U-35871

Katama Technologies, Inc.

**Report in support of the**

**Application of**

**Pointe Coupee Electric Membership Corporation**

**For Approval to Acquire and Install an Automated Metering System and Request for Cost Recovery and Related Relief**

**Submitted by**

**Greg Johnson**

**Katama Technologies, Inc**

**On behalf of**

**Pointe Coupee Electric Membership Corporation**

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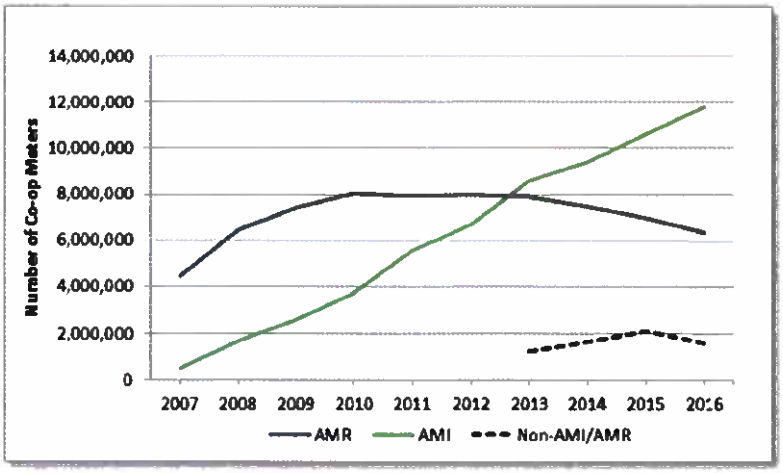
# Pointe Coupee Electric (PCE)

## 1. Background

Pointe Coupee Electric (PCE) has approximately 10,500 meters that are manually read by a combination of employees and contract meter readers using Itron's FC300 handheld meter reading system. Itron has announced that support for the FC300 meter reading system will cease and PCE will need to replace its existing handheld meter readying system in 2022. In addition, the meter reading process is labor intensive in an operational area where there is a high turnover of personnel resulting in continuous and significant requirement for training and quality control. Finally, the current meter reading technology is limited to providing monthly meter readings; the current system is not capable of innovative rates such as time-of-use or prepay nor is it capable of remote disconnect functionality.

As a part of a long-term vision and since PCE must upgrade or replace the current FC300 system, PCE has reviewed its options and the resulting impact on its members, operational efficiencies, and future rates. An upgrade for the FC300 manual meter reading system would be the simplest and lowest cost alternative; however, this alternative is not aligned with the strategic vision of PCE's management nor does it deliver the functionality that has come to be expected by electric consumers or employees. Therefore, PCE is proposing to implement an Advanced Metering System (AMS) compliant with the directive from the Louisiana Public Service Commission General Order R-29213. This will be PCE's first AMS system.

Since 2007, AMS solutions have been embraced by electric cooperatives to assist with delivering added functionality and improved efficiencies. In fact, based on a NRECA analysis of industry data in 2018, the number of manually read meters had fallen to less than 10% of the installed base by the end of 2016 (see the figure to the right). Functionality, reliability and performance of modern AMS solutions has become so effective that cooperatives who installed Automatic Meter Reading (AMR) systems in the 1990's are now upgrading to AMS because they can justify the benefits and will not consider stepping back to manual meter reading technologies.




Source: NRECA analysis of EIA-861 data, February 2018

While the cost of AMS is higher than replacing their current outdated system with a similar manual and outdated handheld meter reading system, the increased functionality of AMS will dramatically improve PCE's operational effectiveness and the resulting member experience. Currently, PCE's knowledge of each member's electric meter usage and service quality is limited to one monthly meter reading and general service information such as system-wide outage history. AMS is expected to deliver:

- Improved Billing Information
  - Hourly or sub-hourly data available through a customer portal
  - Remote Disconnect and reconnect of all residential meters
  - Any meter can be a demand meter
  - Timely and accurate billing
  - Identify tamper sites more effectively
  - Standard meter to manage local generation
- Customer Service
  - Prepaid metering
  - Customer high bill alerts
  - Customer selected due dates
- Load studies data with virtual meters

    - Cost of service studies
    - Transformer load monitoring
    - Right sizing of transformers
- Identify outages (loss of power for more than 2 minutes)
    - Single, small outages
    - Integration to the future NISC OMS application
    - Restoration verification
    - Confirm outages that may be a customer caused occurrence
- Power quality
    - Capture blinks (~2 seconds – 2 minutes)
    - High/Low voltage for 15 minutes

Due to the numerous benefits, PCE decided to evaluate the numerous AMS vendors and to assess the business case for an AMS implementation.

## 2. Review of Potential AMS Vendors

In 2018, PCE began the consideration of four leading AMS providers: Aclara, Honeywell (formerly Elster), Itron and NexGrid (through Anixter). These four providers use varying types of Radio Frequency (RF) technologies for bi-directional communications with the meters.

A brief overview for each of these providers is shown in the tables below:

| | |
|---|---|
| **AMI Provider** | **Aclara Point to MultiPoint (Licensed RF)**<br>St. Louis, NC<br>www.aclara.com |
| **System Overview** | Aclara is one of the pre-eminent providers of AMI solutions to the electric utility industry and offers a variety of technologies including AMI using Cellular, Power-Line-Carrier and RF technologies. They have over 500 customers in nine countries and are now owned by Hubbell.<br>Aclara's RF AMI system is based on the 450 – 470 MHZ licensed radio band which employs a fixed two-way point-to-multipoint (P2MP) architecture for metering endpoints where data is directly transmitted from the meter communications card to a collector (referred to as a DCU) and then to the head-end (software). |
| **Strengths** | ✓ Aclara's meters (which were acquired from GE) are among the best in the industry including high reliability and solid functionality.<br>✓ Service and support from Aclara are very strong.<br>✓ Aclara owns a meter installation service company which has a strong reputation.<br>✓ Delivered many systems to cooperatives throughout the US. |

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| | ✓ Numerous ancillary applications such as load control. |
| **Weaknesses** | ✓ Limited field experience with new network.<br>✓ Lower bandwidth communication network which is not IPV6 compliant.<br>✓ Costs are slightly higher than the competition. |
| **Conclusion** | Aclara offers a strong product and was invited to participate in the Request for Proposal (RFP) process. |

| | |
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| **AMI Provider** | **Honeywell (RF-Mesh AMI)**<br>Raleigh, NC<br>www.honeywellsmartgrid.com |
| **System Overview** | Honeywell bought Elster which was previously ABB metering. Elster was the first vendor to use RF Mesh technology at commercial scale with Salt River Project in 2003. They have since introduced a couple of new generations of their RF Mesh product line. Today they have a new RF Mesh based network that is IPV6 compatible and offers high data throughput with a smaller communications hardware footprint. They have large cooperative customers and a strong support service network. |
| **Strengths** | ✓ Honeywell's software platform is called Connexo and offers strong communications management and data presentation functionality.<br>✓ IPV6 positions Honeywell well for interoperability integration with WISUN.<br>✓ Higher-bandwidth communication network.<br>✓ Network uses the lowest quantity of components resulting in lower maintenance costs.<br>✓ Numerous ancillary applications such as thermostat controls.<br>✓ Have contracted with a neighboring utility (SLEMCO) to deliver an AMI system. |
| **Weaknesses** | ✓ Limited field experience with new network. |
| **Conclusion** | Honeywell offers a strong product and was invited to participate in the Request for Proposal (RFP) process. |

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| **AMI Provider** | **Itron (RF Mesh)**<br>Spokane, WA<br>www.itron.com |
| **System Overview** | Historically, Itron had a large market share with investor-owned and municipal utilities but they did not have a strong presence with cooperative utilities. Their |

| | |
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| | OpenWay AMI system had inherently high costs and was not effective in rural areas. In addition, their service and support were not effective at smaller utilities.<br><br>In late 2017, Itron acquired SilverSpring Networks (SSN) due to their superior mesh-network architecture and market leadership with Investor-owned utilities. SSN's mesh network was developed as a standards-based, high-speed architecture. Regarding the management of the Itron and SSN technologies, it is expected that Itron will use their own innovative AMI meter technology developed for a product function called RIVA and combine that with the network strengths of SilverSpring. |
| **Strengths** | ✓ Meter quality.<br>✓ Itron has a track record of creating strong value from acquired companies.<br>✓ Standards-based, high-speed network. |
| **Weaknesses** | ✓ Itron's presence in the cooperative market is inconsistent.<br>✓ Itron's acquisition of SilverSpring Networks has created significant uncertainty.<br>✓ Integration/interoperability is limited.<br>✓ Service/support reputation is poor. |
| **Conclusion** | Due to Itron's lack of experience with cooperatives, limited integration experience and uncertainty regarding the convergence of the Itron and SilverSpring networks, Itron was not invited to the RFP process. |

| | |
|---|---|
| **AMI Provider** | **NexGrid (RF Mesh)**<br><br>Fredericksburg, VA<br><br>www.Nexgrid.net |
| **System Overview** | NexGrid solutions "utilize high speed, standards-based communications to provide the most reliable energy data communication networks that enable energy management and utility operations in real time. NexGrid is a manufacturer and integrator of self-managing devices that offer utilities unrestricted monitoring and control of metering and data for electric, water, and gas."<br><br>Their ecoNet Multi-Mash solution is built on a premise that takes advantage of numerous standards-based devices and technologies to deliver meter reading data to the utility's software application. The standard technologies that they use include ethernet and Zigbee. |
| **Strengths** | ✓ Standards-based, high-speed network.<br>✓ Emerging company includes a strategic direction that matches the needs of PCE. |
| **Weaknesses** | ✓ Do not make their own meter.<br>✓ Very small company with very few cooperative customers.<br>✓ No existing integration with NISC.<br>✓ Standard communication technologies that they have selected are not in wide use in Louisiana. |

| | |
|---|---|
| **Conclusion** | Due to NexGrid's lack of experience with cooperatives and limited integration experience, they were considered as a dark-horse candidate; however, they declined to submit budgetary pricing claiming that the PCE "footprint is not a good match for our solution and have other opportunities that will be a better use of our resources at this time."<br><br>Therefore, NexGrid was eliminated from further consideration. |

In early 2020, PCE selected Katama Technologies, Inc. (KTI) to lead PCE through the finalization of a thorough and objective assessment and selection process for the most suitable AMS provider. KTI led PCE through a multi-step process that reviewed the prior work and then finalized the selection of the best fit AMS provider from those that were initially considered.

The initial stages of KTI's deliberate process included:

1. A review of the vendors that had been considered.
2. Evaluation of the original budgetary pricing
3. Discussions with PCE management about the strategic interests and expectations for AMS.
4. Assessment of the expected benefits to be derived from AMS.
5. Assessment of the expected impact of AMS on the PCE organization.

As discussed in the earlier tables, of the four vendors that had originally been considered, Aclara, Honeywell, Itron and NexGrid, it was determined that Aclara and Honeywell warranted further consideration. However, Aclara and Honeywell systems are based on different types of RF technologies which required evaluation and consideration. Aclara uses a Point to MultiPoint or Tower technology and Honeywell uses a Mesh technology.

Tower RF systems use frequency bands that are licensed and allow for signal strengths that are a higher power and which are directed back to a small number of concentration points located throughout the service area. Essentially, Tower systems create a large communications umbrella in which all meters report back to the focal point (i.e., Tower) of the umbrella. Tower systems typically have smaller bandwidths and communicate over distances of up to ten miles for each meter back to the tower. In general Tower systems perform better under outage conditions than Mesh systems.

Mesh RF systems are based on unlicensed frequency bands which use very low power and are distant cousins to the technology used for cordless phones, residential garage door openers and baby monitors. These RF systems have a high degree of interconnectivity and signal repeatability between all the deployed meters and are therefore referred to as Mesh Systems. Mesh systems typically have higher bandwidths and typically communicate over distances of

less than one mile from meter to meter. In general Mesh systems are faster than Tower systems and have stronger adherence to standards of the communications industry.

A table showing the general attributes for Tower and Mesh technologies is shown below.

| Attribute | RF Mesh | RF Tower |
|---|---|---|
| **Vendors Considered** | Honeywell, Itron, NexGrid | Aclara |
| **Data Throughput** | High | Medium |
| **Experience with Coops** | Variable | High |
| **Hardware Footprint** | Medium to high | Low to medium |
| **Capacity** | 250 - 500 kbps | 100 kbps |
| **Rural Coverage** | Good | Excellent |
| **Scalability** | Excellent | Good |
| **Latency** | 5-30 sec | 5-15 sec |
| **Spectrum** | Unlicensed, No Fee | Licensed, Fee |

## 3. Selection of preferred AMS Vendor

The review and assessment for the 2 finalists was performed jointly by KTI and PCE, it included obtaining a final proposal for each which formalized the requirements for:

1) Communications performance – to ensure that the vendors provide a communications network that will meet the present and future needs of PCE, it is critical that the specifications clearly articulate a robust network.
2) Product warranties – currently AMI providers are willing to provide 5-year warranties for meters along with a cost recovery clause that is triggered if there is a latent defect that affects a large quantity of meters. As an example, if a meter component begins is faulty and starts to have excessive failures after 2 years, then the AMI provider will replace all the parts and pay PCE [redacted]/meter to assist with the costs to uninstall and reinstall new meters.
3) Standardization of meter installation services – to ensure that the meter installation services were consistent and compliant with PCE needs, a formal requirements document was issued to Aclara and Honeywell.

4) Delivery of the software application – since the PCE runs a lean IT staff, it was decided that the software applications should be cloud based.

The technical assessment of the vendors based on the updated offers is shown in the table below.

| | Aclara | | Honeywell | |
|---|---|---|---|---|
| | **Pros** | **Cons** | **Pros** | **Cons** |
| Network | • P2MP network offers strong performance during outages<br>• Licensed network | • Limited operating experience with electric meters in RF network<br>• History of Hexagram-based RF solution has been poor | • Network has been selected by numerous other cooperatives based on a high-bandwidth and standards-based platform | • Performance during outages is based on Mesh technology which will be slightly worse than P2MP |
| HES/Apps | • 13 months of data storage | • Aclara is transitioning from a 3rd party software company to a self-produced application | • Software is modern design with intuitive screens that has been available for 3 – 4 years. | • <90 days of local data storage, must use NISC MDM |
| Meters | • Market leader in technology and share<br>• Ability to detect phase of service | • Requote uses local hire contractors with limited training | • Strong meter history<br>• New A4 meter is feature rich | |
| Future | | • Ability to support standards-based requirements, e.g., WISUN is questionable. | • Design is 3rd generation which is standards-based, e.g., IPv6 | |
| General / Commercial | • Aclara has strong commitments to Cooperatives<br>• Local service and support | • Small RF AMI market share | • Strong corporate backing and complementary products | • Local service and support have recently expanded in Louisiana due to implementation of AMS at Entergy. |

In addition to the updated technical review, the AMI vendors submitted new pricing to PCE based upon the above requirements and the data was analyzed, with the results shown in the table below.

| | Aclara | Honeywell |
|---|---|---|
| 12-year summary of: | | |
| Capital costs ($) | [redacted] | [redacted] |
| Operational Costs ($) | [redacted] | [redacted] |
| Finance costs ($) | [redacted] | [redacted] |
| Total Capital, Financial and Operational Costs | [redacted] | [redacted] |

Notes:

1. Costs for the conversion are for all meters, i.e., ~10,500.
2. All residential meters include remote disconnect/reconnect functionality.

The summary of the above technical and financial analyses is that Honeywell offers:

- Stronger meter functionality – the Honeywell A4 meter line offers a single platform for residential and commercial/industrial applications with significantly greater functionality including instrumentation grade power quality.
- Greater adherence to communications standards specifically IPV6 which provides numerous benefits to PCE:
    - Maintenance and operations do not require specialty training for PCE employees to learn a customized technology.
    - The communications industry is moving towards greater standardization through the Wireless Smart Utility Network (Wi-SUN) which is a wireless communication standard that enables seamless connectivity between smart-grid devices. Honeywell is compliant with these standards which simplify the effort for 3rd-party providers to integrate products to the AMS network. This could include products for lighting controls, distributed energy resource management, load control and more.
    - By using a standards-based technology, PCE will have options for future product sourcing making it less reliant on Honeywell.

- Honeywell has a strong presence in Louisiana, e.g., they are currently installing 2.9 million meters for another Louisiana investor owned utility and has been selected by another Louisiana utility as their preferred AMS provider. These local initiatives will provide opportunities for synergies, lessons learned and other collaborations.
- Lower implementation costs and annual expenses

As a result, Honeywell has been selected as PCE's AMS partner and a suitable contract has been negotiated contingent upon a successful outcome with the LPSC.

## 4. Development of the AMS Business Case

In collaboration with the PCE AMS team, KTI used its Business Planning Model that has been used by well over 125 utilities nationwide. In PCE's case, these savings are derived from 5 distinct areas: reduced meter reading costs, Improved cash flow and financial performance, reduced overtime expense, Miscellaneous Savings and Reduction of Diversion. A discussion of each of these follows:

1. Reduced meter reading and billing costs

Currently, a 3rd-party contractor reads approximately 44% of the PCE meters with an annual cost of nearly $74,000. In addition, PCE uses multiple employees for meter reading and billing services which results in an additional annual cost of $165,000. Due to implementation of AMS and attrition, these staff members will not need to be replaced which will result in an annual savings of nearly $239,000. To accommodate the attrition rate, the business model estimates that it will take 3 years for all the personnel changes to be completed.

2. Improved cash flow and financial performance

There are numerous areas where PCE will see improved financial performance which includes:

- **Reduced delinquency write-offs** - As is the case with most utilities, delinquencies occur that can be mitigated with a modern AMS project which includes the ability to support remote disconnect and reconnect meters. The planned wide-scale availability of these meters allows PCE to be more pro-active with the disconnect process without the additional labor and to offer functions such as prepay metering to individuals that might benefit. By being more proactive and reducing the time between delinquency and disconnect, PCE will limit its exposure.

  Prepay metering has been broadly accepted by consumers to avoid large deposits and to take control of their own energy use. Cooperatives have been in the forefront of implementation of this technology, Brunswick EMC in North Carolina has offered these rates for nearly 20 years. Anecdotal evidence among Cooperatives gives an indication

that with greater knowledge of their energy consumption, customers reduce their energy consumption between 10% and 15%. With freedom to pay when it is convenient, no worries about credit checks and with no penalties or reconnection fees, prepay metering is an ideal tool for some customers. The benefit to the utility is that this has a significant impact on delinquency write-offs.

As stated earlier, the PCE AMS project includes disconnect functionality for all applicable residential meters being acquired in the proposed project. 100% disconnect meters is not an unusual approach for utilities now and is becoming the standard in the industry. The cost differential between meters with and without this capability has dropped to the point where it is on average approximately $25.

Currently, PCE's delinquency expense is $43,400 per year. New AMS meters will be applied to all PCE members and wherever possible, remote disconnect meters will be used. Currently, disconnect meters are available for residential and small retail/commercial meter applications. It is expected that there will be a 25% reduction in delinquency expenses at those locations where disconnect meters are employed. Based on these assumptions we estimate that PCE should see a savings of $10,850 per year.

- **Improved cash flow** – For a variety of reasons including the use of contract meter readers, the lag between the time the meter is read, and a bill is issued is excessive, i.e., over one month. This results in two areas of impact, the first being that the member is being sent a very "stale" bill that provides poor feedback about his/her energy consumption. As an example, if a member's meter is read on August 31 for consumption during that "hot" month and the bill is not issued until early October, they are likely to see a high bill when the actual temperature/climate may be very comfortable. It can be difficult for the member to correlate what happened in August with that bill that they open in October.

  In addition, this lag means that PCE actually paid for the energy and has not yet billed the end-user. For PCE, improving the billing turnaround by 25 days will result in an annual savings of $30,500.

- **Reduced interest expense on customer deposits** – By law, PCE must pay 5% interest on customer deposits. While some member may regard this as a good rate of return on their "investment" many would prefer to have the money made available to them for uses that they prefer. Once PCE has implemented the AMS solution and the pre-pay meter option, it is expected that some members will select prepay and eliminate this interest expense. Currently, PCE pays nearly $20,500 of interest and by reducing this by 15% will save the utility $3,000 annually.

3. Reduced overtime expense

A major benefit of AMS systems occurs during outage from "last-gasp" and subsequent power restoration messages. Meters can be programmed to provide an affirmation that a sustained outage has occurred. For large outages, AMS provides significant detail to the OMS to define the location and severity of the event. For isolated outages, AMS can frequently identify the outage even if the customer is not home and aware that it has occurred. In these cases, PCE may be able to fix the outage during normal business hours avoiding an after-hours trip and associated overtime costs.

When a major storm occurs, the full damage to the distribution network is not readily available until the crews get to the field and begin the restoration process. Frequently, there are numerous sources of damage that can result in "nested" outages. This is a case where a device serving a smaller number of customers is damaged early in the event and then a larger problem occurs. The crews can fix the larger problem and miss the smaller problem; if they are not made aware, they can leave the scene to go to another damaged area and leave customers in the dark. When it is finally apparent that there are still customers without power, the costs to return to the area may be more expensive. AMS solves the problem of nested outages and reduces crew times.

Through 2-way on-demand communications, AMS enables the utility to verify that all customers have electric power. This provides numerous benefits:

- Customers are served by a more reliable network,
- PCE has greater knowledge of the status of its distribution system and
- Overtime costs are reduced.

In this case, we project that PCE will reduce its overtime hours by 15% which would save an estimated $23,248 per year.

4. Miscellaneous Savings

Due to the implementation of AMS, PCE will not upgrade its existing handheld meter reading system and associated annual expenses. The annual expenses were considered earlier in the reduced meter reading costs but the capital costs for a one-time $20,250 upgrade is added here. In addition, since the AMS system will be implemented within a short timeframe, it will mean that PCE will not have to purchase meters to replace those that are retired annually. Currently, PCE purchases $26,420/year which is factored in as an annual savings.

5. Reduction of Diversion

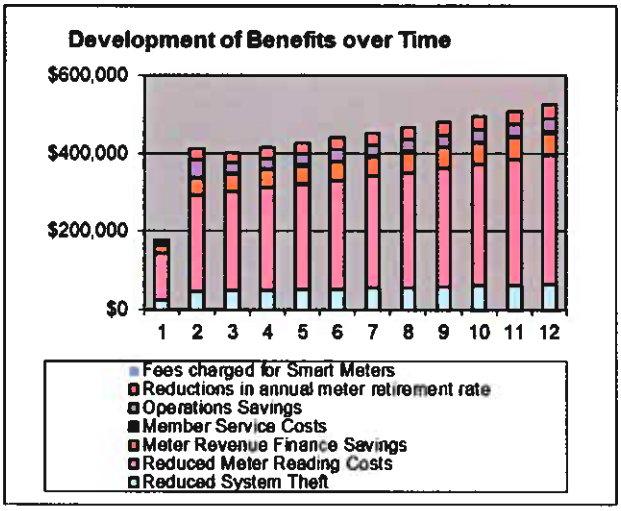
As with all utilities, during routine site visits, PCE will find sites where a member is diverting (stealing) energy at the meter site. Industry estimates of diversion savings are 0.5% - 2.0% of kWh generated are stolen for all utilities nationwide and it is perceived that cooperatives are on the lower end of the scale. Diversion is especially problematic for cooperatives since the members are harming other members and creating inequity. AMS has historically been effective at reducing diversion since the meters can detect items such as inexplicable outages, reverse power rotation, sudden changes in load and more. To be conservative, we assumed diversion at PCE is 0.25% and captured this as $46,000 for the business case.

## 5. Results of the AMS Business Case

The summary results for annual system savings are shown in the table below.

| Pointe Coupee Electric | Summary of Estimated Annual Savings | | KTI |
|---|---|---|---|
| **Reduced System Theft** | | | $46,041 |
| 1 We expect to reduce diversion by [1] | 0.250% | $46,041 | |
| [1] Industry estimates of diversion savings are 0.5% - 2.0% for all utilities. Average estimated diversion savings for surveyed Utilies is 0.50%. | | | |
| **Reduced Meter Reading Costs** | | | $238,748 |
| 1 Contract Meter Readers | | $73,697 | |
| 2 Meter Readers and Servicemen | | $165,051 | |
| **Improved Cash Flow** | | | $41,380 |
| 1 Primary meter reading finance costs | | $30,529 | |
| 2 Annual reduction in delinquency write-offs | | $10,851 | |
| **Member Service Savings** | | | $3,062 |
| 1 Reduced interest expense on customer deposits | | $3,062 | |
| **Operations Savings** | | | $23,248 |
| 1 Overtime Savings | | $23,248 | |
| 2 Defer replacement of current system | $ 20,246 | starting in year 2 / ending in year 2 | |
| **Miscellaneous System Benefits** | | | $26,040 |
| 1 Reductions in annual meter retirement rate | | $26,040 | |

The expected/estimated annual savings will develop over time due to project deployment schedule and inflation. The graph to the right describes this development. In year 1, the number of installed meters is a subset of the total, so the available savings are based on a partial implementation. Savings potential increases in years 2 and 3 to the total maximum of approximately $400K per year. After year 3, the savings increase per the annual inflation rate.




Using the savings baseline as described above and factoring in inflation and WACC (2.1%), the total NPV estimate for savings over the 12-year planning period is $4.56M. The detailed table for these annual savings is shown later in this report.

Factoring in the costs and benefits, the net impact of AMI over the 12-year planning period is shown in the table below:

**Estimated Results for 12 Years of Operation**

| | | |
|---|---|---|
| <-- System Costs --> | AMI System Costs | [redacted] |
| | Implementation Costs | $710,000 |
| | Total Capital Costs | [redacted] |
| | Annual Expenses | $1,030,000 |
| | Finance Costs | $270,000 |
| | Total Cost of Ownership | [redacted] |
| <-- System Benefits --> | Reduced System Theft | $540,000 |
| | Reduced Meter Reading Costs | $2,890,000 |
| | Improved Cash Flow | $500,000 |
| | Member Service Savings | $40,000 |
| | Operations Savings | $300,000 |
| | Miscellaneous System Benefits | $290,000 |
| | Total Benefits | $4,560,000 |
| | Estimated 12 year Net Impact for AMI system | $1,050,000 |

The final estimated NPV Net Benefit for the PCE AMS project which considers the $4.56M savings and the $[redacted] cost of ownership is a positive $1.05M NPV.

| Pointe Coupee Electric | General Information | KTI |
|---|---|---|