

# Participation: A Performance Goal or Evaluation Challenge?

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## ABSTRACT

Reaching customers who have not participated in energy efficiency programs provides an opportunity for program administrators to reach higher levels of savings. Increased participation also serves to distribute the benefits of rate-payer funded programs across a larger population, ameliorating rising issues of customer equity and increased budgets. To push Program Administrators to look for a breadth of savings opportunities, some have advocated for regulators to require participation goals.

The rush to a new metric for program performance, however, overlooks the lack of consistency and accuracy in accounting for participation. As part of a model of how energy efficiency affects Rhode Island customers' bills, I performed an analysis of historical participation data that removed the overlap across programs and time. Unique account information available for several programs allowed for significant insight, but upstream residential lighting programs captured no customer-specific data.

The lack of lighting participation data precluded the exact determination of the number of individuals who participated in any program in a given year, the ostensible target of a participation goal. For participation numbers to be eligible as a regulated goal, there must be consensus on whom to count and how to count them. Without guidelines, participation numbers could be misleading and not representative of program performance. My paper will review in more detail my analysis and areas for improved research and evaluation before commenting on what is feasible and reasonable for using participation as a regulated goal.

## Introduction

Between 2011 and 2014, the target for National Grid's electric energy efficiency programs in Rhode Island, where the company is the sole gas and electric program administrator, increased from 1.36% to 2.5% of 2009 sales (RI PUC, 2010). The targets were developed by the Energy Efficiency and Resource Management Council, which has statutory oversight of utility-led energy efficiency programs in Rhode Island. This structure follows the Least Cost Procurement provisions of Rhode Island General Law (R.I. Gen. Laws §39-1-27.7). Accelerating the reduction in energy consumption, this ramp-up required complementary increases in budgets. While the number of customers benefiting from the efficiency services grew and cost-effectiveness was never in jeopardy, the rate of increase and magnitude of the budgets elicited concern from the Division of Public Utilities and Carriers ("the Division"), regulators tasked to advocate for rate-payer concerns.

The rate mechanism used to collect efficiency funds, the System Benefit Charge, has been commonly perceived by regulators as a measure of the economic cost to customers for the sake of efficiency. Load reduction from energy efficiency programs, however, yields benefits beyond the direct energy savings to program participants: commodity and capacity charges fall to meet demand and future capital investments in transmission and distribution are reduced. To illustrate the hidden benefits of efficiency investments, the consultant for the Division developed a model of electric efficiency programs' effects on customer bills (RI PUC, 2014). The effort required the integration of rate structure modeling and efficiency program savings and

participation data. National Grid prepared and organized historical customer participation and savings data from its efficiency programs for use as inputs to ensure the bill impacts model was robust and accurate.

Our research and analysis of the participation data demonstrated trends in program participation that have since become important in an ongoing conversation between National Grid, energy efficiency stakeholders, and regulators on participation and program design in Rhode Island. The budgetary concerns that led to this analysis have also raised questions from the Division on the equity of energy efficiency programs and the potential need for participation goals to guide the distribution of program benefits. After providing some background on how energy efficiency participation is defined in National Grid’s Rhode Island programs, trends in historical participation will be reviewed and explained. Finally, the paper will conclude with comments on how program administrators, regulators, and stakeholders should approach a discussion of participation goals.

## Defining Participation

While National Grid has historically tracked and reported program participation data with energy savings, Rhode Island regulators have never made it a performance metric. The unique billing account information of customers who have received incentives for purchasing efficient equipment is the preferred unit for counting participants, but the data has always come in myriad definitions that align with program designs. Below, Table 1 outlines these definitions for both the commercial and residential sectors.

Table 1. Participant definitions

Sector	Program	Participation Unit
Residential	HVAC	Unique Billing Account
	Behavior	Unique Billing Account
	Single Family Audit	Unique Billing Account
	Low Income Single Family Audit	Unique Billing Account
	Multifamily Audit	Housing Units
	Low Income Multifamily Audit	Housing Units
	Appliances	Rebates
	Lighting	Calculated Households
Commercial	Large Commercial New Construction	Unique Billing Account
	Large Commercial Retrofit	Unique Billing Account
	Small Commercial	Unique Billing Account
	Upstream Lighting	Customer Name and Address

Source: National Grid 2013.

For the residential appliance program, processed rebates, which frequently lack requested account information, serve as the unit of account. Multi-family buildings often have master accounts for the whole building, so for the multi-family audit program, the number of housing units is the measure of participation.

In National Grid’s residential lighting program, the cost of efficient lamps and fixtures is reduced at the retail level, upstream of the consumer, obviating the need for a rebate. Distributors, however, cannot share information on who bought lighting due to privacy concerns, so participation must be estimated. In Rhode Island, National Grid assumes a participant purchases five bulbs in a year, a factor based on third-party market research (Cadmus, 2011). A version of this upstream model focused on commercial customers has been developed over the past few years, capturing more customer-specific information, but not to the unique account level. For all other commercial programs and the residential HVAC and behavior programs, unique account information is collected.

The commercial and residential upstream lighting programs are massive sources of savings and participation, but the lack of unique account information makes it impossible to determine which customers participate and to what degree they benefit. The question of how much customers benefit becomes more complicated when one accounts for program overlap. A customer who receives a home audit can, hypothetically, purchase discounted appliances and lights, thereby being counted as a participant in three different programs.

## Participation Trends

To better understand how often customers participate in multiple programs, we began with fifteen years of participation data available at the unique account level for all of National Grid’s residential and commercial programs. For the period of 2010-2012, we found the overlap of unique accounts appearing in participation data for National Grid’s single family home energy audit, multifamily home energy audit, low income home audit, appliance, and HVAC programs. Only the three most recent years of data were used because prior to 2010, only a few of the current programs were in existence. The rates of this cross-program overlap, characterized as the overlapping unique accounts as a percent of combined program accounts is displayed below in Table 2.

Table 2. Residential cross-program overlap (overlapping unique accounts as percent of combined program accounts)

Program	2010	2011	2012	2010-2012
Standard Income Multifamily Audit & Appliances	0.03%	0.09%	0.01%	0.04%
Single Family Audit & HVAC	1.65%	4.30%	2.16%	2.39%
Single Family Audit & Appliances	0.63%	2.47%	3.52%	2.70%
HVAC & Appliances	0.00%	0.02%	0.14%	0.08%
Singe Family Audit, HVAC, & Appliances	0.03%	0.11%	0.12%	0.10%
Low Income Single Family Audit & Appliances	0.00%	0.02%	0.17%	0.09%
Low Income Single Family Audit & HVAC	0.00%	.00%	0.00%	0.00%

Source: National Grid 2013.

The two rebate-based programs, HVAC and appliances, had minimal common participants between them, on average less than .1% of the number of participants in both programs from 2010-2012. The single family home energy audit program, however, had slightly

higher average rates of overlap with both the HVAC and appliance programs between 2010 and 2012, 2.39% and 2.70% respectively. The low income and multifamily audit programs, though, had almost no overlap with the rebate programs. In addition to installing efficient lights and weatherization, the home auditors promote the HVAC and appliance programs. Customers with sufficient income, therefore, should be expected to participate in additional programs.

National Grid segments its commercial programs into two demand-based classes, large commercial, for customers with greater than 200kW peak demand, and small commercial, for customers with less than 200 kW peak demand. Two programs, one focused on retrofits and the other on new construction and major renovations, target large commercial customers. A third program is devoted solely to the small commercial customers. Since 2012, the aforementioned commercial upstream lighting initiative has been developed within the large commercial new construction program. Small commercial customers are not barred from participating, however, so in our analysis, we attempted to treat the upstream service as a separate program to provide better granularity on cross-program overlap. Customer-specific data collected in this upstream lighting initiative was often incomplete or incorrect so the conclusions on how it contributed to overlap are estimates. It was found, though, that a small amount of customers who participated in the retrofit program and new construction program in 2012, .97% and .14% respectively, also participated in the commercial upstream lighting initiative. With improved data collection and an increase in the size of the program, more recent data would more likely show a higher rate of overlap.

The most significant instance of cross-program overlap found in the commercial sector was between the retrofit and new construction programs. For any given year since 1998, between 5%-8%, and on average 5.76%, of total participants in the two programs have participated in both. Table 3 below details the cross-program overlap, the amount of participants common to two or more programs in a given year, from 2008-2012 for all commercial programs.

Table 3. Commercial cross-program overlap (overlapping unique accounts as percent of combined program accounts)

Program	2008	2009	2010	2011	2012	2008-2012
Small Commercial & Large Commercial Retrofit	0.73%	0.20%	0.70%	.63%	0.46%	0.53%
Small Commercial & Large Commercial New Construction	0.00%	0.13%	0.18%	0.31%	0.40%	0.24%
Large Commercial Retrofit and Large Commercial New Construction	5.19%	5.22%	.27%	7.09%	5.11%	5.76%
Large Commercial Retrofit and Upstream Lighting	N/A	N/A	N/A	N/A	0.97%	0.97%
Large Commercial New Construction and Upstream Lighting	N/A	N/A	N/A	N/A	0.14%	0.14%
Small Commercial and Upstream Lighting	N/A	N/A	N/A	N/A	3.09%	3.09%
Small Commercial, Large Commercial Retrofit and Large Commercial New Construction	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Large Commercial Retrofit, Large Commercial New Construction, and Upstream Lighting	N/A	N/A	N/A	N/A	0.00%	0.00%
All Commercial Programs	N/A	N/A	N/A	N/A	0.00%	0.00%

Source: National Grid 2013.

A small amount of overlap does exist between the small commercial program and each of the large commercial programs, annually less than 1% of the two programs' participants for both cases. While any customer with greater than 200kW peak demand is not eligible for the small commercial program, customers with less than 200kW peak demand occasionally have needs that require the services of the large commercial program, such as with large equipment like HVAC systems or chillers.

The extent of cross-program overlap in the commercial sector suggests that an efficiency program can better be seen as a pathway for services and not as a resource for a particular customer segment. When considering how benefits are distributed amongst customers, the extent to which some participate in multiple programs becomes more important. Some participants benefit more than others, not just due to the manner of participation (e.g. lighting installation versus a combined heat and power), but also due to the frequency.

Complementary to the question of how frequently customers participate in multiple programs in one year is how often they participated in the same program the year before. An

analysis of the same dataset, historical residential and commercial program participation data for 1998-2012 found the frequency of this cross-year overlap, displayed below in Table 4.

Table 4. Cross-year overlap (average percent of program participants who participated in the same program the year before)

Sector	Program	Overlap Rate
Residential	Lighting	10.0%
	Products	1.9%
	HVAC	5.2%
	Standard Income Single Family Audit	4.3%
	Standard Income Multifamily Audit	8.6%
	Low Income Multifamily Audit	7.1%
	Low Income Single Family Audit	7.6%
Commercial	Small Commercial	4.1%
	Large Commercial Retrofit	16.3%
	Large Commercial New Construction	11.2%

Source: National Grid 2013.

For the residential rebate-based programs (appliances and home heating and cooling equipment), on average 1.9% and 5.2% of participants in any given year had participated the year before. For the home audit programs, regardless of customer income or building type, the repeat participation rates were higher: 4.3% for standard income single family customers, 8.6% for standard income multifamily customers, 7.1% for low-income multifamily customers, and 7.6% for low-income single family customers. None of the programs allows for customers to receive audits in consecutive years, though, so the results at first seem indicative of unenforced policies. Each data point, however, did not correspond to an audit. Weatherization and other follow-up work do not always occur in the same calendar year as the initial audit and are recorded separately.

The dearth of any unique customer information for residential lighting purchases prevented any determination of repeat participation rates in the lighting program. For the purposes of the Division’s bill impact model, 10% was agreed upon as a working assumption. If program administrators were able to gather more metadata on purchases from distributors or if market research could improve the bulbs per person estimate, an understanding of the repeat light program participation could be improved.

In the commercial programs, repeat participation within a program in consecutive years was more common. As seen above in table 4 above 4.1%, 16.3%, and 11.2% of participants in the small business, large commercial new construction, and large commercial retrofit programs respectively had, on average, participated the year before from 1999 to 2012. Both the characteristics of large customers and the nature of their efficiency projects contribute to the frequency of participation in consecutive years. Due to the time-scale of new builds, major renovations, and retrofits, some commercial customers have an extended period of participation. The installation of one energy-saving measure may occur months before the final phase of construction when another measure comes online. If this period spans December and January, the customer will be recorded as a participant in two years.

Customers that have campuses or have multiple buildings associated with an account, such as universities, hospitals, municipalities, industrial facilities, and manufacturers likely have

an array of inefficient equipment, a stock of potential energy efficiency projects. Their scale of consumption also warrants repeat participation so that they can achieve the same level of energy savings a small commercial customer could receive from a single project.

Large customers often have the means to allocate time and resources to develop these projects and to coordinate with utility efficiency programs. Participation, therefore, becomes part of their operations. Program administrators come to view these customers as a consistent source of energy savings and return to them each year to develop more projects. While this method of project development constitutes logical and efficient program implementation, the degree of repeat participation in the large commercial programs does suggest a possible dependence on a subset of customers. More research into the amount of energy savings from these repeat customers may offer more insight into potential overreliance.

## **Participation Goals**

The various definitions of participation, the gaps in participation data, and the constraints to determining the overlap across programs and time all suggest that a regulated participation goal is a complex task and warrants discussion prior to adoption. Participation goals could take multiple forms: total participants, participants by rate class, participants in a geographic area, participants in certain programs, or the number of participants who have previously never participated. Whatever the metric, it will only have meaning in the context of the population eligible for participation.

While the total number of customers eligible for energy efficiency programs is not difficult to determine, the number of customers eligible for an individual program is more complex because those customers may represent multiple rate-classes. Low-income customers and small businesses could feasibly purchase upstream lights that target and are tracked for regular residential customers. To qualify for National Grid's low-income programs, customers must have a household income below a certain threshold. The screening process, however, is less exclusive than that for National Grid's discounted low-income rate class. The population eligible for low-income efficiency programs, therefore, exceeds the population on the low-income rate. In multi-family buildings, units do not always have their own billing accounts. The number of inhabitants, who may also be purchasing incentivized bulbs and appliances, may not be known or ever available to program administrators, thereby limiting an estimate of eligible populations and program overlap.

If reliable estimates of eligible participants were determined, a program that had both savings and participation goals would, in effect, have an average savings per participant imposed on it. When it develops plans for efficiency programs, National Grid estimates program participation targets based on historic savings per participant, framing participation as a result and an intent of energy savings. Program administrators have to adapt to market conditions, adjusting incentives and services to meet demand and to assure the achievement of savings goals. Having to also meet fixed participation goals could, therefore, reduce program flexibility. When program administrators must meet portfolio level goals, underperformance in one program necessitates overperformance in another. Budgetary transfers can facilitate this portfolio balancing, but the added constraint of a participation goal could lead to a trade-off between savings and participation goals.

A potential reason for establishing participation goals is to encourage program administrators to break into hard-to-reach markets (e.g. geographic areas, renters, low-income households, and customers who do not speak English as a first language). Delivering services to these customers often requires additional incentives and outreach efforts, resulting in a higher

cost of saved energy. Identifying markets by non rate-class terms such as language or income introduces uncertainty into the quantification of eligible populations.

Program administrators may respond to high participation goals by targeting customers with low cost and low savings measures in order to hedge against the possibility that program designs that seek greater depth in savings will fail to reach the participation goal. The average quality of service could then decline.

These scenarios are not inevitabilities of having participation goals, but their consideration is prudent since program design is a function of both savings and participation and one cannot be discussed without the other.

## **Recommendations**

As efficiency program budgets grow, the equity of the distribution of benefits and costs will be of greater concern to regulators and program administrators will benefit from taking a proactive role in the discussion of participation goals. First, they can make the accounting of participation more transparent and educate regulators and stakeholders on the complexity of the issue. Merely defining participation could mitigate regulators' concerns over what program administrators are recording as program achievements. Next, researching the populations eligible for participation and the overlap of participation across programs and time and then making those findings transparent to stakeholders and regulators could increase awareness of the uncertainty and complexity of analyzing participation. Program administrators will likely benefit from this research as well because it will provide information useful to program design. Whether participation goals are established or not, program administrators should only count participation that is attributable to the program's presence so that it can be considered with savings in equivalent terms.

Unlike the reporting of net energy savings, participation reporting has never factored in free-ridership, which accounts for those who would have purchased an efficient device without the efficiency program and spill-over rates, which account for participants investing in efficiency outside of the program and non-participants who install efficiency equipment only from awareness of efficiency programs. These market effects, aggregated in a net-to-gross factor, are important for energy savings because they adjust the estimated gross savings to what is attributable to the existence of the efficiency program.

For the purposes of estimating the effects of efficiency programs on customer bills, it was necessary to use these 'net participant' numbers, because otherwise, too few savings would be associated with each participant. For each residential and commercial program, National Grid developed a participation net-to-gross factor that was an average of measure-level net-to-gross factors weighted by those measures' energy savings in 2012. Program administrators should consider applying net-to-gross factors to their program-level participant counts to better illustrate what participants are attributable to the efficiency program's presence.

Clarity on what concerns regulators and stakeholders have about participation and what the intended effects of participation goals are could allow for a discussion on alternative means of improving participation by program design. Allowing program administrators to focus on mutually-agreed upon changes to program design could be more resource efficient than having them react to participation goals. Improved reporting requirements that do not go so far as setting goals could also serve as an appropriate compromise between regulators and program administrators.

It is also appropriate to limit any participation goals to programs of interest and to not go through unnecessary analytical and reporting exercises. It is very important that any goals are



calculated relative to historical trends of savings per participant, as National Grid currently does with its estimates of participation. Program design is sensitive to both participation and savings numbers so adjusting one metric necessitates adjusting the other accordingly. Including program administrators in the development of the goals will incorporate their understanding of shifting markets and likely make them more comfortable with the final goals. Increasing participation is an implicit aspect of reaching increased energy savings goals and the prospect of reaching more customers is desirable for program administrators. Being constrained in how to reach those customers and being closed out of determining what a feasible goal for participation is, however, could cause program administrators to dissent. A better approach may be to establish a framework for determining participation reporting requirements and or goals that addresses the program design-related concerns of program administrators and recognizes the complexity of accounting for participation.

## **Conclusions**

An analysis of historical efficiency program participation data can yield insights into program design and customer needs that will benefit program administrators in developing their portfolios. The establishment of program participation as a regulated goal for efficiency portfolios, however, could adversely affect program design. Program administrators, should, however, take a proactive role increasing transparency on participation definitions and trends to improve regulator and stakeholder understanding of the impact of efficiency programs. Programs administrators should also apply net-to-gross factors to participation counts to better represent what is attributable to efficiency programs and to provide information fundamental to understanding the equity of the distribution of efficiency benefits.

## **References**

- Cadmus Group, Inc. and NMR Group, Inc. 2011. Results of the Multistate CFL Modeling Effort. Prepared for National Grid.  
<http://www.riermc.ri.gov/documents/evaluationstudies/2011/FINAL%20RI%20CFL%20Modeling%20Report%20041511.pdf>
- National Grid. 2013. InDemand [Energy efficiency database]. Unpublished raw data.
- R.I. Gen. Laws § 39-1-27.7
- RI PUC (Rhode Island Public Utilities Commission). 2010. EERMC's Introduction and Summary of Proposed Energy Efficiency Savings Targets. Docket No. 4202.
- RI PUC (Rhode Island Public Utilities Commission). 2014. Division – Memorandum of Tim Woolf. Docket No. 4443.