Coordinated Retro-Commissioning

CY2019 Process Evaluation Results - Final

Submitted to:
ComEd
Nicor Gas
Peoples Gas
North Shore Gas

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**Executive Summary - Findings and Recommendations**

**FINDING 1**
Participants dropped out of the Tune-Up path most often because their facility was not a good fit for retro-commissioning.

**RECOMMENDATION 1**
EESPs should be selective in approaching potential customers, and advance only those projects that offer reasonable savings with a payback period in line with the program.

**FINDING 2**
Participants from all paths are concerned with issues of persistence, and have expressed interest in leave-behind materials and training to enhance persistence.

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EESPs should be offered a system to refer facilities that are not appropriate for Tune-Up, but have energy efficiency needs that can be addressed by other programs.

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Current practices should be leveraged to provide leave-behind checklists and references that will support participants’ efforts to maintain persistence.

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BOC and other training should be offered and/or re-offered at the end of the project to help facility staff understand implemented measures, how to use checklists and read the data, and how to return the optimized measures from temporary or seasonal changes, and provide EESP contact information as a resource.

**FINDING 3**
Investigation Reports lack material for non-technical decision makers looking for a business case to support funding the recommended projects.

**RECOMMENDATION 5**
The Executive Summary should feature accessible language, images and tables to effectively communicate to non-technical decision makers.

**RECOMMENDATION 6**
Financial metrics should be expanded to offer a business case for the project.
ComEd has been operating the Northern Illinois Coordinated Utility Retro-Commissioning (RCx) Program for nine program years. CY2019 also marked the eighth program year ComEd coordinated program operations with the gas utilities that have service areas which overlap ComEd’s service area.

The program helps commercial and industrial customers improve performance and reduce energy consumption of their facilities through the systematic evaluation of existing building systems and the implementation of low- and no-cost energy efficiency solutions.

Generally, the program pays for 100% of a detailed study, contingent upon a participant’s commitment to spend a defined amount of their own money to implement a bundle of improvements recommended through the study with a simple payback of 18 months or less. The resulting Investigation Report promotes the recommended improvements and may detail additional capital improvement projects.

The RCx Building Tune-Up (Tune-Up) path features the option to immediately implement some common measures during the investigation visit by the Energy Efficiency Service Provider (EESP) in addition to a cash incentive for implementing savings following receipt of the Investigation Report.

Monitoring based commissioning (MBCx) utilizes a building automation system (BAS) to monitor energy use and detect potential areas for optimization.
## CY2018 savings by fuel type within utility service territories

<table>
<thead>
<tr>
<th></th>
<th>MBCx</th>
<th>RCx</th>
<th>RCexpress</th>
<th>Tune-Up</th>
<th>DCEO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projects</td>
<td>21</td>
<td>6</td>
<td>22</td>
<td>74</td>
<td>44</td>
</tr>
<tr>
<td>ComEd, kWh</td>
<td>11,713,535</td>
<td>5,837,900</td>
<td>7,511,685</td>
<td>6,997,731</td>
<td>7,497,253</td>
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<tr>
<td>Nicor Gas, therms</td>
<td>-</td>
<td>71,497</td>
<td>7,256</td>
<td>96,512</td>
<td>379,175</td>
</tr>
<tr>
<td>Peoples Gas, therms</td>
<td>267,278</td>
<td>14,864</td>
<td>72,612</td>
<td>31,083</td>
<td>424,811</td>
</tr>
<tr>
<td>North Shore Gas, therms</td>
<td>-</td>
<td>-</td>
<td>4,369</td>
<td>16,263</td>
<td>137,256</td>
</tr>
</tbody>
</table>

Savings not necessarily indicative of savings purchased or claimed by individual utilities

Source: Navigant analysis of ComEd CY2018 Tracking Data
Process research conducted between October, 2018 and June, 2019 addressed three of the four Retro-commissioning paths: RCx, RCxpress and Tune-Up. Navigant researched three topics requested by the program manager and implementer:

1. Why did Tune-Up participants drop out after receiving their Investigation Reports?

2. How can the program help participants improve the persistence of savings from the measures they addressed during their project?

3. How can the Investigation Reports drive greater adoption of recommended measures and channeling of capital improvement projects?

Navigant activities included interviews with program participants and industry experts, secondary research of industry best practices, document review, and analysis of prior participant and service provider survey results.
02
Tune-Up Path Drop Outs
The Tune-Up path is expected to grow as the program encourages greater participation of smaller facilities outside Chicago. However, this path historically struggled with EESP reluctance due to low margins and smaller savings available to smaller facilities, as well as customer confusion and drop outs.

The evaluation team identified the following key evaluation questions:

1. Why did Tune-Up participants drop out of the program between receiving the Investigation Report and implementation of the recommended measures?

2. What could be done to bring drop outs back into the program or avoid dropouts in the future?

The team answered these questions through the following research:
- Interviewing of former participants who dropped out
- Reviewing Investigation Reports for participants who dropped out

The following slides provide a contextual timeline of the Tune-Up path evaluation, verbatim quotes from ComEd customers, and Navigant’s findings and recommendations based on PY9 and CY2018 participants.
The Tune-Up path evolved to address various deficiencies, from lack of EESP interest due to low fees or margins, customer lack of awareness or frustration over what they interpreted as a prescriptive treatment when they expected a custom service.

The following timeline depicts major changes to the implementation and design of the Tune-Up path and the number of interview respondents.

<table>
<thead>
<tr>
<th>PY7</th>
<th>PY8</th>
<th>PY9</th>
<th>CY2018</th>
<th>CY2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>(4 Interview Respondents)</td>
<td>(0 Interview Respondents)</td>
<td>(9 Interview Respondents)</td>
<td>(3 Interview Respondents)</td>
<td>Implemented cancellation policy</td>
</tr>
<tr>
<td>Outreach based on Remote Building Audits of 200 likely candidates</td>
<td>Outreach not targeted Negative EESP feedback, PY8 had low participation</td>
<td>Initiated calling campaign by EnVINTA promoting Tune-Up as a free audit, but it was not free</td>
<td>Increased EESP and participant fees, including incentive for in-house labor</td>
<td>Increased screening of prospective participants</td>
</tr>
<tr>
<td>Low EESP fees</td>
<td>Negative EESP feedback, PY8 had low participation</td>
<td>Leads were low quality based on the implementer interview</td>
<td>Cease EnVINTA campaign</td>
<td>Limited projects to no more than three from a customer (e.g., school district)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Increased EESP and participant incentives</td>
<td>EESPs develop own leads, found to be higher quality</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cancellation rate of 45%</td>
<td>Public sector facilities eligible for program</td>
<td></td>
</tr>
</tbody>
</table>
Participants who dropped out reported highest satisfaction with minimal staff time required.

The **lowest satisfaction** was experienced by those participants who entered the program in PY9.

**Greatest satisfaction** overall was associated with required staff time, assistance in finding a contractor and ability to maintain savings.

“The program made them able to say whether they [implement the measures], which gave them confidence.”

“We had to find a HVAC contractor. It would help if ComEd would have [a] list of building automation contractors”

Customer responses where 0 indicates not at all aware and 10 indicates fully aware of program details going into the investigation.

Source: Navigant interviews of Tune Up Drop Outs, conducted in May, 2019
Participants who dropped out had enrolled to save money & energy, and improve equipment performance.

The majority (59%) of firms entered the program to lower their utility bills or save energy.

Nearly one third (31%) entered the program for non-energy benefits, chiefly to improve equipment performance or to make the facility more comfortable or improve air quality.

I really appreciate that ComEd is taking a very active role in helping school districts and industry in general.... I'm not a greenie but I appreciate that comfort is improved and if I don't have to use energy it saves fossil fuels.

n=32, multiple responses accepted

Source: Navigant interviews of Tune Up Drop Outs, conducted in May, 2019
PY9 participants who dropped out were less familiar with the program requirements than those entering in either prior or subsequent years.

Participating customers in PY7 and CY2018 demonstrated a greater understanding of the program requirements than did those who entered the program in PY9. The EnVINTA calling campaign recruited customers in PY9.

Customer responses where 0 indicates not at all aware and 10 indicates fully aware of program details going into the investigation.

Source: Navigant interviews of Tune Up Drop Outs, conducted in May, 2019
Participants dropped out because they did not find the recommended improvements to fit their business needs.

The most commonly mentioned reasons for dropping out were EESP actions, including that the EESP aborted the project, never provided an Investigation Report, or did not find enough opportunity to continue (29%).

A similar number of respondents reported that they either completed their Tune Up project (18%) or intended to complete the project (12%).

Those participants who decided to drop out did so because the recommendations were not what they expected with payback periods too long or short (23%).

One public participant’s internal budgetary cycle forced them out of the project because the Investigation Report arrived at the wrong time in their budget cycle.

“5 year payback is our standard and we expected to see measures that would meet that.”

“We intended to complete the project but it was tied to the budget cycle and by the time we got the project recommendations, our fiscal year budget was closed so couldn’t proceed.”

Source: Navigant interviews of Tune Up Drop Outs, conducted in May, 2019
Some facilities that received a RCx study may not have been strong candidates – candidates were not vetted properly.

Two sample reports, on this and the following page, illustrate issues Navigant found with some Investigation Reports and the appropriateness of the facility as a Tune-Up candidate, primarily that the payback for the recommendations was too long and the savings too small.

1. This PY7 Investigation Report bundles three measures for the RCx project, two with appropriate payback periods for RCx, and a third that qualifies as a capital improvement.
Some facilities that received a RCx study may be better candidates for other ComEd programs (continued from previous page).

2. This CY2018 Investigation Report uncovered only one measure, a capital improvement with a payback of 9.4 years, exceeding the definition of RCx.

Investigation Reports do not indicate over how many years the electrical cost savings for each measure will be enjoyed, a vital piece of information to make an informed business decision about the proposed project.

These PY7 and CY2018 Investigation Reports both suggest that the facilities studied were not good candidates for RCx, and could have been referred to other programs in the ComEd portfolio.

Source: Navigant research of Tune Up Investigation Reports from CY2018
Participants who dropped out said they may return to the program if their facility has more impactful or higher incented measures and they receive additional follow-up.

Respondents said that more follow-up, either regarding their original project or promoting new opportunities, would bring them back to complete their projects.

An equal number asked for measures with greater impact or payback periods made shorter through higher incentives.

“Address long payback periods that incentives don’t bring down enough by increasing incentives”

“Move to next tier and do actual retro-commissioning – the impacts were in some ways a waste of time – didn’t get all the info needed from just Tune-Up”

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>5% Don’t know</td>
<td></td>
</tr>
<tr>
<td>5% Need more information</td>
<td></td>
</tr>
<tr>
<td>5% Resend Investigation</td>
<td></td>
</tr>
<tr>
<td>Report</td>
<td></td>
</tr>
<tr>
<td>5% Extend project</td>
<td></td>
</tr>
<tr>
<td>until complete</td>
<td></td>
</tr>
<tr>
<td>5% Understand</td>
<td></td>
</tr>
<tr>
<td>public sector</td>
<td></td>
</tr>
<tr>
<td>budgetary timeline</td>
<td></td>
</tr>
<tr>
<td>11% Offer measures</td>
<td></td>
</tr>
<tr>
<td>with greater impact,</td>
<td></td>
</tr>
<tr>
<td>more measures</td>
<td></td>
</tr>
<tr>
<td>11% Nothing;</td>
<td></td>
</tr>
<tr>
<td>everything was great</td>
<td></td>
</tr>
<tr>
<td>32% More follow up</td>
<td></td>
</tr>
<tr>
<td>21% Greater incentives</td>
<td></td>
</tr>
</tbody>
</table>

Source: Navigant interviews of Tune Up Drop Outs, conducted in May, 2019
Improving Persistence
PY9 participants in the RCx, RCxpress and Tune-Up paths reported an eagerness for leave behind materials and training to help them maintain persistence of the savings achieved through their RCx project.

Although the RCx and RCxpress participants send staff to Building Operator Certification training, they, too, started to express interest in training and materials to support efforts at maintaining persistence.

**The evaluation team identified the following key evaluation questions:**

1. What are industry best practices to maintain persistence at retro-commissioned facilities?
2. Which of those best practices would translate easily to the existing ComEd program?

**The team answered these questions through the following research:**

- Secondary research of best practices
- Analysis of prior participant and EESP survey results
Changes in operations, personnel and facilities challenge successful persistence of savings for RCx measures.

Retro-commissioning benefits are susceptible to the degradation of persistence for multiple reasons or manual operations or overrides that become permanent that occur as part of day-to-day operations, including:

- Temporary schedule changes
- Churn in personnel, from tenants to custodians, control and service contractors
- Facility and physical plant changes

Some industry best practices exceed the current design of most current ComEd RCx Program offerings, including:

- Equipment lists
- In-depth information on all equipment at a facility
- Operations & Maintenance manuals
- Additional reference and record of maintenance practices and history for all equipment at a facility
- Control System documents
- Reference documents including points, as-built sequences of operations and system diagrams

“We learned that our building engineers made a system change to rectify immediate problems which in turn made problems later.”

PY9 RCx PARTICIPANT

“[We urge caution] about making changes without fully understanding the needs of the building or the systems that they are dealing with.”

PY9 TUNE UP PARTICIPANT

Source: Navigant Net to Gross and Process surveys of PY9 participants and interviews of PY9 Service Providers
Checklists and training will help participants maintain persistence of savings.

Program participants are asking for material to help them achieve greater persistence. Applying best practices to the RCx Program operations, a series of checklists may best serve to enhance persistence for participants who contract out controls and service work as well as those who experience churn and multiple demands on their in-house maintenance staff.

The checklists present limited data to offer a rationale for the improvements, instruction on maintaining the improvements and a record of observations or activity.

**Current practices may be leveraged to ease the burden of creating a checklist and may not increase program costs.**

For example:

- Rationales for improvements may be found in Investigation Reports
- Certain temperature resets may have boilerplate rationale that is easily adopted
- Tune-Up calculators may offer desired controls ranges and settings
- BOC training, required for RCx and RCxpress participants, may feature the creation of checklists as part of the training. These lists may be used in coordination or replacement of program-created checklists.

Source: Navigant Net to Gross and Process surveys of PY9 participants and interviews of PY9 Service Providers
Persistence of savings is likely to be improved with operations and trouble-shooting checklists.

Provide checklists that:

List monthly, seasonal and annual tasks and system parameters specific to the equipment and systems changes addressed during the RCx project including acceptable ranges for:

- Temperature parameters
- Static air pressure
- Pumps
- Constant or variable volumetric air pressure
- Chilled water

Reference or incorporate equipment lists, training material and rationale for the improvements.

Offer the EESP contact information as a resource should questions arise.

Deliver a form, excel template or data-entry system to record actions taken, results observed, challenges experienced.

Feature a troubleshooting page for each piece of equipment addressed in the RCx project that includes equipment details and reasons for observed settings.

- Expected values or range of values for summer, winter, spring and fall
- Operating parameters
- Possible reasons values may exceed the expected range
- Possible actions to restore expected operations

“[We would like] any information that would help to keep the optimization in place and working.”

PY9 TUNE-UP PARTICIPANT

“Reminder of the actions we took, and maybe items for further evaluation or further consideration.”

PY9 TUNE-UP PARTICIPANT

“[We need material] about the equipment … in my building and how to maintain it. [For example,] if something goes wrong it could show what to look at such as humidity, temperature and sunrise and sunset or if it is a sunny day or a cloudy day.”

PY9 RCx PARTICIPANT

Source: Navigant Net to Gross and Process surveys of PY9 participants and interviews of PY9 Service Providers
Participants request training to understand the data and improvements delivered through their projects as well how to maintain persistence of savings from projects.

“[We would like appropriate] … training for our contractors and our staff at different levels with twenty hours of training.”

PY9 RCx PARTICIPANT

“[The ideal training] would provide my building maintenance staff with information on what to look for and the perimeters of what they should look for in the equipment.”

PY9 TUNE UP PARTICIPANT

“[We would like training on] how to use the data.”

PY9 TUNE UP PARTICIPANT

“[We could use training on] seasonal adjustments, and red flags to inefficiency and how to maintain optimal efficiency.”

PY9 TUNE UP PARTICIPANT

Participants are requesting training for their staff in addition to the BOC training required for RCx and RCxpress.

EESPs could offer training that is constrained to improvements and data delivered through the RCx project, as appropriate to the audience:

• cursory for controls and service contractors
• high level for facility managers
• suitable to sustain operations, collect data and observe trends for facility staff charged with maintenance and operations

A recording of the training session may serve as a reference for those who attended, and training for future staff.

Source: Navigant Net to Gross and Process surveys of PY9 participants and interviews of PY9 Service Providers
Investigation Reports detailing findings from the facility study are designed to explain the recommended improvements, and often communicate more potential than the required minimum for participation.

As such, these reports must present a business case to win funding of the projects.

However, the reports are better suited to a technical audience, and lack drivers for non-technical decision makers to fund recommended improvements.

The evaluation team identified the following key evaluation questions:

How can the Investigation Reports be more valuable, generating:

1. Higher adoption of the recommended measures beyond those that are required?
2. Higher adoption of the capital improvement recommendations?

The team answered these questions with:

- Interviews with industry experts representing service providers, implementers, and the ASHRAE Technical Committee, responsible for creating the ASHRAE Audits
- Review of existing Investigation Reports for all RCx offering tracks

Navigant reviewed the Investigation Report structure and content. The following results are a compilation of this review and insights from our research.
ComEd Investigation Reports could be improved to better communicate with non-technical decision makers.

This sample opening of a ComEd Executive Summary from a RCx Investigation Report may communicate well to engineers and others with a technical background, but challenges the non-technical audience likely responsible for business decisions about the funding and advancement of proposed projects.

1. Generally, the content is offered in a block with little white space to attract a scanning eye.

2. While pleasantly complimenting client staff, the report does not suggest a familiarity with or address the client’s needs: why should they fund the project?

3. Grammatical errors in a paragraph with a number discourage reading.

4. What does 825,000 kWh mean, and why does it matter to this company that predicted savings are exceeding that goal?

5. The references to measures are not accessible to the non-technical, who are unlikely to be pulled in by a technology they do not understand.

6. The logic behind this order is mysterious, lending confusion to the decision making process.

7. Measure life and financial metrics do not demonstrate the longevity of the measures’ savings, necessary to build a business case promoting the project.

Navigant’s business practice is to include executive summaries in memos and reports so that reader fully understands the content upon reading a document.

McKinsey and Company found that up to 13% of top management want to immerse their firms in energy efficiency and sustainability initiatives, while 17% are completely disengaged.

For mature programs like RCx that may have already served most of the highly motivated firms, 70% of the potential market waits to be convinced that the proposed energy efficiency project presents the best overall use of their limited funds.

Since all projects are in competition for funding, Investigation Reports should address risk versus reward in the Executive Summary, allowing a straightforward business decision to be made about funding the project.

The remainder of the Investigation Report and Appendix may be written for engineers, facility managers and technical audience.

Reports that best communicate a business case to implement the recommended measures are most likely to be funded.

Key components of an actionable Executive Summary:

High-level project detail

Possibly as few as 3 - 4 bulleted key points

Outline the key points so they are actionable

A summary targeted to the non-technical decision maker should assess risk versus reward and build a business case for approving the recommended projects.

An Executive Summary should be ready to distribute to top management for funding and buy-in.

Key features of an actionable summary include:

- Content relevant to the reader, free of technical terms and easy to understand
- Show an appreciation of the firm’s needs
  - Scheduling constraints presented by operational needs or budget cycles
  - Multiple needs addressed by recommended improvements, where possible
- Financial metrics that promote the full benefit of implementation over the measure life
- Scannable copy broken up with images, figures and tables for quick communication that attracts the eye
- Recommended improvements in a hierarchical order based on delivering the most benefit to the customer
- A second set of data for recommended capital improvement projects, with references to channel to other ComEd programs

Technical and specific content may follow the Executive Summary and include content targeted for a technical audience such as facility engineers and managers.
ComEd RCx Investigation Reports should consider expanding metrics to help advance a project.

ComEd investigation reports present energy savings, project cost, potential incentives, and the payback period.

Additional metrics will help satisfy various corporate requirements, and could help advance proposals to become funded projects.

As shown in this sample Executive Summary from a RCxpress Investigation Report, the metrics offered are:

1. Savings in kWh and therms per year
2. Savings by energy cost per year
3. Project cost
4. Simple payback

Capital improvement recommendations are offered in a different format, without similar metrics, which may serve to leave their consideration out and discourage their adoption.

Tune-Up Investigation Reports, shown on Slide 16, present limited data on a project basis, rather than by measure.

Financial Metrics make the business case.

Businesses consider multiple metrics, and often have a minimum threshold to approve a project. Delivery of these metrics in a manner that the project contact can simply cut-and-paste into a report or request for funds would make their task easier, and help to develop buy-in throughout the company.

Because businesses may differ in the metrics of greatest importance, we recommend that all appropriate measurements be offered to answer decision makers’ questions before they have to ask them, including:

- Operations and Maintenance Savings
- Measure Life
- Internal Rate of Return (IRR)
- Net Present Value (NPV)

Deliver metrics that support adoption of the proposed projects in an easily accessible format to decision makers.

Source: Greater Allen Cathedral Senior Residence Energy Audit, Quadlogic Controls Corporation
This example of a table detailing Energy Conservation Measures in an Executive Summary offers a number of metrics, including:

1. Operations & Maintenance Savings
2. Measure life
3. Internal rate of return (IRR)
4. Net present value (NPV)

Source: Greater Allen Cathedral Senior Residence Energy Audit, Quadlogic Controls Corporation
Photographs and layout help pull decision makers into reports.

Photographs of the customer’s facility serve to bring the proposal home and make it seem customized.

EESPs can take photos with their tablets on an early facility visit, and enter them into a database to simply create these reports.

Report layout that features images, tables, bulleted lists and white space is accessible and encourages continued reading.

Source: Minnesota Turn Key Sample Assessment Report, Excel Energy

Source: Quadlogic Controls Corporation energy audit for Greater Allen Cathedral Senior Residence, 2015
Photographs communicate efficiently and help make details accessible to non-technical decision makers.

Images of the customer’s facility deliver a custom approach that helps to alleviate the negative “prescriptive” feel of the Tune-Up path that a number of participants have reported.

Photographs speed understanding of the project and what the measure will address, helping the non-technical decision maker in particular.

Source: West End Place report, Elysian Energy
Findings and Recommendations

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Participants dropped out of the Tune-Up path most often because their facility was not a good fit for retro-commissioning.

**RECOMMENDATION 1**
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Participants from all paths are concerned with issues of persistence, and have expressed interest in leave-behind materials and training to enhance persistence.

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Thank you

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