FINAL REPORT:

ALTERNATIVE MICHIGAN ENERGY SAVINGS GOALS TO PROMOTE LONGER TERM SAVINGS AND ADDRESS SMALL UTILITY CHALLENGES

Prepared for

Michigan Public Service Commission

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INTRODUCTION

In Michigan and every other jurisdiction in North America policy-makers give utilities and/or non-utility administrators of efficiency programs a high level set of performance goals, usually including some measure of the amount of energy savings that will be produced. Ideally, those goals should be expressed in a manner that is most consistent with public policy objectives. That is, they would encourage efficiency program administrators to optimize their efficiency program portfolios in ways that maximize achievement of those objectives.

There are typically a wide range of policy objectives associated with legislative and/or regulatory requirements for utilities or non-utility administrators to promote end use efficiency. However, the most common and often the most important of those is to maximize net economic benefits. That is particularly important in jurisdictions in which spending on cost-effective efficiency programs is capped in some way.[1]

One important element affecting the value of efficiency investments is the longevity of the savings that the investments produce.[2] Some efficiency programs produce savings that are relatively short-lived, either because they rely on behavioral change that doesn't persist for long periods of time absent continued or additional efficiency program support, or because they promote measures that do not last very long before they wear out and need to be replaced. Examples of the latter are programs that promote the sale, purchase and/or installation of compact fluorescent light bulbs (CFLs), low flow showerheads and other hot water conservation measures, advanced or "smart" power strips, and steam traps. Other programs produce savings that are much longer-lived because they focus on measures that are either permanent (e.g. the orientation of a new building) or have very long lives (e.g. building insulation, HVAC equipment and some appliances).

Thus, ideally, savings goals should be articulated in ways that place greater value on longer-lived savings and less value on short-lived savings, or at least on capturing those savings that offer the largest lifecycle net economic benefits. Unfortunately, in Michigan and many other jurisdictions across North America, savings goals are expressed as the amount of savings that efficiency measures will produce just in their first year of functionality. That sends a less than ideal signal to utilities charged with designing and implementing efficiency programs. Specifically, it encourages them to maximize first year savings rather than maximizing lifetime savings or the value of the benefits provided over the entire lives of the efficiency measures.

Consider, for example, the hypothetical decision a utility must make when deciding whether to promote an efficiency measure that saves 20 therms of gas for just one year and costs $10 (i.e. $0.50 per unit of first year savings and $0.50 per unit of lifetime savings) or a measure

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[1] Some states require utilities or other program administrators to pursue all cost-effective efficiency investments regardless of budgetary requirements. While they endeavor to keep spending as low as possible, the obligation to capture all cost-effective efficiency is the over-riding obligation. In Michigan and many other states, spending is capped either legislatively or through regulatory processes.

[2] Longevity of savings is also closely related to other policy objectives, such as minimizing emissions of air pollutants.

that saves 100 therms per year for 20 years and costs $200 (i.e. $2.00 per unit of first year savings and $0.10 per unit of lifetime savings). All other things being equal, the low cost per unit of first year savings creates an incentive that encourages utilities to invest much more in the first measure even though the second measure provides five times as much value over its life.[3]

The Michigan Public Service Commission is keenly aware of this problem and has commissioned the Optimal team to help it assess alternatives to traditional first year savings goals. Using data from both DTE and Consumers Energy as well as some other states, this report provides several key pieces of information to help illuminate the issue:

1. 2012 Consumers Energy and DTE Efficiency Program Results:
   We look at the overall portfolio-wide average measure life for each utility's electric and gas portfolios to provide a sense of the most recent year's mix of shorter-term and longer-term measures and programs. In addition, we calculate the cost per unit of annual and lifetime energy savings for individual programs and rank the programs to see which are the most and least expensive from an annual and lifetime perspective.
2. 2013 – 2015 Consumers Energy and DTE Efficiency Program Plans:
   We examine the two utilities' previously filed plans, assessing which programs and which measures are expected to make the greatest contributions to the achievement of the utilities' goals for the period 2013 – 2015. This includes a comparison of future planned program mixes to the 2012 results to determine whether the mix of savings from longer-term and shorter-term measures is projected to change significantly for each utility over time.
3. Jurisdictional Comparison:
   We compare the average measure life of the Michigan utilities to those of utilities in several other jurisdictions, both in the Midwest and for a couple of nation-leading jurisdictions in New England to provide a sense of how the mix of short and long-term measures and programs of the two Michigan utilities compare to their peers.

Based on this analysis, we then describe a set of policy options for the Public Service Commission and other Michigan stakeholders to consider in order to reduce the bias to pursue savings that may be the most inexpensive from a first-year perspective, but not necessarily optimal in the longer-term.

Following this, we also explore another issue: whether savings goals are significantly more difficult for small cooperative and municipal utilities to achieve than for the larger investor-owned utilities. This analysis included reviewing current performance toward goals for all Michigan utilities, and analyzing whether performance appears to have a strong correlation with utility size and resources. We also considered the achievements of some small utilities outside of Michigan to inform this analysis.

[3] The factor of five is calculated without any discounting of future benefits. However, even if future benefits were discounted using a 5% real annual discount rate, the second measure would be far preferable, providing more than three times the lifetime benefits.

IMPACT OF FIRST-YEAR SAVINGS GOALS AND OPTIONS FOR CHANGING THEM

ANALYSIS OF 2012 DATA

DTE

The tables below show the data for annual and lifetime savings, as well as costs, for the DTE electric and gas efficiency programs.

Table 1: DTE 2012 Actual Electric Savings, Costs, $/MWh, and Rank in $/MWh by Program[4]

		Savings (MWh)			Program Cost/MWh			
Program	Average Measure Life	Annual	Lifetime	Program Cost	Annual	Rank	Lifetime	Rank
Residential								
HVAC	11.24	3,300	37,092	$1,000,000	$303	10	$27	8
Multifamily	9.42	10,900	102,678	$1,700,000	$156	7	$17	7
Administrative				$2,289,000				
Appliance Rec.	8.00	45,600	364,800	$4,400,000	$96	3	$12	6
Audit & Wx	9.63	17,700	170,451	$5,000,000	$282	8	$29	9
Low-Income	9.59	21,200	203,308	$6,200,000	$292	9	$30	10
ENERGY STAR	9.06	201,100	1,821,966	$12,100,000	$60	1	$7	1
Res. Subtotal	**9.01**	**299,800**	**2,700,295**	**$32,700,000**	**$109**		**$12**	
C&I								
Administrative				$2,216,000				
Non-Prescriptive	10.79	113,000	1,219,270	$13,400,000	$119	6	$11	5
Prescriptive	11.40	133,100	1,517,340	$12,200,000	$92	2	$8	2
C&I Subtotal	**11.09**	**246,100**	**2,729,249**	**$27,700,000**	**$113**		**$10**	
Ed. & Awareness	10.80	19,800	213,840	$2,200,000	$111	5	$10	4
Pilot Program	10.80	35,500	383,400	$3,900,000	$110	4	$10	3
TOTAL	**10.07**	**601,200**	**6,054,084**	**$69,700,000**	**$116**		**$12**	

[4] Energy Optimization 2012 Annual Report.

Table 2: DTE 2012 Actual Gas Savings (Thousand Mcf), Costs, $/Mcf, and Rank in $/Mcf by Program[5]

Program	Average Measure Life	Savings (Thousand Mcf) Annual	Savings (Thousand Mcf) Lifetime	Program Cost	Program Cost/Mcf Annual	Rank	Program Cost/Mcf Lifetime	Rank
Residential								
ENERGY STAR	11.08	28.7	318	$300,000	$10.45	3	$0.94	4
Multifamily	15.61	49.1	766	$600,000	$12.22	4	$0.78	3
Low-Income	12.08	140.4	1,696	$6,000,000	$42.74	9	$3.54	9
Audit & Wx	15.11	200.8	3,034	$4,800,000	$23.90	7	$1.58	5
HVAC	15.06	225.3	3,393	$6,300,000	$27.96	8	$1.86	6
Administrative				$1,358,000				
Residential Subtotal	**14.29**	**644.4**	**9,208**	**$19,400,000**	**$30.11**		**$2.11**	
C&I								
C&I Non-Prescriptive	10.38	256.8	2,666	$1,800,000	$7.01	1	$0.68	1
C&I Prescriptive	10.62	464.4	4,932	$3,400,000	$7.32	2	$0.69	2
Administrative				$580,000				
C&I Subtotal	**10.53**	**721.2**	**7,598**	**$5,800,000**	**$8.04**		**$0.76**	
Education and Awareness	10.00	38.7	387	$800,000	$20.67	6	$2.07	8
Pilot Program	10.00	69.7	697	$1,400,000	$20.09	5	$2.01	7
TOTAL	**12.68**	**1,474**	**18,690**	**$28,600,000**	**$19.40**		**$1.53**	

At the program level, there does not appear to have been a dramatic difference between the ranking of electric or gas programs by dollars spent per unit of first year energy saved versus per unit of lifetime energy saved. Some programs exhibited a difference that is worth noting. For example, on the electric side, the Appliance Recycling Program was relatively inexpensive from a first-year savings perspective (rank = #3) but was more expensive from a lifetime perspective (rank = #6). The eight-year measure life is the shortest of any of the electric programs. This indicates that while the immediate savings that resulted from investing in this program may have been significant, the total long-term savings from these investments were relatively smaller. Similarly, on the gas side, the HVAC program moved up in the rankings when considered from a longer-term perspective. This program ranked near the bottom from a first-year perspective (rank = #8), but moves closer to the middle of the pack from a lifetime perspective (rank = #6) because of its relatively long measure life (15.06 years). However, the rankings of most other programs did not change much when comparing costs per unit of first year savings vs. costs per unit of lifetime savings. Put another way, most of the programs that

[5] Energy Optimization 2012 Annual Report.

were least expensive in terms of achieving first-year savings were also the least expensive for achieving longer-term (lifetime) savings.

That is not a surprising result when one considers that the range in average measure lives across the two program portfolios was relatively narrow (all electric programs have average lives between 8 and 11.4 years; all gas programs have lives between 10 and 15.6 years). However, as discussed further below, the range in measure lives across the utility's program portfolio can be expected to be more diverse in 2013 and beyond. The introduction of the residential behavior program with a measure life of just one year, by itself, significantly changes the range of average program lives.

Further, though not reflected in the DTE's plans, the reality of 2020 EISA lighting efficiency requirements effectively means that no new CFL installation will produce savings beyond 2020.[6] That means that though DTE's recent plan assumes CFLs will have a 9 year life regardless of the year in which they are installed, its 2013 program will produce savings for only 7 years, its 2014 program for only 6 years and its 2015 program for only 5 years. On the other end of the spectrum, the Michigan Efficiency Measures Database (MEMD) has measures life assumptions of just 20 years for measures like insulation which can remain unchanged in buildings for far longer periods. Many other jurisdictions assume at least a 25 or 30 year life for such measures. Shortening the lives of CFLs installed in future years, and increasing the lives of other long-lived measures for which such increases would be appropriate, could also start to affect the calculus of which programs in future years provide the biggest lifetime savings per dollar invested.

It is also important to understand that many of the programs listed in Tables 1 and 2 promote a wide variety of efficiency measures. Thus, it is possible that the current focus on first year savings might have led to the inclusion of substantial savings from some very short lived measures in some programs that dramatically reduces the overall weighted average program measure life. If this was the case, shifting just those few measures to longer lived measures could result in significant shifts in program rankings that are obscured by the more aggregated data. Given available data for 2012, we have not been able to tease out any such potential issues.

[6] CFL savings estimates are predicated on the assumption that they replace either incandescent or halogen lamps which have much shorter lives (typically on the order of 1 year) than CFLs (assumed in the MEMD to be 9 years). The 9 year savings life assumptions for CFLs implicitly assumes that had the incandescent or halogen not been replaced by a CFL, that the customer would have replaced burned out incandescent or halogen lamps with new incandescents or halogens for the next nine years. However, by 2020, when much more stringent lighting efficiency standards go into effect, the baseline scenario could no longer be continued replacement with incandescent or halogen lamps. Instead, most experts believe that they would have to purchase a CFL (or perhaps and LED) at that time. Thus, if incandescent or halogen lamps last only about a year, the measure life of a CFL cannot be longer than the period between when the CFL is installed and 2020 (or perhaps 2021 if one wanted to make assumptions about stockpiling of products before the new lighting standards go into effect).

Consumers Energy

The tables below show the data for annual and lifetime savings, as well as costs, for Consumers Energy's electric and gas efficiency programs.

Table 3: CE 2012 Actual Electric Savings, Costs, $/MWh, and Rank in $/MWh by Program[7]

Program	Average Measure Life	Savings (MWh) Annual	Savings (MWh) Lifetime	Program Cost	Cost/MWh Annual	Rank	Cost/MWh Lifetime	Rank
Residential								
ENERGY STAR Lighting	9.01	78,996	711,487	$6,203,651	$79	1	$9	1
ENERGY STAR Appliances	11.32	1,447	16,382	$277,610	$192	6	$17	6
HVAC and Water Heating	13.73	5,284	72,559	$2,179,519	$412	8	$30	8
Income Qualified	9.75	3,677	35,866	$1,563,654	$425	9	$44	9
Appliance Recycling	8.04	40,269	323,579	$4,153,407	$103	2	$13	5
Multifamily	9.74	6,127	59,700	$2,824,536	$461	10	$47	11
Think! Energy	9.64	2,244	21,631	$589,873	$263	7	$27	7
HP with ENERGY STAR	13.38	1,707	22,843	$3,537,620	$2,072	13	$155	13
Home Energy Analysis	9.14	4,852	44,362	$3,150,029	$649	11	$71	12
New Home Construction	17.39	179	3,121	$147,390	$821	12	$47	10
Residential Subtotal	**9.06**	**144,782**	**1,311,529**	**$24,627,289**	**$170**		**$19**	
C&I								
Comp. & Custom Bus. Solutions	12.12	145,367	1,761,853	$20,637,393	$142	5	$12	2
Small Business Direct Install	10.04	75,651	759,541	$9,508,822	$126	3	$13	4
Bus Multifamily Direct Install	10.67	5,365	57,240	$698,162	$130	4	$12	3
C&I Subtotal	**11.46**	**226,384**	**2,594,355**	**$30,844,377**	**$136**		**$12**	
TOTAL	**10.52**	**371,166**	**3,905,884**	**$55,471,666**	**$149**		**$14**	

[7] Residential Savings and Measure Lives: Cadmus, "Residential Energy Optimization Certification Report: 2012 Program Year." C&I Savings and Measure Lives: Correspondence from Benjamin M. Ruhl, August 2, 2013. Costs: Consumers Energy: 2012 Energy Optimization Annual Report.

Table 4: CE 2012 Actual Gas Savings (Thousand Mcf), Costs, $/Mcf, and Rank in $/Mcf by Program[8]

		Savings (Thousand Mcf)		Program Cost	Cost/Mcf			
Program	Average Measure Life	Annual	Lifetime		Annual	Rank	Lifetime	Rank
Residential								
ENERGY STAR Appliances	11.46	47.5	545	$243,367	$5.12	2	$0.45	2
HVAC and Water Heating	13.44	363.3	4,882	$8,164,392	$22.47	7	$1.67	6
Income Qualified	9.28	180.7	1,676	$10,463,836	$57.91	11	$6.24	11
Multifamily	9.81	230.3	2,258	$2,547,681	$11.06	4	$1.13	4
Think! Energy	12.00	50.9	610	$1,056,603	$20.77	6	$1.73	7
HP with ENERGY STAR	16.2	141.7	2,295	$6,087,006	$42.96	9	$2.65	10
Home Energy Analysis	10.26	109.3	1,122	$1,491,359	$13.64	5	$1.33	5
New Home Construction	18.68	8.5	158	$394,265	$46.63	10	$2.50	9
Residential Subtotal	**11.97**	**1,132.2**	**13,547**	**$30,448,509**	**$26.89**		**$2.25**	
C&I								
Comp. & Custom Bus Solutions	15.14	556.6	7,638	$6,054,667	$10.88	3	$0.79	3
Small Business Direct Install	9.43	475.9	4,383	$1,889,574	$3.97	1	$0.43	1
Bus Multifamily Direct Install	12.05	64.2	775	$1,506,954	$23.48	8	$1.95	8
C&I Subtotal	**11.67**	**1,096.6**	**12,796**	**$9,451,195**	$8.62		$0.74	
TOTAL	**11.82**	**2,228.8**	**26,343**	**$39,899,704**	**$17.90**		**$1.52**	

As was the case for DTE, there does not appear to have been a dramatic difference between the ranking of most electric or gas programs by dollars spent per unit of first year energy saved versus per unit of lifetime energy saved. There was one exception. Specifically, on the electric side, the Appliance Recycling Program was relatively inexpensive from a first-year savings perspective (rank = #2) but was more expensive from a lifetime perspective (rank = #5). The eight-year measure life is the shortest of any of the electric programs. This indicates that while the immediate savings that resulted from investing in this program may have been significant, the total long-term savings from these investments are relatively smaller. However, the rankings of most other programs did not change appreciably when comparing costs per unit of first year savings vs. costs per unit of lifetime savings. Put another way, most of the programs that were least expensive in terms of achieving first-year savings were also the least expensive for achieving longer-term (lifetime) savings.

Again, that is not a surprising result when one considers that, as was the case with DTE in 2012, the range in average measure lives across the two program portfolios was relatively

[8] Residential Savings and Measure Lives: Cadmus, "Residential Energy Optimization Certification Report: 2012 Program Year." C&I Savings and Measure Lives: Correspondence from Benjamin M. Ruhl, August 2, 2013. Costs: Consumers Energy: 2012 Energy Optimization Annual Report.

narrow. However, as mentioned above and discussed further below, the range in measure lives across the utility's program portfolio can be expected to grow in 2013 and beyond.

Further, though not reflected in Consumers' plans, the reality of 2020 EISA lighting efficiency requirements effectively means that no new CFL installation will produce savings beyond 2020.[9] That means that though Consumers' recent plan assumes CFLs will have a 9 year life regardless of the year in which they are installed, its 2013 program will produce savings for only 7 years, its 2014 program for only 6 years and its 2015 program for only 5 years. On the other end of the spectrum, the Michigan Efficiency Measures Database (MEMD) has measures life assumptions of just 20 years for measures like insulation which can remain unchanged in buildings for far longer periods. Many other jurisdictions assume at least a 25 or 30 year life for such measures. Shortening the lives of CFLs installed in future years, and increasing the lives of other long-lived measures for which such increases would be appropriate, could also start to affect the calculus of which programs in future years provide the biggest lifetime savings per dollar invested.

Again, as noted above, it is also important to understand that many of the programs listed in Tables 1 and 2 promote a wide variety of efficiency measures. Put another way, the average program measure life can mask significant differences between the lives of savings within the program. Given available data for 2012, we have not been able to tease out any such potential issues.

[9] CFL savings estimates are predicated on the assumption that they replace either incandescent or halogen lamps which have much shorter lives (typically on the order of 1 year) than CFLs (assumed in the MEMD to be 9 years). The 9 year savings life assumptions for CFLs implicitly assumes that had the incandescent or halogen not been replaced by a CFL, that the customer would have replaced burned out incandescent or halogen lamps with new incandescents or halogens for the next nine years. However, by 2020, when much more stringent lighting efficiency standards go into effect, the baseline scenario could no longer be continued replacement with incandescent or halogen lamps. Instead, most experts believe that they would have to purchase a CFL (or perhaps and LED) at that time. Thus, if incandescent or halogen lamps last only about a year, the measure life of a CFL cannot be longer than the period between when the CFL is installed and 2020 (or perhaps 2021 if one wanted to make assumptions about stockpiling of products before the new lighting standards go into effect).

2013 – 2015 FORECAST TRENDS

In this section we present the results of our analysis of the two utilities' forecast savings for 2013 to 2015. It should be noted that we have not verified that the assumptions used by the utilities in their forecasts are accurate or consistent with the Michigan Efficiency Measures Database (MEMD).[10]

DTE

In 2012, DTE filed an update to its 2012-2015 electric DSM plan. In the table below we present the forecast 2013 savings mix by program.

[10] We make this point in part because in reviewing Consumers' forecast savings by measure for 2013 through 2015 we noted that the forecast appeared to assume that most gas measures in its home retrofit program had a life of only 10 years. That is clearly too short for many measures, particularly insulation measures. This is the only example of a case in which we noticed something that appeared significantly "off". However, as noted, we did not attempt to conduct a thorough review of all assumptions in the measure-level forecast.

Table 5: DTE 2013 Forecast Electric Savings, Costs, $/MWh, and Rank in $/MWh by Program[11]

Program	Average Meas. Life	Savings (MWh) Annual	Savings (MWh) Lifetime	Program Cost	Program Cost/MWh Annual	Rank	Program Cost/MWh Lifetime	Rank
Residential								
Res. ENERGY STAR Products	8.8	143,956	1,261,815	$12,426,000	$86	2	$10	3
Appliance Recycling	8.0	34,687	277,496	$4,961,000	$143	8	$18	9
HVAC	15.0	2,526	37,973	$1,221,000	$483	17	$32	12
Multifamily	8.9	4,818	42,770	$1,479,000	$307	13	$35	13
Home Energy Consultation	9.1	8,247	75,183	$3,216,000	$390	15	$43	16
Audit and Weatherization	16.6	140	2,324	$469,000	$3,350	18	$202	18
School Program	9.0	2,735	24,615	$463,000	$169	11	$19	10
Behavior Programs	1.0	23,106	23,106	$2,229,000	$96	3	$96	17
Emerg. Meas. & Approaches	15.0	143	2,145	$910,000	$6,364	19	$424	19
Admin. & Infrastructure				$1,728,000				
Residential Subtotal	**7.9**	**220,358**	**1,746,209**	**$29,102,000**	**$132**		**$17**	
Low Income								
LI-Nonprofit	12.4	8,154	101,319	$3,835,000	$470	16	$38	14
LI-MF	8.9	2,405	21,349	$664,000	$276	12	$31	11
LI-HEC	9.1	6,109	55,692	$2,144,000	$351	14	$38	15
LI -Admin & Infrastructure				$677,000				
Low Income Subtotal	**10.7**	**16,668**	**178,016**	**$7,321,000**	**$439**		**$41**	
Commercial & Industrial (C&I)								
Prescriptive	11.8	108,903	1,283,651	$12,168,000	$112	4	$9	2
Non-Prescriptive	10.0	81,837	820,461	$13,580,000	$166	10	$17	8
Emerging Meas. & Approaches	10.0	5,286	52,860	$834,000	$158	9	$16	7
Energy Star Retail Lighting	2.0	28,214	56,428	$481,000	$17	1	$9	1
Multifamily Common Areas	10.3	5,482	56,280	$737,000	$134	7	$13	6
Admin. & Infrastructure				$1,655,000				
C&I Subtotal	**9.7**	**229,722**	**2,235,958**	**$29,455,000**	**$128**		**$13**	
Other Programs and Costs								
Pilot Program	10.0	25,968	259,680	$3,265,000	$126	6	$13	5
Education Program	10.0	15,581	155,810	$1,786,000	$115	5	$11	4
EM&V				$3,425,000				
Admin. & Infrastructure				$1,447,000				
Other Prog. & Costs Subtotal	**10.0**	**41,549**	**415,490**	**$9,923,000**	**$239**		**$24**	
TOTAL	**9.0**	**508,297**	**4,575,673**	**75,801,000**	**$149**		**$17**	

11 Costs and annual savings: Docket Number U-17049, Exhibit A-4 of witness V.M. Campbell. Lifetime savings and average measure lives based on measure level data provided in an Excel spreadsheet by DTE in response to NRDC/DE-6 in U-17049.

The average measure life of DTE's efficiency portfolio savings is forecast to be about 10% lower in the 2013 than it was in 2012. Three factors appear to drive this change. The first is the addition of a full scale residential behavior program (O Power) which is forecast to provide about 4% of total first year saving, but with a savings life of just one year. The second is the addition of a C&I retail lighting program which is forecast to provide approximately 5% of total first years savings, but with a savings life of just two years. As Table 5 shows, the addition of these two programs illustrates how the relative rank of a program in cost per first year savings can be very different than the rank in terms of cost per lifetime savings. Finally, DTE has estimated that an average measure life of 10 years for the 2013 C&I non-prescriptive program – a little lower than the nearly 10.8 year average life experienced in 2012. This could be a result of choices to include more short-lived measures encouraged by the current goals structure, but that would require more detailed analysis at the measure level to confirm.

In general, the mix of savings forecast by DTE for 2014 and 2015 is very similar to the mix shown above for 2013. As a result, the average measure life for the portfolio of savings is forecast by DTE to be very similar (only very slightly higher) in 2014 and 2015 to what it is forecast to be for 2012. The four year trend in average measure life from 2012 through 2015 is provided in the table below.

Table 6: DTE Portfolio-Level Electric Average Measure Life, 2012 - 2015

Year	2012	2013	2014	2015
Average Life	10.1	9.0	9.2	9.2

As noted above, some similarities in the ranking of efficiency programs by cost per unit of first year savings and cost per unit of lifetime savings may mask significant differences between measures within programs. In other words, the effect of articulating goals as lifetime savings rather than as first year savings may be even greater than suggested by the program comparisons provided above. We have not conducted an exhaustive assessment of the potential impacts at the measure level. However, to gain some insight into that issue we did look at how the ranking of measures within DTE's C&I Prescriptive program forecast for 2013 (in terms of rebate cost per unit of savings) changed when moving from a focus on first year savings to a focus on annual savings. Table 7 shows 12 program measures whose rank changed by more than 50% (in either direction) when shifting from a rebate per first year savings metric to a rebate per lifetime savings metric. Some changed quite substantially. For example, high performance glazing was the 81st cheapest measure in terms of rebate cost per first year kWh saved, but 33rd cheapest per lifetime kWh saved.[12] If the assumed life for this measure was increased to 30 years (20 seems conservative, at least for some types of commercial buildings), it would move into the top 15 measures in terms of cost per lifetime kWh. At the other end of the spectrum, low watt T8 lamps, which rank 14th and 15th per first year kWh, rank 73rd and 74th per lifetime kWh. These examples illustrate why it may be plausible that the utilities would

[12] There were 117 C&I Prescriptive program measures analyzed in DTE's most recent EO plan. Some of the measures are simply different variations (by size, applicable market, applicable baseline condition, etc.) of the same technology. Thus, the number of measure types is considerably smaller.

consider not only changing their emphasis on different programs if a lifetime savings goal was adopted, but also consider changing emphasis on different measures within programs.

Table 7: Selected DTE Forecast 2013 C&I Prescriptive Program Measure Rankings (Incentive $/kWh)

Measure	Measure Life	Incentives $ per kWh Saved		Measure Rank (out of 117)	
		1st Year	Lifetime	1st Year	Lifetime
Barrel Wraps Inj Mold and Extruders	5	0.0222	0.0044	4	13
Low Watt T8 lamps	5	0.0556	0.0111	14	73
LW T8 U-Lamp, replacing Standard T8	5	0.0556	0.0111	15	74
Anti Sweat Heater Control	15	0.0597	0.0040	22	9
ECM Motors for Walk-in Refrigeration Cases	15	0.0651	0.0043	24	12
LED Exit Signs Electronic Fixtures (Retrofit Only)	15	0.0691	0.0046	26	16
LED Refrigerated Case Lighting	16	0.0725	0.0045	31	14
Motors 1 to 5 HP	15	0.0736	0.0049	33	19
LED Auto Traffic Signals	6	0.0808	0.0135	35	81
Night Covers (vertical)	5	0.0831	0.0166	42	87
LED recessed down light - ENERGY STAR qualified	15	0.0855	0.0057	45	29
High Performance Glazing CI E	20	0.1333	0.0067	81	33

Consumers Energy

In 2011, Consumers filed its plan for 2012 through 2015. In the tables below we present the forecast 2013 savings mix by program.

Table 8: CE 2013 Forecast Electric Savings, Costs, $/MWh, and Rank in $/MWh by Program[13]

Program	Average Measure Life	Savings (MWh) Annual	Savings (MWh) Lifetime	Program Cost	Program Cost/MWh Annual	Rank	Program Cost/MWh Lifetime	Rank
Residential								
Appliance Recycling	8.2	43,840	357,905	$3,908,231	$89	2	$11	3
Energy Education	9.0	1,846	16,614	$595,197	$322	8	$36	8
Multifamily Direct Install	9.1	5,758	52,285	$3,792,197	$659	10	$73	11
Energy Star Appliances	10.2	877	8,965	$407,277	$464	9	$45	9
Energy Star Lighting	9.0	59,439	535,061	$4,823,220	$81	1	$9	1
HVAC and Water Heating	10.5	4,842	50,983	$3,570,035	$737	11	$70	10
Inc. Qualified Assistance	8.8	1,540	13,481	$1,520,858	$988	12	$113	12
New Construction	13.0	101	1,313	$242,808	$2,404	13	$185	13
Existing Home Retrofit	9.2	21,251	196,071	$5,418,296	$255	6	$28	7
Residential Pilots	10.0	6,322	63,220	$1,456,285	$230	5	$23	6
Residential Subtotal	**8.9**	**145,816**	**1,295,899**	**$25,734,403**	**$176**		**$20**	
Business				$0				
Custom & Prescriptive	12.5	210,142	2,621,193	$23,918,655	$114	3	$9	2
Small Bus. Direct Install	12.1	31,110	374,876	$8,280,094	$266	7	$22	5
Business Pilots	11.0	10,536	115,896	$1,855,571	$176	4	$16	4
Business Subtotal	**12.4**	**251,788**	**3,111,965**	**$34,054,320**	**$135**		**$11**	
TOTAL	**11.1**	**397,604**	**4,407,864**	**$59,788,724**	**$150**		**$14**	

13 Costs and annual savings: Consumers Energy 2012-2015 Amended Energy Optimization Plan. Lifetime savings and average measure lives based on measure level data provided by Consumers in response to NRDC data request #23 in MPSC Case No. U-16670.

Table 9: CE 2013 Forecast Gas Savings (Thousand Mcf), Costs, $/Mcf, and Rank in $/Mcf by Program[14]

Program	Average Measure Life	Savings (Thousand Mcf) Annual	Savings (Thousand Mcf) Lifetime	Program Cost	Program Cost/Mcf Annual	Rank	Program Cost/Mcf Lifetime	Rank
Residential								
Appliance Recycling	10.0	17.3	173	$99,019	$5.72	2	$0.57	3
Energy Education	12.0	31.8	381	$980,712	$30.88	10	$2.57	11
Multifamily Direct Install	12.3	272.2	3,337	$2,316,511	$8.51	4	$0.69	4
Energy Star Appliances	12.0	95.9	1,148	$204,233	$2.13	1	$0.18	1
HVAC and Water Heating	15.8	423.4	6,686	$9,272,221	$21.90	7	$1.39	7
Inc. Qualified Assistance	12.9	64.4	831	$9,928,667	$154.25	12	$11.95	12
New Construction	13.0	6.4	83	$249,380	$39.12	11	$3.01	10
Existing Home Retrofit	10.6	274.5	2,910	$6,036,507	$21.99	8	$2.08	8
Residential Pilots	10.0	58.7	587	$1,687,544	$28.77	9	$2.88	9
Residential Subtotal	**13.0**	**1,244.5**	**16,136**	**$30,840,072**	**$24.78**		$1.91	
Business								
Custom & Prescriptive	12.3	728.1	8,920	$8,737,465	$12.00	5	$0.98	5
Small Bus. Direct Install	8.9	127.5	1,133	$1,046,694	$8.21	3	$0.92	2
Business Pilots	11.0	33.4	368	$579,638	$17.33	6	$1.58	6
Business Subtotal	**11.7**	**889.1**	10,421	**$10,363,797**	**$11.66**		**$1.00**	
TOTAL	**12.4**	**2,133.6**	**26,556**	**$41,203,868**	**$19.31**		**$1.55**	

In general, the mix of savings forecast by Consumers for 2014 and 2015 is very similar to the mix shown above for 2013. As a result, the average measure life for the portfolio of savings is forecast by Consumers to be nearly identical in 2014 and 2015 to what it is forecast to be for 2013. The four year trend in average measure life from 2012 through 2015 is provided in the tables below. For both electricity and gas it appears as if Consumers' is projecting that average measure lives will increase modestly over 2012 levels.

[14] Costs and annual savings: Consumers Energy 2012-2015 Amended Energy Optimization Plan. Lifetime savings and average measure lives based on measure level data provided by Consumers in response to NRDC data request #23 in MPSC Case No. U-16670.

Table 10: CE Portfolio-Level Electric Average Measure Life, 2012 - 2015

Year	2012	2013	2014	2015
Average Life	10.5	11.1	11.1	11.1

Table 11: CE Portfolio-Level Gas Average Measure Life, 2012 - 2015

Year	2012	2013	2014	2015
Average Life	11.8	12.4	12.3	12.2

As noted above, some similarities in the ranking of efficiency programs by cost per unit of first year savings and cost per unit of lifetime savings may mask significant differences between measures within programs. In other words, the effect of articulating goals as lifetime savings rather than as first year savings may be even greater than suggested by the program comparisons provided above. We have not conducted an exhaustive assessment of the potential impacts at the measure level. However, to gain some insight into that issue we did look at how the ranking of measures within CE's C&I Prescriptive program forecast for 2013 (in terms of rebate cost per unit of savings) changed when moving from a focus on first year savings to a focus on annual savings. Table 12 shows 12 program measures whose rank changed by more than 50% (in either direction) when shifting from a rebate per first year savings metric to a rebate per lifetime savings metric. Some changed quite substantially. For example, specialty CFLs were the 5th cheapest measure in terms of rebate cost per first year kWh saved, but 41st cheapest (out of 49 measures) per lifetime kWh saved.[15] These examples illustrate why it may be plausible that the utilities would consider not only changing their emphasis on different programs if a lifetime savings goal was adopted, but also consider changing emphasis on different measures within programs.

[15] There were 117 C&I Presciptive program measures analyzed in DTE's most recent EO plan. Some of the measures are simply different variations (by size, applicable market, applicable baseline condition, etc.) of the same technology. Thus, the number of measure types is considerably smaller.

Table 12: Selected CE Forecast 2013 C&I Prescriptive Program Measure Rankings (Incentive $/kWh)

Measure	Measure Life	Incentive $ per kWh Saved		Measure Rank (out of 49)	
		1st Year	Lifetime	1st Year	Lifetime
CFL Screw in (30 watts or less) P - 2013	2	0.0104	0.0052	2	11
Compact Fluorescents: Screw-in, 31-115 W	2	0.0177	0.0089	3	23
4-foot Standard T8 to Reduced Wattage T8 (lamp only)	12	0.0358	0.0030	4	2
CFL Specialty (down-light, 3-way, dimmable)	2	0.0404	0.0202	5	41
VFD on HVAC Fans and Pumps	15	0.0542	0.0036	6	3
Network Power Management Software	5	0.0565	0.0113	7	31
Recessed Downlight Fixture (LED)	15	0.0570	0.0038	8	4
Anti Sweat Heater Controls	15	0.0597	0.0040	10	5
VFD for Process Pumping, <= 50 HP	15	0.0620	0.0041	11	6
Demand Control Ventilation - Electric Customers	15	0.0643	0.0043	13	7
Demand Control Ventilation - Combination Customers	15	0.0648	0.0043	14	8
LED, T-1, or Electroluminescent Exit Signs	15	0.0689	0.0046	16	9

JURISDICTIONAL COMPARISON

In the table below we provide a comparison between the 2012 actual and 2013 to 2015 forecast average electric efficiency portfolio savings life for DTE, Consumers and several other efficiency program administrators in New England and the Midwest. It should be noted that it is not always very easy to obtain such information because it is not commonly reported. Indeed, we do not have sufficient data from other jurisdictions to present a comparable table for gas efficiency program portfolios. This underscores the reality that Michigan's historic focus on first year savings is not unique to the state or even its region.

Table 73: Electric Average Measure Lives in Various Jurisdictions

Program Administrator	Source	2012	2013	2014	2015
DTE	2012 Actuals, 2013-15 Plan	10.1	8.8	9.0	9.0
Consumers Energy	2012 Actuals, 2013-15 Plan	10.5	11.1	11.1	11.1
Efficiency Vermont[16]	2012 Actuals	11.2	n.a.	n.a.	n.a.
NSTAR (MA)[17]	2012 Actuals	11.7	n.a.	n.a.	n.a.
Commonwealth Edison (IL) [18]	PY4-PY6 Plan 6/2011 to 5/2014)	8.6	n.a.		
Focus on Energy (WI)[19]	2012 Actuals	11.0	n.a.	n.a.	n.a.

Average measures lives for the six program administrators for which we've acquired data range from a little less than 9 years to a little more than 12 years. DTE's forecast average measure life for 2013 to 2015 is at the low end of that range and notably about 20% lower than Consumers' average for the same time period. Consumers' average life appears to be consistent with most of the others. However, it should be emphasized that average measure life calculations for portfolios of efficiency programs are necessarily a function of assumptions used for the savings lives of many different efficiency measures. While Consumers and DTE presumably use the same MEMD assumptions, some of the differences between their average portfolio savings lives and those of program administrators in other jurisdictions might be a function of different assumptions for the same measures. As discussed above, there are examples in the MEMD of measure life assumptions which appear to be conservatively low (e.g. insulation measures) as well as examples that appear to be high (e.g. CFLs). We recommend that these and perhaps some other lifetime assumptions in the MEMD be re-examined, particularly if Michigan policies begin placing more emphasis on lifetime savings.

OPTIONS FOR REMOVING BIAS TO PURSUE CHEAP SHORT-LIVED SAVINGS

Ultimately, there are two policy "levers" for addressing these perverse incentives to pursue short-term savings that are inherent in goals articulated as first year savings. The first is to redefine savings goals in a way that encourages greater consideration of the lifetime benefits of efficiency measures. The second is to establish shareholder incentive metrics that do the same thing. In general, we believe both should be changed, starting with the goals themselves because they are the root of the problem. If the goals are unchanged (i.e. remain articulated as first year savings) and utilities are provided shareholder incentives that are based on some measure of lifetime savings or benefits, they will perceive themselves as being in the position of having to meet two different, sometimes competing, objectives. That would likely lead to some

[16] Efficiency Vermont 2012 Savings Claim Summary.

[17] Northeast Utilities (parent of NSTAR), "Energy Efficiency Programs," http://www.nu.com/responsible_energy/our-business/energy-efficiency-programs.html.

[18] Based on lifetime savings data over the PY4 to PY6 plan period provided by Com Ed in a personal communication. Lifetime savings were divided by annual savings for the same plan period as filed by Com Ed in Illinois Docket Number 10-0570.

[19] The Cadmus Group, Focus on Energy Calendar Year 2012 Evaluation Report, Volume 1; April 30, 2013.

improvement in outcomes (i.e. more investment in long-live savings), but not as much as if the fundamental goals were corrected or changed.

There are several different ways to adjust savings goals so that they better encourage utilities to maximize the lifetime benefits of efficiency programs. What follows is a discussion of the following options:

1. Lifetime savings goals
2. Discounted lifetime savings goals
3. Net present value of net benefits
4. Cumulative annual savings goals over a multi-year period
5. 1st year savings goals with limits on quantity of savings from short-lived measures
6. 1st year savings goals with bonuses/penalties for long/short-lived measures
7. 1st year savings goal with average measure life adjustment factor

Lifetime Savings

Under a lifetime savings goal, program administrators' performance would be measured relative to the total savings they produce over the life of the efficiency measures that they cause to have installed. For example, if a furnace saves 100 therms of gas per year for 20 years, then the lifetime savings for that measure would be 2000 therms.

The advantages of this metric of performance are that it is conceptually easy to explain and understand, simple to calculate using data that program administrators already routinely collect and evaluate (all TRMs have both annual savings and measure life as key components), and clearly values all of the savings that efficiency measures will produce over their lives. It also preserves utility flexibility in being able to choose a balanced portfolio that can support short-lived measures as well, if appropriate, so long as they have a plan that meets the overall target.

Depending on one's perspective, there is one *potential* disadvantage to this metric: it treats savings 10 or 20 years from now as just as valuable as savings this year. Put another way, it does not discount the value of future years' savings. Thus, while it fixes the problem that first year savings goals have of not valuing future years' savings at all, relative to the net present value calculation that is typically used for cost-effectiveness screening, a lifetime savings goal *may* sometimes over-value future years' benefits. We say sometimes "*may*" rather than "*will*" because the avoided costs used to value savings can also change over time and are often higher in the long term than in the short term. If avoided costs are increasing at roughly the same annual rate as the discount rate, a lifetime savings metric would be a very good proxy for the economic benefits of efficiency investments.

The Canadian province of Ontario began using lifetime savings in 2012 as its principal metric for measuring the effectiveness of its two gas utilities' efficiency program performance. The Wisconsin Focus on Energy program switched to goals expressed as lifetime savings in 2013.

Discounted Lifetime Savings

Discounted lifetime savings is the same as the lifetime savings metric except that a real discount rate (i.e. excluding inflationary effects) is applied to future year savings so that the farther out in time you go the less value is attached to each year's worth of savings. For example, using a 5% real discount rate, an efficient furnace that saved 100 therms/year for 20 years would have a discounted lifetime value of 1309 therms.[20]

As with the lifetime savings metric discussed above, this metric clearly values all of the savings that efficiency measures will produce over their lives rather than just the first year of savings. One *potential* additional advantage of this metric *could* be a better reflection of the economic value of the savings because savings that will occur many years out in the future would be valued less than those that occur in the near term. Economists – and most consumers – value a dollar today more than a dollar they will receive next year and value a dollar they will receive next year more than a dollar they will receive in ten years. However, it is important to remember that savings are not necessarily the same as dollars. Their value is a function of *both* how far out in the future they will occur and what the utility's avoided costs are in future years. Changes in forecast avoided costs over time could potentially offset (or even more than offset) the effects of discounting, so discounting will not necessarily lead to more accurate valuing of future year savings.

One major disadvantage of using discounted lifetime saving is that it is complicated. It would require additional development of discounting factors for every different possible measure life (i.e. rather than just multiplying annual savings by measure life to obtain lifetime savings, you must also multiply that product by a discounting factor that is a function of measure life and discount rate). Further, those discounting factors could change over time as the real discount rate changes.[21] They may also be different even between utilities in the same state, making comparisons of performance difficult. Another important disadvantage is that it is difficult to explain and understand. Finally, as discussed above, depending on how avoided costs change over time, discounted lifetime savings may not be a more accurate reflection of the lifecycle value of efficiency than undiscounted lifetime savings. Many experts believe that concerns about climate change are likely to make efficiency savings in the longer term even more important than today, and that additional costs not fully captured now in avoided costs will likely be imposed (e.g., a carbon tax). This would also lead one to consider not discounting physical units of future savings as inappropriately discounting efficiency resources that may actually be worth more in the future than current models suggest.

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[20] Using a 5% discount rate, 1 unit of savings is worth 13.09 units over 20 years, 10.90 units over 15 years, 8.11 units over 10 years and 4.55 units over 5 years.

[21] A utility's cost of capital is often used as a nominal discount rate. However, that can change over time – as can the inflation rate which needs to be subtracted from it to produce a real discount rate.

We are not aware of any jurisdiction that uses discounted lifetime savings as a performance target.

Net Present Value of Net Benefits

In one sense, the best way to ensure that savings from both short and long-lived measures are valued in proportion to the benefits that they provide is to base goals on the computation of net economic benefits. Such calculations are routinely performed in most jurisdictions to justify programs during the planning process and to retrospectively assess the benefits that were actually achieved.

The obvious advantage of this approach is that it adjusts not only for the live of the savings, but also for the value to the system of savings in different years, the value of savings during different seasons and times of day, and for the cost of acquiring the savings.

However, there are a variety of disadvantages of using this approach to set high level goals. First, the very attributes that ensure that it provides exactly the right weighting to different measures also ensure that it would be complex to administer, with the potential for significant disagreements over not only annual savings levels and measures lives, but also avoided costs, load shapes, measure costs, etc. That can add significantly to annual savings verification processes. Second, it is unclear how to objectively set economic benefits targets without extensive analysis. There is a wealth of information on how difficult different levels of first year savings are to achieve from numerous states. There is almost as much information regarding typical portfolio average measure lives. Both sets of insights are largely transferable from one jurisdiction to the next. There is much less information about what it takes to achieve $100 million in net benefits. Moreover, because of significant variations in avoided costs, any such information could be difficult to transfer from one jurisdiction to another. Third, the key variable of avoided costs can differ between utilities in the same state and change non-trivially from year to year. That makes it difficult to benchmark and adopt a single metric for an entire jurisdiction, to determine appropriate goals for more than a year or two at a time, or to assess trends in performance over time. We believe this is problematic because, while in theory goals based on net benefits can be adjusted annually whenever avoided costs change, and adjusted between utilities with differing avoided costs, we believe this would add unnecessary transactional costs and analyses, and reduce the overall transparency of the Michigan efficiency efforts and direct comparability between utility performance.

The province of Ontario used to use TRC net benefits as the principal performance metric for its gas portfolio, but switched to lifetime savings in 2012 in large part because of direct experience with the concerns articulated above. Some other jurisdictions (e.g. Connecticut, Massachusetts and Vermont) have net or gross economic benefits as one of the metrics used to judge program administrators' performance, but our experience has been that those metrics are usually established by first setting a 1st year savings target, determining how that target is likely to be met or could be met with an acceptable mix of programs, and then calculating the economic benefits that mix of programs would produce. In other words, such goals are usually driven primarily by first year savings goals rather than developed independently.

Cumulative Annual Savings over Multi-Year Period

Under a cumulative annual savings goal, an efficiency program administrator would be measured relative to the annual savings that are still being realized in the final year of a multi-year period. For example, if a program administrator caused one efficient furnace that produced 100 therms of savings for 20 years to be installed in each of the five years of a program (five furnaces total), then the cumulative annual savings in year 5 would be 500 therms. On the other hand, if a program designed to influence efficiency or conservation behavior produced 10 therms of savings that lasted only one year, after five years of implementation of the program the cumulative annual savings would still only be 10 therms because only the savings produced in year 5 would still be in effect in year 5 (savings produced from the program in years 1, 2, 3 and 4 would have ended).

The principal advantage of this type of metric is that it discounts the savings produced in the early years of a multi-year period by measures with very short lives.[22] An additional side benefit – not associated with trying to promote long-lived measures – is that multi-year goals offer program administrators greater flexibility in designing and managing their efficiency programs.

However, there are a number of disadvantages with regard to addressing the lifecycle benefits of efficiency measures. First, the metric will not make any distinction between the value of measures with moderate lives and the value of those with long or very long lives. Most jurisdictions are unlikely to establish goals over multi-year periods of more than five years. Thus, even for measures implemented in the first year of a multi-year period, there would be no difference in value assigned to measures with lives of 5 years relative to measures that will produce savings for 10, 20 or 30 years. Moreover, as you progress through a multi-year period the cumulative annual savings metric will not even discount the benefits of the most short-lived measures. For example, in the last year of a multi-year period, a behavior program that produces savings with a life of only one year will be valued just as much as a program that produces savings over 10, 20 or 30 years. Finally, this type of approach can create perverse

[22] Note that this is the only advantage associated with the cumulative annual savings aspect of this type of goal. There are other advantages of having multi-year goals rather than annual goals. These include the ability to manage variability in market response to programs over time, better incentives to address efficiency opportunities that take a number of years to reach fruition, better incentives to invest in research and development and better incentives to invest in program approaches that may cost more in the short run per unit of savings realized but have good pay-offs over a longer-term. We don't focus on those advantages here because they are not unique to a cumulative annual savings goal. One could have, for example, a multi-year goal that is focused on lifetime savings (i.e. where lifetime savings achieved through programs run over a 3 or 5 year period are the metric of concern) rather than cumulative annual savings. Indeed, there are jurisdictions (e.g. Vermont) which have multi-year (3 years in Vermont's case) targets that focus on the sum of first year (not cumulative and still persisting) annual savings.

incentives both early in the period as well as toward the end of the period, unless it is somehow combined with annual goals. For example, all things being equal a goal-maximizing utility would decline to promote *any measure with a measure life shorter than the remaining period no matter how cost-effective it might be, and then pursue as much of that short-lived measure in the last year or few years of the period, even it is was relatively more expensive on a life-cycle basis.* An example of this would be for a utility to pursue no behavioral programs in years 1-4, and then shift a large portion of its portfolio to investing in a behavior program only in year 5. Not only would this likely result in worse long term net benefits maximization, but limits the benefits of consistency in terms of customer and trade ally marketing and relations, and the effects of market transformation over time.

The European Union recently adopted a cumulative annual savings obligation covering the period 2014 through 2020.

1st Year Savings Goals with Limits on Savings from Short-Lived Measures

One option to address concerns that goals expressed as 1st year savings provide inappropriate incentives to promote inexpensive short-lived savings is to put a cap on the amount of savings from such measures that can be counted towards the first year savings target. For example, one could require that no more than 10% of savings come from measures with lives of five years or less.

This approach has the obvious advantage of curbing incentives that first year savings targets provide to promote inexpensive and very short-lived savings. It is also relatively simple and easy to understand. Finally, it maintains the principal advantage of continuing to express savings in first year terms – namely, that first year savings are easy to understand and easy to put into context. In particular, when savings targets are expressed as a percent of annual energy sales, it is easy for everyone to understand how much of a contribution new savings from a set of programs is contributing to overall energy needs.[23]

However, there are disadvantages to this approach as well. In short, it is a blunt instrument. Consider the example provided above. If the only constraint imposed is a limit on the amount of savings from measures with a life of five years or less, no distinction is made between measures with lives of 6 or 7 years and measures with lives of 20 or 30 years, even though savings from the latter group can last three to four times as long as savings from the former group. Similarly, no distinction is made between measures with lives of 1 or 5 years, even though savings from the latter group are worth five times as much as savings from the former group. This problem can theoretically be reduced by having a number of different constraints (see discussion below). However, as the number constraints increases, the administrative complexity for an efficiency program portfolio also increases. Another disadvantage of a limit on short-term savings is that it doesn't distinguish between the relative cost-effectiveness of different short-lived efficiency measures. If an efficiency measure with a life of only one or two years is very inexpensive per unit of first year savings, but relatively expensive per unit of

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[23] Though what should really matter is what cumulative annual savings are as a percent of sales over a multi-year period, as that is most relevant to longer-term planning.

lifetime savings, then finding a way to limit the promotion of that measure (absent a mandate to pursue all cost-effective savings) may be a good idea. Alternatively, if an efficiency measure with a life of five years is not only very inexpensive per unit of first year savings but also has by far the lowest cost per unit of lifetime savings, then constraining its promotion would work against overall policy objectives.

The approach to limiting the portion of savings that can come from short-lived measures has been used in several European countries.

1st Year Savings Goals with Bonuses/Penalties for Long/Short-Lived Measures

Another option for addressing concerns about the signals that a 1st year savings goal send, without fully jettisoning the use of a 1st year savings goal, is to provide bonuses for long-lived measures and penalties for short-lived measures. For example, one could require that 1st year savings from measures with lives of 5 years or less be multiplied by 0.5 and savings from measures with lives of 15 years or more to be multiplied by 1.5. Under such a scheme, an efficient furnace that saves 100 therms/year for 20 years would count as 150 therms towards a first year savings target and a behavior program that saved 20 therms for only one year would count as 10 therms towards the first year savings target.

This approach has the obvious advantages of reducing incentives to promote resources that are inexpensive on a first year basis but that are not (relatively) as cost-effective on a lifecycle basis while increasing incentives for resources that are cheaper on a life-cycle basis. It also maintains the principal advantage of expressing savings in first year terms – that first year savings are easy to understand and easy to put into context.

However, it is still a somewhat blunt instrument. If there is a single threshold for defining a "short-lived measure" and a single penalty multiplier for such measures, as well as a single threshold for defining a long-lived measure, some perverse signals can be sent. For example, in the example provided above, a program administrator would consider a measure with a life of 6 years to be more than twice as valuable as a measure with a life of 5 years (2.5 after the 50% multiplier is applied). On the other hand, the program administrator would see the same value in a measure with a life of one year as in a measure with a life of 5 years and the same value in a measure with a life of 6 years as in a measure with the live of 14 years. Among other things, this will also put a lot of pressure on the determination of appropriate measure life assumptions for measures that are at or very close to the threshold levels for penalties and bonuses.

This approach of providing penalty multipliers to short-lived measures and bonus multipliers to long-live measures has been used in Denmark (measures with a life of less than 4 years got a 0.5 multiplier and some[24] measures with a life of over 15 years got a 1.5 multiplier.)

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[24] The 1.5 multiplier applied only to measures with lives of over 15 years that saved fuels not covered by a carbon emissions cap and trading system.

1st Year Savings Goal with Average Measure Life Adjustment Factor

A third way to continue to use 1st years savings as the way of expressing savings goals while sending better signals regarding the longevity of savings is to establish an average measure life expectation and related total savings adjustment factor that is applied at the portfolio level, along with the 1st year savings target. For example, if the goal was to achieve first year savings of 100,000 MWh with an average life of 10 years, and the program administrator achieved only 90,000 but with an average life of 12 years, the savings achieved would be given a 20% bonus (i.e. a multiplier of 12 divided by the expected 10) and the goal would have been exceeded (108,000 MWh after adjustment). Conversely, if 110,000 MWh of first year savings was achieved but with an average measure life of only 8 years, a 20% penalty (i.e. a multiplier of 8 divided by the expected 10) would be applied to the savings and the goal would not have been met (88,000 MWh after adjustment).

This approach is functionally the same as setting a lifetime savings target, except that it builds on an explicit 1st year savings goal and an average measure life expectation. The scalable nature of the adjustment factor eliminates any of the disadvantages associated with the "blunt instruments" described above. Thus, it retains the communication advantages of a 1st year savings goal while providing exactly the right level of incentive to all efficiency measures regardless of their useful life – a 3-year measure is worth exactly three times as much as a 1-year measure; a 10-year measure is worth exactly twice as much as a 5-year measure; an 18-year measure is worth exactly three times as much as a 6-year measure; etc. Further, we believe that preserving consistency with expressing goals as annual has some value for purposes of transparency, comparability among jurisdictions, and potentially for legal and regulatory reasons.

We do not see any significant disadvantages to this approach. However, we are unaware of any jurisdictions that have adopted it to date.

Summary

There are a variety of different approaches one could use to either change first year savings goals or replace them with alternative metrics (like lifetimes savings goals), each of which has different advantages and disadvantages which we have discussed above. Note that the examples we used in the discussions were illustrative only.

Ultimately, our view is that the last option discussed – a first year savings goal with an average measure life assumption and related, proportional first year savings adjustment factor applied at the portfolio level – is the best. It strikes the best balance between clarity of objectives, ease of implementation and sending the right signals regarding the relative benefits of measures with different lives.

Note that it is also possible to combine some of the approaches discussed above. For example, one could combine the use of first year savings goals with average measure life adjustment factors (our preferred approach) with a multi-year savings target. Under this example, utilities could be required to meet a four-year savings goal of 4% with an average measure life of 12 years and proportional adjustments for deviations from that average life,[25] rather than having four one-year goals of 1% savings with the same 12 year measure life adjustment factor.[26] That combination would provide the benefits of the measure life adjustment factor approach while also providing utilities with the flexibility advantages of a multi-year savings target.

[25] Under this approach, we presume that first year savings would still be calculated and adjusted (using the benchmark measure life) annually, with the four annual values then summed to determine whether the 4-year goal was met.

[26] Note that the time periods, savings levels and measure lives used in this example are not recommended values for any of those parameters. They are used for illustrative purposes only.

APPLICABILITY OF SAVINGS GOALS TO SMALL UTILITIES

Analysis of small utilities' efficiency program savings goals and performance data suggests that savings targets similar to those of large utilities are achievable. With a savings goal of 1% of sales in 2012 (following a 3 year ramp-up period), the average percent of this goal achieved by the 57 small electric utilities was 111%. The 4 small gas utilities achieved an average of 153% of a 0.75% four year savings target.

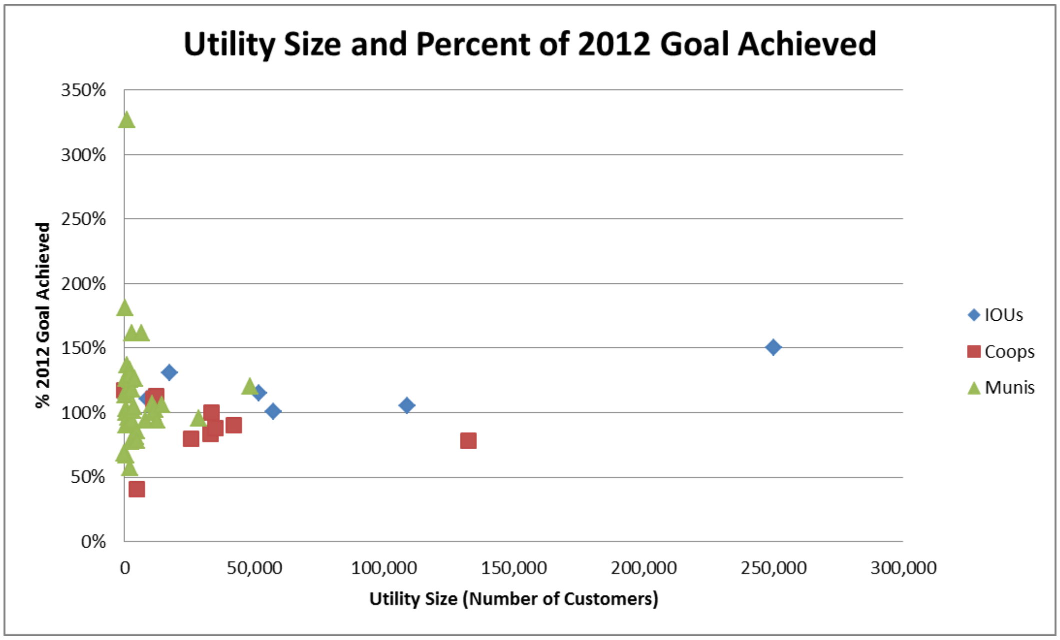
VARIATION IN GOAL ACHIEVEMENT

Savings performance does vary by type of small utilities (IOU, Coop, Muni) as well as the utilities' participation in Efficiency United (EU). While the average achievement of electric IOUs and Munis was well above 100 percent (119 and 115% respectively), the average achievement for Co-ops was 90%. Overall, the utilities that are part of Efficiency United achieved greater savings than the non-EU utilities (122 and 105 percent respectively). While the percent of goal achievement was widely spread and ranged from 40 to 327% for non-EU utilities, every EU utility met over 100% of the savings target with a range of 102 to 182%. The success of small utilities that are members of EU suggests that those underachieving utilities may be able to reach goals by participating in Efficiency United. By choosing not to join EU, utilities should be confident that they can achieve goals on their own choose not to join EU this should be because they are confident that they can achieve goals on their own.

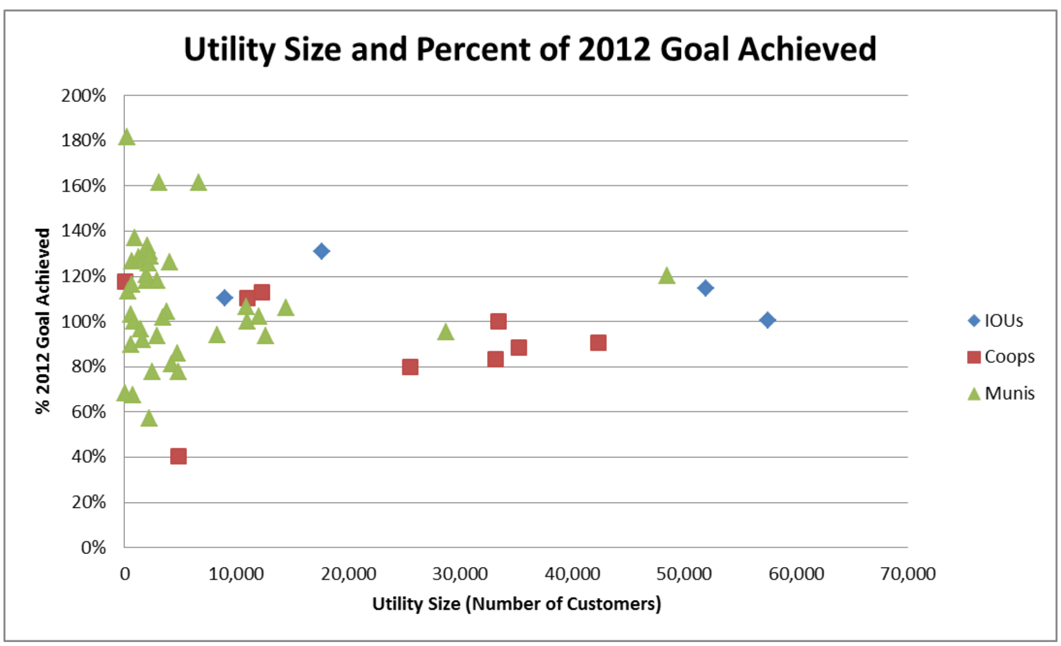
GOAL ACHIEVEMENT AS A FUNCTION OF UTILITY SIZE

Data on the number of customers was only available for electric IOUs and Coops. Rough estimates of utility size for Michigan's Munis were estimate based on the number of households reported in U.S. Census data from 2010.[27] Analysis of the data suggests that utility size does not appear to be a primary driver of performance outcomes. The average percent of the target achieved for the smallest half of utilities is 98% while the larger half achieved an average of 104%; however, it is likely that those utilities that did not meet goals were randomly distributed rather than related to utility size. For example, both the largest and the smallest utility achieved well over 100% of the savings goal (151 and 118%). Yet, the achievement percentage of the two median sized utilities came to an average of 92 percent. As demonstrated by the table below, a linear relationship between utility size and goal achievement is difficult to discern.

[27] For Detroit DPL, the customer estimate of 115 was taken from a Detroit News article. Nichols, Darren A., "DTE to Take Over Detroit Electricity Service." *The Detroit News.* June 27, 2013.



Removing the three largest utilities and the utility that achieved over 300% of its saving goal provides an even clearer picture of the lack of relationship between utility size and goal achievement.



Although the data analyzed suggests that small utilities are meeting their performance goals, we have not obtained data sufficient to scrutinize the source of the savings in terms of individual programs and measures. It is possible that some utilities have been effectively cream skimming (e.g., achieving savings mostly from CFLs) and that achieve goals while offering more comprehensive programs might be a greater challenge. We hope to be able to obtain and analyze this data and include discussion of results in a final report. However, we believe the goals overall are not so aggressive that we are overly concerned about this issue or about small utilities running out of low hanging fruit any time soon.

SMALL UTILITY PERFORMANCE BEYOND MICHIGAN

Performance outcomes from communities participating in Efficiency Smart largely corroborate the results in Michigan described above. Efficiency Smart is a program of energy efficiency services offered to 49 municipal electric providers, primarily in Ohio, that are members of American Municipal Power, Inc. (AMP). In 2012, the second year of Efficiency Smart's operation, the program achieved more than 140% of its performance target for that year and almost 75% of its three-year energy savings goal.[28] In 2012, Efficiency Smart achieved more than 140 percent of its performance target. The three-year service period, beginning in 2011, was designed to save participants 81,000 megawatt-hours (MWh) of energy by the end of 2013.[29] Efficiency Smart exceeded this level of savings in March, and has turned its attention to individual savings targets for each of its participating municipalities. As of July 15, 2013, 34 participating communities had achieved at least 70% of their energy savings goal, with 22 of those municipalities already surpassing 100% of their savings target.[30]

CONCLUSION

Analysis of savings goals and achievements of small utilities in Michigan suggests that statewide savings goals are appropriate and attainable. On average, Michigan's small utilities met over 100% of the savings goal of 1% of retail sales in 2012. Additionally, all individual utilities participating in Efficiency United met over 100 percent of savings targets. Those utilities that are struggling to meet statewide goals have the option of participating in Efficiency United as a way to improve performance. Therefore, we recommend that the MPSC hold the state's small utilities to the same saving goals and standards as those developed for larger IOUs. A forthcoming analysis for the Michigan PSC will analyze whether goals post 2015 should be increased, decreased, or held the same, and whether the structure of the targets should be changed (such as the use of lifecycle energy targets or the addition of peak demand targets). If ultimately there is a decision to increase current goals substantially, we will review whether these higher goals are still achievable by the smallest utilities. However, at this stage we believe the current goals are sufficiently achievable by all utilities regardless of size.

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28 Efficiency Smart, "2012 Annual Report—Energizing the Future." Accessed July 29, 2013. http://www.efficiencysmart.org/Media/Documents/Publications/2012%20Efficiency%20Smart%20Annual%20Report.pdf.

29 AMP's Newsroom, "AMP/VEIC Execute New Efficiency Smart Contract." July 15, 2013. http://amppartners.org/newsroom/amp-veic-execute-efficiency-smart-contract/.

30 Ibid.