

# **Reap What You Sow: The Role of a Central Design Authority Framework to Achieve More Aggressive Energy Efficiency Goals**

*Toben Galvin, Ian Smyth, Dimitris Vantzis  
Navigant Consulting, Inc. Vermont, USA / London, UK*

## **ABSTRACT**

The energy efficiency industry has experienced significant growth over the past decade. Recent policy announcements in the United States and the European Union will further increase the role of utilities and governmental agencies to design, deliver, and evaluate energy efficiency programs. Achieving more aggressive energy efficiency savings targets, and maximizing the value of design, implementation, and evaluation efforts requires; innovation, coordination, awareness and prioritization of both sequential and parallel activities. This paper presents the idea of adopting some of the operational principles of a Central Design Authority (CDA) framework. A CDA team is commonly created for large information technology (IT) development projects as a means to ensure; awareness, communication, and coordination of large and complex projects. In the context of demand side management (DSM), a CDA team will help the responsible parties coordinate and effectively plan, implement, and manage the full array of activities required for more effectively meeting more aggressive energy efficiency savings goals.

## **Introduction**

As of April 2014, 25 states in the United States, representing 60% of electricity sales have established long-term Energy Efficiency Resource Standards (EERS) that specify explicit energy efficiency savings targets (ACEEE 2014). The majority of EERS were created as a result of either direct action by state public utility commissions or state legislation. EERS require utilities to comply with energy savings targets that typically are equivalent to approximately 1% of energy sales per year and in several states savings are in the range of 2% to 3% of sales (Navigant, 2014). In June 2014, the United States Environmental Protection Agency issued new Clean Air Act enforcement provisions per Section 111 (d) of the Clean Air Act. If fully implemented, this enforcement will require states to reduce carbon emissions by 30% below 2005 levels, which among other items, highlights the role of energy efficiency to achieve compliance (EPA, 2014).

In Europe, as part of the *Europe 2020 Strategy* that has been formulated by the European Council, the member states of the European Union have targeted to achieve 20% savings on the Union's overall primary energy consumption by 2020, and discussion is underway to revise the target to a 30% reduction by 2030. The European Council concluded in 2011 that the agreed target savings were not on track and actions had to be taken so that the target is met (European Council, 2011). To remedy this, the Commission adopted the Energy Efficiency Plan 2011 that spells out a series of policies and measures covering the full energy chain including; generation, transmission, and distribution (European Commission, 2011). The subsequent Directive on Energy Efficiency of 2012 (European Commission, 2012) aims to establish the legal framework that will complement

the Energy Efficiency Plan 2011 in the effort to achieve the overall objective of saving 20% of the Union's primary energy consumption by 2020.

For utilities and state agencies tasked to comply with EERS, or the European Union energy efficiency directives, coordinating the various components of an energy efficiency strategy, from design, to implementation, to evaluation is a complicated and challenging effort. This paper will review in further detail the role and importance of investing more in coordinated planning, via the formalization of a Central Design Authority internal to an organizations structure, as the internal coordination entity to the various activities of energy efficiency design, marketing, implementation, and evaluation, which will help to facilitate more cost-effective and aggressive energy savings goal attainment.

## **A Central Design Authority Serves as the Coordinating Internal Entity**

A Central Design Authority (CDA) is a common term in large information technology projects or Business Transformation programs that refer to the group of solution architects comprised of technical engineers, statisticians and analysts. The overall function of the CDA team is to design and then preserve the integrity of the solution. Failure to establish an effective CDA can be one common cause of program failure as core functional requirements are not tracked or completed as planned.

Northern Ireland Electricity (NIE) has introduced the idea of a CDA in the coordination and support of the design of Retail Market Arrangements for electricity. NIE recognized that the opening of the Northern Ireland electricity market to full retail competition represents a challenge for the industry, since there needs to be effective design and implementation of programs that can ensure consistency between all market design components. Therefore, NIE introduced a CDA board to perform an administrative, industry-facing role that will support and coordinate the overall market design.<sup>1</sup>

A traditional role of a CDA in a DSM program would be the following:

- Understand the functional requirements of the portfolio savings objectives and develop technical requirements for portfolio operations.
- Design solutions to meet these requirements.
- Manages version control of overall solution approaches and the constituent elements.
- Define elements of the project for execution, build the knowledge blocks, and integrate the outputs that emerge from the activities.
- When variations or modifications to the program are proposed, the CDA conducts impact assessments to ensure that the overall integrity of the program is not compromised.
- Approve changes and modifications to any key portfolio component.

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<sup>1</sup>Northern Ireland Electricity, Central Design Authority <http://www.nie.co.uk/Market-services/Central-design-authority>

As energy efficiency program design challenges become more complex and savings targets increase, the need to maximize the value of investments to achieve those targets will also increase. The level of utility investment in energy efficiency is approaching 10% of utility revenues for some of the most aggressive states in the United States.<sup>2</sup> In this expanding financial environment, with millions of dollars at stake, the need to formalize the coordination, decision making, and planning process becomes more apparent.

The traditional CDA framework is highly “command and control”, and can be effective for targeted projects. However, applying this extreme level of control to the web of interconnected DSM activities would be impossible. Nevertheless, drawing from the general organizing principles of a CDA could be helpful. This paper proposes to modify the concept of the CDA and incorporate portfolio management /coordination functions, as an operational team that represents an Enhanced Central Design Authority (E-CDA). In the context of energy efficiency demand side management (DSM), the E-CDA is a proposed framework for formalizing the planning and coordination of inter-related elements of DSM portfolio management. Unlike a traditional CDA structure which is very controlling and self-contained, the role of the E-CDA is two-fold: 1) To lead the design, development, maintenance, and execution of major portfolio management systems (e.g. benefit-cost screening tools, DSM tracking systems and; 2) To facilitate, not decide, key actions or steps related to the overall portfolio operations. The E-CDA, in an energy efficiency framework serves to track progress toward goals and plays an important role to break down barriers between different organizational departments, while working toward a common goal. The E-CDA may be less effective due to failure to communicate and coordinate activities effectively. The E-CDA will function as a standing group, with representation from implementation, evaluation, marketing, regulatory, and data tracking/reporting. In the DSM environment, formalizing the coordination role of these cross-portfolio roles should help to improve program operations.

The E-CDA plays an important role to advance integrated DSM design planning, in which design is closely coordinated with EM&V (or any other channel of the DSM delivery cycle). While coordination and communication is not a new idea or a controversial goal, effectively achieving the objectives can be challenging. Developing and branding internally within a utility or DSM program administrative entity, the E-CDA framework, provides the venue to help implement the aspirational principles of more effective DSM design, delivery and evaluation. As presented in Figure 1 below, the role of the E-CDA is to be the central platform to bring key internal parties together, facilitate information exchange and prioritization, track progress toward goals, and facilitate the group’s decision making.

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<sup>2</sup> For example, in 2012 the State of Massachusetts in the United States spent approximately 8% of utility revenue on DSM programs. Source: Benchmarking of Efficiency Vermont and Burlington Electric Department 2011 and 2012 DSM Results. Prepared for Vermont Public Service Department by Navigant Consulting Inc. 2014.

**Figure 1. Enhanced Central Design Authority Coordinates Cross-Portfolio Departments**



The E-CDA structure can help to improve DSM organizational and implementation goals in the following ways:

- **The E-CDA and DSM Organization:** In some utility DSM organizations, the work of the evaluation, measurement and verification (EM&V) team is poorly aligned with the program implementation or program design and strategy teams. This lack of collaboration between related organizational branches of a DSM organization can be due to internal politics or simply lack of an organizing framework that forces better awareness and facilitates collaboration and coordination. Often times within EM&V, as well as within the research activities for implementation, discretion is used to prioritize research efforts. In the absence of awareness for critical program design gaps, lost opportunities persist, leading to less than ideal program design and uncoordinated research efforts. Absent a E-CDA framework, EM&V research areas may be prioritizing topics of interest to the evaluators, but that are of less interest, relevance, or need to the program implementation group.
- **The E-CDA, Design Planning, and Leveraging EM&V:** The E-CDA structure provides the opportunity to increase the value and relevance of program design and EM&V, via the coordination and awareness opportunities. For example, an integrated DSM design, fostered with the help of a E-CDA framework, will effectively leverage EM&V resources (as well as implementation resources) to provide more real-time feedback on program operations, as well as apply the market research capabilities of the EM&V team to identify, test, or confirm program design elements; such as measure mix, incentive levels, trade ally

communication strategies, and barrier analysis. Discretionary EM&V budgets, and market research staff, can and should be used to assist the design teams objectives, which are directly coordinated with the needs identified by the implementation teams. Design uncertainties and research needs often can be incorporated into the broader EM&V function without sacrificing core EM&V impact responsibilities. This requires planning and coordination between EM&V and the cross-functional design team, which, if successful, will truly result in EM&V findings that directly inform design changes that all parties agree make sense. Better communication between the evaluators, planners, and implementers, should drive joint interest in cross-cutting research such as energy efficiency baseline or potential studies that have the potential to advance multiple interests. Far too often, we have seen a lack of proper planning and sequencing of deliverables, resulting in portfolio designs submitted to regulators prior to completion of in-process baseline or potential studies representing lost opportunities for improved DSM planning deliverables. The strategy, sequencing, and awareness of the interconnected opportunities from DSM support activities need to be at the heart of the E-CDA.

## **The Role of an Enhanced Central Design Authority in the Context of European Union Energy Efficiency Mandates**

In the context of achieving the European Union's carbon reduction goals, each member state is required to prepare energy efficiency plans and implement a variety of targeted initiatives. The Directive on Energy Efficiency of 2012 establishes legally binding energy saving targets, and as noted in Table 1, provides direction as to how and what member states must do to comply. Member states were required to submit National Energy Efficiency Action Plans (NEEAP) by 30 April 2014 and every three years thereafter. The plans should cover significant energy efficiency improvement measures and describe the expected energy savings. As of June 2014, 18 out of 28 member countries have submitted the required NEEAP plans (European Commission, 2014). The table below summarizes the major components of the directive, each of which will require extensive planning and coordination, which, can be best achieved via the use of the E-CDA concept.

**Table 1. Summary of European Commission Directive 2012/27/EU on Energy Efficiency**

<b>EU Directive</b>	<b>Summary</b>
<b>National Energy Efficiency Targets</b>	Each member state has to set an indicative national energy efficiency target, based on either primary or final energy consumption, primary or final energy savings, or energy intensity.
<b>Public Sector Building Retrofits</b>	Member states need to establish a long-term strategy for mobilizing investment in the renovation of the national stock of residential and commercial buildings, both public and private.
<b>Public Sector EE Procurement</b>	Member states should ensure that central governments purchase only products, services and buildings with high energy efficiency performance, as long as that requirement is consistent with cost effectiveness, economic feasibility and technical suitability.
<b>EE Obligation Scheme</b>	Each member state should set up an energy efficiency obligation scheme. That scheme should ensure that energy distributors and retail energy sales companies ( <i>obligated parties</i> ) operating in each member state's territory achieve a cumulative end-use energy savings target by 31 December 2020. This target should be at least equivalent to achieving new savings each year from 1 January 2014 to 31 December 2020 of 1.5% of the annual energy sales to final customers of all energy distributors or all retail energy sales companies by volume, averaged over the most recent three-year period prior to 1 January 2013 (excluding sales of energy used in transport). Member states shall put in place measurement, control and verification systems under which at least a statistically significant proportion and representative sample of the energy efficiency improvement measures put in place is verified. This process should be conducted independently of the obligated parties. Furthermore, it should be ensured that no double counting occurs when the impact of policy measures or individual actions overlaps.
<b>Energy Audits</b>	Member states shall develop programs that encourage SMEs to undergo energy audits and the subsequent implementation of the recommendations from these audits.
<b>Electricity Metering</b>	Member states should ensure that final customers for electricity, natural gas, district heating, district cooling and domestic hot water are provided with competitively priced individual meters that accurately reflect the final customers' actual energy consumption and provide information on actual time of use. This is a mandatory requirement for replacements of existing meters and new connections made to new or renovated buildings.
<b>High-Efficiency Cogeneration</b>	Member states should carry out comprehensive assessments of the potential for application of high-efficiency cogeneration and efficient district heating and cooling. The assessments should be used in conjunction with policies that encourage the use of such technologies at the local and regional level. The assessments should include a cost-benefit analysis covering the member state's territory based on climate conditions.
<b>Transmission &amp; Distribution System Efficiency</b>	Member states should ensure that national energy regulatory authorities encourage the implementation of energy efficiency improvement measures through tariffs and regulations aimed towards the grid operators. Furthermore, member states should ensure that an assessment is undertaken by 30 June 2015 of the energy efficiency potential of their gas and electricity infrastructure and that concrete measures are identified for the introduction of energy efficiency improvements.
<b>Accreditation &amp; Information Dissemination</b>	Member states should ensure that certification and accreditation schemes are in place for providers of energy services, energy audits, energy managers and installers of energy-related building elements. It should be also ensured that information on available energy-efficiency mechanisms and financial and legal frameworks is available and widely disseminated.
<b>Financing</b>	Member states should facilitate the establishment of financing facilities, or use of existing ones, for energy efficiency improvement measures.

Achieving the ambitious and multi-faceted European Directives, or achieving aggressive energy efficiency savings in the United States and elsewhere, will be more likely to succeed with effective planning and organizational management and coordinated decision making as inherent in the structure of an Enhanced Central Design Authority conceptual framework. The next section of this paper presents additional detail on how to establish an E-CDA within a DSM organization, and what are some of the likely areas for coordination.

## **E-CDA's Role in DSM Portfolio Design and Evaluation**

Establishing an E-CDA team within a DSM organization, or cross-organizations, should include mid-level representatives from the utility strategy group, regulatory, evaluation, marketing, and implementation teams. The E-CDA is tasked to ensure coordination and tracking of the array of interrelated activities and design, development, and maintenance of key DSM tracking systems and tools. With an E-CDA, decisions on how, if, and where to proceed on an item should be more informed and justified. However, final decision making is still delegated to the specific departments. In an organization that emphasizes integrated design, and successfully achieves the vision of an E-CDA, the following activities are to be expected within DSM organizations:

- The E-CDA is responsible for design, development, and maintenance of key portfolio tracking and management software systems (i.e. benefit-cost screening tools, portfolio tracking and reporting systems, portfolio design and optimization planning tools, etc.). These functional tools and systems need to be available, functional, and up-to-date, to support the array of portfolio activities. Many times, systems are not maintained or simply updated as needed, just before a critical due date. When this occurs, limited time and budgets are spent addressing fundamental tools or system update issues, reducing the available time to focus on product enhancement or innovation.
- The E-CDA assists to identify that sufficient time and resources are allocated to ensure discrete deliverables (e.g. baseline studies, potential studies, impact and process evaluations, etc.), capture core design inputs, and preferably, are customized to inform design gaps or market or programmatic issues.
- Review of the logic and purpose for allocating discretionary budgets. For example, helping to ensure discretionary market research or evaluation projects are coordinated and targeted to address design gaps or implementation barriers. For example; identifying underperforming programs, underserved market segments, programs with high free-ridership, and testing solutions and strategies to enroll first time participants.
- Monitor measure characterization efforts to ensure they reflect the most current and anticipated changes in codes and standards, including revising deemed savings included in a technical reference manual (TRM).
- High-level tracking and monitoring market outreach strategies, such as; promotional campaigns, targeted mailing, and trade ally motivation events.
- Coordinating emerging technology research
- Reviewing the strategy and timeline for pilot testing of innovative approaches for marketing or delivering programs, or designing new program areas, such as formalizing

ways to claim savings by supporting adoption of local, state, and federal codes and standards, or energy use behavior modifications strategies.

- Reviewing stakeholder engagement plans across various forms, including focus groups, surveys, and interviews (in person, phone, or web-based) with trade allies and customers, to get input on program changes or potential innovations and if possible, formal support for the plan during the regulatory approval process.
- Ensuring regulatory requirements are addressed in the DSM plan and program implementation manuals reflect new and improved approaches to design and delivery.

As noted, DSM design, delivery, and evaluation is a complex endeavor. Many DSM organizations are successfully balancing the multiple channels, while others are struggling, not necessarily with achieving the savings target, but struggling with maximizing savings opportunities, and the value of related research and design activities to support the implementation.

## **Challenges in the Implementation of the E-CDA model**

Considering the fact the E-CDA is responsible for facilitating the overall DSM portfolio, and component programs to its true purpose, the people who can actually be part of a CDA board are very difficult to find in an organization. It is expected that such people will be able combine experience and breadth in technical knowledge, but at the same time being able to combine strategic thinking. E-CDA board members need to also have a good understanding of processes, and contextualize implementation with design. It can be argued that a E-CDA that doesn't combine all the above elements is destined to harm rather than benefit program design and implementation.

Furthermore, a key consideration is the timing of the introduction of the E-CDA in a portfolio. Ideally, the E-CDA needs to be part of the portfolio or program from its inception in order to allow it to become a central part of the organizational structure. Introducing the E-CDA concept at a delayed stage in the program or at a limited scale negates the purpose of the E-CDA and takes away its main characteristic, which is to facilitate the design of the program and anchor its implementation, and associated support activities (i.e. EM&V) to the initial design principles. As such, if launching an E-CDA within an existing portfolio, time must be invested to educate all organizational stakeholders of the role and purpose of the E-CDA as a major new strategic initiative, whose purpose is to facilitate better decision making among all key stakeholders in the organization.

## **Conclusion**

Implementing the array of requirements specified in the European energy efficiency directives is an example of where an Enhanced Central Design Authority (E-CDA) can be a centerpiece of a member state's compliance plan. With member representation drawing across the spectrum of key stakeholders, information would be shared more easily, progress toward goals tracked would be more fluid, and economies in approach and cross-functional research identified



and coordinated. In a similar manner, expanding energy efficiency portfolios and compliance with the U.S. EPA's 111 (d) carbon reduction goals or Energy Efficiency Resource Standards also presents opportunities for an E-CDA to assist with coordination and maximize the value of state or utility initiatives to achieve targets. Maturation and expansion of the size and scale of the energy efficiency industry requires increased formalization of processes to help ensure effectiveness and value of targeted initiatives. An E-CDA team can provide a level of formality and focus to help bridge communications across diverse internal or external stakeholder groups. Breaking down the internal barriers within organizations, and increasing awareness and collaboration through the E-CDA framework will help to advance improved DSM program design, marketing, implementation, and evaluation activities.

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