City of Holland

Home Energy Retrofit Pilot Program Plan

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Schneider Electric

Table of Contents

City of Holland
Home Energy Retrofit
Pilot Program Plan

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Acknowledgements

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DOCUMENT ACCEPTANCE and RELEASE NOTICE

This is Version 2013.a of the Home Energy Audit Pilot Program Plan.

The Pilot Program Plan is a managed document. Recipients should remove superseded versions from circulation. This document is authorized for release once all signatures have been obtained.

PREPARED:_____DATE: _2_/28_/_13_

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ACCEPTED:_____DATE: ___/___/___

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Introduction and Summary

Document Purpose

The Pilot Program Plan (PPP) is the operational document for the project. It is owned, maintained and utilized by the Program Manager and Project Team to support the delivery of the agreed project outputs. The PPP is the responsibility of the Program Manager and is the 'road map' enabling the effective conceptual planning and execution of the PPP.

Intended Audience

This document is intended for review by City of Holland public officials and administration, the HPBW board and administration, and the CEP Task Force (s). It is not a private document, but it is also not intended to serve as a widely circulated public document.

- Knowledge of the CEP and the HER scale project recommendations is assumed;
- As the PPP proceeds through a series of iterations during the life of the program (e.g. after each phase), its structure, emphasis and intended audience may change.

Project Outputs

Output	Description
A. HER Pilot Program Audit Pool	One-hundred (100) Homes will be selected and Home Energy Audits will be performed on them.
B. Communication and Marketing Plan	A communication and branding strategy will be created that will focus on the HER Pilot Program but also the larger overall energy stewardship identity of Holland
C. HER Pilot Program Execution	A goal of Ninety (90) % or more homes from the Program Audit Pool will be retrofitted.

Overview

The Pilot Program Plan is a “road map” to be used by the Pilot Project Team to deliver the agreed upon program outputs. It outlines the steps required of the City, Program Manager, Project Team and the key stakeholders. A Pilot Program Plan is developed to explain recommended next steps in delivering a comprehensive Home Energy Retrofit program for the City of Holland. There is still a great amount of information that is unknown regarding the final Project Plan. The following planning resources are highlighted in this Pilot Program Plan:

- proposed execution steps and schedule;
- audit and planning recommendations;
- quality procedures;
- construction development overview;
- reporting and labelling procedures;
- communication and marketing strategy
- pilot program budgets; and
- theoretical micro-assessment

This document provides recommendations regarding the most efficient path forward for the successful execution of the Pilot Program Plan. Success will be defined by the accomplishment of the key objectives as described to the Project Team in the specification documents and stakeholder meetings. These key objectives are described in the following Summary.

Summary of Objectives

Schneider Electric has been engaged with the City of Holland for approximately 60 days prior to submittal of this Pilot Program Plan. Several meetings were held with the HER Task Force and goal sessions were conducted.

As a result of these meetings, this plan will focus on the accomplishment of the below three (3) primary objectives:

- **Dynamic Energy Reduction**
- **Comprehensive Participation**
- **Application of Community Values**

HER Pilot Program Targets

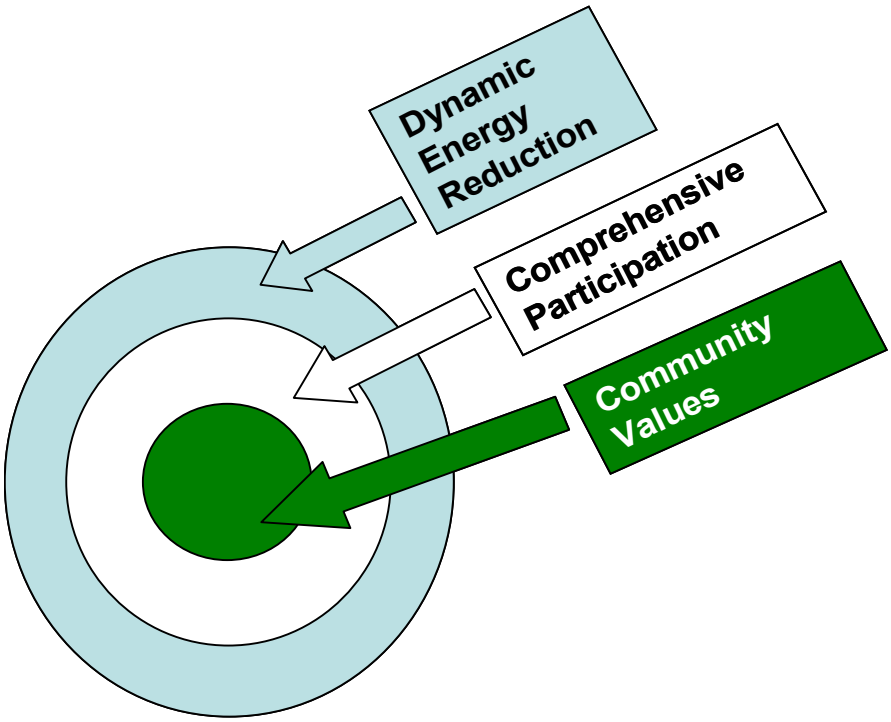


Diagram 1a

The Diagram 1a above details the objectives of the HER program. It is expected that successful execution of the Pilot Program Plan will result in the overall success of achieving the above objectives.

Dynamic Energy Reduction

The development of this PPP is one of the outcomes of the larger Community Energy Plan. Thus, substantial energy reduction throughout the city is a primary goal of the Home Energy Retrofit (HER) program. However, it is clear that the HER program must have a greater focus than just overall energy reduction. Residences are consumers of energy in Holland; but they are not the largest consumers. Therefore, if simple energy reduction impact was the sole objective of the plan, residences would not be the primary target. It should be understood that the HER Pilot Program is one of many scale projects being undertaken by the City of Holland as an implementation of the Community Energy Plan. As such, the objectives of the HER program go beyond energy reduction, and involve community participation in a common goal. A benefit of the HER program is that it has the ability for the city (and associated stakeholders) to interact and impact every resident.

The goal of the Pilot Program Plan is to get the homes involved in the pilot to rank in the top twenty (20) % of homes in the US for efficient energy use. A benchmark for the improvement is the DOE Home Energy score. The below table (1a) provides a snapshot of the projected impact of the Pilot Program Plan.

Random Sample of 100 Homes	DOE Home Energy Score	DOE Home Energy Score Goal	Improvement
10 Homes	1	8	70%
10 Homes	2	8	60%
10 Homes	3	8	50%
10 Homes	4	8	40%
10 Homes	5	8	30%
10 Homes	6	8	20%
10 Homes	7	8	10%
10 Homes	8	8	<20%
10 Homes	9	8	<10%
10 Homes	10	8	Minimal

Table 1a

While the final homes retrofitted will not align perfectly with the above projection, it is provided to show that there will be a diversity of the types and costs of improvements in each residence. It is likely that homes with the most room for improvement will require a mixture of conservation improvements. Homes that are already near the top will typically require less overall investment since outlay in energy related improvements have, on average - already been performed.

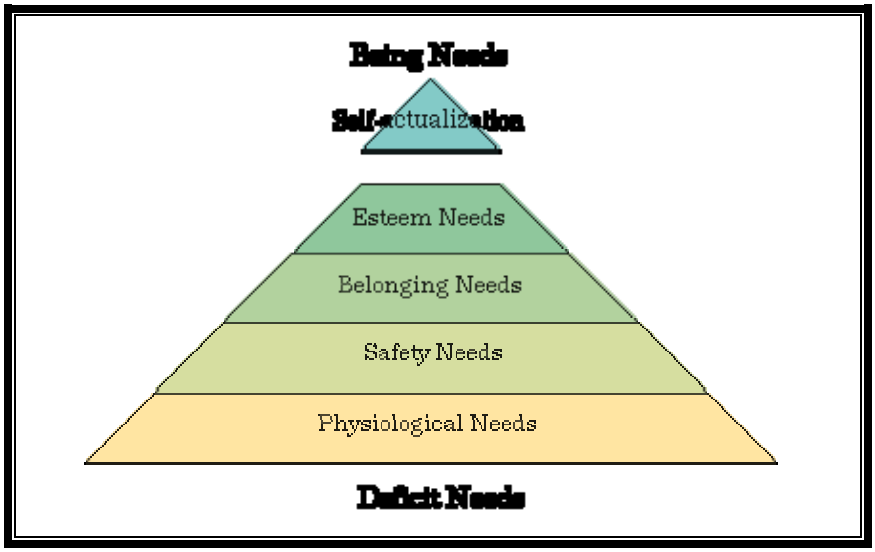
Once specific funding has been allocated, the exact capital match of the program should be determined. The PPP recommends a sliding scale that encourages investment that would not be performed without the capital match. Less costly improvements that have a quicker return on investment can often be accomplished without additional funding. The goal of the program is to create a mechanism where investment in the property has no greater than a 10 year payback to the resident. In efforts to encourage improvements in the housing stock of the community, improvements that save energy but have longer break-even points should receive greater funding from the program. In the end, the economic goal is – a multiplied overall investment in the community of Holland.

Comprehensive Participation

Ownership and improvement of ones property is a key importance that most healthy individuals in a society value. A more specific objective of the Pilot Program Plan is thus the creation of a model that allows the majority of the individuals in the community to participate in joint action. This requires comprehensive participation in the HER plan.

This Pilot Program Plan proposes utilizing current energy dollars that are providing little value to the residents of Holland and repurposing those to make a significant infrastructure improvement in the housing stock of the city. The recommendation is to establish a program that supports a maximum investment from citizens. This type of approach is recommended due to the positive impact it will have on Holland. There are multiple programs throughout the nation that promote incremental investment in energy efficiency. Most of these programs lack substantial value to their communities due to their focus on small individual improvements.

To accomplish the goal of “comprehensive participation”, the Pilot Program Plan must provide enough motivation to warrant individual participation. The focus in the design of the program must therefore provide an opportunity cost acceptable by the majority of Holland Residents. Opportunity cost varies from individual to individual. However, evidence shows that communities tend to allocate the same opportunity cost to the same goods and services when their common value is accepted by the majority. Consequently, while individual participation in the HER Pilot is important, perhaps even more significant is the value the majority in the community place on the program.



Maslow’s Pyramid

Diagram 1b

This psychological component of belonging is one of the reasons why an effective communication strategy is such a critical element of the entire effort. Our collective ability to drive interest, awareness and engagement through thoughtful, ongoing messaging may well prove to be the difference between this project being a catalyst for lasting civic pride and national notoriety rather than simply an interesting science experiment. Gathering an initial pilot group of quality participants will not prove to be as difficult as sustaining those efforts as the program scales.

The way in which the PPP communicates the initial excitement and momentum will ultimately define how easy and efficient future years' recruitment efforts will be. The best way to keep the program growing and flourishing is by building enough interest and intrigue at launch to begin a waiting list of participants. The goal is a group of residents that are eager to be a part and see their participation in this community service as an honor.

As a result of comprehensive participation, the other primary objectives of the plan are also achieved. Comprehensive Participation will allow for greater energy use reduction and thus support the Smart Home and other Plan objectives. It also is an essential pathway for accomplishing the final main objective of the Pilot Program Plan, which involves the execution and application of the community values Holland is committed to achieving.

Application of Community Values

Any major community action should be regulated by its effectiveness to accomplish the implementation of the commonly held values of that community. Holland has committed to several values that are a focus of the implementation of this Pilot Program Plan. The Values as stated by the Community Energy Strategies Teams are below:

Stewardship: *being thoughtful about our resources: energy, funding, and natural resources*
This is a key component of the HER Pilot Program Plan. Significant impacts on energy reduction will be outputs of the plan. The plan proposes to utilize the impact and interaction with each Holland resident as a leverage point for a larger community mindset toward stewardship. It is also transferring current energy liabilities into generating assets to fund the majority of the initiative.

Quality: *identifying and supporting long term integrity and value*
The focus on deeper comprehensive improvements sets this Pilot Program Plan apart from the middle-of-the-road initiatives conducted elsewhere. As a result, Holland is implementing significant high quality improvements in the value of housing in the city. This investment will raise property worth and contribute to a higher quality of life for many in the area.

Creativity/Innovation: *designing new and more efficient ways to do things*
The Pilot Program Plan is a testing ground for the larger HER initiative that will transform the city. This type of creative approach to improving private property is a magnet for increased innovation and creativity. As the program grows, the impacts will be valued and spur the creation of even greater transformative innovations.

Entrepreneurship & Economic prosperity: *measured risk-taking for a brighter future*
The performance of the Pilot Program will be assessed on its ability to ameliorate multiple neighborhoods in the city. The investment in the program should achieve measurable gains in the economic rents of citizens. Reallocating current funds and making smart investments with those funds, rather than a creating a new tax burden is also a low-risk approach with large potential upside gains.

Education & Learning: *providing opportunities to achieve intellectual potential*
The Pilot Program Plan includes a focus on education. The communication plan will be a key element of successful execution of the HER and other CEP initiatives. There are recommendations in the communication plan that engages with the more common foundational educational systems in the Holland area. There will also be education that takes place in the homes that get retrofits under that program. Residents will now have a daily reminder of how energy is consumed and used around them.

Compassion: *helping others with their essential needs*
The goal of the Pilot Program Plan is to invest in all homes regardless of demographics. There will be practices in place to make certain that low-income Holland residents receive funding for improving a basic need, which is shelter. This plan is unique in the sense that it is not a tax or philanthropic based social welfare plan. It is a program for all of Holland, by all in Holland – there is dignity and responsibility in this approach.

Development Plan

HER PILOT PROGRAM - ROADMAP TO SUCCESS

PHASE I – ENTRY PHASE

City Approval of Phase I (Plan, Budget, Audit Cost, etc)

The first step in executing the Pilot Program is approval of key elements of the Pilot Program Plan. The final budget to implement the program will not be finalized until after the AUDIT PHASE has been completed. Also, the specific funding structure for the entire program will not be accessible until the FINANCING PHASE is complete. In order to move into both the AUDIT and FINACING PHASES, a resolution should be passed to provide action and allocate funding.

The Pilot Project Plan recommends a resolution containing the following actions:

1) Approval to make the program public and highlight the specific homes eligible to enroll in the program lottery.
2) Approval for funding allocation for the feasibility assessment and AUDIT PHASE.
3) Approval to enter into the FINANCING PHASE, which includes legal approvals, approval of financing specifications and any necessary authorization for HPBW partnership.
4) Approval of Schneider Electric as Program Manager, Audit Manger, and turnkey provider of services for the HER Pilot Program.

Resident Recruitment

The second part of PHASE I is resident recruitment. This Pilot Project Plan recommends a potential pool of three-hundred (300) homes. This is not intended to be a “media-buy” type of recruitment plan. It is recommended that recruitment channels be primarily of the grass roots variety. Along with current recruitment efforts by the HER Task Force, the resolution passed in the previous step should be enough pubic coverage to generate the three-hundred interested residential properties required.

It will be necessary to gather basic information on each home as a part of the recruitment process. Home owners will need to sign letters allowing the Audit Manager to obtain utility information on the meters associated with the home. The letter will need approval by the gas utility and HPBW prior to distribution.

A sample application and questionnaire are provided below:

Sample Application:

CUSTOMER APPLICATION FORM

Customer Name:	Service Address:			Unit No.:
Service City:	State:	Zip Code:	CD:	Telephone No.:
Mailing Address: ☐ Check if the same as service address	Mailing City:	County:	State:	Zip Code:
Email Address:	Account No:		CAN No:	

Type of Dwelling	Type of Cooling	Heating Type	Type of Range
☐ SFD - Owner, 1 Unit	☐ Central/ FAU	☐ Electric	☐ Electric
☐ SFD - Rental, 1 Unit*	☐ Window / Wall AC	☐ Natural Gas	☐ Natural Gas
☐ MFD - Owner 2-4 Units	☐ Evap. Cooler	☐ Wood	☐ Other: _____
☐ MFD - Rental 2-4 Units*	☐ Fan (s)	☐ Propane	**Type of Water Heater**
☐ MFD - Owner >4 Units	☐ Portable Elec. Device	☐ Fuel Oil	☐ Electric
☐ MFD - Rental >4 Units*	☐ AC - Split Unit	☐ Kerosene	☐ Natural Gas
	☐ None	☐ None	☐ None
	☐ Other: _____	☐ Other: _____	☐ Other: _____

←Total Number of persons living in household, including applicant

Check appropriate box for the total annual household income.

- ☐ $0 - $30,000
- ☐ $30,001 - $45,000
- ☐ $45,001 - $60,000
- ☐ $60,001 - $75,000
- ☐ $75,001 - $90,000
- ☐ $90,001 - $105,000
- ☐ $105,001 and over

* - If you are renting your residence you must obtain the property owner's approval prior to participation. (Property Owner Permission Form enclosed)

Owner's/Manager's Name: _____

Owner's/Manager's Address: _____

_____

Owner's/Manager's Phone No: _____

Owner's/Manager's E-mail: _____

Sample Questionnaire:

1. What type of residence do you live in?
   - ☐ One story house
   - ☐ Two-story house
   - ☐ Three-story or more
2. What portion of the year is this home occupied?
   - ☐ Year round
   - ☐ Summer only
   - ☐ Winter only
   - ☐ Other seasonal use
3. When was your home built?
   - ☐ Before 1930
   - ☐ 1931-1965
   - ☐ 1966-1978
   - ☐ 1979 and after
4. How many rooms are in your home? (Only include areas used as living space. Do NOT include bathrooms and hallways.)
   - ☐ 1 - 2 rooms
   - ☐ 3-4 rooms
   - ☐ 5-6 rooms
   - ☐ 7-8 rooms
   - ☐ 9-10 rooms
   - ☐ 11-12 rooms
5. What is the approximate square footage of the living space of your home? (Do **NOT** Include unconditioned garage, attic, or basement space.)
   - ☐ less than 500 sq.ft.
   - ☐ 500-1,000 sq. ft.
   - ☐ 1,001-1,500 sq.ft.
   - ☐ 1,501-2,000 sq.ft.
   - ☐ 2,001-2,500 sq.ft.
   - ☐ 2,501-3,500 sq.ft.
   - ☐ 3,501-4,500 sq.ft
   - ☐ more than 4,500 sq.ft.

Once three-hundred (300) homes have enrolled and filled out the forms, this group will serve as the "the pilot feasibility pool", any additional enrollments will be placed in the pool for PHASE I 2014.

PHASE II - AUDIT PHASE

Feasibility Assessment and Data Collection

The City of Holland will have a master contract in place with the Audit Manager as an output of the ENTRY PHASE. The Audit Manager will conduct a data analysis on the pilot feasibility pool. The Audit Manager will collect data directly from the utilities on each of the meters in the pilot feasibility pool. The information from the applications will then be cross referenced with the utility information and homes will be mapped/zoned and grouped by similar characteristics.

Specific characteristics analyzed for the categorization exercise will include:

- Size of home
- BTU/Sq ft. (with adjusting multipliers for occupancy)
- Household Income
- Age of home
- Location of home

Once the homes have been categorized, the Audit Manager will select 33% of the homes to receive energy audits. This group of homes will serve as the "audit pool". Letters and emails will be sent to the homes selected notifying them of their potential inclusion into the Pilot Program. Residents will be given a deadline ("the audit deadline date") to reply and agree to enter into a home energy audit contract with the City of Holland.

Scheduling 100 Home Audits and home owner approval

The goal of the AUDIT PHASE is to move the majority of homes in the audit pool into the CONSTRUCTION PHASE. The goal of the Pilot Program Plan is NOT to conduct energy audits. There are many programs throughout the state and nation that encourage energy audits of homes by subsidizing them and providing high level assessments of the homes to keep costs low. This approach conveys the perception that the audits are of little value. Residents of homes are thus inclined to dismiss the results of the audit or perhaps do the minimum low-priced and easy improvements if they have funding available.

The Pilot Program Plan recommends promoting high value audits. In efforts to move the residents into comprehensive retrofits, the audit should provide in-depth information about a wide-range of potential home improvements. These audits will not be high level potential recommendations, but rather design and construction grade documents.

The fee structure for the audit will encourage the home owner to move forward into the CONSTRUCTION PHASE. The audit contract will have contingency language stating that the audit will require NO COST to the resident if any of the following occur:

1) The results of the audit indicate that the home does not qualify to enter into the CONSTRUCTION PHASE of the Pilot Program.
2) The results of the audit indicate that the home qualifies for entry into the CONSTRUCTION PHASE and the resident enters into this phase by agreeing to have work performed on the home.

There will also be language describing the intent of the CONSTRUCTION PHASE, which is to provide home improvements that require no upfront capital by the resident. The improvements will be paid over a future period of time and initial funds will be matched with some ratio by the Pilot Program in efforts to keep entry costs low.

The audit contract will also contain a contingency fee to be paid by the resident if neither of the above criteria is met. The Pilot Program Plan recommends that this fee be at least 50% of the actual cost of the audit. The fee should to be large enough that it motivates residents to move to the CONSTRUCTION PHASE under condition that the audit results indicate a retrofit to the home can be executed that meets the Pilot Program objectives.

Audits of Homes

The scheduling of individual audits will be conducted by the Audit Manager. After the audit deadline date, the Audit Manger will begin planed phasing of audit implementation. Residents will be given advance notification of the proposed date for the audit and approve that this date is acceptable. It is anticipated that there will be three phases of audits based on the timeline required to complete the Pilot Program. The Audit Manager will use the micro-site information in the audit pool database to divide the homes that have entered into audit contracts into three (3) groups.

Group A Homes

- Homes that indicate longer potential construction periods.

These homes will be audited in the first wave of audits due to their potential complexity and extra time required to get specific design and bids back from contractors.
Example Improvement: Double deck roof system

Group B Homes

- Homes that are candidates for advanced technology.

These homes will be audited together as they will require specific subject matter experts to evaluate the potential of the individual technologies.
Example Improvement: Solar hot water heater

Group C Homes

- Remaining homes in the audit pool.

Once the homes with more complex and specific technology analysis have been audited, the remaining homes in the audit pool will be completed.
Example: Low income home

Individual audit reports will be prepared and personally reviewed with the residents as they are completed. The goal of the audit is to provide multiple options (where appropriate) for the resident to choose from. Most reports will contain at least three (3) options for the resident to choose from for execution in the CONSTRUCTION PHASE. All options will provide the resident with improvement recommendations that will be paid for over a multi-year period. The monthly savings they realize on their utility bills will be leveraged and transferred to pay for the improvements over the term of the program. In some cases, audit improvement recommendations will not meet the financial or safety parameters of the program. Residents will NOT be responsible for the contingency cost of the audit in such cases.

PHASE III - FINANCING PHASE

The Pilot Program Plan recommends the creation of an "Energy Trust" to provide funding for the HER Pilot Program. This "Energy Trust" could also be used to fund potential future phases of the HER Program as well as other Community Energy Plan related initiatives. As this type of funding structure is not existent today, the steps for approval will be dependent on the local laws of Holland and the charter of BPW. It is probable that the creation of such an entity will require Board and/or other necessary legal actions. Once the specifics of the funding mechanism are in place, these steps should be built into the Pilot Program Plan.

BPW Funding and Finance as Service Approval

In order for residents to pay for the improvements over time and require no up-front cost, it will be necessary for the Energy Trust to have a billing mechanism. Since HBPW already bills all of the potential participants in the Pilot Program Plan - it is recommended that they serve as the agency that invoices and collects from the participants in the Pilot Program. In order for HBPW to perform this task, they will need to approve provision of this service under their umbrella of other services. Resources will also need to be allocated to make certain that the current billing and accounting systems can perform this assignment. An appraisal should also be conducted to determine if/what the additional administrative costs are for this supplementary service.

The Pilot Program Plan also recommends that HBPW provide an influx of money into the Energy Trust. This money will be used along with other community funding to buy down the cost of the projects for the participants in the program. HBPW currently provides their electric customers with an "Energy Smart Program". This program spent approximately $900,000 on programs last year focused on electric efficiency.

HBPW currently has authority to spend up to 2% of their revenues on electric reduction (EO) programs. For the year ended June 30, 2012, Total electric revenue was 88,448,748. 2% of this revenue is approximately $1,770,000. Current spend on energy efficiency programs has been around $900,000. It is recommended that the additional $870,000 that is available be allocated to supplement electric efficiency measures in the pilot homes. HBPW would need to authorize this allocation of funding and be confident that they will still achieve their year over year efficiency targets. This approval process on another funding source from the HBPW will need to be approved prior to requesting funding from outside sources in the RFP Phase. It is also recommended that the City allocate approximately $130,000 to be invested into the fund and thus share in the capital contribution of the Program.

RFQ

The Holland Energy Trust should seek statements of interest and qualifications from all interested parties to provide financing for certain energy efficiency projects. The issuance of the RFQ will be the initial step towards financing the HER Pilot Program.

The purpose of the RFQ will be to:

1. Alert potential financial partners and solicit their input regarding available financing.
2. Provide potential financial partners the opportunity to state terms and conditions that they would require in a financing.
3. Provide potential financial partners the opportunity to outline financing strategies.

The principal purpose for the RFQ, then, is to solicit information. Financial partners deemed most qualified will be invited to present solutions and presented with a future RFP and specific financial parameters around the HER Pilot Program.

LOIs signed by Residents

Audit recipients will be given a due date after receiving the audit report. They will be responsible for indicating which program option they want to execute in the CONSTRUCTION PHASE by this due date. The residents will then sign contracts or letters of intent with the Program Manager that state the specific costs and intended financial structure for repayment. Other documents my need to be executed at this time or prior to CONSTRUCTION PHASE depending of the final legal structure of the Holland Energy Trust.

RFP for Funding

Once LOIs are signed, there will be a specific funding amount that has been determined to complete the HER Pilot Program. This Plan recommends allowing those firms who were determined to be most qualified under the RFQ process, the ability to put a financial solution together that includes pricing and costs for the HER Pilot Program. Utilizing this process, the participants in the program as well as the Energy Trust will be guaranteed a low cost of outside capital throughout the lifespan of program repayment. Keeping the cost of capital as low as possible is another factor that sets the Pilot Program Plan apart from other energy retrofit initiatives. Schneider Electric serving as Program Manager is also willing to guarantee a specific amount of energy savings that will be returned to the Energy Trust as payment. This approach allows for very low risk from private investors. The less money that is spent servicing the debt, results in a more comprehensive program with larger impacts while also providing less risk to the City of Holland, HBPW, the Program Manger, and those receiving home retrofits.

Financial Contracts Executed

The Holland Energy Trust, City of Holland, HBPW, or an appointed representative will execute a financial agreement with the most qualified and valuable respondent to the RFP. It is anticipated that this agreement will provide capital into the Holland Energy Trust (or equivalent) on the date described in the contract. Repayment and commitment to future payments under the contract terms should last throughout the HER Pilot term, which is expected to be approximately ten (10) years.

PHASE IV - CONSTRUCTION PHASE

The CONSTRUCTION PHASE will be a critical phase of the Pilot Program Plan, as this is the phase with the most interaction with the residents. The participants in the program will judge and promote the Plan based on their thoughts and interactions with this phase more than any others. Thus, the CONSTRUCTION PHASE must be executed with excellence.

Contractor Pre-Qualification

The Program Manager will mitigate risk for residents participating in the Pilot Program through use of a Contractor Certification and Recruiting program. The program will be designed to provide residents with the safest working environment, the best quality of installation available and the highest cost/value ratio that can exist in the marketplace. The Program Manger will have stringent requirements concerning the quality of subcontractors placed in homes. The contractor recruitment program will begin during the AUDIT PHASE and prior to the actual CONSTRUCTION PHASE. The pre-qualification of all contractors involved in the audits and retrofits will be the sole responsibility of the Program Manager. The Program Manager shall also continually monitor all facets of the CONSTRUCTION PHASE.

Construction Phasing Planning

The Program Manager will act as a general contractor in implementing the Home Energy Retrofits. The Program Manger will utilize the pre-qualified contractors recruited in the previous step of the plan as needed to install the various improvements. The Program Manager will be responsible for the design, plans and specifications, construction drawings, record drawings, scheduling, equipment procurement, construction management, start-up, punch-list development, and final acceptance inspections for all projects.

Construction schedules will be created that focus on executing the retrofits as quickly as possible in each individual home. Expedition at the residence is the most important factor in the CONSTRUCTION PHASE. The implementation of the Pilot Program should not be invasive. The construction phasing plan will include training contractors on the standards required by the Program Manager prior to resident interaction. The Phasing Plan will be designed to get contractors in and out of the residences as quickly and quietly as possible while marinating a high quality of work.

The construction will happen in the same order as the AUDIT PHASE:

First stage:	Group A Homes
Second stage:	Group B Homes
Final stage:	Group C Homes

PHASE V - MARKETING PHASE

The MARKETING PHASE is a key criteria to the success of the Pilot Program Plan. There will be no future phases of the Pilot Program Plan unless the MARKETING PHASE has a successful execution. The Pilot Program Plan should **not** be initiated without commitment to implementation of the MARKETING PHASE.

Governor/MPSC/Government Reach Out

The Pilot Program Plan proposes to schedule a meeting for MPSC staff, Holland Board of Public Works and Holland citizens, and Program Manager, to discuss ways that the MPSC can assist Holland's goals and objectives enumerated in the Home Energy Retrofit (HER) project. This is an opportunity for Holland citizens to inform the MPSC about its plans and goals; similarly, this provides an opportunity for the MPSC to offer assistance and guidance with some of the potential issues of implementation. This meeting would also be considered a kick-off meeting to develop interest from public officials and discuss additional potential funding sources including the Michigan Saves program.

Discovery / Communications Strategic Planning

The creation and overall significance of the Home Energy Retrofit program and other energy initiatives into one brand for Holland is a critical element for success. This effort should start with a brainstorming session with the key stake holders. Community outreach to local churches, schools, historic neighborhoods, and municipal activation campaigns should also be managed and implemented. This planning phase will insure that the overall communication plan is standardized from the very beginning of the program. A brand will be discovered and specific outreach programs implemented as a result of the strategic planning phase. The Program Manager will hire a marketing firm to facilitate and manage this phase and develop the needed solutions for the initiatives that result from the planning.

Community Branding and Fundraising Competitions

The community should be involved and have ownership in the new “energy brand” of Holland. In order to promote ownership, resident commitment should to be requested and there should be areas for Holland residents to get involved. A fund-raising campaign utilizing “Kick-starter” or some other crowd source technology should also be utilized to gather ownership and funding for parts of the plan including the artistic public display described in the MARKETING PHASE.

Brand Development & Participant Recruitment

After the Strategic Planning and Branding Competitions have been completed, the communications team shall deliver a detailed plan to enact a marketing and branding campaign for the Pilot Program Plan.

Deliverables of this phase include:

- Name, logo, brand standards
- Basic presentation
- Initial "pride" item designs (yard signs, stickers, shirts, desirable symbol, etc.)

Website and App Design & Development

Time will need to be dedicated to develop an engaging web presence. Online will prove to be a critical location for this entire project, and a properly developed mobile-friendly web platform can transform this from a fairly typical governmental/public works project into a cultural movement. At launch, the main website would be built using responsive design standards, so its content would be available via mobile devices. The development of the web and mobile will need to begin soon after funding is available for the Pilot Program.

Public Display Commissioned

An artist should be commissioned to create an artistic structure in downtown Holland that captures the impact and identity of the HER Program and the other Community Energy Plan initiatives. The structure should include interactive technology that attracts attention from the general public and engages them on the energy and stewardship of Holland.

Public Announcement of Program/Brand/Artistic Commission

The Tulip Festival is a time when the City of Holland has a large audience to showcase its values and quality of life. This is an ideal time to have a large event commemorating the HER Pilot and other CEP initiatives. The Pilot Program Plan recommends that the technological artistic display be dedicated at this time. Other Holland energy initiatives should also be highlighted at the 2014 Tulip Festival.

PHASE VI - TRACKING & FUTURE PHASES

Tracking

A monitoring and tracking initiative is a required element of the Pilot Program Plan. This PHASE shall be implemented gradually as individual residences finalize construction. An interactive program tool shall be utilized to track the utility usage of homes that have enrolled in the program. The Program Manager shall use this technology database as a "dashboard" to track, verify, and promote the results of the Pilot Program Plan. The dashboard will:

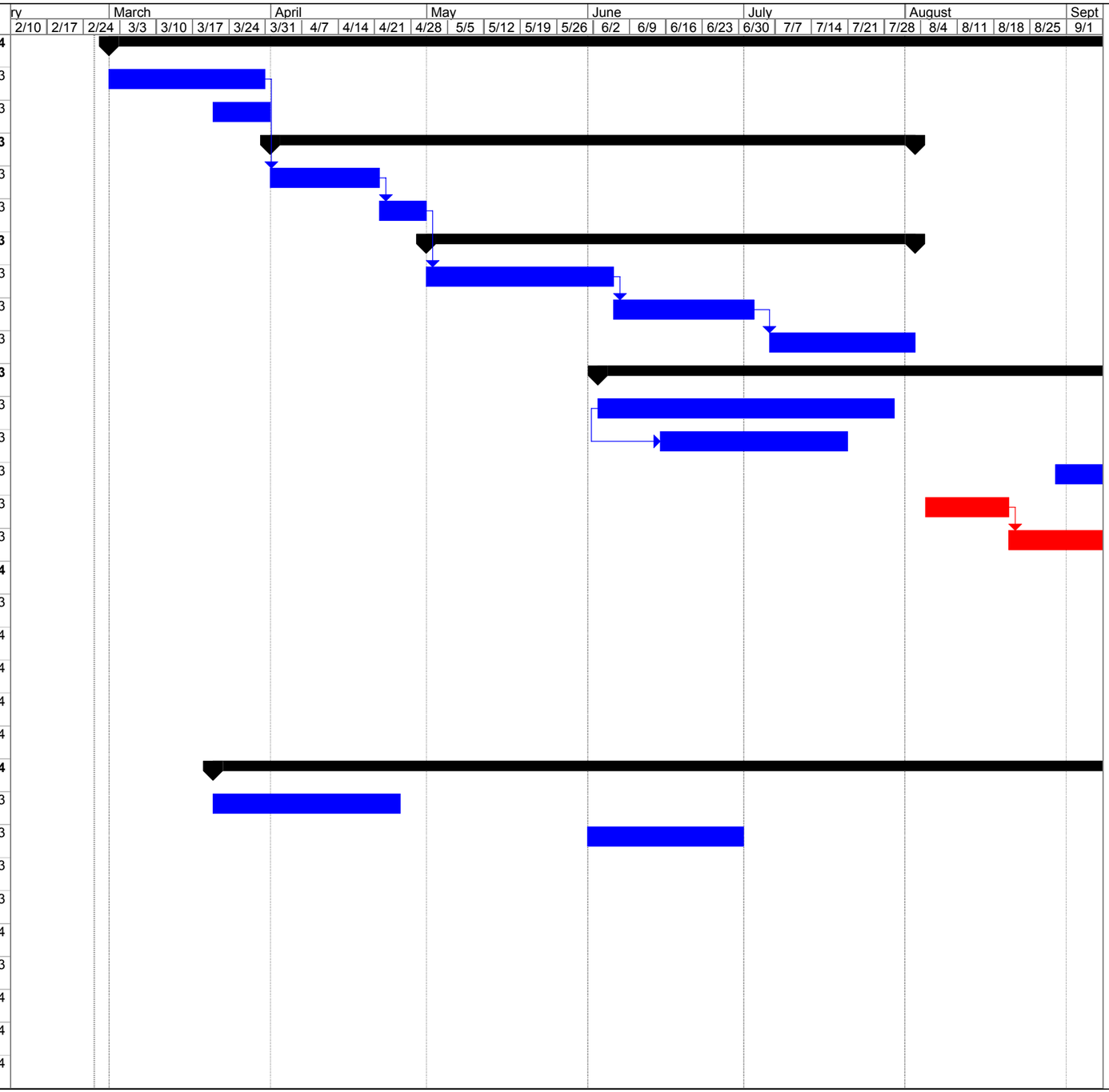
1) Allow energy tracking of pre and post program executions
2) Provide valuable data to be utilize for the PHASE I 2014 HER Program
3) Provide inputs that can be used by both individual private residents as well as public information requests.
4) Provide data that will be used in a number of other initiatives including the downtown artistic interaction.

The benchmarking and tracking will provide a data-set to be utilized for classification and labeling of the homes. It is the goal of the Pilot Program Plan to get the homes in the program to approximate DOE Home Energy Scores of 8. This score will be used as an internal standard and point of reference. The Program Plan recommends creating a unique labeling system for Holland that adheres to the communication and branding strategy. The Program Manager will work in partnership with the marketing consultant and utilize the outcomes of the local brainstorming/competitions to determine the best label classification for the Program.

Phase I - 2014

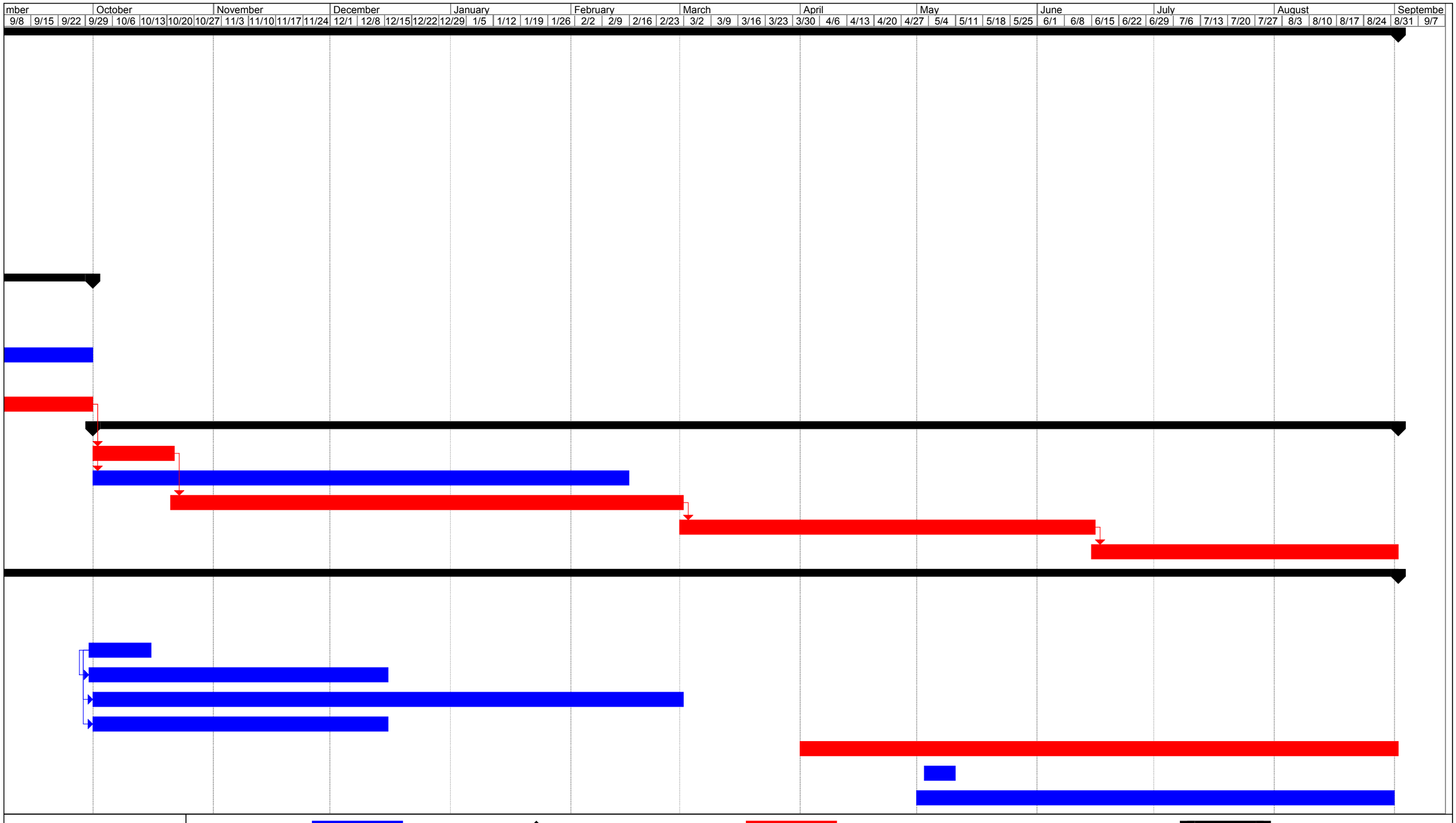
PHASE I 2014 will begin after the lessons learned from the HER Pilot Program have been assessed and review sessions have been conducted. The data inputted from the Pilot Program will be uploaded into the tracking system described in the TRACKING PHASE, and this data will be utilized for scenario planning. It is the intent of the Pilot Program Plan to create processes and platforms that can be easily scaled and utilized for the larger HER and CEP execution.

ID		Task Name	Duration	Start	Finish
1		**Working Schedule for Holland**	**550 days**	**Fri 3/1/13**	**Mon 9/1/14**
2		City Approves (Plan, Budget, Audit Cost, etc)	30 days	Fri 3/1/13	Sat 3/30/13
3		Ramped up Grass roots campaign to get 300 homes signed up	11 days	Thu 3/21/13	Sun 3/31/13
4		**AUDIT PERIOD**	**124 days**	**Mon 4/1/13**	**Fri 8/2/13**
5		Feasility Assement and Data Collection	21 days	Mon 4/1/13	Sun 4/21/13
6		Scheduling 90 Home Audits and home owner approval	9 days	Mon 4/22/13	Tue 4/30/13
7		**Audits of Homes**	**94 days**	**Wed 5/1/13**	**Fri 8/2/13**
8		Group A Homes	36 days	Wed 5/1/13	Wed 6/5/13
9		Group B Homes	27 days	Thu 6/6/13	Tue 7/2/13
10		Group C Homes	28 days	Sat 7/6/13	Fri 8/2/13
11		**FINANCING PROCESS**	**120 days**	**Mon 6/3/13**	**Mon 9/30/13**
12		RFQ	57 days	Mon 6/3/13	Mon 7/29/13
13		BPW Funding and Finance as Service Approval	36 days	Sat 6/15/13	Sat 7/20/13
14		LOIs signed by Residents	32 days	Fri 8/30/13	Mon 9/30/13
15		RFP for Funding	16 days	Mon 8/5/13	Tue 8/20/13
16		Financial Contracts Executed	41 days	Wed 8/21/13	Mon 9/30/13
17		**CONSTRUCTION PERIOD**	**336 days**	**Tue 10/1/13**	**Mon 9/1/14**
18		Construction Phasing Planning	21 days	Tue 10/1/13	Mon 10/21/13
19		Contractor Pre-Qualificaiton	138 days	Tue 10/1/13	Sat 2/15/14
20		Group A Homes	132 days	Mon 10/21/13	Sat 3/1/14
21		Group B Homes	107 days	Sat 3/1/14	Sun 6/15/14
22		Group C Homes	79 days	Sun 6/15/14	Mon 9/1/14
23		**MARKETING PLAN**	**530 days**	**Thu 3/21/13**	**Mon 9/1/14**
24		Governor/PEC/Government Reachout and Meetings	36 days	Thu 3/21/13	Thu 4/25/13
25		Discovery / Communications Strategic Planning	30 days	Sat 6/1/13	Sun 6/30/13
26		Brand Development & Participant Recruitment	16 days	Mon 9/30/13	Tue 10/15/13
27		Community Branding Competition	77 days	Mon 9/30/13	Sun 12/15/13
28		Fundraising / Kick-Starter Campaign	152 days	Tue 10/1/13	Sat 3/1/14
29		Website and App Design & Development	76 days	Tue 10/1/13	Sun 12/15/13
30		Public Display Commissioned / Unvieled	154 days	Tue 4/1/14	Mon 9/1/14
31		Public Announcment of Program/Brand/Artistic Commissio	8 days	Sat 5/3/14	Sat 5/10/14
32		Phase 2 Audit Planning	123 days	Thu 5/1/14	Sun 8/31/14



Project: Jeff Q
Date: Tue 2/26/13

Task
Critical Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Critical Task
Rolled Up Milestone
Rolled Up Progress
Split
External Tasks
Project Summary
Group By Summary
Deadline



Project: Jeff Q
Date: Tue 2/26/13

Task	Milestone	Rolled Up Critical Task	Split		Group By Summary		
Critical Task	Summary	Rolled Up Milestone	External Tasks		Deadline		
Progress	Rolled Up Task	Rolled Up Progress	Project Summary				

Audit Phase

$100,000 Budget

The audit process will be managed by the Audit Manager. The Pilot Program Plan is committed delivering major improvements in home energy use as described in the first key objective of the Plan. The goal is to enable city residents to maintain lifestyle and convenience, but at a target goal of an 8 or better DOE score and reduction in both energy consumed and in financial cost. The budgeted cost of the AUDIT PHASE includes the cost associated with the ENTRY PHASE. The Home Energy Audits will require a significant amount of time both on-site as well as developing the appropriate models for energy impacts. The cost per home is expected to be around $1,000. This cost should be provided in the form of a contingency contract as described in the Development Plan. The cost should not be an upfront cost to the resident - unless they decline entry into the Program after a successful audit has been preformed. The Audit Manager will bill the City directly to manage the entire AUDIT PHASE as a lump-sum contract. The final costs of the AUDIT PHASE should be included in the Holland Energy Trust model and most audit fees will simply become a part of the entire CONSTRUCTION PHASE fee.

There will be 3 major elements to each audit: Structural Integrity (envelop and ductwork), Lifestyle Support (appliances, HVAC, local renewable energy, and other energy using devices), and behavior. Finally, the Pilot Program Plan recommends a “living approach” to Energy Efficiency. Oak Ridge National Labs, a Schneider Electric customer, maintains a state of the art living laboratory on residential energy efficiency. Led by Dr. William Miller, this facility has had a major impact over the years in construction techniques and in building code development.

The City of Holland would set itself apart by designating a small subset of pilot homes (three or so) to work with Oak Ridge for cold climate development of techniques that show promise but are not quite ready for commercial release. Such developments would “stream into” the City’s program as they become certified for public use, and would help to maintain Holland’s thought leadership in Energy Conservation.

Any Energy Efficiency program targeted at individual residences must maintain a sense of perspective. The focus of the audit will be to design a super-efficient house. The largest investments should pay for the most important energy savings, and not be sidetracked with trends or gadgets.

The biggest users of energy in housing are HVAC systems followed by refrigeration and domestic water heating. The smallest energy users in typical dwellings are lighting, cooking, laundry, dishwashing and electronics. The Schneider Electric approach keeps this in mind. The auditor will assess each home for the following:

Structural Integrity

The envelope and ductwork of a home, even of recent construction, accounts for the vast majority of unnecessary energy use. With a typical air change between 10 and 20 times *per hour*, addressing this area will prove beneficial as a first step. Worse, over time typical contractor grade duct installation loses 20% of its conditioned air as it is delivered to rooms in the house. Ductwork in an attic or crawlspace also will draw in overly cold or hot air from the outside forcing the HVAC system to work much harder than necessary.

The two essential tests for this are “blower door” and “duct blaster” testing. A blower door is a powerful fan that mounts into the frame of an exterior door. The fan pulls air out of the house, lowering the air pressure inside. The higher outside air pressure then flows in through all unsealed cracks and openings.

The auditors may use a smoke pencil to detect air leaks. These tests determine the air infiltration rate of a building.

Blower doors consist of a frame and flexible panel that fit in a doorway, a variable-speed fan, a pressure gauge to measure the pressure differences inside and outside the home, and an airflow manometer and hoses for measuring airflow. For ductwork, the duct blaster is connected to the air handler to pressurize (or depressurize) the taped-over duct system at the same pressure that an HVAC system normally experiences. The total amount of duct leakage is determined. Since some duct leakage may occur within the conditioned space and is not necessarily a negative from an energy utilization standpoint, an additional duct test is performed to measure leakage to outside air. For this test, the blower door is used to pressurize the house and the duct blaster pressurizes the ductwork to the same level.

All duct leakage that is measured is lost to the outside or unconditioned space, and represents heating or cooling energy that is directly wasted. In existing dwellings, envelope and duct leaks are addressed with caulk, tape, weather stripping, foam and other sealing means. More comprehensive measures include window replacement and exterior wall reinforcement with a surrounding system such as Dryvit®.

After air infiltration, radiance and conduction are the next largest energy “zappers”. The most effective countermeasure is added insulation. Even in cold climates, older homes may have no insulation. Over time, newer homes with insulation suffer compression. As gravity compresses insulation, the air gaps that actually provide resistance to heat transfer are compressed and ultimately ineffective.

Adding insulation to existing walls can be disruptive and messy for the homeowner, though often less costly than a new exterior wall system. The Pilot Program Plan recommends utilizing thermography to determine the typical state of wall insulation in the housing stock and thus determine if superior insulation is a necessary step to achieve the reduction goal.

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Attics present a different set of opportunities. All ceiling penetrations must be sealed; e.g., vent stacks, HVAC registers, skylights, and similar. After this is done, basic insulation should come to the top of the ceiling joists. This can be either loose fill or bat style. Ideally there should be a second layer, either batts run at 90 degrees to the bottom layer, or additional loose fill blown to a total depth of not less than 14 inches and evenly distributed, with no low spots from center to eaves. Adding insulation to a depth of 24 inches or more will provide better thermal efficiency, but may not be cost effective if doing so takes budget away from other efficiency measures. Finally, there should be no wet spots as these are an indication either of roof failure or blocked/defective draining from attic mounted equipment. Special attention is paid to attic access and other large openings such as whole house fans. When not in use, these should be sealed using one of several available techniques with significant heat transfer resistance.

Two more recent innovations deserve discussion: radiant barrier and foam sealed attics. The effectiveness of Radiant Barrier is open to debate, even in hot climates, but it provides little value outside of heavy cooling needs. It would not be an effective measure in Holland. In contrast, attic sealing is very effective at retarding heat transfer. It works by sealing the top and sides of the attic with expanding foam effectively tuning the attic into conditioned space. This forms a barrier to heat transfer from lower levels, and it enhances the performance of ductwork in the attic. Unfortunately, Oak Ridge is monitoring issues with retained moisture and is not recommending installation at this time. The lab is working on a solution.

In the meantime, the recommended approach is a “double decked” roof. Essentially, this mounts a new sheathing layer over the base layer with foam insulation sheets and ventilation paths. This makes a significant difference in performance but prevents moisture build up.

The final step in envelope assessment is in unfinished basements and crawlspaces. Unvented crawlspaces should be sealed on all planes with insulation on walls and underneath flooring. For vented crawlspaces, the technique is similar, but allowances made for opening vents and for sealing them in cold

weather when not needed. Unfinished basements receive similar treatment except that under normal circumstances, there is no need to seal the floor.

In summary, the most effective increases in efficiency occur when appropriate measures seal the walls, windows, attics and foundation areas. Details matter. Effective attic insulation is marginalized when electric switch plates and outlet covers lack sufficient foam backing. Taken as a system these measures will reduce air turnover to twice per hour, still healthy, and much more efficient.

Lifestyle Support

Home infrastructure refers to systems that support home comfort, convenience and safety. This starts with furnaces (or boilers); air conditioning units and water heaters. In Holland, the vast majority of home heat appears to be natural gas fired. In this case, the auditor will check the AFUE (ratio of heat entering the duct system to the fossil fuel consumed). A ratio of 90% is the general minimum in cost weather states.

The cost of an incremental increase to 98+% of the highest efficiency furnaces can make sense for an older unit and is a quality approach when a furnace needs replacement. The current best practice is a Condensing Furnace in which hot condensate from flue gases enter a second heat exchanger for extra efficiency. Such a furnace typically will have sealed combustion so that incoming air is completely supplied by return ducts, and therefore warmer than ambient air. This is less of an issue for furnaces located in conditioned space.

In cases of extremely old furnaces, replacement almost always delivers a solid payback as the efficiency of these systems can be as low as 55%. Here again, basics apply. The most efficient furnace can lose 35% of its heat through poorly sealed ducts. Lack of proper maintenance (filter changes, burner cleaning, visual inspection and repair of heat exchanger, blower/door adjustments, etc) can rob a furnace of efficiency. Though an auditor can check for some of this and caution the homeowner, there is no way to guarantee the homeowner will adopt proper habits. The continued monitoring of the homes energy usage and reminders to the homeowner through both technology and other education initiatives of the Program Plan will help maintain savings over the life of the Program.

In high efficiency furnaces, the final temperature of flue gas may be too low for additional heat recovery economically, but older furnaces not ready for replacement may offer another opportunity. Though not common, technology does exist to allow heat exchangers to supplement water heating. Geothermal systems and other technologies will also be recommended on a case by case basis.

Heating water accounts for approximately 18 percent of a home's energy use. High efficiency water heaters use 10 to 50 percent less energy than standard models, saving homeowners money on their utility bills. Actual energy savings from high efficiency water heaters depend on family size, heater location, and the size and placement of water pipes.

HIGH EFFICIENCY WATER HEATER TECHNOLOGIES

- Storage (Tank) Water Heaters. Water is kept hot and ready for use at all times in insulated storage tanks with capacities ranging from 20 to 80 gallons. Many fuel options are available, including electricity, natural gas, oil, and propane. One drawback of these units is the energy used to keep the water hot at all times, otherwise known as "standby losses."

- Demand (Tankless) Water Heaters. Water circulated through a large coil is heated only on demand using gas or electricity; there is no storage tank continuously maintaining hot water. A possible concern with this technology is the limitation on the number of fixtures that can simultaneously use hot water. However, there is an endless supply of hot water and standby losses are eliminated.

- Heat Pump Water Heaters. Heat pumps transfer energy from the surrounding air to water in a storage tank. These water heaters are much more efficient than electric resistance water heaters and most effective in warm climates with long cooling seasons, thus they may not e applicable to the Pilot Program.

- Solar Water Heating. While the initial purchase price of solar water heaters is high compared to standard models, they can be cost effective. That is because the sun's energy is harnessed to reduce operating costs up to 90 percent. Solar water heating systems require a conventional water heater as a backup water heating source to ensure hot water is available when solar energy is not. There are also considerable tax credits available for these installations.

IMPORTANT WATER HEATER METRICS

- First-Hour Rating (FHR). FHR measures how much hot water will be available during the busiest hour of the day. A large tank does not necessarily translate to a higher FHR. The recovery rating is important as it indicates the water heater's ability to replenish hot water as it is drawn from the tank.

- Efficiency. The water heater's efficiency is measured as an Energy Factor (EF). The higher the number, the more energy efficient the water heater. The second element of efficient hot water technology is the actual use itself. In most households, showers and baths account for 49%, clothes washing for 25%, Dishwashing 14%, and sink use for 11%. This means water pipes should be insulated, even in conditioned space when accessible. Faucets and shower heads should be of efficient flow design, a special consideration in older homes. Finally, efficient washing machines and dishwashers use less water than their standard counterparts and therefore less heated water.

While efficient heat and hot water will lower energy cost and emissions footprints, they will not have a major impact on electrical demand given Holland demographics. Air conditioning, though limited to a short season, is a concentrated electric load. Given the extensive use of gas for heating, the more efficient heat pump based air conditioner is not likely to be widespread. These may be of the central or "room" (window) style.

Central air units over 12 years old are only 70% as efficient as modern high efficiency units. Given the limited cooling season, even this gap may not be compelling, but a replacement can make sense in conjunction with a furnace replacement. The blower fan, part of the furnace, is a key component for efficiency. Connecting a modern unit to an older blower/air handler ruins the efficiency gains.

The replacement question is much clearer for window units. Newer high efficiency units are a lower cost investment than central units, and they can be limited just to rooms where needed (e.g., bedrooms). A newer mini-split type of unit has appeared in recent years that is ultra-high efficiency. They consist in an interior air handler and exterior compressor, both wall mounted, connected by a small conduit for electrical and working fluid. These units can cool a larger area than traditional window units. Since they do not use ductwork, they can achieve very high efficiency.

The second element of infrastructure efficiencies includes lighting and major appliances. These are beyond the scope of a typical home energy audit, because some may be moved from home to home while others may not add enough efficiency to justify replacement. The Program Plan recommends adding this element to an audit in pursuit of class leading efficiency.

Lighting can make a big difference. The average home has 30 light fixtures. Switching all of them to higher efficiency light bulbs can save $400 or more annually. Given the superior longevity of these bulbs,

they are well suited to inaccessible areas and to areas where there is not frequent use (vacation homes, sheds, docks, etc.). In cases of continuous lighting, such as security, the difference can be dramatic.

Lighting design can play a big efficiency role as well. Most light bulbs emit light in all directions, but LED bulbs are directional. This makes them ideal for reading, design emphasis, work spaces and so forth. Other considerations are light color and dimmable fixtures. Auditing home lighting will require information for the consumer that will explain the attributes of different styles of lighting and allow and informed choice. Since this is an area where poor design can lead to consumer disenchantment, any suggestions should include energy star rated bulbs from quality manufacturers.

The remaining infrastructure components consist of major kitchen appliances ("white goods") and occasional other devices, such as dehumidifiers, fans and space heaters, that can use large amounts of energy but are used ad hoc. There are numerous such devices in the typical home. An inventory of all would be time consuming and potentially a security concern for the homeowner. For this reason, the Pilot Program Plan recommends the physical audit cover only those elements that are built in; i.e., kitchen appliances. However, a questionnaire for the homeowner should be used to determine the draw on all potential appliances. This will be necessary for the energy model and also the potential for load control device recommendations.

Name plate data and user interviews will allow a simple calculation whether an upgrade makes sense. One other area with potential is the presence of "vampire" loads. Examples include TV's, computers, and similar gear. The Program Plan recommends the use of a current clamp to asses these loads and to offer various devices to curtail this load as part of the program. In general, homeowners prefer the convenience of "instant on" to the perceived small savings of a secure power down. The pilot portion of the program can help determine the effectiveness of this installation.

Calculating the energy cost of individual devices is a simple formula:

(Wattage × Hours Used Per Day) ÷ 1000 = Daily Kilowatt-hour (kWh) consumption

This is a list of typical home devices and wattages:

- Aquarium = 50–1210 Watts, depending on size, heater and pump type.
- Clock radio = 10
- Coffee maker = 900–1200
- Clothes washer = 350–500
- Clothes dryer = 1800–5000
- Dishwasher = 1200–2400 (using the drying feature greatly increases energy consumption)
- Dehumidifier = 785
- Electric blanket (*Single/Double*) = 60 / 100
- Fans
  Ceiling = 65–175
  Window = 55–250
  Furnace = 750
  Whole house = 240–750
- Hair dryer = 1200–1875
- Heater (*portable*) = 750–1500
- Clothes iron = 1000–1800
- Microwave oven = 750–1100
- Personal computer
  CPU - awake / asleep = 120 / 30 or less

Monitor - awake / asleep = 150 / 30 or less
Laptop = 50
- Radio (*stereo*) = 70–400
- Refrigerator (*frost-free, 16 cubic feet*) = 725
- Televisions (*color*)
    - 19" = 65–110
    - 27" = 113
    - 36" = 133
    - 53" - 61" Projection = 170
    - Flat screen = 120

Toaster = 800–1400
Toaster oven = 1225
VCR/DVD = 17–21 / 20–25
Vacuum cleaner = 1000–1440
Water heater (*40 gallon*) = 4500–5500
Water pump (*deep well*) = 250–1100
Water bed (*with heater, no cover*) = 120–380

Behavior

One of the largest factors in home energy use is the behavior of the occupants. Successful efficiency programs are those that do not seek to change consumer behavior in awkward or inconvenient ways. The better programs enable consumers to do the things they want to do. One example is programmable thermostats. No one wants to pay to heat an empty house. Modern thermostats allow the homeowner to address this potential.

Electronics have matured quite a bit since the original programmable thermostats. Without touching any of the physical characteristics of the home, many studies have shown that consumers will drop energy consumption by 2-5% just from the awareness of how and why money is spent on energy bills. Other sections of this report will address the value of networking, social media, and the “Smart Home” potential. To support that activity, the PPP recommends including an assessment of the potential for a home energy management system. The elements of this assessment will include a usable gateway to the home (meter based, cellular or local broadband); integration of connected devices (thermostats, load controllers, security system; and the availability of calculated data and suggested actions to the homeowner.

This will require coordination with HBPW, the homeowner, and potential third parties. Ideally, there must be a mechanism that makes near real time energy visible. This will require meter data, either from the revenue meter or a “shadow” meter coupled with an infrastructure system (BPW or third party) that can provide visibility on an appropriate portal.

Portal access is key. Today’s consumer wants convenient data access, but the definition of “convenient” varies. Almost certainly, it is not on the thermostat itself as has been attempted in the past. More likely, an appropriate application on a home computer, smartphone or tablet is the best choice. However, there are gains available without portals. The use of smart networks to manage thermostat settings can be very effective.
The proposed audit will include an interview process to determine the approaches that work best for the homeowner. This will become part of the audit recommendation and will be part of the overall retrofit solution for the pilot series.

Summary

This audit process is designed around a pilot concept of around 100 homes. A number of the homes could be a proof environment for more advance measures, while aggressive but proven techniques would apply to the rest. The goal of the process is energy use reduction without regard to whether the underlying energy is electricity or gas. The actual measures themselves can be applied to all homes or divided into sets to allow comparisons of techniques providing for the best return on investment.

The measures themselves stop short of techniques that might jeopardize homeowner comfort. If installed, these measures should increase comfort through reduction in drafts and more stable temperatures delivered throughout the home. Certain measures, notable foam sealed attics, are not recommended at this time due to observed significant increases in moisture inside the living spaces.

Pilots should establish a performance baseline. Use of either the REM/Rate™ or Energy Gauge® rating systems is appropriate and can form the basis of a larger community effort to establish informed homeownership. Further, such ratings can add market value to homes with substantial energy savings investments.

Even though this is the pilot phase of a program that will target 7,000 local households, the city should encourage all homeowners to take advantage of lessons learned in their own home planning. This will also be a part of the marketing plan and educational outreach of the Pilot Program Plan.

Financing Phase

Budget - $100,000

Multiple financing and program management options were analyzed as a result of this Pilot Program Plan. There are many programs being implemented around the county in attempts to create greater energy efficiency in our housing stock. After an initial assessment of these multiple solutions, it was determined that a majority of these programs: center primarily on one technology, promote a majority of simple low-value improvements, have a high-cost / highly-complicated financing mechanism, or focus on only one demographic of the population (new homes, low-income, etc.). Consequently, the objectives of the Pilot Program Plan were in conflict with these types of approaches.

Once the above approaches were dismissed, only three (3) potential solutions appeared to have the ability to meet the objectives of the Pilot Program Plan. These are highlighted below:

Property Assessed Clean Energy

As described by PaceNow:

"Property Assessed Clean Energy (PACE) is an innovative way to finance energy efficiency and renewable energy upgrades to buildings. Interested property owners evaluate measures that achieve energy savings and receive 100% financing, repaid as a property tax assessment for up to 20 years. The assessment mechanism has been used nationwide for decades to access low-cost long-term capital to finance improvements to private property that meet a public purpose. By eliminating upfront costs, providing low-cost long-term financing and making it easy for building owners to transfer repayment obligations to a new owner upon sale, PACE overcomes challenges that have hindered adopted of energy efficiency and related projects in our nation's buildings.

The City of Ann Arbor created an energy assessment district under Michigan PACE law (Act 270, 2010). Clean Energy Coalition (non-profit) along with the City staff is administering the program. The program has launched and applications from commercial property owners are being accepted. Ann Arbor's PACE program instituted a pre-screening process that is meant to determine whether it makes sense for a certain property owner to apply for financing. During this process energy spending, loan–to-value ratio, and lender's preliminal consent are determined.

Michigan Lean & Green is a state-wide PACE program, structured to allow every municipality to join after holding a public hearing and passing a resolution of intent and adoption. To date, the City of Southfield has joined the program and 1-2 municipalities will be joining by the end of this year. The program is requiring lender consent. Lean & Green financing model is termed open-market or owner-arranged. Lean & Green with match property owners with financial institutions."

The Pilot Program Plan suggests two (2) main issues with the PACE option as it currently exists in Michigan:

1) It is primarily focused on commercial institutions
2) It requires lender consent.

The ability of a homeowner to obtain explicit consent from their mortgager is both unrealistic and also an undue burden. The goal of the Pilot Program is to provide a mechanism that allows residents to enroll in

the program without expending a great amount of time and resources. The PACE option would not provide residents this opportunity.

Increased Millage

A straightforward way to pay for any program would be to increase taxes in efforts to fund the program. An increase in property taxes for Holland residents could be proposed to fund the HER Pilot Program. This solution was determined to require too much complexity for a pilot initiative. The Pilot Program Plan suggests two main issues with the Increased Millage option:

1) There would need to be the necessary approval process, which takes significant time and is not guaranteed to be funded.
2) The Pilot Project Plan proposes that the branding and perception of the Program is essential to its success. A “mandate” or “tax” could negatively effect the perception of the Program.

It has been concluded that the Pilot Program is too early of an initiative to consider increased taxes on a larger population that would receive little immediate benefits. There is much deliberation around energy efficiency investment in private property by means of public capital. The community should see the investment in the housing of the city as a public benefit rather than a local improvement. Once a majority in the community are convinced it is a public benefit, an Increased Millage could be re-considered as a valuable option. The Pilot Program will be more focused on early adopters, and as such, the Pilot Program Plan recommends utilizing other funding vehicles outside of a generalized tax levy.

Holland Energy Trust

The Holland Energy Trust would create a city backed private institution financing instrument. The Trust would be a nonprofit organization established pursuant to either City or HBPW (or both) governing bodies. The Trust would provide investors and organizations, including: foundations, public sector and private sector pension funds, private equity funds, charitable organizations, credit unions, banks, mutual funds and life settlement instruments the ability to invest in energy related initiatives in Holland.

The Trust would provide funding and credit support, attract private investment, and make grants to the City, HBPW, residents, local commercial businesses, institutions, and other potential local organizations. The Trust will work collaboratively with The Program Manager, the City and HBPW in a transparent and strategic manner to accomplish a range of transformative projects for the benefit of the City of Holland and its residents.

To make projects economically viable, The Pilot Program Plan recommends that residents execute an agreement with HBPW to undertake a Home Energy Retrofit. HBPW will then apply to the Holland Energy Trust to provide funding for the individual home retrofits. The Trust will develop a customized financing structure for each project it finances - using taxable or tax-exempt debt, equity investments and other forms of support.

Initial funding for the Trust will be provided by the City of Holland and HPBW, for up to $1,000,000 as initial capital for funding the HER Pilot Program. Additional funding for the Trust will be provided by grants, private investors, philanthropic donations, governmental programs, investment returns, and on-going repayments from HPBW as residences pay future fees on their utility bill. Projects financed by the Trust may or may not be secured by the City's full faith and credit and general taxing power. The final formation of the Holland Energy Trust, its administrative structure, and the programs it funds will be determined by agreement after due diligence has been completed.

The Trust will serve Three Main Purposes:

1) It will serve as a Public Private Partnership, thus encouraging investment through a combination of low risk assets and a secured payment stream;
2) It will provide low cost and easily accessible capital to fund the Home Energy Retrofit Pilot Program; this will increase participation in the Program; and
3) It will allow for additional services to be provided to the citizens of Holland by both the City and HBPW as it serves as a financing body for multiple initiatives.

The Holland Energy Trust will serve as a conduit for financing from diverse types of investments, donations, and multiple other funding sources. It will provide a structure and the associated management to fund individual programs, including the Home Energy Retrofit Program.

On-Bill Finance

This Program Plan also recommends utilizing the HBPW to collect account receivables on behalf of the trust through an "on-bill" financing which will be attached to the electric account for that dwelling. The desired result is enabling the homeowner to make significant investments without up-front cost or an increase in monthly expense.

The "on-bill" financing will allow HBPW to expand the current relationship it has with its current customers. HBPW also has the infrastructure needed to invoice residents for payment – so it is an added economic use of a previous investment. The "on-bill" approach should also allow for a standardized enrollment of each participant in the Program, as individual loans and credit screenings will be minimized. This approach will also create an ease of entry for residents. A separate loan and added payment to a new bank or institution can intimidate potential participants and should be seen as an obstacle to be avoided. The "on-bill" method allows the loan to be part of the customer utility bill and viewed as an additional service rather than additional debt.

The Pilot Program Plan recommends that HBPW define finance as a service that they shall provide and create any necessary rate structure language as needed to bill customers for the service. HBPW already provides services very similar to this type of billing system. It is assumed that credit checks have already been performed on most customers and defaults in these types of programs have been historically low. The overhead costs associated with the EO program and others could also be incorporated to provide management of the on-bill finance service solution.

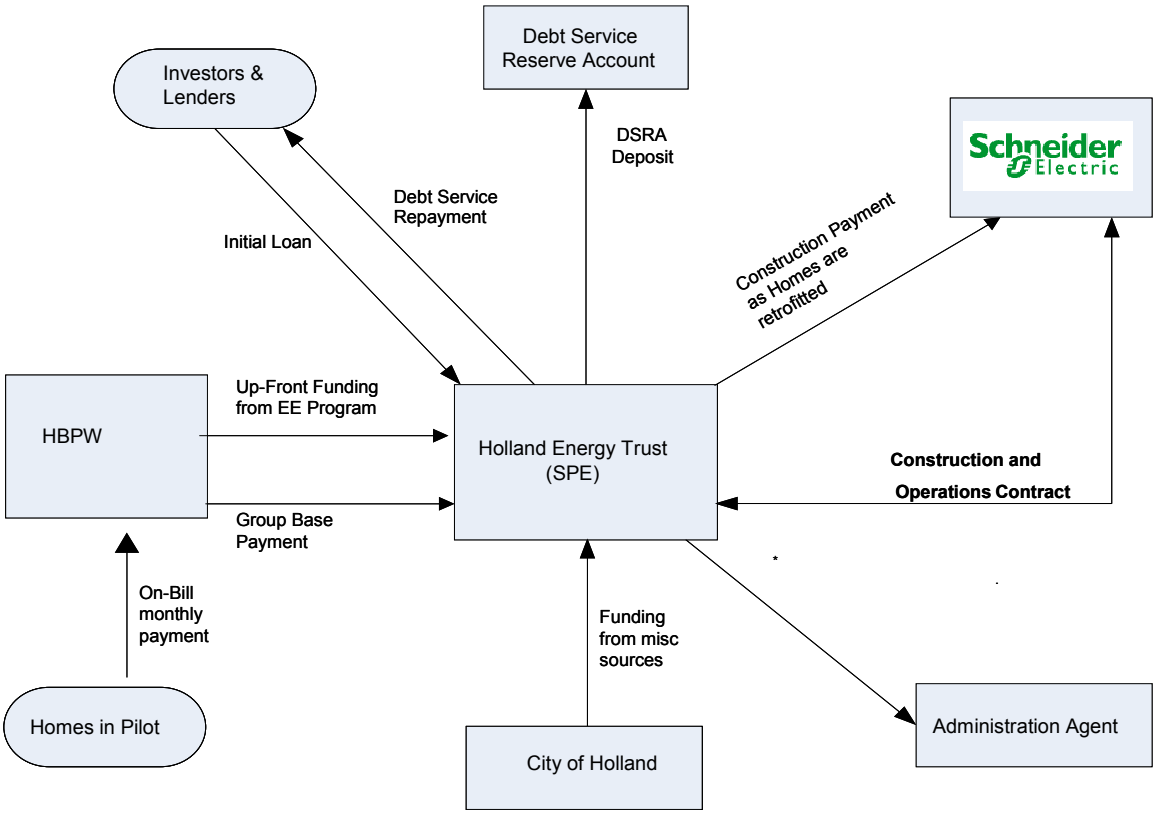
The Program Plan also recommends that the service be tied to the meter and not the individual customer. HBPW has the authority to turn the meter on and off, and as such maintains most services from a "meter" perspective. This also provides HBPW with a unique and effective collection tool that a typical bank or loan can not access.

The majority of the retrofit improvements will stay with the structure that the meter is connected to. If a home owner or tenant leaves the home, then the improvements will stay behind. It should be disclosed at the time of sale that the home has the added service attached to the meter for the remaining number of years left on the agreement. The buyer and seller can then determine if the service shall be fully reconciled at time of the sell, or if the new owner or tenant wish to continue the payment for the future years. With this approach, the home improvements provide both parties with value and the energy use and living standard improvements are allocated to the current homeowner.

Structure

It is recommended that the Holland Energy Trust be created as a Special Purpose Entity with representatives from both the City of Holland and HBPW overseeing its governance and actions. Initial review from national legal counsel has indicated that this structure should be valid. However, the Pilot Program Plan did not include the funding or resources to investigate the legally of the model at the local level.

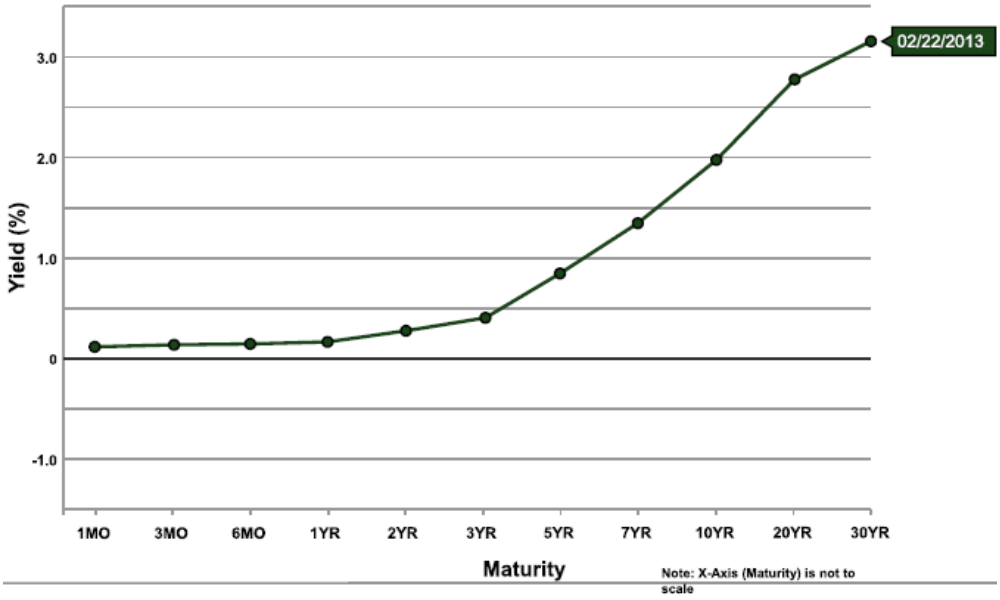
The Program Plan recommends that the City of Holland and HBPW confirm with legal counsel that such a structure can be created. A trusted advisor knowledgeable in local governance should also be retained to construct the appropriate oversight and specific documents required for the formation of the Trust. Below is a visual representation of the proposed structure of the Holland Energy Trust and its interaction with the HER Pilot Program.



Funding

The Holland Energy Trust shall be funded and financed by a number of banking resources including both national firms and local banks. The Community Reinvestment Act (CRA) of 1977encourages depository institutions to provide credit and capital to the needs of the communities in which they operate. This applies not just to local banks like Macatawa Bank, but also national institutions like BofA, Fifth Third, Citi, and others. The Pilot Program Plan, by recommendation of the Holland Energy Trust, encourages investment from many financial resources as it will formulate CRA credits.

The graph below represents the current yield curve. It indicates that leveraging long term debt in today's economy is a wise asset allocation strategy. Capital is available today to make investments in the Holland community at historically low costs. This type of environment will allow for larger higher value improvements under the Pilot Program Plan.



The Holland Energy Trust should utilize a RFQ/RFP process to gather interest from potential funding providers. This will allow the Program to take advantage of the historically low cost of capital available in the market currently. By combining this approach for support with other financial resources, the Trust will contain a diverse funding portfolio. The following pages detail some of the potential funding sources available for the Program. It is also understood that HBPW is currently conducting a study to uncover a greater pool of prospective financial support for the larger Community Energy Plan.

Loan/Debt Finance Options

FUNDING SOURCE	POTENTIAL FUNDING	NOTES
QECB Bonds	Unknown, but Ottawa County has an allocation of $2.7M. State may have some reserves.	These provide major tax credits and thus provide for very low-cost capital in the private market.
MDEQ – Green Project Reserve	$6M was available in 2012.	Primarily focused on water, but energy is also a potential. Also provides for low-cost capital
HUD Loan – 108	This program matches CDGB funds – Holland could qualify for almost $1.5M in Funding.	This program allocates money for "economic development" projects. Since it comes from HUD – the idea of providing funding for home retrofits might be appealing.
Michigan Saves – Home Energy Loan Program	Right now this program limits individual loans at $20,000 and loans can be as high as 7%. The program provides individual home loans currently with individual credit applications. One benefit of the program is its ability to back funding with a loan loss reserve.	The Program Plan does not recommend putting any burden on home owners to "qualify" for a loan. The basis of the Program Plan is also the promotion of comprehensive community improving retrofits (over $20,000 in some case). There is also a need to keep the cost of capital low to make the program a success. The Program Plan recommends discussing with the Michigan Saves program how they can be competitive with other sources of capital and perhaps provide some funding for the Energy Trust.
A mixture of private funding.	There are several instruments in the private capital market that could be utilized to fund the program. These include: Tax-exempt leases, Energy Service Agreements, Sustainable Energy Utility Financing, Pension and Life Settlement, etc.	The private market is currently full of a number of vehicles that might provide low-cost capital for the Program. Alternative energy financing options are numerous in the marketplace. The RFQ & RFP phase should insure the program gets the most competitive rates available.

Grant and Other Funding Options

FUNDING SOURCE	POTENTIAL FUNDING	NOTES
Federal Tax Credits for Consumer Energy Efficiency	Residents will receive 10% of cost up to $500 for most improvements. Specific improvements that will qualify for 30% of cost include solar water heating, geothermal systems, and wind turbines. There will be a focus on these improvements for residents interested. The tax-credit should be used when received to pay down the loan. This is built into the financial model of the Pilot Program Plan.	All participants in the Pilot Program should receive Federal Tax credits as a result of their retrofits. The only reason they would not is due to the fact that they have previously gotten Tax Credits and met their total limit or it is not a “principle residence”.
Utility Rebates	SEMCO currently offers prescriptive rebates for improvements that reduce gas usage in the home. Discussions have been had with them that indicate potential for around $50,000 in funding for the Pilot Program.	HPBW also has a rebate program, but the Program Plan recommends that they add all available EE funding to the Energy Trust in efforts to buy down the cost of the Program residents. It is not expected that additional individual rebates from HPBW would apply given their already large proposed contribution to the Program.
Lowes Community Partners Grant	Potential for up to $100,000 in funding. This grant provides monetary assistance to municipalities looking for support of high-need projects such as: building renovations/upgrades.	Deadline for 2013 is July 30.
DOE Weatherization Grants	DOE grants funding to local community action groups and governments to provide weatherization assistance to homes that fall below a specific income line.	If the city or some other local agency is not already using 100% of these funds, they could be used to supplement the work of lower-income residents enrolled in the Program.
Wells Fargo/National Fish & Wildlife Grants	Provides up to $100,000 to communities with economic benefit and a sustainably focus.	This is a competitive grant – but there is an “Environmental Solutions for Communities” Grant that could be applied for.
A mixture of other local funding and private philanthropy should be able to provide additional funding	HUD, EPA, and USDA all provide funding for specific initiatives that might qualify as part of the Pilot Program Plan. Healthy Homes, the City of Holland Home Repair Program, and the Neighborhood Impact Program could also provide grant funding for income eligible participants in the Pilot Plan.	Other potential funds should come from local employers as matching grants, or basic philanthropic donations. The COMMUNICATIONS PHASE also recommends utilizing some crowd sourcing for addition brand ownership, recognition, and funding.

Budget

A proposed budget was created for the Pilot Program Plan and is included below. The budget used inputs from the Hypothetical Micro-assessment, the RFP for the Home Energy Retrofit Pilot Planner, and the original CEP to determine the proposed budget.

Pilot Program Budget	
Constuction/Audit Program Budget	**$2,407,000**
Soft Costs	----------
Communication/Marketing	$200,000
Misc - Program/Finanice Administration	$100,000
TOTAL PILOT PROGRAM COSTS	**$2,707,000**
Fund Sources	----------
BPW Efficiency Program	$870,000
Tax Credits (Home Envelope/HVAC)	$55,000
Tax Credits (Renewable Credits)	$42,000
Gas Rebates	$48,000
Home Repair Program	$30,000
Public/Philenthropic/Employer Donations	$120,000
Grants	$55,000
City Contribution	$130,000
TOTAL FUNDING/COSTS	----------
Total from Fund Sources	**$1,350,000**
TOTAL PILOT PROGRAM COSTS	**$2,707,000**
Loan Borrowed Day 1*	$1,707,000
Total Funding outside BPW/City	$350,000
Outstanding Loan**	**$1,487,000**

** This amount borrowed is the total amount for program minus BPW and City contribution*

*** This amount is what is left after Year 1 Payment from rebates,tax credits, etc.*

It is assumed that partial funding will need to be borrowed in order to complete the Pilot Program in accordance with the proposed schedule in the plan. This amount is specified in the "Loan Borrowed Day 1" line in the above budget. It is also possible that this amount could be funded internally and paid back over time with the same assumed investment returns to the City/HBPW.

Hypothetical Mico-Analysis Results

The below table represents the outputs from the Hypothetical Micro-assessment (which is contained in the Appendix). The model was run and associated savings were utilized to validate the costing and funding of the potential Pilot Program.

Savings Generated

Home Name	Savings	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
BAKER	$1,881	$1,937	$1,996	$2,055	$2,117	$2,181	$2,246	$2,313	$2,383	$2,454	$19,683
BUSKIRK	$692	$713	$734	$756	$779	$802	$826	$851	$877	$903	$7,241
GRAAF	$1,444	$1,487	$1,532	$1,578	$1,625	$1,674	$1,724	$1,776	$1,829	$1,884	$15,110
JANSSEN	$1,227	$1,264	$1,302	$1,341	$1,381	$1,422	$1,465	$1,509	$1,554	$1,601	$12,839
VOSS	$1,404	$1,446	$1,490	$1,534	$1,580	$1,628	$1,676	$1,727	$1,779	$1,832	$14,691
TOTAL	**$6,648**	**$6,847**	**$7,053**	**$7,264**	**$7,482**	**$7,707**	**$7,938**	**$8,176**	**$8,421**	**$8,674**	**$69,564**

Improvements and Costs Generated

The following table details the outputs of the Hypothetical Micro-assessment. Capital match from the Program was assumed to be on a sliding scale ranging from 50 cents on the dollar for home retrofits with shorter energy paybacks to $1 for $1 matches on homes with longer energy payback. This structure was used as a test only - to prove the financial viability of the model. Specific matching funds will be determined after Program review by the city and the specific funding allocations have been approved.

HOME	Total Investment	Capital Match	On-Bill Finance	Annual Energy Savings	IMPROVEMENT								
					Smart Tstat	New Windows	Air Sealing	Cool Roof	New Furnace	Solar Water Heat	Instant Water Heater	CFL Lighting	LED Lighting
Baker (.5)	$29,524	$9,841	$19,683	$1,881	X	X	X		X		X	x	
Buskirk (1)	$14,482	$7,241	$7,241	$ 692	X		X	X			X		
Graaf (.6)	$24,176	$9,066	$15,110	$1,444	X	X	X				X	X	
Janssen (1)	$25,678	$12,839	$12,839	$1,227	X			X	X	X			X
Voss (.8)	$26,443	$11,752	$14,691	$1,404	X	X	X		X		X	X	
Total 5 homes	**$120,303**	**$50,739**	**$69,564**	**$6,648**									
Total Program	**$2,406,060**	**$1,014,780**	**$1,391,280**	**$1,391280**									

Cash-flow Generated

Below are the assumptions for the funding of the Pilot Program Plan as a result of the Hypothetical Micro-assessment.

Fund No	HER Pilot Program	Pilot Program Borrowed Budget Cost	Estimated Pilot Pool Energy Savings
1	Total Borrowed Funding	$ 1,707,000	$ 132,960
TOTAL ALL ABOVE ECMs/FINANCED AMOUNT		**$ 1,707,000**	**$ 132,960**
Interest During Construction (IDC)- Deferred		$ 12,501	
		$ -	
TOTAL ECMs INCLUDING IDC		**$ 1,719,501**	**$ 132,960**
Federal Tax Credits/Grants/ Rebates/etc - Paid Year 1		**$ 350,000**	

The below assumptions were used to determine the validity of the cash-flow and inflows of payment into the Holland Energy Trust to service the required debt.

Financing Assumptions	
Total Funded Amount PlusConstruction Interest	$ 1,719,501
Payments per year (1, 4, 12)	12
In Advance (1), In Arrears (0)	1
Term (years)	10
Interest Rate	1.70%
Construction Financing	
Construction Term (months)	10
Construction Financing Rate	1.70%
Accrued (1) Capitalized (0) Deferred (2)	2
Funding Date	08/01/13

Escalation Rates	
Energy Savings	3.0%

The below cash-flow was generated as an output of the model. This is the payment stream that would be used to service the initial debt needed to fund the HER Pilot Program. The model run for this exercise intended to keep the payment obligations of the Holland Energy Trust at a neutral cash flow throughout the future years of the Pilot program repayment.

	1	2	3	4	5	6	7	8	9	10
Savings (no utility rate escalation-used for Cashflow)										
Energy Savings	$ 132,960	$ 136,949	$ 141,057	$ 145,289	$ 149,648	$ 154,137	$ 158,761	$ 163,524	$ 168,430	$ 173,483
Additional Funding		$ 350,000								
Total Annual Savings	$ 132,960	$ 486,949	$ 141,057	$ 145,289	$ 149,648	$ 154,137	$ 158,761	$ 163,524	$ 168,430	$ 173,483
Costs										
Principal	$ 107,015	$ 463,134	$ 122,470	$ 128,833	$ 135,433	$ 142,278	$ 149,376	$ 156,735	$ 164,365	$ 149,864
Interest	$ 25,945	$ 23,815	$ 18,588	$ 16,456	$ 14,215	$ 11,859	$ 9,385	$ 6,789	$ 4,065	$ 1,221
Total Lease Payment	$ 132,960	$ 486,949	$ 141,057	$ 145,289	$ 149,648	$ 154,137	$ 158,761	$ 163,524	$ 168,430	$ 151,085
Total Program and Financing Costs	$ 132,960	$ 486,949	$ 141,057	$ 145,289	$ 149,648	$ 154,137	$ 158,761	$ 163,524	$ 168,430	$ 151,085
Net Cash Flow Benefit - Goal is Neutral - Service Dept	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 22,398**

The above cash-flow makes several assumptions about the potential for the Pilot Program. The assumptions made can be reviewed by referencing the previous pages of the FINANCIAL PHASE Section as well as the Hypothetical-Micro assessment in the Appendix.

Construction Phase

Budget - $2,307,000

The processes and procedures established by the Program Manager to execute the Home Energy Retrofit Program for the City of Holland should be certified to the requirements of ISO 9000. The standard is based on a number of quality management principles including a strong customer focus, the motivation and implication of top management, the process approach, and continual improvement.

The Program Manager will assign the follow roles to manage the CONSTRUCTION PHASE:

Construction Manager: The CM is the project manager's supervisor. CM roles include:

- Working with project manager to strategize project sequencing and schedule
- Making sure that project manager has all needed resources
- Accountability for project finances
- Submittal reviews
- Plan reviews
- Constructability reviews
- Project technical and management resource

Construction Services Manager: The CSM will work with project financials. CSM roles include:

- Subcontract negotiations
- Subcontractor billing
- Project billing
- Equipment purchasing

Project Manager: The PM will be resident's day-to-day contact with Schneider Electric.

With Schneider Electric serving as Program Manager, the CONSTUCTION PHASE will be executed in accordance with Schneider Electric's customer satisfaction and quality plan, this sets forth the procedures and guidelines used in ensuring the required performance standards or services levels are achieved by the all service providers employed by Schneider Electric to implement the retrofits. The suppliers selected for the assessment/audit contract delivery will be reviewed and approved through an independent review performed and monitored by PICS Auditing.

The Customer Satisfaction and Quality Service Surveillance (CSQSS) describes the systematic methods used to monitor performance and to identify the required documentation and the resources to be employed. The CSQSS provides a means for evaluating whether the service contractors are meeting the performance/customer satisfaction and quality levels identified in the Schneider Electric Quality Control Plan.

This CSQSS defines the roles and responsibilities of all members of the Home Energy Retrofit project team, identifies the performance objectives, defines the methodologies used to monitor and evaluate the supplier's performance, describes quality assurance documentation requirements, and describes the analysis of quality assurance monitoring results.

Performance Management Approach

The CSQSS will define the performance management approach taken by Schneider Electric to monitor and manage the suppliers and service providers' performance to ensure the expected outcomes or performance objectives communicated in the Statement of Work (SOW) are achieved. Performance management rests on developing a capability to review and analyze information generated through performance assessment. The ability to make decisions based on the analysis of performance data is the cornerstone of service performance management; this analysis yield information that indicates whether expected outcomes for the project are being achieved by the supplier.

Service performance management focuses on assessing whether outcomes are being achieved and to what extent. This approach migrates away from scrutiny of compliance with the processes and practices used to achieve the outcome. A performance-based approach enables the supplier to play a large role in how the work is performed, as long as the proposed processes are within the stated constraints. The only exceptions to process reviews are those required by law (federal, state, and local) and compelling business situations, such as financial stability, safety and health. A "results" focus provides the supplier flexibility to continuously improve and innovate over the course of assessment/audit and contract/delivery order as long as the critical outcomes expected are being achieved and/or the desired performance levels are met.

Performance Management Strategy

The supplier is responsible for the quality of all work performed and care of the customer's premises. The supplier measures their quality through the supplier's own quality control plan (QCP) and compliance requirements within PICS Contractor Auditing. All suppliers will submit the Quality Control Plan Report for approval by Schneider Electric. Quality control is work output, not workers, and therefore includes all work performed under this supplier/delivery order regardless of whether the work is performed by supplier employees or by service providers. The supplier's QCP will set forth the staffing and procedures for self-inspecting the quality, timeliness, responsiveness, customer satisfaction, and other performance requirements in the SOW. The supplier will develop and implement a performance management system with processes to assess and report its performance to Schneider Electric.

Schneider Electric will assess performance using Supplier Performance Assessment Report (SPAR) to determine how the supplier is performing against communication performance objectives. The SPAR assesses a supplier's performance against communicated performance objectives. The SPAR report on performance provides both positive and negative, and provides a record on a given in-home contract during a specific period of time.

Each assessment will be based on objective data (or measurable, subjective data when objective data is not available) supportable by program and in-home contract management data. Potential sources of will be defined and agreed to prior to the execution of sub-contracts by Schneider Electric. Examples of typical sources include:

- Supplier operations reviews
- Status and progress reviews
- Production and management reviews
- Cost performance reports and other cost and schedule metrics
- Other metrics:
  - Measures of assessment audit success and accuracy
  - Measures of progress and status of critical resources
  - Customer feedback/comments and satisfaction ratings
- Service Provider Reports

Schneider Electric utilizes PICS auditing for their contractor prequalification services. PICS acts as an extension of Schneider Electric, validating that regulatory forms, insurance requirements, and contractor licenses are in compliance. PICS employs highly trained and experienced safety professionals to perform one-on-one reviews verifying everything from paperwork in the office to performance in the field. They also have developed assessments which look at Craft Training, HSE competencies, MSHA training. PICS consideration and selection process is based upon application and stringent background research.

Methodologies to Monitor Performance

Surveillance Techniques
The SOR will use the following methods of surveillance:

- Construction Manager Oversight
- Random Monitoring
- 100% Inspection & Commissioning
- Periodic Inspection
- Customer Survey
- User/Customer Complaints

Customer Feedback

The supplier is expected to establish and maintain professional communication, in-home care, security and appearance between its employees and customers. The primary objective of this communication, in-home care, security and appearance is customer satisfaction. Customer Satisfaction is the most significant external indicator of the success and effectiveness of all services provided and can be measured through customer complaints and structured customer satisfaction survey. Performance management requires the supplier to be customer focused through initially and internally addressing customer complaints and investigating the issues and/or problems. The customer will be encouraged to direct complaints directly to the Schneider Electric Construction Manager. Customer feedback may also be obtained either from the results of formal customer satisfaction survey or from random customer complaints.

Acceptable Quality Levels

The acceptable quality levels (AQLs) included in Enclosure 1 for supplier performance are structured to allow the supplier to manage how the work is performed

Quality Assurance Documentation

The Performance Management Feedback Loop

The performance management feedback loop begins with the communication of expected outcomes. Performance standards and performance monitoring techniques are express in Enclosure 1.

Analysis of Quality Assessment

Determine Performance
The Project Manager shall use the monitoring methods cited to determine whether the performance standards and AQLs have been met. If the supplier has not met the minimum requirement the supplier will receive a negative SPAR.

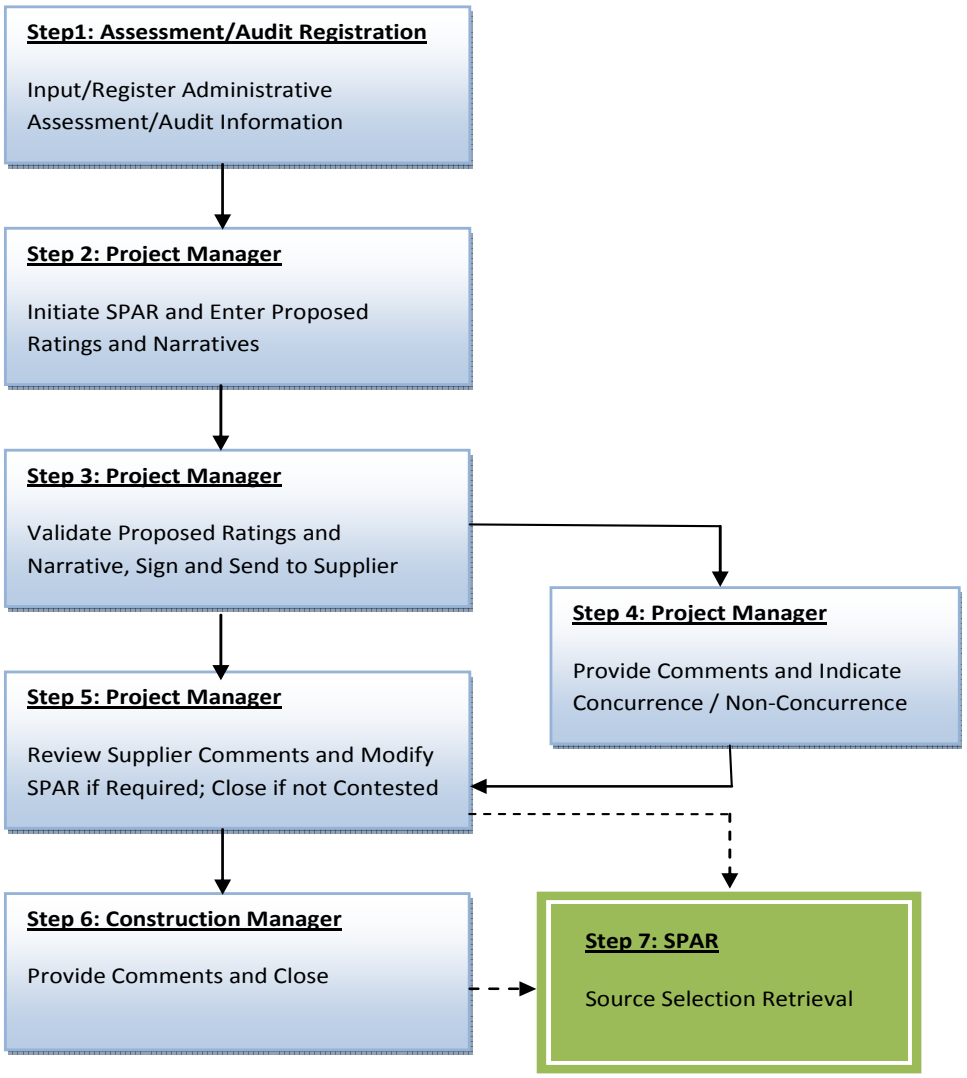
Reviews and Resolution
Upon Program Manager review and signature of the SPAR by the CM, the supplier will be notified and given the opportunity to review and comment to indicate concurrent/non-concurrence. If the supplier does not concur, the CM shall resolve significant discrepancies.

Performance Standards
Enclosure 1 below provides standards that will be used to measure supplier performance and are the key customer satisfaction elements to the SPAR.

Enclosure 1: Performance Standards

Performance Objective	Performance Standard	Acceptable Quality Levels	Methods of Surveillance
Provide operations and accuracy for the in-home assessment/audit	Services provided in accordance with SOW; Section:	100%	Random Inspection
Provide On Time Delivery of Assessment	Services provided in accordance with SOW; Section:	100%	Random Inspection
Provide Program & Technical Management to meet performance and cost objectives	Services provided in accordance with SOW; Section:	100%	Random Inspection
Provide sustaining engineering services and perform assessment plan	Services provided in accordance with SOW; Section:	100%	Random Inspection
Provide satisfactory services in accordance with the SOW	For all valid complaints, a plan of resolution is provided within 3 days.	100%	Written Users/Customer Complaints
Provide proof of background and criminal checks for all supplier staff that arrives on customer's premises	For all supplier valid staff, proof of clearance is provided prior to arrival on customer premises	100%	Confirmation of background check supplied by supplier
Provide data deliverables in a timely manner in accordance with Supplier Data Requirements List in the SOW	Data deliverables received on schedule in accordance with each deliverable	95%	Random Inspection
Provided data deliverables at a quality level in accordance with Supplier Data Requirements listed in SOW	Data deliverables received with a first pass yield, Assessment Acceptance Rate, and On Time Delivery	95%	Random Inspection
Overall customer satisfaction based on technical performance, schedule adherence, staffing, appearance, in-home care, security, & overall management.	100% of end users satisfied with supplier overall performance	95% of end users satisfied with supplier overall performance	End User Satisfaction Survey

Enclosure 2: Points of Contact/Workflow Chart



Marketing Phase

Budget - $200,000

Overview

As Holland prepares to implement the recommendations of this PPP, there is a critical communicative component that requires some advance planning and strategizing.

The needs for this sort of an initiative are three-fold. First, it is critical to raise awareness and excitement among residents. Without their energetic support, participation, and civic pride, the entire project will struggle to gain the early momentum needed to achieve established benchmarks. Second, throughout the entirety of this long term program, valuable lessons will be learned (both good and bad) that can help hundreds, if not thousands, of municipalities around the globe plan and create more sustainable communities. As thought leaders and cutting edge implementers, it is our responsibility to educate engineers, civic planners, politicians, business leaders, and even the general population around the world about the ways in which they can best incorporate the lessons learned in Holland to their communities and homes. Finally, this project creates an outstanding opportunity for promotion of the City of Holland, Schneider, and all others involved in taking these great strides. There will be long-term benefits in effectively capitalizing on the marketing power of an innovative, timely, and impactful job well done.

A long running effort such as this one requires more than just a short list of marketing tactics. Over the course of the project, technologies and media will continue to evolve and change significantly (ten years ago, there was no Facebook, YouTube, or Smartphone), meaning that the most crucial portions of the communicative effort need to remain flexible and adaptive so that great stories and metrics can be tracked and shared regardless of how technologies change.

The recommendations that follow represent formative thinking around ways to approach each of the key communicative goals of the project. Beyond the deliverables, it is highly recommended that a series of regularly scheduled ongoing meetings/summits are established to assess and adapt the goals and tactics of the campaigns.

Communication Strategy and Planning

The onset of this project should include an intensive process to establish the goals of the entire project. Some of these, such as total energy used, will become key metrics to track and communicate throughout the process. Others, such as media mentions, new business relocations, increases in tourism, etc. would serve to track the success of the strategies themselves.

This process would seek to gather the leadership of the various organizations involved in the project and outline the key talking points, messaging and success metrics for the entirety of the project. These would then serve as guidelines towards the communication campaigns.

Initial Recommendations

Each audience requires different types of messaging and different channels for delivery. Below are a few initial thoughts to best communicate and accelerate the program.

Holland Residents // Participant Recruitment and Public Awareness Campaign

Simply put, this Plan needs to be wrapped in a very compelling brand. Something that evokes tremendous local pride and allows the residents and especially the participants to think (and share), "How cool is it that this is MY town?" We must think bigger than newspaper headlines and instead think to winning over hearts and minds that it is an exciting honor to live here and be a part of a movement that will reverberate across the nation and around the world. (Think of such campaigns as Virginia is for Lovers, Keep Austin Weird, Don't Mess with Texas, etc.) This may include some "teaser" types of elements in public spaces with posters, billboards, or even more "guerilla" tactics such as electric outlet plug covers in coffee shops, a "Blackout Beer" at one of the local breweries, or attention-grabbing "public art" displays around town.

As this campaign is established, we then begin to build upon the "honor of participation" with tangible, real world artifacts (such as yard signs, mailbox flags, car stickers, t-shirts, etched plaque on home, notoriety from historic association, etc.) that support online efforts to announce and explain the hows and whys of the effort while encouraging participation. There should be a significant feel of "bragging rights" for homes that are participating and corresponding curiosity and even jealousy from the neighbors who aren't yet. It is an honor to have been selected as a participant and over the course of such a long initiative, continuing to build on the waiting list is critical.

Especially in the pilot year, the homes participating should really get the VIP treatment in the form of unanticipated gifts and courtesies all throughout the year. Occasional, but simple things like a complimentary dinner or a tree planted in their yard will go a long way to keep them inspired, actively participating, informed about the program's progress (and their individual impact, when possible) and gladly talking about the program. Partnering with local businesses (perhaps even some of which will be participating in the effort) to establish some of these rewards could further the "we're all in" community feel and becomes very shareable via media. Since participating homeowners will be sharing data from their homes, it would be best if most (but perhaps not all) of these gifts came as a celebration of an achievement in their home ("You've used 25% less energy than you had at this time last year. Thanks!") or as a collective ("Thanks to your hard work and citizenship, members of the Holland Legacy Initiative have saved more than $200,000 in energy and environmental costs for the city.").

An early partnership with an historic neighborhood would create an excellent backdrop to the story to be told. Those older homes present unique challenges and the clustering of many participants geographically will create further momentum and excitement.

Website

They site should have plenty of capacity for flexible updating and publishing, but it should also feature some very high-end visual elements that help to tell the story of the project and show that there are critical metrics being tracked and reported. This is not just a surface level attempt at publicity for the city, but rather, a calculated and considered scientific initiative. It's not a stunt, it's a sustainable process and a commitment to excellence.

The following are a few key components that could become a part of the site:

Metric-driven visuals
Very simplified, but compelling scoreboards for tracking and comparing Holland's progress towards established goals (month over month, year over year) and in comparison to other cities.

Infographics
Showing expertise in the plan and in action steps to be taken by individuals through visuals. These same graphics could then be used in monthly newsletters, as well as end-of-year reports.

Animations
A series of short 1-2 minute animations explain what this effort is all about and educate around key components.

Household Pre-Audit Quiz
Residents would be challenged in a short quiz to test their knowledge. The end goal would be to pull them in to volunteer to participate and to educate them.

Recruitment Tools
Visitors to the site would be challenged to participate and given tools to encourage others to do the same. Rewards would be provided to those who actively and effectively refer participants. The tone of these would all be light-hearted and fun, making it more about being proud of their hometown than nagging or talking down to neighbors.

Participant Portal
Depending on technological support, a future iteration of this site may also feature a participant portal that allows individuals to track what's happening in their home (before and after an audit, for example) or gamify the process of continual improvement.

Participant profiles
In addition to other ongoing news items, families and businesses that are participating could be featured through ongoing blog posts of quick video interviews. This is also another method of rewarding and celebrating their commitment.

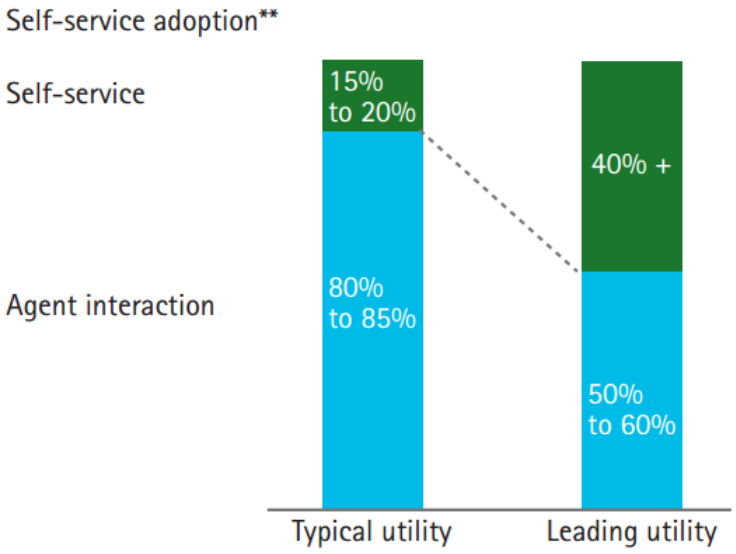
Mobile App

As the program gets established, there is an opportunity to consider piloting an app that could help families track their usage and milestone achievements. Properly conceived, this could eventually be scalable for other communities or better, individual homeowners around the country.

Mobile apps are changing the way we communicate, shop, and learn about the world. They're also changing the way we interact with traditional service providers. As an example, a recent study estimates that by 2016, more than half of US bank account holders will conduct the majority of their banking via mobile devices. The majority of B2C service providers are currently developing mobile engagement strategies. This includes many utilities throughout the nation that are beginning to introduce mobile apps to the market.

Table 1b

By increasing self-service adoption, a typical utility could realize annual savings of more than $1 million to $3 million, or more.*

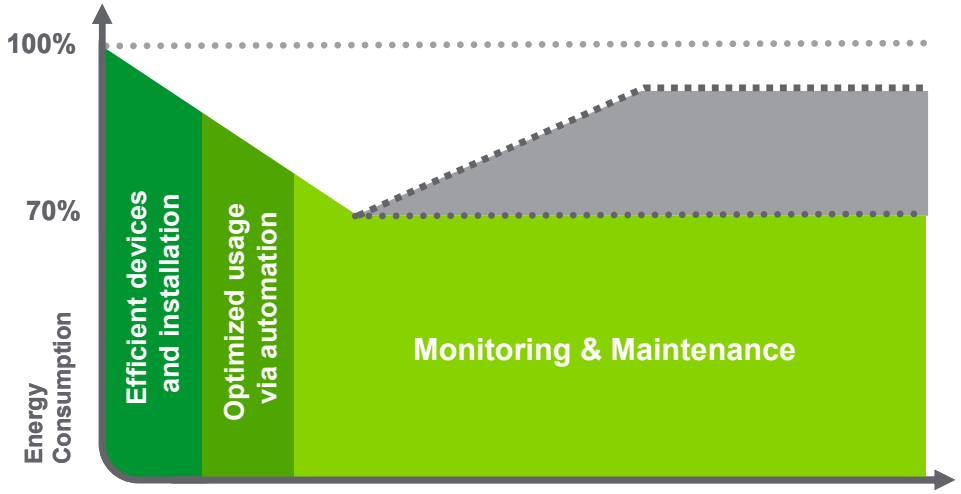


* Based upon 2 million annual call volume at $5 cost per call, 10 to 25 percent net increase in self-service adoption

** IVR Resolution Rate (Proxy for self-service adoption) - North American Client High Performance Customer Care Benchmarks – Accenture (2007)

Table 1b above references a 2010 Accenture study. It is included to show the implications of allowing customers to interact more via web and mobile technology with their utility providers. As technology continues to develop over the next several decades, it is critical that BPW is developing client facing interactive tools. We thus recommend that the HER Pilot Program includes execution of a mobile app pilot.

Ownership of conservation strategies is a key success driver. A mobile application should be deployed that provides Holland residents who engage in energy efficiency retrofits more data and more choices. This interaction will impact long-term success of operational efficiencies in the home. The application should allow residents access to usage information, energy analysis, and device control at a minimum.



Graph 1b

Graph 1b above details the results of a 2009 Energy Systems Labs Analysis. The results of the analysis found a 30% energy increase in buildings when residents are not engaged in routine energy management practices. Specific measures in the homes including higher insulation will save energy regardless of resident actions. However, there are a number of energy conservation measures (temperature change when unoccupied for example) that require willingness on behalf of the home resident.

FROM HBPW REPORT: *"While we don't yet offer fiber-to-the-home service to residential customers, a network expansion could open the door to a number of exciting technologies—things like Smart Metering that makes it easy to monitor your energy usage in real time and adjust accordingly to save power and money—on top of Internet connection speeds that are, on average, 30 times faster than cable or DSL"*

Schneider Electric recommends that HPBW engage in a Smart-Home program. The pilot homes selected for retrofits under this Pilot Program Plan should be the beta test for the Smart Home program. Smart Home features would include dynamic pricing, smart meters, controllable devices in the home, web and mobile platforms for client engagement. The specifics of some of these are highlighted in this plan, however this document does not provide the in-depth analysis needed before such is offered. Schneider Electric recommends a parallel path (in conjunction with the execution of this Pilot Program Plan) strategy with direct engagement from HBPW for the execution of the pilot Smart Home program.

Public Spaces Display/Scoreboard

Since the entire city of Holland is making a sincere commitment to this effort, it only makes sense that a tangible, physical part of the city should highlight the goals, track the progress, and honor the participants.

In a prominent and central location in the city, a digital and interactive display would be created to artfully display key rankings and progress that otherwise would be restricted to the web. Included in this display could be 1) a scoreboard tracking the key metrics, 2) a leaderboard showing how Holland stacks up against the competition, 3) explanations about how a viewer can make differences and be a part, 4) a map showing participating homes, neighborhoods, and businesses around the city.

Youth Element

Properly considered, this project could impact generations of residents. One possible strategy would be to arm and train members of a certain Hope College class/organization to go present and teach about the basics of sustainable design and energy conservation in elementary classrooms throughout the area. These classrooms could then be given the challenge of leading efforts in and around their schools or by brainstorming innovative ideas for how current problems could be handled in the future. These efforts could be tracked and measured, creating a competition amongst schools and/or classrooms, with the winners earning recognition, certification, and/or prizes. This wouldn't be thought of as year-long curriculum, but rather as a day project or ongoing exercise (perhaps the college student visits once per month).

Youth Extension: Class of 2026

It could be incredibly interesting to select a group of kindergartners in 2013 to follow throughout their schooling through high school graduation (2026). Snippets of interviews with them and their families and what their experiences are in the community would be released as Holland's 20 year vision of becoming "The Most Energy Efficient Town in the Midwest" is realized. There may even be a way to incentivize the kids to stick around Holland for the entire 20 year program by providing them gratis education at Hope College.

Churches

Given its high number of churches, getting church leadership involved will be important. As the leaders of these groups become invested they will share their enthusiasm with their congregants. Perhaps a retrofit of one or two church buildings or parsonages could occur. There is also great potential in creating a church-specific sub-program that allows those groups the opportunity to track their progress and participation collectively. Appropriate materials and even education sessions could frame the importance of this project from a perspective of doing well by doing right for the community they serve.

Municipal and Business Level Participants

Similar to the above-mentioned school and church groups, there is also an intriguing play in the ways the stories are told surrounding businesses large and small. These groups will all be looking for ways to achieve efficiencies and save capital, and our program can be a great way to do so. Selected businesses might have to pledge to live to an established list of rules and provisions that go all the way down to the employee level, allowing them internally focused metrics to track around details as specific as what hours they leave lights and computers turned on and running, carpooling, etc. Potentially, some internal incentive-based programs might help to spark consciousness and participation at home, as well.

Michigan Government

The Michigan Public Service Commission (MPSC) is the state's "expert" on energy matters. The MPSC is therefore in the best position to work with Holland citizens to help them meet their targets under Michigan's Energy Optimization statute (i.e., Public Act 295 of 2008). John D. Quackenbush was appointed by Governor Rick Snyder to serve as Chairman of the MPSC on Sept. 15, 2011. Schneider Electric met with Chairman Quackenbush in early February regarding several matters and including some of the work planning we are performing with Holland currently. As an outcome of that meeting, the MPSC is interested in working with Holland to ensure that its unique needs and objectives are attained in a cost-effective manner.

Tracking Phase

Budget - $30,000

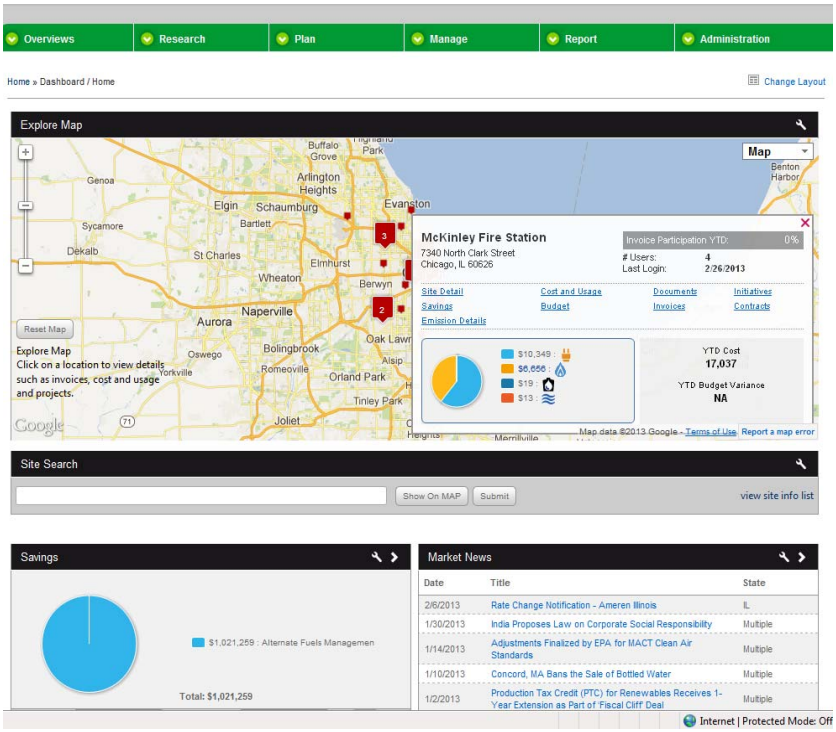
The Pilot Program Plan proposes to track, benchmark, and label enrolled homes utilizing an award winning Software-as-a-Managed Service (SaaMS) technology platform called Resource Advisor. This tracking system will deliver visibility into energy and resource use at all levels of a city, from enterprise level to individual meters. It is currently in use by over 800 organizations, supporting over 200,000 users, and tracking over 150 different energy and sustainability related services and metrics. This tracking and management approach by a proven and established system will enable the City of Holland to measure, manage, and report on all relevant data streams throughout both the Pilot and also future phases of the HER Program. Moreover, it will provide dynamic analytics to benchmark internally and externally and develop, evaluate, and track goals and projects associated with reduction initiatives across the City of Holland's footprint, thus supporting its public commitment to sustainability and energy efficiency.

Resource Advisor provides key attributes and benefits including, but not limited to:

- Customization to match hierarchy to City of Holland's municipal structure
- Dashboard library that aggregates content from the full data set onto personalized dashboards
- Extensive data quality strategies and management to identify data errors and processes to address anomalies
- Extensive reporting at any level of the municipality from citywide to individual residence with ability to normalize data to compare similar properties.
- Advanced business analytics with intuitive 'drag and drop' interface for benchmarking, customized labeling, resource opportunity identification, and dashboard creation.
- Projects and scenarios planning that allows the City of Holland to track resource reduction project initiatives from the HER and larger CEP scale projects.

This tracking approach is recommended in the PPP due to its ability to configure and standardize on the specifics of the HER Program, and also the Home and Building Labeling initiative. When deployed across the city, it will provide a multitude of functional areas. The Program will have the ability to store any number and type of quantitative and qualitative attributes associated with an entity. This provides multiple ways that residents, departments, buildings and other users can be grouped and filtered allowing precise analytics for reporting, classification, labeling, and decision making.

Example Dashboard with 'Drill Down' City Map



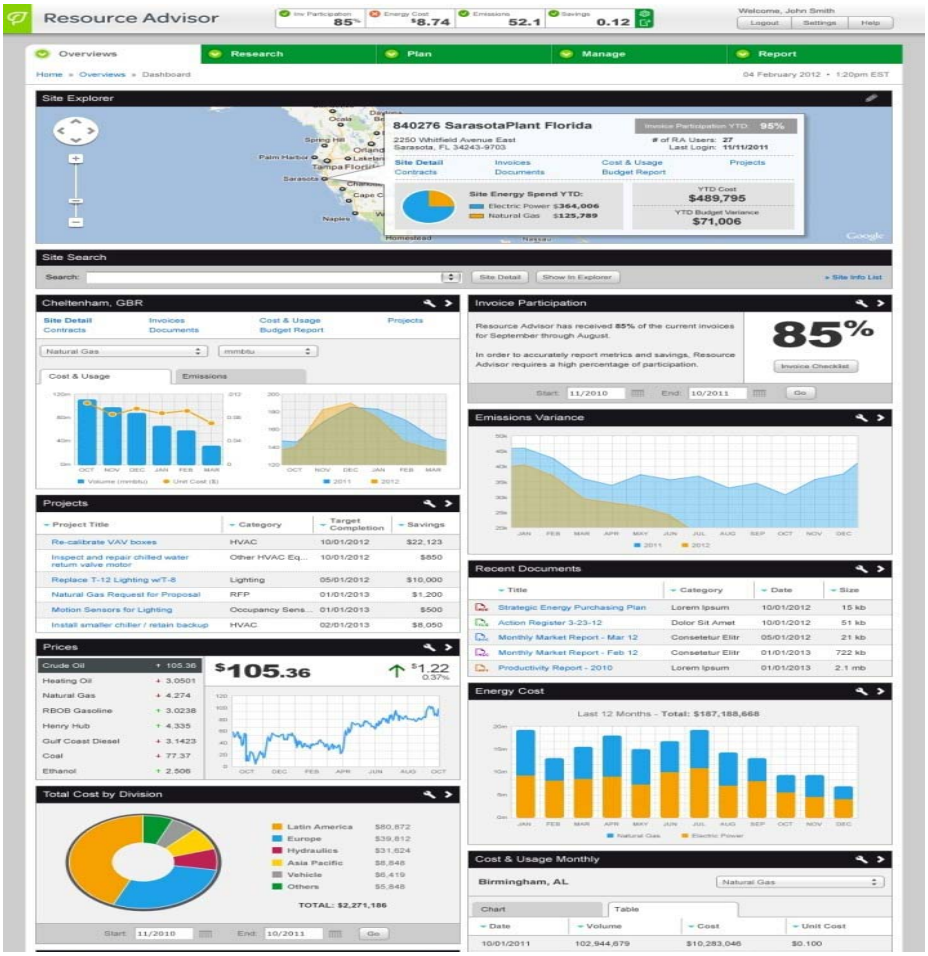
Maps of the city can be created detailing the rated and labeled homes in the city on a house by house basis. This information would only be made public with permission of the home owner. However, a larger "generic" view of Holland can also be generated to show how houses are performing in "regions" or "zones" rather than by specific address. As more homes and buildings become labeled, the tracking system will be a common central access point giving purview and visibility into the success of the Program.

The Program Manager and other city administrators will use the system to provide user defined and site dashboards to provide a truly personalized approach for accessing critical data and information. Dashboards are completely configurable with a comprehensive widget library for emissions data and can be customized by individual house depending on what data the resident wants to see. Visual representations of benchmark comparisons are made easy with real-time chart building. Analysis of data ranging from simple aggregations to minimums and maximums, as well as other outliers, will allow the City of Holland to identify inefficiencies and focus on needed improvements to drive cost savings and reduced energy and environmental impacts.

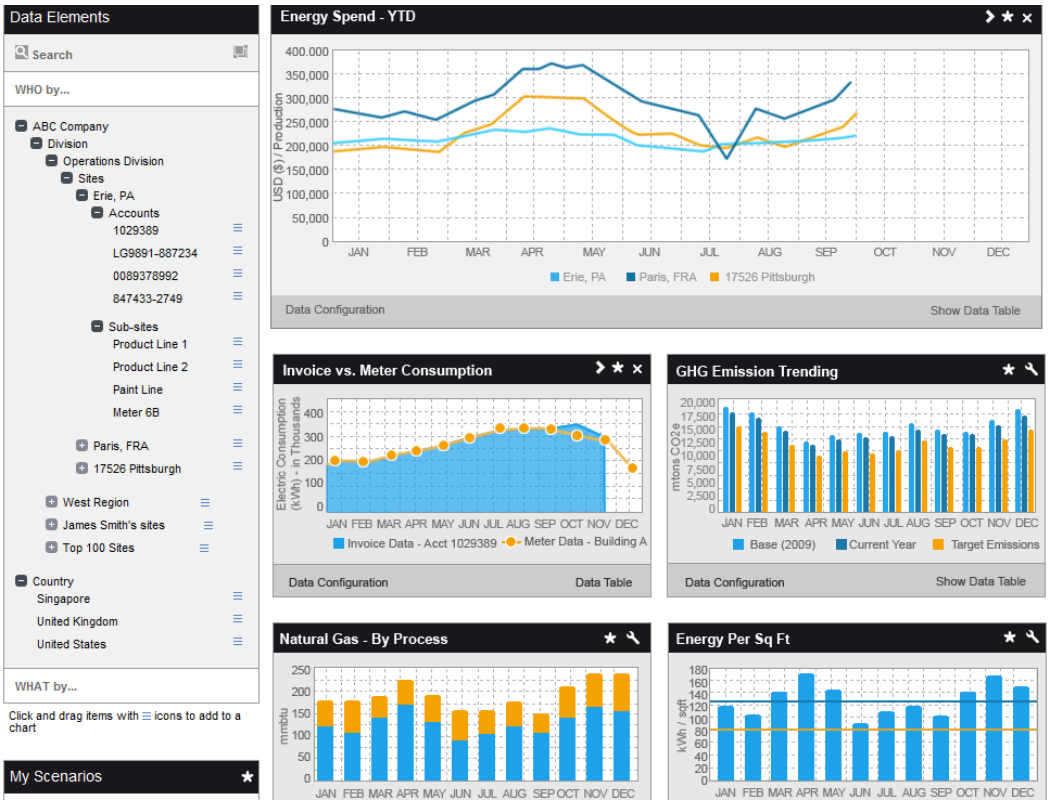
The Program will provide reports such as Monthly, Summary, Variance, Budget and Savings for energy, water, waste and other metrics. The tracking system will also aggregate all cost, consumption or emission data across any organizational structure which has been defined in the system. This includes the ability to track, report, and manage Scope 1, 2, and 3 emissions data. This aggregated or non-aggregated data can be combined with customer specific attributes such as the proposed energy label, DOE Home Energy Score, and/or other metric data to normalize the cost or energy consumption data.

Custom reports will be generated through the tracking system and allow Holland to benchmark home performance. The Program Manager will also leverage the Business Analytics functionality within the system to develop tailored reports associated with CDP, GRI, Energy Star, EPA MRR, and other relevant external reporting requirements. Maps of homes in the program will be created for personalized micro-views, and Holland will be classified into "zones" for potential public viewing and access. The outputs from this tracking system can be used for Public Displays such as the artist commissioned downtown project recommended in the COMMUNICATIONS PHASE.

Example Energy and Sustainability Dashboard



Business Analytics



The Program Manager will also use the tracking system to track key criteria of home energy conservation measures including ROI, payback, project cost, annual savings, project implementation status, action plans, supporting documentation, and other qualitative information. Scenario analysis will also be performed to determine the effect that energy and GHG resource reduction projects will have on the City of Holland's resource conservation and cost saving goals based on actual and forecasted values.

In addition to the above, the tracking tool will also be able to start planning future phases of the HER program. The tool will be used to provide the high-level feasibility assessments at the beginning of each Phase. Scenario planning can then conducted to determine with more accuracy the costs, resources, timing, and other key data that will be provided as a result of the Pilot Program. Currently, the Plan is relaying on hypothetical macro averaged data. The goal of the Pilot Plan is to create real data that can be used to make more informed decisions about future phases.

HYPOTHETICAL MICRO ASSESSMENT

Schneider Electric

HYPOTHETICAL MICRO ASSESMENT

Budgeting and scenario planning are complicated tasks to perform prior to actual home selection, feasibility assessment, and home auditing. The following table is taken directly from the Community Energy Plan, where a macro level assessment was completed.

Site Energy (Gas & Electricity)											
Model (IP)	Space Cooling	Heat Rejection	Space Heating	Fans	Pumps	Equipment	Interior Lighting	Exterior Lighting	Process	Domestic Hot Water	Total
	MMBtu/a	MMBtu/a	MMBtu/a	MMBtu/a	MMBtu/a	MMBtu/a	MMBtu/a	MMBtu/a	MMBtu/a	MMBtu/a	MMBtu/a
SFHd-pre1880 Heat only	0	0	494,993	0	308	123,777	46,592	4,806	0	29,680	700,155
SFHd-pre1880 Heat and Cool	7,499	0	150,555	16,811	0	21,979	8,273	853	0	9,373	215,343
SFHa-Pre1880	3,818	0	64,284	3,421	0	9,872	3,721	2,238	0	4,270	91,623
SFHa-Post1880	4,941	0	41,234	2,712	0	16,807	6,336	3,810	0	6,405	82,243
MFH-Pre1880	2,307	0	19,828	3,801	0	5,816	4,760	320	0	5,417	42,248
MFH-Post1880	2,008	0	18,451	2,865	0	8,492	6,950	468	0	6,621	45,854

While the above macro assessment was a valuable tool for purposes of identification of the Home Energy Retrofit initiative, it does not provide micro-level information. The more granularity that is required, the less accurate any prediction analysis will be. As a result, for the purposes of this Pilot Program Plan, there was no accurate tool to utilize for forecast and budgeting purposes.

In order to facilitate such an exercise, a hypothetical scenario was modeled based on five (5) sample homes. The information from these 5 homes was then extrapolated to a population of 100 homes. Modeling more homes was considered, but it would have added very little accuracy to outcome, as there is no defined group of homes at this stage. Thus, It should be clearly stated that this extrapolation exercise is not intended to be an accurate predictor of the final HER Pilot Program. Its intent is simply to apply future potential projects to a costing/value model for purposes of this plan.

Results:

Home Name	Savings	# of Like Homes	Total 1st Year Savings
BAKER	$1,881	20	$37,620
BUSKIRK	$692	20	$13,840
GRAAF	$1,444	20	$28,880
JANSSEN	$1,227	20	$24,540
VOSS	$1,404	20	$28,080
TOTAL	**$6,648**	**100**	**$132,960**

These results were used to approximately formulate the potential composition of the HER Pilot Program. Savings and costs from this hypothetical micro-assessment are used in the FINANCIAL PHASE of the Plan. The following pages show the individual cases used for the model.

HOME ENERGY SAVER™

HOME ENERGY SAVER
REPORT

Prepared by:
BAKER HOME

This report is generated by the Home Energy Saver
web-based energy audit tool, developed by
the U.S. Department of Energy's
Lawrence Berkeley National Laboratory,
and can be reached at http://hes.lbl.gov

HOME ENERGY SAVER™

HOUSE CONFIGURATION

General Information

Name or other identifier this home/session : **Baker Home**; User's email address : **tyrmiller@hotmail.com**; Purpose of this assessment : **Hypothetical analysis**; City : **Holland**; State : **Michigan**; City with most similar climate to modeled house : **Muskegon**; Year house was built : **1968**; People living in the house, by the age - 0-5 : **0**; People living in the house, by the age - 6-13 : **2**; People living in the house, by the age - 14-64 : **2**; People living in the house, by the age - 65 plus : **0**;

House Shape Size

Energy Prices

Energy Prices - Electricity : **0.110**; Energy Prices - Piped Natural Gas : **0.700**; Energy Prices - Liquid Propane Gas (LPG) : **2.000**; Energy Prices - Fuel Oil : **2.000**;

Building Design

Foundation or floor insulation : **No/Don't Know**; Attic type : **Unconditioned Attic**; Wall Construction Front : **Wall insulation ewwf03wo**; Does the house have weather-stripping and/or caulking : **No**; Describe windows on each side of house - Front Type : **Single-pane, clear, Wood or Vinyl**; Describe windows on each side of house - Front SqFt : **72.00**; Describe windows on each side of house - Back Type : **Single-pane, clear, Wood or Vinyl**; Describe windows on each side of house - Back SqFt : **72.00**; Describe windows on each side of house - Left Type : **Single-pane, clear, Wood or Vinyl**; Describe windows on each side of house - Left SqFt : **36.00**; Describe windows on each side of house - Right Type : **Single-pane, clear, Wood or Vinyl**; Describe windows on each side of house - Rgith SqFt : **36.00**; Stories above ground level : **1**; Roof Insulation level : **R-0**; Type of foundation : **Slab-on-grade Foundation**; Ceiling Insulation level : **R-3 (1-2 inches)**;

Appliances Equipment

Clothes Washer : **Yes**; Number of refrigerators : **1 Refrigerator**; Water heater - year purchased : **1984**; Water heater - Tank Size : **40**; Water heater - Fuel : **Natural Gas**; Heating equipment - Type : **Central Gas furnace**; Heating equipment - Year purchased : **1988**; Cooling equipment - Type : **Room air conditioner**; Cooling equipment - Year Purchased : **1994**; Thermal distribution - Duct Location : **Unconditioned basement or unvented crawlspace**; Thermal distribution - Ducts Insulated : **No/Don't Know**; Thermal distribution - Boiler pipe insulation : **No/Don't Know**;

HOME ENERGY SAVER™

YEARLY ENERGY COSTS

Providing more details will make your results more accurate.

Existing Home	$2,799
With Upgrades	$918

	Total	Heating	Cooling	Hot Water	Large Appliances	Small Appliances	Lighting
Existing Home	$2,799	$2,022	$36	$165	$275	$142	$159
With Upgrades	$918	$416	$7	$97	$200	$142	$56
Savings	**$1,881**	**$1,606**	**$29**	**$68**	**$75**	**$0**	**$103**

Important Note: These are initial estimates only, and results may vary. If the owner has not already done so, we strongly recommend that they retain a professional energy auditor to develop a detailed work scope and budget for improving the home. We also recommend the Home Performance with ENERGY STAR program when considering home improvements.

Comparing Results to Home's Utility Bill

HOME ENERGY SAVER™

YEARLY WHOLE HOUSE RESULTS

		Existing Home	With Upgrades	Savings	Percentage Reductions
Whole House	Energy Bill	$2,799	$918	**$1,881**	67%
	Electricity	7,509 kWh	3,755 kWh	**3,754 kWh**	50%
	Natural Gas	2,818 Therms	721 Therms	**2,097 Therms**	74%
	Emissions	45,385 CO2	14,657 CO2	**30,728 lb. CO_2**	68%
Heating	Energy Bill	$2,022	$416	**$1,606**	79%
	Electricity	2,247 kWh	508 kWh	**1,739 kWh**	77%
	Natural Gas	2,535 Therms	514 Therms	**2,021 Therms**	80%
	Emissions	33,345 lb. CO_2	6,850 lb. CO_2	**26,495 lb. CO_2**	80%
Cooling	Energy Bill	$36	$7	**$29**	81%
	Electricity	330 kWh	66 kWh	**264 kWh**	80%
	Emissions	548 lb. CO_2	110 lb. CO_2	**438 lb. CO_2**	80%
Hot Water	Energy Bill	$165	$97	**$68**	41%
	Natural Gas	235 Therms	138 Therms	**97 Therms**	41%
	Emissions	2,746 lb. CO_2	1,612 lb. CO_2	**1,134 lb. CO_2**	41%
Large Appliances	Energy Bill	$275	$200	**$75**	27%
	Electricity	2,197 kWh	1,384 kWh	**813 kWh**	37%
	Natural Gas	48 Therms	69 Therms	**-21 Therms**	-44%
	Emissions	4,207 lb. CO_2	3,103 lb. CO_2	**1,104 lb. CO_2**	26%
Small Appliances	Energy Bill	$142	$142	**$0**	0%
	Electricity	1,290 kWh	1,290 kWh	**0 kWh**	0%
	Emissions	2,141 lb. CO_2	2,141 lb. CO_2	**0 lb. CO_2**	0%
Lighting	Energy Bill	$159	$56	**$103**	65%
	Electricity	1,445 kWh	507 kWh	**938 kWh**	65%
	Emissions	2,398 lb. CO_2	841 lb. CO_2	**1,557 lb. CO_2**	65%

Heating electricity values include fan or pumping energy for homes that have forced-air or water-based heating systems powered by circulation pumps. The values for Hot Water include taps and faucets only; the energy consumed by the water heater to supply hot water for appliances such as clothes washers and dishwashers is included instead in the rows for those appliances.

HOME ENERGY SAVER™

YEARLY HEATING AND COOLING RESULTS

Show Details

	Total Cost
Cost	$2,058
Heating	$2,022
Cooling	$36

	Total Energy
Energy Use	2,535 therms 2,577 kWh
Heating	2,535 therms 2,247 kWh
Cooling	330 kWh

Notes: this house is 0% heated by wood fuel.
100% of the floor area is heated and 100% cooled.

Heating electricity values include fan or pumping energy for homes that have forced-air or water-based heating systems powered by circulation pumps.

What if my results don't match my energy bill?

HOME ENERGY SAVER™

YEARLY LARGE APPLIANCES AND WATER HEATING RESULTS

Show Details

Appliance	Total Cost
First Refrigerator	$61
Stove	$40
Oven	$26
Clothesdryer	$92
Clotheswasher	$28
Dishwasher	$27
Hot Water: Taps and Faucets	$165
Totals	$439

Equipment energy is the energy used by motors, heating elements, and burners inside your appliances. This number excludes the energy consumed by your water heater to supply hot water for appliances such as clothes washers and dishwashers (which is included instead in the rows for those appliances).

What if my results don't match my energy bill?

HOME ENERGY SAVER™

YEARLY SMALL APPLIANCES RESULTS

Show Details

Category	Energy Use	Energy Costs
Entertainment	345 kWh	$38
Home Office	361 kWh	$40
Miscellaneous Kitchen	464 kWh	$51
Other Appliances	120 kWh	$13

What if my results don't match my energy bill?

HOME ENERGY SAVER™

YEARLY LIGHTING RESULTS

Here is the calculated Yearly lighting bill based on the inputs you provided:

Show Details

Room	Energy Use	Energy Costs
All Bathrooms	202 kwh	$22
All Bedrooms	68 kwh	$7
Dining Room	120 kwh	$13
Family Room	77 kwh	$8
Garage	75 kwh	$8
Hall	114 kwh	$13
Kitchen	208 kwh	$23
Living Room	273 kwh	$30
Master Bedroom	68 kwh	$7
Outdoor Lighting	240 kwh	$26

What if my results don't match my energy bill?

HOME ENERGY SAVER™

HOME ENERGY SAVER
REPORT

Prepared by:
BUSKIRK HOME

This report is generated by the Home Energy Saver
web-based energy audit tool, developed by
the U.S. Department of Energy's
Lawrence Berkeley National Laboratory,
and can be reached at http://hes.lbl.gov

HOME ENERGY SAVER™

HOUSE CONFIGURATION

General Information

Name or other identifier this home/session : **BUSKIRK HOME**; Purpose of this assessment : **Hypothetical analysis**; City : **Holland**; State : **Michigan**; City with most similar climate to modeled house : **Muskegon**; Year house was built : **1927**; People living in the house, by the age - 0-5 : **0**; People living in the house, by the age - 6-13 : **2**; People living in the house, by the age - 14-64 : **3**; People living in the house, by the age - 65 plus : **0**;

House Shape Size

Energy Prices

Energy Prices - Electricity : **0.110**; Energy Prices - Piped Natural Gas : **0.700**; Energy Prices - Liquid Propane Gas (LPG) : **2.000**; Energy Prices - Fuel Oil : **2.000**;

Building Design

Foundation or floor insulation : **No/Don't Know**; Attic type : **Unconditioned Attic**; Wall Construction Front : **Wall insulation ewwf11wo**; Does the house have weather-stripping and/or caulking : **Yes**; Describe windows on each side of house - Front Type : **Single-pane, clear, Wood or Vinyl**; Describe windows on each side of house - Front SqFt : **80.00**; Describe windows on each side of house - Back Type : **Single-pane, clear, Wood or Vinyl**; Describe windows on each side of house - Back SqFt : **122.00**; Describe windows on each side of house - Left Type : **Double-pane, clear, Wood or Vinyl**; Describe windows on each side of house - Left SqFt : **42.00**; Describe windows on each side of house - Right Type : **Double-pane, clear, Wood or Vinyl**; Describe windows on each side of house - Rgith SqFt : **38.00**; Stories above ground level : **2**; Roof Insulation level : **R-0**; Type of foundation : **Unconditioned Basement**; Ceiling Insulation level : **R-9 (3-4 inches)**;

Appliances Equipment

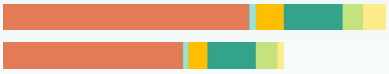
Clothes Washer : **Yes**; Number of refrigerators : **2 Refrigerators**; Water heater - year purchased : **1998**; Water heater - Tank Size : **50**; Water heater - Fuel : **Natural Gas**; Heating equipment - Type : **Gas boiler**; Heating equipment - Year purchased : **1995**; Cooling equipment - Type : **Central air conditioner**; Cooling equipment - Year Purchased : **1999**; Thermal distribution - Duct Location : **Unconditioned attic**; Thermal distribution - Ducts Insulated : **No/Don't Know**; Thermal distribution - Boiler pipe insulation : **No/Don't Know**;

HOME ENERGY SAVER™

YEARLY ENERGY COSTS

Providing more details will make your results more accurate.

Existing Home	$2,585
With Upgrades	$1,893



	Total	Heating	Cooling	Hot Water	Large Appliances	Small Appliances	Lighting
Existing Home	$2,585	$1,657	$42	$186	$399	$142	$159
With Upgrades	$1,893	$1,204	$36	$129	$326	$142	$56
Savings	**$692**	**$453**	**$6**	**$57**	**$73**	**$0**	**$103**

Important Note: These are initial estimates only, and results may vary. If the owner has not already done so, we strongly recommend that they retain a professional energy auditor to develop a detailed work scope and budget for improving the home. We also recommend the Home Performance with ENERGY STAR program when considering home improvements.

Comparing Results to Home's Utility Bill

HOME ENERGY SAVER™

YEARLY WHOLE HOUSE RESULTS

		Existing Home	With Upgrades	Savings	Percentage Reductions
Whole House	Energy Bill	$2,585	$1,893	**$692**	27%
	Electricity	9,517 kWh	7,077 kWh	**2,440 kWh**	26%
	Natural Gas	2,196 Therms	1,590 Therms	**606 Therms**	28%
	Emissions	41,449 CO2	30,322 CO2	**11,127 lb. CO_2**	27%
Heating	Energy Bill	$1,657	$1,204	**$453**	27%
	Electricity	3,041 kWh	2,410 kWh	**631 kWh**	21%
	Natural Gas	1,889 Therms	1,341 Therms	**548 Therms**	29%
	Emissions	27,116 lb. CO_2	19,670 lb. CO_2	**7,446 lb. CO_2**	28%
Cooling	Energy Bill	$42	$36	**$6**	14%
	Electricity	381 kWh	323 kWh	**58 kWh**	15%
	Emissions	632 lb. CO_2	536 lb. CO_2	**96 lb. CO_2**	15%
Hot Water	Energy Bill	$186	$129	**$57**	31%
	Natural Gas	265 Therms	183 Therms	**82 Therms**	31%
	Emissions	3,096 lb. CO_2	2,138 lb. CO_2	**958 lb. CO_2**	31%
Large Appliances	Energy Bill	$399	$326	**$73**	18%
	Electricity	3,360 kWh	2,547 kWh	**813 kWh**	24%
	Natural Gas	42 Therms	66 Therms	**-24 Therms**	-57%
	Emissions	6,066 lb. CO_2	4,996 lb. CO_2	**1,070 lb. CO_2**	18%
Small Appliances	Energy Bill	$142	$142	**$0**	0%
	Electricity	1,290 kWh	1,290 kWh	**0 kWh**	0%
	Emissions	2,141 lb. CO_2	2,141 lb. CO_2	**0 lb. CO_2**	0%
Lighting	Energy Bill	$159	$56	**$103**	65%
	Electricity	1,445 kWh	507 kWh	**938 kWh**	65%
	Emissions	2,398 lb. CO_2	841 lb. CO_2	**1,557 lb. CO_2**	65%

Heating electricity values include fan or pumping energy for homes that have forced-air or water-based heating systems powered by circulation pumps. The values for Hot Water include taps and faucets only; the energy consumed by the water heater to supply hot water for appliances such as clothes washers and dishwashers is included instead in the rows for those appliances.

HOME ENERGY SAVER™

YEARLY HEATING AND COOLING RESULTS

Show Details

	Total Cost
Cost	$1,699
Heating	$1,657
Cooling	$42

	Total Energy
Energy Use	1,889 therms 3,422 kWh
Heating	1,889 therms 3,041 kWh
Cooling	381 kWh

Notes: this house is 0% heated by wood fuel.
100% of the floor area is heated and 100% cooled.

Heating electricity values include fan or pumping energy for homes that have forced-air or water-based heating systems powered by circulation pumps.

What if my results don't match my energy bill?

HOME ENERGY SAVER™

YEARLY LARGE APPLIANCES AND WATER HEATING RESULTS

Show Details

Appliance	Total Cost
First Refrigerator	$61
Second Refrigerator	$128
Stove	$40
Oven	$26
Clothesdryer	$92
Clotheswasher	$25
Dishwasher	$25
Hot Water: Taps and Faucets	$186
Totals	$583

Equipment energy is the energy used by motors, heating elements, and burners inside your appliances. This number excludes the energy consumed by your water heater to supply hot water for appliances such as clothes washers and dishwashers (which is included instead in the rows for those appliances).

What if my results don't match my energy bill?

HOME ENERGY SAVER™

YEARLY SMALL APPLIANCES RESULTS

Show Details

Category	Energy Use	Energy Costs
Entertainment	345 kWh	$38
Home Office	361 kWh	$40
Miscellaneous Kitchen	464 kWh	$51
Other Appliances	120 kWh	$13

What if my results don't match my energy bill?

HOME ENERGY SAVER™

YEARLY LIGHTING RESULTS

Here is the calculated Yearly lighting bill based on the inputs you provided:

Show Details

Room	Energy Use	Energy Costs
All Bathrooms	202 kwh	$22
All Bedrooms	68 kwh	$7
Dining Room	120 kwh	$13
Family Room	77 kwh	$8
Garage	75 kwh	$8
Hall	114 kwh	$13
Kitchen	208 kwh	$23
Living Room	273 kwh	$30
Master Bedroom	68 kwh	$7
Outdoor Lighting	240 kwh	$26

What if my results don't match my energy bill?

HOME ENERGY SAVER™

HOME ENERGY SAVER
REPORT

Prepared by:
GRAAF HOME

This report is generated by the Home Energy Saver
web-based energy audit tool, developed by
the U.S. Department of Energy's
Lawrence Berkeley National Laboratory,
and can be reached at http://hes.lbl.gov

HOME ENERGY SAVER™

HOUSE CONFIGURATION

General Information

Name or other identifier this home/session : **Graaf Home**; User's email address : **tyrmiller@hotmail.com**; Purpose of this assessment : **Hypothetical analysis**; City : **Holland**; State : **Michigan**; City with most similar climate to modeled house : **Muskegon**; Year house was built : **1964**; People living in the house, by the age - 0-5 : **0**; People living in the house, by the age - 6-13 : **0**; People living in the house, by the age - 14-64 : **3**; People living in the house, by the age - 65 plus : **0**;

House Shape Size

Energy Prices

Energy Prices - Electricity : **0.110**; Energy Prices - Piped Natural Gas : **0.700**; Energy Prices - Liquid Propane Gas (LPG) : **2.000**; Energy Prices - Fuel Oil : **2.000**;

Building Design

Foundation or floor insulation : **No/Don't Know**; Attic type : **Unconditioned Attic**; Wall Construction Front : **Wall insulation ewwf11wo**; Does the house have weather-stripping and/or caulking : **Yes**; Describe windows on each side of house - Front Type : **Double-pane, clear, Aluminum**; Describe windows on each side of house - Front SqFt : **120.00**; Describe windows on each side of house - Back Type : **Double-pane, clear, Aluminum**; Describe windows on each side of house - Back SqFt : **80.00**; Describe windows on each side of house - Left Type : **Single-pane, clear, Aluminum**; Describe windows on each side of house - Left SqFt : **36.00**; Describe windows on each side of house - Right Type : **Single-pane, clear, Aluminum**; Describe windows on each side of house - Rgith SqFt : **46.00**; Stories above ground level : **2**; Roof Insulation level : **R-11**; Type of foundation : **Unconditioned Basement**; Ceiling Insulation level : **R-6 (2-3 inches)**;

Appliances Equipment

Clothes Washer : **Yes**; Number of refrigerators : **1 Refrigerator**; Water heater - year purchased : **1993**; Water heater - Tank Size : **50**; Water heater - Fuel : **Electricity**; Heating equipment - Type : **Electric furnace**; Heating equipment - Year purchased : **1995**; Cooling equipment - Type : **Central air conditioner** ; Cooling equipment - Year Purchased : **1995**; Thermal distribution - Duct Location : **Conditioned space**; Thermal distribution - Ducts Insulated : **No/Don't Know**; Thermal distribution - Boiler pipe insulation : **No/Don't Know**;

HOME ENERGY SAVER™

YEARLY ENERGY COSTS

Providing more details will make your results more accurate.

	Total	Heating	Cooling	Hot Water	Large Appliances	Small Appliances	Lighting
Existing Home	$4,171	$3,119	$40	$388	$323	$142	$159
With Upgrades	$2,727	$1,949	$40	$267	$273	$142	$56
Savings	**$1,444**	**$1,170**	**$0**	**$121**	**$50**	**$0**	**$103**

Important Note: These are initial estimates only, and results may vary. If the owner has not already done so, we strongly recommend that they retain a professional energy auditor to develop a detailed work scope and budget for improving the home. We also recommend the Home Performance with ENERGY STAR program when considering home improvements.

Comparing Results to Home's Utility Bill

HOME ENERGY SAVER™

YEARLY WHOLE HOUSE RESULTS

		Existing Home	With Upgrades	Savings	Percentage Reductions
Whole House	Energy Bill	$4,171	$2,727	**$1,444**	35%
	Electricity	37,918 kWh	24,782 kWh	**13,136 kWh**	35%
	Emissions	62,924 CO2	41,124 CO2	**21,800 lb. CO_2**	35%
Heating	Energy Bill	$3,119	$1,949	**$1,170**	38%
	Electricity	28,356 kWh	17,715 kWh	**10,641 kWh**	38%
	Emissions	47,056 lb. CO_2	29,397 lb. CO_2	**17,659 lb. CO_2**	38%
Cooling	Energy Bill	$40	$40	**$0**	0%
	Electricity	363 kWh	363 kWh	**0 kWh**	0%
	Emissions	602 lb. CO_2	602 lb. CO_2	**0 lb. CO_2**	0%
Hot Water	Energy Bill	$388	$267	**$121**	31%
	Electricity	3,527 kWh	2,427 kWh	**1,100 kWh**	31%
	Emissions	5,853 lb. CO_2	4,028 lb. CO_2	**1,825 lb. CO_2**	31%
Large Appliances	Energy Bill	$323	$273	**$50**	16%
	Electricity	2,937 kWh	2,480 kWh	**457 kWh**	16%
	Emissions	4,874 lb. CO_2	4,115 lb. CO_2	**759 lb. CO_2**	16%
Small Appliances	Energy Bill	$142	$142	**$0**	0%
	Electricity	1,290 kWh	1,290 kWh	**0 kWh**	0%
	Emissions	2,141 lb. CO_2	2,141 lb. CO_2	**0 lb. CO_2**	0%
Lighting	Energy Bill	$159	$56	**$103**	65%
	Electricity	1,445 kWh	507 kWh	**938 kWh**	65%
	Emissions	2,398 lb. CO_2	841 lb. CO_2	**1,557 lb. CO_2**	65%

Heating electricity values include fan or pumping energy for homes that have forced-air or water-based heating systems powered by circulation pumps. The values for Hot Water include taps and faucets only; the energy consumed by the water heater to supply hot water for appliances such as clothes washers and dishwashers is included instead in the rows for those appliances.

HOME ENERGY SAVER™

YEARLY HEATING AND COOLING RESULTS

Show Details

	Total Cost
Cost	$3,159
Heating	$3,119
Cooling	$40

	Total Energy
Energy Use	28,719 kWh
Heating	28,356 kWh
Cooling	363 kWh

Notes: this house is 0% heated by wood fuel.
100% of the floor area is heated and 100% cooled.

Heating electricity values include fan or pumping energy for homes that have forced-air or water-based heating systems powered by circulation pumps.

What if my results don't match my energy bill?

HOME ENERGY SAVER™

YEARLY LARGE APPLIANCES AND WATER HEATING RESULTS

Show Details

Appliance	Total Cost
First Refrigerator	$61
Stove	$40
Oven	$26
Clothesdryer	$92
Clotheswasher	$57
Dishwasher	$46
Hot Water: Taps and Faucets	$388
Totals	$710

Equipment energy is the energy used by motors, heating elements, and burners inside your appliances. This number excludes the energy consumed by your water heater to supply hot water for appliances such as clothes washers and dishwashers (which is included instead in the rows for those appliances).

What if my results don't match my energy bill?

HOME ENERGY SAVER™

YEARLY SMALL APPLIANCES RESULTS

Show Details

Category	Energy Use	Energy Costs
Entertainment	345 kWh	$38
Home Office	361 kWh	$40
Miscellaneous Kitchen	464 kWh	$51
Other Appliances	120 kWh	$13

What if my results don't match my energy bill?

HOME ENERGY SAVER™

YEARLY LIGHTING RESULTS

Here is the calculated Yearly lighting bill based on the inputs you provided:

Show Details

Room	Energy Use	Energy Costs
All Bathrooms	202 kwh	$22
All Bedrooms	68 kwh	$7
Dining Room	120 kwh	$13
Family Room	77 kwh	$8
Garage	75 kwh	$8
Hall	114 kwh	$13
Kitchen	208 kwh	$23
Living Room	273 kwh	$30
Master Bedroom	68 kwh	$7
Outdoor Lighting	240 kwh	$26

What if my results don't match my energy bill?

HOME ENERGY SAVER
REPORT

Prepared by:
JANSSEN HOME

This report is generated by the Home Energy Saver
web-based energy audit tool, developed by
the U.S. Department of Energy's
Lawrence Berkeley National Laboratory,
and can be reached at http://hes.lbl.gov

HOME ENERGY SAVER™

HOUSE CONFIGURATION

General Information

Name or other identifier this home/session : **Janssen Home**; Purpose of this assessment : **Hypothetical analysis**; City : **Holland**; State : **Michigan**; City with most similar climate to modeled house : **Muskegon**; Year house was built : **1959**; People living in the house, by the age - 0-5 : **0**; People living in the house, by the age - 6-13 : **0**; People living in the house, by the age - 14-64 : **2**; People living in the house, by the age - 65 plus : **2**;

House Shape Size

Energy Prices

Energy Prices - Electricity : **0.110**; Energy Prices - Piped Natural Gas : **0.700**; Energy Prices - Liquid Propane Gas (LPG) : **2.000**; Energy Prices - Fuel Oil : **2.000**;

Building Design

Foundation or floor insulation : **No/Don't Know**; Attic type : **Unconditioned Attic**; Wall Construction Front : **Wall insulation ewwf11wo**; Does the house have weather-stripping and/or caulking : **Yes**; Describe windows on each side of house - Front Type : **Double-pane, clear, Wood or Vinyl**; Describe windows on each side of house - Front SqFt : **60.00**; Describe windows on each side of house - Back Type : **Double-pane, clear, Wood or Vinyl**; Describe windows on each side of house - Back SqFt : **60.00**; Describe windows on each side of house - Left Type : **Double-pane, clear, Wood or Vinyl**; Describe windows on each side of house - Left SqFt : **42.00**; Describe windows on each side of house - Right Type : **Double-pane, clear, Wood or Vinyl**; Describe windows on each side of house - Rgith SqFt : **42.00**; Stories above ground level : **1**; Roof Insulation level : **R-0**; Type of foundation : **Unvented Crawlspace**; Ceiling Insulation level : **R-11 (4-6 inches)**;

Appliances Equipment

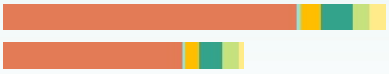
Clothes Washer : **Yes**; Number of refrigerators : **1 Refrigerator**; Water heater - year purchased : **1997**; Water heater - Tank Size : **40**; Water heater - Fuel : **Natural Gas**; Heating equipment - Type : **Propane (LPG) furnace**; Heating equipment - Year purchased : **1992**; Cooling equipment - Type : **Central air conditioner**; Cooling equipment - Year Purchased : **1999**; Thermal distribution - Duct Location : **Conditioned space**; Thermal distribution - Ducts Insulated : **Yes**; Thermal distribution - Boiler pipe insulation : **No/Don't Know**;

HOME ENERGY SAVER™

YEARLY ENERGY COSTS

Providing more details will make your results more accurate.

Existing Home	$3,294
With Upgrades	$2,067



	Total	Heating	Cooling	Hot Water	Large Appliances	Small Appliances	Lighting
Existing Home	$3,294	$2,509	$36	$176	$272	$142	$159
With Upgrades	$2,067	$1,526	$26	$118	$199	$142	$56
Savings	**$1,227**	**$983**	**$10**	**$58**	**$73**	**$0**	**$103**

Important Note: These are initial estimates only, and results may vary. If the owner has not already done so, we strongly recommend that they retain a professional energy auditor to develop a detailed work scope and budget for improving the home. We also recommend the Home Performance with ENERGY STAR program when considering home improvements.

Comparing Results to Home's Utility Bill

HOME ENERGY SAVER™

YEARLY WHOLE HOUSE RESULTS

		Existing Home	With Upgrades	Savings	Percentage Reductions
Whole House	Energy Bill	$3,294	$2,067	**$1,227**	37%
	Electricity	6,307 kWh	4,024 kWh	**2,283 kWh**	36%
	Natural Gas	294 Therms	234 Therms	**60 Therms**	20%
	Emissions	28,906 CO2	18,566 CO2	**10,340 lb. CO_2**	36%
Heating	Energy Bill	$2,509	$1,526	**$983**	39%
	Electricity	1,044 kWh	603 kWh	**441 kWh**	42%
	LPG	1,197 Gallons	730 Gallons	**467 Gallons**	39%
	Emissions	16,738 lb. CO_2	10,151 lb. CO_2	**6,587 lb. CO_2**	39%
Cooling	Energy Bill	$36	$26	**$10**	28%
	Electricity	331 kWh	240 kWh	**91 kWh**	28%
	Emissions	549 lb. CO_2	398 lb. CO_2	**151 lb. CO_2**	28%
Hot Water	Energy Bill	$176	$118	**$58**	33%
	Natural Gas	251 Therms	168 Therms	**83 Therms**	33%
	Emissions	2,932 lb. CO_2	1,963 lb. CO_2	**969 lb. CO_2**	33%
Large Appliances	Energy Bill	$272	$199	**$73**	27%
	Electricity	2,197 kWh	1,384 kWh	**813 kWh**	37%
	Natural Gas	43 Therms	66 Therms	**-23 Therms**	-54%
	Emissions	4,148 lb. CO_2	3,072 lb. CO_2	**1,076 lb. CO_2**	26%
Small Appliances	Energy Bill	$142	$142	**$0**	0%
	Electricity	1,290 kWh	1,290 kWh	**0 kWh**	0%
	Emissions	2,141 lb. CO_2	2,141 lb. CO_2	**0 lb. CO_2**	0%
Lighting	Energy Bill	$159	$56	**$103**	65%
	Electricity	1,445 kWh	507 kWh	**938 kWh**	65%
	Emissions	2,398 lb. CO_2	841 lb. CO_2	**1,557 lb. CO_2**	65%

Heating electricity values include fan or pumping energy for homes that have forced-air or water-based heating systems powered by circulation pumps. The values for Hot Water include taps and faucets only; the energy consumed by the water heater to supply hot water for appliances such as clothes washers and dishwashers is included instead in the rows for those appliances.

HOME ENERGY SAVER™

YEARLY HEATING AND COOLING RESULTS

Show Details

	Total Cost
Cost	$2,545
Heating	$2,509
Cooling	$36

	Total Energy
Energy Use	1,197 gallons propane 1,375 kWh
Heating	1,197 gallons propane 1,044 kWh
Cooling	331 kWh

Notes: this house is 0% heated by wood fuel.
100% of the floor area is heated and 100% cooled.

Heating electricity values include fan or pumping energy for homes that have forced-air or water-based heating systems powered by circulation pumps.

What if my results don't match my energy bill?

HOME ENERGY SAVER™

YEARLY LARGE APPLIANCES AND WATER HEATING RESULTS

Show Details

Appliance	Total Cost
First Refrigerator	$61
Stove	$40
Oven	$26
Clothesdryer	$92
Clotheswasher	$26
Dishwasher	$25
Hot Water: Taps and Faucets	$176
Totals	$446

Equipment energy is the energy used by motors, heating elements, and burners inside your appliances. This number excludes the energy consumed by your water heater to supply hot water for appliances such as clothes washers and dishwashers (which is included instead in the rows for those appliances).

What if my results don't match my energy bill?

HOME ENERGY SAVER™

YEARLY SMALL APPLIANCES RESULTS

Show Details

Category	Energy Use	Energy Costs
Entertainment	345 kWh	$38
Home Office	361 kWh	$40
Miscellaneous Kitchen	464 kWh	$51
Other Appliances	120 kWh	$13

What if my results don't match my energy bill?

HOME ENERGY SAVER™

YEARLY LIGHTING RESULTS

Here is the calculated Yearly lighting bill based on the inputs you provided:

Show Details

Room	Energy Use	Energy Costs
All Bathrooms	202 kwh	$22
All Bedrooms	68 kwh	$7
Dining Room	120 kwh	$13
Family Room	77 kwh	$8
Garage	75 kwh	$8
Hall	114 kwh	$13
Kitchen	208 kwh	$23
Living Room	273 kwh	$30
Master Bedroom	68 kwh	$7
Outdoor Lighting	240 kwh	$26

What if my results don't match my energy bill?

HOME ENERGY SAVER™

HOME ENERGY SAVER
REPORT

Prepared by:
VOSS HOME

This report is generated by the Home Energy Saver
web-based energy audit tool, developed by
the U.S. Department of Energy's
Lawrence Berkeley National Laboratory,
and can be reached at http://hes.lbl.gov

HOME ENERGY SAVER™

HOUSE CONFIGURATION

General Information

Name or other identifier this home/session : **Voss Home**; Purpose of this assessment : **Hypothetical analysis**; City : **Holland**; State : **Michigan**; City with most similar climate to modeled house : **Muskegon**; Year house was built : **1964**; People living in the house, by the age - 0-5 : **0**; People living in the house, by the age - 6-13 : **1**; People living in the house, by the age - 14-64 : **4**; People living in the house, by the age - 65 plus : **1**;

House Shape Size

Energy Prices

Energy Prices - Electricity : **0.110**; Energy Prices - Piped Natural Gas : **0.700**; Energy Prices - Liquid Propane Gas (LPG) : **2.000**; Energy Prices - Fuel Oil : **2.000**;

Building Design

Foundation or floor insulation : **No/Don't Know**; Attic type : **Unconditioned Attic**; Wall Construction Front : **Wall insulation ewwf03wo**; Does the house have weather-stripping and/or caulking : **No**; Describe windows on each side of house - Front Type : **Single-pane, clear, Wood or Vinyl**; Describe windows on each side of house - Front SqFt : **85.00**; Describe windows on each side of house - Back Type : **Single-pane, clear, Wood or Vinyl**; Describe windows on each side of house - Back SqFt : **75.00**; Describe windows on each side of house - Left Type : **Double-pane, solar-control low-E, Wood or Vinyl**; Describe windows on each side of house - Left SqFt : **34.00**; Describe windows on each side of house - Right Type : **Double-pane, solar-control low-E, Wood or Vinyl**; Describe windows on each side of house - Rgith SqFt : **34.00**; Stories above ground level : **2**; Roof Insulation level : **R-11**; Type of foundation : **Unconditioned Basement**; Ceiling Insulation level : **R-3 (1-2 inches)**;

Appliances Equipment

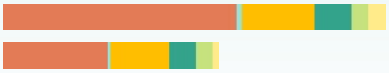
Clothes Washer : **Yes**; Number of refrigerators : **1 Refrigerator**; Water heater - year purchased : **1998**; Water heater - Tank Size : **50**; Water heater - Fuel : **Electricity**; Heating equipment - Type : **Central Gas furnace**; Heating equipment - Year purchased : **1998**; Cooling equipment - Type : **Central air conditioner**; Cooling equipment - Year Purchased : **1998**; Thermal distribution - Duct Location : **Unconditioned attic**; Thermal distribution - Ducts Insulated : **Yes**; Thermal distribution - Boiler pipe insulation : **No/Don't Know**;

HOME ENERGY SAVER™

YEARLY ENERGY COSTS

Providing more details will make your results more accurate.

Existing Home	$3,227
With Upgrades	$1,823



	Total	Heating	Cooling	Hot Water	Large Appliances	Small Appliances	Lighting
Existing Home	$3,227	$1,955	$46	$609	$316	$142	$159
With Upgrades	$1,823	$877	$26	$500	$222	$142	$56
Savings	**$1,404**	**$1,078**	**$20**	**$109**	**$94**	**$0**	**$103**

Important Note: These are initial estimates only, and results may vary. If the owner has not already done so, we strongly recommend that they retain a professional energy auditor to develop a detailed work scope and budget for improving the home. We also recommend the Home Performance with ENERGY STAR program when considering home improvements.

Comparing Results to Home's Utility Bill

HOME ENERGY SAVER™

YEARLY WHOLE HOUSE RESULTS

		Existing Home	With Upgrades	Savings	Percentage Reductions
Whole House	Energy Bill	$3,227	$1,823	**$1,404**	44%
	Electricity	13,693 kWh	9,206 kWh	**4,487 kWh**	33%
	Natural Gas	2,459 Therms	1,157 Therms	**1,302 Therms**	53%
	Emissions	51,452 CO2	28,793 CO2	**22,659 lb. CO_2**	44%
Heating	Energy Bill	$1,955	$877	**$1,078**	55%
	Electricity	2,127 kWh	891 kWh	**1,236 kWh**	58%
	Natural Gas	2,459 Therms	1,113 Therms	**1,346 Therms**	55%
	Emissions	32,258 lb. CO_2	14,480 lb. CO_2	**17,778 lb. CO_2**	55%
Cooling	Energy Bill	$46	$26	**$20**	44%
	Electricity	421 kWh	239 kWh	**182 kWh**	43%
	Emissions	699 lb. CO_2	397 lb. CO_2	**302 lb. CO_2**	43%
Hot Water	Energy Bill	$609	$500	**$109**	18%
	Electricity	5,535 kWh	4,542 kWh	**993 kWh**	18%
	Emissions	9,185 lb. CO_2	7,537 lb. CO_2	**1,648 lb. CO_2**	18%
Large Appliances	Energy Bill	$316	$222	**$94**	30%
	Electricity	2,875 kWh	1,737 kWh	**1,138 kWh**	40%
	Natural Gas	0 Therms	44 Therms	**-44 Therms**	-4%
	Emissions	4,771 lb. CO_2	3,397 lb. CO_2	**1,374 lb. CO_2**	29%
Small Appliances	Energy Bill	$142	$142	**$0**	0%
	Electricity	1,290 kWh	1,290 kWh	**0 kWh**	0%
	Emissions	2,141 lb. CO_2	2,141 lb. CO_2	**0 lb. CO_2**	0%
Lighting	Energy Bill	$159	$56	**$103**	65%
	Electricity	1,445 kWh	507 kWh	**938 kWh**	65%
	Emissions	2,398 lb. CO_2	841 lb. CO_2	**1,557 lb. CO_2**	65%

Heating electricity values include fan or pumping energy for homes that have forced-air or water-based heating systems powered by circulation pumps. The values for Hot Water include taps and faucets only; the energy consumed by the water heater to supply hot water for appliances such as clothes washers and dishwashers is included instead in the rows for those appliances.

HOME ENERGY SAVER™

YEARLY HEATING AND COOLING RESULTS

Show Details

	Total Cost
Cost	$2,001
Heating	$1,955
Cooling	$46

	Total Energy
Energy Use	2,459 therms 2,548 kWh
Heating	2,459 therms 2,127 kWh
Cooling	421 kWh

Notes: this house is 0% heated by wood fuel.
100% of the floor area is heated and 100% cooled.

Heating electricity values include fan or pumping energy for homes that have forced-air or water-based heating systems powered by circulation pumps.

What if my results don't match my energy bill?

HOME ENERGY SAVER™

YEARLY LARGE APPLIANCES AND WATER HEATING RESULTS

Show Details

Appliance	Total Cost
First Refrigerator	$61
Stove	$40
Oven	$26
Clothesdryer	$92
Clotheswasher	$53
Dishwasher	$43
Hot Water: Taps and Faucets	$609
Totals	$924

Equipment energy is the energy used by motors, heating elements, and burners inside your appliances. This number excludes the energy consumed by your water heater to supply hot water for appliances such as clothes washers and dishwashers (which is included instead in the rows for those appliances).

What if my results don't match my energy bill?

HOME ENERGY SAVER™

YEARLY SMALL APPLIANCES RESULTS

Show Details

Category	Energy Use	Energy Costs
Entertainment	345 kWh	$38
Home Office	361 kWh	$40
Miscellaneous Kitchen	464 kWh	$51
Other Appliances	120 kWh	$13

What if my results don't match my energy bill?

HOME ENERGY SAVER™

YEARLY LIGHTING RESULTS

Here is the calculated Yearly lighting bill based on the inputs you provided:

Show Details

Room	Energy Use	Energy Costs
All Bathrooms	202 kwh	$22
All Bedrooms	68 kwh	$7
Dining Room	120 kwh	$13
Family Room	77 kwh	$8
Garage	75 kwh	$8
Hall	114 kwh	$13
Kitchen	208 kwh	$23
Living Room	273 kwh	$30
Master Bedroom	68 kwh	$7
Outdoor Lighting	240 kwh	$26

What if my results don't match my energy bill?

SMART HOME

Schneider Electric

SMART HOME Solution Overview

As a component of the HER Pilot Program, it is recommended that the majority of the homes enrolled in the pilot are upgrade to “Smart Homes”. The Program Manager can provide a turnkey solution for this under the proposed Program Pilot Plan. The following details the Smart Home solution:

The solution outlined is a proven, fully-integrated demand side management and customer presentment platform that will allow the City of Holland to:

Wiser™ Solution Components:

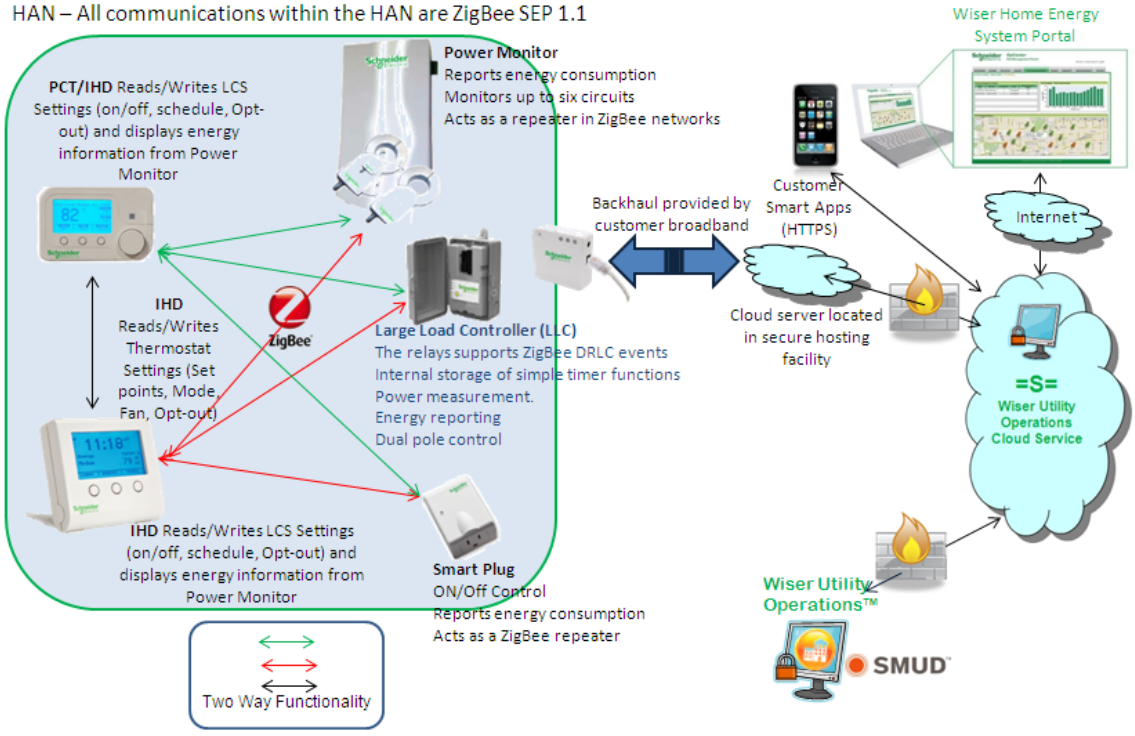
- **Utility Operations Software –** providing complete demand side management, rates, and analytics
- **Energy Management System –** an intuitive and engaging customer web portal and mobile application
- **Integration Tool Kit and Enterprise Service Bus –** for rapid and optional cost-effective integration with AMI and other utility back end systems as required
- **In-Home Display –** for portable and engaging messaging, pricing, and energy presentment
- **PCT/IHD –** providing advanced thermostat control, engaging color display, and energy information
- **Load Control Relay –** providing a flexible unit for a variety of loads and control strategies
- **Broadband Gateway –** supporting a variety of ZigBee and other standards-based HAN devices; supports both broadband and cellular communications
- **Power Monitor –** providing near real-time energy monitoring when an AMI meter is not present.

ALL SCHNEIDER PROPOSED COMPONENTS ARE SCHNEIDER PRODUCTS WITH SCHNEIDER SUPPORT AND WARRANTIES

- Successfully **evaluate and identify customer-facing technologies** that will enable customers to understand and manage their energy consumption and resulting costs.
- **Test and optimize powerful Consumer Engagement programs** that utilize a flexible set of end-point HAN devices, control strategies, and customer messaging to maximize load control capability while minimizing customer impact.
- **Identify, implement, and optimize reliability** with powerful forecasting, dash boarding, and analytics capabilities that identify when, where, and how long to call DR events.
- **Rapidly integrate with existing utility systems.** Our unified operations center connects data, devices, software engines and applications into a single DSM platform to improve Holland’s decision making and control capabilities.
- **Deploy a future-proof, flexible, and scalable platform** that will support a broad range of hardware devices, networks, analytics, rates, and DSM programs – today and in the future. Once installed, this platform can be easily expanded following the pilot to support a much larger population of customers.

This solution is **proven** through a variety of large-scale deployments in North America, and is **available today.** In addition, our team has the expertise required to make this program a success and a showcase in the utility industry.

Complete - Full Functioning HEM System



Program Manager Can Provide

Product Brand	Product
Schneider Electric	Home Energy Gateway
Schneider Electric	Communicating whole house sub-meter
Schneider Electric	Programmable Communicating Thermostat
Schneider Electric	In-Home Display
Schneider Electric	110v Plug Load Monitor
Schneider Electric	240v Load Control Switches w opt out capability
Schneider Electric	Head-end control software (hosted)
Schneider Electric	Customer Portal software license
Schneider Electric	Monthly Maintenance and Support

Software

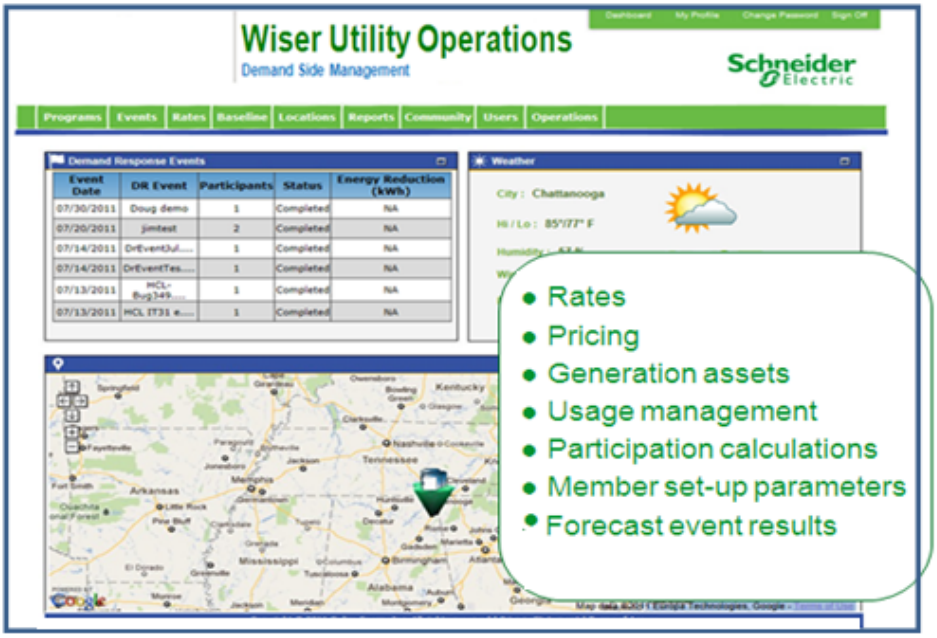
Wiser™ Utility Operations Software

Utility Control

Developed inside a utility, the *Wiser Utility Operations Software* (Wiser UOS) provides modular solutions for Smart Grid integration and enablement. These include: command and control; demand side management; and intuitive technologies that engage residential customers in long-term energy use reduction.

The platform is specifically designed to integrate quickly and easily with existing legacy systems, applications, and devices utilizing UOS Platform Services, our team of integration specialists, and a series of pre-built API libraries.

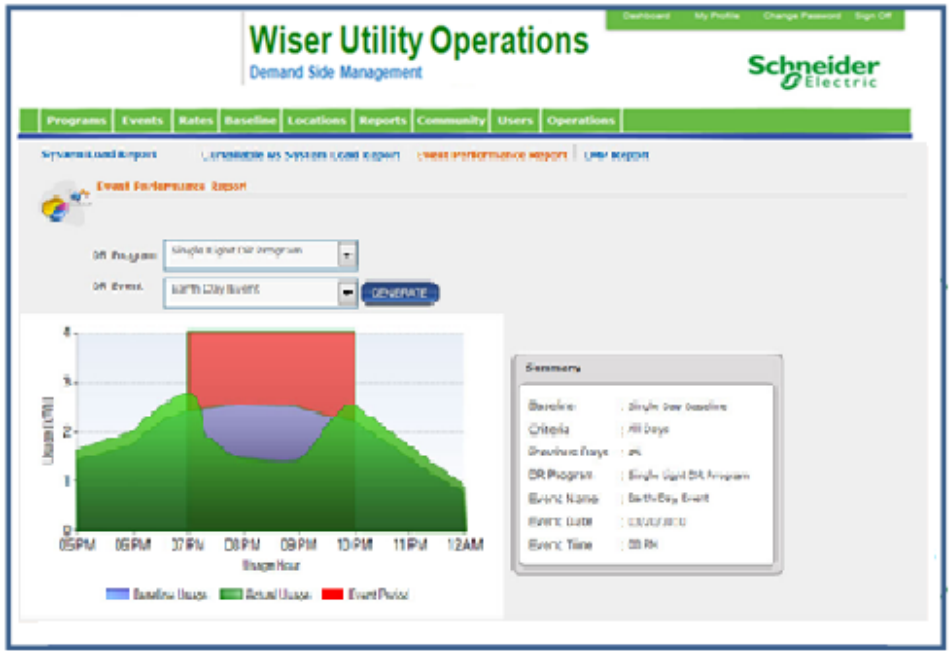
Wiser UOS also includes a robust, customer-centric web portal and home area network (HAN) solution that implements multiple technologies in their best-fit capacity to achieve a sustainable blend of customer enablement, grid empowerment, and demand side management effectiveness.



Centralized components are built to enterprise-grade, to withstand heavy system traffic deployments, provide scalability, and ensure expandability with little overhead. UOS is the first platform of its kind to offer both separately branded and focused residential and business customer enablement web and in home display (IHD) tools.

Wiser UOS is the utility's command and control portal of a Wiser Utility Operations Software deployment. UOS offers a rich, graphically driven, web environment for program managers, support personnel, and system administrators to configure, monitor, and control nearly every aspect of a deployment. UOS is a secure portal hosted with SSL and requiring authentication credentials to gain access. Once logged into UOS the system is organized in the following way:

- Rate Setup
- Baseline
- Location Management
- Reports
- Community
- User Management
- Settings

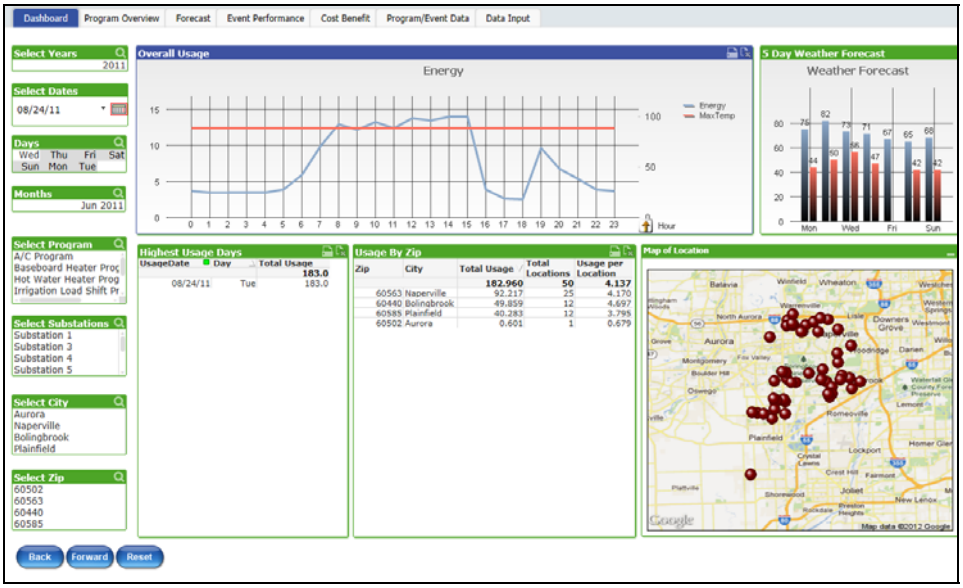


WEMS provides an interactive visual display that will allow Holland's staff across operational groups to layer and compare diverse data sets in a configurable dashboard. Utilities can discover new opportunities to optimize energy, reduce costs, and quantify the impact of energy management programs. The analytics engine of the WEMS platform will allow the city to perform pre and post event analysis of an event as well as monitor the progress during an event.

The WEMS utilizes estimation algorithms to project energy usage. The engine combines past energy usage with weather data to create a baseline of energy use and shows projected energy consumption relative to the baseline. The screen shot below shows the Forecast tab of the analytics module within the WEMS, with projected usage in red and baseline usage in blue. The operator can select specific time windows and drill down by any of the variables on the left side.

During an Event, the city can monitor usage in near real time to see an events progress and monitor its effectiveness. Below is a screen shot within WEMS Analytics monitoring energy usage near real-time. As with the Forecast tab, the left hand side of the screen allows for Consumers to filter down to specific groups and/or individuals to monitor their progress and effectiveness during the event.

You will also find a map that allows you to select a specific premise to easily see an individual's performance. Also, as with the Forecast tab, the data displayed can be configured to show the proper information.



After an event has ended, the city can view how the event performed within the Analytics Module. The screen shot below shows how and event performed compared to the baseline usage. The filters on the left hand side allow you to select a specific event as well as drill down to specific groups or individuals to see their performance. As with the forecast screen, the reporting can be configured to show the proper information that best meets the city's needs.

The more control consumers have over their comfort and energy cost the happier they are. The Wiser Energy Management System (EMS) gives the consumer the ability to control their energy usage. Through the use of budget goals, automation and usage awareness the homeowner can reduce energy cost and benefit the environment. This intuitive web site is also available on mobile devices.

The Energy Management System component allows the customer to browse, enroll, and participate in Consumer Engagement programs. Customers can view available Consumer Engagement programs as defined by their customer class and/or current rate. Customers are able to view a description of the program, incentive details, seasonal information, voluntary and mandatory participation requirements, and other customer requirements. While enrolling in an event via the Enrollment Wizard, EMS will confirm program requirements, such as the presence of an appropriate control device or mandatory notification strategies. If applicable to the program, the customer will also be able to subscribe to additional optional notifications or add additional devices for utility control to maximize energy reduction contributions.

The customer web portal is the residential customer enablement component of WEMS. It is a web presentment solution that requires no on-site installation – and it can also be deployed as a HAN solution that enables energy management and automated control.

The web portal allows the customer to actively manage their electricity usage, analyze their current and historical costs, receive behavioral-based tips, evaluate and enroll in Consumer Engagement and other utility-sponsored programs, join engaging communities, and monitor their utility bills.

The utility side web portal of WEMS integrates with the customer web portal providing the city that bridge to communicate with their customers – within the context of their individual accounts and notification preferences. As with all components of the WEMS, functionality within web portal can be enabled or disabled to meet specific customer and utility needs. Core functionality includes:

- Standard Web Interface with HTTP and HTTPS support – A single, engaging user interface with HTTP and HTTPS support that allows customers to review electrical cost information.
- Configurable notification channels
    - SMS
    - Text
    - Voicemail
    - Email
    - Instant message
- PDA/Smartphone Web Interface (iPhone, BlackBerry, Droid, etc.)
- Messaging to Customer Energy Displays and PCTs
- Ability to embed web parts/portlets from other applications
- Ability to feed data into external portals, or provide an embedded web part/portlet
- API-based access to customer charts and data feeds

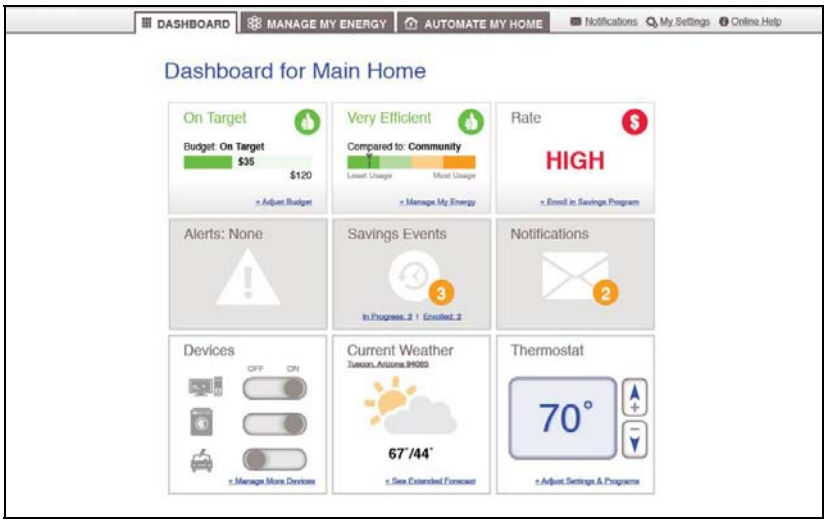
- Compare rates, benchmark their energy use and CO2 footprint against their community neighbors, access account information, analyze their bill, and receive notifications from the Cooperative
- Self-enroll in programs, set and monitor an electricity budget, make educated choices about how they use energy, and ultimately save money in ways that work for their lifestyle
- Purchase and self-register a broad variety of standards-based control devices, including Electric Vehicle charging stations, Programmable Control thermostats (PCTs), In-Home Displays (IHDs), load control devices, and mobile phone and mobile display units

Dashboard
The Dashboard is the entry point to the customer web portal for the customer. The Dashboard displays the following information for each customer:

- The budget they set for themselves for that current billing period and where they are in respect to their goal
- How their usage compares to their community
- What their current rate is. The screen shot below is for a customer on a Time of Use (TOU) rate and they are currently in the high rate period for the day)
- Alerts
- Savings Events
- Notifications
- Status of devices (Devices can be turned on and off from the Dashboard)
- Current Weather
- Thermostat (The PCT can be adjusted from the Dashboard screen)

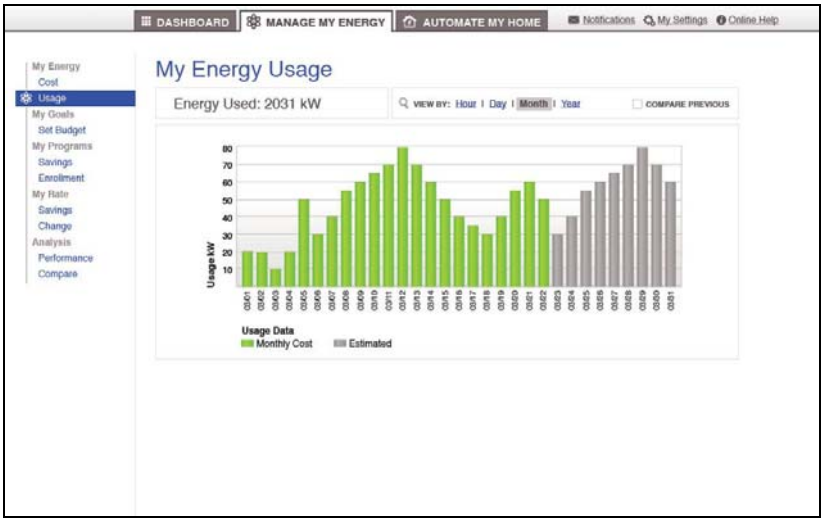
The customer can jump to the appropriate screen by selecting any of the panels. As an example, by selecting the Notifications widget, the customer will be taken to the Notifications screen.

Also included on the Dashboard are a utility messaging area and a section available for promoting relevant utility and third party programs such as home energy audits or refrigerator recycling programs.



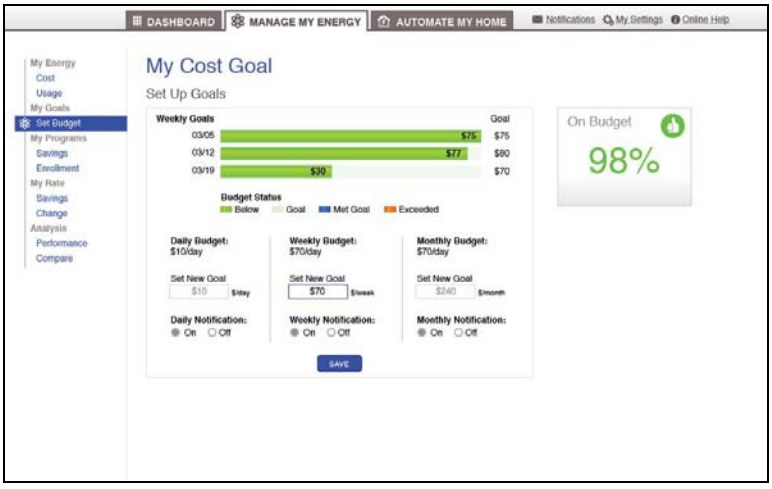
Manage My Energy

One of the most important components to the customer web portal is its ability to provide a breakdown of Energy Cost and Usage for the customer within the **My Energy** section of the Manage My Energy tab. This component provides the ability to review cost and usage information on an hourly, daily, monthly and yearly basis. The customer can also do comparisons with previous periods to better understand their costs as they relate to their energy bill. In conjunction with an extensive rate engine and energy baseline and estimation algorithms, the platform is also able to provide the customer with cost and usage projections to alert them to potentially high bills before they occur.



By selecting the “Compare Previous” box in the upper right corner of the “My Energy – Cost” or “My Energy – Usage” screens, the customer can compare their energy cost or usage to the previous period selected (hour, day, month or year). The screen shot below shows a cost comparison between the current month and the previous month.

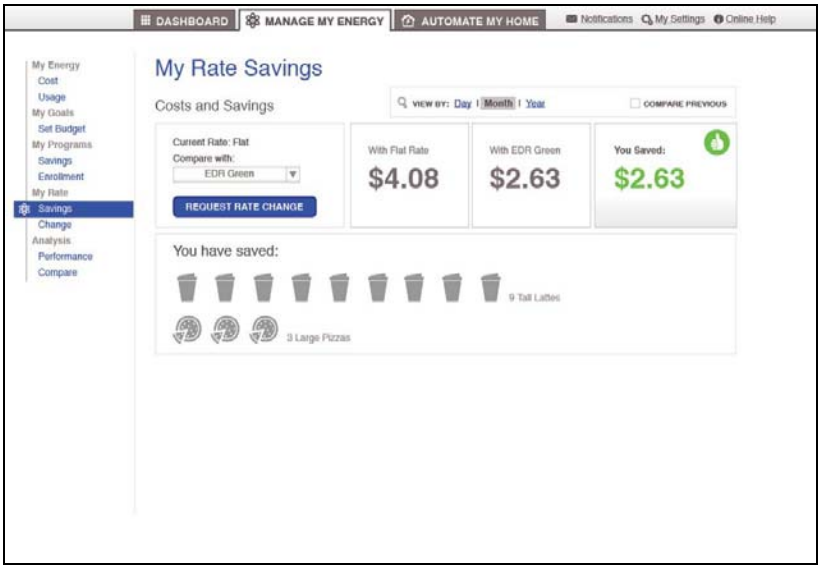
With the **My Goals** section, customers are able to manage their energy cost by setting daily, weekly, or monthly spending goals. A customer can also choose to be alerted when they have met or exceeded their cost goals.



A bar graph changes colors accordingly based on where the customer is, or ended up at, in regards to their goal. Also a panel shows the customer, percentage wise, if they are on budget to their set goal.

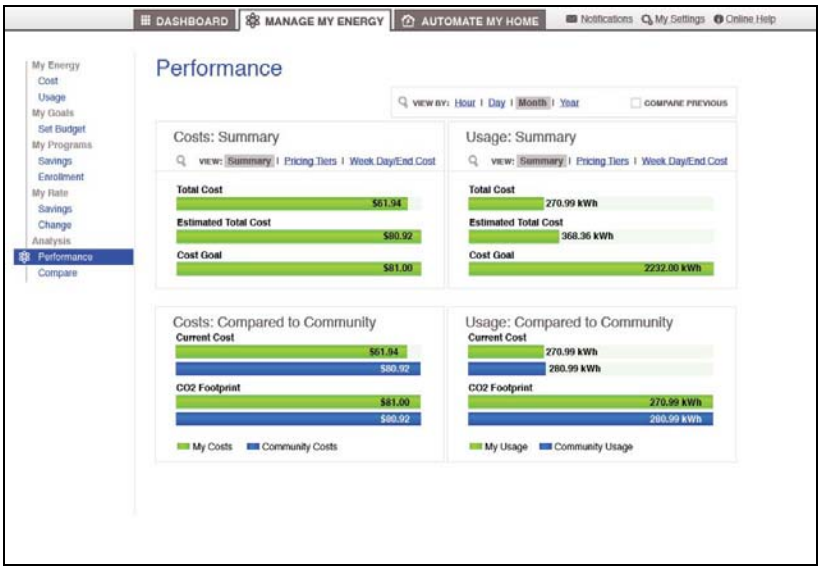
The **My Programs** section allows the customer to browse, enroll, and participate in Consumer Engagement programs as well as view savings for events they have participated in. Customers can view available Consumer Engagement programs that meet their eligibility. Customers are able to view a description of the program, incentive details, voluntary and mandatory participation requirements, and other customer requirements. While enrolling in an event the software will confirm program requirements, such as the presence of an appropriate control device or mandatory notification strategies. If applicable to the program, the customer will also be able to subscribe to additional optional notifications or add additional devices for utility control to maximize energy reduction contributions.

The screen shot below shows the customer in a graphical format all events they have participated in for the month and the savings they received for each program as well as the total savings for each day if there was more than one event run for the day. They can also view the graph by day or week. This screen can be viewed by selecting “Savings” under My Programs.

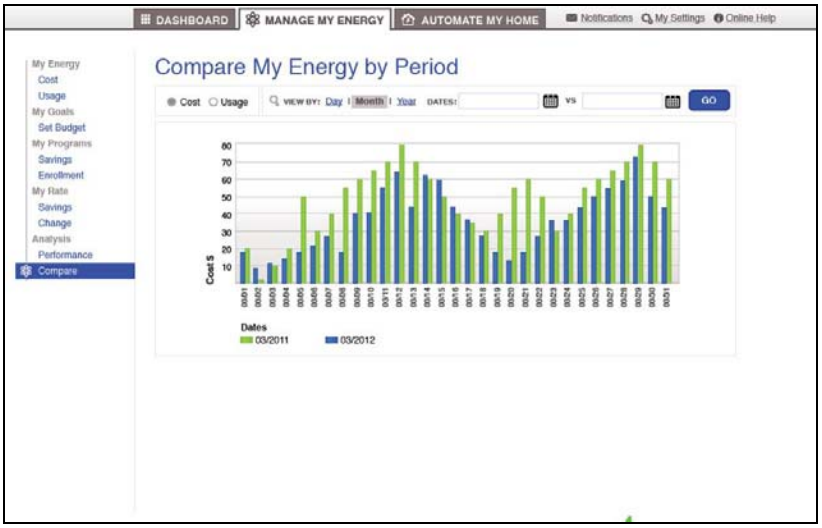


Under the **Analysis** section of Manage My Energy, the customer can view bar graph summaries of their usage and cost by hour, day, month or year. This is compared to the goals that they have set for themselves. The bar graphs can also be displayed by pricing tier if they are on a TOU rate and can also be viewed by week day vs. weekend cost or usage. As with My Energy section described above, the customer can select “Compare Previous” to compare the usage and cost to the previous hour, day, month or year.

The customer can also view their cost and usage compared to the Community they have enrolled in. Communities are groupings that share a particular commonality such as a substation, customer class, or geographical area such as zip code or city. The customer can view and enroll in communities under the My Settings area of the customer web portal.



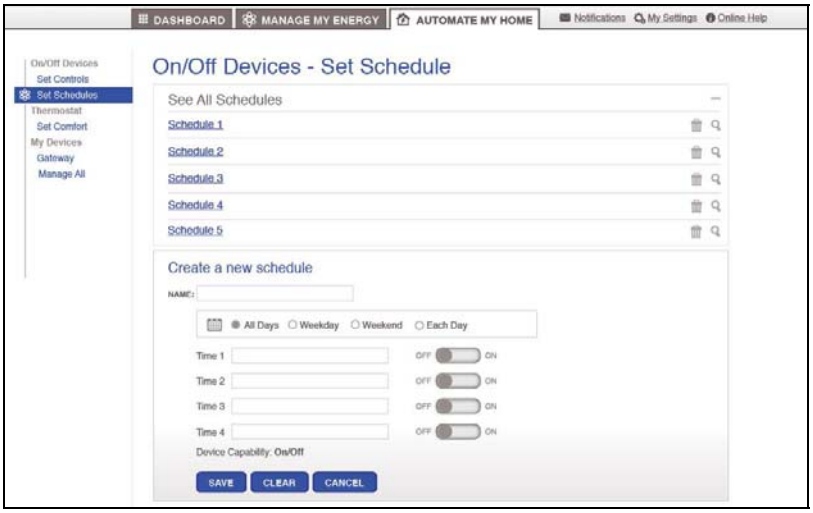
The compare period allows the customer to compare cost or usage for any given time period other than just a specific day, month or year.

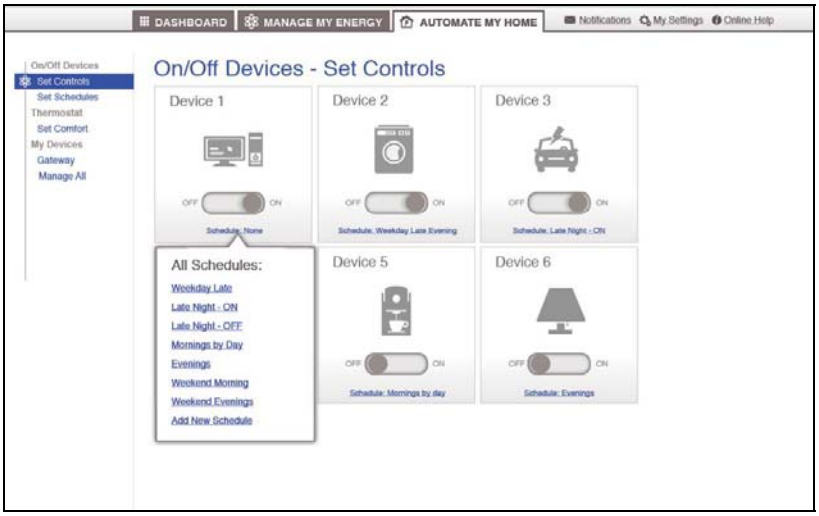


Automate My Home

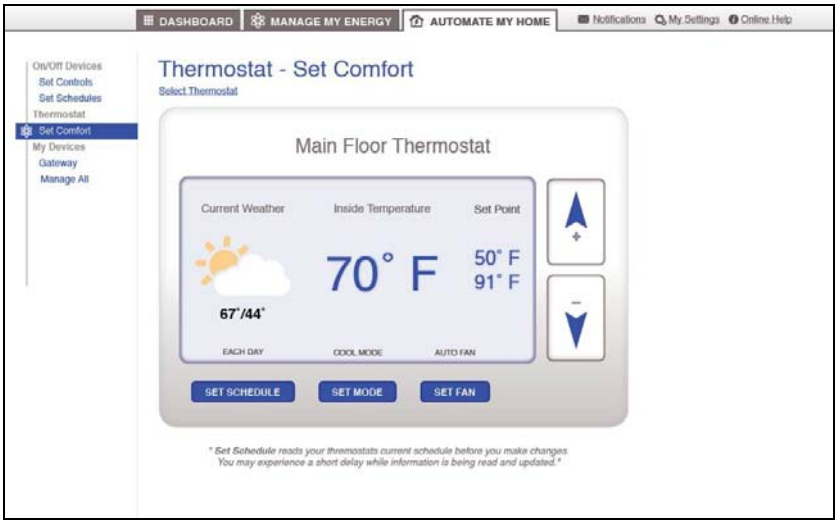
The customer web portal allows the home owner to turn on and off any installed device on Central Air Conditioning (CAC) systems, hot water heaters, pool pumps, or other customer appliances/equipment through the “Set Controls” screen under the Automate My Home section shown below.

The customer can create and edit schedules and assign them to devices within the home through the “Set Schedules” and “Set Controls” screens as shown below.





The customer can also control and schedule the PCT through the “Set Comfort” screen of the web portal.



My Settings

The My Settings area of the customer web portal allows the customer to:

- Manage and maintain users who can access the web portal
- Change Passwords
- Describe their residence (Residence Name, address, number of floors, square footage, etc.)
- Enroll in Communities
- Set up their billing period
- Set their temperature display to either Fahrenheit (F) or Celsius (C)

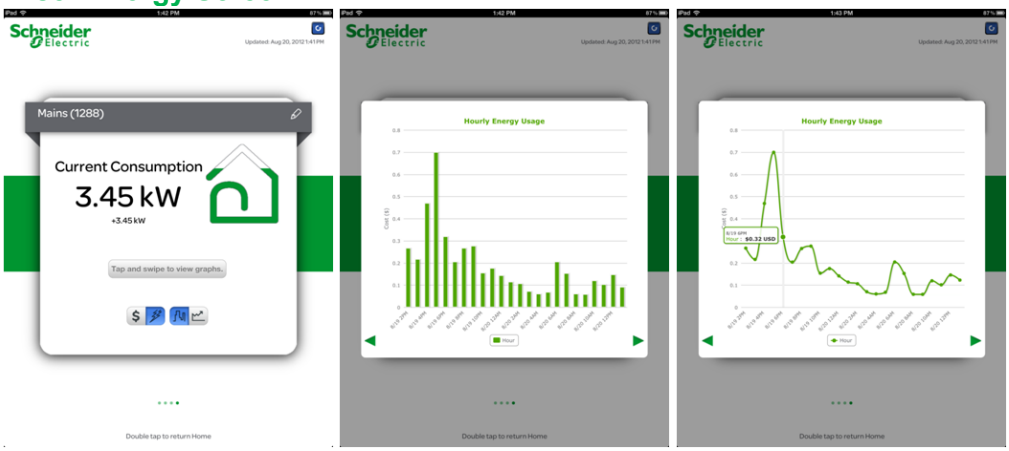
Schneider Electric believes that the future is instilled in mobile applications. Many simple operations can and will be performed by consumers while they are on the go.

The Schneider Mobile Application is designed to be simple yet offer the control functionality consumers want. The initial home screen gives the consumer access to eight modules.

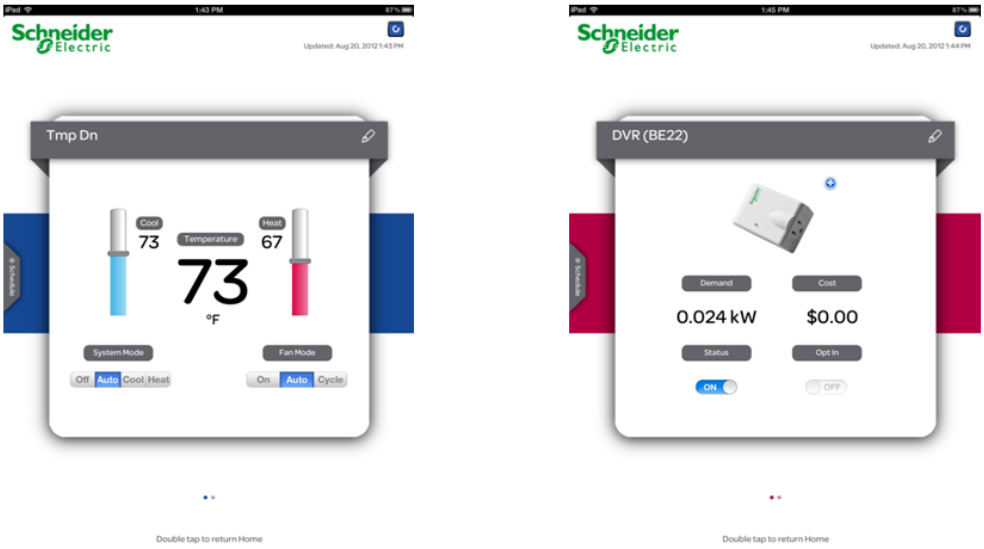
- Energy
- Budgeting
- Fan Control
- Solar Integration
- Electric Vehicles
- Plug Loads
- Home Network
- Tools

Wiser App Screen

Wiser Energy Screen



Wiser Thermostat and Smart Plug Settings



Wiser Budgeting

EXCLUSIVE: The Wiser thermostat gives the homeowner the ability to view the status of and control Load Control Modules that are on the home ZigBee network from the thermostat interface.

HAN Devices – ALL UL APPROVED

The proposed Wiser™ HAN solution is designed to communicate over all data networks that support the ZigBee Smart Energy Profile 1.1 and 2.0 when ratified and communication chipsets are available from the manufacturers. All Schneider products are engineered with safety in mind and comply with all industry standards. As extra value to your customers all **Schneider products are UL approved** for safety and peace of mind.

We realize the need to increase the functionality of the “standard” thermostat. Increased awareness of usage, control and messaging are critical components of consumers taking advantage of advanced technology. ***We have combined the functionality of the PCT and IHD in one device increasing the value*** to the consumer at a reduced cost.

TOU Color Signaling

The Programmable Communicating Thermostat (shown below) is the HVAC management component of Schneider Electric’s home energy management solution. This unit increases homeowner involvement by use of informative displays combined with color signaling. General interest information, such as time and temperature, are shown on a “home” screen where color is combined with innovative use of messaging to attract homeowner attention. In addition to its Smart Energy features, this unit also performs all of the functions of a four event, seven day, programmable thermostat.

The Programmable Communicating Thermostat is designed to operate with other ZigBee Smart Energy equipment, such as in home displays and load control devices. Each device provides standard Smart Energy features. When combined with other Schneider components, increased functionality is available. This functionality includes simple timer functions in load control devices, and other convenience features, such as demand management and opt-out.

The PCT will support the following industry standardized Smart Energy Profile commands:

- Thermostat Cluster
- Temperature Measurement Cluster
- Demand Management Cycling and Load Control Cluster
- Messaging Cluster
- Price Cluster
- Read and Report Simple Metering devices

Customer Event Management is achieved through the PCT, and includes the following messages which are available through the AMI network:

- Load Control Event command received
- Event started
- Event completed
- User has chosen to “Opt-Out”
- The event has been cancelled
- The event has been superseded
- Event partially completed with User “Opt-Out”
- Rejected – Invalid Cancel Command (Invalid Effective Time)
- Rejected – Event was received after it had expired
- Rejected – Invalid Cancel Command (Undefined Event)
- Load Control Event command Rejected

Install Exclusive - “Wiser Catchphrase”

The “Wiser Catchphrase” simplifies the user input required to commission/provision/register a device. Three simple words rather than long mac/install code sequences.

The Wise Gateway allows for communication between the city and the customers residence via broadband.

Schneider Electric believes that as consumers become engaged, Energy Management will begin to expand into additional functionalities. These functionalities will become an increasing consumer requirement. Schneider recognized that this evolution is eminent and as such has developed a gateway device that will deliver current and future needs of a developing consumer space.

Added functionality created by the Schneider ZigBee gateway includes:

- Real-time home energy management
- Remote access to the homes energy usage
- Remote (and enhanced) energy analytics
- Remote (and enhanced) programming features of PCT, Timer Functions, DR event elections

The Schneider gateway is a simple addition to a scalable solution. The gateway commissions to the network in the same way as the other Schneider ZigBee products, and creates a two way bridge on the Smart Energy side of the network; ensuring consistent security throughout the solution and communication between the city and control devices.

The Large Load Control is a part of Schneider Electric's growing family of energy management products. It is designed for use in Demand Management and Energy Management applications, and may be used for remote monitoring and management of HVAC compressors, water heaters, pool pumps, and other power circuits.

The Large Load Control (shown below) consists of a controllable circuit breaker, ZigBee compliant radio, and a (optional) branch current transformer. The resulting system is compatible with the ZigBee 'Smart Energy' profile, and is designed to work with the remote interface features of AMI metering systems. This enclosure contains all of the necessary logic for control and measurement, and for RF communication. It can be installed in any location where a branch circuit breaker, or disconnect, is normally used.

Each enclosure is capable of operating a double pole system such as 240 volt (2 leg electric feed). QOPL circuit breakers are available from 15 to 60 amps.

The Large Load Control has been designed to operate with other ZigBee Smart Energy equipment, such as communicating thermostats and in home displays. Each device provides standard Smart Energy features. When combined with other Schneider components, increased functionality is available, such as demand management and opt-out, are also supported by the system.

Customer Event Management is achieved through the LLC and includes the following messages which are available through the AMI network:

- Load Control Event command received
- Event started
- Event completed
- User has chosen to "Opt-Out"
- The event has been cancelled
- The event has been superseded
- Event partially completed with User "Opt-Out"
- Rejected – Invalid Cancel Command (Invalid Effective Time)
- Rejected – Event was received after it had expired
- Rejected – Invalid Cancel Command (Undefined Event)
- Load Control Event command Rejected

Wiser™ Power Monitor

For use when an AMI system is not present the Schneider CT Clamps have been specially designed to communicate with the Wiser HAN system.

- Measure up to six loads
- Single, two or three phase support
- Voltage and Power (wattage) measurements
- 0.1 watt / watt-hour precision
- 0.1 volt precision
- 1% accuracy class
- Installable in existing breaker boxes CT and “brain box” powered intern box
- Industry standard ZigBee SEP 1.1

Wiser™ Smart Plug

Sensible solution to control many 110 volt appliances remotely through Wiser Home Energy Management system. Features include:
Remote On/Off Control
Reports Energy consumption to IHD and/or PCT
Acts as ZigBee repeater
Opt out button

Communications Protocols

All Wiser HAN devices utilize wireless ZigBee radios and ZigBee SEP 1.1 (or possibly higher at time of testing/release for this pilot) for in-home communications. This includes any device to device communications with the AMI meter. Access into the home to the HAN devices can be via the meter or broadband through the Wiser Gateway. The gateway utilizes a hard-wired Ethernet port.

A world
where we all
can achieve more
while using less
of our common planet.

Schneider Electric