Evolution of Energy Efficiency Programs Over Time
The Case of Standby Power

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ABSTRACT

Issued in 2001, Presidential Executive Order 13221 directed federal agencies to purchase products with low standby power, with the goal of 1) reducing energy consumption in federal facilities, and 2) drawing attention to the problem of high standby power consumption, with guidance provided by the Federal Energy Management Program (FEMP). At that time, standby power was newly recognized as an increasing building energy load. Since then, procurement of products with low standby power have been set in place in acquisition processes, and the purchasing power of the federal government continues to influence manufacturers' design decisions related to standby power. In recent years, FEMP has shifted effort from direct manufacturer outreach for data collection, to integrating low standby requirement into broader acquisition programs including Energy Star and Electronic Product Environmental Assessment Tool (EPEAT). Another milestone has been the labeling of low standby products on the GSA Advantage website to simplify and enhance compliance. Looking forward into the program's future, this question arises "How do we design programs over time to reflect market and technology changes, by adjusting programmatic requirements while maintaining effectiveness?" This paper discusses that question for the case of standby power, which transitioned from covering a single to multiple environmental attributes, both in the context of the program's past and future.

Introduction

In the early 1990s, researchers identified standby power consumption as a significant energy load (Meier, Rainer, and Greenberg 1992; Sandberg 1993). By 2001, proposals had been made for establishing a standard maximum standby power level of one watt (Meier, Huber, and Rosen 1998) and Lawrence Berkeley National Laboratory (LBNL) had compiled a database of standby power measurements for over 1,000 products in 17 product categories. In 2001, President Bush issued Executive Order 13221, which required federal agencies to purchase products with a standby power level of no more than one watt and directed the Department of Energy (DOE) to provide a list of products subject to the one-watt requirement.

This paper provides a discussion of the implementation of Executive Order 13221, which directed federal agencies to purchase products with low standby power consumption, undertaken by the DOE's Federal Energy Management Program (FEMP) and supported by LBNL. In particular, we discuss three elements of the program's history: the importance of research in informing policy implementation; the integration of standby power into a larger landscape of federal sustainable acquisition mandates; and the necessity for working within a broader federal procurement context to achieve changes in purchasing behavior. We then argue these three elements are important for designing programs that evolve over time.

Transferring Research into Implementation

Research in the area of standby power in general, and to support FEMP implementation of federal mandates in particular, has primarily consisted of research in two areas: types and quantities of energy consuming products used in the federal sector, and opportunities for standby power reduction within a given product category.

At the time of Executive Order 13221's signing on July 31, 2001, the largest compilation of information about standby power consumption was the Standby Power Data Center (SPDC) database at LBNL. The SPDC was a collection of standby power measurements submitted by various researchers, but it was far from comprehensive. The SPDC provided information about the relative scale of standby power consumption in a handful of product categories, and that was enough to establish guidance to federal agencies about the product types that would be covered by the Executive Order. The SPDC contained primarily data on office equipment. As a result, the federal procurement requirement focused on these product categories.

Standby power consumption was not a characteristic that was typically disclosed by manufacturers in product information. It quickly became clear that federal buyers needed this information to comply with the purchasing requirement of the Executive Order. FEMP (through LBNL) issued requests to manufacturers to provide information about standby power consumption of office equipment. That manufacturer-supplied information augmented the SPDC, and the information in the SPDC was made publicly available to federal buyers to help them identify products that met the purchasing requirement.

The larger data set also helped provide information about the availability of products at or below the one-watt threshold. In some product categories, FEMP relaxed the federal procurement standard because too few products were available at one watt or less. The threshold for desktop computers, for example, was set at three watts. The original product categories and federal procurement requirement thresholds are listed in Table 1 below.

Table 1. Original Low Standby Product Categories and Compliance Levels

Product Category	**Standby Level Requirement**
Desktop Computer	3 watts
Laptop Computer	1 watt
Computer Monitor	2 watts
Printer	1 watt
Copier	1 watt
Fax	4 watts
Scanner	1 watt
Multi-function Device	1 watt
TV	1 watt
VCR	2 watts
Combination TV/VCR	3 watts
Audio Products	2 watts

Source: Adapted from Harris et al. 2003.

Attention to low standby was given a further boost by the Energy Independence and Security Act (EISA) of 2007. Section 524 of EISA made federal procurement of low standby products federal law, arguably adding strength to the procurement mandate.[1] Section 524 also required DOE to produce a publicly accessible list of eligible products. In response to EISA, DOE transferred the LBNL-based Standby Power Data Center to DOE servers and renamed the database the "Low Standby Product List."

There are three important elements of the above. (1) Manufacturers had their attention drawn to the standby power consumption of their product offerings through the FEMP information requests. (2) Comparative standby power information was publicly available, allowing identification of the variability in standby power consumption within a given product category. (3) FEMP established federal requirements that were based on the data provided. The combination of these three elements sent a strong signal to manufacturers that the federal procurement community could act on the information available and choose products based on their standby level. This combination led manufacturers to adjust their product offerings to meet the low standby requirements.

Over time, then, FEMP's implementation of this program shifted from the initial research focus of collecting standby power data on a variety of products to maintaining a list of qualified products for federal buyers. Rather than focusing on technical issues related to standby energy consumption in the vast array of devices found in federal buildings, FEMP's attention has shifted to encouraging buyers to comply with procurement mandates and buy products found on the Low Standby Product List. While this has likely enhanced the uptake of products on the qualified products list, it has narrowed the scope of the program in terms of the kinds of products covered.

Integrating Low Standby into Other Federal Procurement Requirements

Executive Order 13221 was not the only federal requirement guiding the procurement of energy-consuming products. Executive Orders 12902 and 13123 (issued by President Clinton) had established requirements for procurement of energy-efficient products. EO 12902 (issued in 1994) directed agencies to "increase… purchases of products that are in the upper 25 percent of energy efficiency for all similar products, or products that are that are at least 10 percent more efficient than the minimum level that meets Federal standards." EO 13123 (issued in 1999) directed agencies to "select… ENERGY STAR® and other energy efficient products when acquiring energy-using products." The shift in requirement from "upper 25 percent" to "ENERGY STAR" reflected both the increasing prevalence of the ENERGY STAR program and the need to simplify acquisition requirements. FEMP and ENERGY STAR coordinated to incorporate standby requirements into ENERGY STAR specifications. While the programs were not fully consolidated, the principle of FEMP and ENERGY STAR coordination informed outreach to the federal procurement community. ENERGY STAR incorporated specific standby requirements into some of its product categories and incorporated data collection of standby power consumption into additional categories.

The passage of time brought further procurement requirements for office equipment, broadening beyond energy efficiency to sustainable acquisition more generally. Executive Order 13423 (issued in 2007) included the requirement for purchase of products registered with the Electronic Product Environmental Assessment Tool (EPEAT). EPEAT-registered products meet

[1] While Executive Orders technically have the force of administrative law, Congressional statutes are generally given additional weight within the federal community, in part because they cannot as easily be reversed.

a number of environmental requirements including reduction or elimination of environmentally sensitive materials, packaging minimization, and design and management of product end-of-life in addition to energy consumption. In its implementation guidance to federal agencies regarding EO 13423, the Office of Management and Budget directed ENERGY STAR to incorporate the federal low standby requirement into all of its product specifications. Because EPEAT incorporates ENERGY STAR by reference, this in theory consolidated several procurement requirements into one – at least for those products covered by the EPEAT program. Executive Order 13514 (issued in 2009) further worked to bring multiple federal acquisition requirements together under one general heading of sustainable acquisition by consolidating requirements for EPEAT, ENERGY STAR, and other forms of environmentally preferable purchasing. Unfortunately, EO 13514 did not explicitly address the low standby requirement.

Ultimately, then, federal buyers were faced with the overlay of multiple requirements: buy low standby; buy ENERGY STAR; and buy EPEAT. FEMP recognized that these multiple requirements were overly complicated and confusing. Where possible, FEMP worked to consolidate low standby requirements into either ENERGY STAR or EPEAT product requirements. That has not been possible in all cases; however, there are now only a few product categories for which federal buyers have to look to more than one procurement requirement.

Over the years, the implementation process of the FEMP low standby program has moved from operating as a stand-alone program to working within a broader sustainable acquisition context. Early implementation of EO 13221 featured a database of standby power consumption across a variety of product categories, with the federal procurement official left to look up a product of interest to identify if (a) the product was in the database, and if so, (b) it met low standby requirements. Over time, FEMP worked with broader product programs like ENERGY STAR and EPEAT to integrate low standby requirements into their specifications. This has generally been successful; however, some product categories (notably computers) have not been unified under a single program. Neither ENERGY STAR nor EPEAT has a low standby requirement for their computer specifications, so the FEMP Low Standby Product List remains the sole source of information to federal buyers about computer products that meet federal low standby purchasing requirements.

Table 2 illustrates how FEMP is leveraging the Energy Star and EPEAT product lists to fulfill its requirements under EO 13221.

Table 2. Current federal acquisition requirements for low standby consumption

Product Category	**Standby Level Requirement**
Computers (desktop)	1 watt
Computers (thin client)	1 watt
Computers (workstation)	1 watt
Computers (integrated)	Buy EPEAT-registered
Computers (notebook)	Buy EPEAT-registered
Displays	Buy EPEAT-registered
Imaging Equipment	Buy EPEAT-registered
Televisions	Buy EPEAT-registered
Audio/visual equipment	Buy ENERGY STAR-qualified
Computers (small-scale servers)	Buy ENERGY STAR-qualified
Displays (professional signage)	Buy ENERGY STAR-qualified
Uninterruptible Power Supplies	Buy ENERGY STAR-qualified
All other product types	Buy products rated at ≤ 1 watt, or the lowest available standby power level for the product category, per 42 U.S.C. §8259b(e)

From FEMP Low Standby Product List at http://femp.energy.gov/standby.

Drawbacks to Program Integration

When the low standby program was first developed, FEMP had a database of roughly 1,000 products. The data in that database were collected from manufacturer and researcher submissions. Over time, FEMP moved away from collecting standby power consumption information. There were two main reasons for this shift: one, it was expensive and time consuming to continue to solicit and accept data from manufacturers; and two, in the wake of a US Government Accountability Office (GAO) audit on the Energy Star program, there was concern in the federal sector about the objectivity of manufacturer-supplied data (GAO 2010).

Manufacturers were providing similar energy consumption information to the ENERGY STAR program, so FEMP began receiving information about standby through manufacturer submissions to ENERGY STAR. Manufacturers found it easier to submit data to one federal entity (ENERGY STAR) rather than two (ENERGY STAR and FEMP). This has generally made it easier to provide lists of qualified products to buyers. FEMP has also benefitted from the third-party testing regime established by ENERGY STAR, which provides a level of objectivity and standardization to the data collection process.

However, that standardization has not been without cost. By definition, FEMP now collects **only** data from ENERGY STAR-qualified products. This means that FEMP has no information about the relationship of the standby levels of ENERGY STAR products relative to the broader universe of products in the market. FEMP also has no standby power information about ENERGY STAR product categories where the ENERGY STAR specification does not require reporting of standby power consumption, such as for imaging equipment. Finally, FEMP has no data about product categories not covered by ENERGY STAR. While it is now easier to implement a low standby requirement for the categories FEMP covers, there is no mechanism for identifying the broader energy savings potential of product categories that are currently not covered. It is also not possible to assess the degree to which low standby requirements may be

"spilling over" into the broader market. It is possible that the federal low standby requirement has had a universal impact on the product categories it covers (i.e., on both ENERGY STAR-qualified and non-ENERGY STAR products), but FEMP no longer collects the data to make that assessment.

Changing Federal Purchasing Behavior

The discussion above has focused on changing the implementation of federal procurement **policy** related to low standby; however, little has been said about changing federal purchasing **behavior**. FEMP recognized that changing buyer behavior would require more than establishing policies, no matter how readily they might be followed. Low standby requirements must also be integrated into federal procurement systems to result in changes in procurement outcome. FEMP has only recently begun focusing on this area of program implementation. Two activities are underway: integration of qualified product identification in the federal supply sources, and review of contract solicitations for inclusion of low standby requirements.

There are two federal supply sources that are given preference in federal procurement: the acquisition systems of the General Services Administration (for civilian procurement) and the Defense Logistics Agency (for military procurement.) The General Services Administration has an online tool called GSA Advantage! that provides access to their multiple award schedules. Advantage! is basically the Amazon.com of the federal supply service – a federal buyer can look up a product, find pricing, and place an order online.

FEMP has worked with GSA to identify products that meet the low standby requirements in GSA Advantage! Basically, FEMP provides GSA with a list of make/model numbers for products within the product categories still covered by FEMP. GSA then matches that list of qualified products against products within Advantage! and identifies the qualified products with a unique icon. Buyers can search for products that are labeled with the icon. For covered product categories, GSA Advantage! also offers a warning to buyers trying to purchase a product that is not on the qualified products list. Buyers are notified that they may not be in compliance with federal procurement requirements if they complete the purchase of a non-qualified product.

The combination of these two features makes it (a) easy to find a qualified product, and (b) incrementally harder to purchase a non-qualified product. The collaboration of FEMP and GSA is working to establish standard business practice for procurement of low standby products.

The second way FEMP is supporting a transition of standard business practice to procurement of low standby products is through monitoring of the contract solicitation and award process. GSA Advantage! is one (significant) avenue for procurement. Another is direct agency solicitations and contract awards. In this process, agencies issue a request for solicitation, accept bids, and award a purchase contract to the winning bidder. For all contract actions above $25,000, agencies must report their actions through Federal Business Opportunities (FBO), a public online portal of federal acquisition information. FEMP has begun monitoring FBO for contract actions related to the procurement of product categories covered by the low standby requirements. When relevant solicitations are found (e.g., a solicitation for IT services that includes IT product acquisition as a requested contract element), the solicitations are reviewed to determine if contract language specifying low standby products is included. If such language is missing from the solicitation, FEMP offers technical assistance to the agency issuing the solicitation to incorporate low standby into the solicitation and contract award process. Agency contract officers then learn how to incorporate low standby into future acquisition actions, integrating low standby products into the standard acquisition process.

Elements Important for Responsive Program Design

This case study of implementation of Executive Order 13221 has illustrated how these three key program design elements have contributed to the responsiveness of the regulation over time to market and other changing conditions.

First, support of fundamental research to identify standby power consumption in products and which products were of particular interest for the federal sector allowed the program to initially target high-impact products and develop a program structure (e.g., focus on office equipment) that would reduce standby consumption in the federal government and encourage manufacturers to respond. These products were in wide use in the government with relatively high turn over, not highly specialized equipment, and technical specifications that allowed for relatively straightforward reduction in standby consumption. Ultimately this support of research shifted to other areas. Continued research support could allow FEMP to identify new product categories. It could also identify energy savings opportunities as product operating characteristics become more complex; e.g., energy used by networked devices. These areas are currently left unexamined.

Second, Executive Order 13221 entered a field where other regulations existed. This required the program managers to decide how their program would relate to and be situated amongst these other requirements and programs. Originally, FEMP obtained standby consumption data for certain products directly from manufacturers, and for other products from Energy Star. Ultimately, FEMP has come to rely on Energy Star for data for all products. This allows FEMP to leverage the strong market power and testing regime of Energy Star particularly as political circumstances changed regarding manufacturer-reported data, but it also limits the data available upon which federal procurement guidance can be offered.

Third, FEMP program managers have over time paid increasing attention to whether and how purchasers comply with Executive Order 13221. FEMP has no budget (and little authority) for auditing or enforcing federal procurement practices. Original program implementation assumed that federal buyers would automatically comply with federal mandates once product information about low standby consumption was made available. Over time, FEMP has recognized that more than simple information is necessary to change acquisition outcomes. FEMP has therefore partnered with other agencies (e.g., GSA) to change procurement processes and encourage changing procurement actions. This reflects the necessity for iteration and continuous improvement in program implementation over time. If the program had been overly prescriptive at the outset, it would not have been able to accommodate this realization.

Conclusion

Over the twenty years since standby power was first identified as a significant energy load, the federal government has put in place procurement policies and processes that aim to transform the market for priority product categories – notably office equipment. Initial procurement requirements relied on data collected by energy researchers, and the requirements caught the attention of the manufacturing community. In the years since EO 13221 was issued, FEMP has focused on simplifying implementation of the procurement mandate by narrowing its scope (focusing on priority products), integrating the single product attribute of low standby power into broader multi-attribute programs (ENERGY STAR and EPEAT) that also have federal procurement mandates, and incorporating procurement goals into purchasing systems like the federal supply sources and solicitation processes. Arguably that has resulted in higher

compliance within the federal procurement community with regard to the priority products, but it has also reduced the capability of FEMP to understand the broader impact of standby power broadly.

Most energy efficiency programs (at least those with limited resources) face this dichotomy. On the one hand, it is important to have a full understanding of the technology landscape, so continuous data collection is essential to guiding programmatic priorities. On the other hand, data collection is expensive, and implementation efficiency is equally important to program effectiveness. At one extreme is a perfect understanding of the market with an ineffectual mechanism for change, while at the other extreme is an extremely effective program that rapidly loses applicability as technology and consumption patterns change.

There is also the trade-off between "going it alone" and trying to implement a program that uniquely targets the specific issue of interest versus collaborating with broader programs that will not share 100% of the program objectives. Program implementers must balance the needs of their unique program offering with the power of broader but more diffuse market reach.

Ultimately, these tensions must be acknowledged and balanced. By explicitly recognizing the need for both elements throughout a program's life cycle, program implementers can avoid the pitfalls of focusing too carefully on one to the exclusion of the other.

In its implementation of EO 13221, FEMP has faced these trade-offs in an iterative manner: first focusing on identifying product category targets and setting appropriate levels, then on integrating with other market actors (e.g., ENERGY STAR and EPEAT), and finally on compliance (recognizing the interconnections between these elements). At this point the standby levels established by FEMP in its initial response to EO 13221 have in large part been incorporated by the ENERGY STAR or EPEAT requirements. Thus, at this juncture FEMP is in a position to begin identifying new energy efficiency potential through analysis of a broader scope of product categories covered by the federal low standby requirement.

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Disclaimer

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