City of Tallahassee's Innovative Energy Initiatives

Evaluating Smart Meter-enabled technologies

A project to evaluate customer response and acceptance to in-home Smart Meter-enabled technologies that allow consumers intelligent control of their energy usage.

FINAL/TECHNICAL REPORT

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Executive Summary

The City of Tallahassee's *Innovative Energy Initiatives* program sought, first, to evaluate customer response and acceptance to in-home Smart Meter-enabled technologies that allow customers intelligent control of their energy usage.

Additionally, this project is in furtherance of the City of Tallahassee's ongoing efforts to expand and enhance the City's Smart Grid capacity and give consumers more tools with which to effectively manage their energy consumption. This enhancement would become possible by establishing an "operations or command center" environment that would be designed as a dual use facility for the City's employees - field and network staff - and systems responsible for a Smart Grid network. A command center would also support the City's Office of Electric Delivery and Energy Reliability's objective to overcome barriers to the deployment of new technologies that will ensure a truly modern and robust grid capable of meeting the demands of the 21st century.

A pilot group was asked to test the in-home Smart monitors and respond to a series of survey questions to assess the product performance.

The City of Tallahassee conducted a series of 3 surveys of pilot program participants and gained valuable feedback on (1) device features, (2) frequency of device/customer

interaction, (3) energy usage awareness, (4) timing of energy use, (5) energy cost savings, (6) value of the in-home device, (7) delivery and installation of the in-home device, (8) evaluation of the customer service and business process of installing and using the in-home device.

The research indicated that by giving consumers intelligent control of their energy usage, in-home Smart Meter-enabled technology provides useful service and information for the consumer of electric power. Those consumers who successfully deploy and use this technology find the data enlightening and helpful in controlling their in-home energy usage.

But the devices themselves need to be more consumer-friendly. Consumers found device's monitor interface "cluttered" and found features they deemed important – such as no connectivity to the internet and the inability to send and receive messages – troublesome. The fact that most participants indicated they would not be willing to pay for the device themselves is likely the result of the "less than consumer friendly" experiences documented through the surveys.

The research also indicated that the industry and corresponding infrastructure that provides and services in-home Smart Meter-enabled technology is not ready to consistently provide equipment and service to customers. The industry and corresponding infrastructure has not yet developed enough to support widespread consumer-friendly deployment of this technology.

Background

The City of Tallahassee maintains a municipal utility system that supplies electric power to approximately 113,000 customers located within a 221 square mile service territory. Smart Meters were installed throughout the utility's service territory to coincide with the City's offering of voluntary dynamic time-of-use rates that require in-home Programmable Controllable Thermostats (Smart Thermostats). These two-way communication and control devices for air conditioners, water heaters and other appliances automatically control energy usage based on price and the customer's preference. To accelerate adoption of these new rates and technologies the City implemented the *Innovative Energy Initiatives* project to understand and enhance the level of energy awareness among its residential customer base.

Scope

Initially, the City of Tallahassee's *Innovative Energy Initiatives* project involved enlisting a representative sample of utility customers to take part in a field evaluation of in-home energy monitors that provide real feedback on energy consumption habits. The City evaluated customer response to his type of

information and these types of emerging technologies in order to be better prepared to deploy a citywide Smart Grid electric utility system that is embraced by its customers. In doing so, this project supported the City's Office of Electric Delivery and Energy Reliability's objective to overcome barriers to the deployment of new technologies that will ensure a truly modern and robust grid capable of meeting the demands of the 21st century

Goals and Objectives

Goals:

Evaluate customer response and acceptance to in-home Smart Meter-enabled technologies that allow customers intelligent control of their energy usage.

Use the results to develop innovative residential rates, Demand Response incentives and education programs that advance a Smart-Grid platform for the City of Tallahassee to maximize customer participation in electric demand reduction and energy saving activities.

Locate and develop a single location for all smart grid related data compilation, analysis and a command center environment that integrates both cyber and physical security and conducive to testing and training.

Objectives:

- Develop a market research strategy to guide the City's interaction with participating customers during the evaluation period.

- Enlist a diverse sample of residential customers to participate.

- Install energy display devices in participating homes and monitor customer response and changes in energy consumption for 6-12 months.

- Evaluate customer feedback periodically and make refinements to market research plan to enhance results.

- Compile findings and recommendations.

- Renovate an existing facility using recycled materials, ergonomic workstations and methodologies, creating a command center.

- Establish a testing/training environment for the Smart Grid to facilitate testing of new devices, hardware/software upgrades to both the Advanced Meter Infrastructure (AMI) and Meter Data Management (MDM) databases, along with an environment to provide cross and advanced training for AMI and MDM personnel.

Scorecard

Exhibit 1, the Blue Line Smart Monitor In-Home Device (IHD) pilot, provides feedback, accomplishments, and a graphic rendering of collected data supporting goals/objectives/accomplishment.

Goal/Objective	Accomplishment	Goal/Objective Met?
Evaluate customer response and acceptance to in-home Smart Meter-enabled technologies that allow customers intelligent control of their energy usage.	The City of Tallahassee conducted a series of 3 surveys of pilot program participants (before during and after the in-home devices were installed). Valuable feedback, detailed in Exhibit 1, was received on (1) device features, (2) frequency of device/customer interaction, (3) energy usage awareness, (4) timing of energy use, (5) energy cost savings, (6) value of the in-home device, (7) delivery and installation of the in-home device, (8) evaluation of the customer service and business process of installing and using the in-home device.	YES

Goal/Objective	Accomplishment	Goal/Objective Met?
Develop innovative residential rates, Demand Response incentives and education programs that advance a Smart-Grid platform for the City of Tallahassee to maximize customer participation in electric demand reduction and energy saving activities.	Since January 2009 City of Tallahassee Utility rates have decreased by 23%. The City of Tallahassee offered customers a "Nights and Weekends Pricing Plan"-- an alternative rate option with a lower price on electricity used during nights (7 p.m. - 7 a.m.), weekends and holidays at 6.830 cents / kWh and a higher rate during weekdays (7 a.m. - 7 p.m.) at 21.126 cents / kWh. [i] Tallahassee was chosen to receive the E.F. Scattergood System Achievement Award, a prestigious honor given by the American Public Power Association (APPA) who has picked fewer than five other Florida utility providers for the recognition. The city's Smart Grid system and long list of utility offerings, such as Nights & Weekends rate, double rebates and e+ Online, helped Tallahassee beat out more than 2,000 small to large utility providers nationwide serving more than 46 million customers. In addition, the city's Neighborhood REACH was named 2012 APPA Energy Innovator Award. Barry Moline, executive director for the Florida Municipal Power Association, said the award lets residents know the city is taking steps to improve its operation and overall delivery of "clean, affordable and reliable electricity." "They're also leading the nation in innovative programs across the board, from smart grid to efficient power plants to energy efficiency," Moline said. "And they're doing it with a measure of caution while still being innovative and controlling rates.	YES

Develop a market research strategy to guide the City's interaction with participating customers during the evaluation period.	The City of Tallahassee conducted a series of 3 surveys of pilot program participants (before during and after the in-home devices were installed). Valuable feedback was received on (1) device features, (2) frequency of device/customer interaction, (3) energy usage awareness, (4) timing of energy use, (5) energy cost savings, (6) value of the in-home device, (7) delivery and installation of the in-home device, (8) evaluation of the customer service and business process of installing and using the in-home device.	YES
Enlist a diverse sample of residential customers to participate.	The pilot group was comprised of sixty (60) volunteers, City of Tallahassee employees from Utility Customer Services and Energy Services, who were asked to test the Smart monitors and respond to a series of survey questions to assess the product performance ultimately aiding in the development of future research/marketing processes.	YES
Install energy display devices in participating homes and monitor customer response and changes in energy consumption for 6-12 months.	Pilot development and training began in May of 2010. This was followed by device programming, meter upgrades, device delivery and setup from June 1, 2010 until June 30, 2010, culminating with a period of time for participation, surveys, and measurement from July to December 2010. The device selected for the project was a Blue Line PowerCost Monitor AMI for Elster EnergyAxis.	YES
Evaluate customer feedback periodically and make refinements to market research plan to enhance results.	The City of Tallahassee conducted a series of 3 surveys of pilot program participants (before during and after the in-home devices were installed). Valuable feedback was received on (1) device features, (2) frequency of	

	device/customer interaction, (3) energy usage awareness, (4) timing of energy use, (5) energy cost savings, (6) value of the in-home device, (7) delivery and installation of the in-home device, (8) evaluation of the customer service and business process of installing and using the in-home device.	
Compile findings and recommendations.	Detailed feedback and graphics included in Exhibit 1, pp. 12 - 15	YES
Locate and develop a single location for all smart grid related data compilation, analysis and a command center environment conducive to testing and training.	The Field Services dayroom with its accessible location served as an employee coordinating/meeting place. It ideally presented the space and was transitioned into a command center atmosphere to hold ready-to-view, key system health indicators, along with providing means to direct work group on various detailed segments of the metering network environment – network status, gatekeeper outages, real-time crew locations, weather alerts/updates, etc.	YES
Renovate an existing facility using recycled materials, ergonomic workstations and methodologies, creating a command center.	Construction and design of the command center was in two phases: physical transformation and technology implementation. This included a centralized layout with an open working area with monitors and personal computers at each workstation, along with larger monitors on the walls. Ergonomic design was utilized where applicable. Similarly and where feasible, recycled materials were used in the new flooring and cabinetry. The pairing of the design and construction with workstations, monitors, and personal computers supported the technology element to integrate multiple City databases – Customer Information System (CIS) and Outage Management System (OMS) - and systems serving the smart grid – AMI and MDM. Additionally, mobile GPS-based workforce management data and weather information will be available on command	YES *See Exhibit 2A-C; 3A-G*

	center screens for review and tracking purposes.	
Establish a testing/training environment for the Smart Grid to facilitate testing of new devices, hardware/software upgrades to both the Advanced Meter Infrastructure (AMI) and Meter Data Management (MDM) databases, along with an environment to provide cross and advanced training for AMI and MDM personnel.	The Command Center provides multiple system health indicators at ready view through multiple wall mounted monitors as well as an 8' x 8' "Video Wall" that allows city technical and field staff to observe the entire service territory on a single map. The City's utility footprint covers the city limits, as well as parts of Gadsden, Leon and Wakulla Counties. Because of the widely dispersed geographic area, this mapping feature is critical for staff to see any potential field network communication failures and to do trend analysis of meter communications. The room's open layout and design for technical service staff provides the means to focus a working group on more detailed segments of the metering network environment, including network status, gatekeeper outages, real-time crew locations and local weather alerts and updates.	YES *See Exhibit 3C, 3G*

Activity Summary

We met a number of goals and objectives with this project; however, there were unforeseen circumstances that precluded moving forward with Smart technology application: no support of widespread deployment of the technology; and "little or no adoption of a communication protocol among existing in-home displays and no industry standard for wireless communication." The inability to move forward with the technology also affected our meeting expenditure goals. We fell short of the approved budget of $1,300,645, having expenditures totaling only $1,079,096.70.

DE-EE0000277 (City of Tallahassee)		Dollars			Percentage	
		Total $$	DOE	Cost Share	DOE	Cost Share
Approved Budget	Phase 1	$ 719,625.00	$ 570,900.00	$ 142,725.00	80%	20%
	Phase 2	$ 587,020.00	$ 250,000.00	$ 337,020.00	43%	57%
	Total:	$ 1,300,645.00	$ 820,900.00	$ 479,745.00		
Actual Spent	Phase I	$ 503,091.18	$ 402,472.94	$ 100,618.24	80%	20%
	Phase 2	$ 576,005.52	$ 288,002.76	$ 288,002.76	50%	50%
	Total:	$ 1,079,096.70	$ 690,475.70	$ 388,621.00		
	SUMMARY:	Funding Year	DOE Funding Available	Drawdown to Date	DOE Funding Remaining	Final Drawdown
		2009	$ 570,900.00	$ 488,091.20	$ 82,808.80	$ 82,808.80
		2010	$ 250,000.00	$ -	$ 250,000.00	$ 119,575.70
					Last drawdown $	202,384.50
					De-obligate $	130,424.80

4th Quarter – 2009 (4Q09)

City staff prepared an agenda item to be presented to the City Commission for its approval and acceptance of the Innovative Energy Initiatives Grant, Award Number DE-EE0000277 and its authorization of staff to administer funding. Approval was expected to come in 2Q10. In the meantime, staff was presented with an opportunity to evaluate a smart thermostat, direct load control device and in-home energy display device in approximately 10 homes. The cost of this "pre-pilot trial" was approximately $25,000 and was covered as cost share by the City. Staff planned to evaluate the hardware for functionality and compatibility with the City's existing smart meter platform and decide whether to pursue expanding the pilot project with these devices or another manufacturer's.

1st Quarter – 2010 (1Q10)

The City Commission granted approval and acceptance of the *Innovative Energy Initiatives* grant, Award Number DE-EE0000277 at its January 27, 2010 meeting, further authorizing staff to administer funding. Initial results of first quarter "pre-pilot trial" deployment of a suite of devices (thermostat, 1 or 2 load control switches, and an energy monitor) to 10 homes within the service territory were positive. However, following installation several communication failures occurred. The devices failed to work with the network; staff continues to work with the vendor. Moving forward, staff purchased 200 display devices at a cost of approximately $40K of the recipient cost share. These energy devices that communicate via radio frequency are more robust and will evaluate how customers will use the data collected. Sixty (60) of the 200 devices purchased will be provided, as a part of the research and evaluation process, to staff whose utility services are provided by the City of Tallahassee and who daily serve the larger customer base in their roles as frontline, customer services representatives. A more informed service representative can better assist customers with their product choices and conservation efforts. We further anticipated that this group of staff could provide invaluable information for the marketing of the devices to the larger customer base.

With assistance from a City partner, a research and consulting firm, methodology and research were developed and conducted to evaluate customer response and acceptance of the in-home technologies. "A professional phone bank interviewed a random sample of 506 utility customers, residing in the City of Tallahassee. The survey, conducted March 4 – 9, 2010, was matched according to key demographics in an attempt to make the final sample 'look like' the

City. The survey, which was a recipient cost share of $15K, had a margin of error of 4.3% at the 95% confidence level."

Some Survey Findings:

"COT utility customers are very happy with the quality and reliability of services provided by the City and the utility. Eighty-five percent of respondents rated the overall quality of service provided by the city as "excellent" or "good" and ninety-two percent had a favorable impression of the quality of their utility service.

Utility customers want some price relief, and they want the City to assist them in finding or implementing ways to lower utility bills.

When looking across most of the questions, it is apparent that customers do not feel they can control these costs alone and they desire a partnership or at least some direct help from the city in conserving energy, lowering consumption and lowering prices.

While they generally want help in reducing the cost of receiving utility services the specific plans floated were only attractive to select audiences. (It is important to note that these figures may not translate into actual behavior nor will they be directly predictive of participation. This survey was designed to measure consumer *attitudes* about such programs. Often attitude measures do not directly correlate to actual behavior or behavioral implementations.)

- Rebates. Nearly 60% strongly agree and another 30% agree that this would be an important program.
- More Information. Consumers feel strongly (50% feel very strongly) that if they had more information about their usage, they could take more steps to lower their bills.
- Shifting usage. Respondents generally like the idea of being able to save money simply by using large appliances or shifting some of their usage to off-peak hours and weekends."

2nd Quarter – 2010 (2Q10)

Our focus this quarter involved additional research for marketing and soliciting of customer participation/acceptance of in-home Smart Meter-enabled technologies. We did so with the creation of the e+Smart Monitor Pilot Program that will ran from June 30, 2010 through August

30, 2010, and allowed participants to see their real-time electric consumption and relate the usage to nights and weekend pricing. The pilot program is another facet of the groundwork from which the facility and ease of identification and development of future products and applications the City can offer its customers.

The pilot group was comprised of sixty (60) volunteers, City of Tallahassee employees from Utility Customer Services and Energy Services, who were asked to test the Smart monitors and respond to a series of survey questions to assess the product performance ultimately aiding in the development of future research/marketing processes. By further dividing the volunteers into three groups and making distribution of the product via pick up at the worksite, postal delivery, or home installation by energy auditors and by including a quick reference guide, methods of delivery and instruction were reviewed. While an initial survey was sent to each participant to gather demographic data, participants, who daily respond to customers with questions about energy use and consumption, received training structured around a "Smart Choices" curriculum. By design and structure the curriculum offered the operational knowledge and internal support structure that will allow us to move our research beyond a local venue into one more extensive and more global.

This brought us to an additional undertaking this quarter. We worked with a partnership of national companies on the terms for a 10,000 end point pilot for extensive research of consumer use of the various smart technologies. Each home was equipped with a gateway device that would communicate with a smart meter and smart appliances in the home including an energy monitor. We planned on the customer paying a nominal fee of $25, while the City and partner companies would fund the remaining cost, an amount that should address expenditures for monitoring and data collection. The goal again was to prove that when consumers are armed with real-time information about their energy usage, they will find ways to modify their behavior to maintain suitable levels of consumption or reduce levels of consumption all together.

3rd Quarter – 2010 (3Q10)

As we reported last quarter, the *e+ Smart Monitor Pilot Program* began in June with the identification of sixty (60) volunteers who would receive, install or have installed in-home smart monitors to view their real-time energy consumption. The program was slated to conclude the end of August. In order to gather more customer feedback and operation experience, the program was extended until the end of the year. Preliminary feedback denoted the in-home monitors have a great deal of appeal to the user. Given the value of customer feedback, the

additional time will benefit the quality of information retrieved via a "closeout" survey. Further, from an operational   and customer focus, the quantity and quality of information helped us move strategically into the larger pilot size as envisioned in the Project.

Additionally, the City continues work with two national companies to implement a large-scale project. The work effort targets finalizing the project plan for the 10,000 end point pilot, whose launch was targeted for March 2011. The plan included marketing strategies for a community launch, identification of logistics for product delivery and customer field support, surveys and data gathering at several points to ensure scope and focus.

4th Quarter – 2010 (4Q10)

This quarter marked the conclusion of the *e+ Smart Monitor Pilot Program.* The sixty (60) volunteers who were provided a smart monitor shared their experiences via a survey. Survey data, collected, analyzed, and reported next quarter, centered around responses to the following: frequency of viewing/interaction with the monitor; awareness of "overall" energy usage; benefits of continued use of a monitor; the monitor's assistance with lowering one's utility bill; and monitor type/cost in the selection process.

In preparation for the next phase of the project – the 10,000 end point pilot - the City purchased approximately 3800 Zigbee enabled meters at a cost in excess of $400K. The purchase of these meters took our research to the next level, a "step up" in the pilot progression and offered an important opportunity to explore consumer use of smart technologies. The meters that are equipped with radios will facilitate communication with the in-home display devices. Preparation was also underway for development of the pilot roll out – marketing, the community launch, field support, and data collection.

1st Quarter 2011 (1Q11)

All aspects of Task 1 - program design and initiation, procurement of devices, research methodology, customer solicitation, and device installation - were completed at this point of the pilot portion of the project. The Smart Monitor In-Home Device (IHD) pilot project was designed to gather information to help successfully design and implement future programs/product offerings that could use an IHD as either a stand-alone product or as part of additional programs. The monitor allowed pilot participants to see their electric consumption

real time, and relate the usage to nights and weekend pricing. Specifically, the pilot sought to answer the following:

- Pilot participant feedback on device features.
- Pilot participant feedback on how often they or family members interacted with this device.
- Did this device change pilot participant awareness of "how much" energy they used?
- Did this device change pilot participant awareness of "when" they used energy?
- Did pilot participants think that this monitor helped them save money on their utility bills?
- Pilot participant feedback on perceived monetary value of the IHD.
- Testing of multiple delivery methods of IHD's to pilot participants.
- Testing of utility business processes relating to IHD distribution.

Task Overview

Process. Pilot development and training began in May of 2010. This was followed by device programming, meter upgrades, device delivery and setup from June 1, 2010 until June 30, 2010, culminating with a period of time for participation, surveys, and measurement from July to December 2010. The device selected for the project was a Blue Line PowerCost Monitor AMI for Elster EnergyAxis. In addition to the monitor, participants received the following: AC adaptor; user guide; wireless thermometer, used for placement outside to monitor outdoor temperature or placed in a room in the home; battery; and a Quick Guide, which was created in house to give the pilot participants an easy reference for installation and use. The Quick Guide proved to be an important factor with the business process testing and mitigation of calls to the Call Center. A monitor was distributed to each of the participants using one of three methods; a) installation by a City of Tallahassee Energy Auditor, b) pickup and self-installation by employee, or c) mail and self-installation by employee. Prior to the installation, the smart meter at the participant's home was upgraded by a field technician to enable the two-way communication between the smart meter and the IHD. The monitors were pre-programmed with artificial Time-of-Use rates to closely mirror possible future optional rate plans. Peak pricing was set at $0.24/kWh from 6 a.m. to 7 p.m. weekdays and Off-Peak pricing was set at $0.08/kWh from 7 p.m. to 6 a.m. weekdays and weekends. Cumulative bill cycle totals were reset at the end of each billing cycle for each pilot participant during the pilot period.

Data Collection. To obtain pilot participant feedback, a series of three surveys were designed and distributed over the Internet to the employee customer group who agreed to take part in the pilot.

- Survey 1 - Distributed before installation of the IHD, gathered demographic information (gender, age range, and education level). Pilot participants were selected City of Tallahassee Utility employees that agreed to participate in the pilot. Fifty-eight (58) employees from the Energy Services Department and the Utility Business and Customer Services Department were invited to be a part of the pilot. The initial invitations were distributed by email on June 1, 2010, with a link to the initial online demographic survey. A reminder email to fill out the first survey was sent on June 22, 2010. Pilot participants were divided into two basic groups. Group one, with 29 participants, had the monitor installed by a City of Tallahassee Utilities energy auditor through an appointment process. Group two, comprised of 29 participants as well, did self-installation. Of the 29 participants in this group, 14 picked up their monitors while 15 had their monitors delivered. Fifty-six (56) were tabulated

- Survey 2 - Distributed within one week of installation of the IHD, gathered feedback on the installation process based on type of delivery, features of the IHD, and customer awareness of "how much" and "when" energy was used and perceived monetary value of the IHD. Two versions of Survey 2 were created based on the type of distribution/installation method of the Smart Monitor: energy auditor Installed or self-Installed. Twenty-one (21) responses were collected from participants having the monitor installed by an energy auditor. Seventeen responses were collected from participants who did a self- installation.

- Survey 3 - Distributed at the end of the pilot from January 26 – February 14, 2011, gathered feedback on features of the IHD, customer awareness of "how much" and "when" energy was used and perceived monetary value of the IHD. Thirty-nine (39) responses were collected for this survey.

Results/Conclusions.

1. Pilot participant feedback on device features.

   a. Based on participant feedback in the second survey, participants most liked the instant feedback on usage in both kW and dollars. They also liked how the monitor indicates usage changes when specific appliances were turned on or off
   b. Participants would most like to simplify or "de-clutter the monitor interface and have the ability to turn off the back lighting. Adding connectivity to the internet and the ability to receive and send messages were noted as potential benefits.

   Participants like:

   a. Feedback on electrical usage in real time – 27 comments
   b. Feedback on usage as it relates to different appliances – 9 comments

    c.   Feedback on electric bill in dollars – 5 comments

Pilot participants dislike or would change:

    a.   Always on lighting – 6 comments
    b.   Home screen usability – would like to simplify – 7 comments
    c.   Add connectivity to internet – 3 comments

2.   Pilot participant feedback on how often they or family members interacted with this device.

    a.   Participant engagement with the device was high in the first week of the pilot as indicated in Survey 2. Daily interaction was 76.2% for the "Energy Auditor Installed" group and 94.2% for the "Self-Installed" group.

        This differential could be due any of or combination of the:
        i.   Small group size
        ii.   Make up of employee group
        iii.   Self-Install group has higher degree of initial interaction with the device and therefore feeling of "ownership".

    b.   Other household members who looked at/interacted was 61.9% for the "Energy Auditor Installed" group and 82.4% for the "Self -Installed" group in Survey 2. Again the percentage was significantly higher for the "Self-Installed" group. The differential could be due to any of or combination of the following:
        i.   Small group size
        ii.   Make up of employee group
        i.   Self-Install group has higher degree of initial interaction with the device and therefore feeling of "ownership".

    c.   83.8% of pilot participants were still interacting with the device at least once or twice a week at the end of the pilot period.

    d.   Participants went through "product/technology fatigue" in their interaction and interest with the IHD over the pilot time period. The ability to message the device with information of value to the customer may lessen this affect.

    e.   There is a high probability of future customer interaction and use of this type of product to monitor energy usage with possible use for demand and conservation programs.

    f.   Testing of message content/frequency and a range of optimum levels of customer interaction will need to be considered in future design program design.

3.   Did this device change pilot participant awareness of "how much" energy they used?

a. 90.5% of the "Energy Auditor Installed" and 82.3% of the "Self-Installed" group Agree/Somewhat Agree that they were more aware of "how much" energy they used in Survey 2.

b. In Survey 3, 67.5% of the combined groups Strongly Agree/Somewhat Agree that they were more aware of how much (overall) energy usage.

c. IHD's have a significant impact of customers' awareness of overall energy usage. This benefit will be valuable in future program design and pilots including key messaging.

d. Product/technology fatigue contributed to the awareness levels of the information provided by an IHD over the pilot time period. The ability to message the device with information of value to the customer may lessen this affect.

e. Testing of message content/frequency and a range of optimum levels of customer interaction will need to be considered in future design program design.

4. Did this device change pilot participant awareness of "when" they used energy?

a. 76.1% of the "Energy Auditor Installed" and 88.3% of the "Self-Installed" group Agree/Somewhat Agree that they were more aware of when they used energy in Survey 2.

b. In Survey 3, 70.2% of the combined groups Strongly Agree/Somewhat Agree that they were more aware of when they used energy.

c. IHD's have a significant impact of pilot participants' awareness of when they used energy.

d. This benefit will be valuable in future program designs and pilots. This benefit will be especially important in Time-of-Use programs.

e. Product/technology fatigue contributed to the awareness levels of the information provided by an IHD over the pilot time period but had less of an affect in this category. The ability to message the device with information of value to the customer may lessen this affect.

f. Testing of message content/frequency and a range of optimum levels of customer interaction will need to be considered in future design program design.

5. Did pilot participants think that this monitor helped them save money on their utility bills?

a. 54% of pilot participants Strongly Agree/Somewhat Agree that the IHD helped them save money of their utility bill.

b. This benefit is based on pilot participants' perception that by receiving actionable information on how much and when they use energy they will save money on their utility bills.

c. This benefit will contribute to the success of future program designs and should be made a part of key marketing messages.

6. Pilot participant feedback on perceived monetary value of the IHD.

a. 52.6% of all participants in Survey 2 said they would not be willing to pay for this device.

b. 47.4% of all participants in Survey 2 said they would pay one-half to one-quarter price for this device.

c. 60.5% of all participants in Survey 2 said they would not be willing to pay to rent this device.

d. 39.5% of all participants in Survey 2 said they would be willing to pay $5-$15 per month to rent this device.

e. 54.1% of all participants in Survey 3 would pay less than $50 for this device. Note: Renting question was not asked in Survey 3.

f. 24.3% % of all participants in Survey 3 would not pay for this device. Note: Renting question was not asked in Survey 3.

g. The results of this question will have to be considered in future program design and how IHD's will fit into value questions and customer acquisition.

7. Testing of multiple delivery methods of IHD's to pilot participants.

a. Delivery through USPS/FedEx or pick-up and self-installation possibly causes a higher initial interaction with device when compared to the group with devices installed by Energy Auditor as noted in # 2 above.

The differential could be due to any of or combination of the:

iii.   Small group size

iv.   Make up of employee group

i.   Self-Install group has higher degree of initial interaction with the device and therefore a feeling of "ownership".

8. Testing of utility business processes relating to IHD distribution.

a. Training of Customer Service Representatives and Installation staff is essential to successful distribution of devices.

b. Sufficient time for development of business processes and training should be a part of any future program design and implementation.

Notes:

1. The demographics of the pilot participants for Gender and Education mirrors the demographics of Leon County Florida, the service area of the City of Tallahassee Utilities. The demographics for age of pilot participants skews toward the mid-range of 25-44 as expected for participants with jobs as opposed to Leon County Florida demographics which is spread for all age ranges.

- Gender
  - o   Leon County/52.2 % Female (source: Census Bureau)
  - o   Pilot/50% Female
- Education
  - o   Leon County/College or Associates Degree/42.5% (source: Census Bureau)
  - o   Pilot/College or Associates Degree/48.2%

2. The outcomes of the pilot are affected by the small size of the pilot group and this fact will need to be considered when using the data in future programs

3. The outcomes of the pilot are affected by the pilot group being employees of the City of Tallahassee Utilities and this will need to be taken into account when using the data in future program design.

2nd Quarter – 2011 (2Q11)

The City of Tallahassee initiated a conference call between the grant oversight team for the Department of Energy and the city's representatives to provide a verbal update and expound upon the City's progress along with identifying obstacles affecting future progress in the achievement of its goal of providing in-home devices that afford a high level of control, quality of information, and the ability to communicate with other Smart-enabled technologies. Ultimately, the devices will assist the customer in his efforts to manage his energy and water usage.

As reported last quarter, a pilot study with approximately sixty (60) participants provided good research information, setting the stage for moving forward with a 10,000 end point pilot launch. Unfortunately, through mutual agreement, the City and its partner decided not to pursue the pilot. This was a minor setback; however, the City's intent is to refocus, move forward, and address other obstacles that may impede achieving its goal.

The greatest hurdle to overcome was the fact that there is little to no adoption of a communication protocol among existing in-home displays and no industry standard for wireless communication. The City had hoped Zigbee would emerge not just as the front-runner but as the standard protocol adopted by vendors, but there has been no consensus. In its continued work with Elster, the City found that the AMI vendor can accommodate our customer base in Tallahassee with a device that will work with the Smart Grid. However, with little movement toward a standard communication protocol and the scarce availability of consumer devices, progress has been delayed. The lack of an industry standard further interferes with the level of control the city can implement over other customer devices, devices that will take into account pricing, customer preference, and the quality and level of information a customer may want in order to maximize the benefits of choices he makes. The City is, however, proceeding with its efforts. To date approximately $484,430 has been expended for which the City intends to seek reimbursement in accordance with the grant. Based on the direction provided by the grant oversight team, the City considered these next steps.

- Request an extension of the project for a year
- Revise the budget with a re-allocation of funds to reflect a "blending" of grant program functions/activities for research and demonstration

- Make modification to the original scope (at this time the City does not believe it will pursue this option, but it is being considered)

3rd Quarter – 2011 (3Q11)

The City of Tallahassee continued to work with its AMI provider in seeking options to mitigate the impact of the lack of a communication protocol among existing in-home displays and a non-existent industry standard for wireless communication. Once these options have been identified and the associated steps initiated (establishing timelines, completing budget revisions, locating new vendors, etc.), we planned to move forward with a pilot launch on a greater scale than that of the 60-participant pilot to gather additional information. Moreover, we planned to seek reimbursement of the project expenditures to date -- $484,430 -- in accordance with the grant parameters.

4th Quarter – 2011 (4Q11)

The City of Tallahassee made progress this quarter by identifying new strategies and more advanced resources for the further evaluation of customer response and acceptance of in-home, Smart Meter-enabled technologies.

We identified a smart thermostat that offers advanced technology. It can be accessed through the Internet or via a Smartphone. Thermostat settings can be changed remotely, while energy consumption can be tracked online. Other features of the thermostat include its ability to communicate with the customer's smart meter, its ability to display real-time energy usage, and its ability to provide among other things a weather forecast. Additionally, the thermostat serves as a "demand response" device. This is a wonderful feature for assisting customers in their control of energy consumption and quite beneficial to the electric grid. During "peak electric" events the utility can send a signal to the smart thermostat and temporarily adjust the temperature and reduce the potential for strain on the electric grid. This feature fits in with the City of Tallahassee's demand side management goals to decrease the future need for a new power plant.

Moving forward with a proposed pilot program that will utilize the smart thermostats, we planned to identify City of Tallahassee residential customers wishing to participate who reside in homes with a central HVAC system and WIFI connection. Thermostats will be installed at no

cost to the participants. We will be testing all features of the thermostat including the demand response device that will require simulating a demand response event as described above.

1st Quarter – 2012 (1Q12)

Invoices were presented to Accounting. Staff assisted with initiation and completion of recouping funds expended thus far on the project. Additionally, staff was provided the plans for the layout of the Utilities Operation Center, and discussions were completed. Final pricing is being determined. The intent is to have a Utilities Operations Center featuring green materials. These materials will be 76% recyclable and manufactured using 52% recycled content. For example, the steel frames on the furniture will be 100% recyclable and readily reusable. The furniture will also be Green guard certified, a level one certification with a 12-year, three working shift warranty. The proposed seating will exceed all national ergonomic seating requirements to support a healthy workforce.

Additional design and work is in progress as well to support the multi-shift video wall that will display historical and real-time status of the electrical and water infrastructure.

Results

Note: Items listed herein were enhanced or realized in-part by our participation in developing Smart Grid technology capacity in general which includes thin-home Smart meter device pilot project

Tools/Collaborations/Awards

e+ Online

The City of Tallahassee's "*e+ Online*" is a web-based tool that provides customers with online account management with up-to-date cost and usage information. The tool provides information for all energy at the customer's fingertips, such as:

- Detailed account information and analysis
- Energy usage and costs by the month, day or hour
- Energy usage and cost of major in-home appliances

- Energy cost comparisons with system-wide averages
- Self-energy audits
- Information on cost savings programs

The web-based tool is enabled, in part, through Smart Grid technology.

White House Grid Modernization Initiative

The City of Tallahassee was invited to participate in the White House Grid Modernization Summit in June 2011. Tallahassee Utilities served as a select technical contributor and stakeholder in the national dialogue with policy-makers and regulators. Contributors worked to ensure that the national electric system evolves in a cost-effective fashion, unlocks innovation, empowers consumers and maintains grid cyber security

The City of Tallahassee's smart grid efforts were later highlighted in the report issued by the Executive Office of the President's National Science and Technology Council entitled "*A Policy Framework for the 21st Century Grid: Enabling our Secure Energy Future.*"

USDOE - American Recovery and Reinvestment Act

The U.S. Department of Energy selected Tallahassee as one of 100 entities nationwide to receive a piece of the $4 billion set aside for smart grid projects in the American Recovery and Reinvestment Act, touted as the largest single energy grid modernization investment in U.S. history. the Grant program is an effort to help modernize the nation's energy grid, support renewable energy sources, stimulate the economy and create jobs.

Florida Municipal Electric Association Community Service Award

The City of Tallahassee received the Florida Municipal Electric Association's Community Service Award for 2011. In addition, the city's Smart Grid system is the first in the nation to combine electric, gas and water in one utility grid system.

Publications/References

Tallahassee #1 in Public Power

Tallahassee Democrat
May 6, 2012
http://www.tallahassee.com/article/20120507/POLITICSPOLICY02/205070310/Tallahassee-No-1-public-power

Tallahassee has been chosen to receive the E.F. Scattergood System Achievement Award, a prestigious honor given by the American Public Power Association (APPA) who has picked fewer than five other Florida utility providers for the recognition. The city's Smart Grid system and long list of utility offerings, such as Nights & Weekends rate, double rebates and e+ Online, helped Tallahassee beat out more than 2,000 small to large utility providers nationwide serving more than 46 million customers. In addition, the city's Neighborhood REACH was named 2012 APPA Energy Innovator Award.

"This is a once-in-a-generation type of award," said Reese Goad, director of the city's Utility Business and Customer Service. "It really was a compilation of all the things we do to serve customers ... This is national confirmation we are on the right track."

The city provides electric power to roughly 113,000 customers and the city operates a gas utility and a water utility, serving about 27,000 and 83,000 customers, respectively.

Tallahassee will be recognized for the two awards June 19 at the national APPA conference in Seattle.

The association's nomination for choosing Tallahassee said, "In the last year, several key distinctions have placed Tallahassee Utilities in a key mentoring role. Responding to a special invitation from the White House for a grid modernization summit in June, Tallahassee Utilities served as a select technical contributor and stakeholder in the national dialogue with policy-makers and regulators. Contributors worked to ensure that the national electric system evolves in a cost-effective fashion, unlocks innovation, empowers consumers and maintains grid cyber security."

Several months ago, the Florida Municipal Electric Agency (FMEA) and the Florida Municipal Power Association (FMPA) nominated Tallahassee for the award.

Barry Moline, executive director for the Florida Municipal Power Association, said the award lets residents know the city is taking steps to improve its operation and overall delivery of "clean, affordable and reliable electricity."

"They're also leading the nation in innovative programs across the board, from smart grid to efficient power plants to energy efficiency," Moline said. "And they're doing it with a measure of caution while still being innovative and controlling rates. We sometimes take what we have for granted because it's so familiar we hardly recognize it."

The city has been recognized with other awards, including the Florida Municipal Electric Association's Community Service Award for 2011. In addition, the city's Smart Grid system is the first in the nation to combine electric, gas and water in one utility grid system.

"We know the city of Tallahassee's utility customers receive some of the best service in America," Tallahassee Mayor John Marks said. "With this prestigious award, our dedication to exceptional service, world class quality and competitive rates will now be recognized by the entire nation."

City of Tallahassee Lowers Electric and Natural Gas Rates
Florida Municipal Electric Association
September 29, 2011
http://www.publicpower.com/archived_news/2011/2011_september.html

City of Tallahassee electric and natural gas customers will see lower utility bills effective Oct. 1. Electric and natural gas rates for residential customers will decrease by two percent each. Rates for commercial customers will lower by between 2.9 and 3.4 percent, depending on the size of the business.

"Having recently met with a group of small business owners, I know this comes as welcome news as they continue to endure a difficult economy," said City Commissioner Andrew Gillum, lead commissioner on the City's Financial Viability of the Government target issue committee. Gillum also indicated that "the City needs to find more ways to help the business community in these trying times."

With the newly announced rate reduction, City electric rates have decreased by 23 percent since January 2009. Natural gas rates have lowered by 24 percent in that same time period. City utility rates are adjusted twice annually, in April and October, based on the cost of fuels to run power plants and the price of natural gas. Changes in the Consumer Price Index (CPI) are also taken into account.

"In comparison, our residential rates remain below the statewide average and our commercial rates are among the lowest in the state," said Reese Goad, director of Utility Business and Customer Services for the City. "Rates for small businesses are the lowest among all municipal utilities and second lowest when compared to all utilities in the state. Local businesses enjoy rates 28 percent lower than those in Gainesville and 17 percent lower than those in Orlando."

Fall is typically a great time for homeowners to make energy-efficiency improvements as contractors typically can work with customers on installations faster than during summer months. With cooler weather on the horizon, this is also a good time for residents to have their home heating systems examined for efficient use.

Tallahassee Preps Nation's First Smart Grid That Fuses Electricity, Gas and Water Utilities
Digital Communities
March 31, 2010
http://www.digitalcommunities.com/articles/Tallahassee-Preps-Nations-First-Smart-Grid.html

Of all the smart electricity grids rolling out locally across the country, Tallahassee's forthcoming advanced metering system might be the smartest.

This fall, the city's public utility will launch a smart grid that encompasses electric, natural gas and water services -- the first of its kind in the country to combine all three utilities in one network. On a backbone of 220,000 smart meters, a communications infrastructure, data collection software and smart devices, the system will enable the city and customers to save money and manage their power use like never before.

The technology, for instance, will allow customers to control thermostats remotely, choose their ideal electricity price rates and compare energy use data. They can sign up for a monetary cap for their accounts or receive a text or e-mail alert when their usage level approaches a preset limit. They can also do activities like laundry at off-peak hours to get cheaper rates. The city's utilities staff will be able to remotely pinpoint electricity outages and water leaks for quicker repairs.

"Our focus has always been the customer," said Reese Goad, Tallahassee's director of utility business and customer service. "Having all three systems under one umbrella, we'll be able to tell them the total cost of utility services, and view in real time the amount of utility services they're using."

Last fall, the U.S. Department of Energy selected Tallahassee as one of 100 entities nationwide to receive a piece of the $4 billion set aside for smart grid projects in the American Recovery and Reinvestment Act, touted as the largest single energy grid modernization investment in U.S. history. Grantees have to match at least 50 percent of the funds, but the government believes the money will help modernize the nation's energy grid, support renewable energy sources, stimulate the economy and create jobs, according to Jen Stutsman, a spokeswoman with the U.S. Department of Energy.

"We think the smart grid has the ability to improve the reliability and security of electrical systems," Stutsman said, "to improve the efficiency of how electricity is transmitted to consumers and give them information about the energy use in their homes."

But Tallahassee is a standout star. The city received and matched the $8.8 million in federal funds to bolster a smart-grid energy management system, consisting of a comprehensive demand response program that includes smart thermostats and in-home displays.

"One of the reasons Tallahassee is different is that once the metering and communications infrastructure is completed, the city will operate the first electric, water and gas smart grid in the

country," Stutsman said. "A number of cities have moved toward that, but this is going to be on the forefront of combining all three systems in one network."

The timeline for Tallahassee's utilities project spans five years, starting in 2005, when the City Commission directed staff to evaluate the potential of smart grid system. On the cutting edge of a burgeoning industry, the commission moved forward with plans to develop a system in 2007. In the next 15 years, Goad said, the city will earn $1.5 million in net present value savings.

"We started the investment in smart grid technology before it took off as a smart concept nationally," Tallahassee Mayor John Marks said last fall. "That's important for our customers as the bottom line is that they will be able to save energy, save water and save money."

Findings:

1. ***The information provided by the devices is very useful to consumers.*** By giving consumers intelligent control of their energy usage, in-home Smart Meter-enabled technology provides useful service and information for the consumer of electric power. Those consumers who successfully deploy and use this technology find the data enlightening and helpful in controlling their in-home energy usage. The devices profoundly changed the consumers awareness of the amount and timing of energy used and provided a basis for saving energy costs

2. ***The devices themselves need to be more consumer-friendly.*** Consumers found device's monitor interface "cluttered" and found features they deemed important – such as no connectivity to the internet and the inability to send and receive messages – troublesome. The fact that most participants indicated they would not be willing to pay for the device themselves is likely the result of the "less than consumer friendly" experiences documented through the surveys.

3. ***The industry and the infrastructure must mature.*** The industry and corresponding infrastructure that provides and services in-home Smart Meter-enabled technology is not ready to consistently provide equipment and service to customers. The industry and corresponding infrastructure has not yet developed the necessary product and market capacity to support widespread consumer-friendly deployment of this technology. There is little to no adoption of a communication protocol among existing in-home displays and no industry standard for wireless communication. Devices are not generally available in retail electronic outlets, distribution systems are limited, there is no point-of-purchase interaction and customer service is often lacking.

Recommendations:

- ❖ Encourage retail marketplace development rather than public sector marketplace development for in-home devices
- ❖ Offer federal income energy saving tax incentives for purchase and use of in-home Smart Meter-enabled devices
- ❖ De-clutter the monitor interface and make home screen more user friendly
- ❖ Add in-home device connectivity to the internet
- ❖ Add in the ability to send and receive messages to in-home devices
- ❖ The Customer Service function for the in-home devices should rest with the provider of the in-home devices and not with the electric utility.
- ❖ Smart Meter technology should be integrated with the burgeoning smart thermostat products now showing up in retail electronic and home improvement stores.

Project Expenditures

Federal Share Plan Total				Recipient Share Plan Total			
Vendor	Purchase Description	Amount	PO#	Vendor	Purchase Description	Amount	PO#
			PHASE I				
Vancore Jones Communicati	Utility Survey	$ 15,000.00	1034509	Vancore Jones Communications	Research Services	$ 15,000.00	1042061
Elster Solutions, LLC	Elster Solutions, LLC	$ 41,080.00	1036796				
Elster Electricity, LLC	Elster Electricity, LLC	$ 25,000.00	1033662				
Elster Solutions, LLC	Elster Solutions, LLC	$ 403,200.00	1069935				
Ecobee Inc.	Remote Sensor Module	$ 3,811.18	Purchase Card				
				Bass Construction Company	Renovation of Field Services	$ 45,499.50	1044192
				Bass Construction Company	Renovation of Field Services	$ 10,200.50	1044192
				Bass Construction Company	Renovation of Field Services	$ 12,784.00	1045295
				Bass Construction Company	Renovation of Field Services	$ 12,168.00	1045295
				Bass Construction Company	Basement Hallway/Shelves	$ 756.00	1045446
				Bass Construction Company	Basement Hallway/Shelves	$ 44,246.00	1045446
				Bass Construction Company	Meter Display Cabinet	$ 756.00	1045300
				Bass Construction Company	Signage	$ 2,735.00	1045450
				Bass Construction Company	Renovation of Basement Ha	$ 22,397.00	1045493
				Bass Construction Company	Additional Plumbing, Bathro	$ 12,581.00	1045580
				Bass Construction Company	Renovate Room 1	$ 7,572.00	1045601
				Bass Construction Company	Video Wall	$ 9,021.00	1045614
				Office Environments	Phase I/Phase II Layout	$ 19,060.00	1044373
				Office Environments	Furniture/Cabinets	$ 119,336.97	1044301
				AVI SPL	Audio Visual Equipment	$ 61,576.79	1045084
				AVI SPL	Materials, Coverage, Integra	$ 54,754.08	1045084
				AVI SPL	Professional Integration Sen	$ 5,965.28	1045084
				Insight	HP Compaq Monitors	$ 2,740.00	1044200
				Insight	HP CPUs	$ 3,290.73	1045294
				Insight	HP Care Pack	$ 93.44	1045294
				Insight	Video Wall Adapter	$ 1,589.70	1045617
				Insight	HP Workstation, Video Wall	$ 3,235.95	1045617
				Sears	Refrigerator	$ 2,076.96	Purchase Card
				Sears	Microwave	$ 275.45	Purchase Card
				Dial International Inc	Cable/Data Wiring	$ 3,496.46	1045167
				Dial International Inc	Cable/Data Wiring	$ 672.64	1045167
				Dial International Inc	Cable/Data Wiring	$ 556.52	1045167
				Dial International Inc	Cable/Data Wiring	$ 932.04	1045167
				Best Buy	TV/Monitors and Mounts	$ 6,199.95	Purchase Card
				Blind Connection	Mini Blinds	$ 468.00	Purchase Card
				Sears	Smart HDTV	$ 378.41	Purchase Card
				Hewlett-Packard	All in One Desktop PC	$ 1,099.99	Purchase Card
				Wal-Mart	Table Lamps	$ 174.24	Purchase Card
				Siemens	OpenStage60 Telephones	$ 7,665.84	1045256
				Siemens	Gateway Card	$ 3,425.50	1045256
				Siemens	Power Supply	$ 786.24	1045256
				Miller Glass	Double Pane Window Glass	$ 436.08	Purchase Card
				Office Environments	Furniture	$ 1,709.66	Purchase Card
				Office Environments	Furniture	$ -	Purchase Card
				Speech Privacy Systems	Installation of Speech Privac	$ 800.00	1045302
				Speech Privacy Systems	Control Module/Emitter	$ 2,650.00	1045302
				PTLA Technologies	Installation and Testing of Vc	$ 750.00	1045297
				Office Environments	Furniture	$ 38,598.82	1045421
				Office Environments	Furniture - Hallway	$ 6,841.82	1045494
				Hayes E-Government Resources	K-10 Bundle	$ 41,704.09	1045302
				Glaro-Sales	Recycling Containers	$ 1,947.87	Purchase Card

PHASE I TOTAL : $503,091.18

PHASE II TOTAL : $576,005.52

Exhibit 1

City of Tallahassee Utilities
Blue Line Smart Monitor In-Home Device (IHD) Pilot Pilot Project Report

Overview

The City of Tallahassee and its municipal utility, Your Own Utilities, is committed to enhancing its utility infrastructure (Smart Grid) employing technology including smart meters, meter data management systems, in-home devices, programs and products that provide customers and the utility significant opportunities for improvements in energy efficiency, demand side management and cost savings.

As part of this ongoing effort, in 2010 the City designed and implemented a "Smart Monitor" In-Home Device (IHD) pilot program. A "Smart Monitor" IHD uses the two-way communication capabilities inherent in a smart meter/smart grid system to display real-time information to the customer on electric usage and costs.

The "Smart Monitor" pilot was designed to gather information to help successfully design and implement future programs/product offerings that could use an IHD as either a stand-alone product or as part of additional programs. The monitor allowed pilot participants to see their electric consumption real time, and relate the usage to nights and weekend pricing. Specifically, the pilot sought to obtain or answer the following:
1. Pilot participant feedback on device features.
2. Pilot participant feedback on how often they or family members interacted with this device.
3. Did this device change pilot participant awareness of "how much" energy they used?
4. Did this device change pilot participant awareness of "when" they used energy?
5. Did pilot participants think that this monitor helped them save money on their utility bills?
6. Pilot participant feedback on perceived monetary value of the IHD.
7. Testing of multiple delivery methods of IHD's to pilot participants.
8. Testing of utility business processes relating to IHD distribution.

Time Line for available IHD device review and testing

Date	Disposition
May, 2010	Pilot development and training
June, 2010	Device programming, meter upgrades, device delivery and setup
July – December 2010	Participation, surveys and measurements

The selected device for the pilot, a Blue Line PowerCost Monitor AMI for Elster EnergyAxis, was distributed to each of the participants using one of three methods; a) installation by a City of Tallahassee Energy Auditor, b) pickup and self-installation by employee or c) mail and self-installation by employee. Prior to the installation, the smart meter at the participant's home was upgraded by a field technician to enable the two-way communication between the smart meter and the IHD.

Exhibit 1

The monitors were pre-programmed with artificial Time-of-Use rates to closely mirror possible future optional rate plans. Peak pricing was set at $0.24/kWh from 6 a.m. to 7 p.m. weekdays and Off-Peak pricing was set at $0.08/kWh from 7 p.m. to 6 a.m. weekdays and weekends. Cumulative bill cycle totals were reset at the end of each billing cycle for each pilot participant during the pilot period.

Each Blue Line PowerCost Monitor contained the following items:
1. AC Adaptor
2. User Guide
3. Wireless Thermometer – used for placement outside to monitor outdoor temperature or placed in a room in the home.
4. Battery
5. Quick Guide – Installation, Features and Basic Usage– The Quick Guide was created in-house by the City of Tallahassee Utilities' to give the pilot participants an easy reference to installation and use. This was determined as an important addition in the business process testing so that to mitigate calls to the Utility call center.

Surveys

To obtain pilot participant feedback, a series of three surveys were designed and distributed over the Internet to the employee customer group who agreed to take part in the pilot.

- Survey 1 - Distributed before installation of the IHD, gathered demographic information (gender, age range and education level).
- Survey 2 - Distributed within one week of installation of the IHD, gathered feedback on the installation process based on type of delivery, features of the IHD, customer awareness of "how much" and "when" energy was used and perceived monetary value of the IHD.
- Survey 3 - Distributed at the end of the pilot, gathered feedback on features of the IHD, customer awareness of "how much" and "when" energy was used and perceived monetary value of the IHD.

Both the second and third surveys used multiple choice and open-ended questions. The order that multiple choice question answers appeared in the surveys were randomized.

Exhibit 1

Pilot Participant Demographics – Survey 1

Pilot participants were selected City of Tallahassee Utility employees that agreed to participate in the pilot. Fifty-eight (58) employees from the Energy Services Department and Utility Business and Customer Services Department were invited to be a part of the pilot. The initial invitations were distributed by email on 6/1/2010 with a link to the initial online demographic survey. A reminder email to fill out the first survey was sent on 6/22/2010.

Pilot participants were divided into two basic groups:
- Group 1 - Installation by a City of Tallahassee Utilities Energy Auditor through an appointment process. 29 participants
- Group 2 – Self Installation- 29 participants – this group was further subdivided into:
  - Monitor Pickup - 14 participants
  - Monitor delivered (Fed Ex or US Mail) – 15 participants

Fifty-six (56) responses were tabulated.

Question 1: Gender
Male: 28   Female: 28

Question 2: Age Range		
Answer Options	Response Percent	Response Count
18 - 24	3.6%	2
25 - 31	10.7%	6
32 - 38	12.5%	7
39 - 45	26.8%	15
46 - 52	26.8%	15
53 - 59	12.5%	7
60+	7.1%	4

Question 3: Education		
Answer Options	Response Percent	Response Count
Less Than High School	0.0%	0
High School / GED	5.4%	3
Some College	28.6%	16
2-Year College (Associated Degree)	10.7%	6
4-Year College (BA / BS Degree)	37.5%	21
Post Graduate	17.9%	10

Exhibit 1

Survey 2 Summary

Two versions of Survey 2 were created based on the type of distribution/installation method of the Smart Monitor; Energy Auditor Installed or Self Installed.
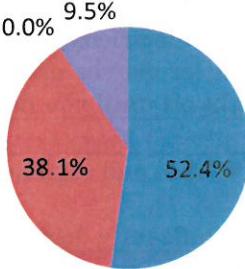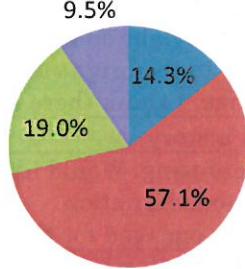
Survey 2 - Energy Auditor Installed
July 12-23, 2010
21 responses were collected for this survey.
For the purposes of this report, questions having to do with Energy Auditors, the Quick Guide and names of participants have been omitted.

2. Compared to other at home appointments you have had (for example cable, phone, repairs), the e+ Smart Monitor appointment process was:	
Answer Options	Response Percent
Better / Easier than I expected	52.4%
About what I expected	47.6%
Worse than I expected	0.0%

7. Have you referred to the "Quick Guide" since your e+ Smart Monitor was installed?	
Answer Options	Response Percent
Yes	66.7%
No	33.3%

9. Did other people in your household look at or ask questions about the e+ Smart Monitor?	
Answer Options	Response Percent
Yes	61.9%
No	28.6%
NA	9.5%

10. In the first week, how many times did you look at / interact with the e+ Smart Monitor?

Every day: 76.2%
Every few days: 14.3%
Once in a while: 4.8%
Never: 4.8%

11. The e+ Smart Monitor is making you more aware of your "OVERALL" energy use.

Agree: 52.4%
Somewhat agree: 33.3%
Disagree: 9.5%
Somewhat disagree: 4.8%

Exhibit 1

12. The e+ Smart Monitor helps you be aware of "WHEN" you are using energy.	13. You believe you would save energy and money on a "Nights and Weekend" rate like the one programmed into the e+ Smart Monitor.
0.0% 9.5% 52.4% 38.1%	9.5% 14.3% 19.0% 57.1%
■ Agree ■ Somewhat agree ■ Disagree ■ Somewhat disagree	■ Agree ■ Somewhat Agree ■ Disagree ■ Somewhat disagree

14. Assuming that the full price of a Smart Monitor is $200, if a Smart Monitor was offered as part of a Nights and Weekend rate plan, would you be willing to:

Pay

Answer Options	Full Price	Half Price	Quarter Price	I wouldn't pay for this	Response Count
e+ Smart Monitor	0	4	5	12	21

Rent

Answer Options	$25 / month	$15 / month	$5 / month	I wouldn't rent this	Response Count
e+ Smart Monitor	0	1	8	12	21

15. What do you like about this Smart Monitor?

The estimation of what my bill would be and being able to see the actual charges and Kwh usage!
I like the fact that it lets me know how much the different appliances cost to run.
The fact that you can see the appliances in your home that use the most energy
I like being able to see where I am with my bill so that I can make changes, when necessary.
Need more time to decide any information on this monitor.
Color screen, $ amounts, Date and Time
Basic awareness of energy use. Especially helpful when major appliances such as HVAC and clothes dryer went on.
The device helps me to monitor my usage, and
the fact that its making me much more aware of my electric usages
It tells you the KW and KWH in real time and est. usage
It keeps me aware of usage on different appliances and lights.
I liked that it has made my children more aware of the electric consumption they are using every time they turn something on.
Seeing my usage in real time.
demand indication (kilowatts)
stays lit so you can always read it from a distance
Just being able to see the difference in KWH once you turn the lights, a/c, or dryer on.

Exhibit 1

Seeing usage of different appliances and other energy users.	
16. What features would you change or add to this e+ Smart Monitor?	
It would be cool to add the 'appliance' feature	
Adding water and gas would make this product much more comprehensive.	
Maybe change the light on the monitor, seems like it is using a lot of electricity, however it is a great night light, due to the brightness, but I am concerned that the monitor may be using more electricity than I would like. I think there should be an option to turn the light off until you need it.	
More detailed history	
Buttons are confusing. Would like an on screen comparison of TOU rate and regular rate. Change "Standard" time designation.	
In general I was engaged for the first week and my interest has significantly decreased since then.	
The back light doesn't turn off it like a night light on.	
I would really like to see how the appliance option really works.	
ACTUAL rates, not hypothetical rates	
The display is too bright @ night.	

Survey 2 - Self-Installed

July 12-19, 2010

17 responses were collected for this survey.

For the purposes of this report, questions having to do with the Quick Guide and names of participants have been omitted.

2. Thinking about other items you may have ordered through catalogues or on the Internet, what is your expectation on how long it takes to receive the item when you don't pay for express shipping (for example overnight or second day)?

Answer Options	Response Percent
Less than 3 days	5.9%
4-7 days	64.7%
7-10 days	29.4%

3. When did you set up your e+ Smart Monitor?

Answer Options	Response Percent
The same day I received it	70.6%
1 - 2 days later	29.4%
3 - 7 days later	0.0%
I haven't set it up yet	0.0%

7. Did other people in your household look at or ask questions about the e+ Smart Monitor?

| Answer Options	Response Percent
Yes	82.4%
No	11.8%
N/A	5.9%

8. In the first week, how many times did you look at / interact with the e+ Smart Monitor?

Bar chart: Every day 94.1%, Every few days 0.0%, Once in a while 0.0%, Never 5.9%

Exhibit 1

9. The Smart Monitor is making you more aware of your "OVERALL" energy use.

- Agree — 64.7%
- Somewhat agree — 17.6%
- Disagree — 11.8%
- Somewhat disagree — 5.9%

10. The Smart Monitor helps you be aware of "WHEN" you are using energy.

- Agree — 76.5%
- Somewhat agree — 11.8%
- Disagree — 11.8%
- Somewhat disagree — 0.0%

11. I would save energy and money on a "Nights and Weekend" rate like the one programmed into the e+ Smart Monitor?

- Agree — 35.3%
- Somewhat Agree — 41.2%
- Disagree — 17.6%
- Somewhat disagree — 5.9%

12. Assuming that the full price of a Smart Monitor is $200, if a Smart Monitor was offered as part of a Nights and Weekend rate plan, would you be willing to (answer only one):

Pay					
Answer Options	Full price	Half price	Quarter price	I would not buy this	Response Count
e+ Smart Monitor	0	4	5	8	17
Rent					
Answer Options	$25 / month	$15 / month	$5 / month	I would not rent this	Response Count
e+ Smart Monitor	0	1	5	11	17

Exhibit 1

13. What do you like about this Smart Monitor?
I do not like the monitor.
instantaneous kW reading
Near real time data
provides instant info on energy usage
Made us aware of when we use the most energy, and what the source was. A useful tool for the budgeting.
The fact that it monitors my daily consumption and provide vital information as it relates to my peak usage.
I like how it shows my current rate of charge, (looking at the meter you can only see the kw usage, now I can see how much money is going.
Allowing you to monitor your electric consumption a daily is great.
Provided useful information, updated quickly
How user friendly it is. Love how I can adjust appliance/light usage on the fly to save money. Very cool.
Fairly easy to use, touch screen, large display.
It enhances awareness about what you and your family members are doing relative to usage. Provides first hand confirmation that we really do have control. Will allow a more informed, personal interactive with customers about the e+ monitor.
Instant feedback, estimated cost and consumption for the current bill cycle.
easy to see number, usage estimate is great
Knowing how appliances effect my electric consumption is very useful
It wasn't a like or dislike for me, regardless of what the monitor showed for using any give appliance it didn't change my habit for using it.

| 14. I would change or add the following features to this e+ Smart Monitor |
| --- |
| The screen should not be visible until it is touched. |
| Less clutter. |
| make current rate of usage the default setting vs. having to select it |
| Add alarming devices, such as advising me when I have used to much consumption or alerting me to usage should be decreased at certain times and offer times when is most appropriate to use. |
| face is too complicated, just give me the facts |
| TOU Bars and speedometer on meter are hard to read. Add an indicator of how many days have elapsed since the end of the last billing period. |
| When you desire real-time data and you toggle the button for it to read .. NOW it shows the word .. PREV (which this data is not available anyways). I would like it to reflect the MODE that it is in. So, if NOW is the data desired, then that's how it would read on the button. |
| Too much info on home screen. Display should show current cost for usage and you should have to toggle in between other screens to see all of the other information. |
| I cannot offer a suggestion at this time. |
| Edit the language in the manufacturers manual (i.e., Consumption Ratio Indicator may confuse or customers). Rechargeable batteries that recharge when plugged in to an electrical outlet. Backlight controls that dim the backlight after X seconds when not in use (when plugged in). More control of appliances and thermostats (much like a smart thermostat). Remote control of the device via the internet (E+ online). |
| Ability to dim when not being touched. The outside temperature does not display at all times. |
| show the "price per kwh" for the current period on the main screen |
| Provide an option to turn off the beep and the backlight. It is difficult to determine for what length of time you have consumed the total amount of kWh. Add a daily average consumption and compare it to the temperature. |

Exhibit 1

# Survey 3 Summary

January 26- February 14, 2011

39 Responses were collected for this survey.

| |
|---|
| 1. Thinking over the past few months, how often did you look at / interact with the e+ Smart Monitor? |
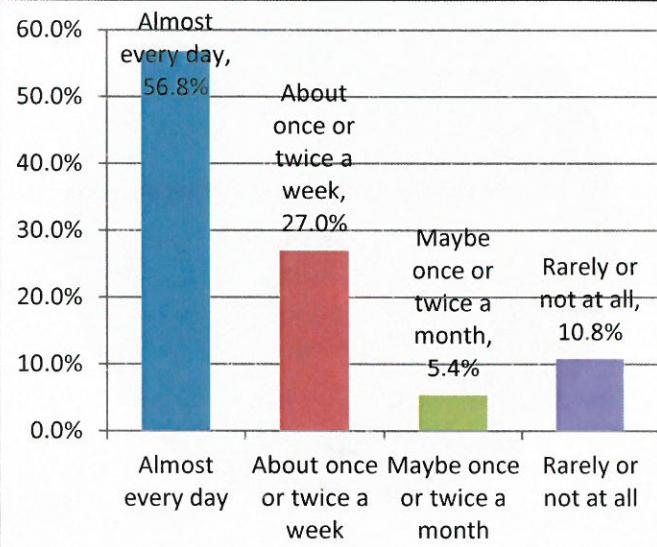
2. In the past several months, the Smart Monitor continued to help me be aware of my "OVERALL" energy use.

Exhibit 1
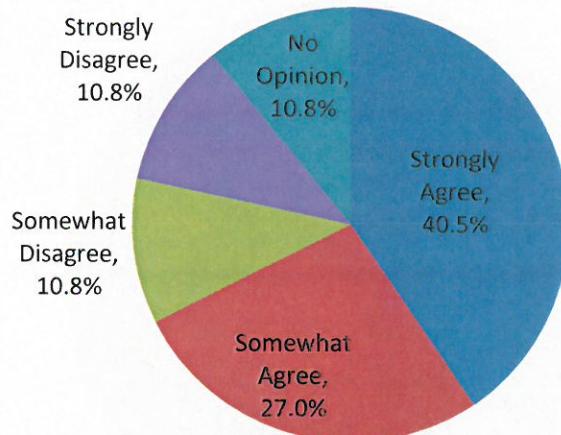
3. In the past several months, the Smart Monitor continued to help me be aware of when I use energy.

- No Opinion, 13.5%
- Strongly Disagree, 8.1%
- Somewhat Disagree, 8.1%
- Strongly Agree, 45.9%
- Somewhat Agree, 24.3%
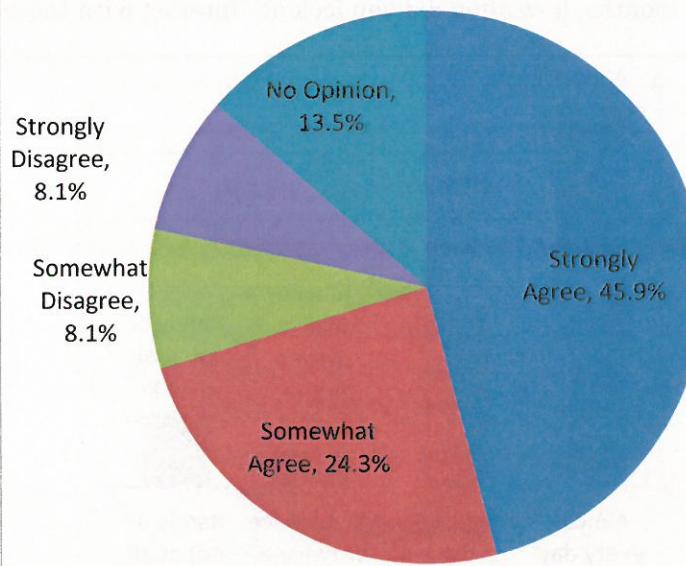
4. The Smart Monitor helped me save money on my utility bill.

- No Opinion, 27.0%
- Strongly Agree, 18.9%
- Strongly Disagree, 10.8%
- Somewhat Agree, 35.1%
- Somewhat Disagree, 8.1%

10

Exhibit 1
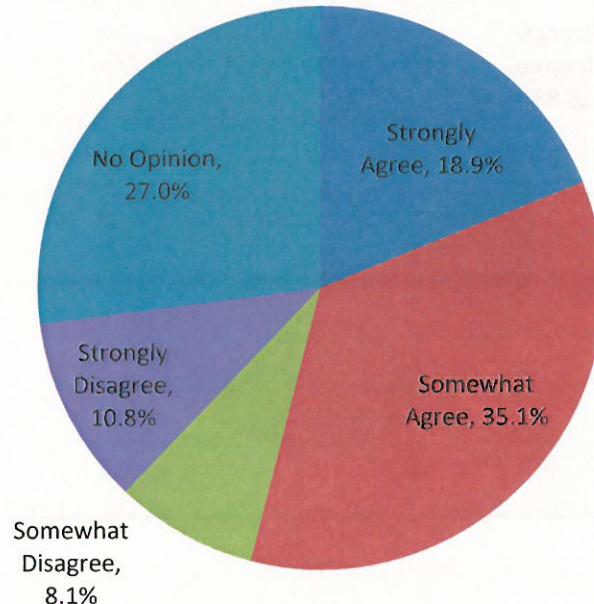
5. Here is a list of changes/improvements from previous surveys. Check all that apply for you. You will be able to add additional suggestions at the end of this survey.
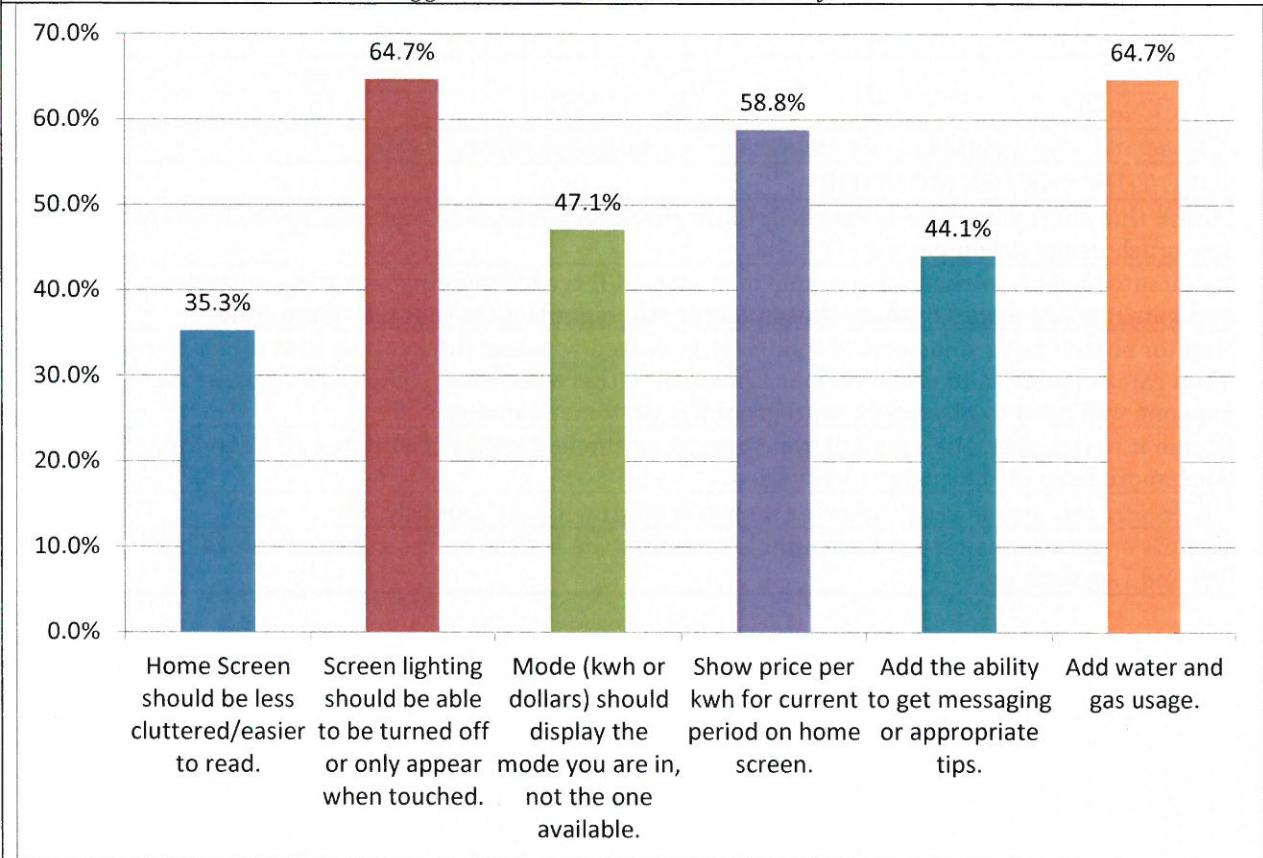
6. If you were going to buy an energy monitor of this type, what would you pay for it?

Exhibit 1
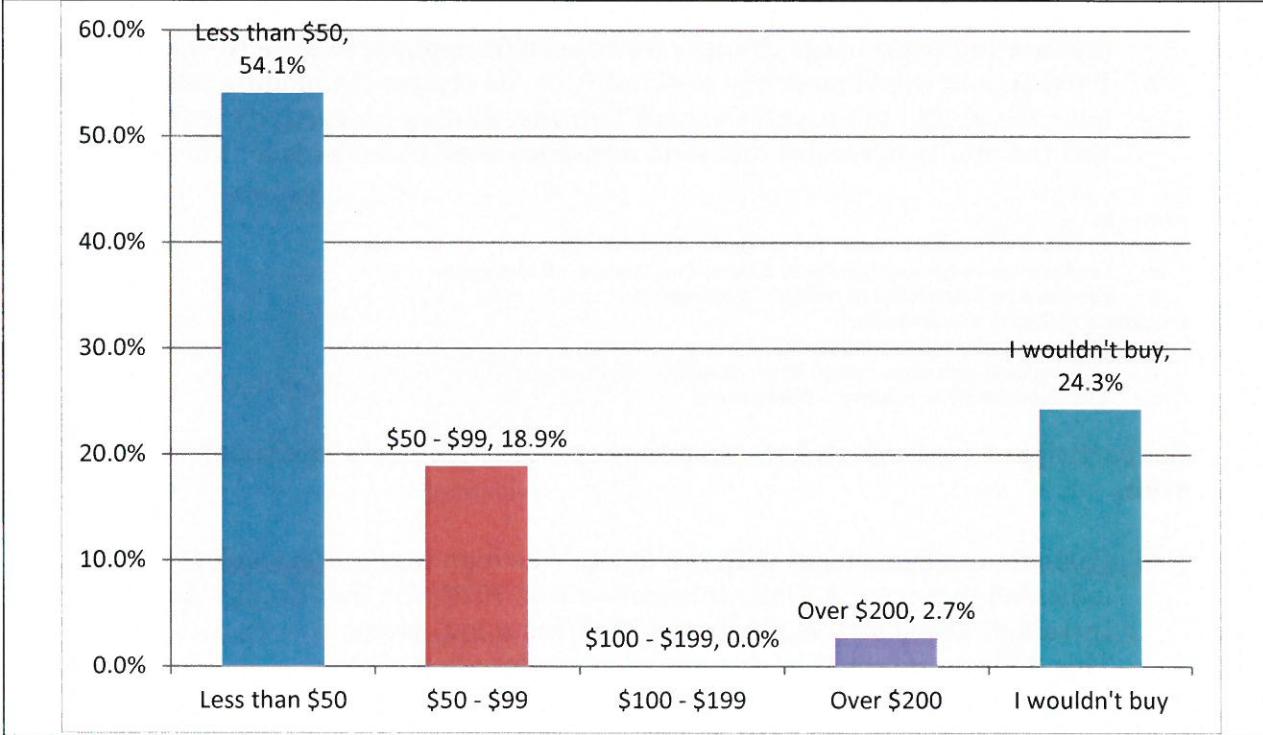
7. Would you prefer to keep your energy monitor for continued use?			
Answer Options	Response Percent	Response Count	
Yes	75.7%	28	
No	24.3%	9	

8. Please add additional ideas for changes or improvements here.
LOVE THIS ENERGY MONITOR! ..
I think this energy monitor is very helpful to check on your usage and help you to learn to control how much usage is being used.
my monitor hasn't worked for a couple of months, I'll try unplugging/removing batteries to see if that gets it going again; outdoor thermometer still signals most (not all) of the time
Monitor should have some sort of connectivity (wired/wireless internet) so that it can be updated when rates change (and other various updates). Otherwise, every time COT changes its rates someone will need to physically reprogram the customer's monitor.
I'd like it to indicate when my bill cycle begins, or the last meter read date - so I can know how much more time in the current bill period.
The energy monitor is great however it should align with my monthly bill.
My only suggestion is that it be available to assess the E Plus online at times, instead of log out of CIS and Log back on.

Pilot Results/Conclusions

1. **Pilot participant feedback on device features.**

   a. Based on participant feedback in the second survey, participants most liked the instant feedback on usage in both kW and dollars. They also liked how the monitor indicates usage changes when specific appliances were turned on or off

   b. Participants would most like to simplify or "de-clutter the monitor interface and have the ability to turn off the back lighting. Adding connectivity to the internet and the ability to receive and send messages were noted as potential benefits.

   Participants like:
   a. Feedback on electrical usage in real time – 27 comments
   b. Feedback on usage as it relates to different appliances – 9 comments
   c. Feedback on electric bill in dollars – 5 comments

   Pilot participants dislike or would change:
   a. Always on lighting – 6 comments
   b. Home screen usability – would like to simplify – 7 comments
   c. Add connectivity to internet – 3 comments

2. **Pilot participant feedback on how often they or family members interacted with this device.**

   a. Participant engagement with the device was high in the first week of the pilot as indicated in Survey 2. Daily interaction was 76.2% for the "Energy Auditor Installed" group and 94.2% for the "Self-Installed" group.
   This differential could be due any of or combination of the:
      i. Small group size
      ii. Make up of employee group

12

Exhibit 1

       iii. Self-Install group has higher degree of initial interaction with the device and therefore feeling of "ownership".

b. Other household members who looked at/interacted was 61.9% for the "Energy Auditor Installed" group and 82.4% for the "Self -Installed" group in Survey 2. Again the percentage was significantly higher for the "Self-Installed" group. The differential could be due any of or combination of the:

       i. Small group size
       ii. Make up of employee group
       i. Self-Install group has higher degree of initial interaction with the device and therefore feeling of "ownership".

c. 83.8% of pilot participants were still interacting with the device at least once or twice a week at the end of the pilot period.

d. Participants went through "product/technology fatigue" in their interaction and interest with the IHD over the pilot time period. The ability to message the device with information of value to the customer may lessen this affect.

e. There is a high probability of future customer interaction and use of this type of product to monitor energy usage with possible use for demand and conservation programs.

f. Testing of message content/frequency and a range of optimum levels of customer interaction will need to be considered in future design program design.

3. Did this device change pilot participant awareness of "how much" energy they used?

a. 90.5% of the "Energy Auditor Installed" and 82.3% of the "Self-Installed" group Agree/Somewhat Agree that they were more aware of "how much" energy they used in Survey 2.

b. In Survey 3, 67.5% of the combined groups Strongly Agree/Somewhat Agree that they were more aware of how much (overall) energy usage. \

c. IHD's have a significant impact of customers' awareness of overall energy usage. This benefit will be valuable in future program design and pilots including key messaging.

d. Product/technology fatigue contributed to the awareness levels of the information provided by an IHD over the pilot time period. The ability to message the device with information of value to the customer may lessen this affect.

e. Testing of message content/frequency and a range of optimum levels of customer interaction will need to be considered in future design program design.

4. Did this device change pilot participant awareness of "when" they used energy.

a. 76.1% of the "Energy Auditor Installed" and 88.3% of the "Self-Installed" group Agree/Somewhat Agree that they were more aware of when they used energy in Survey 2.

b. In Survey 3, 70.2% of the combined groups Strongly Agree/Somewhat Agree that they were more aware of when they used energy.

c. IHD's have a significant impact of pilot participants' awareness of when they used energy.

d. This benefit will be valuable in future program designs and pilots. This benefit will be especially important in Time-of-Use programs.

e. Product/technology fatigue contributed to the awareness levels of the information provided by an IHD over the pilot time period but had less of an affect in this

Exhibit 1

category. The ability to message the device with information of value to the customer may lessen this affect.

    f.   Testing of message content/frequency and a range of optimum levels of customer interaction will need to be considered in future design program design.

5. Did pilot participants think that this monitor helped them save money on their utility bills?

    a.   54% of pilot participants Strongly Agree//Somewhat Agree that the IHD helped them save money of their utility bill.

    b.   This benefit is based on pilot participants' perception that by receiving actionable information on how much and when they use energy they will save money on their utility bills.

    c.   This benefit will contribute to the success of future program designs and should be made a part of key marketing messages.

6. Pilot participant feedback on perceived monetary value of the IHD.

    a.   52.6% of all participants in Survey 2 said they would not be willing to pay for this device.

    b.   47.4% of all participants in Survey 2 said they would pay one-half to one-quarter price for this device.

    c.   60.5% of all participants in Survey 2 said they would not be willing to pay to rent this device.

    d.   39.5% of all participants in Survey 2 said they would be willing to pay $5-$15 per month to rent this device.

    e.   54.1% of all participants in Survey 3 would pay less than $50 for this device.
        Note: Renting question was not asked in Survey 3.

    f.   24.3% % of all participants in Survey 3 would not pay for this device.
        Note: Renting question was not asked in Survey 3.

    g.   The results of this question will have to be considered in future program design and how IHD's will fit into value questions and customer acquisition.

7. Testing of multiple delivery methods of IHD's to pilot participants.

Delivery through USPS/FedEx or pick-up and self-installation possibly causes a higher initial interaction with device when compared to the group with devices installed by Energy Auditor as noted in # 2 above.
The differential could be due any of or combination of the:

    iii.   Small group size

    iv.   Make up of employee group

    i.   Self-Install group has higher degree of initial interaction with the device and therefore a feeling of "ownership".

Exhibit 1

8. **Testing of utility business processes relating to IHD distribution.**
   a. Training of Customer Service Representatives and Installation staff is essential to successful distribution of devices.
   b. Sufficient time for development of business processes and training should be a part of any future program design and implementation.

Notes:
1. The demographics of the pilot participants for Gender and Education mirrors the demographics of Leon County Florida, the service area of the City of Tallahassee Utilities. The demographics for age of pilot participants skews toward the mid-range of 25-44 as expected for participants with jobs as opposed to Leon County Florida demographics which is spread for all age ranges.
   - Gender
     o Leon County/52.2 % Female (source: Census Bureau)
     o Pilot/50% Female
   - Education
     o Leon County/College or Associates Degree/42.5% (source: Census Bureau)
     o Pilot/College or Associates Degree/48.2%

2. The outcomes of the pilot are affected by the small size of the pilot group and this fact will need to be considered when using the data in future programs
3. The outcomes of the pilot are affected by the pilot group being employees of the City of Tallahassee Utilities and this will need to be taken into account when using the data in future program design.

EXHIBIT 2B
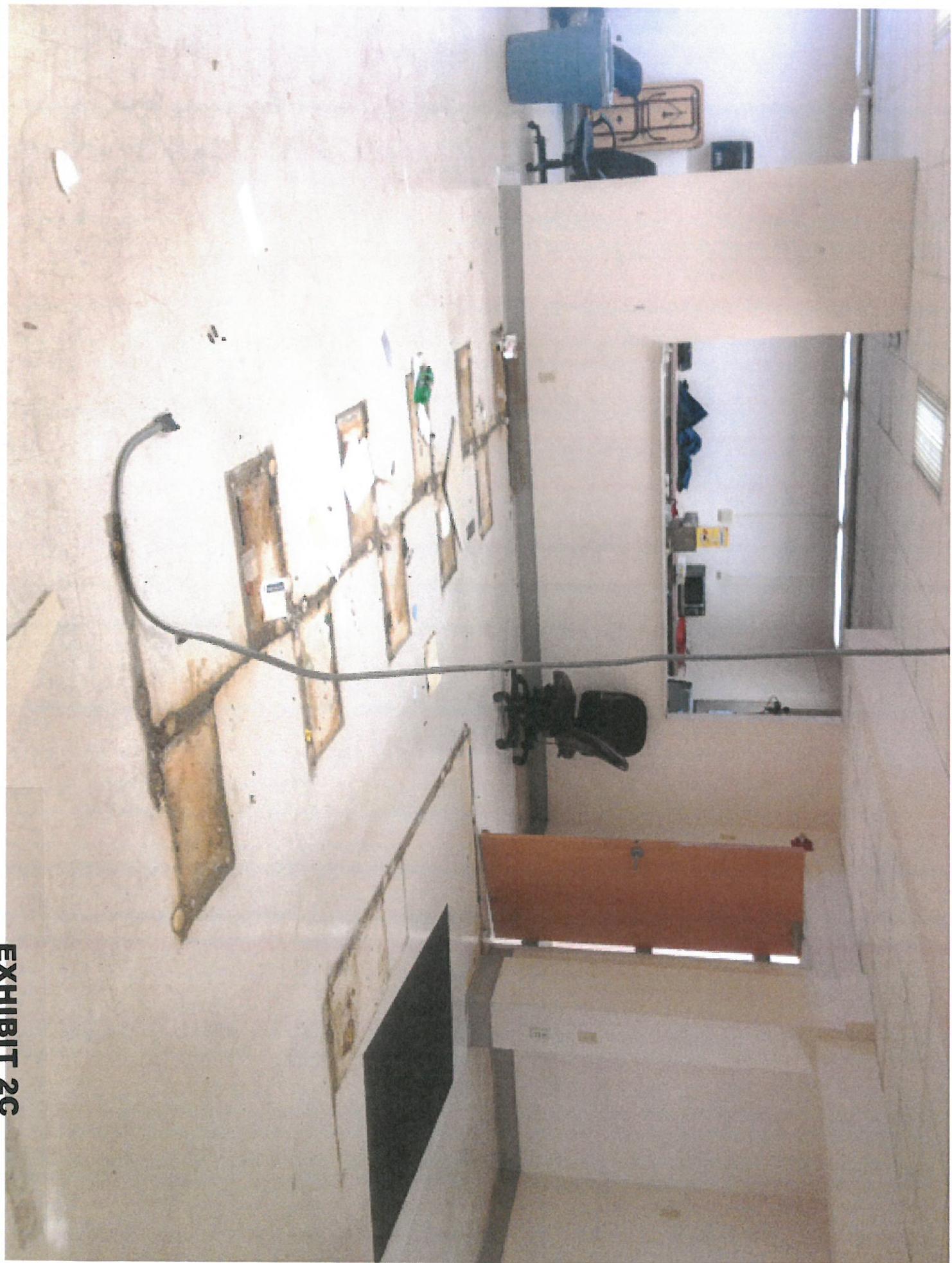
EXHIBIT 3A

EXHIBIT 3B

EXHIBIT 3C

EXHIBIT 3D

EXHIBIT 3E

EXHIBIT 3F

EXHIBIT 3G