NAVIGANT

ComEd Operational Efficiency Impact Evaluation Report

Energy Efficiency / Demand Response Plan: Plan Year 9 (PY9)

Presented to Commonwealth Edison Company

DRAFT

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ComEd Operational Efficiency Impact Evaluation Report

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1. INTRODUCTION

The Operational Efficiency Program (OEP) is a new program. OEP looks to identify energy efficiency opportunities that are not captured by other traditional programs. The program is a mix of a custom and TRM measures. These measures include low cost and no cost upgrades, behavior changes and system optimization. This is the initial year of Navigant's evaluation. Navigant calculated savings through a detailed review of program tracking data. The savings reported below as ex ante were for the Program Year 9 (PY9) period of June 1, 2017 to December 31, 2017. In addition to verifying program impacts the evaluation addressed process improvements to help the program be prepared for future evaluations.

Overall, the OEP was successful in capturing approximately 3 GWh of annual savings with a Realization Rate of 0.946 as shown in section 3 below. OEP has many strong components, however, ComEd should consider the recommended changes detailed below to have the information required for future evaluations. Specific recommendations include: (i) Improving data collection requirements for measures that are more complex; (ii) Creating well vetted and accepted measure calculations through the TRM process; and (iii) Ensuring that enough information is collected to meet program level needs.

Navigant does not believe that OEP is implementing measures with high-level of scrutiny required of a custom program and the program structure appears to lack adequate tracking data to properly identify standardized measures. Navigant discusses this issue in further detail in section 8.4.

2. PROGRAM DESCRIPTION

The OEP evolved as part of ComEd's Facility Assessment (Assessment) Program offered to customers with a demand of 100 kW and above. The Assessment Program identifies energy-efficiency opportunities and the associated energy savings, cost savings, project cost, potential incentives, and simple payback. These energy efficient opportunities may include measures which are already a part of ComEd's existing program offerings, such as Lighting or HVAC, but may also include low and no cost and operational measures (OEP measures) outside of ComEd's other programs. These measures focus on taking advantage of equipment already installed at the site or applying maintenance or operational best practices to realize energy savings for little or no investment by the customer. During an assessment, OEP measures are identified and then placed in the OEP tracking system. Implementation may or may not occur at the time of the assessment. If it does not occur during the assessment, program outreach staff follow up with the customer to see if the OEP measures were implemented.

3. PROGRAM SAVINGS

Table 3-1 and Table 3-2 summarize the electricity savings from the OEP Program for the PY9 period of June 1, 2016 to December 31, 2017. In addition to overall program savings, Navigant categorized the measures based on the tracking data and savings provided. Detailed measure information includes counts (number of installs) by measure types and savings totals within each measure category.

Table 3-1: Overall OEP Program Savings

Savings Category	Energy Savings (MWh)
Ex Ante Gross Savings	4,363,213
Program Gross Realization Rate	0.946
Verified Gross Savings	4,128,394
Program Net-to-Gross Ratio (NTGR)	0.95
Verified Net Savings	3,921,974

Source: Provided program tracking data and ComEd PY9 NTG recommendations

Table 3-2: Program Savings and Measure Counts by Measure Type

Measure category	Count	Ex Ante Gross Savings (kWh)
HVAC System Controls	37	1,377,971
Heater Control	17	619,310
Exhaust Fan Hour Reduction	7	342,600
Reduced compressor pressure	14	313,787
Manual Lights off	36	232,870
Ensure more doors closed	6	203,100
Manual HVAC Temperature adjustment	8	188,712
Manual On/Off process controls	4	139,100
Compressor Air Leak	4	110,200
Reduced occupied space	1	108,267
Computer power controls	10	92,647
Process VSD	2	77,800
Disable unneeded Equipment	10	76,380
Manual Compressor Off	2	63,820
Lights occupancy sensor	5	58,920
Reduced domestic hot water temp	12	49,740
HVAC Maintenance	7	43,890
Photocell Repair	10	34,810
Server closest HVAC setpoint	9	25,360
Delamp Lights	2	22,600
Manual VFD adjustments	1	17,400
Server closest HVAC setpoint- Mechanical Room	4	9,140
Timer for Office Water Dispenser	6	7,500
Rescheduling lighting controls	3	7,370
Turn off ceiling fans	3	4,360
Turn off TV	2	4,000
Small refrigerator controls	1	3,100
Manual Shut off audio equipment	3	2,310
Window Blinds	1	1,900
Manual off projectors	1	1,800
Remove old Refrigerator	1	1,310
VSD on pumps and Projectors off	1	1,100
Domestic Hot Water Pipe Insulation	2	220
Turn off stove top burners	1	0

Source: Program tracking data and Navigant analysis

Additional findings and recommendations regarding this tracking review can be found below in section 8.3

4. Evaluation Tasks

ComEd tasked Navigant with determining whether OEP had sufficient content, detail, and structure to facilitate future evaluations. The team used the following three evaluation activities to make this determination.

- Program Manager Interview
- Savings Calculation Review
- New Measure Research

In addition to these tasks, the program provided Navigant with tracking data that they used to determine ex post savings. The remainder of this memo summarizes these evaluation activities and presents the results in section 8 below.

5. Program Manager Interview Summary

Navigant conducted an extensive interview with ComEd's OEP Program Manager. During this interview, Navigant discussed many topics including: program structure, program tracking needs, program reporting, program marketing, programs strengths and challenges, and participant satisfaction. During the interview, Navigant identified a number of potential issues and improvements as detailed below in Section 8.

6. Savings Calculation Review Summary

Navigant reviewed the measure-level savings calculations provided by ComEd for each measure offered through the OEP. Navigant reviewed each measure against other resources such as the utility TRM and double checked all assumptions and sourcing. Navigant identified a number of individual measure issues (see the detail in 8.4Appendix A).

In addition to the measure-by-measure review, Navigant staff concluded that ComEd should consider implementing certain measures differently to allow for easier data tracking and accounting in future evaluations; further details are in section 8.4 below.

7. New Measure Research Summary

Navigant identified 38 additional measures that ComEd should consider implementing through the OEP and refined the list to 14 measures that met the following criteria:

- Measures that were low-cost, behavior based measures,
- No overlap with other measures currently offered by other programs within the ComEd portfolio
- Measures that are included within the TRM, when possible.

Table 7-1 summarizes the 14 identified measures. The Savings column represents the relative saving potential ComEd could expect for each measure. The Opportunity column describes how frequently a measure appears in the market. The Source column details the documentation for the savings calculation, and the Semi/Custom column describes how OEP could calculate savings for this measure. The Semi-Custom measures are measures that could be developed into standardized measures. The Custom measures would require custom evaluation with more detailed data collection. Further details regarding measures type are in section 8.4 below.

For a full discussion of semi-custom measures see Major Program Recommendation - Evaluation Ready Measures.

Table 7-1. OEP Measure Review Summary

Measure	Savings	Opportunity	Source	Semi/Custom
Check and adjust occupancy sensor settings	Mid	Mid	IL TRM	Semi-Custom
Clean lamps and lenses	Low	Mid	IL TRM	Semi- Custom
Remove Electric Space Heaters	Mid	Mid	Navigant SME[1]	Semi-Custom
Reset VFD Setting	High	Low	IL TRM	Custom
Tighten Drive Belts	Low	Mid	Navigant SME	Semi-Custom
Remove objects from around condenser unit & clean condenser	Low	High	IL TRM	Semi-Custom
Turn off crankcase heaters when not needed	Low	Low	Navigant SME	Custom
Remove and ban halogen torchiere lamps	High	Mid	Navigant SME	Semi-Custom
Repair broken door closers	Mid	Mid	IL TRM	Semi-Custom
Activate Antisweat Heater Control if disabled	High	Low	IL TRM	Semi-Custom
Use operable windows for ventilation in mild weather	Low	High	Navigant SME	Custom
Check defrost schedules and change if excessive	Mid	Low	Navigant SME	Semi-Custom
Enable Power Management Settings on printers and copiers	Mid	Mid	Navigant SME	Semi-Custom
Relocate appliances and equipment to better area	Mid	Low	Navigant SME	Custom

Source: Navigant Analysis

8. Findings and Recommendations

Navigant's findings and recommendations are organized by key topic or research area in the following pages.

8.1 Program Manager Interview Findings

During the Program Manager interview, Navigant staff identified a disconnect between program cost, program savings, and program measure life. The program calculated savings consistent with a custom calculation program. The program calculated costs so they were consistent with a no cost direct install program. The program calculated measure life based on the residential behavioral program but the savings methodologies and types of measures installed are often inconsistent with a behavior program. These issues are further described in the finding below.

Finding 1: The program determines savings using a number of engineering calculations of measures identified during the onsite visit. Many of these calculations are custom to the

[1] Subject matter expert

customer site and use the "as-found" baseline and the "site-reported" post conditions to calculate savings. However, the post condition is only truly verified if the measure is installed during the onsite visit, otherwise, this key input to the savings calculations relies solely on what is reported by the site.[2] Since these measures were calculated using custom or semi-custom calculations, self-reporting may be unreliable.

In addition to the uncertainty of the post condition, some of the calculation methodologies make broad assumptions rather than collecting individual site data. These calculations used values such as average energy per sq. ft. without measuring the individual site energy per sq. ft. While these calculations are carefully completed and internally verified, in many cases the amount of information collected during implementation of the program may not be sufficient to justify program savings. For calculations where these assumptions would be appropriate, they should be presented to the IL TRM Stakeholder Advisory Group Technical Advisory Committee process so all assumptions can be thoroughly assessed.

Recommendation 1: Navigant presents a recommended calculations' methodology in section 8.4 below.

Finding 2: ComEd conducts approximately 500 customer-requested commercial audits each year. Since the OEP program consists of low cost/no cost and operational measures, the program costs are currently a portion of the Facility Assessment costs of $1,200 -$1,400 per site.

Recommendation 2: If the OEP shifts to a custom savings estimation approach, it will likely incur additional program costs to collect necessary trend data for developing the engineering calculations. This cost should be accounted for and included in the total program cost.

Finding 3: ComEd currently defines the measure life of the OEP based on its residential behavior-based programs. However, this program is not strictly a behavior-based program, but rather a set of low cost and no cost measures.

Recommendation 3: Measure life should be correlated to the measures installed at each site.

Finding 4: The project manager reported that ComEd has its own data collection and internal tracking requirements for OEP projects. ComEd would have to consider standardizing these program activities for each of the program measures that are considered standardized measures.

Recommendation 4: ComEd should consider spending time to develop an acceptable implementation methodology that meets the needs of all internal and regulatory stakeholders. Standard data collection activities should be developed for each measure to ensure that all information that is needed is collected during the implementation of the program.

Finding 5: The OEP project manager also said ComEd is not currently conducting direct marketing efforts, or paying incentives directly to customers under the OEP title.

Recommendation 5: In its marketing efforts, the Facility Assessment program could highlight the savings and benefits of the OEP to increase customer participation. If increased implementation requirements cause additional burden to the customers, the program should consider adding incentives to remove the barrier.

[2] The savings calculation findings here are at a higher level than the measure level specific findings detailed in the Calculation Review Summary.

8.2 Savings Calculator Review Findings

The review of the calculator used to determine the savings from the OEP produced the following findings and recommendations:

Finding 6: Not all of the calculations use the TRM as its main source of assumptions or instead use an old version of the TRM. Not all information and assumptions are from other clearly identified sources.

Recommendation 6: Savings calculations in the calculator should default to the most current, applicable TRM when appropriate. Navigant recommends that ComEd review the project documents to ensure that all information matches the latest version of the TRM and the calculation sources are identified.

Finding 7 Measure descriptions were very general and did not provide enough detail for evaluation.

Recommendation 7: ComEd must provide more detailed descriptions of each measure to facilitate evaluation. For example, a measure categorized as an upgrade, must include detailed baseline and efficient measure conditions. Each measure should use these "terms and conditions" to ensure that all calculation assumptions are appropriate to the as found and as installed condition. The issue is that the measures are more like custom-type measures and do not have detailed information to determine appropriate baseline or energy efficient conditions. If these measures are transferred to the TRM, baseline and efficient conditions will be defined.

Finding 8: Many measures may require documentation collected during the audit (e.g., picture, onsite notes, etc.) that clearly define the equipment or operation as found and the existing energy efficient conditions. These conditions will be part of the developed calculation methodologies and any unknown values should be clearly noted within tracking documentation.

Finding 9: Most of the reviewed measures do not define a measure life. This information will be a requirement in the future.

For more detail on the findings for each reviewed measure, see Appendix A.

8.3 Tracking Data Review Findings

Navigant reviewed the tracking data to support determining the ex post savings for the OEP. This review produced the following findings and recommendations:

Finding 10: The difference between ex ante and ex post savings were caused by a number of issues:

- Three measures provided limited details that made it unclear what the measures were and/or what was installed. Although details throughout the tracker were limited, these measures were especially limited and it was unclear what was installed resulted in 0 kWh ex post savings.
- Three measures had language in the tracker that made it clear that these measures had not been installed or that there would be extreme difficulty maintaining these measures. These measures also received a 0 kWh ex post savings.

Finding 11: At least 15% of the measures are manual and have very short or unknown measures lives. The tracker indicated that several measures had not been installed, may have been baseline practice or may not last long if installed. In these cases, the site contacts reported that: they were going to make the change, that they already had best practices in place and

what was observed during the visit was abnormal, or they were going to rely on staff or others that they had limited control over to make the changes.

Recommendation 11: The program should not claim savings for measures that have not been completely installed or that will be quickly disabled. The program may consider not claiming savings for these measures due to the high level of uncertainty associated with these measures.

Finding 12 Around 50% of the savings from this program come from heating and HVAC opportunities.

Recommendation 12a: The program should consider streamlining these major opportunities by developing standardized calculators where appropriate.

Finding 12b: The tracking data details were very limited and do not include references to standard calculations developed for the program or the inputs for these calculators as would likely be needed for a TRM-based program.

Recommendation 12c: For measures that could be treated as standardized (not custom), additional tracking details will be required that indicate what calculation methodologies are used and what inputs are used in those calculations.

Finding 14: There are a number of measures that are included in the tracker that are too complex or custom to be calculated using standardized methodologies.

Recommendation 14: These custom type measures should be clearly identified in the tracker and any associated calculation sheets should be carefully documented for future evaluations.

8.4 Major Program Recommendation - Evaluation Ready Measures

The program's measures are diverse, but their implementation is not set-up properly to support future evaluations. Certain measures will have more data collection requirements than others based on their complexity, level of uncertainty, and level of savings.

The measures included in the OEP fall into two categories:

- Semi-custom measures
- Custom measures

Semi-custom measures are low complexity custom measures that would benefit from standardizing the calculation methodology. Navigant suggests that these measures be included in the TRM with clearly defined criteria such as measure life, baseline and efficient condition, and all associated calculation assumptions. Some of this information currently exists within the provided measure calculations, but it is unclear, incomplete, or inconsistent with the current IL TRM.

Custom measures require broad assumptions or have many unknowns. The requirements for these measures are like other custom programs which include:

- Pre- and post-measurements of trend data
- Clear identification of existing baseline and efficient equipment
- Custom engineering calculations

The identification of these measures would occur during audits, in the same manner as the semi-custom measures; however, they would require follow-up collection of trend data, equipment invoices, and other data requirements. Table 8-1, below, provides Navigant's suggestions for categorizing measures into semi-custom or custom measures.

Table 8-1. OEP Measure Review Summary

Measure	Existing/ Recommended	Semi/ Custom	Notes
Shut off Valves to Compressed Air Nozzles	Existing	Semi	Clearly define the measure needs
Shut down Compressors on Off Hours	Existing	Semi	Measure compressor operating power (if possible) as there are too many factors that can greatly affect operating power.
Shutdown Idle Process Equipment	Existing	Custom	Baseline power is uncertain as this measure covers a wide-range of equipment.
Turn off Lighting	Existing	Semi	This measure's lighting table doesn't align with TRM.
Compressed Air Leak Repair	Existing	Semi	Current calculation is too simple and needs further explanation.
Close Compressed Air Valves to Isolate Areas	Existing	Custom	Assumptions in calculations seem too large to be part of a TRM. The Total Flow of Isolated Area percentage seems to be a guess and significantly effects estimated savings.
Reduce Compressed Air Pressure Setpoint	Existing	Semi	Measure compressor operating power (if possible) as there are too many factors that can greatly affect operating power.
Adjust Electric Hot Water Heater Temperature	Existing	Semi	Double check flow for building types but a good TRM measure.
Adjust Space Thermostat Setpoint	Existing	Semi	Use the approved TRM method when possible.
Enable Programmable Thermostat	Existing	Semi	Use the approved TRM method when possible.
Manual Chilled Water Reset	Existing	Custom	There is high uncertainty to manual controls and would need a high level of rigor to prove savings.
Reverse Ceiling Fans Seasonally	Existing	Custom	There is concern regarding the persistence of this measure and the broad, general assumptions which could have significant influence on the impact savings.
Control Conditioned Air Exhaust	Existing	Custom	A very complex measure with unsupported documentation for energy savings.
Consolidate Working Space	Existing	Custom	Many overreaching assumptions for a measure that could be quantified based on whole building usage.
Enable Power Management Settings on Computers	Existing	Semi	Very good TRM candidate.
Change Dirty Filters (Improve Air Flow)	Existing	Semi	With additional research, this could be a very good TRM measure given the large market.
Close Window Blinds	Existing	Custom	This measure appears very unreliable given the uncertain assumptions, unclear persistence and needed manual changes.

Measure	Existing/ Recommended	Semi/ Custom	Notes
Minimize Time with Open Doors	Existing	Custom	The implementation of this measure is unclear, door opening time is greatly variable both base and post. In addition, impact is highly dependent on associated systems (such as HVAC).
Adjust Data Closet Thermostat Setpoint	Existing	Semi	This measure could be a very good TRM measure by using server load or some other measure of load.
Other Opportunity	Existing	Custom	Custom measure.
Check and adjust occupancy sensor settings	Recommended	Semi	Determined by other TRM's
Clean lamps and lenses	Recommended	Semi	This custom measure is simple to quantify and confirm; however, it may be difficult to ensure persistence.
Remove Electric Space Heaters	Recommended	Semi	This custom measure is simple to quantify and confirm, however, persistence may be difficult to ensure.
Reset VFD Setting	Recommended	Custom	This measure has a high level of uncertainty. If the VFD setting is for one speed it could be semi; but if the setting is variable speed this is custom.
Tighten Drive Belts	Recommended	Semi	While small, the assumed energy savings are easily quantified or sourced.
Remove objects from around condenser unit & clean condenser	Recommended	Semi	This measure is part of the IL TRM and therefore vetted.
Turn off crankcase heaters when not needed	Recommended	Custom	While the calculation of this measure is straight-forward, it is a custom measure given the uncertainty of its implementation.
Remove and ban halogen torchiere lamps	Recommended	Semi	Create a TRM measure for simple lighting upgrade measures.
Repair broken door closers	Recommended	Semi	IL TRM has deemed calculation.
Activate Antisweat Heater Control if disabled	Recommended	Semi	Multiple TRM calculations include this measure.
Use operable windows for ventilation in mild weather	Recommended	Custom	This measure is unreliable due to the manual changes needed and unclear persistence.
Check defrost schedules and change if excessive	Recommended	Semi	This measure is highly dependent on the baseline and energy efficiency being clearly defined.
Enable Power Management Settings on printers and copiers	Recommended	Semi	Very good TRM candidate.
Relocate appliances and equipment to better area	Recommended	Custom	Although simple in concept, many equipment combinations could occur making this difficult to easily calculate.

APPENDIX A. IMPACT ANALYSIS METHODOLOGY

Navigant offers the following information for each OEP measure reviewed for this task.

Shut off Valves to Compressed Air Nozzles

- Include the source for the Volumetric Flow Rate equation in the calculator.
- Add language regarding the application of this measure (the assumption was open valves in use with no load).

Shutdown Compressors on Off Hours

- Add the equation for percent leakage to the calculator (cell E12).
- Include the source for the Compressor Operation Curves in the calculator.
- Include only the horsepower for shut-off compressors; do not include redundant compressors.
- Determine whether the calculation needs to check for load curve at 0-40% versus 40-100%. Currently, the calculation assumes the system always is operating at 0-40% and this may be inaccurate. The Compressed Capacity Factor is the average capacity that the system operates at compared to full load capacity. If unknown, use an assumed value of 70%; for load and unload use, an assumed value of 100%; and others, use 0-40% (based on SME).

Shutdown Idle Process Equipment

- Provide a thorough explanation of the load factor for motors, including a review of the determination for the default load factor of 75%. The TRM seems to default to 65%, but references many sources. Some notable TRM sources for load factor are:
  - 4.4.17 Variable Speed Drives for HVAC Pumps and Cooling Tower: assumes the load factor for motors is 65%
  - 4.4.26 Variable Speed Drives for HVAC Supply and Return Fans: defaults to a load factor of 65%
  - 4.4.30 Notched V Belts for HVAC Systems: assumes the load factor for motors is 80%
  - 4.8.1 Pump Optimization: uses a load factor of 65%
- Source the chosen load factor value from one of the TRM examples above.

Turn Off Lighting

- Navigant recommends upgrading the lighting table to match the TRM (see lighting tables in TRM section 4.5.3). The source for this table is the CEE commercial lighting qualifying product list. The current lighting table used in this calculator does not align with the TRM values.

Compressed Air Leak Repair

- Update the load factor to 90% for air compressors to match the TRM (section 4.7.1 VSD Air Compressor).
- Include sources for the leak repair “savings factors” used in the calculator.

Close Compressed Air Valves to Isolate Areas

- Similar to the Shut off Valves to Compressed Air Nozzles measure above, include the source for the Volumetric Flow Rate equation in the calculator.

Reduce Compressed Air Pressure Set Point

- Identify the source of the calculations methodology in the calculator.
- Review the load factor and update to match the TRM if necessary. The TRM uses a load factor of 90% for compressed air while this calculator uses a capacity factor of 75%.
- Provide an explanation and the source for the “HPtypical” and “HPreal” values; Navigant is unclear on how they are used and why they are hard coded values.

Adjust Electric Hot Water Temperature

- Clearly source the Existing Energy Factors.
- Review the value for “restaurant water usage” which seems unusually high.

Adjust Space Thermostat Set Point

- All calculations should default to the TRM. This measure should use TRM section 4.4.18 Small Commercial Programmable Thermostats for the basis of this calculation. Navigant has included a sample calculator using the TRM method for calculating savings in Appendix C.

Enable Programmable Thermostat

- All calculations should default to the TRM. This measure should use TRM section 4.4.18 Small Commercial Programmable Thermostats for the basis of this calculation. Navigant has included a sample calculator using the TRM method for calculating savings in **Error! Reference source not found.**Appendix C.

Manual Chilled Water Reset

- Determine consistent savings for manual chilled water control. The header for the table says that manual was de-rated 20% while the calculation uses a value of 40%. The correct value is 40%.
- Define the terms and conditions for this measure as manual operation is difficult to enforce.
- Confirm the ex post conditions to ensure the measure will last more than a very short time.
- Compare the savings factors to the most recent TRM as some values may have changed.

Reverse Ceiling Fans Seasonally

- Clarify the source for average heating Btu/hour per square foot for a typical commercial space and the conversion factor using in the conversion to kW/square foot.
- Collect the EFLH heating savings from the TRM instead of the current estimated hours. Should use EFLH table in section 4.4 if IL TRM (defined by building type and Control Zone).

Control Conditioned Air Exhaust

- Navigant found discrepancies between the SEER values on the calculator (system types: Through-the-wall, Air Source Heat Pump, and PTHP) and what is in the most current version of the TRM.
- Navigant was unable to find the information for the heating system type COP in the 2 sources referenced in the calculation sheet.

Consolidate Working Space

- Navigant recommends referencing the source for all non-TRM data sources.
- Navigant found that the calculation of energy savings used assumptions that were too broad; it is not realistic to assume a specific area uses energy independent from the rest of the building.
- It might be difficult to separate HVAC load enough for unoccupied spaces to use zero energy. Therefore, the savings would be a fraction of the maximum savings based on commercial building energy consumption (CBEC)’s.
- The calculation tool should have inputs and outputs so that it does not just show maximum potential savings, but results based on measured conditions.
- This calculation assumes that all loads can be removed for each space, which results in savings that likely are over estimated. Detailed building measurements would be required to accurately calculate the impact of this measure due to the large number of unknowns associated with “shutting down” spaces.
- Adjust the savings to reflect that portions of a building cannot be truly isolated. Even unoccupied, a space uses a certain amount of energy from HVAC overflow and other issues.

Enable Power Management Settings on Computers

- Navigant recommends using more than three data points to calculate the curves for the different sleep mode settings. This will help to ensure that the fit is linear as currently shown.

Change Dirty Filters

- Navigant has concerns regarding the assumptions for this measure. Currently, the calculation of fan savings is due to a change in pressure at a constant CFM. In practice, a dirty filter will result in a drop in CFM and a drop-in fan power. Savings are instead due an increased load on the heating/cooling coil due to a drop-in air flow. Navigant recommends finding a well vetted source of savings for this measure.
- This calculation seems to be calculating full system usage and not energy savings, resulting in savings that are much too high.

Close Window Blinds

- Provide a basis for the assumed implementation factor of 50%.
- There should be clear base and energy efficient standards explaining the calculation of the savings and how they will be sustained in the long run.

Minimize Time with Open Doors

- Include a source of the wind consideration factor (25%), and the flow rate and infiltration equation sources.
- Include a picture of the pre- and post-condition to justify the reduction in hours.

Adjust Data Closet Thermostat Set Point

The accuracy of the cooling load calculation could be improved by calculating the heating load based on server kW or some other factor rather than 80% of the un

APPENDIX B. APPENDIX 2. IMPACT ANALYSIS DETAIL

The attached excel sheet includes all measures identified by Navigant as potential additions to the OEP. This sheet includes the full list of considered measures and detailed calculations for each measure included as additions. These calculations include kWh and demand savings as well as cut sheets of referenced materials used to develop the calculations.

Additional Measures Calculations and Deta

APPENDIX C. APPENDIX 3. TRC DETAIL

Below is a provided calculation sample in support of the Adjust Space Thermostat Set Point and Enable Programmable Thermostat measure. This calculation was developed to follow the TRM methodology and could be used to update the current methodology for these measures.

Sample Thermostat Adjustment Calculator