Public Sector Leadership: Government Purchasing of Energy-efficient Products to Save Energy and "Pull" the Market

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ABSTRACT

In most countries, government spending represents between 10% and 25% of total economic activity, with the national government generally accounting for the largest portion. Consequently, governments' spending can exert a strong influence on the markets for the products and services they purchase, especially when this procurement is concerted. In the last decade, several governments have instituted programs designed to direct their purchasing of energy-using products to the more efficient models on the market. This has two impacts: It provides substantial direct savings to the government on its utility bills while also helping to increase the availability and lower the prices of these more efficient models for all buyers.

However, determining which products are efficient and communicating that to buyers is not a simple task. Two approaches – identifying complying product efficiency cut-off levels and utilizing existing "endorsement" labeling programs (such as Energy Star) – have been successful. The first has the advantage of providing greater control for program designers while the latter offers simpler product identification for buyers.

This paper focuses on the design and development of these government purchasing programs, with reference to the United States' and other countries' initiatives. Issues addressed include: deciding whether it is feasible to embark on such a program (since success hinges on certain precursor conditions vis a vis product efficiency testing and information availability); determining which product types should be covered to optimize savings; setting product efficiency specifications (such that purchasers will realize considerable energy savings without paying excessive purchase prices); establishing the political and technical support to ensure recommended products are really purchased; disseminating the information to the specifiers and purchasers who actually determine what gets procured; and estimating savings potential from these programs.

The paper contends that an energy-efficient purchasing program can be an extremely worthwhile component of a governmental energy management strategy, but requires technical and political attention to succeed.

Introduction

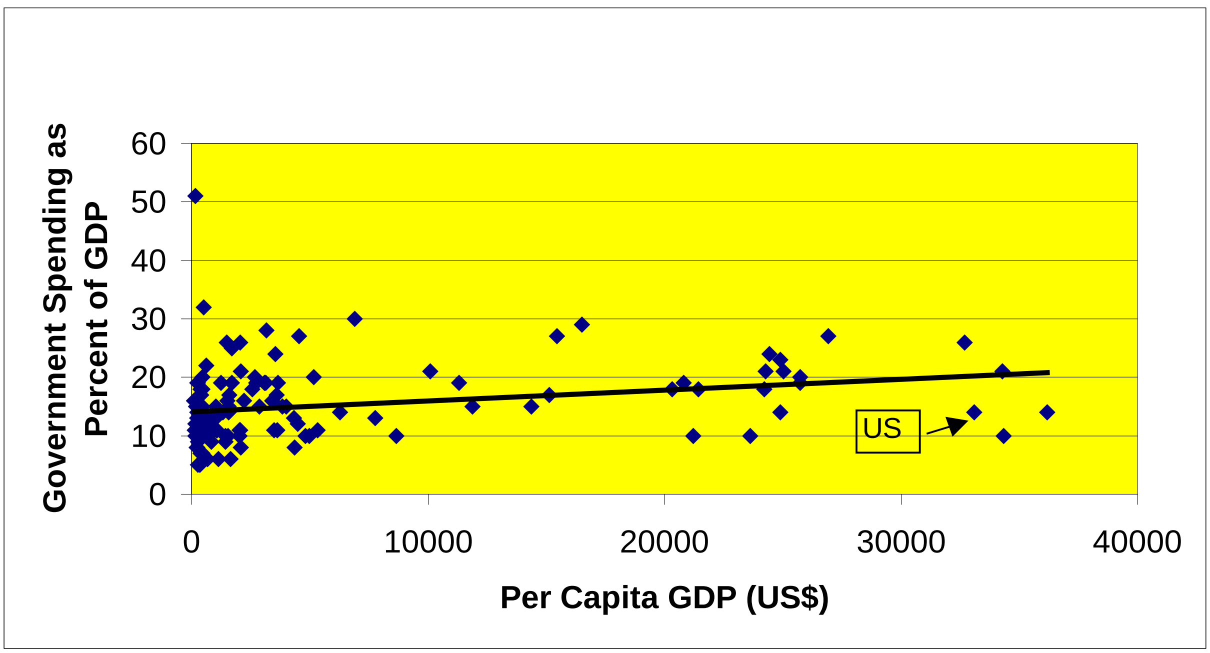
In the early-90s, the U.S. Federal Energy Management Program (FEMP) had a vibrant, ambitious staff implementing promising initiatives in renewables, design assistance, building audits, and performance contracting. It had the ear of legislators – who reinforced and fortified its plans by passing the Energy Policy Act (EPACT, 1992) – and annual increases in funding to support its efforts.

But research into the government's energy usage revealed a big hole in FEMP's approach: There were on the order of 10 billion dollars being spent each year to buy energy-using products in government facilities (Harris & Johnson, 2000) – products ranging from office copiers and light bulbs to large chillers – and FEMP was affecting barely any of it. For every one building being audited and retrofitted as part of an energy-saving project, there were a hundred more of equal size that were purchasing energy-guzzling products every day – and likely without a thought to their efficiency.

This realization was the impetus for FEMP's Buying Energy Efficient Products program (www.eere.energy.gov/femp/procurement). Started in 1996, the program's intent, supported by U.S. Executive Orders 12902 (1994), 13123 (1999), and 13221 (2001), is to inform federal buyers of what constitutes "efficient" for any type of commonly purchased energy-using product and then get them to buy these more efficient models. It covers roughly 50 different products ranging from residential dishwashers to water-cooled chillers to fryers and steamers for commercial kitchens. FEMP works closely with the U.S. EPA/DOE ENERGY STAR® labeling effort to recommend to federal users products that represent roughly the top quartile (25%) of efficiency for similar products available on the market.

This energy-efficient government purchasing strategy, which has also been employed successfully in Korea, Japan, and several European Union countries (sometimes as part of larger "green" purchasing efforts), takes advantage of the fact that governments are generally very large purchasers. Figure 1 shows the proportion of GDP that government spending constitutes in 150 countries, including a full continuum from the poorest nations to the most industrialized. It generally ranges between 10% and 25%.

Figure 1. Government Spending as a Proportion of Gross Domestic Product



Source: World Bank, 2002

Though these figures represent the aggregate spending of all levels of the public sector within the respective countries, the constituent governments' purchasing volumes – particularly in national and, to a lesser extent, state and provincial governments – is also often enormous. Naturally, energy-using equipment is a significant component of this procurement. In the U.S., for instance, the staggering $10-20 billion annual expenditure by the federal government on energy-using products is estimated to be only about a quarter of that spent, in aggregate, by the U.S.'s fifty individual state governments (Harris & Johnson, 2000).

Given the high volume of government purchasing of energy-using products and the fact that efficient products generally offer energy savings of 10-70% relative to standard models on the market (and sometimes higher, such as with light-emitting diode exit signs, which generally use 90% less electricity than their incandescent counterparts), the pursuit of an energy-efficient purchasing initiative by a government seems intuitively sensible. Add to this the likely economic spillover effects of increased availability and decreased prices for these products in the broader national market, and the strategy becomes even more compelling. However, actual experience with these programs has revealed a number of barriers to their successful implementation. Below we address those barriers – some of which may deem the effort not even worth pursuing, depending on certain characteristics of a country's market for these products – and provide critical guidance towards achieving a thriving program where the necessary precursors are in place.

Credibility and Availability of Product Efficiency Information

The establishment of a governmental energy-efficient purchasing program is predicated on other national efficiency initiatives that may or may not exist in a given country. The most critical prerequisite for a purchasing program is the existence of a means to differentiate among different models of a given product type. For this to occur, there must be a standardized method by which different models are tested for their energy performance – a national (or international) measuring stick to fairly compare the products. In the U.S. these test methods, which exist for dozens of products, are developed and maintained by a number of organizations devoted to such standards (including standards for non-energy performance features), as well as by the U.S. Department of Energy. Internationally, there are numerous standards associations, many of which are government-sponsored. The most prominent is the International Standards Organization (ISO), which maintains test methods for a multitude of products. The ISO's standards are utilized directly by many countries, and even when not, they are often used as a basis to develop or improve those countries' own product standards (Wiel & McMahon, 2001).

Beyond a standardized means to measure energy performance of a given product type, an additional necessity for government purchasing programs is the dissemination to prospective buyers, in some form, of the results of those tests. This can occur via dedicated efficiency labels, through energy information provided on general consumer information labels, in product manuals, or even on the product itself. In the U.S., for instance, most appliances and residential heating and cooling equipment carry the government's "EnergyGuide" label, while most lighting products provide their energy performance information on their packaging; for commercial heating and cooling products, the information is usually published in the product manual. What is critical is that buyers have easy access to this efficiency information so that competing models can be differentiated on the basis of their efficiency.

If efficiencies are not tested and reported in a standardized and accessible way for most of the energy-using products purchased by a government, the establishment of an energy-efficient purchasing program will be difficult, if not impossible. Instead, the effort that would be devoted to the purchasing program should be placed on developing this essential infrastructure, the benefits of which will provide value that goes well beyond the potential to develop an efficient procurement program.[1]

Choosing Which Products to Cover

Given a group of product types with energy performance test methods whose results are readily available to prospective consumers, the next step is to choose some subset of them to cover in the program (and an order in which to address them). The ultimate aim of this exercise is simple: to select the products that can save the most energy and money for the government.

To accurately determine which products have the largest savings potential, one would need to know the number, capacity, and efficiency of the units purchased (for the most recent year or two, preferably), along with the average efficiencies and operating hours of those models already in use in government facilities. Lastly, to truly get a good assessment of what savings are achievable, one would need the range of efficiencies currently available on the market for these products, and the price increments of the more efficient offerings relative to the standard-efficiency models.

Regardless of the country or city, **it is quite likely that none of these data will be available**, at least not fully. The critical task is to dispense with perfectionist tendencies and work with what is accessible. It may be possible to select a good group of products to begin a program merely by using existing knowledge and common sense, preferably along with a network of personnel who possess some understanding of the government's facilities' operations.

The U.S. government's experience is instructive regarding the determination of which products have the greatest savings potential. FEMP's approach was to contact the two federal government supply agencies (the General Services Administration and the Defense Logistics Agency) and tap their knowledge and sales data (as well as to enlist their support in the eventual program). These agencies were helpful regarding government demand for some products (mostly lighting and appliances), but less so with others (largely because they do not sell much of the larger commercial energy-using equipment).

Since government-wide data on installations and purchases of products was not found, FEMP next turned to the interagency network of energy managers that it regularly convenes. From this assemblage, an ad hoc "Products Working Group" was formed. The working group was able to help instruct FEMP on which products were the most prevalent in their agencies, as well as the biggest energy users and the best candidates for large-scale purchases. Though their input was largely anecdotal, the breadth of the feedback from these energy managers was extremely helpful at directing both the products for which FEMP created purchasing recommendations and also the order with which they were covered. For example, based on feedback from the Product Working Group and other government energy and facility managers, FEMP turned its focus in 1997 to covering commercial products (such as chillers, boilers, and distribution transformers) rather than residential products and office equipment, and has largely retained this leaning. (This is less obvious than it might seem, as the U.S. government owns close to 300,000 residential housing units of various kinds).

Besides its informal surveying of federal energy managers, FEMP also looked at data from product manufacturers and their trade groups to try to ascertain which types of products had broad ranges of available efficiencies in the market. For instance, FEMP found that the range of

[1] For an extensive discussion on this, consult the CLASP guidebook (Wiel and McMahon, 2001) cited in References.

efficiencies for commercial ice-makers was very wide, while that for residential clothes driers was negligible (at least when considering gas and electric models separately); indeed, this helped inform the decision to cover ice machines and not driers. FEMP's research effort also considered the efficiency of products for sale compared to the installed base. This was the factor that led to coverage of several plumbing products (showerheads, toilets, and urinals) for which there was very little range in flow rate among the models for sale, but where the current market's products used much less water than those installed in almost all existing facilities (this was due primarily to nationally legislated flow rates that had just taken effect a couple of years earlier, in 1994).

The complete list of FEMP-covered products (as of early 2004) is listed below, by category:

- Residential Appliances: room air conditioners, refrigerators, clothes washers, dishwashers
- Residential Equipment: central air conditioners, air-source heat pumps, gas furnaces, electric water heaters, gas water heaters
- Water-Saving Technologies: faucets, showerheads, toilets, urinals
- Lighting Technologies: fluorescent tube lamps, fluorescent ballasts, fluorescent luminaires, exit signs, compact fluorescent light bulbs, industrial high intensity discharge (HID) luminaires, commercial downlight luminaires, lighting controls
- Commercial Appliances: hot food holding cabinets, gas fryers, pressureless steamers, commercial ice cube machines, family-size clothes washers, gas griddles, refrigerators
- Office Technologies: monitors, computers, printers, fax machines, copiers
- Commercial Equipment: water-cooled electric chillers, unitary air conditioners, commercial heat pumps, commercial boilers, air-cooled electric chillers, ground-source heat pumps
- Construction Products: residential windows, roof products
- Commercial/Industrial Technologies: motors, distribution transformers, centrifugal pumping systems
- Other Efficient Technologies: low-standby power products

Setting Qualifying Levels

Once a group of initial products has been selected, the next task is to determine the efficiency levels to recommend (or require). There are several different factors that may play a role in this level-setting process. Obviously, the range of efficiencies available on the market sets the bounds for a recommendation. To achieve significant savings and exert a positive role in the market, the qualifying level for a given product should certainly be in the more efficient half of the market (FEMP aims for the 75^{th} percentile of models for sale). But other considerations might include:

- endorsement label or other efficient product purchasing programs in the country or region;
- the incremental savings and costs for moving up the efficiency ladder;
- the number of different manufacturers with models among the higher efficiencies (a consideration for maintaining sufficient competition); and

- the proportion of domestic vendors represented among the qualifying models relative to the entire market (to avoid discrimination against these suppliers).

Each of these is discussed below.

In the U.S., the presence of an ENERGY STAR® labeling program for a given product type made FEMP's job considerably easier. After doing some analysis of an ENERGY STAR® level, FEMP generally just adopted that cut-off as its own; in a couple of cases, FEMP recommended to the agency responsible for the labeling program (DOE or EPA, which split the responsibilities) that the qualifying level be raised.

The presence of the label holds two advantages for FEMP: First, along with matching the level in its recommendation, FEMP can also advise purchasers to look for the label as an easy way to identify models qualifying for the FEMP specification. Second, by adopting the same levels, FEMP and ENERGY STAR® reinforce one another to buyers. By allying with ENERGY STAR® in this way, FEMP also is able to exert more influence over qualifying levels for the label, as well as which new products are covered by the ENERGY STAR® program.

Purchasing programs in several public sector entities – South Korea, China, the states of California, New York, Arizona, Wisconsin, and Massachusetts, and the cities of Wuppertal, Germany and New York – have linked (or are linking) their purchasing efforts, at least in part, to endorsement labels (Harris, 2003). In Mexico, this strategy is currently under consideration.

Alliances with other purchasing programs can also be worthwhile. In the U.S., a large group of electric and gas utilities utilize the Consortium for Energy Efficiency (CEE) as a source for their rebate programs. CEE does the market research and establishes tiers of efficiency, the idea being that products meeting higher tiers – there are usually two to four – will qualify for higher utility rebates. FEMP and CEE collaborate on many of the products they cover, resulting in many similar or identical cut-off levels for jointly covered products. As with ENERGY STAR®, the two organizations' cross-referencing adds credibility and prominence to both.

Another area to investigate as part of the level-setting process is the added cost to consumers for greater levels of efficiency. For instance, the installed cost of a 90% efficient condensing residential gas furnace can be up to US$1,000 in some parts of the U.S., and at least $200-$300 in areas where they are most prevalent. Since there are virtually no models between a few percentage points above the required standard efficiency of 78% and the 90% minimum one finds with condensing equipment, both ENERGY STAR® and FEMP chose to set 90% as their qualifying level. FEMP addressed this by providing considerable guidance to potential buyers as part of its recommendation, warning them of this added cost and instructing them on guidelines for conducting a cost-effectiveness calculation.

Conversely, one product that FEMP and ENERGY STAR® cover, exit signs, showed such small cost increments among higher efficiency (lower wattage) models that setting an ambitious specification was easy to do (in 2004, eight years after the initial 5 watts-per-face specification was set, it is being considered for revision to an even lower-wattage threshold, as the market transformation has been very successful). If there is little or no first-cost trade-off to consumers for greater efficiency, a more stringent specification makes sense.

One crucial aspect of setting qualifying efficiency levels is assuring that the chosen level be met by models from a diversity of manufacturers. The FEMP program generally requires that models from at least three different manufacturers comply with its proposed levels; if this is not the case, the efficiency level is then lowered until it allows for three. In the development of the hopefully pending Mexican purchasing program, Mexico's energy conservation agency

(CONAE) examined national sales data indicating that only one motor manufacturer offered models at the originally considered NEMA Premium™ levels used by the FEMP program (NEMA is the National Electrical Manufacturers Association, a prominent U.S. trade group). Consequently, Mexico chose to consider somewhat lower efficiency levels, at least initially.

Another consideration, subsidiary to the total number of companies with qualifying models, is the representation among those complying vendors by domestic manufacturers. If this is an area of concern for a prospective program, a simple way to assess the impact on domestic manufacturing is to compare the proportion of domestic makers in the overall market with the proportion among the qualifying products at a given threshold. If the two proportions are reasonably close, there will likely not be a problem with discrimination against domestic suppliers. If the proposed efficiency level looks as though it will serve to largely exclude domestic manufacturers, and this is opposed to other government policy goals, a relaxing of the qualifying levels might be considered.

Once an efficiency level for a product has been chosen, the next step is to subject the level to review by peers and other interested parties. FEMP's primary reviewers were its interagency "Products Working Group," as well as some known experts for each product type covered. In a few cases where it felt its information base was weak, FEMP even chose to share its draft specification with representatives of the product's manufacturing industry. This is generally not warranted since manufacturers, and those representing them, are necessarily biased reviewers. Generally, though, exposing the draft specification to others will not only serve to ensure its reasonableness, but also enhance its adoption by these groups once the spec is finalized.

Table 1 below provides a representative list of products currently covered by FEMP, along with the efficiency thresholds and a comments column describing key issues (such as presence of an ENERGY STAR® endorsement labeling program covering the product).

Table 1. Representative Products Covered by U.S. FEMP, with Complying Efficiencies

Product Type	Efficiency Cut-Off*	Comment
Room Air Conditioners	< 20,000 Btu/h (5.86 kW): 10.7 EER (3.14 COP) > 20,000 Btu/h (5.86 kW): 9.4 EER (2.75 COP)	Same as ENERGY STAR®
Res. Gas Furnaces	90% annual fuel utilization efficiency (AFUE)	Same as ENERGY STAR®
Residential Windows	Cold climate: 0.35 U-factor** Temperate climate: 0.40 U-factor, 0.55 SHGC Warm climate: 0.75 U-factor, 0.40 SHGC	Same as ENERGY STAR®
Computer Monitors	15 watts in first-stage "sleep" mode	Same as ENERGY STAR®
Gas Fryers	50% cooking energy efficiency and 6500 Btu/hr. (1.9 kW) idle energy rate	For standard 15 inch (38 cm) open deep fat fryers
Exit Signs	5 watts per face	Same as ENERGY STAR®
Water-cooled Centrifugal Chillers	150-299 tons (527-1054 kW): 0.52 kW/ton$^+$ 300-2000 tons (1055-7032 kW): 0.44 kW/ton$^+$	= 6.76 COP = 7.99 COP
Single speed 4-pole (1800 rpm) motors	1 HP (.746 kW) – 85.5%; 5 HP (3.73 kW) – 89.5%; 10 HP (7.46 kW) – 91.7%; 50 HP (37.3 kW) – 94.5%; 100 HP (74.6 kW) – 95.4%	Same as NEMA Premium™ levels

* As rated by U.S. DOE-accepted test methods
** Units for U-factor are Btu/hr * ft^2 * ^{o}F
$^+$ Chiller efficiencies are integrated part-load values (IPLVs), which weight performance at various chiller loads

Disseminating the Information

The final step in launching an energy-efficient purchasing program is the communication of the efficiency thresholds to prospective buyers. This can be done, at minimum, by way of a simple correspondence (preferably coming from a high level in the government; see "Getting Recommended Products Purchased," below), including a list of the covered products and their efficiency criteria. However, it may be effective – both for credibility and to increase compliance with the recommendations – to present more.

FEMP chose to produce a series of one-sheet (double-sided) guides, each devoted to one of the products. Along with providing the complying efficiency thresholds, FEMP's "Product Efficiency Recommendations" also included:

- a "Where to Find" section, informing prospective buyers of any federal sources (there are two U.S. government supply agencies) that offer efficient models;
- a "Buyer Tips" section, covering issues such as proper sizing, pluses and minuses of various product features (with regard to efficiency), technology options (e.g., for residential water heaters, there is guidance on choosing gas- versus electric-fueled types, as well as a discussion of tank-less and solar-assisted models), and the pros and cons of early replacement; and
- a "Cost-Effectiveness" example, which uses expected product lifetimes, average usage profiles, typical federal energy prices, and time value of money discounting to compare standard efficiency models with recommended and "best available" ones. These examples' "bottom line" is the estimated dollar savings a facility could expect over the lifetime of the product; there are also conversion aids to help users adjust the modeled savings for different product capacities, energy prices, and usage profiles.

FEMP's recommendations were distributed in a loose leaf binder, which also included material on government policies on energy-using products, case studies, life-cycle cost analysis guidance, and other sources of information on efficient products. The initial binders, covering just a dozen products, were published in early 1997. Update packages, with new and amended recommendations, are distributed to subscribers, who now number almost 4,000, twice annually. Currently, the binder covers 46 products. In 2004, FEMP plans to switch to a CD-ROM format for distributing this material.

Simultaneous to its initial release of the binders, FEMP also developed a web site (www.eere.energy.gov/femp/procurement) that provides html and pdf versions of all the recommendations. Along with the same cost-effectiveness example as in the hard copies, the web site also offers "cost calculators" for many of the products. These permit users to enter their own site-specific energy prices, hours of use, etc., and to compare lifetime (discounted) energy costs for models with various efficiencies.

FEMP's broadcasting of this information over the web has been an enormous success. Several hundred people visit the web site daily, and they are always looking at the most recent versions of all the information. If FEMP needs to make a change, it can be reflected on the web site within days.

Although web dissemination requires internet capability for prospective users, this seems to be its lone downside. Constructing and maintaining a web site is substantially cheaper than printing and mail distribution, especially when the necessary updates – which require maintenance of a user database – are factored in.

Getting Recommended Products Purchased

Once a set of product-specific purchasing recommendations is in place and a dissemination system established, the program needs to concentrate its efforts on the ultimate, but perhaps most elusive, goal: getting buyers to actually follow the recommendations and purchase the more efficient products.

The reasons why this poses such a difficulty are fairly intuitive to most people in government:

- most purchasers, specifiers, and project and department heads operate with an annual budget, which they try hard to stretch in order to achieve the most they can **during that year** – therefore, their tendency is to buy the least expensive item that meets their needs;
- it is very commonly the case that the person responsible for purchasing an energy-using product is not the one who also has responsibility for the facility's energy bill, and therefore may not be particularly motivated to buy an energy-saving model (this is often referred to as the "principal-agent problem");
- buying a more efficient product sometimes means asking for something that is not exactly like the product that it will replace, and may pose some investigation regarding its fit, cost-effectiveness, and ability to perform "like the old one";
- buying the cheapest product is always defensible; purchasing one that is more expensive sometimes requires an explanation, which may or may not be well received;
- government purchasers frequently feel burdened by the number of requirements and preferences already facing them and often do not welcome additional constraints – **assuming they are even aware of them**.

How can a program overcome these problems? Clearly, a multi-faceted approach is warranted since there are a number of different obstacles. Probably the most valuable action is to get the attention and support of people at the highest levels of your government, particularly in the form of a policy issued by them. The biggest coup for the "Buying Energy Efficient Products" program was the direction given by President Clinton's Executive Order 13123 (Clinton, 1999), which very explicitly called for government purchasers to buy products that were either Energy Star labeled or in the top 25 percent of energy efficiency "as designated by FEMP." A similar directive occurred in the "Federal Acquisition Regulations" governing U.S. government procurement. Though each of these policy tools permitted some "wiggle room" by allowing exceptions based on cost-effectiveness criteria, they were instrumental in getting the attention of people with the power to execute them – because they came from above.

Even agency-level policy can be a sufficient motivator. FEMP was able to convince some of the U.S. federal agencies to change their own specific purchasing guidance to cross-reference E.O. 13123 and urge its compliance by their purchasers and specifiers. Often the direction from a given agency carries as much or more weight with those agency's employees as that from the head of government.

One effective tool in implementing a purchasing program is to implement the necessary policy changes such that those in charge of selecting energy-consuming products are also those held responsible for the utility bills. One city, Modena, Italy, has successfully implemented this structure, while another, Montpelier, France, though it has not modified the split incentive structure, communicates utility consumption and cost information to all user facilities (Borg, 2003). A creative solution such as an incentive program rewarding purchasers – along with facility managers, when the two are different – for declining energy expenses can be effective. One thing FEMP did was to explicitly include purchasing as one area eligible for its high-profile annual awards, and then to make sure to regularly nominate agency personnel it knew had achieved distinction in promoting energy-efficient procurement.

FEMP achieves perhaps its greatest success in getting efficient products into federal buildings by targeting the authors of agency-wide guide specifications. These specifications, maintained by several of the larger U.S. agencies, direct the architects and engineers of agency facilities to ensure quality and consistency in the selection, design, and installation of systems and products for new construction and major renovation projects. While not all governments maintain their own set of guide specifications, there is usually some sort of guidance document that directs the architects and engineers selected to design and construct the agency's, or government's, buildings. Uncovering this information and promoting the purchasing recommendations to those in charge is an effort with enormous leveraging potential, since this guidance may dictate a large proportion, or all, of the entity's construction and renovation work.

FEMP has long sought, without success, to "reverse the burden of proof" on purchases, such that procurement of products that do **not** meet its recommended levels would have to be justified to procurement heads. For instance, a purchaser would provide justification that an order of incandescent light bulbs being purchased was primarily for closet lighting where the bulbs would be turned on infrequently, or for an area subject to disruption and vandalism causing the bulbs to be broken regularly. Frankfurt, Germany has instituted such a policy, along with other complementary provisions, such as savings retention and required life-cycle cost analysis for large energy-related procurements (Borg, 2003).

In summary, there is a multitude of ways to take a program from policy to practice. A subset of them has been described here. A particular government's structure may lead one to several more. Getting the attention of high-level officials and targeting the personnel in charge of specifying large chunks of energy-using equipment are general strategies that are likely to pay off in greater implementation.

Updating the Levels

Once the procurement program is established and covers a group of commonly purchased products, its managers are immediately faced with the possibility of the efficiency specifications obsolescing. Product specifications can become obsolete because of technology changes, manufacturing advances, new standards for energy consumption, the program's (or other market transformation initiatives') success, and other factors.

There are two obvious ways to address the need for review of specifications – one by setting a regular interval (e.g., every three or four years) at which time each spec should be revisited, another merely on an as-needed basis. Some hybrid of these two is probably the most sensible approach.

The advantage to choosing the regular-interval approach is that the specifications will never become too out-of-date. There are two problems with the regular-interval method, however. The first is that some specifications may obsolesce in advance of their scheduled review. For instance, because of the onset of new national minimum efficiency standards, FEMP has updated certain products' specs – pushing them higher, in parallel with the new minima – after only two years. Without this modification by FEMP, the existing specs would have become largely meaningless.

The other pitfall of regular-interval updating is that it will likely entail some wasted effort. Some levels will not need modification, and the effort to conduct the research to confirm what may already be known, and on top of that to re-issue published or web material that does not need updating, is effort that could be used more productively on other aspects of the program.

The goal of the updating protocol should be to a) continue to ensure good savings relative to costs for buyers, and b) try to stimulate the technological advance of the market. Slavishly assuring that the program's levels meet some percentile cut-off in the market is unwarranted, but maintaining some "market pull" is important; making sure the government gets a good deal is critical.

FEMP uses the as-needed approach, defending it with the conviction that the people involved in the program are already quite intimate with the markets for the products they cover (at least vis a vis efficiency). However, some of the FEMP recommendations have not (as of late 2003) been reviewed since their initial release in the early stages of the program, in the 1996 to 1998 time frame. In some cases this is justified but in others FEMP is clearly delinquent, as change in the relevant markets (e.g., in commercial lighting) is evident.

Perhaps the best approach is to update the levels as necessary, but at least every four or five years, assuring that no recommendations obsolesce too badly. Providing the program's audience with a sense that things are being kept fresh is probably worth some added effort, and the credibility lost if one or more of the program's recommendations is seen as withered is well worth the trouble to avoid it.

Savings Potential

Given that establishing an energy-efficient purchasing program will require a significant effort, a policy makers natural response would be to ask about savings potential. Very little effort has been devoted to these assessments, but those studies that have addressed the issue present an impressive prospect. Harris and Johnson estimated that between about US$265 million (in 2003 terms), on the order of about 6-7% of the U.S. federal government's annual building energy expenditures, would be saved in their "most likely" scenario. In that model, complying purchases – whose efficiencies they estimated as being, on average, mid-way between the levels that just meet the FEMP criteria and those representing the best available on the market – ramped up from 20% to 80% frequency over a 14-year period (this term was chosen since it represented the time between the 1996 onset of the program and the 2010 energy-savings goal year established in the most recent presidential executive order). Their savings estimates, they note, are conservative, since they only analyzed products for which the FEMP program had already released purchasing recommendations; more than a dozen additional products have since been covered (Harris & Johnson, 2000).

Another study, the 2001 "PROST" (Public Procurement of Energy Saving Technologies) report, estimated that an incremental investment of 80 million euro per year in efficient products for the entire European (EU-15) public sector (including all levels of government, hospitals, schools, public universities, etc.) would yield an enormous savings of between 9 and 13 billion euro annually by 2020 (all currency expressed in 2001 euro). This reduction is from a projected business-as-usual public sector energy budget of 52 billion euro in 2020 (in 2001 the figure was 47.4 billion euro), so represents a savings potential of roughly 20% (Borg, 2003).

Both the U.S. and European studies cited above are based on top-down analyses of entire sectors. Another study estimated the impact of energy-efficiency improvements that had been made to U.S. government agency guide specifications. An Army Corps of Engineers guide spec change on water-cooled chillers alone was estimated to save approximately US$7.5 million per year by 2010 (given ten years of installations at normal stock turnover rates) compared to the situation if the spec had not been modified (Coleman & Shaw, 2000). This may seem unremarkable next to the top-down sector-wide figures reported in the U.S. federal government and European public sector studies, but it represents a very likely scenario (since the Army Corps' guide specifications dictate terms for all Army construction projects), unlike the hoped-for ones modeled in the other two studies.

When that $7.5 million savings is then compared to FEMP's roughly $750,000 annual budget for its purchasing program, which spurred the Army Corps' changing the spec, it makes an extremely compelling argument for such a program: specifically, that one stroke of a pen by a convinced specifier of one product could, by itself, produce a ten-fold return on government investment – forgetting all other savings the program generates.

One additional source of savings, albeit indirect ones, from FEMP's program has come from U.S. states that have adopted the FEMP program's levels in legislation or regulation requiring efficient product purchases for state facilities (Harris, 2003). This has occurred in both California and Arizona. In New York State, legislation requires Energy Star labeled products; for products not covered by Energy Star, buyers are required to purchase models complying with state guidelines, which draw heavily from the FEMP recommendations. Though Wisconsin has not mandated the FEMP criteria, administrators there actively promote their inclusion in procurement. Though these savings cannot be attributed fully to FEMP, the ability of these states to adopt or draw from FEMP with very little incremental effort is a substantial indirect benefit of the program. Other national governments may want to consider this adoption potential, whether by subsidiary states or even other countries in their region, as they weigh the prospect of embarking on a purchasing program.

Conclusion

An energy-efficient purchasing initiative can be a valuable component in a governmental energy management program, capable of yielding very impressive savings. However, there are some pre-requisites to establishing a program, regarding reliable and easily accessible efficiency ratings. Without these elements already in place, any effort to promote efficient purchasing will likely be misspent. Additionally, everything from selecting which products to cover to distributing the recommendations to users can be tricky. And there are no guarantees that mere dissemination of the information will result in purchasers changing their ways; focus and pressure need to be applied at the right points. Nonetheless, in most cases, pursuing these initiatives will make sense, especially at the national government level where procurement volumes are large. Initial studies indicate that program savings – excluding the indirect benefits from greater accessibility and lower prices for efficient products across the economy – can dramatically outweigh costs.

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