



Review of EPY5 Total Resource Cost Test Assumptions

Energy Efficiency / Demand Response Plan:
Plan Year 5
(6/1/2012-5/31/2013)

Presented to
Commonwealth Edison Company

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1. Overview

As part of Navigant’s evaluation of Commonwealth Edison Company’s (ComEd) energy efficiency and demand response programs for program year five we reviewed the outputs of DSMore, an excel based tool, that calculates program level cost effectiveness for various tests, including the Utility, Ratepayer Impact Measure (RIM), Participant, Total Resource Cost (TRC) and Societal tests. The focus of this review is on the basis and reasonableness of the assumptions used to conduct the Illinois TRC test.

The Illinois TRC test is defined in the Illinois Power Agency Act SB1592 as follows:

‘Total resource cost test’ or ‘TRC test’ means a standard that is met if, for an investment in energy efficiency or demand-response measures, the benefit-cost ratio is greater than one. The benefit-cost ratio is the ratio of the net present value of the total benefits of the program to the net present value of the total costs as calculated over the lifetime of the measures. A total resource cost test compares the sum of avoided electric utility costs, representing the benefits that accrue to the system and the participant in the delivery of those efficiency measures, to the sum of all incremental costs of end-use measures that are implemented due to the program (including both utility and participant contributions), plus costs to administer, deliver, and evaluate each demand-side program, to quantify the net savings obtained by substituting the demand-side program for supply resources. In calculating avoided costs of power and energy that an electric utility would otherwise have had to acquire, reasonable estimates shall be included of financial costs likely to be imposed by future regulations and legislation on emissions of greenhouse gases.¹

The Illinois TRC test differs from traditional TRC tests in its requirement to include a reasonable estimate of the financial costs associated with future regulations and legislation on the emissions of greenhouse gases (GHG). This difference adds an additional benefit to investments in efficiency programs that are typically included in the Societal Test in other jurisdictions. However, the Illinois TRC test differs from the Societal test in that it only includes benefits associated with avoided GHGs and the discount rate applied to future benefits is the electric distribution companies (EDCs) Weighted Average Cost of Capital (WACC) which is typically used in TRC calculations.

1.1 IL TRC Equation

The equation used to calculate the Illinois TRC is presented below:

Equation 1 – Illinois TRC

$$BCR_{ILTRC} = B_{ILTRC} / C_{ILTRC}$$

¹ Illinois Power Agency Act SB1592, pages 7-8.

Where,

- BCR_{ILTRC}** = Benefit-cost ratio of the Illinois total resource cost test
- B_{ILTRC}** = Present value of benefits of a Illinois program or portfolio
- C_{ILTRC}** = Present value of costs of a Illinois program or portfolio

The benefits of the Illinois TRC are calculated using the following equation:

Equation 2 – IL TRC Benefits

$$B_{ILTRC} = \sum_{t=1}^N \frac{UAEP_t + UATD_t + UAA_t + EB_t}{(1+d)^{t-1}} + \sum_{t=1}^N \frac{UAC_{at} + PAC_{at}}{(1+d)^{t-1}} + RC$$

The costs of the Illinois TRC are calculated using the following equation:

Equation 3 - IL TRC Costs

$$C_{ILTRC} = \sum_{t=1}^N \frac{PRC_t + PIC_t + PEAM_t + PCN_t + UIC_t}{(1+d)^{t-1}}$$

Where benefits are defined as:

- UAEP_t = Utility avoided electric production costs in year t
- UATD_t = Utility avoided transmission and distribution costs in year t
- UAA_t = Utility avoided ancillary costs in year t
- EB_t = Environmental Benefits in year t
- UAC_{at} = Utility avoided supply costs for the alternate fuel in year t
- PAC_{at} = Participant avoided costs in year t for alternate fuel devices
- RC = NPV of replacement costs of incandescent equivalents

And costs are defined as:

- PRC_t = Program Administrator program costs in year t
- PIC_t = Program Implementation costs in year t
- PEAM_t = Program Evaluation, Measurement & Verification (EM&V), Advertising and Miscellaneous costs in year t
- PCN = Net Participant costs
- UIC_t = Utility increased supply costs in year t
- d = Utility weighted average cost of capital, used as discount rate

The Illinois TRC test allows for utilities to claim as a benefit the net present value (NPV) of the avoided cost of purchasing incandescent bulbs that accrues to program participants as a result of the significantly longer lifetimes of efficient CFLs and LED light bulbs. In general, the avoided cost per bulb is determined by comparing the estimated useful life of efficient and baseline bulbs to determine the number of baseline bulb purchases that are avoided. Based on the average purchase price of baseline bulbs, an NPV is determined by discounting the value of these avoided purchases over the course of the lifetime of the

efficient bulb. The Illinois TRM provides deemed NPV values per bulb based on efficient bulb-type, socket type (commercial or residential), and lumen range. These benefits were included in the program calculations provided below.

1.2 TRC Data Requirements

The data points needed to conduct the Illinois TRC test are provided in Table 1 below and are divided into generic and program specific categories. The program specific data points are further subdivided into those that are provided by ComEd versus those that are a result of the Navigant’s evaluation activities.

Table 1 - Data points needed to conduct TRC

| Category | Data Point | Source |
|-----------------------|--|----------|
| Generic | • Avoided energy costs (\$/kWh) | ComEd |
| | • Avoided capacity costs (\$/kW) | |
| | • Discount Rate | |
| | • Line Losses | |
| | • Escalation Rates | |
| Program Specific | • Participants | Navigant |
| | • Verified Ex-Post Energy Savings (kWh) | |
| | • Verified Ex-Post Capacity Savings (kW) | |
| | • Realization Rate | |
| | • Net to Gross Ratio | |
| | • Measure life | ComEd |
| | • Implementation Costs | |
| • Utility Admin Costs | | |
| | • Utility Incentive Costs | |
| | • Participant Costs | |

Source: Navigant Research

This document provides a summary of the results at the portfolio and program level, the program specific inputs, a description of each of the data points provided by ComEd, the basis of their determination and their reasonableness.

2. Summary of Results & Generic Data Points

2.1 Present Value Summary of Portfolio Benefits and Costs

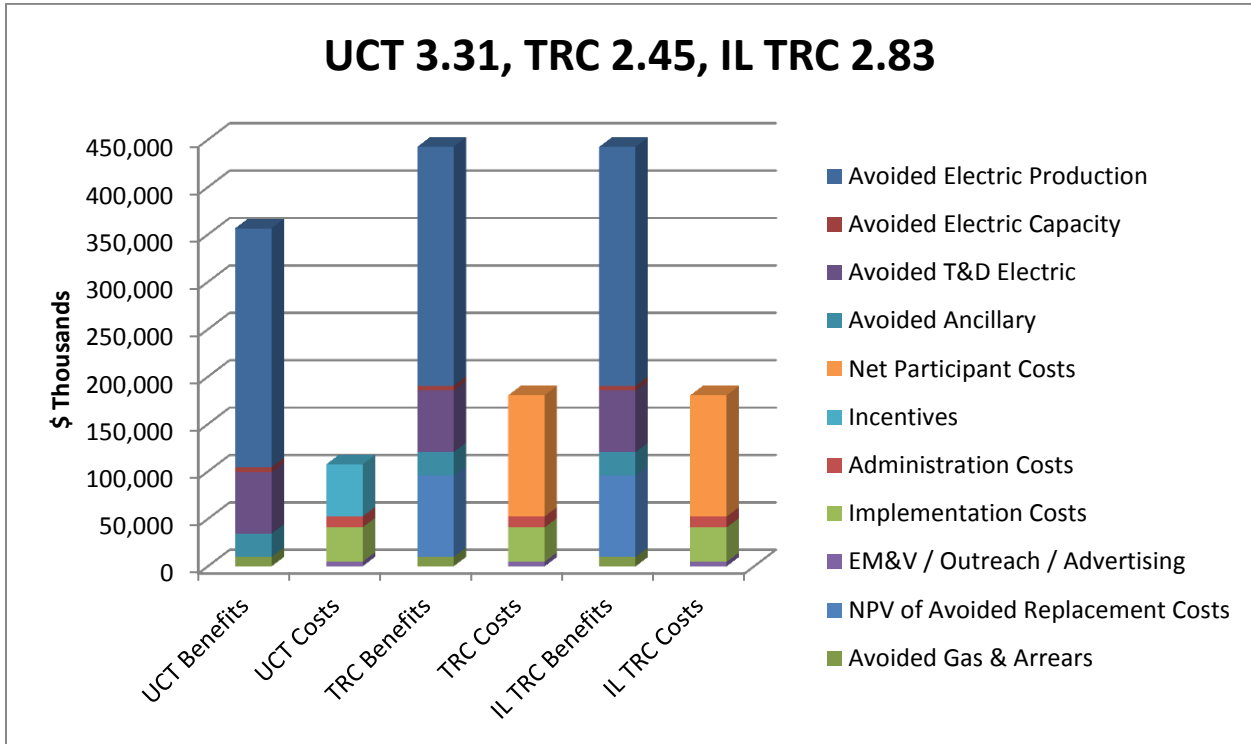
A summary of the portfolio level results, separated by benefits and cost components, is presented in Table 2 and Figure 1 below.

Table 2 – Summary of Portfolio Level Costs and Benefits (\$ in 000's)

| | UCT Test | | TRC Test | | IL TRC Test | |
|----------------------------------|--------------|-----------|--------------|-----------|-----------------|--------------|
| | UCT Benefits | UCT Costs | TRC Benefits | TRC Costs | IL TRC Benefits | IL TRC Costs |
| Avoided Electric Production | 252,288 | | 252,288 | | 320,413 | |
| Avoided Electric Capacity | 4,680 | | 4,680 | | 4,680 | |
| Avoided Gas & Arrears | 9,911 | | 9,911 | | 9,911 | |
| Avoided T&D Electric | 65,113 | | 65,113 | | 65,113 | |
| Avoided Ancillary | 24,623 | | 24,623 | | 24,623 | |
| NPV of Avoided Replacement Costs | | | 85,965 | | 85,965 | |
| Administration Costs | | 11,469 | | 11,469 | | 11,469 |
| Implementation Costs | | 36,319 | | 36,319 | | 36,319 |
| Other and Miscellaneous | | 4,750 | | 4,750 | | 4,750 |
| Incentives | | 55,047 | | | | |
| Net Participant Costs | | | | 127,946 | | 127,946 |
| Present Value Totals | 356,615 | 107,585 | 442,580 | 180,484 | 510,705 | 180,484 |
| Ratio | 3.31 | | 2.45 | | 2.83 | |

Source: Navigant Research

Figure 1 – Summary of Portfolio Level Benefits and Costs



Source: Navigant Research

As shown in Figure 1, the majority of the benefits in the UCT and TRC tests are derived from avoided electric production and T&D costs followed by avoided ancillary costs and finally avoided T&D costs. The NPV of avoided replacement costs also provides a boost to the benefits for both TRC calculations. For the comparison to the standard TRC test shown above, an adder included in the value of avoided electric production to account for CO₂ impacts has been removed.

On the cost side, net participant costs represent the largest component followed by implementation and administration costs in the IL TRC test.

2.2 Generic Data Points

Table 3 shows the typical values for the generic data points used in the IL TRC calculation and is followed by a description of what each of the components used in the TRC calculation represents.

Table 3 - Summary of Generic Data Points Used for TRC

| Data Point | Value |
|--------------------------------------|--------------|
| Avoided Electric Production (\$/MWh) | \$56.89 |
| Avoided Electric Capacity (\$/kW) | \$6.18 |
| Avoided T&D (\$/kW) | \$42.00 |
| Avoided Ancillary (\$/kW) | \$0.8435 |
| Discount Rate (Utility WACC %) | 6.94% |
| Line Losses (%) | 11.02% |
| CO ₂ costs | \$0.0139/kWh |

Source: Navigant Research

2.3 Avoided Electric Production Costs (\$/MWh)

Avoided electric production costs are those associated with purchasing energy from PJM. As per ComEd, avoided energy costs are based on NYMEX “ATC” for NI-Hub for the first 3 years. Future years are estimated and include the environmental benefits deriving from the expected impacts of CO₂ regulations.² ComEd does not typically use a single value for avoided electric production costs. The DSMore model calculates electric production costs under a wide variety of scenarios. The value included above is a weighted average of the probability of each scenario occurring.

2.4 Avoided Electric Capacity Costs (\$/kW)

Avoided electric capacity costs are those associated with the construction of addition electricity generation facilities to meet peak demand. Incremental reductions in the amount of electricity demand during peak hours can delay or eliminate the need to build additional generation. ComEd is a participant in the Reliability Pricing Model (“RPM”), which is PJM’s forward capacity market. The DSMore model uses actual RPM clearing prices for avoided demand costs through the 2013 program year (EPY6). After this time frame, it is assumed that capacity prices will rise to the Cost of New Entry (CONE) value of \$317.95/MW-day by 2018. From there, the price is escalated at the same rate as supply costs based on AEO 2010 forecasts.

2.5 Avoided T&D Electric (\$/kW)

Avoided transmission and distribution (T&D) costs are a benefit associated with not needing to build transmission and distribution infrastructure to meet demand at peak times. Based on a review of avoided costs on ComEd’s grid attributable to energy efficiency, a value of \$9/kW-year is used as an appropriate estimate with a 3% annual cost escalator. However, a value of \$42/kW-year appears to have been used in the evaluation of most portfolio programs, leading to an over estimation of T&D capacity benefits relative to planned assumptions.

² The primary environmental benefit that could be included in the Illinois TRC test is the value of avoided CO₂ emissions. ComEd included the average carbon value proposed by the NRDC within our analysis. This value (\$18.50/tonne) was applied to PJM’s 2009 marginal power plant emission rate to arrive at an average value of \$0.0139/kWh. DSMore does not provide escalation factors for externalities and emissions.

2.6 Avoided Ancillary (\$/kW)

Avoided Ancillary is a benefit associated with avoided costs attributable to the Open Access Transmission Tariff (OATT) that EDCs participating in the PJM market are required to pay based on demand.

2.7 Admin Costs

These are ComEd's internal staff costs for administering these programs.

2.8 Implementation Costs

These are the costs associated with the implementation of the programs, typically paid to a third party to deliver the program.

2.9 Other Program-level and Miscellaneous Expenses

These are other costs directly connected with a specific program, such as marketing campaigns, materials and promotion.

2.10 Incentives

The incentives are paid either to program participants or trade allies and are shown above, but not included in the calculation of costs in the TRC test.

2.11 Net Participant Costs

Participant costs are the costs that participants pay as a result of participating in an energy efficiency program. They are calculated from the perspective of "what would the participant have paid in absence of the program". The gross participant costs are multiplied by the net-to-gross (NTG) ratio to determine the net participant costs which is the amount that is used in the calculation of the TRC test.

2.12 Discount Rate

Not included in Table 2 above, the discount rate is an important determinant of overall cost effectiveness. The avoided electric production, capacity T&D, and ancillary benefits accrue over the life of the measures included in each program. These benefits are discounted to determine the present value of the cumulative benefits. The discount rate used of 6.94% reflects ComEd's weighted average cost of capital (WACC) and is appropriate rate to use for the Total Resource Cost (TRC) Test.

2.13 Line Losses

Also not included in Table 2, line losses are important to incorporate in the calculation of total benefits. The energy and demand savings included in the evaluations are estimated at the customer or meter level. The savings that accrue to ComEd rate payers are those at the generator level and therefore the estimated savings are increased by the line losses within ComEd's transmission and distribution network.

The line losses of 11.02% are based on ComEd's internal analysis. These line losses are in the higher end of the range that Navigant has seen, but are reasonable.

2.14 Miscellaneous Portfolio-level Costs

In addition to costs allocated directly to energy efficiency programs, portfolio level costs not directly incurred by specific programs are also included. These costs may include administrative, research and development, outreach, advertising, evaluation, measurement, and verification, legal, and other expenses. Since statutory costs effectiveness is measured at the portfolio level, ComEd does not allocate these costs to individual programs.

3. Program Specific Data

3.1 Present Value Summary of Program Benefits and Costs

Table 4 - Summary of Program Level Benefits and Costs (\$ in 000's) – ComEd Specific without Natural Gas Data from Joint Programs

| Program | Avoided Electric Production | Avoided Electric Capacity | Avoided T&D | Avoided Ancillary | Avoided Gas and Arrears | NPV of Replacements | Admin Costs | Implementation Costs | Other | Participant Costs (Net) | IL TRC Benefits | IL TRC Costs | IL TRC Test |
|--|-----------------------------|---------------------------|---------------|-------------------|-------------------------|---------------------|---------------|----------------------|--------------|-------------------------|-----------------|----------------|-------------|
| Residential Lighting | 54,312 | 755 | 11,862 | 12 | 0 | 51,067 | 158 | 2,380 | 488 | 21,503 | 118,008 | 24,529 | 4.81 |
| Res Fridge & Freezer | 8,922 | 416 | 2,901 | 0 | 0 | 0 | 125 | 4,137 | 1,331 | 0 | 12,239 | 5,593 | 2.19 |
| Multifamily HES - Joint | 2,030 | 8 | 50 | 97 | 0 | 2,339 | 123 | 502 | 37 | 599 | 4,524 | 1,261 | 3.59 |
| SF HES - Joint | 294 | 0 | 1 | 18 | 0 | 157 | 119 | 175 | 96 | 320 | 470 | 710 | 0.66 |
| Complete Systems Replacement - Joint | 2,246 | 317 | 3,298 | 0 | 0 | 0 | 92 | 189 | 105 | 1,542 | 5,861 | 1,928 | 3.04 |
| Home Energy Report | 3,993 | 0 | 0 | 0 | 0 | 0 | 140 | 3,180 | 131 | 0 | 3,993 | 3,451 | 1.16 |
| Clothes Washer | 549 | 19 | 180 | 0 | 9,911 | 0 | 35 | 310 | 60 | 7,904 | 10,659 | 8,309 | 1.28 |
| Residential NC – Joint | 113 | 0 | 0 | 7 | 0 | 0 | 36 | 26 | 4 | 29 | 121 | 94 | 1.28 |
| Elementary Energy Ed – Joint | 637 | 0 | 1 | 39 | 0 | 108 | 18 | 233 | 6 | 63 | 785 | 320 | 2.45 |
| Business Standard | 139,158 | 1,783 | 30,761 | 13,096 | 0 | 0 | 752 | 5,887 | 1,471 | 51,679 | 184,799 | 59,789 | 3.09 |
| Business Custom | 16,865 | 136 | 2,342 | 1,587 | 0 | 0 | 626 | 278 | 205 | 8,412 | 20,930 | 9,522 | 2.20 |
| Retro-Commissioning - Joint | 5,761 | 107 | 567 | 0 | 0 | 0 | 175 | 494 | 41 | 1,003 | 6,435 | 1,713 | 3.76 |
| Industrial Systems | 6,419 | 122 | 1,163 | 0 | 0 | 0 | 131 | 2,108 | 86 | 1,070 | 7,704 | 3,395 | 2.27 |
| Business NC - Joint | 16,291 | 565 | 4,859 | 0 | 0 | 0 | 131 | 1,509 | 76 | 945 | 21,715 | 2,662 | 8.16 |
| BILD | 24,133 | 424 | 6,315 | 2,236 | 0 | 12,172 | 9 | 862 | 265 | 18,070 | 45,280 | 19,206 | 2.36 |
| Small Business Energy Services - Joint | 14,179 | 2 | 29 | 2,798 | 0 | 15 | 228 | 2,891 | 306 | 7,765 | 17,022 | 11,190 | 1.52 |
| Data Centers | 4,269 | 28 | 480 | 0 | 0 | 0 | 88 | 780 | 40 | 2,112 | 4,776 | 3,020 | 1.58 |
| Sum of programs | 300,170 | 4,680 | 64,811 | 19,889 | 9,911 | 65,859 | 2,984 | 25,941 | 4,750 | 123,017 | 465,320 | 156,692 | 2.97 |
| Misc. and Carryover | 20,243 | 0 | 301 | 4,734 | 0 | 20,107 | 8,485 | 10,378 | 0 | 4,929 | 45,385 | 23,792 | 1.91 |
| Aggregate Portfolio | 320,413 | 4,680 | 65,113 | 24,623 | 9,911 | 85,965 | 11,469 | 36,319 | 4,750 | 127,946 | 510,705 | 180,484 | 2.83 |

Source: Navigant Research; Joint programs only reflect ComEd TRC inputs, values will change when gas inputs are added;

A compilation of the program level cost and benefits components of the TRC analysis is presented in Table 4Table 2 above.

3.2 Discrepancies Between Evaluated and DSMore Ex-Post Net Energy Savings

In comparing the first year ex-post net energy savings that Navigant estimated and the implied first year energy savings used in DSMore, Navigant compared the values as listed in Table 5 below. This review found all of the savings values used in DSMore to be in agreement with Navigant estimates.

Table 5 - Navigant Evaluated vs. DSMore Implied Ex-Post Net Savings (MWh)

| Program | Navigant Evaluated Ex-Post Net Savings | DSMore Ex-Post Net Savings | Difference |
|---|--|----------------------------|------------|
| Residential Energy Star Lighting | 287,135 | 287,135 | - |
| Residential Fridge and Freezer | 30,531 | 30,531 | - |
| Multifamily HES - Joint | 11,285 | 11,285 | - |
| Single Family HES - Joint | 973 | 973 | - |
| Complete Systems Replacement – Joint | 3,077 | 3,077 | - |
| Home Energy Report | 97,442 | 97,442 | - |
| Clothes Washer | 1,203 | 1,203 | - |
| Residential New Construction - Joint | 201 | 201 | - |
| Elementary Energy Education - Joint | 2,236 | 2,236 | - |
| C3-CUB Energy Saver* | 2,914 | 2,914 | - |
| Business Standard | 186,433 | 186,433 | - |
| Business Custom | 28,600 | 22,594 | - |
| Data Centers | | 6,006 | - |
| Retro-Commissioning - Joint | 17,599 | 17,599 | - |
| Industrial Systems | 7,757 | 7,757 | - |
| New Construction - Joint | 22,190 | 22,190 | - |
| Business Instant Lighting Discount (BILD) | 91,829 | 91,829 | - |
| Small Business Energy Services - Joint | 33,573 | 33,573 | - |
| Carryover | 124,414 | 124,414 | - |
| ComEd EPY5 Portfolio | 949,392 | 949,392 | - |

Source: Navigant Research and ComEd DSMore outputs; Only savings and costs claimed by ComEd are included in this table;

*Denotes third party program

3.3 Program Specific Data Review

Amongst the program specific data that were used in TRC calculation, several were based on ComEd’s internal tracking system of its conservation related expenditures. These include implementation, utility admin and utility incentive costs. Implementation and incentives costs are tracked by program, where utility admin costs were allocated to each program based on a survey of ComEd’s energy efficiency staff. This approach seems reasonable and we therefore see no reason to doubt that these costs are accurate and reasonable.

The remaining data points that were provided by ComEd in the TRC evaluation were the Measure Life and Incremental Costs. The Measure Life determines how long the energy and demand savings from any

one measure will last. The Incremental costs are the costs associated with participating in the program, before accounting for any incentives. In most cases, these costs are the difference between the more energy efficient measure purchased due to participation in the energy efficiency program and the baseline measure costs, which is what the participant would presumably have bought in absence of the program. In some instances, the “baseline” measure is to not install any measure, such as for attic insulation. In these instances, the incremental cost is the full cost of the measure. In rebate programs, participants generally pay a portion of the incremental costs, in contrast with direct install programs where the utility generally pays most or all of the incremental costs. In some cases, like refrigerator retirement programs, there are no participant incremental costs. In all these cases, the participant incremental costs should be included in the TRC calculation if nonzero.

The rest of this document provides the program specific values used to calculate the program specific TRC and assess the reasonableness of the data points determined by ComEd that were used in DSMore to calculate cost effectiveness.

3.4 Residential Energy Star® Lighting

The main goal of the Residential Lighting program is to increase the market penetration of energy efficient lighting within ComEd’s service territory by offering incentives for bulbs purchased through various retail channels. The program also seeks to increase customer awareness and acceptance of energy efficient lighting technologies, as well as proper bulb disposal, through the distribution of educational materials.

Navigant agrees with the methodology used to evaluate the cost-effectiveness of the Residential Lighting program, except that per the TRM, load curves specific to lighting end use should be used to model avoided costs.

Table 6 – IL TRC Components for Residential Energy Star® Lighting (\$ in 000's)

| Item | Value |
|-----------------------------|-----------|
| Measure Life (years) | 5.37 |
| Ex-Post Gross Savings (MWh) | 394,595 |
| Ex-Post Gross Savings (kW) | 41,800 |
| Ex-Post Net Savings (MWh) | 287,135 |
| Ex-Post Net Savings (kW) | 30,400 |
| Avoided Electric Production | \$54,312 |
| Avoided Electric Capacity | \$755 |
| Avoided T&D Electric | \$11,862 |
| Avoided Ancillary | \$12 |
| NPV of Replacement Costs | \$51,067 |
| Administration Costs | \$158 |
| Implementation Costs | \$2,380 |
| Other and Miscellaneous | \$488 |
| Utility Incentive Costs | \$13,349 |
| Net Participant Costs | \$21,503 |
| Total TRC Benefits | \$118,008 |
| Total TRC Costs | \$24,529 |
| TRC Test | 4.81 |

Source: Navigant Research

3.4.1. Measure Life

The measure life of 5.37 years used for the Residential Lighting program is a composite measure life for the full range of bulbs discounted through the program. The composite EUL represents a weighted average of the measure life for the individual bulbs. Also included in this weighted average is the proportion of bulbs that are estimated to end up in commercial sockets. When deemed measure lives are not available in the TRM, hours of use were used to determine an appropriate EUL. The component measure lives that comprise this weighted average range from 2.08 years for commercial CFLs to 10 years for residential LEDs. This weighted average approach is appropriate and arrives at valid values.

3.4.2. Participant/Incremental Costs

Incremental measures costs are deemed per bulb in the Illinois TRM and were used to determine the program participant costs. Due to the changing annual incremental costs listed in the TRM, an earlier version was used to determine the appropriate values for the June 2012 – May 2013 period for each bulb and socket type.

3.4.3. Load Shape

ComEd used a combination of an average residential and all business load shape to model program savings and avoided costs. The residential curve was applied to most program bulbs, while the all business curve was applied to the proportion of bulbs that was estimated to have ended up in commercial sockets. However, the TRM suggests that load curves specific to indoor or outdoor lighting

be used for these measures (R06, R07, or C06). Navigant recommends that a more tailored load curve be used to model avoided costs.

3.4.4. Other Benefits

Also, the costs of avoided incandescent bulbs over the lifetime of the efficient bulb claimed as a benefit in the Residential Lighting program. For these calculations, the NPV and levelized costs for each bulb type and socket type were taken from earlier versions of the Illinois TRM to determine the appropriate values for the June 2012 – May 2013 period. The statewide discount rate of 5.23% was also utilized for this calculation.

3.5 Residential Fridge and Freezer Recycle Rewards

The Residential Fridge and Freezer Recycle Rewards (FFRR) program was designed to achieve energy savings through the retirement and recycling of older, inefficient refrigerators, freezers, and room air conditioners (ACs). Navigant found the assumptions used to evaluate the cost effectiveness of the FFRR program to be reasonable, but recommends using an end use specific load curve as part of the TRC analysis.

Table 7 - IL TRC Components for Residential Fridge and Freezer Recycle Rewards (\$ in 000's)

| Item | Value |
|-----------------------------|----------|
| Measure Life (years) | 8.0 |
| Ex-Post Gross Savings (MWh) | 44,674 |
| Ex-Post Gross Savings (kW) | 6,150 |
| Ex-Post Net Savings (MWh) | 30,531 |
| Ex-Post Net Savings (kW) | 4,180 |
| Avoided Electric Production | \$8,922 |
| Avoided Electric Capacity | \$416 |
| Avoided T&D Electric | \$2,901 |
| Avoided Ancillary | \$0 |
| Administration Costs | \$125 |
| Implementation Costs | \$4,137 |
| Other and Miscellaneous | \$1,331 |
| Utility Incentive Costs | \$1,784 |
| Net Participant Costs | \$0 |
| Total IL TRC Benefits | \$12,239 |
| Total IL TRC Costs | \$5,593 |
| IL TRC Test | 2.19 |

Source: Navigant Research

3.5.1. Measure Life

A measure life of eight years was used for the cost effectiveness calculations for this program. This value is consistent with the Illinois TRM which lists 8 years as the estimated remaining useful life for recycled refrigerators and freezers. A measure life of 8 years is also consistent with a 2010 analysis conducted by the Vermont Energy Investment Corporation (VEIC) for the Northeastern Energy Efficiency Partnerships (NEEP). This is the appropriate value to be used.

3.5.2. Participant/Incremental Costs

There are no participant costs involved in the FFRR program. The only program costs included in the TRC calculations are those associated with program implementation and administration. Incentive costs paid to participants are included in the utility cost test (UCT), but were not used in the TRC calculation.

3.5.3. Load Shape

ComEd used an average residential load shape to model program savings and avoided costs. This is appropriate given that the Fridge and Freezer Recycle Rewards program targets residential customers, but a load curve more representative of the measure end use would be a more robust approach per the IL TRM.

3.6 Multi-Family Home Energy Savings – Joint Program

The Multi-Family Home Energy Savings (MFHES) program is in the second year of jointly implemented program delivery with Nicor Gas Company and with Peoples Gas and North Shore Gas. The MFHES program is designed to secure energy savings through direct installation of low-cost efficiency measures, such as CFLs, water efficient showerheads and faucet aerators in residential dwelling units of eligible multifamily residences. Navigant agrees with the methodology used to evaluate the cost-effectiveness of the MFHES program, except that per the TRM, load curves specific to residential lighting and domestic hot water should be used to model savings and avoided costs.

Table 8 - IL TRC Components for Multi-Family Home Energy Savings (\$ in 000's)

| Item | Value |
|-----------------------------|---------|
| Measure Life (years) | 5.42 |
| Ex-Post Gross Savings (MWh) | 13,706 |
| Ex-Post Gross Savings (kW) | 150 |
| Ex-Post Net Savings (MWh) | 11,285 |
| Ex-Post Net Savings (kW) | 120 |
| Avoided Electric Production | \$2,030 |
| Avoided Electric Capacity | \$8 |
| Avoided T&D Electric | \$50 |
| Avoided Ancillary | \$97 |
| Avoided Incandescents | \$2,339 |
| Administration Costs | \$123 |
| Implementation Costs | \$502 |
| Other and Miscellaneous | \$37 |
| Utility Incentive Costs | \$1,394 |
| Net Participant Costs | \$599 |
| Total IL TRC Benefits | \$4,524 |
| Total IL TRC Costs | \$1,261 |
| IL TRC Test | 3.59 |

Source: Navigant Research

3.6.1. Measure Life

The measure life of 5.42 years used for the MFHES program is a composite measure life for the full range of bulbs and water saving measures provided through the program. The composite EUL represents a

weighted average of the measure life for the individual measures. When deemed measure lives are not available in the TRM, hours of use were used to determine an appropriate EUL. The component measure lives that comprise this weighted average range from 1.69 years for CFLs installed in multi-family common areas to 9-10 years for low flow faucet aerators and showerheads. This weighted average approach is robust and arrives at an appropriate value for the TRC analysis.

3.6.2. Load Shape

ComEd used an average multi-family residential load curve to model program savings and avoided costs. The MF residential curve was applied to both light bulbs and water saving measures. However, the IL TRM states that a residential lighting or domestic hot water load curve should be used for the measures included in this program. Navigant recommends that a more targeted load curve be used to model program savings.

3.6.3. Other Benefits

As with the Residential Lighting program, the MFHES program claimed as a benefit the avoided cost of incandescent bulbs that would have been purchased over the lifetime of the efficient bulb. For these calculations, the NPV and levelized costs for each bulb type and socket type were taken from earlier versions of the Illinois TRM to determine the appropriate values for the June 2012 – May 2013 period. Appropriately, the statewide discount rate of 5.23% was also utilized for this calculation.

3.7 Complete System Replacement (CSR) – Joint Program

The Complete System Replacement (CSR) program provides cash incentives to encourage ComEd customers to purchase higher efficiency air conditioning systems. This program is offered in conjunction with high efficiency furnace rebates through the Home Energy Efficiency Rebates (Home EER) program offered by Nicor Gas and the Residential Prescriptive Rebate program offered by Peoples Gas and North Shore Gas.

The CSR program expanded from its EPY4 participation levels, leading to a significant increase in both its TRC costs and benefits. The program produces a significant amount of demand savings, and thus the TRC ratio as currently calculated is benefiting greatly from the high value of avoided T&D being assumed. This assumed value should be revisited in the DSMore model. Navigant also recommends that the incremental cost be adjusted to account for the full range of SEER ratings on the efficient units incented by the CSR program. Additionally, Navigant recommends that a load curve specific to residential cooling be used to model program avoided costs if available.

Table 9 - IL TRC Components for Complete System Replacement (CSR) (\$ in 000's)

| Item | Value |
|-----------------------------|---------|
| Measure Life (years) | 18.0 |
| Ex-Post Gross Savings (MWh) | 3,109 |
| Ex-Post Gross Savings (kW) | 2,290 |
| Ex-Post Net Savings (MWh) | 3,077 |
| Ex-Post Net Savings (kW) | 2,270 |
| Avoided Electric Production | \$2,246 |
| Avoided Electric Capacity | \$317 |
| Avoided T&D Electric | \$3,298 |
| Avoided Ancillary | \$0 |
| Administration Costs | \$92 |
| Implementation Costs | \$189 |
| Other and Miscellaneous | \$105 |
| Utility Incentive Costs | \$1,592 |
| Net Participant Costs | \$1,542 |
| Total IL TRC Benefits | \$5,861 |
| Total IL TRC Costs | \$1,928 |
| IL TRC Test | 3.04 |

Source: Navigant Research

3.7.1. Measure Life

A measure life of 18 years was used for the cost effectiveness calculations for this program. This value is consistent with the Illinois TRM which lists 18 years as the estimated useful life for a central air conditioner with a SEER rating greater than 14.5. The calculations do not included any remaining useful life for existing equipment, which is appropriate given the delivery mechanism of the program.

3.7.2. Participant/Incremental Costs

Participant costs are based on an assumed average tonnage of 2.8 and a price of \$119 per ton, which is taken from the Illinois TRM, Version 3. This per ton price is based on the installation of a SEER 14.0 unit, while units with higher SEER ratings were rebated through the program. Navigant recommends that the incremental cost be adjusted to account for the average SEER rating of units rebated through the CSR program. This change would raise the net participant costs of the program and lower the program TRC ratio. The calculations do not included an incremental cost associated with replacing an existing, working unit, which is appropriate given the delivery mechanism of the program.

3.7.3. Load Shape

ComEd used an average residential load shape to model program savings and avoided costs. This is a conservative approach given that a large portion of the electric savings is likely to occur during summer peak hours. Navigant recommends that per the IL TRM, ComEd use a residential cooling specific load curve to model program savings. This would likely increase the TRC ratio for the program.

3.8 Home Energy Savings (HES) – Joint Program

The Home Energy Savings (HES) program is a joint program of Nicor Gas and ComEd, with Nicor Gas leading the program implementation. The program provides single-family homeowners who are customers of Nicor Gas or ComEd in the Nicor Gas territory a home weatherization service package. The weatherization package is a comprehensive home energy assessment that includes combustion safety testing, direct installation of selected energy efficiency and water-saving measures, and incentives for installing a recommended package of weatherization measures. Navigant agrees with the overall approach used to evaluate the HES program costs and benefits, but recommends that the load curves to model energy savings and avoided costs be updated.

While the HES Program is currently showing as not being cost effective when only ComEd costs and benefits are included in the calculation, it should be noted that a majority of program savings is expected to be generated through avoided gas usage rather than avoided electric usage. This is evidenced by approximately three-fourths of the program costs being allocated to Nicor Gas. It is likely that when TRC costs and benefits from Nicor Gas are included in this calculation, the joint TRC ratio will show the program to be cost effective.

Table 10 - IL TRC Components for Home Energy Savings (HES) (\$ in 000's)

| Item | Value |
|-----------------------------|----------|
| Measure Life (years) | 5.2 - 20 |
| Ex-Post Gross Savings (MWh) | 1,121 |
| Ex-Post Gross Savings (kW) | 0 |
| Ex-Post Net Savings (MWh) | 973 |
| Ex-Post Net Savings (kW) | 0 |
| Avoided Electric Production | \$294 |
| Avoided Electric Capacity | \$0 |
| Avoided T&D Electric | \$1 |
| Avoided Ancillary | \$18 |
| Avoided Incandescents | \$157 |
| Administration Costs | \$119 |
| Implementation Costs | \$175 |
| Other and Miscellaneous | \$96 |
| Utility Incentive Costs | \$302 |
| Net Participant Costs | \$320 |
| Total IL TRC Benefits | \$470 |
| Total IL TRC Costs | \$710 |
| IL TRC Test | 0.66 |

Source: Navigant Research

3.8.1. Measure Life

The range of measure lives were used for the HES program depending on which measure group was being analyzed. An EUL of 5.2 years was utilized for standard CFL bulbs, which is consistent with the IL TRM. An EUL of 11 years was used for water savings measures, which is a reasonable composite of the 9, 10, and 15 year measures lives in the TRM for aerators, showerheads, and pipe wrap, respectively. The 20 year measure life used for weatherization is a composite of the 15 and 25 year IL TRM measure lives for

the individual measures included. Though a weighted average EUL based on proportional program savings would be more robust, this approach is reasonable for the TRC analysis.

3.8.2. Participant/Incremental Costs

The per unit incremental costs utilized in the TRC analysis are values from the TRM (such as \$12 per showerhead) and are appropriately used in the calculations.

3.8.3. Load Shape

ComEd used an average residential load curve to model program savings and avoided costs. The residential curve was applied to light bulbs, weatherization and water saving measures. However, the IL TRM includes end use specific load curves that could be utilized to more properly model the savings for each group of measures individually. Since measures were broken out into end use groups for the TRC analysis already, Navigant recommends that a more targeted load curve be used to model program savings. Additionally, Navigant notes that a multi-family load curve was utilized to model both the lighting and water savings measures. These curves should be updated for the single family customer base to which this program is targeted.

3.8.4. Other Benefits

As with the Residential Lighting program, the HES program claimed as a benefit the avoided cost of incandescent bulbs that would have been purchased over the lifetime of the efficient bulb. For these calculations, the NPV and levelized costs for each bulb type and socket type were taken from earlier versions of the Illinois TRM to determine the appropriate values for the June 2012 – May 2013 period. Appropriately, the statewide discount rate of 5.23% was also utilized for this calculation.

3.9 Residential New Construction – Joint Program

The Residential New Construction program (RNC) is jointly offered by Nicor Gas and ComEd. The RNC program provides incentives to builders and HERS raters for building new homes at least 10% more efficient than current code and installing qualifying energy efficiency equipment in new homes. Navigant found the assumptions used to evaluate the cost effectiveness of the Residential New Construction program to be reasonable and has no recommended changes.

Table 11 – IL TRC Components for Residential New Construction (\$ in 000's)

| Item | Value |
|-----------------------------|----------|
| Measure Life (years) | 5.2 - 20 |
| Ex-Post Gross Savings (MWh) | 251 |
| Ex-Post Gross Savings (kW) | 66 |
| Ex-Post Net Savings (MWh) | 201 |
| Ex-Post Net Savings (kW) | 53 |
| Avoided Electric Production | \$113 |
| Avoided Electric Capacity | \$0 |
| Avoided T&D Electric | \$0 |
| Avoided Ancillary | \$7 |
| Avoided Incandescents | \$0 |
| Administration Costs | \$36 |
| Implementation Costs | \$26 |
| Other and Miscellaneous | \$4 |
| Utility Incentive Costs | \$37 |
| Net Participant Costs | \$29 |
| Total IL TRC Benefits | \$121 |
| Total IL TRC Costs | \$94 |
| IL TRC Test | 1.28 |

Source: Navigant Research

3.9.1. Measure Life

The TRC calculations assume a 20 year measure life for all weatherization measures. The IL TRM provides a range of 15-25 years for various residential air sealing and weatherization measures. Therefore, 20 years is an appropriate, mid-range value to use when combining all weatherization measures together for analysis. A measure life of 5.2 years is used for light bulbs, which is consistent with the TRM. For the remaining prescriptive measures (such as showerheads, aerators, pipe insulation, etc.), a weight average measure life of 9.8 years was determine based on estimates of the rate of installation of each measure. Given the TRM deemed measure lives of 10, 9, and 15 years for these measures, a measure life of 9.8 years for this compilation is appropriate.

3.9.2. Load Shape

ComEd used an average residential load shape to model program savings and avoided costs. This is appropriate given the target customer base for the Residential New Construction program and the range of measures incented through the program.

3.10 Home Energy Report (HER)

The ComEd Home Energy Report (HER) behavioral program is designed to generate energy savings by providing residential customers with information about their energy use and energy savings measures and actions. Navigant found the assumptions used to evaluate the cost effectiveness of the HER program to be reasonable and has no recommended changes.

Table 12 - IL TRC Components for Home Energy Report (HER) Program (\$ in 000's)

| Item | Value |
|-----------------------------|---------|
| Measure Life (years) | 1.0 |
| Ex-Post Gross Savings (MWh) | 97,746 |
| Ex-Post Gross Savings (kW) | 0 |
| Ex-Post Net Savings (MWh) | 97,442 |
| Ex-Post Net Savings (kW) | 0 |
| Avoided Electric Production | \$3,993 |
| Avoided Electric Capacity | \$0 |
| Avoided T&D Electric | \$0 |
| Avoided Ancillary | \$0 |
| Administration Costs | \$140 |
| Implementation Costs | \$3,180 |
| Other and Miscellaneous | \$131 |
| Utility Incentive Costs | \$0 |
| Net Participant Costs | \$0 |
| Total IL TRC Benefits | \$3,993 |
| Total IL TRC Costs | \$3,451 |
| IL TRC Test | 1.16 |

Source: Navigant Research

3.10.1. Measure Life

A measure life of one year was assumed for the Home Energy Report program. This is both an appropriate assumption and a conservative one that assumes that there would be no persistence in participant savings were the delivery of the home energy reports discontinued. Pending the outcome of a persistence study to determine the presence of household savings beyond the time during which reports are delivered, a measure life of one year is conservative.

3.10.2. Participant/Incremental Costs

There is no participant or incremental costs involved in the delivery of home energy reports. The only costs associated are for program implementation and administration.

3.10.3. Load Shape

ComEd used an average residential load shape to model program savings and avoided costs. This is appropriate given the target customer base for the Home Energy Report program.

3.11 Clothes Washer Rebate

The Clothes Washer Rebate (CWR) program provided point-of-sale rebates to ComEd residential customers who purchased specific high-efficiency clothes washer models. Navigant recommends using an end use specific load curve as part of the TRC analysis.

Table 13 - IL TRC Components for Clothes Washer Rebate (\$ in 000's)

| Item | Value |
|-----------------------------|----------|
| Measure Life (years) | 14.0 |
| Ex-Post Gross Savings (MWh) | 1,774 |
| Ex-Post Gross Savings (kW) | 228 |
| Ex-Post Net Savings (MWh) | 1,203 |
| Ex-Post Net Savings (kW) | 155 |
| Avoided Electric Production | \$549 |
| Avoided Electric Capacity | \$19 |
| Avoided T&D Electric | \$180 |
| Avoided Ancillary | \$0 |
| Avoided Gas | \$653 |
| Reduced Arrears | \$9,257 |
| Administration Costs | \$35 |
| Implementation Costs | \$310 |
| Other and Miscellaneous | \$60 |
| Utility Incentive Costs | \$2,247 |
| Net Participant Costs | \$7,904 |
| Total IL TRC Benefits | \$10,659 |
| Total IL TRC Costs | \$8,309 |
| IL TRC Test | 1.28 |

Source: Navigant Research

3.11.1. Measure Life

An effective measure life of 14 years was utilized for all clothes washers rebated through this program. This measure life is consistent with the current version of the Illinois TRM.

3.11.2. Participant/Incremental Costs

The Illinois TRM provides three incremental costs for clothes washers ranging from \$210 to \$458 depending on the efficiency of the unit incented. The per unit incremental cost of \$389.10 used in the cost effectiveness calculations is a weighted average of these costs based on the unit counts in the PY5 program.

3.11.3. Load Shape

ComEd used an average residential load shape to model program savings and avoided costs. Given the narrow focus of this program, a load curve that is tailored toward the particular end use is appropriate. The TRM suggests the use of Loadshape R01 for residential clothes washers.

3.11.4. Other Benefits

The Clothes Washer Rebate program also claims reduced arrears as a benefit due to the aggregate water savings over the 14 year lifetime of the efficient washers. The total benefit is based on a weighted average of water savings values in the TRM and Chicago water/sewage rates of \$8.72 per thousand gallons. This calculates out to an average annual benefit of \$48.55 per efficient washer. This methodology for calculating reduced arrears is appropriate.

3.12 Elementary Energy Education – Joint Program

The Elementary Energy Education (EEE) program is jointly offered by Nicor Gas and ComEd. The EEE program’s primary focus is to produce natural gas and electricity savings in the residential sector by motivating 5th grade students and their families to reduce energy consumption for water heating and lighting in their home. Navigant agrees with the methodology used to evaluate the cost-effectiveness of the EEE program, except that per the TRM, load curves specific to residential lighting and domestic hot water should be used to model savings and avoided costs.

Table 14 – IL TRC Components for Elementary Energy Education (\$ in 000’s)

| Item | Value |
|-----------------------------|-----------|
| Measure Life (years) | 5.2 – 9.8 |
| Ex-Post Gross Savings (MWh) | 2,942 |
| Ex-Post Gross Savings (kW) | 194 |
| Ex-Post Net Savings (MWh) | 2,236 |
| Ex-Post Net Savings (kW) | 147 |
| Avoided Electric Production | \$637 |
| Avoided Electric Capacity | \$0 |
| Avoided T&D Electric | \$1 |
| Avoided Ancillary | \$39 |
| Avoided Incandescent | \$108 |
| Administration Costs | \$18 |
| Implementation Costs | \$233 |
| Other and Miscellaneous | \$6 |
| Utility Incentive Costs | \$65 |
| Net Participant Costs | \$63 |
| Total IL TRC Benefits | \$785 |
| Total IL TRC Costs | \$320 |
| IL TRC Test | 2.45 |

Source: Navigant Research

3.12.1. Measure Life

Two measure lives are used in the TRC calculation for the EEE program. A 5.2 measure life is used for all CFLs given away through the program, while a 9.8 year measure life is used for water saving measures. The 5.2 EUL comes directly from the IL TRM, while the 9.8 EUL is a weighted average of the proportional savings generated by the faucet aerators (9 years) and showerheads (10 years) given away through the EEE program. Both values are appropriate and backed by the TRM.

3.12.2. Participant/Incremental Costs

Per the TRM, actual program delivery costs were used to determine measure incremental costs since the measures were given to participants as part of Efficiency Kits.

3.12.3. Load Shape

ComEd used an average residential load shape to model program savings and avoided costs for all measures. The IL TRM stipulates that a residential lighting or domestic hot water load curve should be

used for those program measures. Navigant recommends that a more targeted load curve be used to model program savings.

3.13 Business Standard Program

ComEd offers standard incentives (rebates) for common energy efficiency measures under the ComEd Smart Ideas for Your Business® Standard (Standard) program to facilitate the implementation of cost-effective energy efficiency improvements for non-residential (commercial and industrial) customers. Eligible projects must involve new equipment installed at an existing facility that results in a permanent reduction in electrical energy usage (kWh). Eligible measures include energy-efficient indoor and outdoor lighting, HVAC equipment, refrigeration, commercial kitchen equipment, variable speed drives, compressed air equipment and other qualifying products.

The Business Standard program produces a significant amount of demand savings, and thus the TRC ratio as currently calculated is benefiting from the high value of avoided T&D being assumed. The relatively high TRC ratio of 3.09 (as compared to 1.30 in EPY4) is partially due to this. This assumed value should be revisited in the DSMore model. Navigant also notes that the value of avoided electricity production is more than 50% greater than in EPY4 in spite of net MWh savings that are about a quarter lower. As such, the calculations leading to the value of avoided electric production should be reviewed. Navigant also recommends using a lighting-specific load curve for the modeling of savings from this component of the Business Standard program. Additionally, a weighted average measure life based on the actual distribution of measures installed during the program year would be a more robust approach if the data is available.

Table 15 - IL TRC Components for Business Standard Program (\$ in 000's)

| Item | Value |
|-----------------------------|-----------|
| Measure Life (years) | 12.0 |
| Ex-Post Gross Savings (MWh) | 261,525 |
| Ex-Post Gross Savings (kW) | 42,100 |
| Ex-Post Net Savings (MWh) | 186,433 |
| Ex-Post Net Savings (kW) | 30,400 |
| Avoided Electric Production | \$139,158 |
| Avoided Electric Capacity | \$1,783 |
| Avoided T&D Electric | \$30,761 |
| Avoided Ancillary | \$13,096 |
| Administration Costs | \$752 |
| Implementation Costs | \$5,887 |
| Other and Miscellaneous | \$1,471 |
| Utility Incentive Costs | \$18,352 |
| Net Participant Costs | \$51,679 |
| Total IL TRC Benefits | \$184,799 |
| Total IL TRC Costs | \$59,789 |
| IL TRC Test | 3.09 |

Source: Navigant Research

3.13.1. Measure Life

A measure life of 12 years is used for both the lighting and non-lighting components of the program. This program-level assumed measure life is consistent with the EPY4 TRC analysis which was found to be reasonable based on an engineering review and analysis of program documentation and tracking system performed by Navigant. Using measure-specific EULs taken from the TRM and other appropriate sources, Navigant found the weighted average of measure lives to be close to 12.0. While this assumed measure life has consistently been appropriately used for the Business Standard Program, a more robust approach would be to use a weighted average EUL based on the proportion of measures installed in a given program year.

3.13.2. Participant/Incremental Costs

Incremental cost data was provided by participants as part of their application for this program. Both the efficient measure and baseline costs are requested when completing an application to this program and these costs are reviewed by the program implementer KEMA for reasonableness before being submitted. Navigant reviewed a sample of these program applications and work papers. In aggregate, the participant costs are lower in EPY5 as compared to EPY4, in spite of the larger total benefits from avoided costs.

3.13.3. Load Shape

A large commercial load shape was used for this cost-effectiveness analysis of this program. This is appropriate for the non-lighting portion of the program given the range of measures installed. Navigant recommends that a commercial load curve specific to lighting be utilized for the lighting measures installed through the program.

3.14 Business Custom and Data Centers Program

The Business Custom (Custom) program provides a custom incentive, based on a formula, for less common or more complex energy-saving measures installed in qualified retrofit and equipment replacement projects. Custom incentives are available based on the project's kWh savings, provided the project meets all program eligibility requirements.

The new Data Centers Efficiency program provides incentives for installing energy efficiency measures in both new and existing data centers. Note that the EPY5 Data Centers Efficiency program was evaluated as part of the Business Custom program evaluation, but is included in a separate table here due to the manner in which ComEd performed its cost-effectiveness calculations.

Navigant recommends using a weighted average measure life based on the actual distribution of measures installed during the program year as a more robust approach if the data is available.

Table 16 - IL TRC Components for Business Custom Program (\$ in 000's)

| Item | Value |
|-----------------------------|----------|
| Measure Life (years) | 12.0 |
| Ex-Post Gross Savings (MWh) | 40,346 |
| Ex-Post Gross Savings (kW) | 2,848 |
| Ex-Post Net Savings (MWh) | 22,594 |
| Ex-Post Net Savings (kW) | 2,314 |
| Avoided Electric Production | \$16,865 |
| Avoided Electric Capacity | \$136 |
| Avoided T&D Electric | \$2,342 |
| Avoided Ancillary | \$1,587 |
| Administration Costs | \$626 |
| Implementation Costs | \$278 |
| Other and Miscellaneous | \$205 |
| Utility Incentive Costs | \$3,756 |
| Net Participant Costs | \$8,412 |
| Total IL TRC Benefits | \$20,930 |
| Total IL TRC Costs | \$9,522 |
| IL TRC Test | 2.20 |

Source: Navigant Research

Table 17 - IL TRC Components for Data Centers Program (\$ in 000's)

| Item | Value |
|-----------------------------|---------|
| Measure Life (years) | 12.0 |
| Ex-Post Gross Savings (MWh) | 10,726 |
| Ex-Post Gross Savings (kW) | 1,031 |
| Ex-Post Net Savings (MWh) | 6,006 |
| Ex-Post Net Savings (kW) | 474 |
| Avoided Electric Production | \$4,269 |
| Avoided Electric Capacity | \$28 |
| Avoided T&D Electric | \$480 |
| Avoided Ancillary | \$0 |
| Administration Costs | \$88 |
| Implementation Costs | \$780 |
| Other and Miscellaneous | \$40 |
| Utility Incentive Costs | \$633 |
| Net Participant Costs | \$2,112 |
| Total IL TRC Benefits | \$4,776 |
| Total IL TRC Costs | \$3,020 |
| IL TRC Test | 1.58 |

Source: Navigant Research

3.14.1. Measure Life

Similarly to the Business Prescriptive program, there were a number of measures included in this program with a wide range of appropriate measure lives. The weighted average measure life of the savings was also similar to the 12 year measure life used by ComEd in its DSMore analysis. Measure life data for this program was based on information provided by participants and reviewed by the program

implementer, KEMA, for reasonableness. This approach is sound, but a more robust approach would be to use a weighted average EUL based on the proportion of measures installed in a given program year.

For Data Centers, the measure life of 12 years was calculated based on the average measure life from projects sampled as part of the PY5 evaluation. This approach is same approach used during the EPY4 evaluation and is a reasonable approach for determining measure life in these more customized projects.

3.14.2. Participant/Incremental Costs

Incremental cost data was provided by participants as part of their application for this program. Both the efficient measure and baseline costs are requested when completing an application to this program and these costs are reviewed by the program implementer KEMA for reasonableness before being submitted. This is a reasonable approach given the custom nature of these projects.

3.14.3. Load Shape

ComEd used a load curve representing all business customers to model program savings and avoided costs for the Business Custom program. This is appropriate given the target customer base.

3.15 Business Retro-Commissioning Program – Joint Program

The Business Retro-Commissioning (RCx) program was offered in partnership between ComEd, Nicor Gas, Peoples Gas and North Shore Gas. The program helps commercial and industrial customers improve the performance and reduce energy consumption of their facilities through the systematic evaluation of *existing* building systems. Low- and no-cost measures are targeted and implemented to improve system operations, reduce energy use and demand, and, in many cases, improve occupant comfort.

Navigant found the assumptions used to evaluate the cost effectiveness of the Business Retro-Commissioning program to be reasonable. The TRC ratio of 3.76 as currently calculated is approximately 2.5 times greater than the TRC ratio of 1.50 calculated in EPY4. This is primarily due to an increase in avoided benefits compared against a significant decrease in program costs and energy savings. Navigant can find no explanation for this disparity. ComEd should review the component calculations that went into the determination of avoided costs to ensure that all internal calculations within DSMore are sound.

Table 18 – IL TRC Components for Business Retro-Commissioning Program (\$ in 000’s)

| Item | Value |
|-----------------------------|---------|
| Measure Life (years) | 5.0 |
| Ex-Post Gross Savings (MWh) | 24,788 |
| Ex-Post Gross Savings (kW) | 1,801 |
| Ex-Post Net Savings (MWh) | 17,599 |
| Ex-Post Net Savings (kW) | 1,279 |
| Avoided Electric Production | \$5,761 |
| Avoided Electric Capacity | \$107 |
| Avoided T&D Electric | \$567 |
| Avoided Ancillary | \$0 |
| Administration Costs | \$175 |
| Implementation Costs | \$494 |
| Other and Miscellaneous | \$41 |
| Utility Incentive Costs | \$1,294 |
| Net Participant Costs | \$1,003 |
| Total IL TRC Benefits | \$6,435 |
| Total IL TRC Costs | \$1,713 |
| IL TRC Test | 3.76 |

Source: Navigant Research

3.15.1. Measure Life

Guidelines published for a Retro-Commissioning program run by Pacific Gas and Electric Company in 2010 listed 3 years as the effective measure life (EUL) for the resetting of HVAC controls and 5 years for recoding HVAC controls,³ both of which are key components of the Retro-Commissioning program. For the installation of controls, a measure life longer than 5 years is not uncommon. The 5 year measure life is also consistent with what was used by the gas utilities jointly implementing the Retro-Commissioning program in EPY4. Therefore, Navigant feels that the assumed 5 year measure life is appropriate.

3.15.2. Participant/Incremental Costs

Incremental measure costs were determined during the EM&V process and are reasonable. ComEd’s portion of the participant costs for this jointly implemented program is based upon utility agreed allocation percentages.

3.15.3. Load Shape

ComEd used an average large C&I load shape to model program savings and avoided costs. This is appropriate given that the Retrocommissioning program targets larger C&I customers.

³ “RCx Project Submittal Guidelines.” Pacific Gas and Electric Company. November 2010.

3.15.4. Incentives

The incentives cover the full cost of the study and a portion of the retro-commissioning measure costs and are paid on behalf of the participants. Actual incentive costs paid by the program are included in the utility cost test (UCT), but were not used in the TRC calculation.

3.16 Business New Construction Service – Joint Program

The Business New Construction Service (BNC) program joined the ComEd portfolio of programs in EPY2 to bring about energy savings as well as help bring about changes in knowledge of energy-efficient commercial building practices. In the fall of 2011, this program became jointly offered by ComEd and Nicor Gas. The Energy Center of Wisconsin implements the program for ComEd as a turn-key program.

The TRC ratio for the Business New Construction program is benefiting from the high value of avoided T&D being assumed. The high TRC ratio of 8.16 (as compared to 2.50 in EPY4) is also being driven by a fourfold increase in the value of avoided electric production as compared against ex-post net energy savings that increased by about 113% year over year. As such, the calculations leading to the value of avoided electric production should be reviewed for accuracy.

Table 19 - IL TRC Components for Business New Construction Service (\$ in 000's)

| Item | Value |
|-----------------------------|----------|
| Measure Life (years) | 12.0 |
| Ex-Post Gross Savings (MWh) | 34,138 |
| Ex-Post Gross Savings (kW) | 7,300 |
| Ex-Post Net Savings (MWh) | 22,190 |
| Ex-Post Net Savings (kW) | 4,800 |
| Avoided Electric Production | \$16,291 |
| Avoided Electric Capacity | \$565 |
| Avoided T&D Electric | \$4,859 |
| Avoided Ancillary | \$0 |
| Administration Costs | \$131 |
| Implementation Costs | \$1,509 |
| Other and Miscellaneous | \$76 |
| Utility Incentive Costs | \$2,423 |
| Net Participant Costs | \$945 |
| Total IL TRC Benefits | \$21,715 |
| Total IL TRC Costs | \$2,662 |
| IL TRC Test | 8.16 |

Source: Navigant Research

3.16.1. Measure Life

As in EPY4, a measure life of 12 years was used in the cost-effectiveness analysis for the BNC program. The program has a strong focus on lighting and HVAC improvements above code. Many commercial efficient lighting fixtures have a measure life of 15 years in the IL TRM, while a significant portion of HVAC equipment has a measure life of 15-20 years. Low flow water measures, such as aerators and showerheads have deemed measure lives of 9-10 years, whereas commercial electric water heaters have a

five year measure life. On balance, a 12 year measure life is appropriate given its use in EPY4 and that the majority of program savings comes from lighting and HVAC measures with higher measure lives.

3.16.2. Participant/Incremental Costs

Incremental costs for the BNC program were determined by multiplying the total square footage of new construction enrolled in the program during PY5 by \$0.33 per square foot.

3.16.3. Load Shape

ComEd used a load curve representing all business customers to model program savings and avoided costs for the Business New Construction program. This is appropriate given the target customer base.

3.17 Industrial Systems Study Program

The Industrial Systems Study (Industrial) program expanded from the study of compressed air systems starting in EPY4. In EPY5, the Industrial program was expanded again to include the study of process cooling systems and industrial refrigeration systems. The Industrial program offers a combination of technical assistance and financial incentives. Navigant agrees with the methodology used for the TRC analysis of this program.

Table 20 - IL TRC Components for Industrial Systems Study Program (\$ in 000's)

| Item | Value |
|-----------------------------|---------|
| Measure Life (years) | 15.0 |
| Ex-Post Gross Savings (MWh) | 11,578 |
| Ex-Post Gross Savings (kW) | 1,305 |
| Ex-Post Net Savings (MWh) | 7,757 |
| Ex-Post Net Savings (kW) | 939 |
| Avoided Electric Production | \$6,419 |
| Avoided Electric Capacity | \$122 |
| Avoided T&D Electric | \$1,163 |
| Avoided Ancillary | \$0 |
| Administration Costs | \$131 |
| Implementation Costs | \$2,108 |
| Other and Miscellaneous | \$86 |
| Utility Incentive Costs | \$0 |
| Net Participant Costs | \$1,070 |
| Total IL TRC Benefits | \$7,704 |
| Total IL TRC Costs | \$3,395 |
| IL TRC Test | 2.27 |

Source: Navigant Research

3.17.1. Measure Life

As in the EPY4 pilot program, the measure life of 15 years used for this program was calculated based on the average measure life from projects sampled as part of the EPY5 evaluation. This is an appropriate way to arrive at the EUL for these non-deemed measures.

3.17.2. Participant/Incremental Costs

The participant cost was determined during the EM&V process and is based on the average cost of projects implemented through the program in EPY5. This approach is reasonable.

3.17.3. Load Shape

ComEd used a load curve representing all large commercial and industrial customers to model program savings and avoided costs for the Industrial Systems Study program. This is appropriate given the target customer base.

3.18 Business Instant Lighting Discounts Program (BILD)

The Business Instant Lighting Discounts (BILD) program provides incentives to increase the market share of energy efficient compact fluorescent lamps (CFL), LEDs, Linear Fluorescents (LF), and High Intensity Discharge (HID) lamps sold to business customers. The program was designed to provide an expedited, simple solution to business customers interested in purchasing efficient lighting by providing instant discounts at the point-of-sale. Navigant recommends that a load curve specific to the lighting end use be used to model program savings.

Table 21 - IL TRC Components for Business Instant Lighting Discounts program (BILD) (\$ in 000's)

| Item | Value |
|-----------------------------|----------|
| Measure Life (years) | 4.25 |
| Ex-Post Gross Savings (MWh) | 124,093 |
| Ex-Post Gross Savings (kW) | 27,500 |
| Ex-Post Net Savings (MWh) | 91,829 |
| Ex-Post Net Savings (kW) | 20,300 |
| Avoided Electric Production | \$24,133 |
| Avoided Electric Capacity | \$424 |
| Avoided T&D Electric | \$6,315 |
| Avoided Ancillary | \$2,236 |
| Avoided Incandescents | \$12,172 |
| Administration Costs | \$9 |
| Implementation Costs | \$862 |
| Other and Miscellaneous | \$265 |
| Utility Incentive Costs | \$3,697 |
| Net Participant Costs | \$18,070 |
| Total IL TRC Benefits | \$45,280 |
| Total IL TRC Costs | \$19,206 |
| IL TRC Test | 2.36 |

Source: Navigant Research

3.18.1. Measure Life

The measure life of 4.25 years used for the BILD program is a composite measure life for the full range of bulbs discounted through the program. The composite EUL represents a weighted average of the measure life for the individual bulbs. Also included in this weighted average is the proportion of bulbs that are estimated to end up in residential sockets. When deemed measure lives are not available in the TRM, hours of use were used to determine an appropriate EUL. The component measure lives that

comprise this weighted average range from 2.08 years for commercial CFLs to 10 years for residential LEDs. This weighted average approach is appropriate and arrives at valid values.

3.18.2. Participant/Incremental Costs

Incremental measures costs are deemed per bulb in the Illinois TRM and were used to determine the program participant costs. Due to the changing annual incremental costs listed in the TRM, an earlier version was used to determine the appropriate values for the June 2012 – May 2013 period for each bulb and socket type.

In aggregate, the participant costs for the BILD program have increased substantially for EPY4. This is the primary component behind the reduction in the calculated TRC ratio from the 4.92 value in the previous evaluation cycle. This is driven by the significant increase in the number of specialty light bulbs and LEDs incited through the program in EPY5 and, more importantly, the more robust method used in EPY5 to account for the variation in bulbs types in this year's calculations. As such, this TRC value is likely an accurate representation of the cost-effectiveness of the program.

3.18.3. Load Shape

ComEd used a combination of an average residential and large C&I load shape to model program savings and avoided costs. The large C&I curve was applied to most program bulbs, while the residential curve was applied to the proportion of bulbs that was estimated to have ended up in residential sockets. This is a sound practice to use load curves for both customer classes. However, the TRM suggests that load curves specific to indoor or outdoor lighting be used for these measures where appropriate. Navigant recommends that a load curve specific to the lighting end use be used to model program savings.

3.18.4. Other Benefits

Also, the cost of avoided incandescent bulbs over the lifetime of the efficient bulb is claimed as a benefit in the Residential Lighting program. For these calculations, the NPV and levelized costs for each bulb type and socket type were taken from earlier versions of the Illinois TRM to determine the appropriate values for the June 2012 – May 2013 period. The statewide discount rate of 5.23% was also utilized for this calculation.

3.19 Small Business Energy Services (SBES) – Joint Program

The Small Business Energy Services (SBES) program is jointly implemented with ComEd, Nicor Gas, and Peoples Gas and North Shore Gas. The program is designed to assist non-residential customers in lowering their energy usage and energy bills by educating them about electric and natural gas savings opportunities through on-site assessments.

Navigant recommends that a load curve specific to lighting end use be used for the lighting portion of the SBES program. Additionally a weighted average measure life should be utilized for the non-lighting measures incited through the program.

Table 22 – IL TRC Components for Small Business Energy Services (SBES) (\$ in 000's)

| Item | Value |
|-----------------------------|------------|
| Measure Life (years) | 2.1 – 12.0 |
| Ex-Post Gross Savings (MWh) | 37,303 |
| Ex-Post Gross Savings (kW) | 6,330 |
| Ex-Post Net Savings (MWh) | 33,573 |
| Ex-Post Net Savings (kW) | 5,710 |
| Avoided Electric Production | \$14,179 |
| Avoided Electric Capacity | \$2 |
| Avoided T&D Electric | \$29 |
| Avoided Ancillary | \$2,798 |
| Avoided Incandescents | \$15 |
| Administration Costs | \$228 |
| Implementation Costs | \$2,891 |
| Other and Miscellaneous | \$306 |
| Utility Incentive Costs | \$4,122 |
| Net Participant Costs | \$7,765 |
| Total IL TRC Benefits | \$17,022 |
| Total IL TRC Costs | \$11,190 |
| IL TRC Test | 1.52 |

Source: Navigant Research

3.19.1. Measure Life

The Small Business Energy Services program used two sets of measure life numbers in the TRC analysis. A 2.1 year life was utilized for installed CFLs, which is consistent with the IL TRM for light bulbs installed in commercial sockets. A 12 year measure life was utilized for all non-lighting measures. The 12 year EUL appears reasonable based on the assumptions used in EPY4 and the distribution of EULs for measures included in the program. However, a more robust approach would be to calculate a weighted average measure life based on the actual number of each measure installed, as has been done for the TRC calculations for other programs.

3.19.2. Participant/Incremental Costs

Due to the varied nature of the measures installed through the SBES program, incremental measure costs were determined during the EM&V process. The aggregate value is reasonable. ComEd's portion of the participant costs for this jointly implemented program is based upon utility agreed allocation percentages.

3.19.3. Load Shape

The small C&I load shape was used for this cost-effectiveness analysis of this program. This is appropriate for the non-lighting portion of the program given the range of measures installed. Navigant recommends that a commercial load curve specific to lighting be utilized for the lighting measures installed through the program.