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Energy Efficiency
Nicor Gas Plan Year 1
(6/1/2011-5/31/2012)

Evaluation Report:
Emerging Technologies Program

Presented to:
Nicor Gas Company

January 17, 2013

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E. Executive Summary

The goal of this report is to present a summary of the findings and results from the evaluation of Nicor Gas' Rider 30 2011-12 Energy Efficiency Emerging Technologies Program (ETP). The ETP is unique among energy efficiency programs (EEP) because instead of providing rebates to customers to adopt energy efficient technologies, the ETP's objective is to "identify emerging technologies and/or practices that are new or underutilized and have the potential for energy savings and possible future integration into the Nicor Gas energy efficiency programs. ETP will achieve energy savings while being transparent, cost-effective, scalable, and developing the needed data to transition measures into the EEP."

E.1 Evaluation Objectives

The primary objectives of the process evaluation effort are to determine key process-related program strengths and weaknesses and help program designers and managers improve the identification, screening, vetting and transfer of emerging technologies to programs. This evaluation does not include an impact evaluation because the program is too new to have measurable impacts. The evaluation team will conduct an evaluation of program impacts in subsequent program years.

The Emerging Technologies Program is administered by the Wisconsin Energy Conservation Corporation (WECC) and implemented by the Gas Technology Institute (GTI). Due to the nature of this program, there are no established goals for energy savings or program participation. However, starting in the second year of the program, the evaluation team will evaluate the quantifiable impacts of the ETP.

E.2 Evaluation Methods

The focus of the process evaluation was a review of the program's marketing and technology idea generation, idea screening, program implementation and barriers, and administration and delivery. The purpose was to develop a complete understanding of how the program works and identify areas for process and implementation improvements.

To conduct this evaluation, the team collected data through comprehensive review of the ETP planning documentation (including operating manuals and tracking systems), and through in-depth interviews with the program administrator and the implementation contractors to research issues of program design, administration and delivery.

E.3 Key Impact Findings and Recommendations

This evaluation for Gas Program Year 1 (GPY1) does not include an impact evaluation. The program is too early in its implementation to have measurable impacts.

E.4 Key Process Findings and Recommendations

Although Gas Program Year 1 (GPY1) ran from June 1, 2011 to May 31, 2012, the ETP however was not operational until December 2011. Therefore, the program was still in the early stages of the

implementation process at the end of GPY1. Nonetheless, Nicor Gas and the ETP program team together have effectively designed and implemented many of the important processes to build a successful program in this short period. The evaluation team recognizes that since the end of GPY1, the ETP has likely evolved further, and may have made progress to address some of the issues discussed in this evaluation. However, based on the research conducted at the time for this evaluation, the evaluation team has concerns about a few program areas, starting with insufficiently defined program objectives. With some focused effort to improve the objective, and to address the recommendations below, in particular those focused on technology transition to EEP, the evaluation team expects the ETP to perform well.

Navigant's key process findings and recommendations are as follows:

- ***Program Objective is Limited*** – The ETP's stated program objective is too limited to assure an effective program. GTI has taken steps beyond the stated objectives that will address this issue and help assure success; however, to be effective, the program objectives and goals should be expanded and more clearly defined. In particular, the objective does not address the actual transition to EEP, which is fundamental to a successful program. Navigant recommends that Nicor Gas and the ETP expand the objective to incorporate a successful technology transition to the EEP. Nicor Gas and the ETP may benefit from additionally defining the ETP's intentions with regards to either long-term or near-term technical and economic savings potential and overall portfolio energy efficiency or end-use therm savings.

- ***Risk Mitigation in Technology Transfer/Deployment to EEP*** – The current deployment process may be insufficiently well defined, potentially putting the success of each technology deployment in jeopardy; a more clearly defined, robust deployment process can help ensure that the technology deploys successfully and contributes expected levels of energy savings to the EEP portfolio. Navigant recommends clearly defining a set of deliverables, including a new market/business assessment and any relevant findings from the pilot, that will enable effective information transfer for the technology, and by assigning responsibility to specific personnel (both in ETP and EEP) to oversee the transition of each technology.

- ***Comprehensive Central Tracking*** - The ETP's technology tracking process does not currently extend beyond the program's 4S selection process to include information on pilot assessment testing or the transition to EEP. This process is an interim solution as they intend to transition to Nexant's TrakSmart software platform, which all EEP-programs plan to adopt. Navigant recommends that the ETP employ a central tracking system that extends from application submission to technology transfer to EEP (or rejection from further analysis) that will enable comprehensive performance assessment. The monthly Project Scorecard and other deliverables should ideally be linked to such a system automatically. It is currently unclear whether TrakSmart will contain the necessary functionality to successfully track the ETP through each process.

- ***Documentation and Re-Evaluation of Promising Technologies*** – The ETP has not defined a process by which they can revisit promising technology applications which do not currently meet all the necessary criteria, but may be viable options in the future. Navigant recommends that the ETP consider recording the summary of reason(s) for not going further (with a date). For some ideas, the ETP may want to set a target date to revisit the status (e.g., in 6 months or two years), including a threshold for improvements which would trigger a re-evaluation.

1. Introduction to the Program

This section includes a brief description of the Nicor Gas Energy Efficiency Program's Emerging Technologies Program (ETP), including the program's implementation strategy, technologies under consideration, and researchable questions for this assignment.

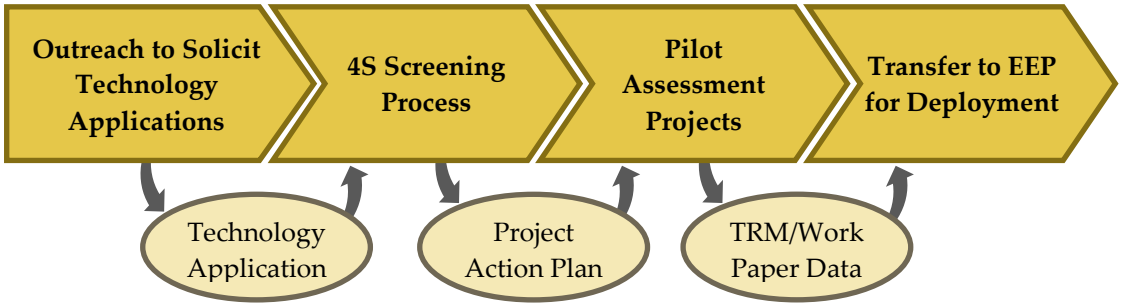
1.1 Program Description

The ETP is designed to identify energy efficient emerging technologies or practices (i.e., measures) that Nicor Gas can incorporate into their EEP to achieve greater program savings and provide better value to their customers. The program's stated objective is to:

> "Identify emerging technologies and/or practices that are new or underutilized and have the potential for energy savings and possible future integration into the Nicor Gas energy efficiency program (EEP). ETP will achieve energy savings while being transparent, cost-effective, scalable, and developing the needed data to transition measures into the EEP."

The ETP finds potential energy-saving technologies by soliciting applications from trade allies, manufacturers, implementation contractors, and other stakeholders. Figure 1- shows the overall steps of the ETP process. Section 1.1.1 details each step of the process.

Figure 1-: Overall ETP Process Steps



The ETP does not have a standardized measure list or gas savings goals as found in other EEP programs. Participation in the program is tracked through the number of initial applications. The ETP measures therm savings through pilot assessment projects. The Gas Technology Institute (GTI) manages the ETP as the implementation contractor with sub-contractor support from Livingston Energy Innovations (LEI). As detailed in the ETP Program Operations Manual, LEI provides program support for a variety of ETP activities, including: program design, development, and launch; transfer of technologies into programs; and business development with stakeholders.[1]

Gas Program Year 1 (GPY1) ran from June 1, 2011 to May 31, 2012, however the ETP was not operational until December 2011. Therefore, the program is still in the early stages of the implementation process. By the end of GPY1, the ETP accepted 21 applications for new emerging technologies, identified 11

[1] From "Nicor Gas ETP Program Operations Manual Final to WECC 03-29-12." The complete list of activities that the ETP identifies as areas in which LEI will contribute can be found on page 8.

applications for further evaluation after screening through the *4S: Ready, Set, Go* process, and has yet to initiate pilot assessment projects to validate energy savings. Therefore, the program evaluation is based primarily on design intent of the program, with little implementation experience to evaluate.

Unlike typical EEP rebates which encourage utility customers to purchase previously identified energy efficiency technologies, the ETP only provides incentives to encourage site-host participation in pilot assessment projects. Incentives are on an as needed basis only, and typically come in the form of program staff time, materials, labor, manufacturer discounts, or direct financial equipment buy-downs. Each pilot assessment project enables the ETP to conduct verification and due diligence of manufacturer-claimed therm savings for each technology.

Table 1- lists the Rider 30 budget components associated with each portfolio support function for each of the three program years.

Table 1-: Program Budget and Allocation

Measure	GPY1	GPY2	GPY3	Total	% of Total
Contract Administration	$40,000	$70,150	$80,450	$190,600	4.8%
Marketing (Advertising & Promotion)	$140,400	$140,000	$150,000	$394,400	9.8%
Incentives	$51,100	$178,850	$346,050	$576,000	14.3%
ET Program Development	$207,500	$50,000	$65,000	$322,500	8.0%
ET Project Selection	$136,000	$123,000	$45,000	$304,000	7.6%
ET Project Execution/ Management	$50,000	$399,500	$603,500	$1,053,000	26.2%
ET Project M&V Costs	$194,000	$370,500	$618,000	$1,182,500	29.4%
Total	$783,000	$1,332,000	$1,908,000	$4,023,000	100%

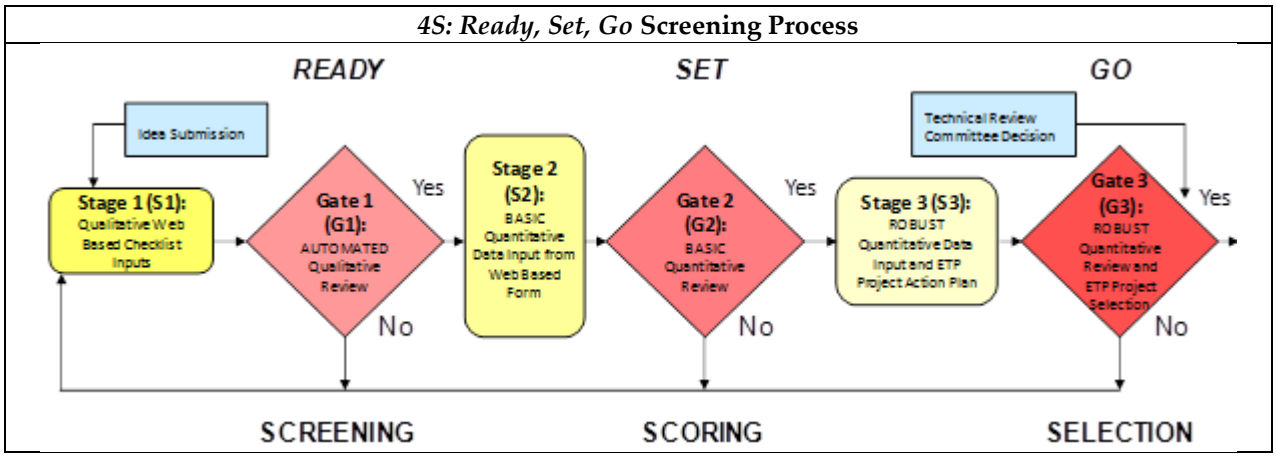
Source: Nicor Gas ETP Operations Manual (March 2012), page 21

1.1.1 Implementation Strategy

The ETP targets manufacturers who will ultimately provide the technologies and processes that lead to higher energy savings. To solicit technology applications from stakeholders, the ETP has a presence in select trade shows, seminars, and in other energy-efficiency-themed forums and industry events. Nicor Gas launched the ETP with an email to stakeholders, directing them to Nicor Gas' ETP website, and encouraging them to apply with any potential emerging technologies through Nicor Gas' online application system. Therefore, the program relies on targeted emails to communicate with stakeholders for most C&O activities.

The ETP uses a technology screening, scoring, and selection system, referred to as *4S: Ready, Set, Go*, to identify pilot assessment projects from technology applications. Figure 1- provides details on the 4S process.

Figure 1-: 4S and Its *Ready, Set, Go* Stage/Gate Process[2]



The ETP screens the applications based on the basic functionality, features, and level of market readiness (*Ready* Stage). For those technologies that meet minimum requirements, the ETP staff request more data from the applicants to conduct a preliminary quantitative analysis of the technology (*Set* Stage). ETP conducts both of these two steps (*Ready* and *Set* stages) on an ongoing basis.

For the most promising technologies, ETP staff conducts a robust quantitative analysis of the application, and then recommends technologies for further evaluation. The Technical Review Committee (TRC) reviews the recommendations and approves select technologies for pilot assessment projects (Go Stage). Go decisions are made collaboratively and are made on an as needed basis coordinated with the TRC, after action plans are presented.

ETP staff then works closely with the applicant and other stakeholders to manage pilot assessment projects for those approved technologies. ETP presents project results in a presentation or project report to EEP staff, and transfers the information to EEP staff in a form that is easily accommodated in a Technical Reference Manual (TRM) or technical work paper. It is then the individual EEP implementation contractor's (IC) responsibility to prepare technical and marketing materials for the measure.

The degree of trade ally involvement during the screening and pilot assessment process varies for each technology. The ETP may call upon trade allies for professional expertise and judgment, such as during the quantitative review process, for TRC decision making, or during pilot assessments to meet contractor needs.

In order to ensure data integrity from manufacturer-submitted applications, the ETP also uses Quality Assurance/Quality Control (QA/QC) procedures to assess the quality of data used in the *4S: Ready, Set, Go* process for project decision making, and the quality of data generated during the pilot assessment. During the *4S: Ready, Set, Go* screening process, the ETP uses automated web-based checklists to screen technologies, and uses rigorous analysis methods and external subject matter experts to verify and validate applicant-submitted information. During the pilot assessments, the ETP clearly defines project goals to address market and EEP needs, performs shakedown of installed data acquisition systems to

[2] Flowchart source: ETP program document: "Nicor ETP Screening Scoring and Selection System Final to WECC 03-19-12-MT-CORRECTION.docx," p. 8.

review data quality and verify measurements, and uses an independent GTI staff member to review all formulas and results to resolve any inconsistencies. ETP also solicits feedback from applicants and other pilot assessment participants through surveys to improve the screening and pilot assessment process. At the end of the technology pilot assessment, the ETP presents the data collected in a format compatible with EEP work paper and TRM documentation requirements to ensure consistency and ease of information access.

Appendix B contains the evaluation team's Logic Model and Program Theory Memorandum, which provide additional details on the program's processes.

1.1.2 Technologies and Incentives

Table 1- lists all the technologies that the ETP screened in GPY1 and that the ETP recommended for further evaluation in GPY2. Table 1- lists all the technologies that the ETP screened in GPY1 which failed to pass through the 4S screening process; this table also indicates the reasoning for not proceeding further with each measure.

Table 1-: ETP Technologies under Evaluation

Technology	Technology Status
High Efficiency Heating Rooftop Unit	Under Continued Evaluation - Draft Action Plans presented to Technical Review Committee at June 7, 2012 meeting
ShowerStart Hot Water Saver	
Multi-Family On-Demand Water Heating Pump	
Ozone Commercial Laundry	
Combined Space and Water Heating Systems	
Industrial Air Barrier	
Boiler Control System	
Advanced Boiler Heat Recovery	
Programmable Thermostat/Feedback	
Commercial Pilotless Range	

Source: Email from WECC dated Oct 5, 2012.

Table 1-: ETP Technologies no Longer Under Evaluation

Technology	Key Failed Criteria & Reason for Not Proceeding with Evaluation
Solar Collector System	Product is not commercially available and will not be in the next 6 months.
Home Energy Management System	Insufficient data available to proceed past Set stage; awaiting additional information on therm savings potential based on an ongoing program trial.
Commercial Energy Management System	Insufficient data available to proceed past Set stage; awaiting additional information to serve as possible basis for Go stage evaluation.
Green Steam Boiler	Applicant has been unresponsive to phone and email inquiries for further information to proceed beyond Ready stage
High Efficiency Commercial Water Heater	High first cost premium for engine driven heat pump water heater currently limits cost effectiveness and application potential.
Advanced HVAC Proposal	This proposal is still under draft revision by the applicant.
MF Heat Reflectors	ETP is awaiting additional information to confirm Set stage finding and decision.
Home Energy Management System Consultant	Company is a consultant for the home energy management system and does not have a separate product they would like to submit.
Natural Gas Cooling	Exclusion of fuel switching technologies from ETP excludes it from further consideration.
Water Heater Vent Heat Recovery	Product has issues with: National Fuel Gas Code compliance, uncorroborated performance projections, and non-commercialized prototype status.
Commercial Food Service Boilerless Steamer	ETP team has followed up with the food service rebate program implementation contractor and they are considering adding 10-pan model to their existing steamer incentive.

Source: Email from WECC dated Oct 5, 2012.

1.2 Evaluation Questions

The evaluation sought to answer the following key researchable process questions.

1.2.1 Marketing and Technology Idea Generation

1. How effective is the ETP's outreach for soliciting new, high-quality technology applications from industry?
2. In what areas could the program improve to create a more cost-effective process for identifying potential technology ideas? Should Are there any indications that the selection processes need to be more rigorous? Should metrics be changed or added to address any obvious limitations or shortfalls in the program design?
3. Will the established processes be sufficient to successfully deploy top technologies to the EEP in GPY2?

1.2.2 Program Characteristics and Barriers

1. Is the technology screening process effective, efficient, and does it contain the appropriate criteria filters?

2. Do information tracking processes document the technology development stage for promising technologies that are not yet program-ready (but may be in the future) for the appropriate stakeholders? Do the tracking processes monitor ETP evaluation status? Do the tracking processes monitor potential value to the portfolio and the program?
3. Is the technology transitioning process (from ETP to the EEP) clearly established to ensure success of deployed technologies? Do the processes sufficiently mitigate high risk issues for transitioning technologies?

1.2.3 Administration and Delivery

1. What challenges have occurred in initial program implementation and how were they handled?
2. Has the ETP's approach been consistent with the program design? If not, how and why did it differ?
3. Are the program processes effective for identifying and vetting new technologies?
   a. Program tracking and information management systems
   b. Internal and external program communications
   c. Program delivery organization and staffing
4. Is Nicor Gas pleased with the way the program has proceeded to date?
5. What aspects of the program seem to be operating effectively? Are there any significant areas in which the program needs to be improved?

2. Evaluation Methods

This section describes the analytic methods and data collection activities implemented as part of the process evaluation of the program. The process evaluation included a review of the program's administration and delivery.

2.1 *Primary Data Collection*

The purpose of the process evaluation was to develop a complete understanding of how the program works and identify potential barriers to program success. The evaluation team conducted in-depth interviews with the program administrator (WECC) and the program implementation contractor (Gas Technology Institute - GTI). Opportunities for improvement, if noted, were identified and communicated to the program team as soon as practicable via email or telephone communication.

Telephone interviews included prepared question topics such as program administration, program outreach and marketing, program delivery and customer satisfaction, along with the opportunity for a "free-flowing" conversation between the evaluation team and participants in order to pursue relevant issues raised during the discussion.

Tracking data analysis, used first in the Verification, Due Diligence and Tracking System Review Memo (VDDTSR - See Appendix A), included review of tracking systems structure and methodology. The ETP did not provide an extract of actual project data for review of their in-use tracking system because they had not yet initiated program tracking at the completion of GPY1. Instead, the ETP provided their intended tracking template (i.e., tracked fields and structure) for the evaluation team to review.

Table 2-, listed below, provides a summary of the principal data sources contributing to the evaluation of the ETP.

Table 2-: Principal Data Sources Contributing to the ETP Program Evaluation

Data Collection Type	Targeted Population	Sample Frame	Sample Design	Sample Size	Timing
Tracking Data Analysis	Program Projects	Tracking Spreadsheet and Software	-	All	June-July 2012
Literature Review	Program Documents	Program Documents	-	All	May-July 2012
In-Depth Telephone Interviews	Program Administrator (WECC)	Contacts from Nicor Gas	WECC Program Administrator Staff	1	April 2012
	Implementation Contractor (GTI)	Contacts from Nicor Gas	GTI Implementation Staff	2	April 2012

2.2 *Additional Research*

The evaluation team did not conduct any additional research for this process evaluation.

2.3 *Impact Evaluation Methods*

This GPY1 evaluation does not include an impact evaluation. The program is too early in its implementation to have measurable impacts.

3. Evaluation Results

This section presents the evaluation team's process findings for the Nicor Gas Emerging Technologies Program (ETP). These findings address the evaluation questions presented in the ETP Evaluation Plan, and in Section 1.2, above.

3.1 Impact Evaluation Results

This GPY1 evaluation does not include an impact evaluation.

3.2 Process Evaluation Results

The process component of the program evaluation is focused on marketing and technology idea generation, idea screening and selection, pilot assessment processes, program administration, and transfer of results to EEP. Each area is addressed in the subsections below. Nicor Gas initiated the ETP in December 2011, half way through GPY1, and the ETP spent much of GPY1 designing the processes necessary to implement the program. Even so, by the end of GPY1 (May 31, 2012), the ETP had accepted 21 applications for new emerging technologies and processed the technologies through their *4S: Ready Set Go* screening, scoring, and selection system. Table 1-, above, lists the 11 technologies that have advanced to the "Set" stage for further evaluation and GTI expects to initiate pilot assessment projects to validate energy savings for at least four of these technologies. The majority of this process evaluation focuses on the program design and adherence to said program design, rather than the effectiveness of implementation, which is still in its early stages.

The evaluation team prepared a detailed Verification and Due Diligence and Tracking System Review (VDDTSR) memorandum delivered to Nicor Gas on August 2, 2012. This section includes key findings from that memorandum as well as findings from review of non-VDDTS processes, such as marketing and outreach. The entire VDDTSR memorandum is included in Appendix 5.1. As indicated in the VDDTSR memorandum, many of the issues raised during the data collection and in-depth interview phase are currently being addressed by the program team for prompt implementation.

3.2.1 Marketing and Technology Idea Generation

In GPY1, the ETP's communications and outreach was successful in soliciting new technology applications from industry during the portion of GPY1 in which they conducted outreach. They received 21 technology applications, 11 of which they presented to the Technical Review Committee (TRC) for further evaluation. The TRC approved four technologies for pilot assessment testing. It is difficult to discern the relative quality of the technologies at this stage of process implementation. After ETP completes these projects, ETP will be better suited to characterize the quality of the original idea submissions.

The ETP is aware that technology idea generation may prove to be increasingly difficult in future program years as the ETP exhausts the opportunities for well-known candidate technologies ("low-hanging fruit"). ETP needs to actively combat this expected trend and prevent a reduction in application rates. Navigant expects that internal research and industry intelligence will play a larger role in years to come as the ETP exerts greater efforts to identify emerging technologies. Based on discussions with

the ETP staff, and past experience with emerging technology programs, proactive research and market scans may be required to supplement the pipeline of ideas.

Outreach for the ETP is a particularly unique component in comparison to other EEP programs, and Navigant expects that the ETP will have to invest heavily in this area to continue to be successful, as there exists no perfect blueprint for them to follow. With greater time and effort available in GPY2 to dedicate to soliciting ideas, the ETP should work to refine this process and expand their reach to new companies, industries, and technology types. Two areas of potential focus include: the ability to attract large organizations for which the ETP may not represent a large market opportunity, and the ability to avoid getting bogged down with marginal applications

Initial screening and selection processes appear to be sufficiently rigorous based on GPY1 technology outputs. A too-rigorous primary screening process can filter out viable technologies for which insufficient data is available but may still be worth pursuing; this does not appear to be an issue for the Nicor Gas ETP.

3.2.2 Program Characteristics and Barriers

Based on the documents reviewed, it appears that the implementation contractor is performing well at screening technologies for eligibility and potential impact on the EEP through the 4S process.

Because the ETP has not yet implemented technology-validation steps beyond the 4S process, it is still to-be-determined whether the remaining steps of the program design will provide the outputs that the EEP expects; however, the level of preparation and quality of program design that the ETP has undertaken point to strong program performance in GPY2.

The ETP established an internal tracking system to document screening progress for each technology submitted to the program. The process is an interim solution as they intend to transition to Nexant's TrakSmart software platform, which all EEP-programs plan to adopt.

The ETP employs "4S Summary Spreadsheets" in Microsoft Excel for tracking individual project progress. This tracking is limited to the 4S process, and does not cover any pilot assessment activities. Each workbook is structured to mirror each 4S Selection process step. The ETP creates a new workbook for each technology when a new technology application is received. The 4S Summary Spreadsheet documents the technology scoring criteria and the actual scores, but does not track the calculations and assumptions used to determine many of the scores. ETP calculates the inputs outside of the spreadsheet and copies the necessary outputs into the 4S Summary Spreadsheet.

The ETP uses a monthly "Project Scorecard" as the primary program tracking document. The Project Scorecard "provides a high-level summary that allows users to quickly locate important and salient project information."[3] To date, ETP has created this scorecard manually by aggregating data from each

[3] From "Nicor Gas ETP Program Operations Manual Final to WECC 03-29-12" under "Reporting: Project Scorecard."

technology's 4S Summary Spreadsheet. As the program grows, manual scorecard generation may prove to be a potential source of error and undue effort to complete. Navigant recommends that the ETP estimate the level of activity at which a transition from manual to automated tracking will be cost-effective. With the transition to a centralized tracking system, which includes all information from each 4S Summary Spreadsheet, the ETP should be able to automatically generate the Project Scorecard each month.

The ETP's current tracking system notably does not document each measure's stage of development, appropriateness for ETP evaluation, or reason(s) for discontinuing evaluation. Such documentation is important both to understand in the future if a technology may be worth revisiting, but also, and perhaps more importantly, to understand when not to revisit a technology that has been previously deemed inappropriate for the program.

To date, pro-active relationship building by the ETP with the implementation contractors of other EEP programs has helped strengthen ETP process development and, most importantly, will facilitate transitions of technologies from the ETP into the EEP in the future. Such active relationships promote frequent communication which will enhance the effectiveness of the transition process by enabling a strong feedback loop to help the ETP to learn what is necessary for successful technology deployment.

However, the ETP has not established a robust process for deploying technologies successfully into the EEP that mitigates all potential high-risk issues. Additionally, mention of a successful transition is not included in the program objectives. The existing process does not address three different high-risk issues:

- *Clarity on data requirements:* The ETP will "provide Nicor Gas EEP teams with data necessary to prepare Work Papers and/or Technical Reference Manual (TRM) documentation for a new EEP measure," but the ETP does not specifically define what these data include.[4] Navigant recognizes that defining data requirements is particularly challenging for the ETP because it may vary for each technology. For each new technology, a preliminary list of data requirements could include the following for each of the baseline technology and the energy efficient technology: detailed description, effective useful life, material and labor costs, energy savings (independently for each configuration or distinct application), and methodology or calculation justification for each of the cost and savings values.
- *Roles and responsibilities:* Without clearly identified responsibilities for deploying a technology, EEP runs the danger of having no clear champion to drive and facilitate the transition and deployment. Additionally, no specific individual, either inside or outside of the ETP, has been identified with ultimate responsibility for drafting technical work papers and other necessary documentation.
- *Business/Marketing information:* The ETP omits any mention of information transfer on each technology related to marketing and business. The existing project-completion process addresses only the technical aspects of each technology, but understanding the market is fundamental to successfully identifying and incorporating new technologies into the EEP. The ETP identifies the value of market acceptance information in the 4S process with the "Ease of implementation and market adoption" metric, but then does not identify any market

[4] From "Nicor Gas ETP Program Operations Manual Final to WECC 03-29-12" page 1.

information for transfer to the EEP.[5] Market information that is vital to a successful deployment include: detailed product description, value proposition, target customer/market, customer need, key benefits, barriers to adoption, and primary differentiation.

The evaluation team did not have the opportunity to speak with any ETP applicants (manufacturers). However, through interviews with the program administrator and program implementation contractor staff, the evaluation team understands that there are no inherent barriers to participation for prospective applicants due to program design or delivery. There is no indication that the program documentation and administrative requirements create an undue burden for manufacturers to participate in the program. To the contrary, the ETP implementation contractor has developed a very low-barrier program that provides every motivation for technology suppliers to participate, requiring only that the technology is commercially available and complies with local, state, and national codes. The ETP's marketing and outreach approach should emphasize that EEP adoption of a manufacturer's technology will open up a large market of potential customers, including an established sales force to help drive sales.

3.2.3 Administration and Delivery

The ETP's challenges come from two key areas: inherent challenges associated with planning and executing a new program, and the uncharted territory that is unique to an emerging technology program. Through a rigorous program design, the ETP has successfully addressed the key challenges of designing the primary operating processes, including communication pathways, tracking systems, marketing and outreach programs, screening, and pilot assessment plans.

The ETP implementation contractor's expertise with emerging technologies has helped them to overcome the challenges of navigating uncharted territory of emerging technology programs. Building on their emerging technology experience, the ETP effectively tailored their administrative processes during program ramp-up to accommodate the numerous unique aspects of the ETP, relative to the other EEP programs, while interfacing effectively with WECC staff through the traditional channels and methods.

[5] The "Ease of implementation and market adoption" is detailed in "Nicor ETP Screening Scoring and Selection System Final to WECC 03-19-12-MT-CORRECTION," page 15

4. Findings and Recommendations

This section describes the evaluation team's recommendations from the Rider 30 evaluation of the Nicor Gas Emerging Technologies Program.

The ETP however was not operational until December 2011, six months into GPY1. Therefore, the program was still in the early stages of the implementation process at the end of GPY1. Nonetheless, Nicor Gas and the ETP program team together have effectively designed and implemented many of the important processes to build a successful program in this short period. The evaluation team recognizes that since the end of GPY1, the ETP has likely evolved further, and may have made progress to address some of the issues discussed in this evaluation. However, based on the research conducted at the time for this evaluation, the evaluation team has concerns about a few program areas, starting with insufficiently defined program objectives. With some focused effort to improve the objective, and to address the recommendations below, in particular, those focused on technology transition to EEP, the evaluation team expects the ETP to perform well.

In GPY2, pilot assessment execution and potentially the deployment to EEP of one or more technologies will shed more light on the effectiveness of the program process design. With few industry best practices to follow, the Nicor Gas' ETP is charting new territory, and with a few enhancements as described in the recommendations, below, the evaluation team believes the ETP is well positioned for success.

4.1 Key Impact Findings and Recommendations

This GPY1 evaluation does not include an impact evaluation.

4.2 Key Process Findings and Recommendations

4.2.1 General

- ***Program Objective is Limited***

  Finding:

  The ETP's stated program objective is too limited to assure an effective program. In particular, the objective does not address the actual transition to EEP, which is fundamental to a successful program. GTI has already taken steps beyond the stated objectives that will aid in achieving success.

  Recommendation:

  Navigant recommends that Nicor Gas and the ETP expand the objective to incorporate a successful technology transition to the EEP. Responsibility for execution of this objective may be shared with Nicor Gas and other ICs (i.e., not limited to GTI staff). Identification of viable technologies is only step one in an ETP, and deployment is often the more difficult and risk-ridden step for ETP.

  Additionally, Nicor Gas and the ETP may benefit from defining the ETP's intentions with regards to either long-term or near-term technical and economic savings potential and overall

portfolio energy efficiency or end-use therm savings. Defining these, and other similar portfolio-level goals of the program, will help the ETP screen technologies more effectively.

4.2.2 Process Tracking, and Reporting Findings

- *Central Tracking*

Finding:

The ETP's technology tracking process does not currently extend beyond the 4S selection process, to include information on pilot assessment testing or the transition to EEP. The current system tracks each technology in a separate Microsoft Excel workbook. This process is an interim solution as they intend to transition to Nexant's TrakSmart software platform, which all EEP-programs plan to adopt.

Recommendation:

Navigant recommends that the ETP employ a central tracking system for all technology applications that extends from application submission to technology transfer to EEP (or rejection from further analysis). The monthly Project Scorecard and other deliverables should ideally be linked to such a system automatically. The use of a comprehensive technology tracking system may enable enhanced documentation of justifications for not pursuing technologies further (see Section 4.2.3). Additionally, this may enable greater accessibility and transparency into project progress for both Nicor Gas and ETP's internal purposes. Such a system will also facilitate third-party measurement and verification by aggregating all necessary data into a single, auditable database.

4.2.3 Marketing and Outreach and Technology Identification Findings

- *Technology Inclusion in EEP is a Sales Opportunity*

Finding:

*W*hen conducting marketing and outreach to solicit technology applications, the ETP can further leverage the fact that EEP adoption of a technology will open up a large market of potential customers for the manufacturer.

Recommendation:

Navigant recommends that, during program outreach and marketing, the ETP place substantial emphasis on the fact that inclusion in the Nicor Gas EEP will open up a new, subsidized market for selected technologies, including a new, experienced sales force within the EEP ICs to promote the technology. Promoting the vast sales benefits of the EEP program to manufacturers as a way to jumpstart a national sales initiative will help to increase the volume of applications. Additionally, by showing manufacturers the potential benefits, the ETP may find that the manufacturers are more willing to provide data and provide assessment support as needed. However, the ETP should also recognize that Nicor Gas's territory is small in the context of a national market opportunity for a large manufacturer, which may hesitate to participate due to preconceptions of slow utility bureaucracies and limited market potential.

- ***Documentation and Re-Evaluation of Promising Technologies***

Finding:

The ETP has not defined a process by which they can revisit promising technology applications which do not currently meet all the necessary criteria, but may be viable options in the future.

Recommendations:

Navigant recommends that the ETP consider recording a summary of reason(s) for not going further with each technology (including a date). For each promising technology for which the ETP discontinues evaluation (excluding technologies which are clearly not viable for the EEP), the ETP should consider setting a target date to revisit the status (e.g., in 6 months or two years), and one or more market or technology trigger (i.e., threshold) that indicates, upon revisiting, whether the technology should be re-assessed by the ETP. Incorporating a process for re-evaluating promising technologies in future years can help ensure that the ETP does not overlook technologies that may be close to program-ready, but still require small developmental improvements.

Further, such a process keeps in focus the need to avoid re-visiting those other technologies which have been discarded for good reason and are not worthy of additional investment by ETP. If the program does not clearly understand and document reasons for specific decisions on each technology, poor ideas can continue to resurface and distract the program from top contenders.

4.2.4 Screening Process Findings

- ***Quantitative Scoring Documentation***

Finding:

The 4S Summary Spreadsheet does not include templates for calculating the quantitative scores. Instead, it is up to the ETP staff to calculate each value and input it into the spreadsheet. The ETP uses these calculations to evaluate the technology's value to Nicor Gas' portfolio and to verify manufacturer-claimed savings within Nicor Gas' service territory.

Recommendation:

Navigant recommends including pre-established lists of input/output variables and methodologies (and calculations, where possible) in the 4S Process Microsoft Excel Spreadsheets, for determining scores for as many metrics as possible. Consistency in savings calculations, in conjunction with savings verification through pilot assessments, will boost confidence in ETP outputs and accelerate program throughput by reducing the time necessary to manually conduct data analysis. Further, such consistent documentation may prove valuable in the transition process as a starting point for the EEP to generate a technical work paper. Navigant recognizes that at times, a unique approach may be required for technologies with unique characteristics or if reliable data is not available, however, Navigant believes that the ETP can maintain consistency between analyses by developing a template that outlines the methodology.

- ***Technology Pilot Assessment Bypass Process***

  Finding:

  The ETP has not yet defined a process for bypassing pilot assessments for near-program-ready technologies, i.e., those that do not need independent testing before they are ready to be deployed in Nicor Gas's portfolio.

  Recommendation:

  Navigant recommends that the ETP design and implement a bypass procedure that identifies technologies in the ETP that can be promptly deployed in the EEP. The evaluation team expects that this should be straight forward to implement because it is primarily about how to identify near-program-ready technologies and about understanding the simplified process by which those technologies can be transferred to the EEP. In recent communications, the ETP stated that they are "currently implementing an 'engineering algorithm' approach for near program ready technologies to utilize existing validated datasets and bypass the need for its own pilot in the Nicor Gas ETP." The ETP's early awareness of the issue and prompt action to define this new process will help facilitate rapid technology deployment wherever possible.

4.2.5 Technology Deployment Findings

- ***Risk Mitigation in Technology Transfer/Deployment to EEP***

  Finding:

  The current transition process may be insufficiently well defined, potentially putting the success of each technology deployment in jeopardy. Few aspects of the transition have been defined and no specific individuals are assigned to manage the transition.

  Recommendations:

  Navigant recommends that Nicor Gas and the ETP consider assigning ultimate responsibility of technology transfer to a specific individual in the EEP (and a second individual within the ETP, if appropriate) to ensure that the process is appropriately managed and guided as necessary. Ideally, the EEP leader is involved with the technology as early as pilot assessment design. Having EEP/IC staff involved builds ownership and helps ensure that the pilot assessment addresses the core questions of the program people. Identifying a leader or champion with specific responsibilities can provide assurance that the transition will not stall or otherwise fail because the manager will be ultimately responsible over the success of the transition.

  Navigant recommends that the ETP consider more clearly defining a set of deliverables that the ETP will provide to the EEP IC that is to deploy the technology. The specific set of deliverables should provide comprehensive information transfer, containing all necessary information for the IC. A more clearly defined, robust set of deliverables can enhance the transition process and help ensure successful technology deployment. This can facilitate rapid incorporation into the rebate portfolio since all the necessary information on the technology will be included in one location.

- ***Market Assessment***

  Finding:

  Currently, ETP objectives and final deliverables put minimal focus on market factors for each technology. Understanding the market is fundamental to successfully identifying and deploying new technologies for the EEP.

  Recommendation:

  Navigant recommends that the ETP consider adding a focused market/business assessment, based on any lessons learned as part of the technology evaluation and pilot assessment, as a deliverable at the completion of a technology assessment for use by the EEP IC(s) that will be deploying the measure. The beginnings of such an assessment, including discussion of the ease of market implementation/adoption and technology maturity, are included in the PAP, which the ETP completes prior to each pilot assessment. A focused market/business assessment could additionally capture the value proposition, target customer/market, customer need, key benefits, barriers to adoption, and primary differentiation. The information needed for this level of basic market assessment should be gathered through any available previously conducted research, any relevant findings from the pilot, and through discussions with the EEP ICs that are familiar with the target market(s).

  By adding a market/business assessment, the EEP may be able to capitalize on the ETP's extensive institutional knowledge on each technology. While the EEP ICs are knowledgeable in the markets in which they work, the ETP is best suited to provide insights into the new technologies, thereby facilitating the development of a stronger business plan for the EEP to implement. This market/business assessment may enable a rapid transition, and provide the best opportunity for success.

5. Appendix

5.1 VDDTSR Memorandum

To: Janet Lynch-Eisenhut (WECC), Doug Kosar (GTI), Scott Dimetrosky (Apex), Jim Jerozal (Nicor Gas)

Copy: Jennifer Hinman (ICC), David Brightwell (ICC), Dan Rourke (Nicor Gas), Ted Weaver (First Tracks), Julianne Meurice (Navigant), Randy Gunn (Navigant)

From: Matt Guernsey (Navigant)

Date: August 2, 2012 (Revised for inclusion in Final EM&V Report Appendix)

Re: Verification, Due Diligence and Tracking System Review (VDDTSR) of Nicor Gas' Emerging Technology Program

The Emerging Technology Program (ETP), a program within Nicor Gas' Energy Efficiency Program (EEP), is unique in that it does not deliver products or services to customers in the typical fashion for an EEP. Instead, the program delivers recommendations and supporting datasets to the EEP for new technologies to be integrated into the program portfolio. The program's stated objective is to:

> "Identify emerging technologies and/or practices that are new or underutilized and have the potential for energy savings and possible future integration into the Nicor Gas energy efficiency program (EEP). ETP will achieve energy savings while being transparent, cost-effective, scalable, and developing the needed data to transition measures into the EEP."

If successful in achieving goals, the ETP facilitates expansion of the EEP and improvements to program offerings.

This document provides the results from our review of the tracking system and quality control processes for Nicor Gas' ETP. Typically, the VDDTSR also documents EM&V savings verification; however, the entire ETP is an exercise in savings quality control and verification of manufacturers' claimed savings. As such, Navigant will include evaluation of verification activities as part of the final evaluation report.

The primary areas of inquiry for this memo were to determine whether:

- Appropriate tracking is in place that facilitates both program operations and EM&V activities
- QA/QC processes are appropriate and sufficient for accurate technology analysis

The ETP was not initiated until midway through Gas Program Year 1 (GPY1), so ETP efforts have focused on program design and the team is still in the early stages of program implementation. By the end of GPY1 (May 31, 2012), the ETP had accepted 21 applications for new emerging technologies and processed the technologies through their "4S: Ready Set Go" screening, scoring, and selection system. The ETP identified 11 of the 21 technologies for potential further evaluation and expects to initiate pilot assessment projects to validate energy savings for a still-undetermined subset of these technologies.

Accordingly, this review is based primarily on design intent of the program, with very little implementation experience to evaluate. This memo defers to GPY2 on inquiry of the following items, which are typically included in the GPY1 VDDTSR:

- Whether appropriate eligibility criteria have been properly adhered to and applications are appropriately reviewed
- Whether project scoring and evaluation information was entered in an accurate manner in the tracking system, including accurate calculation of scored criteria
- Whether verification activities and processes provide the necessary rigor for preparing a technology to transition to the EEP
- Whether savings were calculated correctly for ETP pilot assessment projects

5.1.1 Overview of Findings

5.1.1.1 Due Diligence

The ETP conducts their own savings verification and due diligence (VDD) in two stages: during the 4S Selection Process to determine the validity of manufacturer claims and develop independent savings estimates, and then again during technology pilot assessments to collect primary data on each technology. The ETP did not fully complete either verification step by the end of GPY1, so Navigant will conduct comprehensive review of the implementation of these procedures in GPY2 and GPY2.

Much of the VDD review in GPY2 and GPY2 will confirm the validity of in-place QA/QC practices. However, based on review of existing QA/QC documentation it appears that the ETP has articulated the necessary processes to an appropriate level of rigor given the unique characteristics of each technology evaluation.[6] Two important QA/QC activities that ETP has articulated to enable rapid and error-free identification of top technologies include:

1. Automated filtering of technology applications, where possible, to quickly screen out unviable technologies without excessive staff time investment
2. Clearly characterized screening metrics to facilitate identification of top technologies that could be beneficial to the EEP portfolio

5.1.1.2 Reporting and Tracking

The ETP expects to use Nexant's TrakSmart tools to track program activities. However, Nicor Gas had not yet scheduled the ETP for training by the end of GPY1. Accordingly, ETP staff uses their own excel-based tracking tools, and expands these tools only on an as-needed basis. Presumably, ETP staff will have to work with Nexant to tailor TrakSmart to better suit the unique structure of the ETP. In June 2012 the ETP met with Nicor Gas personnel to discuss TrakSmart capabilities. After additional training in August 2012 the ETP can begin planning a comprehensive and long-term tracking system.

Review of the existing tracking system, though not comprehensive, gives insights into how the ETP may implement a long-term tracking solution. The ETP's current tracking spreadsheets are structured to

[6] Review of QA/QC documentation focuses on the ETP document titled: "GTI 21279 Nicor Gas ETP QA-QC Plan to WECC 02-16-12"

mirror the 4S Selection process steps. The ETP creates a new "4S Summary Spreadsheet" workbook for each technology, starting upon receipt of the technology application. This tracking workbook then follows the technology through the evaluation process.

5.1.1.3 Summary of Recommendations

Based on review of the ETP's planning documents[7], the current tracking system implementation, and general best practices for program management[8], Navigant offers the following observations and recommendations:

- *Quantitative scoring documentation* - The 4S Summary Spreadsheet does not include templates for calculating the quantitative scores. Instead, it is up to the ETP staff to calculate each value and input it into the spreadsheet. The ETP uses these calculations to evaluate the technology's value to Nicor Gas' portfolio and to verify manufacturer-claimed savings within Nicor Gas' service territory.

  Navigant recommends including pre-established methodologies and algorithms (and calculations, where possible), for determining scores for as many metrics as possible. For example, to determine cost-effectiveness, the 4S Summary Spreadsheet could include inputs for material and labor costs, then use the gas savings estimates to calculate the simple payback period and return on investment, both of which are used to determine the cost-effectiveness score. Navigant recognize that at times, a unique approach may be required given the characteristics of the technology or the availability of reliable data; however, Navigant believe that by developing a template that outlines the methodology (which ETP personnel expect to deliver in GPY2/GPY2), the ETP can maintain consistency between each analysis. Consistency in savings verification will boost confidence in ETP outputs and accelerate program throughput.

- *Central tracking and reporting automation* - The ETP's detailed technology tracking does not currently extend beyond the 4S selection process. Further, the high-level monthly Project Scorecard, which ETP uses to communicate program progress to Nicor/WECC, must be created manually each month.

  Navigant recommends that, as the ETP transitions to a long-term tracking solution, the ETP employ a central, detailed tracking mechanism that extends from application submission to technology transfer to EEP (or rejection from further analysis). The monthly Project Scorecard and other deliverables should be dynamically linked to such a system to automatically aggregate reporting information, wherever possible. This avoids undue errors in manually transferring information and reduces preparation time.

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[7] The ETP documents tracking-system planning in multiple documents, including: "Nicor Gas ETP Program Operations Manual Final to WECC 03-29-12," "Nicor ETP Screening Scoring and Selection System Final to WECC 03-19-12-MT CORRECTION," and "Nicor ETP Project Implementation Guidelines Final to WECC 03-29-12"

[8] Evaluation of Emerging Technology Programs, as part of utility Energy Efficiency Programs, is relatively new, and few best-practices exist outside of typical program-management practices. The Benchmarking section provides details on applicable best practices for energy efficiency programs.

- *Key Performance Indicator (KPI) tracking* - The ETP defined seven KPIs for GPY1 to quantify program performance. The KPIs were generally difficult to quantify, and were focused solely on project management activities.

  Navigant recommends adding and tracking additional KPIs that monitor quantifiable performance relative to ETP-specific objectives (i.e., to identify top emerging technologies). The ETP is already in the process of developing draft KPIs for GPY2/GPY2, and will work with Navigant for feedback and recommendations on specific KPIs to incorporate as the program moves forward.

5.1.2 Data Collection

For this VDDTSR, the evaluation team relied on in-depth interviews with program and implementation staff and review of program process documentation, including the:

- ETP Program Operations Manual
- Screening, Scoring and Selection System
- Nicor Gas ETP QA-QC Plan
- 4S Summary Spreadsheet template (blank)
- Nicor Gas ETP Project Scorecard template (blank)

The ETP has completed draft versions of both the 4S Summary Spreadsheets and the Nicor Gas ETP Project Scorecard, but did not provide versions of these or any other program implementation deliverables for review because the documents are not yet finalized. Accordingly, data collection focused solely on design documentation and tracking plans. For the GPY2/3 evaluations, the VDDTSR will focus primarily on the following key program implementation deliverables:

- A sample of technology applications, as documented in completed 4S Summary Spreadsheets
- A sample of monthly ETP Project Scorecards (including the most recent)
- All tracking system components

In addition to tracking-system-design evaluation, as documented here, such additional documentation will enable the GPY2/3 VDDTSR to cover comprehensive ETP due diligence on in-process technology assessments and review of a more comprehensive and long-term tracking system.

To conduct the best practices benchmarking assessment of the tracking system, the evaluation team consulted the *Best Practices Self-Benchmarking Tool* from the *National Energy Efficiency Best Practices Study*.[9] This memo does not document a verification benchmarking assessment because technology savings verification is a primary function of the program itself which Navigant will evaluate in the GPY1 evaluation final report.

[9] "Best Practices for Energy Efficiency Programs" benchmarking tool is available at: http://www.eebestpractices.com/benchmarking.asp

5.1.3 Review of Program Operating Procedures and Tracking System

The evaluation team examined the operating procedures and tracking system used by Nicor Gas' ETP to process new emerging technology applications. The program documentation provides detailed procedures and a flow diagram (see Figure 5-) of the following steps in the process:

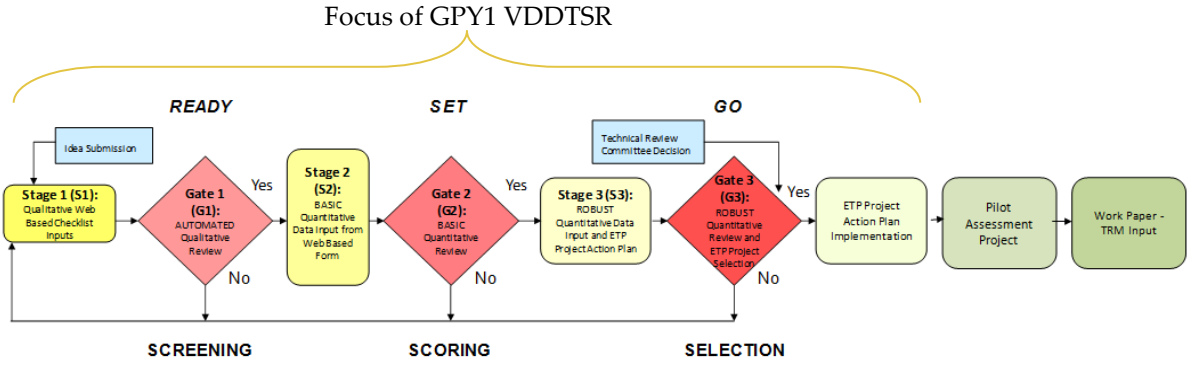
Completed in GPY1:

1. Communications and Outreach (omitted from ETP flowchart Figure 5-)
2. Idea (application) submission
3. Screening (4S process)
4. Basic quantitative data input
5. Scoring (4S process)
6. Robust quantitative data input
7. Selection (4S process)
8. Project Action Plan (PAP) creation and technical review by committee

To be conducted in GPY2:

9. Pilot assessment project implementation
10. Reporting (e.g., Work Paper), and handoff to EEP

Figure 5-: Screening, Scoring, and Selection flowchart from ETP Documentation[10]



By the close of GPY1, the ETP had reached step 8: PAP creation and technical review by committee. Accordingly, the subsections below cover verification, due diligence, and tracking systems as they relate to steps 2 through 8 (omitting step 1 because it includes no relevant activities for the VDDTSR). The GPY1 process evaluation report will additionally include comprehensive assessment of the other steps, such as communications and outreach, and process design for those steps not yet implemented (i.e., pilot assessment project implementation, reporting and handoff to EEP).

5.1.3.1 Application Review

Any manufacturer or technology vendor is eligible to apply to, and participate in, the ETP with one or more technologies. Unlike other EEP programs, which provide rebates to Nicor Gas customers, the ETP

[10] Flowchart extracted from "Nicor ETP Screening Scoring and Selection System Final to WECC 03-19-12-MT-CORRECTION"

identifies technologies for use in the EEP, and therefore limits participation to any company that manufactures or sells an applicable energy efficiency technology (as also presented in the ETP promotional flyer).

The ETP closely evaluates each viable technology application, so quality control of each application is important to avoid wasting time and budget on technologies that should already have been screened out. At the close of GPY1, the ETP was implementing an automated quality assurance system, for GPY2 and beyond, which will notify applicants of missing or incorrect entries. For example, if a manufacturer applies to the ETP with a technology that provides electric savings, but no gas savings, the system will prevent further processing of the application because it does not meet fundamental project criteria. The ETP recognizes that such a system cannot prevent all incorrect entries – only those which are blatantly incorrect or do not meet program criteria.

The application process must inherently rely heavily on trust in each applicant's inputs to avoid overlooking a potential viable technology due to poor application quality. The ETP staff believes that this system could lead to 'gaming' of the system, i.e., submission of incorrect information/data solely to advance in the automated screening process. The ETP views this as unavoidable to a certain extent, and will be vigilant in their review of applications to quickly identify such information.

As part of the "Go" stage of the 4S process, the ETP conducts extensive quality control in the form of rigorous quantitative secondary research and analysis of each technology. They use literature review and engineering analysis to validate claimed costs and savings. This ensures that their decisions on which technologies to further evaluate are based on concrete, accurate data. The individual QA/QC steps vary depending on the technology under investigation.

5.1.3.2 Tracking System

As described in "Overview of Findings," above, the ETP expects to transition to an EEP-wide tracking platform by Nexant called TrakSmart for comprehensive tracking during GPY2 and beyond. Given this process is still in transition, the ETP has developed tracking processes on an as-needed basis, and does not utilize a centralized technology tracking system.

Currently, the ETP employs "4S Summary Spreadsheets" in excel for tracking individual project progress. This tracking is limited to the 4S process, and does not cover any pilot assessment activities. Each workbook is structured to mirror each 4S Selection process step. The ETP creates a new excel workbook for each technology upon receipt of the technology application. Each workbook includes the following worksheets:

- Ready Stage Responses
- Set Stage Data Inputs
- Set Stage Scoring Summary
- Go Stage Scoring Summary
- Criteria Definitions

The 4S Summary Spreadsheet documents the technology scoring criteria and the actual scores, but does not track the calculations and assumptions used to determine many of the scores. ETP calculates the inputs elsewhere and copies the necessary outputs into the 4S Summary Spreadsheet.

As their primary program-level tracking document, the ETP currently uses a monthly "Project Scorecard" that "provides a high-level summary that allows users to quickly locate important and salient project information."[11] It serves the needs of what the program documentation describes as "a master summary sheet that will include project ID, their location within the 4S process, results from each gate/decision, dates of key decisions, and reasons for removal of the submission from consideration, if applicable".[12]

The Project Scorecard includes tracking of many key metrics, including:

- *4S data:* Title, application submission date, stage completion dates, cause of failure to proceed(if applicable), if ETP recommends pilot testing, if the Technical Review Committee has reviewed the Project Action Plan, and if the project will proceed to pilot testing
- *Pilot data:* Title, location, pilot test dates, project size, savings, and result dissemination channels
- *Summary metrics:* Number of technologies that have completed the following activities: application, each stage of the 4S, pilot testing, and transition to EEP

To date, ETP has created this scorecard manually by aggregating data from each technology's 4S Summary Spreadsheet. As the program grows, manual scorecard generation may prove to be a potential source of error and undue effort to complete. At that time, the implementation of a more robust "master summary sheet" will become necessary.

5.1.4 Reporting and Tracking Benchmarking

To conduct the best practices benchmarking assessment, the evaluation team compared the ETP practices (shown in bullet form) with the "Reporting and Tracking Best Practices" portion of the *Best Practices Self-Benchmarking Tool*[13] from the *National Energy Efficiency Best Practices Study,* which are the numbered items in italic font. Given the nature of the ETP program, Navigant excluded best practices that do not apply, most specifically, the "Quality Control and Verification" portion which EM&V reports typically reference.

Table 5- summarizes the scores as determined by the Self-Benchmarking Tool criteria in the "Reporting and Tracking" section. Each practice is rated with one of three potential scores: Meets best practice, Needs some improvement, Needs significant improvement. Navigant recognizes that the ETP is still in its infancy, and accordingly, this review is based on rapidly changing tracking and reporting processes.

[11] From "Nicor Gas ETP Program Operations Manual Final to WECC 03-29-12" under "Reporting: Project Scorecard."
[12] From "Nicor ETP Screening Scoring and Selection System Final to WECC 03-19-12-MT CORRECTION," page 10, under 4S Process Details: Recordkeeping.
[13] See the Best Practices Self-Benchmarking Tool developed for the Energy Efficiency Best Practices Project: http://www.eebestpractices.com/benchmarking.asp.

Table 5-: Reporting and Tracking Benchmarking Scores

ID	Best Practice	Score*
1	Define & identify key information needed to track & report early in program development	Needs some improvement
2	Clearly articulate the data requirements for measuring program success	Needs some improvement
3	Design program tracking system to support requirements of evaluators as well as program staff	Needs some improvement
4	Use Internet to facilitate data entry & reporting; build in real time data validation systems	Meets best practice
5	Automate, as much as is practical, routine functions (e.g., monthly program reports)	Needs some improvement
6	Develop electronic application processes	Meets best practice
7	Develop accurate algorithms & assumptions on which to base savings estimates	Needs some improvement
8	Conduct regular checks of tracking reports to assess program performance	Meets best practice
9	Balance the level of tracking planned against program resource availability	Meets best practice
10	Document tracking system & provide manuals for all users	Needs some improvement

1. *Define & identify key information needed to track & report early in the program development process*
    - The ETP clearly laid out necessary metrics in the Project Scorecard to monitor throughout the 4S selection process. Plans for additional information tracking during pilot assessment testing are less clearly defined, partly due to the fact that each pilot assessment project is a unique activity.

2. *Clearly articulate the data requirements for measuring program success*
    - In lieu of established therm savings goals, which, in the conventional sense, are not practical in an emerging technology program, the ETP has seven Key Performance Indicators (KPI), scored on a 0-5 scale, for measuring program performance relative to contractual obligations (focused on GPY1 program design).
    - The KPIs include work product timeliness and quality, schedule and budget, process development, process integrity, project progress, project diversity, and safety. These KPIs are difficult to quantify in some cases, but perhaps more importantly, do not indicate performance relative to the program's objective. The ETP is currently in the process of developing new KPIs for the implementation phase of the program in GPY2/3 that better track performance relative to program objectives. It is still to be determined whether the new KPIs include sufficient data requirements to measure program success.

3. *Design program tracking system to support the requirements of evaluators as well as program staff*
    - The long-term tracking system is still in development. The current, temporary tracking system does not comprehensively track activities beyond the 4S Selection Process (e.g., pilot assessment projects), nor does it document progress toward program KPIs.

- The ETP documents progress on some key metrics in the monthly scorecard deliverable, but they do not currently monitor ongoing progress in a centralized tracking system.

4. *Use Internet to facilitate data entry & reporting; build in real time data validation systems that perform routine data quality functions*
   - The ETP conducted GPY1 data entry manually. Starting in late GPY1 (May 2012), they published the live application process on the Nicor Gas website. The system facilitates application validation by notifying applicants promptly of missing or incorrect data, thereby alleviating some manual review by ETP staff.

5. *Automate, as much as is practical, routine functions (e.g., monthly program reports)*
   - Monthly reports are not automated. While the ETP has limited options for automation due to the unique nature of most deliverables and activities, the monthly Project Scorecard is a good candidate for automation. The new tracking system, to be implemented in PY2, may provide ample opportunity for automating routine functions.

6. *Develop electronic application processes*
   - The electronic application went live on the Nicor Gas website in late GPY1 (May 2012). As such, the ETP processed the first set of technologies manually. The first complete test of the electronic process will come with GPY2 technology applications.

7. *Develop accurate algorithms & assumptions on which to base savings estimates*
   - As of the close of GPY1, the ETP was still in the process of finalizing savings estimates for the top selected technologies. Of 21 technology applications, ETP evaluated 11 in depth. The ETP has not completed this evaluation.

8. *Conduct regular checks of tracking reports to assess program performance*
   - The ETP IC meets twice monthly with the WECC program manager for regular status updates. The ETP submits monthly Project Scorecards to concisely present the progress on technology evaluations, including both the 4S process and pilot assessment projects.

9. *Balance the level of tracking planned against program resource availability*
   - The ETP has appropriately balanced the need for tracking with resource availability. As this program has a smaller volume of applications than the typical Energy Efficiency Program (i.e., with rebate applications), the tracking needs are reduced. The ETP has adjusted accordingly, focusing up front instead on processes.

10. *Document tracking system & provide manuals for all users*
    - The ETP has not fully documented their tracking system as their tracking system is currently a temporary solution until TrakSmart is implemented (see Summary of Findings, above).

See "Overview of Findings: Summary of Recommendations" on page 3, above, for a list of recommendations from these findings.

5.2 *Logic Model and Program Theory*

5.2.1 Program Theory

Program theory is essentially a structured description of the various elements of a program's design: goals, motivating conditions/barriers, target audience, desired actions/behaviors, strategies/rationale, and messages/communications vehicles. The following subsections describe the Emerging Technology Program (ETP) in these terms.

5.2.1.1 Program Goals

The goal of the Nicor Gas ETP is to identify emerging technologies and/or new or underutilized practices that have the potential to save energy within Nicor Gas' energy efficiency program (EEP). ETP aims to provide Nicor Gas' EEP with sufficient information on identified energy savings opportunities for the EEP to incorporate the technologies into their portfolio of incentivized technologies. The ETP's ultimate outputs are the necessary data for transitioning technologies into the EEP. It is then the responsibility of the EEP and the implementation contractor for the relevant EEP program(s) to integrate the technology into their portfolio of technologies, including creation of technical work papers and other program-specific documentation.

5.2.1.2 Motivating Conditions/Barriers

Steadily tightening building energy codes and appliance efficiency standards improve overall energy efficiency of Nicor Gas' customer base, but in doing so they limit the energy savings that the utility can achieve through the EEP. As codes and standards improve, and as market penetration of high-efficiency technologies increases (and costs come down), the high-efficiency technologies become the new baseline, thereby requiring the utility to find new sources of energy savings to fill this gap and help meet their energy-savings targets. The ETP serves to identify emerging technologies that could feed the EEP pipeline. However, there exist several market barriers to widespread use of such emerging technologies, such as lack of a) reliable technical data, b) technology demonstration and development, and c) robust processes for screening best emerging technologies for future application in the EEP. ETP screens and demonstrates potential energy (natural gas) saving technologies to address these barriers, and provides EEP with the technical data and analysis necessary for implementing new technology measures.

5.2.1.3 Target Audience

There are two target audiences for ETP: stakeholders (upstream), and Nicor Gas' EEP staff and implementation contractors (downstream). The ETP reaches out to upstream stakeholders, both existing participants and potential participants, to solicit new technology ideas (in addition to utilizing the ETP team's own in-house emerging technology expertise). The downstream audience, Nicor Gas' EEP staff and implementation contractors, receives the energy savings data and information outputs from the ETP and incorporates the measure(s) into their portfolio. Awareness of EEP needs and regular communication with Nicor Gas' EEP staff and implementation contractors enable successful transition of technologies from the ETP to the EEP.

5.2.1.4 Desired Actions/Behaviors

The program encourages participation from potential stakeholders via application to the ETP with viable energy (natural gas) saving technologies, and/or practices. ETP screens technology applications to identify high-potential technologies. ETP encourages collaboration with selected applicants to further research and demonstrate energy savings within Nicor Gas' territory.

5.2.1.5 Strategies/Rationale

The program will identify potential future measures for Nicor Gas' EEP by broadly soliciting ideas, conducting rigorous quantitative review, selecting applications for pilot assessments, and sharing the results with EEP staff and implementation contractors and other key stakeholders to enable the transition of high quality emerging technologies to EEP.

In order to maximize the chances of project success, ETP provides support to applicants with viable technologies. ETP may provide program funding during pilot field testing, in the form of program staff time, contributions of materials, labor, and/or other project services, manufacturer discounts, and/or direct financial equipment buy-downs. In some cases, ETP may also offer incentives to encourage site-host participation; while pilot test hosts enjoy the benefit of energy savings, pilot assessments can also be intrusive due to installation, baseline and post-installation monitoring, and survey participation.

5.2.1.6 Messages/Communications Vehicles

To solicit technology applications from stakeholders, the ETP has a presence (with ETP/EEP personnel and/or informational literature) at trade shows, seminars, and other energy-efficiency-themed forums. Nicor Gas launched the ETP with an email to key stakeholders and presentations to trade ally groups, directing them to Nicor Gas' ETP website, and encouraging them to apply with any potential emerging technologies through Nicor Gas' online application system.

At each stage of the ETP's screening process, known as "4S: Ready, Set, Go", the ETP sends an email to applicants outlining the reason(s) that the application will or will not proceed to the next stage. Communication after the first (i.e., "Ready") stage is automated and based on simple, yes or no screening criteria. For technologies that make it to the scoring (i.e., "Set") stage, the ETP communicates with applicants via personalized emails and/or one-on-one meetings to obtain additional data, and to discuss potential future field testing. In the third (i.e. "Go") stage, the ETP communicates with the applicant the intent to prepare a pilot assessment Action Plan and present it to the Technical Review Committee for endorsement to move forward. In the pilot assessment, ETP facilitates specialized training and/or other communication on an as-needed basis depending on technology complexity, and communicates the demonstration project progress and outcomes through progress reports, a final report, presentations, papers, and/or articles.

The ETP has implemented a formal feedback loop for the program. After both the "Ready" (if screened out) and "Set" stages of the 4S process, and then again after the pilot assessment, the ETP will conduct a survey of applicants to obtain feedback on the application process. The first two feedback forms have quantitative questions with scores between 1 and 5, as well as open-ended questions with suggestions for process improvement.

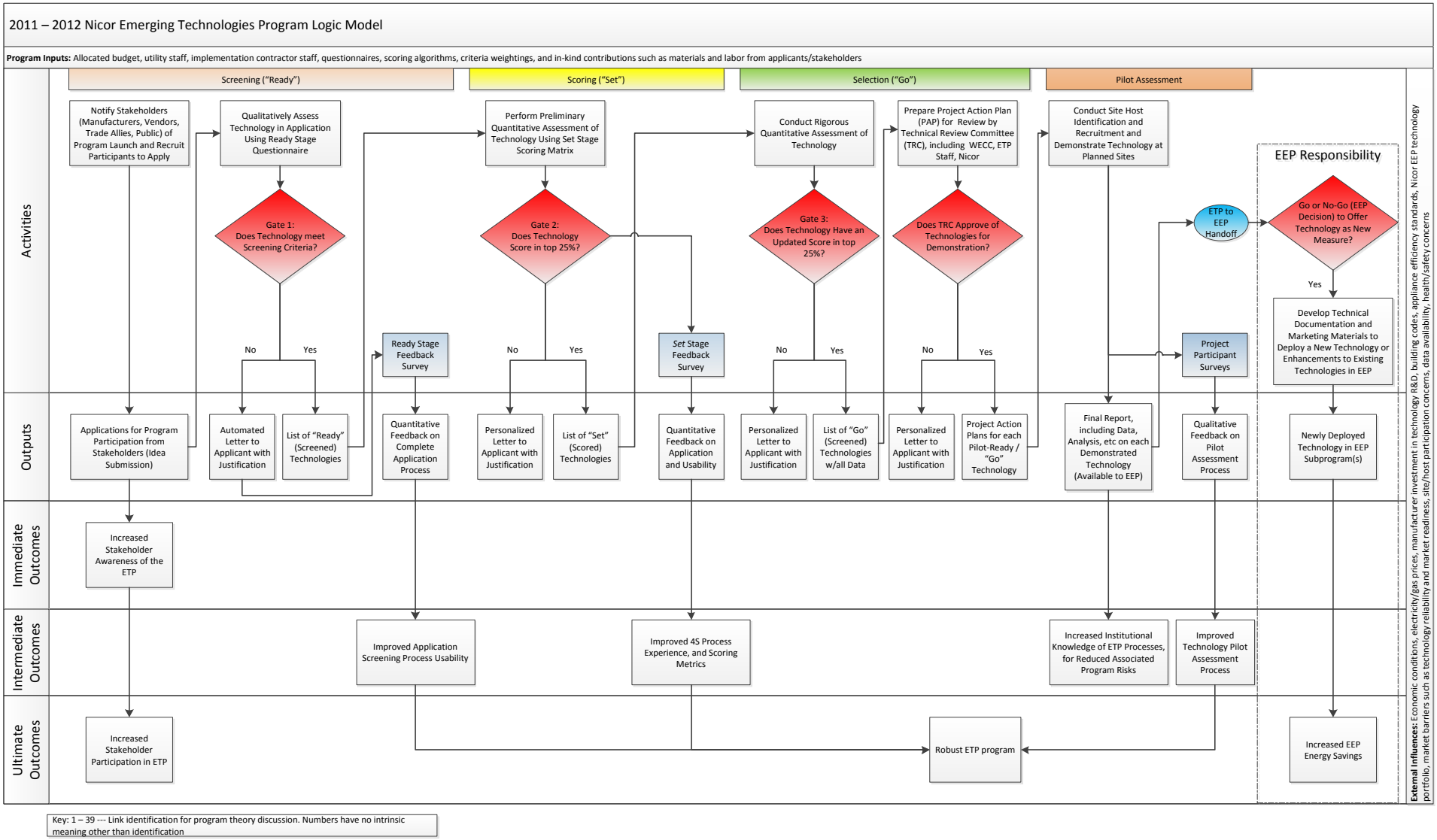
After completion of the pilot assessment phase, the applicant feedback form will be qualitative and focus on the ability to improve the pilot testing process.

5.2.2 Program Logic Model

The following section describes how the ETP activities lead to achieving the program goal of identifying viable emerging technologies and developing the needed data to transition technologies into the EEP. Figure 5- presents the Nicor Gas ETP logic model diagram showing the linkages between activities, outputs and outcomes, and identifying potential external influences. The diagram presents the key features of the program.

The remainder of this chapter presents the resources, activities, outputs, outcomes and associated measurement indicators associated with ETP. Tables in the subsections below include detailed descriptions of the logic model components.

Figure 5-: Program Inputs and Potential External Influences



5.2.2.1 Resources

The ability of the ETP to successfully generate outputs depends in part on the level and quality/effectiveness of inputs (resources) that go into these efforts. The program budget supports the contract administration, communications, program development, pilot project selection, pilot project implementation and management, and project measurement & verification activities. The budget also supports limited site host incentives, and funds to help purchase equipment or partially fund installers for pilot testing. Table 5- shows key program inputs and potential external influences.

Table 5-: Program Inputs and Potential External Influences

Program Inputs
• Nicor Gas ratepayer funds (i.e., ETP budget) • Qualitative questionnaire, scoring algorithms and criteria weightings used in *4S: Ready, Set, Go* technology selection process • Nicor Gas, ETP, and WECC staff resources, knowledge and program management experience • ETP collaboration with Nicor Gas EEP implementation contractors, other utility EEP staff , and external stakeholders to foster identification of emerging technologies • Technical Review Committee review of 4S findings and recommendations for pilot projects • ETP implementation contractor (IC) staff resources and program implementation experience • In-kind contributions such as materials and labor from applicants, and other stakeholders during technology demonstration
External Influences and Other Factors
• Current economic conditions • Electricity and gas prices • Manufacturer, and trade ally investment in technology research and development • Building codes and appliance efficiency standards • Existing Nicor Gas EEP technology portfolio • Ability to identify host-site for pilot assessment, and host-site willingness to facilitate processes and work with ETP • Market barriers such as: ➢ Reliability / market readiness of technologies ➢ Site/host participation concerns (e.g., extent of site intrusion during field testing phase) ➢ Extent of available and verifiable data on emerging technologies ➢ Health and safety concerns for technology demonstration

5.2.2.2 Activities

The purpose of the ETP is to identify technologies and/or practices that are new or underutilized and have the potential for energy savings and possible future integration into the Nicor Gas Energy Efficiency Program (EEP). This requires maximizing stakeholder participation in the program and also developing an efficient technology selection and data collection process that is transparent, cost-effective, and scalable.

Table 5- outlines the key program activities, including:

- Communicating program availability to stakeholders to recruit applicants to participate in the program
- Conducting qualitative assessment of the technology (Ready Stage)
- Performing preliminary quantitative assessment of technology using a scoring matrix (Set Stage)
- Conduct rigorous quantitative assessment of technology, and prepare a Project Action Plan (PAP - outlines the steps to complete pilot assessment, including a timeline, budget estimate, and other planning details) for review by Technical Review Committee (TRC), made up of WECC and Nicor Gas staff (Go Stage)
- Demonstrate the selected technology and prepare project report(s) to document the performance of the technology in a format directly compatible with WP/TRM documentation requirements

Table 5-: Emerging Technology Program Activities

Notify Stakeholders of Program Launch and Recruit Participants to Apply to the ETP
• Distribute one-page e-mail to key, previously-identified stakeholders to solicit applications
• Announce program kick-off on both Nicor Gas' public website and IC website(extranet), including complete details and link to application system
• Present at regional and national conferences, as well as trade shows
• Sponsor an open-forum for applicants to present their technology to an audience through a five-minute presentation (Proposed but not yet implemented as of the close of PY1)
Conduct Qualitative Assessment of the Technology (Ready Stage)
• Screen technologies via web-based qualitative screening process using basic yes/no questions; assesses preliminary technology readiness, energy savings, and potential market barriers
• Automatically send email to applicants – inform unsuccessful applicants of key areas of concern, and inform successful applicants of the next steps in the process
• Collect responses from online Feedback Survey for feedback on application screening process and usability (unsuccessful applicants only)
• Track response rates from communications activities
Perform Preliminary Quantitative Assessment of Technology (Set Stage)
• Collect additional technology information from applicant
• Collect responses from online Feedback Survey for feedback on application screening process and usability
• Assess applications quantitatively, based on a pre-determined scoring matrix that scores each question on a rating of 1 to 5 and determine a final score with appropriate weighting to each question.
• Provide email response to unsuccessful applicants stating justification

Conduct Rigorous Quantitative Assessment of Technology (Go Stage)
• Conduct an in-depth applicant data review using third party data sources for verification • Re-assess the application using scoring matrix (values entered by ETP staff) in the Set stage • Prepare a Project Action Plan (PAP) for review by the Technical Review Committee (TRC) if technology nominally scores in the top 25% of the currently assessed technologies, or as ETP budget constraints dictate • Obtain approval for creating a demonstration project for technology from Technical Review Committee(TRC), made up of Nicor Gas and WECC staff • Provide email response to unsuccessful applicants stating justification
Perform Technology Pilot Assessment and Prepare Project Report(s)
• Using PAP pilot site criteria, recruit site participants in coordination with Nicor Gas and other EEP ICs and obtain site host "buy in" for technology assessment • Manage pilot assessment logistics, and day-to-day activities, data collection, and QA/QC of data • Identify market barriers, and/or other issues observed during pilot assessment process • Present pilot assessment project results in a project report, or some other presentation form to EEP staff • Hand-off all collected data to EEP staff to prepare technical and marketing/communications materials for technology • Collect responses from Feedback Survey for feedback on the technology pilot assessment process

5.2.2.3 Outputs, Outcomes and Associated Measurement Indicators

The following section distinguishes between outputs and outcomes. In this document, outputs are defined as the immediate results from specific program activities. Examples for this program would be the list of technologies obtained from applications, technologies identified in each stage of the selection process, or the results obtained from technology demonstration projects.

Outcomes are distinguished from outputs by their less direct (and often harder to quantify) results from specific program activities. Outcomes represent anticipated impacts associated with Nicor Gas' ETP activities and will vary depending on the time period being assessed. Program activities will lead to immediate outputs that, if successful, will collectively work toward achievement of anticipated intermediate and ultimate program outcomes.

The following tables list outputs (Table 5-) and outcomes (Table 5-) directly taken from the logic model and associated measurement indicators for the program evaluators. For each key performance indicator, the table presents a proposed measurement data source or collection approach. These metrics will not be evaluated in PY1.

Table 5-: Program Outputs, Associated KPIs and Potential Data Sources

Program Outputs from Logic Model	Key Performance Indicators for Program Evaluators	Data Sources and Potential Collection Approaches
Applications for program participation from stakeholders	Number of applications	Complete list of technologies from applications including end-uses & applicable sectors
	Application diversity across end-uses and sectors	
List of "Ready" (screened) technologies with application information	Quality of applications based on percentage that clear "Ready" screening stage	Number of technologies that pass "Ready" stage
List of "Set" (scored) technologies	None at this time	
List of "Go" (screened) technologies	None at this time	
Project Action Plans for pilot-ready technologies	Number of PAPs presented to Technical Review Committee (TRC)	Program Tracking - Complete list of PAPs
	Value to portfolio of PAP-technologies based on review of technical/economic savings potential	Sample of PAPs presented to TRC
Final report, including performance results, documents, and data for demonstrated technology (available to EEP team)	Number of technology demonstration projects completed	Program Tracking - Complete list of technologies with completed pilot assessments
	Accuracy of 4S screening results, based on comparison of expected annual therm savings results (pre-pilot) to final results (post-pilot)	Sample of pilot assessment results/final report
Letters to applicants with justification for rejection of technology	Quality of applications based on number of reasons for rejection (per technology) and frequency of individual reasons (portfolio-wide)	Complete list of reasons for rejection decision on rejected technologies
Quantitative applicant feedback from 1."Ready" stage survey 2."Set" stage survey	Average scores for survey questions	Applicant feedback survey results
Qualitative applicant feedback after pilot assessment	None at this time	
Newly deployed technologies in EEP (EEP responsibility)	Number of ETP-demonstrated technologies transferred to EEP	Program Tracking – List of technologies transferred
	Number of ETP-demonstrated technologies deployed in programs	Program Tracking – List of technologies deployed

Table 5-: Program Outcomes, Associated KPIs and Potential Data Sources

Outcomes from Logic Model	Key Performance Indicators for Program Evaluators	Data Sources and Potential Collection Approaches
Immediate Outcomes		
Increased stakeholder awareness of ETP	Change over time in stakeholder awareness	Qualitative interview with ETP and program administrator
Intermediate Outcomes		
Improved application screening process usability	Change over time in "Ready" stage survey scores	"Ready" stage feedback survey results
Improved 4S process applicant experience, and scoring metrics	Change over time in "Set" stage survey scores	"Set" stage feedback survey results
Improved technology pilot assessment process	Change in number over time of areas of high performance (and underperformance) as identified through qualitative pilot feedback surveys	Sample of qualitative pilot assessment feedback surveys or aggregated results
	Change in number over time of pilot assessment projects completed (including, if available, number completed on time and on budget)	Sample of technology PAPs and pilot assessment reports (for the same technologies)
Increased institutional knowledge of ETP processes, for reduced associated program risks	ETP output quality, based on percentage of ETP-piloted technologies transferred to EEP and deployed in programs	Program Tracking – List of technologies transferred to EEP and, if different, list of technologies deployed
Ultimate Outcomes		
Increased stakeholder participation in ETP	Change over time in number of technology applications	Program Tracking – Complete list of technologies from applications
Robust ETP Program	Change in technology performance in ETP pilot assessment compared with EEP-deployed performance	ETP and EEP Program Tracking – Savings for a sample of deployed technologies
Increased EEP energy savings	Therms saved for each deployed ETP technology	ETP and EEP Program Tracking – Savings for deployed technologies