include environmental criteria in their purchasing decisions. For example, purchasing guidelines often require that particular products contain a minimum amount of recycled content or achieve specified levels of energy efficiency. Guidelines may also favour – through price preferences, explicit set-asides, or other mechanisms – suppliers who exceed official pollution standards, abide by environmental frameworks, qualify for environmental labels, or otherwise demonstrate their “greenness”.

Such greener public purchasing (GPP) policies have a natural appeal, as they couple increased concern about environmental quality with a not-unreasonable belief that governments ought to lead the way by improving their own purchasing habits. The goal of this paper is to develop an economic framework with which to evaluate this belief and, more generally, to identify the strengths and weaknesses of GPP as an instrument of environmental policy.

Several factors play important roles in this evaluation. First is the general design and intent of GPP policies. Some policies seek to correct institutional deficiencies in government procurement practices that lead both to higher government purchasing costs and lower environmental quality. GPP policies that identify and correct such deficiencies are often described as “win-win” since they lead not only to environmental improvement but also to improved government efficiency. Such policies should clearly be encouraged, with policy analysis focusing on identifying and implementing these opportunities. Other GPP policies, however, are designed to improve environmental performance even if it increases government costs or reduces operating performance. Such “win-lose” policies require closer scrutiny to ensure that increased costs for the government are justified by the resulting environmental benefits.

A second factor is the magnitude of government purchasing. GPP will be a more effective instrument of environmental policy, all else equal, when the government sector is a large, co-ordinated purchaser of relevant products. This is certainly the case in some sectors, *e.g.* defence and highway construction, where the central government is the primary source of demand. In many other sectors, however, the direct impact of GPP may be quite limited either because the government sector comprises only a small portion of overall demand or because government purchases are spread across many, unco-ordinated government units. In these sectors, GPP policies will have significant impacts only if individual

governments co-ordinate their actions or if private consumers and producers react in ways that reinforce the intent of the GPP policy.

A third crucial factor is the private sector response to GPP. Private sector purchases in many sectors dwarf public sector purchases, so policy analyses of GPP should be sensitive to the indirect effects of GPP on private markets. In principle, the private sector response may either reinforce or counteract the change in government purchasing. Private purchasing may become greener if the government policy reduces the costs of purchasing green products (*e.g.* by encouraging innovation that creates new, greener products or by enabling green suppliers to realise economies of a significant scale) or increases market acceptance of green products (*e.g.* by demonstrating their commercial feasibility). Conversely, private purchasing may also become browner (*i.e.* less green) if the government policy results in higher prices for green products or lower prices for brown products (*e.g.* through standard supply-and-demand responses). The likelihood and magnitude of these reinforcing and counteracting effects depend on specific features of the product markets.

The remainder of this paper explores these issues in greater detail and develops a framework for evaluating GPP relative to other environmental policy instruments. Section 2 considers the magnitude and scope of government purchasing in OECD member countries. Section 3 distinguishes different types of GPP policies. Section 4 discusses the potential direct effects of GPP on environmental quality and the government's economic performance. Section 5 analyses how GPP may indirectly affect private consumption and production decisions. Section 6 discusses how GPP compares to other environmental policy instruments. Section 7 then concludes.

## **2. An overview of government purchasing**

### **2.1. How much do governments purchase?**

The government sector accounts for a significant fraction of expenditures on goods and services. A recent, comprehensive analysis of OECD member countries has estimated that total government sector expenditures averaged almost 20% of gross domestic product (GDP) from 1990 to 1997 (OECD, 2001).<sup>1</sup> (See Annex B for a fuller discussion on the relative importance of public procurement in OECD economies.) As shown in Table 1, the government sector's share varies significantly across member countries. Average total expenditure shares for 1990-97 varied from 16 to 33%. The average government share has declined several percentage points over the last three decades (OECD, 2000). This downward trend appears to have continued in recent years (OECD, 2001), but its future course is uncertain.

The 20% figure refers to all government expenditures; in other words, it includes both government purchasing and employee compensation.

**Table 1. Government procurement in OECD member countries, 1990-97**  
Average total expenditures as percentage of GDP

	Total expenditures	Total expenditures less employee compensation
Australia	20	9
Austria	25	12
Belgium	17	5
Canada	26	11
Czech Republic	25	17
Denmark	28	11
Finland	26	10
France	23	9
Germany	18	7
Greece	19	7
Hungary	30	18
Iceland	26	13
Ireland	21	10
Italy	20	8
Japan	17	9
Korea	16	9
Netherlands	19	9
New Zealand	18	7
Norway	25	11
Poland	23	11
Portugal	21	7
Slovak Republic	25	15
Spain	21	9
Sweden	33	15
Switzerland	20	9
Turkey	18	7
United Kingdom	25	13
United States	19	9
<b>OECD weighted average</b>	<b>20</b>	<b>9</b>

Source: OECD, 2001.

Government purchasing alone is significantly smaller: about 9% of GDP for OECD member countries during this period. Employee compensation thus accounts for slightly more than half of government expenditures. The 9% figure should be used when estimating the absolute size of government procurement markets; the 20% figure should be used when estimating the relative size of the government in the economy.<sup>2</sup>

These figures illustrate that the government sector accounts for a significant fraction of purchasing. It must be emphasised, however, that this purchasing aggregates decisions by many distinct entities: the central government (which

itself may have many independent departments and agencies making purchasing decisions), sub-central governments, and social security funds (see Annex B).<sup>3</sup> Recent studies of OECD member countries have estimated that central governments account for 30 to 35% of government purchasing (OECD, 2000; OECD, 2001). Central government purchases thus average about 5 to 7% of GDP. Sub-central governments and social security funds account for the remaining 65 to 70% of government expenditures and 10 to 13% of GDP. Sub-national governments are numerous, so their individual expenditure shares, as a fraction of national GDP, are very much lower.<sup>4</sup>

Taken together, these figures illustrate an inherent limitation of using government purchasing as an instrument of environmental policy. At most, procurement policies co-ordinated across all levels of government will directly affect, on average, only 20% of purchases in a targeted market. Similarly, policies co-ordinated at the central government will directly affect, on average, only 5 to 7% of purchases in a targeted market. Policies by individual sub-national governments or policies by decentralised units of central governments will, of course, have even smaller direct effects. The relative importance of individual government units, over central governments, is likely to increase, as decentralisation is a continuing trend in public management (Richard, 2003).

These observations suggest that the potential environmental benefits of GPP may be small, relative to other environmental policy instruments that can target 100% of relevant markets (see Annex B). This does not imply that GPP is undesirable. Other policy instruments may be unavailable or may be more effective when combined with GPP initiatives. Moreover, some GPP initiatives may be justified by their direct economic benefits (“win-win” opportunities) independent of their environmental implications.

The small potential direct environmental benefits of GPP do imply, however, that policy evaluations should be particularly sensitive to the indirect impacts of these policies. As discussed in detail below, GPP initiatives may influence private purchasing and production decisions. Private purchasing may be 20, 50 or 100 times larger than the government purchasing controlled by GPP, so even small changes in private purchasing could have dramatic impacts on the policy evaluation of procurement initiatives.

GPP is, of course, less limited as an environmental policy instrument when government is a large purchaser in a relevant market. One implication of this is that GPP will have more leverage in countries that have relatively large and centralised governments. Similarly, GPP will also have greater direct impact if individual governments co-ordinate their procurement initiatives among themselves or with private organisations (see *e.g.* Westling, 2000). GPP will also have greater direct effects at the sub-central level when focused on products that have relatively narrow geographic markets (*e.g.* a product that is

manufactured and consumed within a single region). In these markets, individual local governments may be significant customers, despite their small role in the overall national economy. Moreover, local governments are more likely to be aware of the specific environmental issues associated with production and usage of the product and can tailor their policies accordingly.

Finally, an additional implication is that GPP will have greater direct impacts if focused on product markets in which the government plays a particularly large role.

## **2.2. What do governments purchase?**

Anecdotally, it is clear that government purchasing varies significantly across product markets. Governments are the primary customers for defence and highway construction, for example, so it may be expected that the government share of national purchasing in these areas is much higher than average. Conversely, governments are generally small purchasers of consumer goods, so their share of national purchasing in these areas could be expected to be quite low.

Unfortunately, little research appears to have systematically quantified variation in government purchasing across product types, and a detailed effort at doing so is beyond the scope of this paper. Two studies have, however, examined data from the 1980s. Using input-output tables, Richard (2003) reports central government purchasing shares for nine OECD member countries in the mid to late 1980s; her figures cover the 17 sectors in which the central governments represent, on average, 5% or more of national demand. Prominent among these sectors are defence, transportation, and energy-related industries (see also Annex B).

François *et al.* (1996) examined government sector purchases in the United States using data for 1987. They aggregated purchases to roughly 85 industry categories and calculated government purchase shares for each one. They found that government purchase shares were highest in defence-related industries, construction and maintenance, and certain areas related to computers and scientific equipment. For most merchandise sectors, however, government purchasing accounted for less than 5% of demand. François *et al.* (1996) thus concluded that preferential procurement initiatives were unlikely to have significant impacts in most sectors.<sup>5</sup>

Table 2 updates their analysis using more recent data for 1997. The table identifies the 20 sectors with the highest government purchasing shares (out of about 90 sectors overall) and reports the basic constituents of overall government purchasing (federal defence, federal non-defence, and state and local). The results are quite consistent with the earlier findings of François *et al.* (1996). Government is the predominant purchaser in one industry sector

Table 2. **Government sector purchases as a share of total purchases in the United States, 1997**

Top 20 industries, ranked by government purchasing share, percentages

Code	Industry	Total	Federal			State/local
			Defence	Non-defence	Total	
13	Ordonance and accessories	81.1	65.1	15.0	80.2	0.9
12	Maintenance and repair construction	26.3	2.7	2.2	4.9	21.4
60	Aircraft and parts	26.0	24.2	1.8	26.0	0.0
61	Other transportation equipment	18.9	18.0	0.5	18.5	0.4
63	Ophthalmic and photographic equipment	15.8	4.9	0.4	5.3	10.5
62	Scientific and controlling instruments	14.6	9.5	2.4	11.9	2.7
73A	Computer and data processing services	13.5	5.6	5.2	10.8	2.7
65C	Water transportation	12.8	4.2	5.4	9.6	3.1
31	Petroleum refining and related products	12.5	1.4	1.2	2.5	10.0
68A	Electric services (utilities)	11.7	0.7	0.7	1.4	10.3
26B	Other printing and publishing	11.5	0.3	2.6	2.9	8.6
56	Audio, video, and communication equipment	11.5	7.9	3.4	11.3	0.1
65A	Railroads and related services	10.2	0.5	1.5	2.0	8.2
73C	Other business and professional services	9.3	2.9	1.8	4.6	4.6
29A	Drugs	9.1	0.7	0.3	1.1	8.0
7	Coal mining	8.8	0.0	3.9	3.9	4.9
68B	Gas production and distribution (utilities)	8.0	0.3	0.6	0.9	7.1
27A	Industrial and other chemicals	7.6	1.1	1.6	2.7	4.9
65D	Air transportation	7.0	1.6	2.1	3.7	3.3
58	Miscellaneous electrical machinery and supplies	6.9	3.9	1.4	5.3	1.6

Source: United States Department of Commerce, Bureau of Economic Analysis (2002).

(ordnance and accessories) where it represents more than 80% of the demand. The government comprises from 7 to 26% of purchasing in the other 19 listed sectors, including aircraft and other transportation equipment, construction maintenance and repair services, and various types of technical equipment. Interestingly, four of the listed sectors involve energy production: electricity, oil, natural gas, and coal. In the remaining 70 sectors (not listed in the table), the government sector comprises less than 7% of purchasing; indeed, it typically comprises less than 2%. This purchasing is spread across federal, state, and local governments so, as noted above, the purchase shares of individual governments are typically much lower still.

It is difficult to draw general results from this table and the related results in Richard (2003) and François *et al.* (1996). The data are either more than a decade old, limited to a single country, or, in the case of François *et al.* (1996), both. Nonetheless, they do suggest some useful hypotheses about government purchasing that should be tested against additional data. First, central governments are a major purchaser of defence-related products. These

products would thus seem to be a natural focus for GPP initiatives. Second, non-defence purchases are concentrated in a limited number of sectors such as construction maintenance and energy use. As with defence, these sectors should be a particular focus of GPP initiatives (and, in the case of energy use at least, they have been). Third, government purchases comprise a relatively small portion of purchasing of most goods and services. Thus most sectors would seem to be weak focuses for GPP initiatives, in the absence of strong indirect effects on private purchasing.

### 3. Greener public purchasing

Governments have developed GPP policies to target a broad range of environmental issues. Perhaps the most common initiatives aim to increase the recycled content of government purchases and to increase the efficiency of energy-using devices. Numerous additional initiatives target other issues, such as promoting the use of bio-based or organic products, alternative fuels, clean electricity, water conservation, integrated pest management, and less-polluting manufacturing technologies.

GPP policies often begin with a generalised mandate that procurement be effected in an environmentally conscious manner. Such general intentions have spawned a broad variety of specific programs. Table 3 lists a few examples and proposes one simple way to classify them for purposes of policy analysis. Additional examples are discussed in Siemens (2003), OECD (2000), and the references therein.

The first set of programmes seeks to correct deficiencies in government budgeting, accounting, and financing mechanisms. These deficiencies include “use it or lose it” incentives from single-year budgeting structures, conflicts between capital and operating budgets, and misalignment of operating and budgeting responsibility. Richard (2003) and Johnstone *et al.* (2003) discuss these institutional deficiencies in great detail.

Flawed budgeting institutions contribute to environmental harm if they lead procurement officials to inefficient purchasing decisions that favour browner products. Overemphasis on initial capital costs, for example, may cause procurement officials to favour less energy-efficient devices, even when more efficient devices would save government resources over the long run. Similarly, neglect of future disposal or replacement costs may cause officials to select products based on their near-term costs, even if more durable or easily disposed products would cost less in the long run.

As noted above, GPP policies that correct such deficiencies are often described as “win-win”, in that they both promote environmental goals and reduce government purchasing costs. Other policies are, of course, “win-lose”,

Table 3. **Examples of greener public purchasing policies**

Policy category	Examples	Reference
Improved budgetary, accounting, and financing systems	Facilitate third-party financing of energy-efficient capital investments (Federal Buildings Initiative, Canada)	Siemens (2003)
	Life-cycle costing in developing federal buildings (Switzerland)	OECD (2000)
Price preferences for greener products	5 to 15% price preferences for recycled content in paper and other products (several American states)	Marron (1997)
	Environmental shadow prices (Switzerland)	Johnstone <i>et al.</i> (2003)
	Weight price at 60% and ecological aspects at 40% in tendering for washing and cleaning agents (Vienna Hospital Association, Austria)	Siemens (2003)
Set-asides for greener products	100% of building electricity requirements from renewable sources (two federal departments in Alberta, Canada)	Siemens (2003)
	Share of organically grown food must reach 30% by 2005 (Vienna, Austria)	Siemens (2003)
	100% of paper from recycled content, 10% of power from renewable sources (Federal Agency, United Kingdom)	Siemens (2003)
	100% of personal computers must meet Energy Star Standards (United States)	Siemens (2003)
Information provision, labelling, and training	Information, workshops, green catalogue (Procurement Service, Austria)	OECD (2000), Siemens (2003)
	Environmental guidelines and training (Denmark)	Siemens (2003)
	Eco-labelling (several dozen countries)	OECD (2000)

Source: Marron.

in the sense that they promote greener government purchasing even if that results in higher government purchasing costs.

The simplest examples of potentially “win-lose” policies are price preferences and set-asides. Under a price preference, the government accepts offers from both green and brown suppliers, but it gives green products a financial edge in evaluating those offers. Certain American states, for example, offer price preferences of 5 to 15% to suppliers who meet recycled content standards (Marron, 1997). A more complex approach is to impute shadow prices to the environmental attributes of particular products (*e.g.* a certain price for each ton of carbon emitted in production); these implicit environmental prices are then added to standard financial prices for purposes of comparing offers. Price preferences have certain similarities to environmental taxes but, as discussed below, they differ in significant ways.

Set-asides target quantity rather than price. As illustrated in Table 3, a typical set-aside requires the government to hit a particular purchasing target, *e.g.* 30% recycled content in paper or 100% purchases of electricity from renewable resources. Set-asides potentially increase government purchasing costs in two

ways: by requiring the purchase of green products even when brown alternatives may be less expensive, and by explicitly limiting competition between brown and green alternatives.

A final category of policies, and perhaps the broadest, seeks to increase procurement officials' understanding of green alternatives through information provision, training, and outreach. These programmes include the preparation of green product catalogues, workshops on green procurement, and the development and endorsement of green product labels. Some of these policies support "win-win" initiatives. For example, they may introduce procurement officials to affordable green products that have been overlooked in previous procurement decisions, or they may assist officials in making appropriate life-cycle costing decisions. Other information policies support "win-lose" policies that promote more expensive but greener alternatives. Green labelling programmes, for example, may provide the basic foundation for set-aside or price preference policies that favour labelled products.

These relationships illustrate a more general point: the four policy types identified in Table 3 often intertwine with each other. The Canadian policy to purchase electricity from renewable resources, for example, took the form of an explicit set-aside (i.e. it was expressed in terms of a quantity target), but was motivated, in part, by a related effort to calculate an appropriate price preference. That preference, in turn, was based on valuing not only environmental benefits but also some economic benefits that might be thought of as "win-win" (Siemens, 2003). The four policy categories identified in Table 3 should therefore not be viewed as mutually exclusive.

## **4. The direct effects of GPP: economic and environmental impacts**

### **4.1. A framework for evaluating direct impacts**

By influencing government purchasing decisions, GPP initiatives directly affect both environmental quality and the economic performance of the government. Unfortunately, relatively little detailed information is available regarding either of these impacts. Anecdotal reports suggest that some environmental goals of GPP initiatives have been achieved, but these are difficult to verify; moreover, it is not clear whether narrowly defined environmental goals translate into overall environmental improvements (Siemens, 2003). Data on the economic impacts of GPP are similarly sketchy and, as a result, "formal evaluation of the true economic efficiency of GPP is not possible" (Siemens, 2003).

Given this lack of hard data, current discussion of the direct impacts of GPP must focus on setting out a qualitative framework for evaluation (see Siemens, 2003, for a related evaluation framework). The first issues, of course, are whether GPP significantly changes the composition of government purchasing and whether it influences a substantial magnitude of purchasing. Policies must have

significant impacts on both composition and magnitude to generate significant direct impacts. As noted by Siemens (2003), a particular issue in this regard is the incrementality of GPP initiatives, i.e. to what extent would greener purchasing have happened anyway due to other forces?

On the environmental side, another key driver is the extent to which policies address environmentally intensive sectors. All else equal, GPP will deliver greater environmental benefits if it is focused on sectors that raise the largest environmental concerns per unit of output. As discussed below, this does not necessarily mean the sectors with the largest environmental impacts per unit of output since existing regulations may have already substantially addressed those impacts. The most direct environmental benefit thus comes from focusing on environmental concerns that existing regulatory structures may have overlooked.

On the economic side, additional driving factors are the relative mix of “win-win” and “win-lose” initiatives, the magnitude of the economic costs and benefits resulting from these initiatives, and the administrative costs of pursuing these initiatives. GPP policies will generate the greatest economic benefits if they identify and implement “win-win” opportunities, avoid “win-lose” initiatives, and minimise the administrative costs of policy implementation.

## **4.2. Win-win opportunities**

As noted above, GPP advocates have argued that the government often makes inefficient purchasing decisions that not only hurt the environment, but also waste government resources. A typical example would be the purchase of a regular HVAC system (heating, ventilating and air conditioning) when careful balancing of initial capital costs and long-run operating costs would favour a highly energy-efficient one.<sup>6</sup>

Such uneconomic decisions can frequently be traced to specific failures in government institutions and policies (Johnstone *et al.*, 2003; Richard, 2003; Siemens, 2003). Budgeting processes that treat capital and operating outlays separately, for example, may result in capital decisions being made without due regard to their implications for operating costs. Poor decisions may also occur because of a lack of relevant information. If purchasing officials are unaware of more economic alternatives (or do not understand the trade-offs between initial costs and operating costs), they will not make efficient decisions.

Such institutional failures should obviously be remedied by institutional innovations that better orient the incentives of purchasing officials and that provide them with sufficient information to make good decisions. Johnstone *et al.* (2003), Richard (2003), and Siemens (2003) investigate these issues in significant detail.

For the purposes of this paper, it is sufficient to note three things about potential “win-win” initiatives. First, such institutional innovations and information provision should be pursued regardless of their implications for environmental performance. Efficient government operation is a legitimate goal of government policy and should be pursued. The fact that some efficiency improvements may generate environmental benefits is certainly useful for marshalling support behind initiatives to improve government operations, but they should not limit the scope of these efforts.

Second, efforts to identify and implement “win-win” policies should be informed by careful analysis of actual costs and benefits. Environmental advocates have long made claims about the untapped potential for energy efficiency in both the private and public sectors (see, *e.g.* the writings of Amory Lovins). Yet policy analyses of efforts to tap these opportunities often find that real savings are substantially less than projected (see, *e.g.* Joskow and Marron, 1993). This is not to say that inefficiencies do not exist in the market for energy-efficient products.<sup>7</sup> Rather, it is simply to note that there are many possible reasons why supposed “win-win” opportunities have not been exploited. In practice, a common reason is that the economic “win” is not really as large as simple spreadsheet models would predict.

Third, the existence of “win-win” opportunities does not free policy makers from the need to make trade-offs between economic performance and environmental quality. The existence of “win-win” opportunities simply means that existing purchasing decisions are inefficient. In correcting such inefficiency, policy makers must decide to what extent they wish to correct the economic inefficiency (*i.e.* reduce purchasing costs) and to what extent they wish to correct the environmental inefficiency (*i.e.* reduce environmental impacts). Some trade-offs will inevitably be made, either implicitly or explicitly, between these two policy goals.

## **5. The indirect effects of GPP: changes in private purchasing**

In addition to their direct effects on government purchasing, GPP policies may also have indirect effects on the purchasing decisions made by private firms and consumers. Indeed, governments frequently intend for GPP policies to not only change their own purchasing decisions but also to “influence the behaviour of other socio-economic actors by setting the example, and by sending clear signals to the market-place” (OECD, 2000, p. 20). The hope, in short, is that GPP will induce private sector buyers to make their own greener purchasing decisions.

Such reinforcing effects are certainly possible; greener government purchasing can, under certain circumstances, elicit greener private purchasing. However, this potential is tempered by two caveats. First, such

reinforcing effects can occur only under certain circumstances; many green purchasing decisions will not produce reinforcing private behaviour. Second, other forces may push in the opposite direction, so that GPP actually induces browner private purchasing (e.g. through crowding-out effects).

Table 4 summarises various ways in which changes in private purchasing might reinforce or counteract changes in government purchasing. The different mechanisms are distinguished by whether they operate through the supply side of the private market (i.e. they influence the cost and availability of green and brown products) or the demand side (i.e. they influence private demand for green and brown products). The likelihood and importance of each of these factors will depend on specific product market conditions and the design of GPP policies.

Table 4. **How private purchasing may reinforce or counteract GPP**

	Potentially reinforcing	Potentially counteracting
Supply side	Cost reductions, induced innovation	Crowding out
Demand side	Setting the example	Setting a bad example

Source: Marron.

## 5.1. Potentially reinforcing effects

### 5.1.1. Induced innovation

One goal of GPP initiatives is to inspire private firms to develop new, greener products that will not only satisfy government purchasers but also attract private customers. For such induced innovation to have significant impacts on private purchasing, green suppliers must succeed at three distinct stages of innovation: they must invent a new product or process, commercialise it, and then gain significant private market acceptance. Each of these stages – invention, commercialisation, and diffusion – is essential to successful innovation.<sup>8</sup>

GPP initiatives are potentially most effective at the first stage of this process: invention. As noted by Geroski (1990), “procurement policy which clearly expresses a demand for services beyond current capabilities is likely to stimulate the development of those capabilities”. In other words, if the government offers a large enough carrot and clear enough guidance, the private sector will respond by developing new products. There is ample historical evidence for this belief. Government procurement has frequently driven invention in industries such as defence and technology. In addition, there are several examples of green product invention in response to procurement initiatives, including the development of highly energy-efficient clothes dryers, electric motors, and office copiers (Westling, 2000).

Of course, the fact that targeted government procurement can inspire private sector inventiveness does not mean that such inventiveness will generate significant social benefits.<sup>9</sup> New products will have minimal impact unless private firms commercialise them and achieve significant market presence. Supplier decisions to commercialise will be largely driven by their expectations about private buyers' willingness to purchase. That willingness will, in turn, be driven by how well the new product satisfies purchasers' needs and budgets.

GPP can thus have significant impacts on innovation only if it generates products that private buyers want and can afford. GPP is therefore most promising when it focuses on product attributes, such as energy efficiency, that will clearly be of interest to private buyers.<sup>10</sup> Conversely, GPP is likely to be less promising when it focuses on product attributes that are irrelevant to private purchasers (*e.g.* aspects of the production process that have no effect on product performance). In these cases, GPP will be an ineffective instrument of overall environmental policy unless other factors drive commercialisation and diffusion.

### **5.1.2. Cost reductions**

GPP might encourage commercialisation and diffusion directly if it helps the private supplier lower its production costs and thereby leads to lower prices for private buyers. Such cost reductions might occur if government purchasing enables suppliers to realise significant economies of scale or to reduce costs through production experience.

In theory, such cost reductions are sometimes possible if the government provides the initial demand for a new product and if the cost structure has the right characteristics. The magnitude of such cost reductions, however, will depend on the production technology, the size of the government demand, and the likelihood of additional private demand. The incremental benefit of the government purchasing will be significant only if the government demand is large enough to allow the realisation of significant scale economies or learning economies and if the likely private demand is sufficiently small that these economies would not have been realised anyway. If government demand is small, it is unlikely to assist green suppliers in realising significant economies of scale or learning economies.<sup>11</sup>

### **5.1.3. Setting the example**

Finally, GPP might also promote commercialisation and diffusion if private purchasers follow the example set by the government. Firms may follow the government example for two reasons. First, government purchasing of the green product may demonstrate the practicality or acceptability of the

green product. In essence, the government purchasing acts as certification of or advertising for the green product. Second, government purchasing of the green product may set a moral example that some private purchasers may choose to follow.

Both the demonstration effect and moral suasion may induce private purchasers to follow the government's lead in environmental purchasing. As with the supply-side effects, these demand-side effects are most likely when the green product has minimal market share and when private customers already have an incentive to adopt greener products (*e.g.* energy-efficient devices). These effects are less likely with more established products (for which some diffusion has already occurred) and products that impose significant costs on private adopters.

## **5.2. Potentially counteracting effects**

### **5.2.1. Crowding out**

Although it is often argued that private market reactions will reinforce changes in government purchasing, it must be emphasised that such reactions may also work in the opposite direction. The simplest examples arise in markets that operate under the most basic supply and demand factors: upward sloping supply and downward sloping demand. Upward sloping supply curves indicate, intuitively, that higher market prices will induce increased production by suppliers; downward sloping demand curves similarly indicate that higher market prices will induce decreased purchasing by buyers.

Under these conditions, a GPP initiative that shifts purchases from a brown product to a green one will cause the price of the green product to increase and the price of the brown product to decrease. Private purchasers would then respond by purchasing more brown products and fewer green products. In economic jargon, government purchases of green products crowd out private purchases (*vice versa* with the brown product), thereby counteracting the government policy.<sup>12</sup> Crowding out may be partial or complete; a simple example of complete crowding out, based on actual experiences in the United States and Germany, is presented in Annex A.<sup>13</sup>

The existence and magnitude of crowding out depends on several factors. First, private sector consumption of the green product must already exist; government purchases of a green product cannot crowd out private purchases that do not exist.<sup>14</sup> This suggests, consistent with the discussion of innovation incentives earlier, that government procurement will be most effective when it focuses on products that are truly innovative and have not yet succeeded in penetrating the commercial marketplace. Once a product has commercial exposure, the potential for crowding-out effects increases substantially.

Second, the degree of crowding out depends on the relative magnitudes of government and private sector demand. If government is a major purchaser of the product in question, crowding out will typically be lower. This should be intuitive: the greater the change in government purchasing, the more difficult it is for private purchasers to adjust their behaviour in response. Conversely, crowding out is quite straightforward if government is a small purchaser.

Third, crowding out depends on the price responsiveness of private demand and private supply (the price elasticities of demand and supply). In the example in Annex A, private purchasers consider the brown and green goods to be perfect substitutes because greenness relates only to the production process, not the services delivered to the buyer. The resulting high cross-price elasticity of private demand for the brown and green products implies that crowding out will be complete: private buyers easily substitute brown products (freed up by the change in government purchasing) for green ones.

Substantial crowding out can also occur if supply elasticities are low. If it is difficult to produce more of the green product (*e.g.* due to capacity constraints) then increased government purchasing will lead directly to decreased private purchasing. Similarly, if brown producers see little reason to reduce production, any brown products freed up by the change in government policy will be reallocated to private buyers. In other words, the brown product that the government chooses not to buy may still find a buyer, while the green product that the government does buy might otherwise have been purchased by a private buyer.

Crowding out will be minor if these conditions are reversed. Highly elastic green and brown supply will generate little crowding out, as most of the change in government purchasing is reflected in changes in actual production. Similarly, a low cross-elasticity of demand for the green and brown products will minimise crowding out, since private buyers will not substitute between the two products; in this case, however, there is also little reason to believe that the private sector will be enthusiastic about adopting the green product.

Ultimately, of course, the potential for crowding out is an empirical issue that must be addressed for specific policy initiatives and product markets. At this time, no policy evaluations have specifically addressed crowding out resulting from GPP. Some analyses have identified complete crowding out, as illustrated in Annex A, in green electricity purchasing efforts that focus on private buyers (see, *e.g.* Rader, 1998); these results presumably apply equally to similar programmes for government purchasing. Other studies have examined other types of government procurement policies, *e.g.* programmes that favour domestic over foreign producers. Not surprisingly, these studies find some effect from government policies; crowding out is not usually complete. Unfortunately, the studies have not estimated the specific magnitude of crowding-out effects; for

summaries of this literature, see Mattoo (1996) and Trionfetti (2000). Further research is required.

### **5.2.2. Setting a bad example**

Finally, it must be noted that governments sometimes set bad examples. The classic example, in a somewhat different context, occurs when performance standards such as building codes fall behind market and technology realities. Such “reassuring but outdated standards”, as the OECD (2000) describes them, place downward pressure on the greenness of private purchasing decisions, since it is often simplest just to build to code. This effect would not be as direct in the case of green procurement, since the standard does not bind private transactions. However, if firms follow the government example for their own green purchasing, an outdated procurement policy may hold back greener private purchasing.

Proponents of GPP initiatives may view such situations as an opportunity to ratchet up environmental standards to new levels. While this is certainly one possible response, it is equally an opportunity to evaluate whether any GPP initiative is still required. The choice must depend on the potential for additional gains and their costs.

### **5.3. Implications for policy analysis**

The most important implication of this discussion is that policy analyses of GPP should consider changes in private purchasing. Evaluations that focus solely on direct changes in government purchasing may overlook significant indirect effects that have equal or greater importance.

A related implication is that evaluations should distinguish between the short-run and long-run effects of changes in government purchasing. Crowding-out effects, for example, are more likely and more severe in the short run; they weaken, but do not disappear, over the longer term. The benefits of learning by doing or induced innovation, on the other hand, are more likely to accrue over the longer term. Policy evaluation should recognise these timing differences.

At the same time, policy evaluations should not accept simple claims that potential future dynamic benefits justify specific actions. Changes in private behaviour can depend quite sensitively on specific market conditions. As a result, policy design and analysis must be informed by specific information about relevant markets. GPP advocates cannot simply point to the possibility of invention, economies of scale, or demonstration effects and conclude that GPP will have positive spillovers into private purchasing behaviour. These positive indirect effects are possible, but they do not necessarily follow from any government procurement initiative (Edquist and Hommen, 1998). Similarly, GPP detractors cannot simply point to the possibility of commercially irrelevant

invention, crowding out, and stagnant standards to conclude that GPP initiatives are impotent or counterproductive. Instead, objective analysis must consider actual market conditions and likely market reactions.

A final implication is that GPP initiatives are likely to be most effective when they are focused on truly new products. GPP provides a much larger boost to invention, commercialisation, and diffusion when the government provides the initial market for a green product. At the same time, crowding-out effects are minimised when the government purchases truly new products. For these reasons, GPP initiatives that focus on new products and processes should be favoured over those that attempt to switch government purchasing to long-available green alternatives.

## **6. GPP as an environmental policy instrument**

GPP is just one of many instruments in the environmental policy toolkit. Others include market-based instruments (*e.g.* emission taxes, subsidies, and tradable permit systems), direct regulation (*e.g.* performance standards and equipment standards) and information and labelling requirements. In evaluating GPP as an environmental policy instrument, it is important both to compare it to these other instruments and to understand how it might work in conjunction with them.

### **6.1. Comparing environmental policy instruments**

Environmental policy instruments can be evaluated along a variety of dimensions; these include the portion of the market that they target, the burdens they place on producers and consumers, the incentives they create for product users, the incentives they create for innovation, the burden they place on the public treasury, and the degree to which they are subject to political or personal manipulation. GPP differs significantly from other policy instruments along several of these dimensions.

As noted earlier, perhaps the most crucial difference is that GPP directly affects only a small portion of the relevant market. Market-based regulatory systems, direct regulations, and information programmes can, in principle, reach all producers and consumers within a particular jurisdiction. Even if some producers and consumers are exempted, such policies will generally encompass the majority of activity. GPP initiatives, on the other hand, generally encompass only a small minority of relevant purchases. For the reasons discussed above, the small focus of GPP limits its effectiveness as an environmental policy tool. Greening 1% or even 5% of purchases in a particular market can only do so much.

GPP also differs from many environmental policy instruments by emphasising environmental decision-making by product purchasers. Emission taxes, permit systems, and direct regulations typically operate through the

supply side of the market, affecting producers, distributors, and retailers most directly. Purchasers then base their decisions on their own preferences and budgets and the price and product combinations that the market provides. For reasons that have been clear for centuries (at least back to Adam Smith), this is usually a desirable allocation of responsibilities: the government sets the standards, suppliers determine how best to respond to them, and purchasers select the best resulting products; each participant has responsibility for making decisions for which it is best qualified.

GPP, labelling regulations, and other green purchasing initiatives complicate this process if they require buyers to consider not only their own preferences (about which they are presumably well-informed) but also the environmental impacts of their purchasing decisions (about which they may have little information or understanding).<sup>15</sup> Transferring this burden to purchasers raises significant concerns about both the efficiency of purchasing decisions and the quality of environmental decisions. Governments have responded to this concern by developing labelling systems, guidebooks, etc., that reduce the informational burden on purchasers (OECD, 2000). Other governments have implemented “shadow price” systems, in which environmental concerns are embodied in implicit environmental taxes (Johnstone *et al.* 2003). Such innovations help separate the informational burdens and policy responsibility for environmental decisions from responsibility for purchasing decisions.

The incentive effects of GPP depend on programme design. A risk, shared by many direct regulations and information programmes, is that GPP may provide little or no incentive for incremental improvements in environmental performance. As noted by Johnstone *et al.* (2003), one manifestation of this problem is that green purchasing may affect the decision of what device to purchase (*e.g.* regular vs. energy-efficient), yet have no effect on ongoing operating decisions. Similarly, purchasing guidelines modelled on regulatory standards (*e.g.* a requirement that recycled content exceed a specified level) do little to encourage behaviour that exceeds the standard. Finally, purchasing guidelines that encourage a switch from brown to green products do little to combat a more direct cause of environmental problems: the overall scale of purchasing (Marron, 1997). Well-designed emission taxes and tradable permit systems, in contrast, provide incentives for cleaner behaviour along each of these dimensions.

As discussed earlier, GPP can provide very direct incentives for innovation. If government demand is sufficiently large, private suppliers will be willing to develop new products and processes to satisfy government purchasing requirements. GPP thus provides a direct demand stimulus for innovation. If government purchasers work closely with potential suppliers, GPP also provides a direct channel by which users and producers can jointly pursue innovative opportunities. Such demand-side approaches to innovation have often proved successful in the past (Edquist and Hommen, 1998). Other

environmental policy instruments, such as taxes, tradable permits, and direct regulations, typically work most directly on the supply side of the market. These policies also create significant incentives for innovation (Jaffe *et al.*, 2000), but through different channels.

The fiscal implications of GPP depend on the prevalence of “win-win” opportunities. “Win-win” initiatives reduce government costs, thereby expanding the government’s ability to provide services or reduce taxes. In this regard, “win-win” GPP initiatives are similar to pollution taxes and auctioned permit systems that raise new revenues for the government.<sup>16</sup> “Win-lose” initiatives, of course, have the opposite effect on the public treasury; in this regard, they are similar to subsidy systems and to regulatory systems that impose direct costs on the government (*e.g.* through monitoring and enforcement costs) or indirect costs through increased purchase prices.

A final distinction is that GPP initiatives appear to receive significantly less public scrutiny than do other environmental policy initiatives. Such reduced scrutiny reflects a combination of factors: packaging (who could be against buying green?), the potential for “win-win” opportunities, and the relatively small stakes (compared with policies that directly affect entire markets). Whether such reduced scrutiny is desirable is another matter. Lack of attention may allow legislators or purchasing officials to design policies and make purchasing decisions that favour their own political or personal agendas, rather than broader social goals.<sup>17</sup>

## **6.2. How GPP interacts with other environmental policy instruments**

This discussion has identified key distinctions between GPP and other environmental policy instruments. In practice, of course, specific environmental problems may be addressed with multiple policy instruments. For that reason, it is important to consider how GPP may complement or conflict with other policy instruments.

A natural starting point is the earlier observation that GPP may be particularly effective at encouraging innovation but, conversely, that it may be relatively weak at sparking subsequent commercialisation and diffusion. Under these conditions, it seems natural to view GPP as an instrument focused on eliciting the development of greener products and technologies, while other policy instruments (*e.g.* taxes, subsidies, and direct regulations) may be focused on the broader private market-place.<sup>18</sup> Comprehensive environmental policy development should emphasise the strengths of each instrument, while moderating their weaknesses.

A related observation is that the limited scope of GPP may be an asset, rather than a limitation, in achieving certain policy goals. Specifically, the government can use its own purchasing as a testing ground for environmental

policies and greener products. By undertaking such testing, the government may position itself to make more informed decisions about subsequent regulations affecting broader public and private markets. GPP can thus set a foundation for better design of traditional environmental regulations.<sup>19</sup>

Finally, it must be noted that GPP raises the potential for over-regulation in a world of pre-existing environmental regulations. This potential is frequently overlooked in policy analyses, so it is best illustrated with a stylised example: Suppose that policy makers have already developed a system of environmental regulations to address a specific environmental concern, *e.g.* emissions of sulphur dioxide (SO<sub>2</sub>) from electricity generation. These regulations reduce SO<sub>2</sub> emissions, but do not eliminate them.

Now suppose that a green procurement official is evaluating government purchases of electricity. Should that official consider SO<sub>2</sub> emissions as part of his/her evaluation? The answer, somewhat surprisingly, is a qualified no. If the existing regulatory system has appropriately addressed environmental concerns about SO<sub>2</sub> emissions, then the purchasing official can safely ignore them. The costs of those emissions are already incorporated in the price of electricity (which reflects the costs associated with regulatory programmes). To include them again in an environmental assessment would be double counting.

In practice, this line of argument can get muddled, of course, because existing environmental regulations are rarely perfect. The basic idea, however, is extremely robust. Green procurement initiatives will generate greater social gains (and, likely, greater environmental gains) when they address environmental issues that have been poorly addressed by existing regulations.

## 7. Conclusions

The economic framework developed in this paper recognises three potential economic justifications for GPP initiatives:

- structural inefficiencies in government purchasing;
- insufficient environmental regulations; or
- insufficient public and private support for innovation.

Only the second of these has distinct implications for environmental policy design. Improvements in government purchasing and the development of appropriate innovation policies are desirable in their own right and ought to be pursued, essentially independent of their environmental implications. Environmental policy makers have an important role in these areas, particularly because the banner of “buying green” and achieving “win-win” solutions may assist in marketing economically desirable reforms; it is important, however, that they co-ordinate their activities with other, non-environmental officials.

The economic framework also implies that GPP has specific strengths and weaknesses as an instrument of environmental policy. GPP is most promising, relative to other environmental instruments, when government is the primary source of demand. In these cases, GPP can be a near-perfect substitute for other environmental instruments.

In markets with significant private demand, GPP appears to be most promising when it focuses on developing and commercialising innovative green products for which there is a latent private demand. In other words, GPP will be most effective when it focuses on bringing forth new green products that the private sector has reason to adopt. Private sector adoption can, in principle, greatly amplify changes in government purchasing. This is crucial since individual governments typically make up only a small fraction of purchases in relevant markets.

Conversely, GPP will be least promising when it focuses merely on switching government purchases from existing brown products to existing green products. Such switching will generate relatively minor environmental gains, given the relatively small purchasing power of most government entities (5% or less of many markets). Moreover, such switching will sometimes be offset, in whole or in part, by contrary changes in private purchasing. Such offsetting behaviour is particularly likely with products whose environmental characteristics are invisible or irrelevant to private purchasers (i.e. products for which there is not latent private demand for the green product). Most notable among these are products that differ only in the greenness of their production, but not in their quality for the buyer.<sup>20</sup> For these products, it should be expected that private buyers will favour the best price and quality combinations. As a result, their purchasing decisions may run directly counter to changes in government policy.

## Notes

1. There are several reasons to believe that the 20% figure overestimates current government expenditure shares. First, the estimate covers the period 1990-97. If government purchasing shares have continued declining, current shares would be lower. Second, the 20% estimate is based on 28 of 30 OECD member countries. According to an earlier study (OECD, 2000), these two countries, Luxembourg and Mexico, have the lowest government purchasing shares in the OECD.
2. Of course the best measure of government's relative share of purchasing would be the ratio of government purchasing to total purchasing. Unfortunately, the most comprehensive analyses of procurement (e.g. OECD, 2001) do not make this calculation.
3. Recent attempts to quantify government purchasing have typically excluded public utilities and other public enterprises (OECD, 2001). GPP may thus be farther reaching if it includes such enterprises.

4. This discussion uses government expenditure shares of national GDP as a simple measure of the importance of government purchasing. This measure implicitly assumes that each individual country is a relevant market within which to evaluate government purchasing. In practice, some relevant markets extend across many countries (e.g. the global market in crude oil), implying that the relevance of any particular government is much lower than the GDP shares would indicate. Conversely, some relevant markets may also be quite local in nature. In these cases, the GDP shares are a reasonable first estimate of the government's relevance, since narrowness of the market affects both the numerator and the denominator.
5. François *et al.* (1996) analysed procurement policies that favour domestic products over foreign ones. Much of their analysis applies equally to any procurement policy that favours one type of product (e.g. green) over another.
6. It must be noted that increased energy efficiency does not necessarily translate into environmental benefits. Environmental impacts are determined not only by the efficiency of the device but also by how much it is used. It turns out, for reasons that are clear in theory and amply documented empirically, that people use high efficiency devices more intensively than they use low efficiency ones; after all, it costs less to operate efficient devices. For example, people with well-insulated homes tend to heat them to higher temperatures. In some cases, this "rebound" effect can offset the environmental gains entirely; more commonly, it offsets a portion of the potential gains.
7. For example, careful econometric analyses have found that decisions to adopt energy efficient technologies appear to be more sensitive to initial costs than they are to long-run operating costs. These findings confirm the conventional wisdom, at least among environmental policy analysts, that efficient technologies are under-used. However, there is significant work to be done to understand the magnitude of and reasons for these findings (Jaffe *et al.*, 2000). DeCanio (1998) provides evidence that these problems may be worse in the public sector.
8. This three-step taxonomy goes back at least to Schumpeter (1942); Jaffe *et al.* (2000) provide a nice discussion in the context of environmental regulation. Both these works use the term "innovation" to refer to the second stage, commercialisation. This paper uses a somewhat different definition, in which innovation refers to all three stages.
9. Any social evaluation of the inventive activity induced by government procurement must also consider its opportunity costs. In the absence of government policy, some inventive activity may well have occurred (possibly in a different direction).
10. As noted by Geroski (1990), "it is almost certainly the case that civil servants are in a poor position to second guess civilian or commercial needs". As a result, procurement policy should focus solely on those product attributes that are of interest to both the government and the private sector. Geroski continues "but there is no reason to think that they are necessarily less competent than anyone else when seeking to act as informed purchasers of goods and services for their own use".
11. This discussion touches on a much more general issue that private firms face every day – how do innovators find initial markets for their products? One common private sector solution is, indeed, to seek large individual purchasers to provide initial demand for the product. In some cases, these initial demanders (chosen because they especially value the product being developed) will pay sufficiently high prices that they will defray development costs. In other cases, however, the initial purchasers demand a return for their commitment: low prices and/or an equity stake in the resultant product. Recognising this, government

purchasing officials should not necessarily offer high prices initially just so that private purchasers can benefit from low prices later on.

12. Crowding out in this context was originally analysed by Marron (1997). Crowding out is a common issue in many policy contexts. Within environmental regulation, a notable current example is “carbon leakage” under regulation of greenhouse gas emissions. The concern is that emission constraints imposed on regulated nations will induce emission intensive industries to increase production in unregulated nations, thereby offsetting some or all of the environmental benefits in the regulated nations.
13. Under rare conditions, crowding out may more than offset the government policy, making overall production browner (Marron, 1997).
14. Reverse crowding out may still occur through the market for the brown good, however.
15. In this regard, it is amusing (but saddening) to note that many well-educated Americans still believe that aerosol cans contain CFC-based propellants that damage the ozone layer. In the United States, this has not been true for more than two decades. The average person does not have the incentive to keep well-informed about such issues; as a result, they are unlikely to make sophisticated green purchasing decisions.
16. Taxes create significant economic distortions. In other words, in collecting each euro in revenue, taxes reduce private sector welfare by more than a euro. The specific ratio depends on a host of details, such as the structure of the tax and the nature of market responses; it is not uncommon, however, for empirical estimates to be in the range of 1.2 to 2.0. Thus, every time a euro of revenue is raised, taxpayers are made worse off by 1.2 to 2.0 euros. Such distortions make environmental policies that raise revenue more attractive and *vice versa*.
17. Marron (1997) cites an instance in which a green purchasing standard for recycled toner cartridges in the United States was allegedly designed to favour a specific firm with close ties to a senator.
18. In this regard, it is interesting to note that some products described in Westling (2000) are being promoted by other means (*e.g.* subsidies).
19. A similar phenomenon exists in the software industry, where vendors are asked whether they “eat their own dog food” (*i.e.* use their own software). There is much to be said for the government eating its own dog food.
20. There are, of course, instances in which firms care about production methods. Most noticeably, firms often want to purchase products made from recycled content; such purchases presumably satisfy some customer, employee, and investor pressures to act green. Similar pressures are likely to be weaker for other environmentally relevant production decisions (*e.g.* choice of solvents).

## ANNEX A

## A Simple Illustration of Complete Crowding Out

This annex illustrates complete crowding out with a stylised example of GPP in an electricity market. While stylised, this example reflects actual experience with certain efforts to promote green electricity purchases in the United States (Rader, 1998); it has been reported that a similar experience has occurred in Germany.

Producers sell power into a central grid that resells power to customers. Before the GPP policy, producers generate 1000 gigawatt-hours (GWh) of electricity, 80% from brown power sources and 20% from green sources. The private sector purchases 90% of electricity production, and the government purchases the remaining 10%.

Table A.1. **Electricity purchases (GWh) before greener public purchasing**

	Brown	Green	Total
Private sector	720	180	900
Public sector	80	20	100
<b>Total</b>	<b>800</b>	<b>200</b>	<b>1 000</b>

Source: Rader.

Suppose that the government adopts a stringent GPP policy for electricity: it will purchase only electricity generated by green sources. The government notifies the electricity grid, which responds by allocating sufficient green power to the government. (This is necessarily an administrative allocation; electrons will not flow any differently.) The resulting purchases are shown in Table A.2.

Table A.2. **Electricity purchases (GWh) under greener public purchasing**

	Brown	Green	Total
Private sector	800	100	900
Public sector	0	100	100
<b>Total</b>	<b>800</b>	<b>200</b>	<b>1 000</b>

Source: Rader.

The GPP policy is completely successful, in that government purchases of electricity are 100% green; government's green purchases have increased by 80 GWh. Unfortunately, private sector electricity purchases from green sources have dropped by 80 GWh. Government's green purchases have crowded out private green purchases one-for-one. Crowding out is complete and the GPP has had no effect on overall electricity production or associated pollution.

This extreme result depends on two key aspects of this stylised electricity market. First, private consumers consider brown and green power to be perfect substitutes; they do not care which they receive, so they prefer whichever is least expensive. Second, it is easy for producers to move brown power from the government to private purchasers (and green power in the opposite direction). Under these two conditions (which hold quite well in actual electricity markets), private customers easily switch their production from green to brown power. In fact, they probably do not even realise that it is occurring.

Although this is an extreme case, it well illustrates the crowding-out problem that can face other GPP initiatives. If private purchasers are willing and able to switch from green to brown alternatives, then their reactions can undermine, in whole or in part, the intent of government policy.

## ANNEX B

## *A Summary of Data Related to Public Procurement<sup>1</sup>*

To assess the impacts of a specific public procurement policy, it is important to take into account that government procurement figures (9% of GDP and 20% of total expenditures) are aggregates (see also Section 2) and that they do not include environmental data. More precisely, such figures have to be carefully analysed for four reasons:

- The public procurement shares vary for different OECD member countries.
- The figures are computed for “total governments” and include various distinct public sector units.
- The figures are aggregated over all product markets.
- The emission intensity of the different sectors is not accounted for in the figures.

This means, on the one hand, that the individual magnitude of government expenditure could be smaller than often suggested but, on the other hand, that the efficiency of government procurement policies could be greater than often suggested if the targeted production has important environmental impacts.

### **Public procurement by member countries and government entities**

Table 1 in Section 2.1 shows total government expenditure and total government procurement for different OECD member countries for the period 1990-97. Table B.1 splits public procurement figures by government entity. Indeed, the influence of GPP policies depends on the internal organisation of the public sector, i.e. the relative importance of various government units in total demand (see Section 2.1 and Atkinson and van den Noord, 2001).

**Table B.1. Public procurement by level of government  
in OECD member countries, 1990-97**

As percentage of GDP, including consumption and investment  
and excluding compensation for employees

	Total expenditures less compensation			
	General	Central	Local	Social
Australia	8.85	2.07	5.81	–
Austria	12.16	2.75	5.70	3.70
Belgium	5.37	2.48	1.95	0.30
Canada	11.47	1.69	8.80	0.02
Czech Republic	17.03	4.45	6.53	5.18
Denmark	10.63	3.34	7.20	0.09
Finland	9.64	4.22	7.44	1.22
France	9.05	3.24	4.22	1.60
Germany	7.32	1.52	5.39	0.40
Greece	7.29	4.32	0.84	1.30
Hungary	18.31	8.56	7.38	2.05
Iceland	12.92	4.81	5.07	2.11
Ireland	10.08	2.73	7.11	0.12
Italy	7.99	2.72	4.90	0.43
Japan	9.35	1.85	7.59	0.08
Korea	9.13	3.94	5.1	0.09
Netherlands	8.96	3.68	4.90	0.37
New Zealand	7.28	3.66	3.80	–
Norway	11.44	5.61	6.06	–
Poland	10.69	6.55	4.31	–
Portugal	7.24	4.83	2.59	0.13
Slovak Republic	15.34	9.46	2.79	2.98
Spain	8.74	2.63	4.44	1.64
Sweden	14.6	6.25	9.00	0.04
Switzerland	8.6	2.08	6.24	0.12
Turkey	7.47	5.58	1.13	–
United Kingdom	13.08	9.00	3.29	0.10
United States	8.8	3.71	5.11	–
<b>Weighted average</b>	<b>9.17</b>	<b>3.39</b>	<b>5.44</b>	<b>0.51</b>

Source: Audet (2002).

## Public procurement by sector and country

Public procurement figures not only aggregate different government entities, but also aggregate a whole range of product markets. Unfortunately, countries do not tend to keep data on public consumption by sectoral or commodity classification. However, tentative estimates of the relative importance of different sectors in public demand can be illustrated using figures derived from input-output tables for Austria, Canada and Japan.<sup>2</sup>

Whereas the total share of public demand in total demand amounts to 12.8%, 11.7% and 13% respectively, sector specific shares vary widely in the three countries (see Tables B.2, B.3 and B.4).

**Table B.2. Some examples of public shares of total demand for Austria**

Percentage

Research and development services	24.43
Recreational, cultural and sporting services	14.09
Land transport and transport via pipeline	8.28
Wearing apparel; furs	7.47
Med. Precision, opt instruments, watches, etc.	7.24
Printed matter and recorded media	6.21
Leather and leather products	6.18
Other mining and quarrying products	5.07
Electrical machinery and apparatus	4.33
Construction work	3.01
Electrical energy, gas, steam, etc.	2.83
Chemicals, chemical products	2.11
Office machinery and computers	1.69
Motor vehicles, trailers and semi-trailers	1.13
Pulp, paper and paper products	1.04

Source: Statistik Austria, *Input-output Tabelle 1995, 2001*.

**Table B.3. Some examples of public shares of total demand for Canada**

Percentage

Ships, boats and parts (excluding pleasure boats)	96.30
Personal medical goods	89.30
Highway and bridge maintenance	80.00
Textile medical products	72.60
Office equipment (excluding photocopy and fax equipment)	34.62
Men's and boys' clothing <sup>1</sup>	25.15
Office supplies	22.96
Gas distribution	12.21
Electric power	11.19
TV, VCR, accessories and unrecorded tape	8.33
Photocopy and microfilm equipment	6.67
Newspapers	3.42
Computers, video units, printers, etc.	3.39
Other paper, containing wood	1.89
Other paper, wood-free	0.56

1. Excluding: men's and boys' knitted clothing, women's knitted clothing, children's knitted clothing, other women's clothing, other clothing and accessories, and man-made fabric for clothing.

Source: I-O Tables Canada (1993).

Table B.4. **Some examples of public shares of total demand for Japan**

Percentage

Other transport equipment (and repairs)	22.82
Construction	15.17
Ships and repair of ships	14.74
Miscellaneous manufacturing products	9.74
Research	8.42
Heavy electrical equipment	8.30
Electronic equipment and communications equipment	7.73
Publishing and printing	5.11
Machinery for office and service industries	4.39
Office supplies	4.29
Transport by private cars	3.18
Gas and heat supply	1.38
Wearing apparel and other textiles	1.36
Motor vehicles	0.48
Paper products	0.16
Pulp, paper, paperboard and processed paperboard	0.09

Source: Japan Statistics Bureau, "Input-Output Tables for Japan 1995", 2000.

Data from different countries are not easily comparable, as each country has its own sector and product classifications, but some similarities are identifiable. Not surprisingly, public demand is of high importance in sectors such as administration services, health, education (including research), and military expenditures. The next most important sectors include shipbuilding, highway maintenance, construction, transport equipment and transport services.

A great part of the differences in demand shares has to be attributed to different classifications used in the three countries. The figures can nonetheless be revealing. For instance, office equipment appears to be important in Canada (34.6% of total demand is public), but less important in Japan (machinery for office and service industry 4.4%) or in Austria (office machinery and computers 1.7%, electrical machinery and apparatus 4.3%). Public demand for wearing apparel and leather products amounts to 13.6% in Austria, but only to 2% in Japan. Similarly, gas distribution and electric power account for respectively 12% and 11% of total demand in Canada, whereas public demand for electrical energy, gas, steam, etc., only amounts to 2.8% of total demand in Austria.

Surprisingly low public demand shares are found in some sectors in individual countries. For instance, public demand for computers, video units and printers, or newspapers represents only 3.4% of the market in Canada. Similarly, demand in Japan for motor vehicles (0.5% of the market) and paper products and pulp and paper (0.25% of the market) is also surprisingly low. Low proportions for motor vehicles (1.1%) and pulp and paper products (1%) are also found in Austria.

The figures also reveal some interesting issues related to product substitution in the public sphere. For instance, it is interesting to note that in the sector “other papers”, Canada’s public share of demand is 1.9% in the market for wood-containing papers, but only 0.6% in the market for wood-free papers. Similarly, the low figures for motor vehicle sales to public authorities in Austria and Japan may be due to greater propensity for leasing rather than purchase.

Table B.5 disaggregates the Canadian public demand shares for the sectors listed previously in Table B.3 by government units: federal government, provincial government and other entities of the total government sector, including the defence sector, universities, hospitals and municipal governments. These figures underline that the sub-national governments have a very different procurement structure from the central government.

**Table B.5. Examples of public shares of total demand by government entity, Canada**

Percentage

Input-output sector	Total government	Federal government	Provincial government	Others <sup>1</sup>
Ships, boats and parts, excluding pleasure boats	96.30	0	0	96.30
Personal medical goods	89.30	0	49.58	39.72
Highway and bridge maintenance	80.00	2.59	7.78	69.63
Textile medical products	72.60	0	0	72.60
Office equipment, excluding copy and fax	34.62	11.54	11.54	11.54
Men’s and boys’ clothing	25.15	9.36	0	15.79
Office supplies	22.96	3.39	5.61	13.96
Gas distribution	12.21	1.48	3.05	7.67
TV, VCR, accessories and unrecorded tape	8.33	8.33	0	0
Photocopy and microfilm equipment	6.67	6.67	0	0
Newspapers	3.42	0.00	0	3.42
Computers, video units, printers, etc.	3.39	0.82	0.03	2.54
Other paper, containing wood	1.89	1.89	0	0
Other paper, wood-free	0.56	0.56	0	0

1. Including the defence sector, universities, hospitals and municipal governments.

Source: I-O tables Canada (1993).

## The environmental intensity of public procurement

The environmental impact of GPP is not just a function of the importance of the public share of demand, but also of the environmental intensity of the targeted sector. For instance, the Canadian provincial government’s demand accounts for 48% of total demand for pharmaceuticals (due to provincial responsibility for health services), whose production could be

environmentally intensive. Similarly, in countries with publicly owned electricity supply generation, public sector demand for different fuels can be environmentally significant.

Unfortunately, systematic data on the relative environmental intensity of public procurement are limited (see Section 2.2). However, comparing American public procurement data (François *et al.*, 1996) with data on the environmental intensity of different sectors derived from the Industrial Pollution Projection System (Hettige *et al.*, 1994), it is possible to identify environmentally intensive sectors in which the public share in total demand is also important. It is the co-existence of these factors (high public demand intensity and high environmental intensity) that is key to the relative importance of greener public purchasing programmes in bringing about general environmental improvements.

Table B.6 lists those sectors that have both public shares of demand which are greater than the weighted mean for all sectors and for which emissions per unit of production (for eight separate pollutants) are greater than the weighted mean for all sectors. In total, 26 of the 65 sectors listed in the I-O tables had above-average public shares of demand. However, only a subset of these appears to also have above-average environmental implications (for the seven pollutants listed).

## Notes

1. This annex was prepared by Katrin Erdlenbruch.
2. Input-output tables for Austria 1995, Canada 1993 and Japan 1995.

Table B.6. **American sectors with above-average public shares of demand and environmental intensity**

SO <sub>2</sub>	NO <sub>2</sub>	CO	VOCs	PM	BOD	TSS
Electrical industrial machinery	Cutlery, hand tools and general hardware	Fabricated metal products, N.E.C.	Shipbuilding and repairing	Shipbuilding and repairing	Pulp, paper and paperboard	Fabricated metal products, N.E.C.
Pulp, paper and paperboard	Electrical apparatus and supplies, N.E.C.	Electrical apparatus and supplies, N.E.C.	Furniture and fixtures of metal	Pulp, paper and paperboard	Industrial chemicals except fertilizer	Pulp, paper and paperboard
Industrial chemicals except fertilizer	Pulp, paper and paperboard	Pulp, paper and paperboard	Structural metal products	Chemical products, N.E.C.		Industrial chemicals except fertilizer
Fertilizers and pesticides	Paper and paperboard containers and boxes	Industrial chemicals except fertilizer	Fabricated metal products, N.E.C.			Fertilizers and pesticides
Synthetic resins, plastic materials and MM fibres	Industrial chemicals except fertilizer	Synthetic resins, plastic materials and MM fibres	Electrical apparatus and supplies, N.E.C.			Synthetic resins, plastic materials and MM fibres
Chemical products, N.E.C.	Fertilizers and pesticides	Chemical products, N.E.C.	Pulp, paper and paperboard			Rubber products, N.E.C.
Railroad equipment	Synthetic resins, plastic materials and MM fibres		Pulp, paper and paperboard articles			
	Railroad equipment		Industrial chemicals except fertilizer			
	Tires and tubes		Fertilizers and pesticides			
			Synthetic resins, plastic materials and MM fibres			
			Paints, varnishes and lacquers			
			Chemical products, N.E.C.			
			Railroad equipment			
			Motorcycles and bicycles			
			Tires and tubes			

Source: Calculated on the basis of data in François *et al.*, 1996, and Hettige *et al.*, 1994.

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