DYNAMIC MODELING OF MARKET EFFECTS AND SPILLOVER WITH LIMITED INFORMATION

Miriam L. Goldberg and G. Kennedy Agnew, KEMA-XENERGY Inc.

Introduction

Diffusion models have been used by various authors to estimate effects of market transformation programs. Mast[1] describes how a "market barriers" framework can be translated into a Bass[2] diffusion model. Sebold et al.[3] present a general dynamic modeling framework for assessing effects of market transformation programs. Other authors (e.g., Reed and Hall[4]) have applied the Rogers[5] diffusion model for this context.

The advantage of diffusion models for market effects assessment is that the models can project effects over a long span of time. This long time frame is essential to valuing market effects appropriately. The accompanying challenge, however, is that it is difficult to specify models accurately at early stages of a program.

The 2001–2002 Business Programs of Wisconsin's Focus on Energy offer a further challenge for market effects estimation. While most market transformation programs are oriented to a particular technology and market, the Focus Business Programs were intended to promote energy efficiency broadly across the commercial, industrial, and agricultural sectors.

This paper presents a framework for estimating ultimate savings due to market effects from such diffuse programs. The paper follows the conceptual approach of Sebold et al. in certain key respects:

- A dynamic model is estimated with and without the program. The difference between the with- and without-program cases is the effect of the program.
- The same model can, in principle, be used from an early planning stage of the program through preliminary evaluation based on early indicators and final retrospective evaluation. At an early stage of the program, the model parameters cannot be determined with accuracy. However, the model provides a framework for articulating what magnitude effects are plausible. As the program progresses, the model parameters and even structure can be refined based on new findings.

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[1]Mast, B. 1999. "Why Can't We All Just Get Along? A Reconciliation of Economic and Innovation Diffusion Perspectives of Market Transformation." *Proceedings of the 1999 International Energy Program Evaluation Conference.* Chicago, Ill.

[2] Bass, F. M. 1969. "A New Product Growth Model for Consumer Durables." Management Science, 15 (January), 215–227.

[3] Sebold, F. D., A. Fields, L. Skumatz, S. Feldman, M. Goldberg, K. Keating, and J. Peters. 2001. "A Framework for Planning and Assessing Publicly Funded Energy Efficiency." Prepared for Chris Ann Dickerson, Pacific Gas and Electric Company, Study ID PG&E-SW040.

[4] Reed, J. H., and N. P. Hall. 1998. "PG&E Energy Center Market Effects Study." Prepared for Traci Grundon, Pacific Gas and Electric Company, Contract No. 4600006483.

[5] Rogers, E. 1995. "Diffusion Innovations, 4th edition." New York: Free Press.

The new steps taken in this paper include the following:

- The model does not just track market indicators over time; rather, it estimates the ultimate effect of interest, namely increased energy savings.
- We provide a flexible model form that can be used even for programs that promote a general disposition to adopt energy efficiency, rather than specific technologies.
- We estimate model parameters for a specific set of programs, to provide explicit estimates of market effects energy savings over a 25-year period. The parameter estimates are based on a combination of historical trends, market baseline information, and surveys with program participants.
- We integrate a "demand-side" model of end users' increased propensity to adopt energy efficiency with a "supply-side" model of vendors' increased disposition to promote energy efficiency.

We refer to the analysis as "pro forma" because of the preliminary nature of the estimates. One reason is that some of the initiatives that have the greatest market transformation emphasis within the Focus Business Programs were still in early stages of development at the time of the analysis. Moreover, even for those program activities that were better established, too little time had elapsed to provide empirical evidence of likely lasting changes resulting from the program.

Thus, a key purpose of this analysis is to establish a framework for thinking about what magnitude of effects are plausible under varying assumptions. Despite these uncertainties in the quantitative results, a benefit-cost analysis conducted for these programs[6] required projections of market effects savings. The analysis presented here provided these projections.

General Structure of the Analysis

The analysis captures several types of market effects:

- Participating end-use customers installing additional measures outside the programs ("partner" spillover);
- Participating suppliers selling additional energy efficiency measures outside the program ("program ally" spillover); and
- Nonparticipating end users or suppliers buying or selling additional energy efficiency measures compared to what they would have without the programs.

The analysis projects adoptions of energy efficiency measures (outside the program) with and without Focus over a 25-year time frame. The difference between the adoption rate with and without Focus is the adoption attributable to Focus. These incremental adoptions are then translated into streams of energy savings.

The economic and cost-benefit analyses conducted separately for Focus specified an assumption that the programs would operate for a period of 10 years, and then be discontinued. Those analyses also required that the effects of these programs be modeled for a period extending 15 years after the end of the program. These assumptions are used for this market effects analysis.

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[6] Focus Evaluation Team (KEMA-XENERGY Inc.). 2003. "Focus on Energy Statewide Evaluation: Initial Benefit-Cost Analysis." Prepared for Wisconsin Focus on Energy, Department of Administration, Division of Energy, Madison.

Unlike many programs with market transformation objectives, the Focus Business Programs are not, in general, oriented to specific technologies. Their market transformation goals are related to increasing end-users' tendency to choose energy-efficient options. Thus, for most of the programs, the effects modeled are end-users' disposition to choose energy-efficient alternatives, and suppliers' sales share of energy efficiency in general. This increased disposition or sales share is then translated into incremental energy savings.

The end-user analysis is conducted separately for each of the Business Programs or, in a few cases, for a group of programs. The supplier analysis is conducted at the sector level since supplier effects are not limited to a particular end-user segment or program, as well as because of limited data that would allow finer differentiation.

Methodology

What Effects Are Modeled

The methodology presented here is designed to provide estimates of incremental energy efficiency implementation over time due to market effects. This implementation is quantified in terms of first-year avoided costs due to the energy savings. Costs and benefits of the stream of energy savings resulting from this implementation over the measure life are quantified in the separate benefit-cost analysis.

Market effects leading to increased energy efficiency adoption are modeled separately for end users and suppliers. End-user market effects are increased adoption of energy-efficient products or methods by end users outside the program, resulting from the program. Supplier market effects are increased sales of energy efficiency goods and services. In principle, these effects coincide: any end user who implements energy efficiency measures outside the program implements them through a supplier, and any supplier who sells additional energy efficiency outside the program sells it to an end user (or to another step in the chain that will end at an end user).

At this stage of development of the methodology, end-user and supplier market effects are modeled separately. End-user market effects modeled capture the effect of Focus in making both participating and nonparticipating end users more disposed to adopt energy efficiency as a matter of practice or policy. Supplier market effects modeled are the participating suppliers' increased ability to sell energy efficiency to end users who are not necessarily disposed to buy it. When the two results are combined, an adjustment is made to avoid double-counting the increased sales by program allies to end users who have become more disposed to energy efficiency.

The end-user methodology is based on a diffusion model of energy efficiency adoption with and without Focus. As noted, the Focus Business Programs are not in general oriented to specific technologies. Their market transformation goals are related to increasing end-users' tendency to choose energy-efficient options. Thus, the basic diffusion process modeled is a disposition to choose energy-efficient alternatives. This increased disposition is then translated into incremental energy savings.

The diffusion model captures both the effects of participant spillover and nonparticipant market effects. Participant spillover is participants' implementation of additional energy efficiency measures without Focus because of their participation. Nonparticipant market effects savings are additional energy efficiency implementation by nonparticipants that results from Focus through word-of-mouth effects and/or supply-side changes.

The supplier market effects are modeled in terms of increased sales by program allies only. This involves a simpler model structure than the end-user diffusion model.

End-user Model

The end-user diffusion model consists of the following components:

- The fraction of the market disposed to choose energy-efficient alternatives when buying energy-using equipment estimated by the diffusion model for Focus and non-Focus projections;
- The fraction of the market that makes a major energy-related purchase each year estimated from Baseline Survey data[7];
- The fraction of those disposed to choose energy efficiency who actually do buy energy efficiency when they make an energy-related purchase estimated from Baseline Survey data; and
- The average (first-year) savings per project implemented based on the impact evaluation results to date; and
- An assumed decay rate.

Steps in the end-user analysis are as follows.

1. A diffusion model is specified. This model gives the fraction of the market that is disposed to choose energy-efficient alternatives when buying energy-using equipment for each year in the time frame modeled.
2. The parameters of the diffusion model in the absence of Focus are calibrated based on Baseline Survey data.
3. The parameters of the diffusion model with Focus are estimated based on participation levels and the preliminary survey findings on potential lasting changes to participants as a result of Focus.
4. The diffusion model is calculated for the with-Focus and without-Focus conditions. The difference for each year of the time frame is the incremental effect of Focus.
5. The incremental first-year savings implemented each year due to market effects is calculated as the product of the following factors:
   - The incremental disposition to energy efficiency,
   - The fraction who do a major project each year,
   - The fraction of those disposed to energy efficiency who purchase energy-efficient alternatives when they do a project, and
   - The average savings per project implemented.

Supplier Analysis

The supplier model estimates additional energy efficiency sales by program allies outside Focus but resulting from the programs. (Increased energy efficiency sales outside the program by

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[7] KEMA-XENERGY Inc., Energy Center of Wisconsin, Opinion Dynamics Corporation, Prahl and Associates, and TecMRKT Works. 2002. Prepared for Wisconsin Focus on Energy, Department of Administration, Division of Energy, Madison.

nonparticipating suppliers are accounted for in the increased end-user purchases). The supplier model combines:

- The proportional increase in energy-efficient sales by program allies outside Focus as a result of the program,
- Estimated current energy efficiency sales by program allies expressed as first-year avoided cost, and
- An assumed decay rate.

The product of these terms gives the annual increased efficiency sales by program allies for each year of the program.

The increase in energy efficiency sales due to Focus is estimated from data collected on a survey conducted with Program Allies. To estimate current energy efficiency sales, the in-program savings for Program Year 1 that was implemented by a program ally is determined from the tracking data. This in-program total is adjusted by the fraction of program ally efficiency sales that was in Focus based on the Program Allies Survey.

Combined End-user and Supplier Analysis

The end-user diffusion model operates as if the only changes to the market are in end-user disposition to adopt energy efficiency. The supplier model operates as if the only changes are in supplier ability to sell energy efficiency. While both effects must be accounted for, it is also necessary to avoid double counting the effects of end users who are more disposed to energy efficiency because of Focus. That is, end users who are working with suppliers who are selling more energy efficiency because of Focus.

A more complete model might integrate the end-user and supplier effects by modeling them jointly and interactively. For the present analysis, we use a simple approach to merging these effects. We assume that a certain fraction of end-user market effects savings is associated with program allies. This fraction is not counted in the combined analysis, because these savings are assumed to be accounted for in the supplier effects. Thus, the combined analysis takes the sum of the estimated supplier effects and the estimated end-user effects minus the portion of end-user effects assumed to be included in the supplier effects. Calculation of this overlap portion is described below.

End-user Model Specification

Diffusion Curve

The diffusion curve used for the end-user analysis is of the form

$$f_t = (1-d)f_{t-1} + p(1-f_{t-1}) + qf_{t-1}(1-f_{t-1}) ,$$

where

f_t = fraction of the market disposed to energy efficiency in year t,
d = decay rate,
p = parameter indicating the effect of direct promotion or external influence, and
q = parameter indicating the effect of word-of-mouth or internal influence.

Without the decay rate, this Bass diffusion model has been used extensively in modeling product adoption.[8] The decay rate is included in the model because the "disposition" that is diffusing is reversible and would be expected to fade without reinforcement.

The model indicates that in each year the fraction f_t disposed to energy efficiency is some fraction (1-d) of those who were disposed in the previous year (f_{t-1}), plus a portion p (dependent on current promotional activity or external influence) of those who were not disposed in the previous year ($1-f_{t-1}$), plus an additional portion influenced by those already disposed (qf_{t-1}).

Translating Diffusion into Energy Savings

As noted, the end-user diffusion model is estimated for two conditions, with and without Focus. The effect of Focus is the difference Δ_t between these two estimates. The additional efficiency implementation due to the incremental disposition to energy efficiency is calculated as

$$ME_t = \Delta_t\, A\, E\, D\,,$$

where

ME_t = incremental first-year savings due to end-user market effects in year t,
Δ_t = difference between with-Focus and without-Focus estimates of disposition to energy efficiency f_t,
A = fraction of the market who does a major project each year,
E = fraction of those disposed to energy efficiency who implement energy efficiency when they do a project, and
D = average first-year net savings per project.

The average savings per project D is the average "net" savings; that is, the evaluation-verified savings attributable to Focus. Savings for measures that would have been implemented anyway, or "free rider" savings, are not counted in this average.

Assigning Parameter Values

The analysis at this stage cannot be definitive because of limited data on some of the key parameters. In particular, parameters that indicate the effectiveness of Focus in creating lasting changes in behavior cannot be estimated with accuracy until such long-term effects can be observed. Nonetheless, we attempted to set plausible parameter values based on available information.

The fractions A and E were taken from results of the Baseline Survey conducted at the outset of Focus. The fraction D was taken from the impact evaluation results. Determining the parameters p, q, and d of the diffusion model was somewhat more complex.

We began by setting the external influence factor p equal to the fraction of the market implementing measures in the program each year, multiplied by the fraction of implementing partners who indicated they were changed in a lasting way because of Focus. This external influence factor is assumed to apply during the years of Focus. After the end of Focus, this factor is set to zero. That is, in every year of

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[8] Bass, F., T. Krishnan, and D. Jain. Why the Bass Model Fits without Decision Variables. *Marketing Science*, Volume 13, Issue 3 (Summer 1994), 203–223.

Focus, the fraction of those who are not yet disposed to energy efficiency who become so disposed directly because of Focus is the fraction who participate in Focus times the fraction of these who will be changed in a lasting way because of Focus.

To determine the internal influence or word-of-mouth factor q, we calibrated our diffusion model to conditions at the start of Focus. The Baseline Survey indicated that 30 to 40 percent of most market segments were already disposed to energy efficiency. This disposition is assumed to be the effect of predecessor energy efficiency programs that have existed in Wisconsin for many years. We set the effects of word-of-mouth/internal influence q and the decay rate d such that the percent disposed to energy efficiency at the start of the program would match the observed level.

In this calibration step, we set the external influence parameter p for the pre-Focus years according to the fraction involved in utility programs each year. We assume that the same fraction of utility program participants is affected in a lasting way as is true for Focus participants. We experimented with different values of the decay rate d. The value of q was determined for a given value of d and the assumed pre-Focus p such that the disposition to energy efficiency at the time of program start matched that found in the Baseline Survey.

With this approach, a value of d around 0.25 was found to give reasonable values of q. Since d and q have complementary effects in the model, a lower value of d requires a lower q to meet the calibration constraint. The final results are not highly sensitive to d subject to this constraint. However, small values of d result in very high fractions of the market disposed to energy efficiency by the end of our study time frame, without any Focus programs.

Each of the parameters was estimated at the finest level of segmentation available from the data. The sources of information used to estimate each parameter and the subgroups for which it was determined are summarized in Table 1.

Table 1. End-use model parameter sources and segment detail.

Factor	Meaning	Source	Data	Detail
A	Fraction who make a major investment each year	Baseline Survey	0.5 * Fraction who made a major renovation in last 2 years	Program
C	Fraction currently disposed to buy energy efficiency	Baseline Survey	Fraction that have policy requiring or preferring energy efficiency	Sector
E	Fraction of those disposed to energy efficiency who buy energy efficiency	Baseline Survey	Of those in C who made an energy-related purchase, fraction who bought energy-efficient option	Sector
D	Average first-year savings per project	Impact Evaluation		Program
r0	Fraction participating each year pre-Focus	WI PSC	Annual participation rate in utility programs	Sector
L	Fraction of those who implement who are changed in a lasting way	Implementing Partners Survey	Savings-weighted fraction likely or very likely to implement other kinds of energy efficiency improvements without Focus	Sector
rF	Fraction participating each year during Focus	Impact Evaluation	Number of implementers to date scaled to projected activity levels	Program

One of the factors subject to uncertainty is the fraction C of the market who are currently disposed to buy energy efficiency. This disposition might be measured a few different ways. We used the fraction that reported having either a formal or informal policy in place requiring or preferring energy efficiency. For Business Programs overall, similar fractions reported they typically pay more for higher efficiency when replacing cooling equipment and when replacing motors.

The fraction C is further adjusted by the fraction E of purchasers who actually bought energy-efficient equipment when they had a purchase to make, where E is calculated based on the same definition as for C. Thus, the exact definition of C is not critical to this analysis. Of course, respondents' perception that what they bought was energy efficient may be incorrect, so that the fraction E may be overstated.

Supplier Model Specification

Model Form

The supplier model calculates the participating supplier spillover savings MS_{ty} in year t due to effects of program year y as

$$MS_{ty} = (p_{>EE}/p_{EE})\ (1\text{-}d)^{t\text{-}y}\ p_{pa|Focus}\ NS_y\ /p_{Focus|pa}$$

where

$p_{>EE}$	=	average increase in energy efficiency share of sales outside of Focus that program allies experience as a result of participating in Focus,
p_{EE}	=	average percent of sales that are currently energy efficiency among program allies,
$p_{Focus\|pa}$	=	fraction of program ally energy efficiency sales that are through Focus,
$p_{pa\|Focus}$	=	fraction of program net savings that are implemented through program allies,
NS_y	=	net savings in year y (total for Business Programs or segment),
MS_{ty}	=	program ally spillover savings from program year y in year t, and
d	=	decay rate.

In this model, the term

$$p_{pa|Focus}\ NS_y$$

is the total amount of savings implemented through Focus by program allies in year y. Dividing this amount by $p_{Focus|pa}$ gives the total amount of energy efficiency savings implemented by the program allies in that year, both in Focus and outside Focus. The ratio

$$(p_{>EE}/p_{EE})$$

is the increase in total energy efficiency sales by program allies as a fraction of their current or pre-Focus level. The factor $(1\text{-}d)^{t\text{-}k}$ accounts for decay of the transformation effect from year to year. Similarly, to the end-user model, the decay factor in the supplier model accounts for the decline of practices and skills related to energy efficiency promotion over time due to staff turnover and other changes within the organization.

One way to look at the magnitude of the projected supply-side market effect is to compare the first-year market effect (that is, the effects prior to any decay) with the magnitude of in-program savings. That is, we look at the first-year multiplier

$$m = MS_{yy}/NS_y = (p_{>EE}/p_{EE})\ p_{pa|Focus}/p_{Focus|pa}.$$

The total supplier market effects in year t is the sum of the market effects due to each year of programs up to year t:

$$MS_t = \Sigma_{y=1}^{t}\ MS_{yt}.$$

Assigning Parameter Values

In-program net savings NS_y is determined as for the end-user analysis, projecting the first-year savings determined from the impact evaluation based on projected spending levels. The proportion of Focus savings that is implemented by a program ally was determined from tracking data. The decay rate d was assumed to be the same as was used in the end-user analysis, 0.25. The remaining parameters were determined from questions on the Program Ally Survey designed to provide this information.

The structure of the Focus Business Programs does not associate a program ally with a unique program, and many program allies in the tracking system have no particular program associated with them. The parameters estimated from the Program Ally Survey data were determined only at the sector level. The portion of Focus savings implemented by a program ally was determined for the Business Program area as a whole, not by sector. Because this is still a fairly speculative analysis, there was little point in attempting to make it more fine-grained.

The basis for assigning the parameters of the supply-side market effects model and the values assigned by sector are indicated in Table 2.

Table 2. Supply-side market effects sources and values.

Factor	Meaning	Source	Value		
			Commercial	Industrial	Agricultural
p>EE	Average increase in energy efficiency share of sales outside of Focus that program allies experience as a result of participating in Focus	Program Allies Survey	0.05	0.06	0.005
pEE	Average percent of sales that are currently energy efficient among program allies	Program Allies Survey	0.54	0.42	0.36
pFocus|pa	Fraction of program ally energy efficiency sales that are through Focus	Program Allies Survey	0.29	0.47	0.27
ppa|Focus	Fraction of program net savings that are implemented through program allies	Program Tracking Data	0.33	0.33	0.33
NS_1	Net savings in year 1	Impact Evaluation	$890,664	$1,406,007	$55,806
MSty	Program ally spillover savings from program year *y* in year *t*	Calculation			
Msyy/Nsy	First-year multiplier		0.10	0.10	0.02
d	Decay rate		0.25	0.25	0.25

Combining the End-user and Supplier Models

To combine the program ally and end-user market effects, we assume that a fraction of the projected end-user effects would be implemented by program allies and are included in the projections from that model. The assumed fraction is the same as the fraction of program savings implemented by program allies. As indicated above, this fraction is

$$p_{pa|Focus} = 0.33.$$

Thus, to calculate the combined the effect MC_t of savings from these two sources, we take

$$MC_t = 0.67\ ME_t + MS_t\ .$$

Pro Forma Estimates of Market Effects

This analysis quantifies market effects in terms of incremental energy savings in each year attributable to the effects of Focus but not included in the direct energy impacts tracked by Focus. These savings are quantified in terms of the avoided cost of energy for the first year of measure implementation.

Assumed Program Activity Levels

The market effects that occur in any year are not associated with a specific program year, but reflect the combined effects of all program activity prior to that year. Thus, projection of market effects requires a projection of program activity.

We measure program activity in terms of total in-program savings, expressed as the avoided cost of the energy savings. This avoided cost, in turn, is assumed to be proportional to the projected program spending levels. The avoided cost savings per dollar of program spending is based on the evaluation results from a 12-month period, excluding the program start-up phase.

Projected Market Effects Relative to In-program Savings

The magnitude of market effects is scaled to the program activity level. Thus, one way to view these effects is in terms of their magnitude compared to in-program savings. This savings level varies in the early program years, but is constant in Years 3 through 10. As a benchmark for comparison, we show the estimated market effects savings in each year as a fraction of this constant assumed level of annual in-program savings.

End-user Effects

Figure 1 displays the new implementations due to end-user market effects in each year as a fraction of the annual in-program implementation assumed for the later program years. A different set of multipliers is shown for each sector and for the program overall.

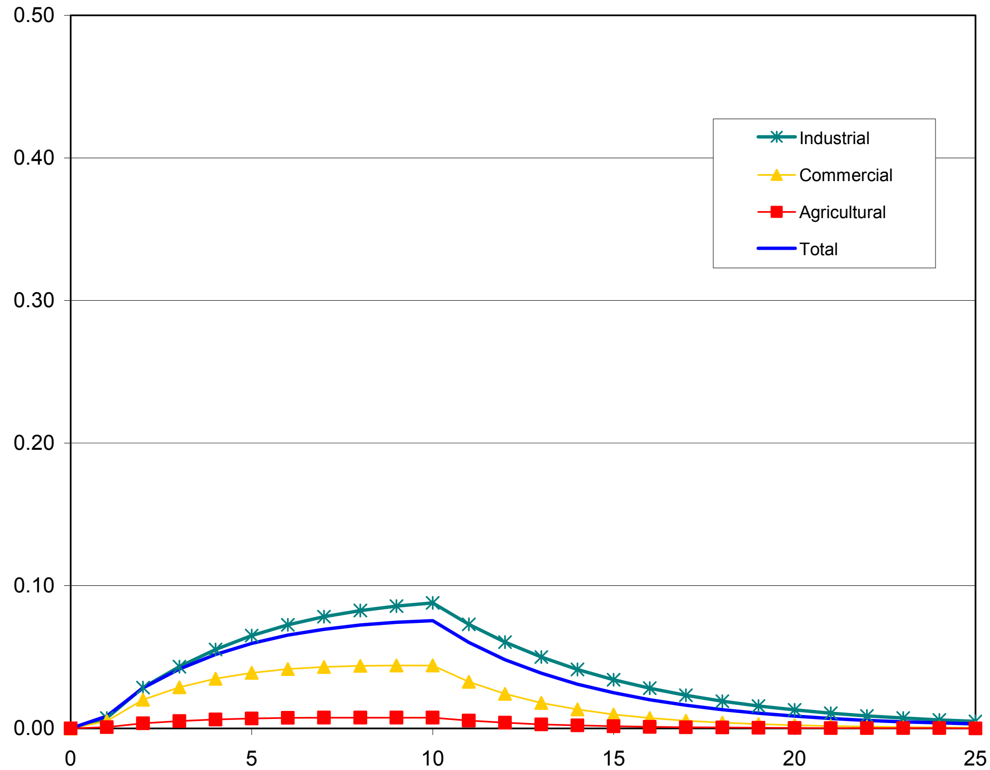

Figure 1. Annual end-user market effects implementation as a fraction of Year 10 in-program implementation.

Figure 1 shows that in Year 10 there will be additional implementation due to end-user market effects equivalent to about 7 percent of the savings implemented under the program in that year. In addition, there will be continuing end-user market effects after the end of the program. The market effects decline after the assumed end of the program in Year 10, and become negligible by Year 25.

For the Industrial Programs, the relative end-user market effects in Year 10 are a little higher—about 9 percent of in-program savings. For the Commercial Programs, the end-user market effects in Year 10 are about 4 percent of in-program savings.

Combined End-user and Supplier Market Effects

The combined end-user and supplier market effects are displayed in Figure 2. In Year 10, the combined market effects for Business Programs overall account for additional implementation equivalent to 45 percent of the in-program savings. The Industrial and Commercial multipliers are similar.

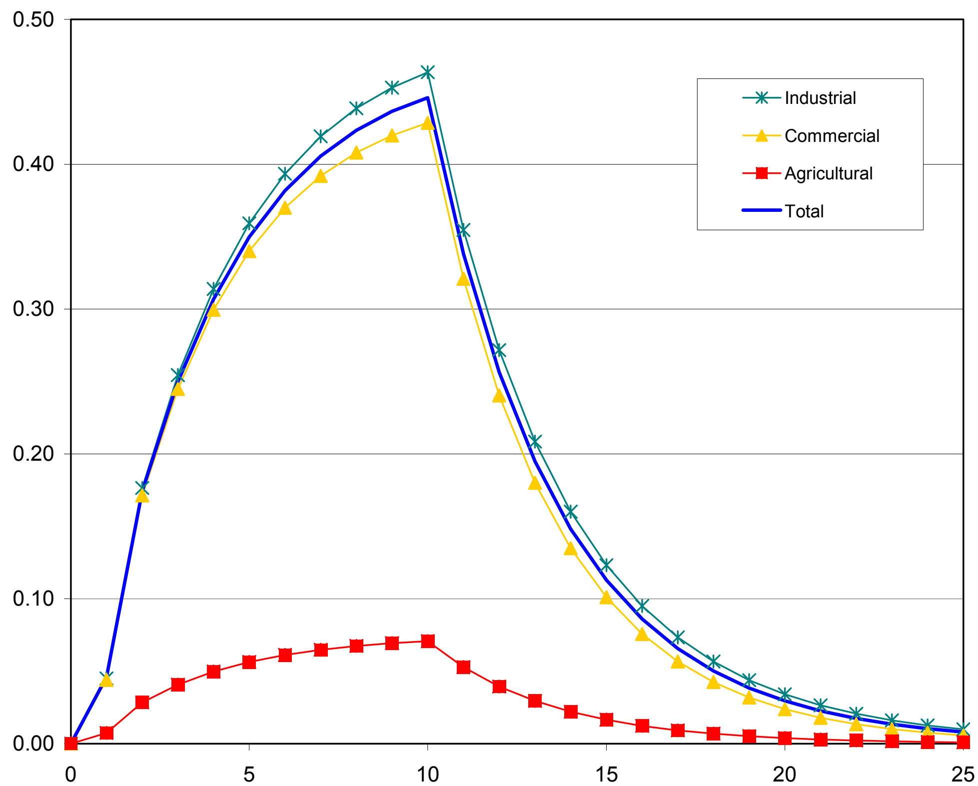

Figure 2. Annual market effects implementation relative to benchmark year in-program implementation combined end-user and program ally effects.

Market Effects Expressed as Avoided Costs

Figure 3 shows the overall Business Program savings, in terms of first-year avoided costs, for projected direct (in-program) savings and for the estimated end-user and combined market effects. The shapes of the curves are those shown in Figures 1 and 2 above. The magnitudes correspond to scaling these relative effects by the first-year direct (net) savings.

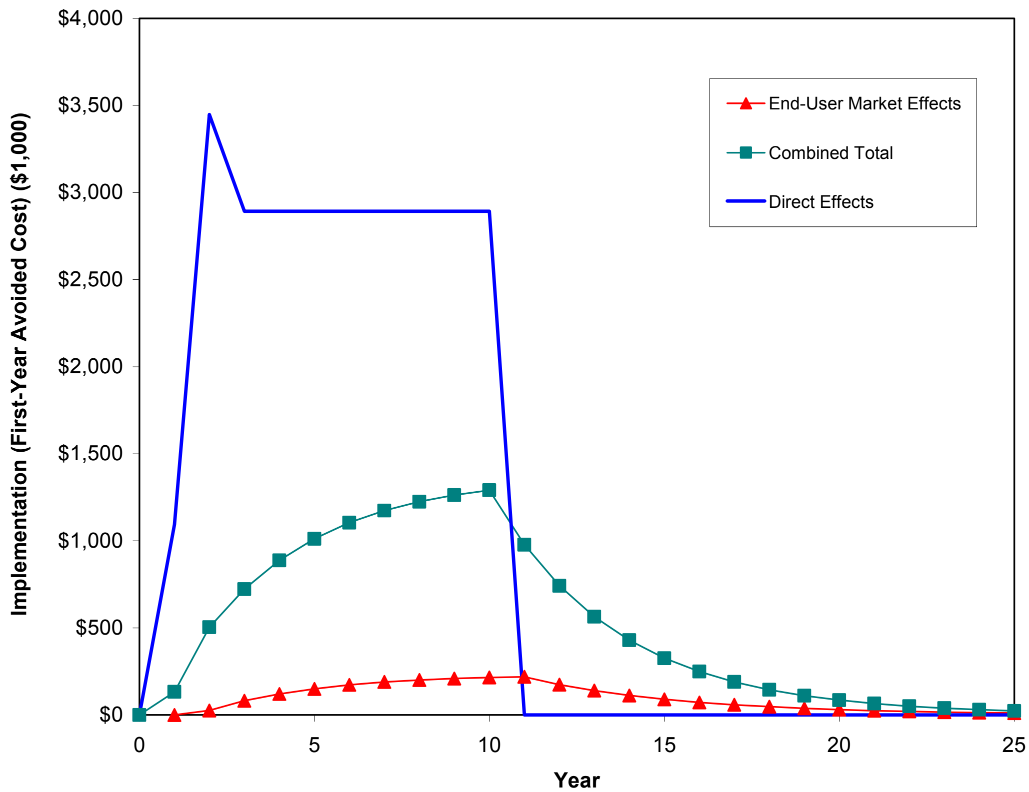

Figure 3. Total business programs savings, direct and market effects first-year avoided costs ($1,000).

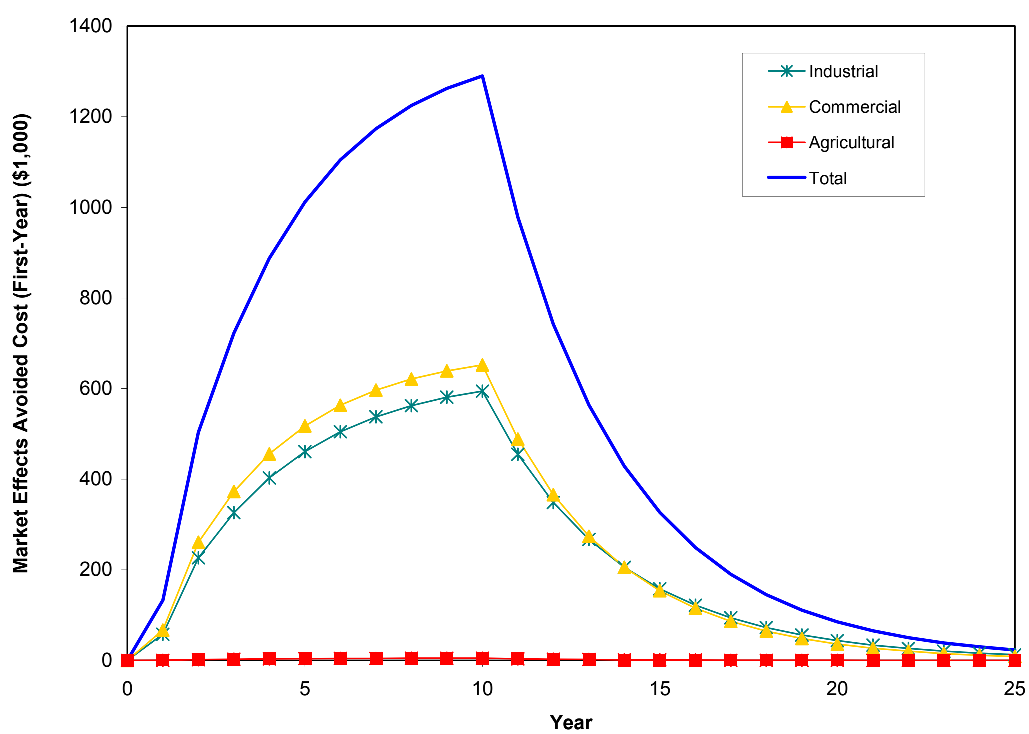

Figure 4. Combined market effects savings by sector first-year avoided costs ($1,000).

Discussion

In this section, we review some of the caveats associated with this analysis, then indicate what lessons can be drawn from it.

Limitations of the Analysis

Data

As with any application of diffusion models to project market changes, this analysis lacks solid data in several areas.

- Participation levels for prior-year programs are approximate for three reasons. First, activity levels were reported by end use, not by individual customer. Customers who participated multiple times were counted multiple times. Second, data were not available by customer sector, but were roughly allocated to sectors based on the type of end use. Third, data were available for one utility, representing about half the activity in the state. The state-level numbers were projected from these.
- The fraction of end-user participants who will become disposed to energy efficiency as a result of the program is based on self-reports within a few months of participating in Focus, and does not reflect actual changes in actions over a longer time frame.
- The fraction disposed to energy efficiency was determined from the Baseline Survey somewhat differently from how it was assessed for implementing partners.
- The Baseline Survey's measure of the proportion of projects that involved energy-efficient choices is based on customer self-reports.
- The change in the energy efficiency share among program allies is based on rough self-reports without reference to specific data.

Model Structure

The main limitation of the model structure is the lack of integration of the end-user and supplier effects into a single diffusion model. A more refined model might also identify other factors that affect the model parameters.

Calibration

The end-user model calibration assumes that the same disposition to energy efficiency was promulgated by the predecessor programs as by Focus. It also assumes that a similar proportion of participants became disposed as a result of the predecessor programs.

Under-stating Factors

While many of the factors above simply create uncertainty, one factor in particular works to lower the estimated effects:

- If Focus were more effective than the traditional utility programs at making customers more disposed to choose energy efficiency, the model calibration would need to adjust for that. A greater difference would then be seen between the with- and without-Focus cases.

Over-stating Factors

At the same time, there are factors that would tend to over-state the estimated effects.

- Lasting effects based on short-term self-reports are likely to be exaggerated, for both end users and program allies.
- The supply-side model does not reflect diminishing new effects over time. It is assumed that Focus affects new suppliers each year in proportion to the total program activity, whereas it is likely that many programs will continue to work with the same program allies. In addition, the model does not reflect a decreasing potential pool to be affected as the total fraction of suppliers who have become program allies rises.

What Can Be Learned from the Analysis?

Using the Model for Scenario Analysis

While none of the results developed in this analysis are definitive, the model framework does provide a basis for assessing the implications of various assumptions. Conversely, it can be used to find what implicitly must be assumed of certain parameters if particular effects are postulated.

Qualitative Findings

All the caveats above make us cautious about over-interpreting the results of the pro forma analysis. Nonetheless, some lessons can be drawn from these results.

- While the calibration step could be adjusted, it still indicates a plausible level of effects. In particular, the end-user results indicate that the programs cannot expect large market effects savings from end-user word-of-mouth related to a general disposition to adopt energy efficiency. About 30 to 40 percent of the market is already disposed to adopt energy efficiency at least to some degree (counting both “required” and “preference for” energy efficiency, and both formal and informal policies). If word-of-mouth could be expected to move this concept forward substantially, it would be expected to happen in the future even without Focus.
- On the other hand, if program allies are truly changed by Focus in substantial ways, the supply-side effects are potentially much larger than the end-user effects.
- Under the assumed 10-year program life, roughly one-third of the market effects implementation occurs after the close of the program. It is recognized that market effects require more than a single program year to be realized. On the other hand, when a stream of effects is assessed in terms of net present value, the value of later-year effects is diminished. This issue is also discussed further in the benefit-cost report.