EXECUTIVE SUMMARY

Tampa Bay Water is an on-demand provider that supplies drinking water to over 2.4 million people in the Tampa Bay area. Through an inter-local agreement of its six Member Governments, the Agency has an unequivocal obligation to meet their demand for Quality Water. A central component of Tampa Bay Water’s approach to delivering reliable, efficient service is the development of an energy management program that will address the increasing role and cost of energy consumption, help lower operating costs, lessen the Agency’s carbon footprint, and enhance its commitment to environmental stewardship. As part of its continued pursuit of efficient operations of its system, Tampa Bay Water engaged Halcrow Inc. to develop an Energy Management Program Roadmap (Energy Roadmap). The Energy Roadmap will provide a planning basis for a 10-year look at issues relating to energy, the organization’s single largest variable expense. The Energy Roadmap also aligns with Tampa Bay Water’s vision outlined in its 2011 Strategic Plan, which has clearly articulated goals in terms of efficiency, sustainability, innovation, and best practices.

Tampa Bay Water has a history of focusing on efficient and sustainable operations. Recent activities have included the investigation of grant opportunities through the United States Department of Energy (DOE), a wellfield pump replacement and optimization study, variable frequency drive (VFD) pump installations, specific energy efficiency improvements at individual facilities, an alternative/renewable energy feasibility study roadmap and a solar energy pilot project. Tampa Bay Water recognizes the importance of integrating its ongoing individual energy projects into a more comprehensive strategy to facilitate decision-making. The Energy Roadmap is the direct result of that effort.

The Energy Roadmapping process combines current budgeted activities and operational considerations with the strategic, as well as, tactical goals of the organization. The process included a review of current and planned activities in the Capital Improvement Program (CIP), multiple interviews with key stakeholders, an analysis of practices, and an examination of work processes as they relate to energy. The perspective in roadmapping is looking back from a future point in time, in Tampa Bay Water’s case, 2020, identifying the desired state and the steps it will take to get there.

Specific to Tampa Bay Water, the following steps were outlined on its roadmap path:


Tampa Bay Water will develop the action plans to support Board goals of efficient operations and financial stability with an increased focus on reduced energy use. Tampa Bay Water will also consider energy factors in decision-making processes.


Tampa Bay Water will collect comprehensive real time energy and flow data. This data collection will support the development of tools to correlate, analyze, and interpret the water/energy relationship. These tools will be used to measure performance and study energy efficiency alternatives.

A focus on employees and the training necessary for informed decision-making is critical. Tampa Bay Water will empower staff with the technology and tools needed to realize and implement the Energy Roadmap and assist with operating decisions. Training and education will be provided to ensure the effective use of the tools.


Tampa Bay Water will expand its total water system management through strategic storage and system cycle management to improve efficiencies (e.g., supply, storage tanks, conservation, and demand). Tampa Bay Water will collaborate with external stakeholders including: Member Governments; existing commercial power providers; and Alternative/Renewable energy power providers.

5. **Combined Power and Water Management System (2019-2021)**

Tampa Bay Water will leverage a combined power and water management system to optimize timing between daily demand and supply to promote energy efficiency. Power and water are balanced and networked.

The team performed a gap analysis to identify key projects necessary to bridge from the existing and/or planned capital projects to the steps and goals identified in the Energy Roadmap. Based on the results of the gap analysis, the team identified a number of opportunities for Tampa Bay Water to expand its energy efficiency focus on operations. These gap projects cut across the organization and timeframe of the Energy Roadmap with some being “quick hit” (i.e., short-term) projects to improve performance, mid-term changes in its capital priorities and others defined as long term strategic needs. The quick hit projects also offer an opportunity for Tampa Bay Water to immediately realize and communicate the value of the roadmap with internal and external stakeholders. The gap projects include capital, technology and software updates, workforce management issues, policies and stakeholder engagement.

Beyond the addition of gap projects, other anticipated projects should be accelerated to further support Tampa Bay Water’s implementation of the Energy Roadmap. This includes the deployment and linkage of planned Supervisory Control and Data Acquisition (SCADA) projects, instituting pump prioritization, expanding energy management tools and continuing to focus on energy use in facilities and vehicles. Key takeaways from the Energy Roadmap include:

- The organization and its staff are supportive of focusing on improvements in energy efficiency. This goes beyond simply finding savings in electricity to include all energy, which results in a reduction in carbon intensity and use. More than half of the staff (75 individuals) participated in the voluntary survey as part of the Energy Roadmap. A vast majority of the survey participants understand the connection and their role in the reduction of energy and chemical costs. This is an initial barometer of organizational support that will facilitate implementation of the Energy Roadmap recommendations.
• There are critical energy management and data collection tools that are necessary in order to effectively prepare and manage energy at Tampa Bay Water.

• Balancing the view of energy along with the environment and economics will mean some changes in policies and procedures. Examples include:
  – Weighting of projects in the CIP process with a heavier emphasis on efficiency.
  – Ensuring specifications for buildings, lighting, and pumps are maximized for energy efficiency even though initial cost may be higher.

• The Energy Roadmap will provide an ongoing measuring stick for progress in achieving greater efficiency and reducing organizational costs. It is best deployed as a dynamic document, regularly reviewed and used as a communications tool internally and externally with stakeholders.

CONCLUSION

The underlying challenge in any Energy Roadmapping exercise is to incorporate the findings and actions into the organization in a programmatic way as opposed to initiating a “project” or series of “projects.” Activities and concepts surrounding the Energy Roadmap need to be embedded in the culture at Tampa Bay Water. Based on a review of the ongoing activities, Tampa Bay Water continues to make strides in improving efficiencies and controlling costs. The willingness of staff to actively participate in the process and offer support for the concepts and tactical actions in the Energy Roadmap bode well for the successful implementation of the recommendations contained in this report.
## TAMPA BAY WATER ENERGY ROADMAP
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1. INTRODUCTION

Through an existing As-Needed contract with Tampa Bay Water (2009-032), Halcrow was issued Purchase Order 20110734-01 to develop an Energy Management Program Roadmap (Energy Roadmap). This effort was in support of Tampa Bay Water’s broader strategic direction, energy goals, sustainability, and improved financial performance. This activity aligns with the Tampa Bay Water’s Vision as outlined in its 2011 Strategic Plan. Specifically, the Strategic Plan calls for Tampa Bay Water to:

- Be a model for regional water supply in the nation
- Be a leader in innovation and best practices; and
- Be a respected member of the Tampa Bay community.

The following goals were identified in support of reaching the overall Vision:

- Achieve a reliable water supply and delivery system
- Continue to improve the efficiency of Tampa Bay Water’s operations
- Maintain the agency’s financial stability and sustainability
- Develop, improve, and maintain collaborative relationship with stakeholders

1.1 BACKGROUND

Tampa Bay Water is pursuing energy efficiency as part of an overall process to reduce costs and improve sustainability performance in serving its six Member Governments (Members). Several individual projects directed to reduce energy consumption have been completed or are currently in progress. These activities include: the investigation of grant opportunities through the United States Department of Energy (DOE), a wellfield pump replacement and optimization study, Variable Frequency Drive (VFD) pumping installations, specific energy efficiency improvements at individual facilities, an alternative/renewable energy feasibility study roadmap, and a solar energy pilot project. Tampa Bay Water recognizes the importance of integrating its ongoing individual energy projects into a more comprehensive strategy to facilitate decision-making. The development of an energy roadmap will guide Tampa Bay Water’s energy related decision-making and future capital investments in support of achieving their broader strategic goals for the next 10 years or more. In addition, based on the employee survey results¹, employees are concerned and committed to helping the organization reduce its energy costs.

¹More than half of Tampa Bay Water’s employees participated in a survey of Agency energy and related issues; see Appendix.
1.1.1 Goals and Desired Outcomes

Tampa Bay Water is intent in maintaining its leadership in efficiency by deploying its Energy Roadmap in a programmatic way. This allows the organization to continuously improve efficiency, meet regulatory requirements and manage increasing costs. The Energy Roadmapping process for Tampa Bay Water has several desired goals and outcomes that combine short-term projects to quickly improve performance with mid-term changes in its capital priorities consistent with longer term strategic needs.
2. ENERGY ROADMAP

The Roadmapping process allows organizations to step back from what they are doing today and look forward, with an eye toward identifying gaps, building pathways to the future and creating actionable plans. A completed roadmap provides a series of destinations, or steps, on the way to meeting strategic direction with tactical action plans underpinning the activities.

2.1 ENERGY ROADMAP BENEFITS

The purpose of the Energy Roadmap is to identify elements of technology and energy infrastructure that will:

- Align with the agency’s overall strategic plan
- Augment the financial stability and sustainability of Tampa Bay Water operations
- Facilitate an understanding of the interaction between the decisions that affect annual operations and maintenance (O&M) and the Capital Improvement Program (CIP) budgeting.

The Energy Roadmap considers a number of options for Tampa Bay Water developed through a facilitated involvement process. The Energy Roadmap provides a strategic view of the choices tactically placed along a timeline to aid decision-making and reinforce alignment with the Agency’s Strategic Plan. The Energy Roadmap allows current projects to be “level set” as the baseline with future desired outcomes arrayed on a time and budget axis. This process brings a perspective to total costs, develops an understanding of expectations, and can provide opportunities to optimize capital budgeting.

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Energy Roadmap 2011

**Figure 1: Energy Roadmap**
The Energy Roadmap was developed in support of Tampa Bay Water’s Strategic Plan and helps in meeting the key performance indicators of reducing energy costs per million gallons of water and increasing the use of alternative energy sources.

### 2.2 ENERGY ROADMAP DEVELOPMENT

The Energy Roadmap acts to visualize, collect, and analyze the desired technology outcomes along a timeline showing O&M and CIP budgeting considerations. The concept is to view any individual technology or project not as an endpoint, but rather a part of a larger process and make decisions for the long-term strategic need rather than reacting to immediate emergencies such as a key equipment failures requiring immediate replacement. The initial step in creating an Energy Roadmap is an institutional understanding of what Tampa Bay Water’s energy goals are 10 years into the future. After understanding these goals, strategic, operational, project, and organizational information is gathered through interviews, facilitated meetings and surveys to identify the strategic goals and support the development of the Energy Roadmap elements. The Energy Roadmap then lays out the pathway to the future state, identifies and quantifies gaps and the roadmap is either altered accordingly or the gaps bridged. The final Energy Roadmap includes the key steps on the path to achieving Tampa Bay Water’s energy goals 10 years in the future, maps individual capital and organizational initiatives to the Energy Roadmap and quantifies the gap projects necessary to ensure success.

#### 2.2.1 Condition Inventory and Assessment

Halcrow initially reviewed the ongoing individual energy-related projects and technology investments (e.g. installation of VFD pumps) to serve as the starting point for the development of the Energy Roadmap. A kick-off meeting and seven facilitated sessions were held with Tampa Bay Water participants including operators, Senior Managers, Executive Team, and the General Manager. The goal was to understand current capital plans and scheduling. This process assessed where Tampa Bay Water is today, analyzed the investments being made, and reviewed the rationale/business cases used in the decision making process. Task 1 provided a quantitative (where possible) and qualitative foundation for the Energy Roadmap and provided a basis for measurement, collection, and reporting of data.

As part of this process, the Halcrow team reviewed documents provided by Tampa Bay Water including, but not limited to, the latest CIP, FY 2011 Budget, Standard Operating Procedures, Tampa Bay Water’s Strategic Plan, and energy consumption data.

#### 2.2.2 Energy Roadmap Team

Appendix 7.1 shows the key individuals involved in the development of the Energy Roadmap. Members of the Executive Team, Senior Managers and the project manager were involved in multiple work sessions and facilitated meetings to refine the Energy Roadmap elements.

#### 2.2.3 Staff Interviews, Evaluations and Gap Analysis

Two of the most significant activities in the scope of work directly supporting the Energy Roadmap development were the staff and Member Government interviews and the gap
The interview process included a total of 28 interviews. Initial interviews were conducted in the Fall of 2010 with most of the Executive Team members. An additional 19 interviews were completed in early 2011. The process also included interviews with two members of the Board of Directors and staff from five of the six Member Governments. These interviews formed the basis for the initial findings used to create key elements of the Energy Roadmap (e.g. steps).

In addition to the interviews, surveys were administered to further support the development of the Energy Roadmap. Seventy five employees and two members of the Board of Directors participated in the survey process. We combined the information gained from the interviews and surveys to evaluate the data and gain a comprehensive picture of the stakeholders’ views. Several interesting and significant contributions to the roadmap were a direct result of the interview and survey process. These contributions were integrated with the data from our review of the CIP budgeting process, strategic plan and energy consumption data. All of this information contributed to the creation of the initial Energy Roadmap Steps (see Appendix 7.2, Table 2.)

**STAFF INTERVIEW RESULTS**

In terms of initial, high level findings, the following five areas merited additional study and were included as part of the roadmap process. These items included:

- **Tactical interpretation of strategic energy objectives:** As the organization raises energy efficiency and energy cost as one of its main strategic considerations, a number of changes must occur to adjust the balance point for decision-making. As indicated by Figure 2, current environmental and regulatory considerations far outweigh the issues of economics and energy. As the organization aligns on the decision to focus more on energy and economics, a shift will have to occur to change this balance.

![Figure 2: Relationship Between Environmental Regulations, Energy, and Economics](image-url)
• **Workforce management tools and technologies:** Accelerating and expanding workforce management tools allows for increased efficiency and lowered costs even though there may be some initial additional deployment and training expenses. Areas such as dispatch, route management, supply routing and a reduction in travel time can make a difference both in terms of energy and environment (reduced vehicle miles equals reduced energy consumption and carbon footprint).

• **Acceleration of intelligence deployed:** Tampa Bay Water continues to have a solid track record of expanding its technology basis from Remote Terminal Units (RTU) and Programmable Logic Controllers (PLC) to VFDs. Increasing the speed of technology deployment and incorporating it into operating procedures and decision processes improves efficiency and reduces costs. This includes the expansion of the fiber optic network.

• **Fleet and Facilities Management:** Improving facilities and fleet operations can make a noticeable and rapid change in energy costs. There are a wide range of opportunities within fleet and facilities management, ranging from solar parking lot lighting to altering driving behaviors (e.g. shutting off vehicles when they are stopped for more than 10 minutes). There are short-term steps (such as replacing and upgrading lighting) and longer-term steps (revising building requirements/specifications) that, coupled with workforce management tools in areas such as routing, can result in relatively low cost actions, which may yield immediate results.

• **Utility services.** Tampa Bay Water has a number of areas in which it can manage and negotiate its power sources in a different manner. As an example, the addition of control and management systems could allow Tampa Bay Water to negotiate with utility suppliers for better rates. In addition, the deployment of auxiliary power (provided there are proper control schemes) can offer the opportunity to re-sell power during times of high demand (e.g. peak periods). Using control systems to manage peak demand is a widely adopted and commercially proven method to reduce overall electricity costs.

There are a number of culture change issues that need to be addressed as Tampa Bay Water moves toward its Energy Roadmap. This includes relatively easy “fixes” such as communicating the importance of being efficient and changing work rules regarding truck idling and route management. However, other cultural issues such as adding an efficiency incentive to performance appraisals, changing models to balance environmental rules with economics and moving/hiring staff in the Southern part of the system will take longer to fully implement.

The interview process yielded a wide array of opportunities that were included in the Energy Roadmap development process. In addition, two specific ideas deserve examination that is beyond the scope of this project. These include a “next best dollar spent” analysis of the programs and initiatives as well as the development or purchase of an electricity pricing model to improve the quality of energy management planning assumptions.
EMPLOYEE SURVEY

The employee survey resulted in a high level of participation with 75 employees taking part. This excellent participation rate represents a strong interest in energy efficiency among the staff. A sample of the online survey tool is shown in Figure 3. Many employees also provided comments along with their responses, which further supported the development of the roadmap. The survey results closely aligned with the interview process in which employees provided a number of intuitive and creative ideas. Complete survey results are available in Appendix 7.3. A summary of the results is included below:

Question 1: On the importance of improving energy efficiency for Tampa Bay Water
   • Nearly 90 percent rate it “critical” or very important”
   • 15 employees provided comments

Question 2: On having a personal stake in energy efficiency
   • 90 percent said they strongly agree or agree
   • 10 percent disagreed (meaning Tampa Bay Water will need to focus on personal involvement as part of its roll out.)

Question 3: On Paybacks
   • 23 percent said Tampa Bay Water should invest in energy efficient projects regardless of payback
   • The remaining respondents said seven years or less should be the payback period

Question 4: On renewable energy use
   • 46 percent said to use renewable energy if the cost is the same
   • 27 percent even if it is higher
   • 27 percent only if lower
   • 19 employees provided comments
Question 5: On the energy/water connection
- 75 percent see water and energy as tightly connected
- 25 percent see water and energy as moderately or loosely connected
- Six employees provided comments

Question 6: On Member Government Expectations
- 20 percent believe customers will not care
- 50 percent only if costs remain the same

Question 7: On the likelihood that certain events occurring in the future (respondents could answer ‘yes’ to more than one question)
- 75 percent feel it is highly likely that drinking water costs will reflect increases in energy costs
- 60 percent feel it is highly likely customers will expect the use of renewable energy
- 20 percent believe it is highly likely Florida will have a smart grid for energy and water

Question 8: On the impact and likelihood of advances in technology
- More than 93 percent believe customers, Tampa Bay Water and Member Governments will be better linked through technology
- Most were conservative in their choices regarding the likelihood of technology being broadly applied
- There is some concern that cyber security risks will rise while at the same time believing that Tampa Bay Water should be adding additional technology.

Question 9: On the chemical use/energy link
- 78 percent believe the opportunity exists to reduce the cost of chemicals through further developments in technology.

Question 10: On major concerns
- Participants ranked lower energy / carbon footprint requirements as the highest concern for Tampa Bay Water in the future. This is followed by;
  - Consumer demand outstripping supply
  - Stricter environmental regulations / water quality standards
  - Costs of water and energy rising quicker than inflation
GAP ANALYSIS

Performing a gap analysis identifies key projects necessary to bridge from the existing and/or planned capital projects to the Energy Roadmap and Tampa Bay Water’s long-term goals. These gap projects have been aligned within the Energy Roadmap to ensure the organization continues to move up the steps towards its overarching strategic intent.

Many of the gaps identified (See Table 5 in Appendix 7.4, and Appendix 7.5) are relatively low cost and could be managed with in-house staff/resources assuming those resources are available. In addition, a number of these projects may be developed and implemented simultaneously providing benefits as part of the process. The gap projects fall into three basic types: planning, Information Technology (IT) / software, and operational changes. Of these, IT / software is the largest portion of the costs.

For planning related projects, the concept is to assure that Tampa Bay Water is prepared to take advantage of ongoing and future efficiency opportunities. For example, the purchase or development of an Electricity Pricing Model will allow for an enhanced understanding of future electricity costs while also preparing the organization to negotiate with its energy suppliers. Similarly, facility audits (budgeted at $100,000) and transformer evaluations could lead to short payback periods (e.g. two years or less).

IT / software improvements represent the largest capital investments (through in-house development); however they provide the organization with the tools necessary to manage its energy consumption. These tools allow energy considerations to be taken into account alongside regulatory and environmental issues in order to increase savings, while improving system management.

Operationally, engaging employees, modifying specifications to focus more on energy efficiency, and increasing the weighting of energy efficiency in the CIP prioritization process are relatively low cost, high impact activities. Work rules management such as vehicle operating and routing improvements are another area of potential impact.

2.3 KEY ISSUES AFFECTING THE ENERGY ROADMAP/SUCCESS FACTORS

There are a number of key issues that will affect the success or failure of the Energy Roadmap. By definition, the Energy Roadmap requires support of management as well as all staff levels if it is to be successfully implemented. The critical support issues include:

• Developing a Culture of Efficiency: The Energy Roadmap should be integrated into the organization’s way of doing business, not just as an “add-on” or individual activity. This effort comes from the top down through the organization, and should be reflected in a reward system.

• Availability and Visibility of Information: In order to be successful with the Energy Roadmap, Tampa Bay Water needs to have an improved real-time display and reporting of energy use. Examples include energy consumption information
dashboards and integration of energy use into operating procedures (such as pump management).

- **Measuring Progress:** The Energy Roadmap should not be a static document but rather a measuring stick by which progress can be viewed. Formally, the Energy Roadmap should be reviewed and updated within six months after its roll-out and amended annually to reflect changes, steps attained and revised CIP projects or priorities. Informally, the Energy Roadmap should be referred to on a regular basis as a filter to support decision making.

- **Member Government Involvement:** In the later years of the Energy Roadmap, working with stakeholders will be one of the major opportunities because aligning the goals of Tampa Bay Water and the Member Governments is the key to the future success. This will require significant effort because both policy and operations are impacted by the recommendations.
3. STEPS

The process of identifying and creating steps along a roadmap allows an organization to align its existing projects and initiatives with the steps, identify gaps that exist and develop a path forward. Based on the results of the interviews with Tampa Bay Water staff, the team developed five key steps in the Energy Roadmap. The five steps (with approximate implementation periods – range of dates) include:

1. **Path to Efficiency: Implementation (2011 – 2013)**

   Tampa Bay Water will develop the action plans to support Board goals of efficient operations and financial stability with an increased focus on reduced energy use. Tampa Bay Water will also consider energy factors in decision-making processes.


   Tampa Bay Water will collect comprehensive real-time energy and flow data. This data collection will support the development of tools to correlate, analyze, and interpret the water/energy relationship. The tools will be used to measure performance and study energy efficiency alternatives.


   A focus on employees and the training necessary for informed decision-making is critical. Tampa Bay Water will empower staff with the technology and tools needed to realize and implement the Energy Roadmap and assist with operating decisions. Training and education will be provided to ensure the effective use of the tools.


   Tampa Bay Water will expand its total water system management through strategic storage and system cycle management to allow greatest efficiencies (e.g. supply, storage tanks, conservation, and demand). Tampa Bay Water will collaborate with external stakeholders including: Member Governments; existing commercial power providers; and Alternative/Renewable energy power providers.

5. **Combined Power and Water Management System (2019-2021)**

   Tampa Bay Water will leverage a combined power and water management system to optimize timing between daily demand and supply to promote energy efficiency. Power and water are balanced and networked.

Each step builds on the previous step in the Energy Roadmap. These steps help Tampa Bay Water’s leadership and staff guide decision making, periodically confirm alignment with the Agency’s Strategic Plan and monitor progress. Through the course of the interviews, development of the Energy Roadmap steps and a review of Tampa Bay Water’s ongoing initiatives, several gap projects emerged.
4. FINDINGS

The combination of survey results, review of various Tampa Bay Water materials such as the CIP, Strategic Plan and operating expenses with experience of the project team have resulted in several key findings that form the basis of the Energy Roadmap themes and recommendations.

1. The Energy Roadmap is closely aligned with Tampa Bay Water’s Strategic Plan. Specifically it is aligned in regards to the innovation, leadership, sustainability, and stakeholders vision elements while, supporting each of the strategic plan’s four goals. The alignment with the Strategic Plan is discussed in detail later in the document.

2. The majority of the Tampa Bay Water staff exhibit a desire to be engaged in making the organization more efficient and recognize it is critical for long-term success—and this includes not just electricity but in overall energy and chemical consumption/usage as well. This high level of engagement will allow for a greater and more expeditious implementation of the Energy Roadmap recommendations.

3. There is broad recognition that tools and software are critical components in order for Tampa Bay Water to be successful and that current procedures do not allow for the most effective flow of information. Additional decision support tools will make a difference for the organization.

4. Given the high level of employee support, a comprehensive employee engagement plan to increase energy efficiency awareness, improve roadmap integration and ensure success should yield significant opportunities for energy savings and improved operations. This should be tied to work management plans and changes in operating and planning procedures.

5. Tampa Bay Water has the ability to successfully raise the awareness of energy efficiency among staff and to implement the Energy Roadmap with relatively low costs; providing the commitment is made to the plan.

6. A structured approach must be taken to manage the changes and transitions required to utilize the Energy Roadmap throughout the operation, culture, and policies of the organization. Specifically this is important in areas of planning (e.g. increasing the energy efficiency weighting in the prioritization component of the CIP), employee work plans and dispatch, information flows and reviews as well as alterations in operations such as pumping and dispatch.

4.1 COMMON THEMES AND ISSUES

The interview process revealed several significant opportunities for the Energy Roadmap. These were broken down into eight categories that provided the basis of the preliminary findings matrix used in development of the roadmap. The comments were categorized as Technology View, Critical Facts, Issues Impacting Customers, Issues Impacting
Staff, Quick Hits, Desired Outcomes, and Valuable Commentary as well as Out of the Box ideas. Many of these insights are valuable for two reasons: first, these individuals know and see opportunities as insiders and secondly, it provided an opportunity for inclusion and support of the Energy Roadmap findings. Many of these suggestions have found their way into the gap projects identified by the team. Some of the highlights of the interviews and preliminary findings include:

Technology View:

- Online and offline tools to improve informed decision-making. Automated event notification.
- Real time source and pump rotation, factoring in water quality, regulatory issues, source availability, and energy consumption.
- Streamline preventative maintenance planning. Knowledge capture tool to track repair issues and corrective actions taken and tools / parts required. Expansion of Computerized Maintenance Management System (CMMS) to include these issues.
- Recognize issues of power quality/power factor correction
- Run emergency generation equipment for peak shaving
- More extensive SCADA, telemetry, additional training, tools, asset management, and criticality assessment program. Better inventory tracking.

Critical Facts:

- Demand management plan looks at reliability; efficiency of supply, reducing costs of future supply.
- Focus on moving as much water as possible from surface water to avoid excessive fines incurred from over-pumping groundwater supply or the increased energy cost associated with the use of desalination
- Previous roadmapping plan done for SCADA and operational systems. Time and resources for energy efficiency must be in-line with current strategic plan.

Issues Impacting Customers (i.e. Member Governments and end-users)

- Must work with customer perceptions especially in areas surrounding wellfields.
- Embracing energy conservation management.
- Educated customer base that understands limited resources.
- Predicting customer demand in order to anticipate chemical demands.
Staff Issues

- As current staff retires and assets increase, additional staff may be required. Staff must be trained to make informed decisions.
- Implement workforce management tools and training to improve work efficiency.
- Shift culture to one of asset management.

Quick Hits

- Full utilization of current system and contract management system, and tie-in to energy/chemical budget.
- More accurate forecast for price impacts of electricity and chemicals.
- Create an energy dashboard to evaluate trends and potential spikes in energy consumption.
- Balance energy consumption into operational decision making. Determine the best way to evaluate demand projections and respond appropriately.
- Stagger VFD’s; schedule energy intensive actions off-peak based on demand.
- Better asset management and tracking system for fuel and chemical ordering.
- Automated dispatch or staff staging closer to asset locations.
- Real time evaluation of on-peak versus off-peak energy charges from utility providers.

Valuable Commentary

- Leadership should have a goal of improving Tampa Bay Water’s image.
- Management outreach to electric utilities.
- The use of an energy console/dashboard as a communication tool for informed decision making.
- Look at vehicles and fleet for savings (e.g. hybrids).

4.2 GAP PROJECT IDENTIFICATION

After completing and reviewing the Energy Roadmap and steps, Halcrow performed a gap analysis, comparing current capital, information technology (IT) and organizational initiatives to each of the steps. As discussed previously, this mapping and comparison identified project gaps in the Energy Roadmap. The most significant gaps identified were in three key areas:

- Supporting the Workforce Integration step
• Stakeholder engagement opportunities
• General electric data gathering, understanding and analysis

This was expected as Tampa Bay Water just recently began investigating and investing in improving energy efficiency and renewable energy use. The full list of gap projects identified by the team fall into three basic types: planning, IT / software and operational changes. The full list of gap projects included:

1. Facilities energy audits
2. Integrate energy efficiency performance metrics
3. Incorporate energy considerations in Standard Specifications
4. Develop an Electricity Pricing Model
5. Expand Energy Consumption Manager Application
6. Transformer inventory and evaluation
7. Develop an internal employee engagement program
8. Incorporate vehicle fuel and operational efficiency
9. Integrate energy considerations in Optimized Regional Operations Plan (OROP)
10. Formalize an internal energy workgroup with roles and responsibilities
11. Develop a comprehensive energy and operational optimization dashboard/program
12. Integrate energy efficiency into CMMS/asset management
13. Expand strategic tank storage internally and through cooperative agreements with Members
14. Member Governments outreach to evaluate end use collaboration opportunities
15. Collaborate with Members for commercial power providers outreach and negotiation
16. Water-energy nexus: inter-governmental coordination

The full list of gap projects above includes inexpensive, in-house projects executed by Tampa Bay Water staff while others are larger projects likely to be completed by consultants or collaborative efforts with Member Governments. See Appendix 7.5 for a more detailed description of each gap project, estimated budget, and schedule. Of the multiple gap projects listed above, five projects were identified as crucial to providing a foundation for future decisions, operations, and capital projects. These five projects will act as precedents to others and include:
1. Expanding Energy Consumption Manager Application (develop baseline energy consumption understanding)

2. Development of a comprehensive energy and operational optimization dashboard/program

3. Development of an internal employee engagement plan

4. Integrate energy efficiency into CMMS/asset management

5. Collaborate with Members for commercial power providers outreach and negotiation

These five projects act as a preliminary prioritization of the gaps between the existing capital and IT projects and the goals of the Energy Roadmap. These projects are a high priority because they will impact and/or provide the prerequisite information required to implement future projects and initiatives. For example, the expansion of the Energy Consumption Manager Application provides valuable baseline energy data for Tampa Bay Water facilities and operations. This data is then used by future projects such as facility energy audits, development of efficiency metrics, energy and operational optimization program, pump/motor replacements and electric tariff modifications.

4.3 PROJECT SCHEDULES AND BUDGETS

In reviewing existing capital project plans, IT projects and gap projects, more than $93 million in projects and initiatives were identified associated with or impacted by the Energy Roadmap. Nearly 99 percent of the $93 million total is associated with the existing Tampa Bay Water capital and IT programs, while slightly more than $1 million in project costs were related to the 16 gap projects identified in the roadmap process. The $1 million in gap project costs includes both capital and in-house / IT related projects. The gap and planned CIP projects critical to the Energy Roadmap account for $1.6 million in project costs over the 10-year roadmap period. It is important to note, while the Energy Roadmap specific projects are a small portion of the overall CIP plan, the Energy Roadmap significantly impacts more than $90 million in capital funds and will support a more efficient and optimal use of the funds.

There is a significant clustering of projects in the first three years of the Energy Roadmap as shown in Figure 4. The majority of the projects are scheduled in the first three years of the Energy Roadmap while nearly all projects are initially scheduled to be completed by 2016. The strategic process of implementing the Energy Roadmap will lead Tampa Bay Water staff to review the schedules and potentially reprioritize some projects to allow for the best results throughout the full Energy Roadmap timeline.

There are also a large number of projects (25) that are identified as IT or ‘in-house’ projects to be completed by Tampa Bay Water staff. From discussions with Tampa Bay Water and review of past IT project prioritizations, it appears 25 projects may overload the existing IT staff. Tampa Bay Water may require outside assistance, the purchase of available software licenses, or temporarily augment staff to complete the projects in the priority needed. Due to
the interdependencies of many of the IT and energy specific projects, it is critical to complete these projects in alignment with the schedule or risk significant delays and impacts to other projects.

### 4.4 ENERGY ROADMAP ALIGNMENT WITH STRATEGIC PLAN

Tampa Bay Water’s recently completed strategic planning document (Strategic Plan) defines the organization’s mission, vision, and goals for the short and long term. All major organizational programs, projects, or initiatives, such as the Energy Roadmap, should be aligned with and guided by the Strategic Plan. As stated in the Strategic Plan, the organization’s Mission is: *Tampa Bay Water reliably provides clean, safe water to the region now and for future generations.*

The overall mission is supported by a vision and goals to define and measure progress towards the vision/mission. The vision and goals are included below:

**Vision:**

- Be a model for regional water supply in the nation
- Be a leader in innovation and best practices
- Be a respected member of the Tampa Bay community

**Goals:**

- Achieve a reliable water supply and delivery system
- Continue to improve the efficiency of Tampa Bay Water’s operations
- Maintain the agency’s financial stability and sustainability
- Develop, improve and maintain collaborative relationship with stakeholders

The Energy Roadmap aligns with the broader vision and highlights the Agency’s commitment to innovation, leadership, sustainability, and stakeholders. The Energy Roadmap is most directly associated with the third goal to “Maintain the agency’s financial stability and sustainability” and related strategies. Implementation of the Energy Roadmap supports the financial stability and sustainability efforts to stabilize member rates and offset costs in innovative ways. For example, the initial efforts and projects in the Energy Roadmap support energy efficiency, operational optimization, and equipment upgrades that may result in lower operating costs and greater financial stability.

While the Energy Roadmap is directly linked to the third goal, it also cuts across the other goals and offers an opportunity to broadly support each of them. The Energy Roadmap includes targeted efforts at employee engagement, innovative practices to optimize operations, member/customer collaboration, and long term water resource planning. The Energy Roadmap’s alignment with the Agency’s Strategic Plan helps to ensure its broader adoption and success.
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5. ENERGY ROADMAP

Figure 4: Energy Roadmap

Actual Budget Dollars

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Key</td>
<td>Key</td>
<td>Key</td>
<td>Key</td>
<td>Key</td>
</tr>
<tr>
<td>Ongoing CIP, IT and Gap Projects</td>
<td>Ongoing CIP, IT and Gap Projects</td>
<td>Ongoing CIP, IT and Gap Projects</td>
<td>Ongoing CIP, IT and Gap Projects</td>
<td>Ongoing CIP, IT and Gap Projects</td>
</tr>
<tr>
<td>Power &amp; Efficiency</td>
<td>Power &amp; Efficiency</td>
<td>Power &amp; Efficiency</td>
<td>Power &amp; Efficiency</td>
<td>Power &amp; Efficiency</td>
</tr>
<tr>
<td>Planning &amp; Water Sources</td>
<td>Planning &amp; Water Sources</td>
<td>Planning &amp; Water Sources</td>
<td>Planning &amp; Water Sources</td>
<td>Planning &amp; Water Sources</td>
</tr>
<tr>
<td>Customers</td>
<td>Customers</td>
<td>Customers</td>
<td>Customers</td>
<td>Customers</td>
</tr>
<tr>
<td>Markets</td>
<td>Markets</td>
<td>Markets</td>
<td>Markets</td>
<td>Markets</td>
</tr>
</tbody>
</table>

Combined Water Management System
Total Water Use Management and Broad Collaboration
Enhance Water & Energy Relationship
Path to Efficiency Implementation

Tampa Bay Water Energy Roadmap 2011
6. CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

Tampa Bay Water is uniquely positioned to implement its Energy Roadmap in an expeditious way due to the recent successful energy related projects, senior management support, a documented willingness of employees to take charge of their energy usage, an agreement with the goals of its Member Governments and alignment with its Strategic Plan.

The organization’s engineering and management focus on details and its project driven culture will support the Energy Roadmap effort in that it is placed in context with other critical activities. The shifting of Tampa Bay Water from a “build” mission to that of increasing efficiency and maintenance can take advantage of the initiatives outlined in the Energy Roadmap.

One of the organizational challenges to implementing the Energy Roadmap is maintaining focus and integrating energy efficiency into the culture, practices, and policies of the Agency. There will be some trade-offs in regards to first costs, payback periods and a shift from meeting regulatory and environmental requirements to balancing environment / economics / energy (see Figure 2 in section 2.2.3).

One of the more critical components for success is increasing Tampa Bay Water’s information and knowledge base. Specifically, the organization should evaluate accelerating the implementation and linkage of its SCADA systems in a more integrated fashion, as well as building out its dashboards and methodologies for reporting energy consumption.

In the later years of the Energy Roadmap, working with stakeholders will be one of the major opportunities for implementation because aligning the goals of Tampa Bay Water and the Member Governments is the key to future success. This will require significant effort because both policy and operations are impacted by the recommendations.

There are significant short term/quick hit opportunities that can have a rapid impact on the organization’s efficiency. These quick hits require management support to succeed as some of these changes will alter operating practices and procedures. Others methods, such as updating the Standard Specifications on efficiency, re-evaluating the weighting of the energy component on the CIP prioritization and performing energy audits and inventories can have a major benefit without requiring major changes.

6.2 RECOMMENDATIONS

Quick hit projects (i.e. short-term projects to improve performance identified through Energy Roadmap process that immediately realizes and communicates value of the roadmap):

1. Reevaluate electric rates for high consumption assets (pumps, plants, etc.) for immediate savings

2. Expand Energy Consumption Manager Application for use on an active basis
3. Expand efficiency requirements for building specifications
4. Examine work rules concerning vehicle management (i.e. idling policy)
5. Collaborate with Member Governments for commercial power providers (e.g. TECO) outreach and demand savings
6. Optimize flow vs. efficiency for desalination & other treatment facilities
7. Initiate employee education and outreach

Implementation:
- Review the elements of the Energy Roadmap within six months, then annually thereafter
- Develop a data tracking dashboard to manage the Energy Roadmap
- Re-evaluate the weighting of energy considerations in the CIP in balance with other considerations
- Establish energy efficiency performance metrics

Key early and foundational / predecessor projects:
- Develop a baseline energy understanding of operations (data inventory and improve efficiency)
- Develop comprehensive / integrated energy optimization tool
- Develop internal employee engagement plan
- Re-evaluate energy considerations in the CIP prioritization and integrate energy considerations into asset management decisions (Renewal and Replacement Program)
- Initiate Member Governments engagement plan for energy and commercial power providers negotiations
7. APPENDIX

7.1 Energy Roadmap Team
7.2 Roadmap Data
7.3 Survey Results
7.4 Capital Improvement Program, Information Technology, and Gap Projects
7.5 Gap Project Summaries
7.6 List of Acronyms
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# 7.1 ENERGY ROADMAP TEAM

Table 1: Tampa Bay Water Energy Roadmap Team and Staff Interviewed

<table>
<thead>
<tr>
<th>Tampa Bay Water Project Manager</th>
<th>Maribel Medina, P.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Board of Directors Members</td>
<td></td>
</tr>
<tr>
<td>Councilman Karl Nurse, City of St. Petersburg</td>
<td>Commissioner Susan Latvala, Pinellas County</td>
</tr>
<tr>
<td>Executive Team and Senior Managers</td>
<td></td>
</tr>
<tr>
<td>Gerald Seeber, General Manager</td>
<td>Charles H. Carden, Director of Operations &amp; Facilities</td>
</tr>
<tr>
<td>Koni M. Cassini, Director of Finance &amp; Administration</td>
<td>Jon Kennedy, Planning &amp; Projects</td>
</tr>
<tr>
<td>Christine Owen, Water Quality Officer</td>
<td>David Detwiler, Information Systems</td>
</tr>
<tr>
<td>Additional Tampa Bay Water Staff</td>
<td></td>
</tr>
<tr>
<td>Paula Dye</td>
<td>Dave Bracciano</td>
</tr>
<tr>
<td>Christina Sackett</td>
<td>Chris Wetz</td>
</tr>
<tr>
<td>Suzannah Folsom</td>
<td>Eric Hoezler</td>
</tr>
<tr>
<td>Tampa Bay Water Member Governments</td>
<td></td>
</tr>
<tr>
<td>Pinellas County</td>
<td>City of New Port Richey Sherman Applegate, Public Utilities Director</td>
</tr>
<tr>
<td>Kevin Becotte, Interim Utilities Director</td>
<td>Bruce Kennedy, Assistant County Administrator Utilities Service Branch</td>
</tr>
<tr>
<td>Hillsborough County</td>
<td></td>
</tr>
<tr>
<td>Luke Mulford, Water Quality Manager</td>
<td>City of St. Petersburg</td>
</tr>
<tr>
<td>Randy Sears, General Manager, Operations &amp; Management</td>
<td>Michael Connors, Public Works Administrator</td>
</tr>
<tr>
<td>Jim Jeffers, Utility Planning Design Section Manager (now retired)</td>
<td>George Cassady, Director of Water Resources</td>
</tr>
</tbody>
</table>
## 7.2 ROADMAP DATA

### Table 2: Tampa Bay Water Energy Roadmap Steps

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluate commercial power purchase options and rate structures</td>
<td>Explore integration of energy consumption in Agency’s OROP model</td>
<td>Explore remote working from home</td>
<td>Alternate energy sources offsetting well pumping with strategic storage (OROP)</td>
<td></td>
</tr>
<tr>
<td>Review facilities energy losses (i.e. conduct industrial grade energy audits)</td>
<td>Complete Alternative/Renewable Energy Feasibility Study (e.g. wind, solar, hydro power)</td>
<td>Deploy knowledge management tools</td>
<td>Link renewables to water to overarching water and energy plan</td>
<td></td>
</tr>
<tr>
<td>Explore deployment of LED lighting</td>
<td>Explore power purchase from waste-to-energy plants</td>
<td>Explore workforce management tools</td>
<td>Examine combined heat and power options</td>
<td></td>
</tr>
<tr>
<td>Explore commercial power rebates</td>
<td>Tie power costs usage to water sources</td>
<td></td>
<td>Striking the balance between demand response and demand management</td>
<td></td>
</tr>
</tbody>
</table>

### Operations

| Incorporate energy considerations in Asset Management Plan (i.e. Renewal & Replacement Program) (e.g. optimize commercial power and fuel use) | Evaluate total carbon footprint-chemical and electricity | | Increase size of mains or add second line | |
| Incorporate energy considerations in Capital Improvement Program projects and prioritization criteria | Evaluate increased SCADA deployment opportunities | Advance deployment and use of SCADA to analyze and manage energy use/trends | Update automation to include better displays, high tech screens and GUIs, real time views of the system | |
| Incorporate Energy Efficiency in Agency’s Standard Specifications | | | Management of treatment plants for balancing energy | |

### Planning & Water Sources

| Consider energy in the Long Term Water Supply Plan Update | Evaluate peak demand balance and alternating energy sources with new Tampa Bay Water’s strategic storage | Evaluate strategic storage of finished water through Tampa Bay Water’s capital investment | Deploy new Tampa Bay Water’s strategic storage of finished water | |

### Customers

| Initiate Energy Management workgroup with Members | Evaluate strategic storage of finished water through cooperative agreements with Members | | Implement Storage through cooperative agreements | |

### Markets

| Explore federal, state or commercial power provider assistance funding and financial assistance opportunities to implement energy related activities and/or projects | Examine opportunities for collaboration and partnerships on energy programs/projects with private entities | | | |
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7.3 SURVEY RESULTS

More than half of Tampa Bay Water’s employee base participated in a survey on energy and related issues. Results and details of the survey questions are found below.
Tampa Bay Water should consider investing in energy technologies that will provide a payback to the agency in the range of:

- 5-7 Years: 30
- 3-4 Years: 25
- Regardless of payback: 15
- 1-2 Years: 5
- Not invest at all: 0

Tampa Bay Waters’s use of renewable energy should be encouraged providing:

- Costs are the same: 80%
- Costs are lower: 20%
Looking 10 years into the future please select how likely you believe the following events will occur:

- Customers will expect renewable energy use
- Drinking water pricing will reflect increased costs of energy
- Customers will be willing to pay more for a reliable, sustainable drink...
- Florida will have a smart grid for electricity and drinking water
- Customers will demand lower costs for water
- Customers will be willing to pay more for drinking water with a lower...
- Homes and businesses will be required to conserve more energy and drink...

Looking 10 years into the future please select the likelihood of the following events occurring:

- Consumers, Tampa Bay Water and Member Governments will be linked together
- Technology will change Tampa Bay Water's relationship with its customers
- Workforce automation will play a significant role at Tampa Bay Water
- Too much focus on technology will lead to cybersecurity problems and...
- Through technology such as advanced control systems Tampa Bay Water w...
### 7.4 CAPITAL IMPROVEMENT PROGRAM (CIP), INFORMATION TECHNOLOGY (IT) AND GAP PROJECTS

#### Table 3: Ongoing CIP Plan Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Estimated Project Cost ($)</th>
<th>Estimated Start Date</th>
<th>Estimated End Date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power and Efficiency</strong></td>
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<tr>
<td>Alternative Energy Feasibility Study</td>
<td>$525,000</td>
<td>2009</td>
<td>2014</td>
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<tr>
<td>Tampa Bay Seawater Desalination Reliability Program</td>
<td>$13,600,000</td>
<td>2009</td>
<td>2017</td>
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<tr>
<td>South Pasco Generator Fuel Tank</td>
<td>$270,000</td>
<td>2012</td>
<td>2013</td>
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<tr>
<td>South Pasco Wellfield Underground Commercial Powerline</td>
<td>$1,700,000</td>
<td>2013</td>
<td>2016</td>
</tr>
<tr>
<td>HVAC/Bldg. Upgrades</td>
<td>$2,400,000</td>
<td>2011</td>
<td>2012</td>
</tr>
<tr>
<td><strong>Operations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vulnerability Assessment/Improvements</td>
<td>$2,500,000</td>
<td>2010</td>
<td>2015</td>
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<tr>
<td>Alafia Pump Station Modifications</td>
<td>$3,000,000</td>
<td>2011</td>
<td>2013</td>
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<tr>
<td>SCADA System Redundancy</td>
<td>$465,000</td>
<td>2010</td>
<td>2012</td>
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<tr>
<td>Morris Bridge Booster Station – Property Acquisition</td>
<td>$400,000</td>
<td>2011</td>
<td>2012</td>
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<tr>
<td>South-Central Hillsborough Wellfield – Pumps Replacement</td>
<td>$1,800,000</td>
<td>2010</td>
<td>2012</td>
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<tr>
<td>Cross-Bar Ranch Wellfield – Pumps Replacement</td>
<td>$3,600,000</td>
<td>2011</td>
<td>2014</td>
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<tr>
<td>System-Wide Renewal and Replacement</td>
<td>$5,000,000</td>
<td>2011</td>
<td>2016</td>
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<tr>
<td>Eldridge-Wilde Hydrogen Sulfide Removal Facility and Pinellas County POCs Updates</td>
<td>$10,000,000</td>
<td>2010</td>
<td>2016</td>
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<tr>
<td>SCHIP Phase III Hydrogen Sulfide Removal at Lithia</td>
<td>$35,000,000</td>
<td>2004</td>
<td>2013</td>
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<tr>
<td>Carrollwood Well #1 – Well House</td>
<td>$330,000</td>
<td>2008</td>
<td>2015</td>
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<tr>
<td><strong>Planning and Water Sources</strong></td>
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<td></td>
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<tr>
<td>Reliability and Future Needs Analysys</td>
<td>$20,000</td>
<td>2013</td>
<td>2016</td>
</tr>
<tr>
<td>Long Term Water Source – Planning Studies</td>
<td>$6,500,000</td>
<td>2009</td>
<td>2019</td>
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<tr>
<td><strong>Customers</strong></td>
<td></td>
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<tr>
<td>No Project Identified</td>
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<tr>
<td><strong>Markets</strong></td>
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<tr>
<td>No Project Identified</td>
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## Table 4: Ongoing Information Technology Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Estimated Project Cost ($)</th>
<th>Estimated Start Date</th>
<th>Estimated End Date</th>
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<tbody>
<tr>
<td><strong>Power and Efficiency</strong></td>
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<tr>
<td>Energy Consumption Manager Application</td>
<td>$25,000</td>
<td>2011</td>
<td>2014</td>
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<td><strong>Operations</strong></td>
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<td>OROP Convert AMPLE</td>
<td>$4,000</td>
<td>2011</td>
<td>2012</td>
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<tr>
<td>Chemical Consumption Manager</td>
<td>$30,000</td>
<td>2012</td>
<td>2013</td>
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<tr>
<td>Manual Data Logger Run optimization / GIS</td>
<td>$6,000</td>
<td>2011</td>
<td>2013</td>
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<tr>
<td>CMMS Program</td>
<td>N/A</td>
<td>2014</td>
<td>2016</td>
</tr>
<tr>
<td>Maintenance Mobile GIS</td>
<td>$20,000</td>
<td>2015</td>
<td>2015</td>
</tr>
<tr>
<td>Budget Rate Model</td>
<td>$30,000</td>
<td>2011</td>
<td>2011</td>
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<tr>
<td>Monthly Ops Report</td>
<td>N/A</td>
<td>2011</td>
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<tr>
<td>Budget and Planning Mgmt.</td>
<td>$20,000</td>
<td>2011</td>
<td>2013</td>
</tr>
<tr>
<td>Equipment Uptime Dashboard</td>
<td>$6,000</td>
<td>2013</td>
<td>2014</td>
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<tr>
<td><strong>Planning and Water Sources</strong></td>
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<tr>
<td>Watershed Mapping</td>
<td>$3,000</td>
<td>2013</td>
<td>2014</td>
</tr>
<tr>
<td>Surface and Recharge Projects Model</td>
<td>$3,000</td>
<td>2011</td>
<td>2012</td>
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<tr>
<td><strong>Customers</strong></td>
<td></td>
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<td></td>
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<tr>
<td>No Project Identified</td>
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</tr>
<tr>
<td><strong>Markets</strong></td>
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<td></td>
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</tr>
<tr>
<td>No Project Identified</td>
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2 Estimated Projects Costs are non-capital related; all project related costs represent an estimate of in-house labor costs (~$75 per hour).
<table>
<thead>
<tr>
<th>Project</th>
<th>Estimated Project Cost ($)</th>
<th>Estimated Start Date</th>
<th>Estimated End Date</th>
<th>In House</th>
<th>Outsourced$^3$</th>
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<tbody>
<tr>
<td><strong>Power and Efficiency</strong></td>
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<td></td>
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<tr>
<td>Facilities energy audits</td>
<td>$100,000</td>
<td>2012</td>
<td>2014</td>
<td>X</td>
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<tr>
<td>Integrate energy efficiency performance metrics</td>
<td>$6,000</td>
<td>2013</td>
<td>2015</td>
<td>X</td>
<td></td>
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<tr>
<td>Incorporate energy considerations in Standard Specifications</td>
<td>$15,000</td>
<td>2011</td>
<td>2012</td>
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<tr>
<td>Develop Electricity Pricing Model</td>
<td>$50,000 (annually)</td>
<td>2012</td>
<td>2014</td>
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<tr>
<td>Expand energy consumption manager application</td>
<td>$30,000</td>
<td>2011</td>
<td>2012</td>
<td>X</td>
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<tr>
<td>Transformer inventory and evaluation</td>
<td>$6,000</td>
<td>2012</td>
<td>2013</td>
<td>X</td>
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<td><strong>Operations</strong></td>
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<td>Develop an internal employee engagement program</td>
<td>$200,000</td>
<td>2012</td>
<td>2020</td>
<td>X</td>
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<tr>
<td>Incorporate vehicle fuel and operational efficiency in existing policy</td>
<td>$6,000</td>
<td>2011</td>
<td>2012</td>
<td>X</td>
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<td>Integrate energy considerations in Optimized Regional Operations Plan</td>
<td>$8,000</td>
<td>2012</td>
<td>2013</td>
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<tr>
<td>Formalize an internal energy workgroup with roles and responsibilities</td>
<td>N/A</td>
<td>2011</td>
<td>2015</td>
<td>X</td>
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</tr>
<tr>
<td>Develop a comprehensive energy and operational optimization dashboard/program</td>
<td>$600,000</td>
<td>2013</td>
<td>2015</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Integrate energy efficiency into CMMS/Asset management program</td>
<td>$22,000</td>
<td>2012</td>
<td>2014</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Planning and Water Sources</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expand strategic tank storage through cooperative agreements with Members</td>
<td>N/A</td>
<td>2016</td>
<td>2020</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Customers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaborate with Members/customers for commercial power provider outreach</td>
<td>N/A</td>
<td>2012</td>
<td>2014</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Customer outreach to evaluate end use collaboration opportunities</td>
<td>$45,000/yr</td>
<td>2012</td>
<td>2015</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Markets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water-Energy nexus: intergovernmental coordination</td>
<td>N/A</td>
<td>2013</td>
<td>2016</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

$^3$ Estimated Projects Costs are non-capital related; all project related costs represent an estimate of in-house labor costs (~$75 per hour).
7.5 GAP PROJECT SUMMARIES

1. FACILITIES ENERGY AUDITS

Perform energy audits of all Tampa Bay Water facilities to identify energy conservation and energy efficiency measures (e.g. lighting retrofit, motor replacements) to implement at each facility and reduce operating costs associated with electricity, diesel, or natural gas use. Tampa Bay Water should prioritize facilities for audits based on size and current energy consumption at the facilities using the data gathered from the Energy Consumption Manager. For example, perform investment / commercial grade audits at all facilities with average monthly energy consumption over 15,000 kWh per month or greater than 10,000 square feet while performing general building and equipment reviews for smaller buildings. This assessment of the scope of work and size of projects will support decisions regarding the use of and appropriateness of performance contracting or capital funds and Request for Proposals (RFPs).

Investment / commercial grade audits will identify specific energy saving measures, calculate savings (costs and energy), justify investment and can be used for performance contracting, if desired. Commercial grade audits cover the entirety of a facility including lighting, motors, HVAC, windows, building envelope, and temperature controls. Specific audit results and recommended upgrades could be included in the CIP plan and/or the renewal and replacement program depending on the project budget and size.

To quickly and efficiently evaluate audit and facility savings potential, Tampa Bay Water could prequalify three to five local audit contractors for bidding purposes through a Request for Information (RFI) or Request of Qualifications (RFQs) process. This same process could be used for the implementation of the audit recommendations (i.e. design and construction). Tampa Bay Water should further investigate their facilities, energy consumption and performance contractors to determine the full potential, optimal investment in audits and appropriate contracting mechanisms (e.g. RFP/Design-Construct or performance contract). The total budget of $100,000 was estimated on performing approximately five to seven commercial audits. Pending the high-level prioritization, this estimate may be adjusted.

2. INTEGRATE ENERGY EFFICIENCY PERFORMANCE METRICS

Including energy and energy efficiency performance metrics in the Agency’s operational goals, performance reviews, specifications, budget reports, etc. will formalize and act to ‘codify’ strategic energy goals. By integrating these metrics, the Agency will begin monitoring and tracking performance, thus improving reporting, reducing costs and realizing greater efficiency.

3. INCORPORATE ENERGY CONSIDERATIONS IN STANDARD SPECIFICATIONS

Tampa Bay Water’s Capital Improvement Program plan includes nearly $1 billion in ongoing and future projects. In addition to capital projects, ongoing and preventative maintenance results in equipment and motor replacements or upgrades. By including efficiency metrics and requirements in project and equipment specifications, it ensures more efficient equipment, motors, and assets and reduces operating costs.
4. DEVELOP AN ELECTRICITY PRICING MODEL

An electricity pricing model forecasts and predicts electricity and power (where applicable) prices in municipal, regulated and competitive electric markets. By understanding potential electricity prices, Tampa Bay Water can prepare for significant market changes and power regulatory issues (e.g. greenhouse gases (GHG) or coal regulations) which will impact their operations. It may also lead to identifying market opportunities such as Water - Energy nexus issues, new power plants, and self-generation. The model further allows Tampa Bay Water to integrate electric pricing more accurately in budgeting and projects. Florida is a fully regulated electric market served by municipal (e.g. FMPA) and regulated investor utilities (e.g. TECO, FP&L) with rates approved by the Public Utility Commission. Wholesale power generation prices are determined by the regulated utilities and bilateral wholesale contracts (e.g. Power Purchase Agreements). Power market reporting services and pricing models are available by subscription or software license. For Tampa Bay Water’s purposes, a subscription to regional and state power market forecasts would likely be adequate to project near and midterm power costs. Monthly updates would be adequate for incorporation into Agency plans and identifying new Water-Energy Nexus opportunities. Companies such as Ventyx and Platts could provide such a service.

See: http://www.platts.com/Products/forwardcurveelectricity/Overview

5. EXPAND ENERGY CONSUMPTION MANAGER APPLICATION

Tampa Bay Water has developed a computer application in-house to track and monitor electricity consumption for specific facilities and assets. This application should be expanded to incorporate all electric consuming facilities or assets. Eventually, vehicle use or fuel use should be incorporated to monitor and manage fuel consumption and quantify savings from specific programs or initiatives (e.g. biodiesel or hybrid vehicles). The energy consumption manager will act as the foundation for energy data used in future projects and programs (such as Optimization Dashboard) and will track and report energy and cost savings. This project is a precedent for multiple other projects.

6. TRANSFORMER INVENTORY AND EVALUATION

Perform an inventory of all electric transformers owned and used by Tampa Bay Water’s facilities. Depending on the transformers age and size, recent regulatory and equipment standards may now significantly exceed their current efficiencies. For example, some older transformers may be approximately 92% efficient, while newer transformers are likely 98% or more efficient. Specific payback will depend on transformer size, electricity costs, and efficiency differential.

7. DEVELOP AN INTERNAL EMPLOYEE ENGAGEMENT PROGRAM

To ensure the success of any broad, organization-wide project, such as the Energy Roadmap, it is essential to develop a staff or employee engagement program to support the implementation of the Energy Roadmap. The engagement program would include specific strategies and tactics to utilize in developing and managing implementation and specific initiatives (e.g. communication strategies and tools, reporting tools, identifying new energy
saving projects, etc.). The engagement program will identify specific champions in the organization, develop roles and responsibilities, and support the staff ownership and buy-in of the roadmap. Overall, the engagement will help make the Energy Roadmap ‘real’ for operational staff and connect the dots from the broader strategic steps of the Energy Roadmap to their day-to-day operations with their jobs and tasks. This project is a precedent for multiple other projects.

8. INCORPORATE VEHICLE FUEL AND OPERATIONAL EFFICIENCY

Vehicle fuel use is an area of significant cost and energy consumption. Tampa Bay Water’s fleet, maintenance, and operators can contribute to reducing energy consumption and costs through fuel efficiency and conservation. Through the employee engagement program, Tampa Bay Water should identify a vehicle or fuel use champion to develop fuel consumption goals, standards and programs or alternatives to conserve fuel, energy, and costs. Programs such as revising or creating an Idling Policy (reduce idling) and biofuel vehicle purchases would be developed under this effort. This data could be incorporated into the Energy Consumption Manager to monitor and report on performance.

9. INTEGRATE ENERGY CONSIDERATIONS IN OPTIMIZED REGIONAL OPERATIONS PLAN (OROP)

Tampa Bay Water’s OROP system currently analyzes water resource conditions while optimizing supply to Members in the most environmentally friendly or compliant manner. This forecasting and decision making tool should include energy consumption and considerations in the decision making and forecasts after the environmental and other higher priority constraints and criteria are met. For example, as OROP considers ground water and pumping stations for their contribution to the water supply, the energy consumption of the wellfields and pumps should be evaluated and eventually optimized (in the Optimization Dashboard discussed as project number 11). In addition, within OROP, when multiple water supply sources are selected or identified to meet needs, the energy impacts of each option could provide the additional information needed for the prioritization. Other plant and pump energy considerations could be included to support more informed energy choices in the water supply decisions. Projects number 1 and 5 (Facility Audits and Expansion of the Energy Consumption Model) are likely prerequisites for this project. Project 11 (Optimization Dashboard) will also be related to the OROP outputs and decisions.

10. FORMALIZE AN INTERNAL ENERGY WORKGROUP WITH ROLES AND RESPONSIBILITIES

In support of the Employee Engagement Program, develop an internal energy workgroup to act as the key staff responsible for implementing, managing, and reporting on the Energy Roadmap. This team would be the point of contact responsible for the Energy Roadmap. The team would likely be a group of six to 10 individuals representing the key departments, staff, operations or facilities that are vital to the success of the Energy Roadmap (e.g. Energy Program Manager, water treatment/quality representative, infrastructure representative, senior. management advocate, operations representative, water resources allocation representative, IS/IT representative, finance representative, etc.). Through the
Employee Engagement Program, a team charter would be developed to guide and provide boundaries for the group’s actions, roles, and responsibilities.

11. DEVELOP A COMPREHENSIVE ENERGY AND OPERATIONAL OPTIMIZATION DASHBOARD/PROGRAM

Utilizing the energy data gathered from the Energy Consumption Manager, Tampa Bay Water should pursue developing a comprehensive and dynamic energy optimization dashboard. This dashboard would include the energy operating data for all major facilities, assets or equipment, electric pricing and rate information and system operational criteria to meet all water delivery, customer, and treatment needs at the lowest possible costs. The dashboard would direct Tampa Bay Water’s assets (either directly or indirectly) to operate in an optimal (most cost and energy efficient) manner. For example, the dashboard would direct the Agency when to operate certain pumps or wellfields to meet demand at the least possible energy cost. It also has the potential to identify equipment or operations that could be upgraded to save money, become more efficient, or identify more advantageous electric rates for specific facilities. This project would be a significant pursuit, likely taking 12-24 months to develop for all assets; however, it could be developed in phases for the Agency such as a wellfield. This project is a precedent for multiple other projects.

12. INTEGRATE ENERGY EFFICIENCY INTO CMMS/ASSET MANAGEMENT

There are opportunities to incorporate energy efficiency into current standards, policies, and/or systems such as CMMS and broader asset management to realize cost savings and energy conservation. By including energy efficiency in current maintenance and asset procedures and decisions will immediately result in cost and energy savings. As assets are maintained or reviewed on a preventative maintenance schedule, specific items such as motor age or efficiency could be evaluated and upgraded if it meets the cost and energy savings criteria. The CMMS could also be adjusted to initially identify older assets with a higher probability of cost and energy savings from a replacement or modification. This same strategy should be used in the renewal and replacement program to further identify opportunities in the system to reduce costs and improve efficiency. In expanding the Energy Consumption Manager, the CMMS or Asset Management system could help identify and prioritize the highest probability assets for replacement and upgrade to more efficient equipment. This project is a precedent for multiple other projects.

13. EXPAND STRATEGIC TANK STORAGE THROUGH COOPERATIVE AGREEMENTS WITH MEMBERS

Tampa Bay Water is an “on-demand” drinking water supplier, which services six Member Governments in the Tampa Bay region. Through inter-local agreement, Tampa Bay Water’s demand response is determined by the needs of each of the Member Governments. The water delivery mechanism between each local government varies between bulk water treatment and storage controlled by the customer (e.g. Hillsborough County) and potable water storage and delivery also controlled by the customer (e.g. St, Petersburg).
Energy Roadmap

Working with the Member Governments through cooperative agreements for strategic storage will allow for consistent and uniform decision-making in a complex and dynamic water supply environment. Strategic storage initiatives will facilitate the Agency to predict demand and adjust operations accordingly based on downstream storage capacity. Through coordinated use of downstream storage, Tampa Bay Water and its Member Governments can take advantage of optimized delivery platforms through peak shaving initiatives that utilize the storage to reduce electrical consumption and peak use during high water and power demand time periods.

14. COLLABORATE WITH MEMBERS / CUSTOMERS FOR COMMERCIAL POWER PROVIDERS OUTREACH AND NEGOTIATION

Due to Tampa Bay Water’s position serving multiple local government customers, collaborating with these Member Governments would provide greater opportunities to collaborate with local or regional electric utilities and commercial power providers. In the past Tampa Bay Water has had difficulty generating a collaborative dialogue with local energy providers. By teaming and collaborating with their Members, it would provide a larger customer or electric load base and greater flexibility in approaching local electric utilities about opportunities for load reduction, demand response, efficiency, and rates. In bringing a larger customer base to the local utilities, it would further strengthen the group’s negotiating opportunities. This project is a precedent for multiple other projects.

15. CUSTOMER OUTREACH TO EVALUATE END USE COLLABORATION OPPORTUNITIES

As Tampa Bay Water is an on-demand wholesale water supplier, the Agency has little to no opportunity to influence the end users or water consumption. By collaborating with the members and coordinated outreach to end users, Tampa Bay Water could begin evaluating opportunities to reduce energy use by influencing end users’ consumption. These outreach efforts could be consolidated and coordinated water conservation programs across all member service areas, thus reducing the costs of the programs and affecting more end users or implementing demand response programs that integrate water and electric demand. This project is a precedent for and will influence multiple other projects.

16. WATER-ENERGY NEXUS: INTER-GOVERNMENTAL COORDINATION

Water and energy are closely connected resources. It takes significant energy to convey and treat water while power generation is highly dependent on water availability and resources. The majority of power generation in Florida is natural gas and coal fuels that are highly reliant upon water for steam and cooling. Water – Energy Nexus issues are local, regional, and national in nature while significantly affecting water and electric utilities. The water-energy nexus issues may provide opportunities for Tampa Bay Water to collaborate with other water utilities on a regional scale. Regional electric utilities like TECO and Florida Power and Light also offer opportunities to collaborate on water-energy issues and water supply.
7.6 LIST OF ACRONYMS

CIP  Capital Improvement Program
CMMS  Computerized Maintenance Management System
FMPA  Florida Municipal Power Agency
FP&L  Florida Power & Light
GHG  Green House Gases
GIS  Geographic Information Systems
HVAC  Heating, Ventilation and Air Conditioning
   IS  Information Systems
   IT  Information Technology
kWh  Kilowatt Hours
OROP  Optimized Regional Operations Plan
PLCs  Programmable Logic Controllers
RFI  Request for Information
RFP  Request for Proposals
RFQs  Request for Qualifications
RTUs  Remote Terminal Units
SCADA  Supervisory Control and Data Acquisition
TECO  Tampa Electric Company
VFDs  Variable Frequency Drives