

## PUBLIC PROCUREMENT FOR R&D

Jonathan CAVE<sup>1</sup> and Erik Frinking<sup>2</sup>

<sup>1</sup>*RAND Europe, 64 Maids Causeway, Cambridge, CB58DD, United Kingdom*

*Tel: +44 2476 523750, Fax: + 44 2476 523032, Email: <mailto:cave@rand.org>*

<sup>2</sup>*RAND Europe, Newtonweg 1, 2333 CP Leiden, Netherlands*

*Tel: +31 71 5245150, Fax: + 31 71 5245190, Email: <mailto:erik@rand.org>*

### 1. APPROACH FOR IDENTIFYING SECTORS AND PRACTICES

In developing an answer to question 1 (“what sectors of activity have the greatest potential for stimulating R&D through public procurement”), we began by distinguishing two different situations in which the question might arise.

The first is one where the perceived need for innovation originates in the procurement activity itself: for instance, where commercially available ‘products’ (the term is used here to refer to both goods and services) do not offer the best combination of cost, performance, quality, etc. In this case, the identification of a sector is secondary to the expected cost and time-scale of innovation. Sector identification arises in muted form in cases where the innovating sector is not obvious<sup>1</sup> or where the procurement relationship is with a different sector than the one where procurement arises<sup>2</sup>. In this situation, the choice of modalities and underlying objectives are determined by the procurement activity itself.

The second is a situation in which procurement is to be used to apply a general stimulus to innovation. In this case, sector identification is of primary importance; not only must the RTD and procurement objectives be balanced, but often the procurement activity will itself represent an innovation, and may entail some degree of privatisation or contracting-out in order to sharpen investment, research and dissemination incentives.

It should also be noted that the ‘sectors of activity’ referred quite properly extend beyond commercial ‘sectors’ in the conventional sense. For one thing, they refer to ‘both sides’ of the procurement relationship: it makes little sense to seek to use procurement in this way when the supply industry is resistant to the stimulus<sup>3</sup>. For another, a sector of public sector activity that has little scope for procurement, or one whose needs are adequately served by existing commercial offerings would have a hard time justifying such a policy.

In choosing a target and structuring the initiative, account should also be taken of the mechanism by which the anticipated impact on innovation is to occur. This will help in the selection of modalities (e.g. contractual forms), the structuring of ancillary activities (e.g. underwriting investments, enforcing information disclosure and IPR conditions, etc.) and identifying possible ‘unintended consequences’ (e.g. distortions of competition, reinforcement of potentially inappropriate innovations, implicit subsidies to inefficient technologies, etc.).

In addressing the general issues raised by this first question, we formulated a number of issues or dimensions that determine the answers to these questions. The advantage of such an approach is threefold. First, it supports a systematic approach to the identification of appropriate sectors and practices; second, the analysis of what makes these sectors and practices appropriate becomes much more transparent; and third, it provides a tool for future identification of sectors and practices. We have identified four relevant dimensions:

---

<sup>1</sup> E.g. in communications procurement, convergence and interoperability mean that innovation may arise in one of the many ‘layers’ of the communications infrastructure.

<sup>2</sup> Continuing the communications example, it may be that the desired innovation arises in the IT sector.

<sup>3</sup> E.g. due to limited opportunities for innovation, extensive commercially-led innovation, or a bottleneck in the form of necessary basic research that may be too remote from the market to provide effective procurement leverage.

1. The relation between public and commercial demand
  - Strength of demand – the strength and variability of public demand relative to commercial demand
    - Direction of demand – the extent to which public procurement induces innovation, when compared to the products demanded (and innovation induced) by commercial demand
2. The reason why the government engages in procurement and wishes to induce innovation
  - Own-account – to obtain better products for use in carrying out government functions
  - Mission-critical – to ensure that vital government functions can be secured against a range of shocks and threats
  - Weight-of-demand (market power) – to exploit appropriately<sup>4</sup> the power represented by a large potential demand with relatively homogeneous characteristics
  - On behalf of others – to ensure that the needs of those consuming public goods (e.g. health, drugs, education, where market forces may not effectively stimulate innovation) continue to be met in the best feasible way
3. The type of innovation involved
  - Product vs. process innovation – some of the innovation sought by public bodies involves the development of new products, with new characteristics, while in other cases the desired innovation has the effect of reducing costs, improving reliability, minimising externalities, etc.
  - Direct demand-pull vs. indirect demand-pull, supply-push, etc. – in some cases the public body purchases products directly from the innovator, while in other cases innovation takes place further up (suppliers of inputs to government suppliers) or down (users of government goods and services) the supply chain
4. The modalities available
  - Short or long-term contracting, framework contracts – a variety of contractual vehicles are available, offering features that minimise distortions to RTD activity whilst protecting the ‘consumer’s interest’ of the public body.
  - Legality of contributions to RTD investment or expenses – one important reason for stimulating innovation through procurement is ‘market failure’ in the market for innovation. In some cases, this reflects barriers to innovative activity, where returns are seen as too risky (or characterised by the ‘wrong sort of risk’) or too remote in time for commercial sources of finance. Under such circumstances, procurement can act simply by providing assurance of future demand for the embodied innovation; but in other cases it is necessary to support the innovation directly. In addition to explicit provisions in procurement contracts, restructuring of the procurement activity itself (e.g. by use of GOCO - government-owned, contractor-operated) facilities) may be appropriate.

---

<sup>4</sup> I.e. without producing undue market distortion – note that demand concentration can sometimes offset ‘natural monopoly’

- Dual sourcing – innovation is a form of evolution and thus depends on variation, heredity and selection. Support for innovative products can reinforce the variation, and long-term contracting and dissemination requirements can improve heredity. Of course, procurement targeting can improve selection, but it remains possible for an innovation to result in ‘capture’ of the government client. This in turn creates a barrier to new entrants (and their ideas)<sup>5</sup>. Moreover, the innovation process does not end with the acceptance of an initial product specification, but continues through the fulfilment process, including learning-by-doing, adaptation to changing customer needs and (in some cases) even end-of-life decommissioning. There is thus scope for non-exclusive relationships to maintain the competitive pressure throughout the procurement life cycle. Note that the market does this through natural processes of economic competition – indeed, this is the basis of the ‘creative destruction’ dynamic behind continuous improvement. Dual sourcing is a way of transposing this to the more rigid and monopsonistic public procurement environment.
- Specification in terms of inputs, processes, specifications, demand, functionality – while customer input is important (even vital), the customer does not have a monopoly on knowledge, and useful innovation is generally an interaction between evolving needs and evolving capabilities. For this reason, it is generally inappropriate for customers to provide detailed product specifications in other than functional terms; such specifications limit the scope for effective competition among suppliers, distort IPR incentives; weaken incentives for public sector customers to explore alternatives; and tend either to lock in obsolete technologies or produce a preference for innovative products simply on the basis of their novelty – in either case, the signals provided to suppliers are distorted.
- Procurement teams, prime contractor models (supply chain maintenance issue) – as mentioned above, innovation is a form of evolutionary process, and continuing engagement between supplier and customer is a good way of exploiting the synergies of mutual learning (providing adequate safeguards against ‘capture’ or ‘hold-up’ are in place). Large-scale procurements of innovative equipment, for example, can usefully be handled by ‘teams’ involving (at different phases of the procurement life cycle) suppliers (technical and sales people), purchasing officers, end users and others. A second point concerns the allocation of risk; innovation is a risky activity, and public procurement often involves substantial risk placement. Indeed, one of the arguments for using procurement in this way is that it reduces the risk to public procurement (and thus government function) posed by commercially led changes, and can reduce collective risk through diversification. A second argument is that demand pooling can in and of itself reduce risk. In any event, changes in the nature of government procurement (e.g. those attending privatisation and contracting out, as exemplified by e.g. the PFI initiative in the UK) rely on efficient risk transfer and management. In such situations, it is necessary to have a concentration of responsibility around a procurement contract that is sufficiently aggregated to ensure that the customer’s needs for functionality are met. Different people may provide the components of a complex undertaking, while the functionality depends on the system as a whole.
- Payment details: cost-plus, fixed-price, etc. – it is fairly obvious that a cost-plus contract for a well-defined product does not encourage the supplier to reduce costs, while a fixed-price contract allows the supplier to appropriate all of the returns to cost-reducing innovation. In much the same way, a contract that pays for functionality can either encourage or discourage product innovation.

---

<sup>5</sup> A recent RAND Europe study of ‘own-account’ research procurement by UK government ministries found considerable awareness of this danger, with a concomitant preference for competitive mechanisms over long-term relationships.

The remainder of this document will elaborate on each of these dimensions and its relevance to stimulating R&D through public procurement and highlight to what sectors and practices this pertains.

## **1.1. RELATION BETWEEN PUBLIC AND PRIVATE DEMAND**

To identify the sectors supplying the government demand (the supplier), it is useful also to consider the other sectors using the supplier's output. This is because government demand exerts a pull similar to that of other customers. Of course, the influence depends on the *strength* and *direction* of the pull.

### **1.1.1. Strength of public demand**

The strength reflects:

- Scale - i.e. does public demand constitute a major part of total market demand – for example, the demand by national health systems for certain types of treatment usually (in Europe) dwarfs commercial demand;
- Contracting terms – i.e. is government demand more (or less) likely to involve long-term contracting<sup>6</sup> - for instance, government initiatives to build energy efficient (demonstration) buildings or to field a fleet of zero-emissions vehicles are likely to be negotiated on a minimum time-frame of two years, and often carry an even longer potential demand tail secured by the legal instrument mandating the initiative.
- The permitted types of investment stimulus (see previous footnote) – for example, whether or not up-front payments for RTD are permitted, whether the procurement contracting process makes allowance for competitive prototype development, etc.
- The reliability of government demand – even when LTC is absent, the pattern of risk associated with public demand is likely to differ substantially from that of private demand. This does not mean that government demand is always more reliable, since it embodies a degree of political risk<sup>7</sup> that is usually absent from commercial transactions and
- The possibility for using other types of regulatory stimulus. Broadly speaking, there are (at least) six mechanisms by which governments can use regulatory measures to stimulate innovative investments.
  - i. The most obvious is by mandating standards of one form or another – this can also be specified in a procurement contract.
  - ii. Another classical method in industries where the government has some price regulation role is the use of an RPI-X formula (prices are allowed to rise at the retail price index minus an 'x factor') – a higher value of x means that firms are obliged to cut costs more rapidly (or to improve the product, if pricing is done on an 'efficiency units' basis) – this can be specified as an escalator clause in a procurement contract.

---

<sup>6</sup> The importance of LTC in innovation is that innovation requires investment by the supplier. LTC can improve investment incentives, either by directly paying part of the RTD investment – thus reducing the up-front cost of innovation, improving the (risk-adjusted) internal rate of return on the innovation – and thus increasing the attractiveness of RTD relative to other projects within the supplier, or reducing investment risk - thus improving suppliers' access to outside investment funds. Large-scale LTC is important because it allows the supplier to pursue RTD that closely matches government demand, even when such demand is distant from or substantially in advance of commercial demand for the suppliers' output.

<sup>7</sup> Including the risk that public opinion will abort the project, or that the underlying mission for which the goods and services are being procured may be changed by world events – there are a number of very clear (and very expensive) examples here.

- iii. If the problem is that subsidies do not flow to RTD investment because specific investment cannot be measured well, reimbursing a high fraction of total investment plus operating cost early on can create incentives.
- iv. If a long-term contract for delivery is negotiated before investment takes place, the paying party can commit to more ex post effort incentives (e.g. use of fixed price contracts, though these fall down on rent extraction grounds and should be tempered somewhat to more carefully distinguish controllable and exogenous sources of cost increase).
- v. To the extent that procurement is repeated over time, reputation mechanisms can reinforce incentives, creating a sort of 'virtual' long-term contract.
- vi. A final mechanism is the encouragement of additional nongovernmental opportunities for the supplying firm. These may be additional public markets, new commercial markets (e.g. created by privatisation and outsourcing through prime contractor/sub-contractor relationships, etc. An example is the UK MOD 'selling on wider markets' initiative).

### 1.1.2. The direction of public demand

Beyond the foregoing considerations, the direction depends on the relation between commercial and government demand. Roughly, government demand may be:

- In advance of commercial demand – in other words, government demand may anticipate innovations that have not yet been taken up by the market place, but that may be expected to 'take off' – a strong example is the procurement of civil aircraft by the US Post Office, which provided the basis for the US civil aviation industry. Another example is the UK 'Launch aid' programme (intended to help with the 'ploughsharing' of Britain's wartime aircraft industry to production of civilian aircraft by a series of sales-contingent claims).
- Different to commercial demand – in other words, government demands goods or services that are simply different and which have no appreciable cross-elasticity (i.e. the government product is not a substitute for the commercial one and *vice versa*). It may also be that in some ways the forces of competition are weaker in public procurement: for example, the government may find it harder to shop around either before (due to procurement rules, among other things) or after (due to bureaucratic inertia) a transaction. Of course, most military procurement and space programme procurement falls into this category, and it is worth recording that the innovation stimulus is often indirect – in other words, while the goods and services procured may have no non-governmental applications, many of the enabling technologies do.
- Deeper than commercial demand – in this case, government requirements for specifications, quality, reliability, etc. may be higher than commercial demand. This category also covers situations in which the good or service is more 'mission critical' in public use, implying higher standards or different practices in logistics, manufacturing, repair, etc. In other cases, the procurement officer has only tenuous and formal contact with the ultimate users of what is procured (this was a particular problem identified during the Smart Procurement study, where the line officers using the equipment did not have good channels for talking with contracting officers or even with suppliers). As a result, standards (e.g. for speed, reliability, cost, performance) tended to be driven by those in the nearest relevant 'market.' Often, these were insufficient, especially for mission-critical goods and services. This is reinforced by the fact that those relying on government services do not have good alternatives, so the government's ability to lay off risk (either to suppliers through a supply-chain relationship or to 'market forces' in the form of other service providers) is limited. The upshot is that the government must often negotiate and enforce higher specifications than those in the market. The main examples would be 'milspec' for IT and other military items with commercial analogues, and energy efficiency, etc. 'green standards' for ministries with an overtly environmental mission.
- Complementary to commercial demand – in this case, the government good or service

works together with its commercial counterpart to produce some mix of public and private value. There are good examples in the IT sector here, for instance those concerned with electronic procurement itself. It can also encompass situations where there is a demonstration effect to government procurement that does not necessarily lead the way for commercial activity but acts in concert with it to produce better social performance. For instance, some green innovations (e.g. waste incineration or RDF (refuse-derived-fuel) plants) act together with changes in commercial waste streams to produce 'win-win' solutions, even though the incinerators themselves may never be 'truly' commercial. In the IT world, the example would be interoperability of government IT systems with commercial ones: for instance, EDI systems for procurement itself that provide at once high levels of commercial assurance and transparency and on the other smooth interface with government information systems, resource accounting and budgeting systems, etc.

### 1.1.3. How does procurement stimulate innovation

An important underlying issue is *how* procurement promotes innovation. It can act directly on innovation by:

- a. Accelerating RTD - or its deployment ("faster")
- b. Encouraging dissemination of RTD results ("wider")
- c. Changing the direction of innovation ("better")
- d. Reducing cost and/or risk barriers to innovation ("cheaper")
- e. Changing the level of RTD (e.g. by providing complementary basic, applied or application-orientated RTD)

In respect of e), it is worth noting that a standard argument for stimulating basic research is that it is a public good (subject to b) and is therefore under-supplied. Ordinarily, the response would be "what has this got to do with procurement?" The answer (and this is of more general importance) is two-fold:

1. Some government procurement is at the same time a direct investment in the national system of innovation: for instance, buying equipment for publicly-supported research establishments; buying all kinds of goods and services to support the work of government departments with a knowledge-producing mission (e.g. health system laboratories, food safety agencies, etc.); in-kind support for the science base, etc.
2. Second, the 'demand-pull' effect depends on the distance between current offerings (and RTD direction) and what is needed - while some types of demand can be met by application-orientated research, others require more basic work.

An indirect mode of action of procurement on innovation involves buying things that go beyond where the market is at the moment. (These are described above). More succinctly, procurement can stimulate innovation:

- a. Directly, by specifying goods and services whose production requires RTD
- b. Indirectly, by launching a tender process, where preparing submissions requires RTD (examples are design competitions, or tenders specified in functional rather than production terms)
- c. By choosing a 'bespoke' (customised) as opposed to a COTS (commercial off-the-shelf) good or service
- d. By providing an assured source of future demand (via a long-term contract) which can provide financial assurance for private sector lenders (including the producer) to invest in RTD
- e. By setting up long-term partnerships lasting from the design/initial RTD phase through production (process RTD), use (operational RTD and feedback) to decommissioning phases - the prime example is the procurement partnership model built into the UK Smart Procurement initiative, but one could imagine such a thing in e.g. Public Procurement, Ltd. (Denmark) or some of the Foresight/link activities.

#### 1.1.4. Specific substantive areas

Among the (joint supply and public-sector) areas of activity where procurement policy has historically been applied with the effect of inducing innovation are:

- Classical defence-orientated procurement (e.g. of weapons systems)
- Discipline- or industry- specific procurement (microelectronics, integrated circuits, computers)
- Focal points for multiple strategic technologies (civil aircraft)
- Classical infrastructure projects (roads, bridges, dams, power conversion systems, etc.)
- Dual-use technologies (encryption)
- Synergistic technologies (re-processing of spent nuclear fuel)

In order to identify candidate supply sectors, as indicated in the attached matrix, we adjusted the standard industrial classification (SITC version 3) to produce a reduced number of highly aggregated sectors. These sectors can be used as a screening device for identifying areas where existing procurement policy can be returned to stimulate innovation, but the specific application will have to go into considerable detail – well below the sectoral level, and in ways that do not match any standard industrial classification. In part, this reflects the necessity to make such standard schemes apply to all countries, and thus ignores important differences in industry structure. In addition, such a scheme by definition is directed towards measurable flows (e.g. of outputs) and thus does not match the entities that carry out the productive (and innovative) activities. A good example of this type of category confusion involves ‘dual-use’ research by firms whose primary current activity may lie in the military area, but where affiliations (and even commercial activities) across a broad range of sectors derive from their RTD activity, considered as a joint output in itself.

The sectors we have chosen to represent are:

- Agriculture, hunting and forestry, fishing – this is particularly relevant if CAP payments are ‘procurement,’ but also includes food purchases for school/poverty/etc.
- Mining and quarrying
- Manufacturing – includes e.g. vehicle fleets, computers, etc.
- Electricity, gas and water supply
- Construction
- Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods – this includes government-owned fleets and other equipment: joint supply-maintenance contracts
- Transport – e.g. mandating zero emissions on contracted transport as a form of *indirect* demand-pull.
- Storage and warehousing – there may be relatively little scope for product innovation here (except e.g. w.r.t. document storage), but ample scope for process improvement.
- Communication -
- Financial intermediation - e-commerce requirements, outsourcing: financial services for e.g. PFI and other complex public procurement activities.
- Real estate, renting and business activities – includes public housing (esp. energy, environmental innovation) and military housing
- Public administration and compulsory social security – this refers mostly to outsourced services (e.g. accounting) and intergovernmental (agency, local/central) arrangements.
- Education

- Health and social work - can be specified by type of procurement and contracting relationship: direct purchase (PPRS, appropriateness); fund holding practices, hospital diagnostics, etc.
- IT Services (Trust, Security) – here, procurement exerts a double leverage: public bodies can procure e.g. cyber-notary services and also indirectly induce demand by requiring cyber-assurance on all electronic procurement and associated EDI. In addition, public bodies can modify contractual terms to allow digital signature, thus providing an impetus for innovation in ‘remote’ sectors such as ICT and financial services.
- Defence – there is a need to separate military equipment, consumables and commercially used products. This sector also involves additional RTD policy objectives such as maintenance of science and industrial base.
- Extra-territorial organizations and bodies

## **1.2. THE REASON WHY THE GOVERNMENT WISHES TO PROCURE**

### **1.2.1. Procurement objectives as such**

To further classify procurement as a tool of innovation policy, it is necessary to identify the other objectives behind procurement policy. These not only indicate the scope for serving RTD objectives, but also the tradeoffs between innovative and commercial-off-the-shelf solutions. In addition, the procurement objectives suggest something about the direction in which innovation can be pulled by procurement (see previous section). The main types of procurement objective (or uses for the procured goods or services include:

- Own-account procurement – in this case, the government is buying the goods or services for its own use. Examples include back-office IT solutions, vehicles or buildings to be used by government personnel, etc. The flexibility for encouraging innovation should be fairly high, but the need for co-ordination across departments to spread and minimise enterprise risk is considerable, as is the downside risk. The clear example is the introduction of innovative large-scale IT systems (e.g. UK air traffic control, social security, passports – all of which were failures).
- Mission-critical procurement – in this case, the goods or services are essential to the delivery of public services by the government. An important distinction is whether current provision is adequate (looking for something better) or not (trying to solve an urgent problem). In the first case, the scope for innovation may be limited – in the second case (e.g. dealing with foot-and-mouth or novel pollutants) innovation is forced.
- Weight-of-demand (market power) – in this case, the government may be aggregating procurement to obtain better commercial terms because its demand represents an appreciable fraction of total demand. This exercise of monopsony power is usually justified on cost grounds, but can be used to motivate product improvements. Indeed, even cost pressure can induce innovation (see next section).
- On behalf of others - e.g. health, drugs, education... – in this case, the definition of the required innovations and the tradeoffs among cost, quality and other aspects are not entirely within public control.

### **1.2.2. International concerns**

In addition to the need to harmonise with or even reconcile the divergent objectives of various types of national policy, procurement raises a host of concerns reaching beyond national boundary, including

- International competitiveness
- Procurement from foreign companies
- Use of foreign technologies
- Co-ordination and intellectual property rights issues



- Multi-national firms
- Joint procurement agreements (e.g. NATO)
- EC procurement directives
- The GATT procurement code
- WTO and similar agreements

### **1.3. THE TYPE OF INNOVATION INVOLVED**

Considering the type of innovation involved can further refine the intended or inadvertent impact of procurement on RTD:

- Product innovation usually leads to new markets, and to products with enhanced characteristics. Because this type of innovation is inherently more risky, financial barriers to entry may be greater and the leverage afforded by government procurement may be greater
- Process innovation usually leads to lower costs, and is associated with more incremental types of innovation and lower risk.

It is a commonplace that this distinction does not characterise sectors so much as the combination of sectors and national systems of innovation and finance. The literature suggests that product innovation is more common in the US and the UK, that it leads to relatively greater job creation, and that different sectors are characterised by very different patterns of innovation type and intensity.

- Direct demand-pull – in this case, the intention is to procure innovative goods and services directly
- Indirect demand-pull – in this case, the innovation is a by-product of government procurement. Many process innovations have some indirect component.
- Supply-push – in this situation, the government procurement is used to produce public services that are directly innovative. An example would be procurement of research services from a PSRI that is encouraged/permitted to find commercial applications for its innovations.

In addition, nations differ in some important ways that affect the use, implementation and consequences of innovative procurement policies. These include:

- The importance attached to specific substantive areas (e.g. defence in the US)
- The strength, structure and performance of national industries and infrastructures (conventional, technological, legal, financial)
- The relative importance of budgetary, competitiveness, environmental, social and other policy objectives
- The organisation of decision making with regard to procurement and/or other policies that may employ procurement
- The strength of their belief in the efficacy of demand side vs. supply side policies
- The extent to which they are bound by or able to influence supranational policy

### **1.4. THE MODALITIES AVAILABLE**

The scope for innovation stimulus depends on the types of contract or procurement relation available. Among the considerations are:

- Short or long-term contracting (see Section 1.1)
- Framework contracts – these allow the government to specify overall or crosscutting conditions that affect both current and potential suppliers, facilitate demand aggregation across Government Departments, and allow the government to use continuing

competitive pressure to secure a steady stream of innovation. One example is the environmental considerations used in the Danish framework supplier National Procurement, Ltd. Another is found in current UK procurement practices in which the framework contract is used to benchmark suppliers against one another, providing continuing innovation incentives tied to direct government needs. The advantage of such mechanisms is that they avoid two persistent problems involved in procurement of innovative products: the risk that the government may be convinced to invest in capabilities that do not match current or future public or market needs, or which involve inappropriate risk transfer; and the 'lock-in' phenomenon whereby Schumpeterian ('creative destruction' competition in the procurement market leads to supplier monopoly power – the issue being that once the government has adjusted to an innovative product it faces a high cost of switching to an alternative. It is not in the interest of sole-source suppliers to invest in 'open' technologies or to share information with clients or rivals.

- Legality of contributions to RTD investment or expenses (e.g. GOCO - government-owned, contractor-operated) facilities (again, see earlier section)
- Dual sourcing – this can be part of framework contracting, and is frequently used in the US in both public and private (e.g. Master foods) contexts. The contracts have to be carefully crafted to protect innovation incentives, but there is a growing body of literature and (mostly commercial) experience.
- Specification in terms of inputs, processes, specifications, demand and functionality – such specifications encourage innovation and better cost-quality tradeoffs.
- Procurement teams, prime contractor models (supply chain maintenance issue) – the point here is that procurement may well be a joint activity, and dealing with a single contractor can improve incentives and simplify negotiations/
- Payment details: cost-plus, fixed-price, etc. (see brief mention in Section 1.1)
- IPR arrangements – to the extent that the application of innovation goes beyond the use governments can make of the products in which the RTD is embedded, incentives can be improved by appropriate IPR arrangements. Typically, IPR rests with the acquiring party, leading to well-understood 'hold-up' problems. In some (very few) contexts, IPR remains with the supplier, though this can lead to abuse of the procurement relationship and the exploitation of what becomes in effect publicly-sponsored research for private commercial gain (such outside exploitation is probably justifiable where public interest can be demonstrated). A good example is the use of government contracts to do product development and learning-by-doing in semiconductors – e.g. by Texas Instruments in the mid-1970's.

## 2. SELECTION OF INTERESTING INITIATIVES

### 2.1. INTRODUCTION

We have attempted to identify a number of interesting initiatives that can illustrate the power of public procurement in stimulating innovation. It should be clear that these initiatives do not operate in a vacuum. It is important to take context into consideration. This includes the roles and positions of specific national governments and systems of innovation, the government's policy objectives, the market structure of the targeted sector and even more informal aspects of the context. The focus of presenting the initiatives is, however, not on providing an extensive analysis of this context, but on demonstrating the application of public procurement and its potential to stimulate innovation and R&D activities. As a result, we have identified these practices as interesting rather than best practice.

First, we provide a number of *types* of procurement practices, followed by specific instances of individual practices. Each section first presents the reason for selecting the initiative, identifies specific demand issues, gives the reason why the initiative is being conducted by a government, describes the type of innovation involved and concludes with modalities being used. This follows the more generic approach presented earlier.

### 2.2. CONCENTRATION OF PROCUREMENT ACTIVITIES

There is a growing tendency for governments to concentrate procurement in specialized agencies. The practices considered and provided below represent an organisational means of

- a) Emphasising the strength of public demand by reaching economies of scale and potentially taking a larger share of total demand than if each government actor would act individually;
- b) Directing R&D activities by using (or even requiring harmonisation of) functional specifications across different policy domains and thus aiming at setting higher and/or deeper requirements that could lead to product innovations.

These procurement agencies often operate as front offices for goods and services for the government's own use. These initiatives are usually motivated by concerns for the efficiency of procurement *per se*, and for focus on specific policy concerns, typically environmental impact or energy conservation. However, they do require substantial coordination efforts.

Some good examples of this type of procurement practice are:

- National Procurement, Ltd. In Denmark.
- OGCBuying.solutions (formerly The Buying Agency) in the UK,
- The FEMP (administrators of the Procurement Challenge) in the US, and

We have focused additional analysis of the operations of these organisations primarily on the Danish example, while providing a quick overview of the objectives of the other two.

#### 2.2.1. National Procurement, Ltd.

This is a quasi-private-sector<sup>8</sup> organisation that handles procurement of a wide range of goods for various agencies of the Danish government. Its goals are efficiency (reduction in procurement cost and purchase prices); environmental friendliness; electronic document interchange; and financial self-sufficiency.

##### Public and private demand structures

It negotiates 'frame contracts' with vendors of specific products. This is done in full compliance with EU Procurement Directives – it is an open tender addressed to an international market. Product standards are EU and ISO standards where applicable. In cases

---

<sup>8</sup> Jointly owned by the federal government and local authorities.

where EU standards clearly lag international standards, the latter are used instead. No preference is given to Danish firms *per se*, though local service capability is a natural requirement. The contracts are specified in functional terms, allowing vendors to substitute functionally-equivalent or superior products as they become available in product lines subject to rapid technological progress (e.g., IT). Once frame contracts have been negotiated, the details of different vendors' offerings (including environmental characteristics, etc.) are incorporated into the organisation's catalogue. Government clients can then make their purchases from this listing.

The leverage of this arrangement comes from the aggregation of marketing power, and economies with regard to procurement costs. The explicit understanding between National Procurement, Ltd. and the EU is that rigid adherence to Procurement law in letting the frame contracts can be exchanged for exemption from the requirement for tendering in dealings between government clients and National Procurement, Ltd. This avoids the need to conduct multiple public tenders for each acquisition of a given item of equipment, and for re-bidding contracts whenever product specifications change.

#### Reason why government wishes to procure

The goals for setting up the organisation are efficiency (reduction in procurement cost and purchase prices); environmental friendliness; electronic document interchange; and financial self-sufficiency. Together, the federal and local governments act as the owners of NP, influencing its overall strategy via their equity.

The organisation has a large catalogue of items ranging across the whole spectrum of goods bought by the government. While the overall goals of the organisation are not directly oriented towards innovation, certain product characteristics (e.g. environmental friendliness), product lines, (e.g., office furniture), and procurement practices (e.g. use of EDI) are highlighted in ways that encourage producers to supply innovative products.

#### Type of Innovation

As far as innovation *per se* is concerned, National Procurement, Ltd. incorporates current legal standards and requirements into tenders. In addition, they encourage vendors to compete in terms of the environmental characteristics of their products, both in terms of contract allocation and in subsequent product description. Overall, the programme can be linked to four general types of innovation incentive:

- *Demand-pull product innovation* – the tender specifications give expression to consensus product or performance standards among the user community<sup>9</sup>;
- *Supply-push product innovation* – vendors can compete on product characteristics (especially environmental ones) highlighted in the catalogue descriptions<sup>10</sup>;
- *“Best-practice” knowledge diffusion* – within the limits imposed by EU requirements<sup>11</sup>, firms are encouraged to adopt and implement good procedures in product manufacturing, packaging, etc. This can produce a change in attitudes among suppliers as to the importance of using such practices. This is facilitated by a dual-listing system that separates product characteristics and vendor characteristics.

---

<sup>9</sup> “User groups” for each major product line influence operational matters and tender specifications. As the decision support system (see text below) evolves, more users will be linked through a distributed decision environment.

<sup>10</sup> Plans for the coming year call for inclusion of other sorts of product information – e.g. energy efficiency – in the catalogue listings.

<sup>11</sup> EU rules forbid renegotiations of existing contracts, so these “best practices” can only be brought in when contracts are re-bid.

- *Procurement practice innovation*– National Procurement, Ltd. has made particular efforts to encourage use of electronic document interchange (EDI) on both the demand and supply sides of its operations. Although EDI is not (indeed cannot) be a formal qualification condition yet it is used as an “award criterion” to break ties between otherwise-equivalent vendors.

### Modalities

The tender process involves periodic calls for tender in specific product lines. Tenders incorporate current legal standards and requirements, as well as emphasising environmental consciousness throughout the range of vendors’ activities. Qualifying bidders are selected, and frame contracts with a subset are negotiated. In addition to the economies this offers with respect to EU mandatory tendering, this process helps to focus the expression of demand and supply possibilities at discrete points. Finally, while this organisation is not formally co-ordinated with government policies in specific mission areas, it does act to further certain specific public interests. **As far as innovation *per se* is concerned, National Procurement, Ltd. incorporates.ERIK – see this!**

**OGCbuying.solutions** is an Executive Agency of the Office of Government Commerce in the United Kingdom Department of the Treasury. The Office of Government Commerce (OGC) was launched on 1 April 2000 with the aim of achieving substantial value for money improvements in the Government's annual procurement budget of over £13 billion. It merged the procurement services previously provided by The Buying Agency (TBA), the Central Computer and Telecommunications Agency (CCTA), Property Advisers to the Civil Estate (PACE) and procurement units from the Treasury to create OGCbuying.solutions on 1 April 2001.

This larger, more cohesive and customer-focused organisation offers products and services to the public sector through a number of new and existing schemes through framework contracts.

The **Federal Procurement Challenge** (FPC) is a voluntary, government-wide commitment that uses federal buying power to:

- Support and expand markets for today's "best-practice" energy-efficient, renewable, and water-conserving products;
- Save money through reduced operating costs for Federal agencies;
- Conserve energy, water, and other resources;
- Create new entry markets for advanced energy-saving technologies and products
- Lower the costs of efficient products for all consumers by providing a large, reliable market;
- Reduce government energy use and greenhouse gas emissions; and
- Provide market leadership for other governmental, corporate, and institutional purchasers.

FEMP personnel estimate that "best practice" products can often produce energy cost savings of 25% or more. For example, while a high-efficiency 25-horsepower motor may cost about \$230 more than a standard model, energy savings typically repay this difference in only 18 months. For some products, such as fluorescent lamp ballasts, high-volume buying of energy-efficient products will reduce energy costs with little or no increase in purchase price.

The federal supply agencies (General Services Administration (GSA) and Defence Logistics Agency (DLA)) work with FEMP to identify products that meet the recommended efficiency levels and are available through the Federal supply system. GSA and DLA use a specific symbol to identify products meeting FEMP energy efficiency criteria. To date, efficient refrigerators, room air conditioners, and dishwashers have been identified in GSA and DLA catalogues. In 1997, the symbol will be applied to other product types and included in GSA and DLA on-line systems.

Many Federal agencies also purchase energy-using products from commercial sources. Some types of energy-efficient products, such as office equipment, home appliances, and heating and cooling equipment, also qualify for the “ENERGY STAR” label. These products also meet FEMP criteria for Federal purchasing.

### **2.3. PROGRAMMES OF GREEN PROCUREMENT**

A second type of prominent procurement practice is that of green procurement. Many nations have instituted programs intended **to foster the development of environmentally friendly products and production processes** by providing a core of market demand. These practises obviously provide a more functional means of stimulating R&D. Here governments attempt to use contractual relationships to establish long-term beneficial outcome that are valuable to a broad range of actors. In case of, for instance, energy efficiency programmes they are clearly also economical to the direct business of a government itself. This broadening of the objective of green procurement programmes has provided important stimuli for its introduction.

These programs have evidently succeeded, based on their widespread use and indirect evidence about the development and dissemination of new ideas in countries that follow them. In most cases, they ‘piggyback’ on existing procurement programs (following the lead of the early US ETIP program) by mandating standards for a wide range of government procurement activities. They are usually based in the relevant environmental ministry, though not always. In addition to mandating standards for government procurement, the responsible organisation typically provides guidance for procurement officers and imposes reporting requirements.

Specific examples on green procurement initiatives include:

- The development of general energy efficiency and environmental protection standards for public procurement by the Division of Clean Technology and Products in the Danish Environmental Protection Agency, and the specific material and product standards used for construction projects funded by the Danish Ministry of Housing.
- The procurement and standardisation activities of the UK Department of the Environment are used internally for their own purchases of goods and services for environmental cleanup and monitoring. They are also disseminated on a voluntary basis throughout the government under the auspices of various programs of The Buying Agency in the Cabinet and the Unit on Procurement of Her Majesty’s Treasury, which oversees all ministerial spending plans.
- Various US standardisation and procurement efforts, including:
  1. The activities of the Federal Emergency Management Program to implement Executive Order 12902: the Department of Energy's Federal Energy Management Program works to reduce the cost and environmental impact of the Federal government by advancing energy efficiency and water conservation, promoting the use of distributed and renewable energy, and improving utility management decisions at Federal sites.
- The Federal Procurement Challenge (see above)  
The Energy-Efficient Procurement Collaboration.

#### **2.3.1. The Danish Green Programmes**

The Environmental Protection Agency (EPA) developed a regulation requiring **all** public procurement to consider environmental protection and energy efficiency. These considerations are to be documented in a public procurement plan. The EPA provides assistance to help organisations develop these plans. To provide an exemplar, the EPA developed a procurement plan covering its logging activities. In a related activity, the EPA worked with the Ministry of Housing (involved in more than 50% of total Danish housing construction activities) to develop environmentally sensitive material and product standards

for Ministry-funded construction projects.

#### Public and private demand structures

**Market structure:** Concern was expressed about market concentration as a source of market distortions and a drag on innovation. Another important factor was the Government's role as a major owner of timberlands. On the demand side, the Government was a participant in more than half the public housing construction. It was felt that Government and private demand were roughly parallel, but insufficiently focused to induce useful process innovations.

**Demand side:** The demand side organisation combined three common elements: "showcase" programmes by the responsible Ministries (Environment and Housing); definition of mandatory standards for use throughout Government; and assistance to other Government Agencies in developing procurement programmes. Standards were developed co-operatively within the Government.

#### Reason why government wishes to procure

The overall objective of these activities was to speed the development and use of environmentally sound and energy efficient products by introducing and diffusing environmental and energy related considerations into the decisions made by (government) consumers and producers alike. A second motive was to stimulate markets for such products directly (by boosting demand), via capital markets (by providing a credible commitment to such products in the long term) and through competitive forces (by encouraging entry).

The government as a whole acts as a direct buyer and a facilitator of capital markets. Specific areas were logging (where the focus was on environmentally sound practices) and construction (where the focus was product and material standards). The development of standards spread across other areas.

#### Modalities

**Interface:** To the extent that the programme involves environmentally sound production practices as opposed to product specification, the Government co-operates with industry, both in terms of information exchange and in terms of providing guarantees to encourage private capital markets.

**Mechanism:** The mechanism combines minimum technical, economic and environmental standards for Government procurement with explicit provision for above-market payment for above-market performance. In other words, the negotiations start with the characteristics and prices of best available items as a "reservation point" and work upwards.

### **2.3.2. The UK Green Programmes**

#### Public and private demand structures

**Market structure:** Heavy emphasis is laid on using as wide a network of suppliers as possible; to correct what was seen as undue concentration of Government demand on a few suppliers within an industry where concentration was increasing. Government demand is not notably in advance of or different to public demand.

**Demand side organisation:** The initiative is centred within the Department of the Environment; standards are mainly developed there and shared with other Agencies. Assistance is also provided to other Ministries.

#### Reason why government wishes to procure

The primary objective of the responsible Ministry (DEFRA) is to encourage the dissemination of sound environmental practice and the integration of environmental considerations into supply and demand decisions on both sides of the market. Other objectives originating within the department are: to encourage recycling and reuse and to ensure that environmental costs are included in life cycle project costing. Other Ministries contribute economic objectives such as "value for money," faster development, marketing and delivery of innovative

products, promoting small- and medium-sized enterprises and generally increasing the competitiveness of British suppliers in increasingly “green” world markets.

The Government is acting here primarily as a direct buyer of goods, though Green Procurement concerns have begun to be reflected in Private Finance Initiative (see below) activities in which the Government shifts to being a buyer of services.

In one sense, these activities stretch across all product areas. As the programme is voluntary, however, coverage can be spotty. It does include such diverse items as: electrical appliances; heating, lighting, ventilation and water systems; furniture; building, landscaping, agricultural and office supplies (especially paper); engines and vehicles; paints and batteries; environmental, packaging, printing and other services. In other Ministries, the emphasis to date has been on paper products, with many moving towards mandatory EDI and other “paperless office” practices. The implicit basis for this selectivity is that this area offers the greatest scope for improvement of current practices within Government and dissemination of “best practice” outside, as opposed to incentives for new market or product creation.

#### Modalities

**Mechanism:** The primary mechanism is competitive tender. The number of firms invited to tender depends on the value of the contract, propriety, competition and legislation including European Community directives. Sole-source contracts are awarded on the basis of an integrated assessment including quality, environmental product performance, delivery, value for money and the firm’s use of environmentally sound materials and practices throughout its (public- and private-sector) activities. To this end, bidders are invited to provide details of their other operations. In some cases, bidders have been specifically asked for details, proof of compliance with recognised standards, etc.

**Other interesting features:** The costing of bids for comparison uses standardised environmental costing techniques as part of the life cycle costing required by Government Procurement Policy.

#### **2.3.3. US Green Programmes**

There are several US procurement programmes with a “green” flavour. These include the “Alternative Fuelled Vehicles” initiatives described separately below. Here we discuss a number of activities connected with energy efficiency, loosely tied together under the control of the Department of Energy. These include: “showcase” facilities required of all agencies; mandatory procurement of products employing “best practice” technologies; and a voluntary “Federal Procurement Challenge” programme for acquisition of particularly advanced products. They are life-cycle programs, operating to foster the growth of private market demand and realisation of economies of scale in production. Unlike the Alternative Fuelled Vehicles programme, these initiatives mix demand and supply elements.

#### Public and private demand structures

Federal Executive Order supports all three initiatives: the showcase and best-practice initiatives are binding on all agencies, while the Procurement Challenge Initiative is voluntary (except for the *responsible agencies*<sup>12</sup>). Showcase plans are developed in co-operation with the Department of the Environment, and strategic support is supplied by other responsible agencies. Best practice procurement in all agencies takes place according to guidelines and product listings maintained by the Office of Management and Budget and updated by responsible agencies. Procurement Challenge participation is organised by the Department of Energy’s Federal Energy Management Programme and supports both energy and broader environmental goals. Agencies are rewarded for participation in both formal and informal ways. Beyond the federal level, the reach of the Challenge is extended through partnership

---

<sup>12</sup> Department of Energy, Office of Management and Budget, General Services Administration, Department of Defence, National Institute of Standards and Technology and Environmental Protection Agency.



programmes such as the Energy-Efficient Procurement Collaborative that includes state and local government as well as utilities.

#### Reason why government wishes to procure

The showcase programme is intended to publicise and demonstrate the feasibility of energy efficiency in both existing and new buildings. “Best-practice” procurement is intended to concentrate federal buying power by maintenance of a standardised list of products, and also to produce savings on energy costs and encourage development of mechanisms for assessing progress. A second goal is to provide support for products at the upper end of the energy efficiency scale to encourage market development. The Procurement Challenge is principally oriented towards private market development within current technological capabilities by in advance of effective public demand. Anticipated public benefits include money saving (over the long term, through reduced operating costs); conservation; stimulation of competition; lower costs for energy efficient products for all consumers; reductions in government emissions; and market leadership. Government market power is not being used to obtain favourable prices in the short run. Rather, the objectives are to lower production costs and build a healthy, competitive demand for these products by example - this will lead to sustainable lower prices in the long run.

In the showcase initiative, the government acts as a “role model,” filling a marketing or information-broker role. It can be characterised as a “mature-product” intervention to improve the effectiveness with which “good” products are used. The best practices procurement initiative marks a “leading consumer” role within the spectrum of currently-available products - the aim being to build demand and reduce prices at the top end of the market and thus to shift total demand towards more-efficient (and typically newer) goods. On the supply side this is really more about dissemination than innovation. In the Procurement Challenge, the Government is acting as a “leading consumer” in the classic sense of providing demand-led innovation to the development phase of the product life cycle. On the other hand, the “approved-list” orientation of these activities gives them a distinct supply-side flavour (see “Interface/Mechanism” below).

As mentioned, the showcase and best practice elements are concentrated on energy and water efficiency, together with co-generation, renewable energy technologies and indoor air quality improvements. From a policy point of view, these parts of the initiative represent products for which technology is already available on the market, but where market demand could usefully be oriented towards the “top end” of the performance scale and improved by better information about the possibilities inherent in existing products. To date, the products involved have included office equipment, home appliances, heating and cooling equipment, fluorescent lamp ballasts and motors. The Procurement Challenge, on the other hand, seeks out products for which no private market exists at the moment.

#### Modalities

**Interface/Mechanism:** The primary mechanism for the showcase programme is the plan developed by each agency. To meet the plan, the agency’s standard procurement techniques (usually including competitive selection and multiple sourcing) are used. Best-practice procurements are oriented towards government-wide lists of qualifying products, supported by the inclusion of energy costs in life-cycle costing justifications required within each agency’s procurement programme. Qualifying products are allowed to display visible symbols of compliance. The fact that product areas are not specified in advance introduces “design competition” or “tournament” elements into the mix, as firms compete for listing or approval. It is also interesting to note that the public disclosure of these approvals means that this incentive exists regardless of whether the government actually makes any purchases of a specific item.

Other aspects: the formal descriptions of the programmes do not distinguish between US and foreign firms, so there is probably no difficulty in terms of the applicable GATT and WTO

requirements.

## **2.4. SPECIFIC INDIVIDUAL PRACTICES**

There is obviously a long list of interesting practices that can illustrate the conceptual approach that we put forward. We have selected an additional three examples from Germany, the UK and the US for very different reasons. The German example is actually a demonstration of very promising design, which failed because of political factors. The UK experimented successfully with a combination of public and private investments in stimulating innovation both in outcome and process thus (partially) transferring risk to private parties. Finally, the US example focuses very much on specific product innovation through procurement, which has traditionally been a weak factor in Europe.

### **2.4.1. A systematic approach to choosing strategic technologies– the Public Procurement and Technological Innovation Project in Germany**

This project began in partial emulation of the US Experimental Technologies Initiative Program. It took a much more systematic approach to developing methodologies for identifying candidates and tools for the use of procurement to encourage innovation. While its long-term procurement activities were limited by political factors, it was innovative in its systematic approach to area selection and identification of the reasons behind the perceived need for government involvement. The project sought answers to four questions:

- Are there special fields where public procurement has played or could play a role in stimulating innovation and technology transfer?
- What are the possible regulatory or procedural impediments?
- What risks are there for public purchasers?
- What conditions should be factored into the design decision?

#### Public and private demand structures

The market structures varied from case to case. In many cases, the supply side was concentrated and profitable and the pace of innovation was slow, either as a result of industry psychology or as a result of long dependence on government subsidies. Demand was often fragmented and in some areas plagued by “free-rider” problems as different jurisdictions each waited for others to underwrite product development, etc. costs.

The fundamental idea was to divert some of the traditional R&D support into federal funds for paying the incremental costs of innovative products geared to specific performance or product characteristics. In some cases, co-operative procurement agencies were already in place, but steps were needed to ensure that they had adequate resources and a clear sense of mission. Where obvious lead consumer organisations within the government could be identified (e.g. the Bundespost for motor vehicles or the Bundeswehr for fire protection equipment) they were provided with extra budgets in exchange for a commitment to co-ordinate with other agencies to develop demand specifications.

These considerations led to several explicit project selection criteria:

- Large technological potential for innovation;
- Large share of market demand held by government purchases;
- High probability that the private sector would respond positively;
- Centralised rather than decentralised public demand;
- High social relevance of the selected product lines;
- Product lines that are representative of broader classes of products; and
- A technology that is “well in hand” - at least in terms of demonstration projects.

These criteria led to selection, analysis, and proposal development for several product areas.

### Reason why government wishes to procure

The objectives of the project were: to identify areas where ongoing public procurements could be re-focused to stimulate innovation and technology transfer; to identify and where possible remove regulatory or procedural impediments to use of superior products in the public sector; and to diversify and minimise risks faced by public-sector purchasers. The government as a whole acted here as a direct consumer.

The project developed a systematic approach to identifying likely candidates, based on the seven specific criteria listed above.

Areas were selected on the basis of some combination of these criteria: there were no rigid formulas, but all criteria had to be considered. Among those passing the test were: heat pumps and solar power, motor vehicles (improvements in seat belts and oil use), medical and geriatric items and fire protection equipment.

### **2.4.2. Encouraging innovation through buy-or-lease and contracting-out – the Private Finance Initiative**

The Private Finance Initiative (PFI) is a “meta-initiative” that considerably broadens the scope for innovative use of procurement by “a transformation of the role of the public sector from being an owner of assets and direct providers of services, to a purchaser of those services from the private sector.” The Office of Government Commerce (see also the UK procurement agency example) has policy responsibility for the Private Finance Initiative in respect of procurements using PFI techniques. The three types of project developed by PFI (financially free standing, services sold to the public sector, public-private joint ventures) are of independent interest, suggesting alternative ways to increase the efficiency with which public goods and services are supplied to the public. In other words, the PFI is relevant both as a means of stimulating (primarily process) innovation and as an example of a procedural innovation in procurement practices.

In the normal operation of the PFI, a spending ministry conducts an evaluation of the prospects for a “service privatisation” - until recently, all activities involving capital goods procurement had to be subjected to such a test. The agency involved defines its needs in functional terms in its “frame budget” and defends its procurement plans to the Office for Procurement within HM Treasury. This office will determine whether a PFI initiative is required or justified, and will also help the agency to structure the tender. This office also collects and disseminates case information and periodically revises its “best practice” recommendations.

### Reason why government wishes to procure

It is governed by two principles: value for money and transfer of risk. The first means that the Treasury will insist that the needs of each agency identified in the framework budget are being met at the lowest possible cost in the detailed spending plan. This is interpreted to involve a preference for buying services as opposed to buying goods (especially capital goods). The second principle means that the proposals should strive to attain 'optimal risk allocation.' In practice, this means pricing risks accurately and placing them on the party best able to manage them: the government in the case of legislative, outline planning or regulatory risk, and private firms in the case of performance or timing risk. Secondary objectives include highlighting “pioneering” projects, spreading good practices throughout government and building public-private partnerships to support future innovation in meeting government needs.

The essence of the PFI is a change in Government role from service provider to service purchaser. In any specific instance, the economic and technological incentives for PFI projects should be balanced with the agency’s mission objectives to ensure that the government retains adequate control and oversight.

## Modalities

**Interface:** In most cases, PFI contracts are let competitively in the beginning. Once private partners are selected, the service contracts involve them in every stage of the project. As mentioned, there are three types of PFI project:

- Financially freestanding projects are those private sector projects requiring government approval, but which are otherwise private. The organisation that runs the UK national lottery, Camelot, is an example.
- Joint ventures are projects to which both public and private entities contribute assets and expertise. Development and operation remain under private control, but infrastructure is jointly exploited. Public sector investment may take many forms: concessionary loans, equity, transfers of existing capital assets, etc. An example is the current automation of Post Office Counters, Ltd.
- Sale of services is perhaps the closest fit with the information society initiatives mentioned above. The distinguishing characteristic is an integrated provision to the government of a service that was formerly produced by the government. Another characteristic is that a significant proportion of the cost is private sector capital cost. One specific design feature is the use of leases – to ensure a proper transfer of risk and control incentive effects when contracts are re-let, these are structured as “operating” rather than “finance” leases.

**Mechanism:** As mentioned, the initiative for a PFI project comes from the responsible agency, which conducts a feasibility study. If plans are approved, tenders are solicited using performance, technology utilisation and other specifications. The number of bidders is limited to a maximum of four, competing for a sole-source prime contract. In many cases, it is expected that the successful bidder will provide or organise private financing for some portion of the capital expenditure. Projects are divided among financially freestanding ventures; sales of services; and joint ventures. In the first type, all costs are to be recovered through user charges, so the bids are evaluated on the basis of credibility and service characteristics. In the second type, capital and operational costs are to be recovered through subsequent exclusive service contracts, introducing an explicit cash element into the competition. The third type involves a mix of public and private sector funding, subject to overall private sector control; public funds are explicitly targeted to particular social aspects of the services provided.

### **2.4.3. An early, long-term intervention to create a new set of products – US Procurement of Alternative-fuelled Vehicles (AFV)**

In response to the various oil price shocks of the past three decades, the rapid depletion of fossil fuel sources and growing concern for the environmental impact of mobile-source emissions, the US government has developed a number of policies aimed at encouraging the development and use of alternative fuels. Early initiatives<sup>13</sup> had a strong research support component. Two later programmes, laid out in the National Energy Policy Act of 1992 and a subsequent Executive Order<sup>14</sup> are explicitly oriented to procurement of alternative fuelled vehicles (AFVs).

#### Public and private demand structures

This programme is well in advance of market demand and with no "supply shaping" characteristics. It has been in place for several years, and has been formally evaluated in several annual reports. It adopts an industry life-cycle approach to innovation, working to improve the health of dynamic competition and help industries to achieve economies of scale. It shares these characteristics (and the environmental secondary objective) with the related “Green procurement” initiatives described above, though the latter have a distinct supply-side component. This programme is also important in view of its vertical co-ordination - it

---

<sup>13</sup> The Advanced Battery Consortium and the Partnership for a New Generation of Vehicles.

<sup>14</sup> Executive Order 12844, "Federal Use of Alternative Fuelled Vehicles"

includes components that should stimulate the production of both AFVs and alternative fuels themselves and the fuelling infrastructure needed to combine the two.

The government acts here as a monopsonist or dominant oligopsonist. It is by far the largest single buyer of AFVs. It is also acting vertically by using regulatory and planning mechanisms to facilitate construction of the required fuelling infrastructure, which in turn will lower entry costs and increased perceived demand for producers of alternative fuels. Finally, in certain areas of the country (e.g. the Los Angeles Air Quality Management District), tight government emissions standards for mobile pollution sources (such as motor vehicles) provide an extra impetus to the purchase of AFVs by local government and the private sector.

The salient features of the market in this case are that government needs lead consumer needs by a substantial margin and that price incentives are seen as frustrating both supply- and demand-led private initiatives. None of those connected with these programs expressed particular concerns about industry structure, conduct or performance except for the usual ones directed at the heavily cartelised fossil fuels industry. However, no conscious intervention was undertaken to encourage new entrants into the alternative fuels industry.

The programme involves a targeted acquisition of AFVs by federal agencies maintaining vehicle fleets. Assistance (technical, legal and financial) is to be provided to other government agencies by the responsible department (Department of Energy) and through the General Services Administration. From the analytic point of view, this amounts to a mandatory technology use criterion for a specified portion of ongoing procurement activities as opposed to an interactive “user group” intended to arrive collectively at a product specification.

#### Reason why government wishes to procure

The primary strategic objectives are: reduced atmospheric pollution and vehicle maintenance costs; increased domestic economic activity, job creation and domestic fuel source use. Secondary goals include market impetus for the development and manufacture of AFVs and expansion of the fuelling infrastructure necessary for privately owned AFVs. Operational goals are: continued reduction in the incremental cost associated with specific vehicle and fuel combinations; long-term movement toward increasing availability of AFVs as standard manufacturers' models; and minimising life cycle costs in AFV acquisition. From a purely procurement point of view, the programme can be characterised as an attempt to help new technologies achieve “critical mass” in terms of manufacturing scale and market penetration. Over time, it is hoped that the market for AFVs will cease to be dependent on government sales.

#### Modalities

Internally, the programme involves directed purchase of specified proportions of AFVs. To facilitate this, financial incentives are available to cover the *incremental* costs of acquisition and, possibly, fleet conversion once a suitable technology has been chosen. The federal government will also co-operate with private industry fuel suppliers, and State and local governments, to ensure that adequate private sector refuelling capabilities exist or will exist wherever Federal AFVs are sited.

### 3. COMMENTS ON INTERNATIONAL PROCUREMENT POOLING

This is a very intriguing idea. Something similar has been suggested in various contexts, specifically in the suggestions made for revision of the TEN Telecom (now eTEN) programme<sup>15</sup>. In implementing such a programme, however, certain concerns should be addressed.

The first of these is practical. Particularly where new major systems are involved, the potential for expensive co-ordination failure; a recent audit of the Eurofighter programme showed that the cost to *each* participating nation was close to the stand-alone cost of developing the system – so that even the economies of scale associated with marketplace competition among systems were lost. To guard against this possibility, a joint body should agree on the functional characteristics (including cost, performance, etc.) of the new product, after which a ‘double-blind’ joint procurement exercise following e.g. the EU Procurement Directives should be used to select a few (preferably more than one) prime contractors. These would then subcontract the work again according to Single market requirements to mitigate bias.

A second concern is that the incidence of such a programme might not be spread appropriately. It is almost inevitable that such a scheme would (at least initially) favour suppliers in some countries and undercut the (potential) market of suppliers in others. Moreover, the government participants will naturally give regard to social and economic development considerations, which may complicate the incentives provided to the innovation system and lead to distorting transfers, implicit subsidies and other forms of rent-seeking. For instance, a national representative whose domestic industrial base specialised in (or held key patents in) a specific technology would naturally try to encourage its adoption and/or further development, arguing on the basis of greater familiarity, compatibility and exploiting existing investment. The transparency requirements above should guard against such rent seeking.

A third concern is that there may be systematic national differences in the nature of demand and/or the tolerance of public sector clients for innovative products and the associated risks. For example, a country that has ‘bedded-in’ its e-government or e-procurement systems may have systematically different demands and risk tolerance than one where these initiatives are still unfolding. In this case, it is necessary to consider whether a harmonised approach is appropriate or not – in other words, demand pooling should not be an automatic approach. The additional advantage of such an approach is that synergies can be recognised and encouraged at the design stage, and appropriate organisational adjustments undertaken<sup>16</sup>. Finally, to the extent that different countries are at different stages of essentially the same developmental trajectory, appropriate cross-subsidy and/or information exchange can be considered. This might take the form of cross licensing.

A fourth problem is endemic to the use of *public* procurement as a stimulus to innovation: potential for conflict with other policy domains, e.g. competition policy. Markets for innovation have a tendency towards ‘tipping’ (monopolistic or oligopolistic capture by one or a few dominant incumbents). If the incumbency advantage is strong enough (e.g. via IPR, long-term contracts, or sheer market volume), future innovations are more likely to come from dominant firms. This can damage market competitiveness and reduce the scope for innovation. Of course, the same factors can increase competition, if pooled public sector demand is specifically directed towards a variety of approaches and suppliers (using the risk-pooling aspect of joint demand).

A related issue is that of potential monopsony power, on the part of the joint public clients in

---

<sup>15</sup> TEN Telecom Guidelines Status Review by Jonathan Cave, Maarten Botterman, Renske Ellens, Paivi Luoma, Gert Jan de Vries and Roel Westerhof, 2001.

<sup>16</sup> An example is a proposed project to develop a harmonised database standard for European-wide information relating to organ transplants.

cases where total public demand is a large fraction of total demand.

Finally, it should be noted that, even without a unified procurement programme, a joint panel meeting to establish guidelines for tender specification could lay the groundwork for 'natural experiments' on a trans-European scale. Particularly in cases where public demand differs from or substantially leads commercial demand, innovation is effectively an interactive process between both parties to the procurement transaction. This is in contrast to traditional market models where signals as to which innovations are most appropriate come via the price system.

#### **4. ANNEX: A MATRIX OF POSSIBILITIES**