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## HIGHLIGHTS

Highlights of City Auditor Report #0901, a report to the City Commission and City management

### WHY THIS AUDIT WAS CONDUCTED

This audit of the Electric Utility's construction project to repower Hopkins Unit 2 was included in our 2008 Audit Plan. Our audit was conducted during the construction phase of the repowering project and our objectives were to provide assurances and advisory services related to project management activities; report on the project status and accomplishments; and provide an independent assessment of risk management, project controls, project goals, and expected deliverables.

### WHAT WE RECOMMENDED

There are no action plan steps needing to be performed by management in response to this audit report, as the results of our assessment indicated that there were adequate controls in place to minimize risks.

### PROJECT BUDGET AND COSTS TO DATE

Table 1 shows the total encumbered and expended for the project as of September 30, 2008.

**Table 1  
Hopkins Repowering Project Total Encumbered  
and Expended as of September 30, 2008**

Account Description	Total Encumbered and Expended	Percent of Total Project Budget
Contractual Services	\$ 73,649,808	47%
Equipment	\$ 48,216,205	31%
Contract Engineering Services	\$ 14,394,083	9%
Building & Structures	\$ 2,526,770	2%
Supplies	\$ 2,739,895	2%
Salaries, Overtime & Direct Overhead	\$ 1,439,210	1%
Miscellaneous Expenses (1)	\$ 783,486	1%
<b>Totals</b>	<b>\$143,749,457</b>	<b>92% (2)</b>
<b>Total Project Budget</b>	<b>\$156,000,000</b>	

Note: (1) Miscellaneous expenses included office related expenses, rent, insurance, travel and training, legal services, and temporary wages.  
(2) Management expects the project to be completed under budget after all project activities and billings have been finalized.

To view the full report, go to: <http://www.talgov.com/auditing/index.cfm>  
For more information, contact us by e-mail at [auditors@talgov.com](mailto:auditors@talgov.com) or by telephone at 850/891-8397.

October 21, 2008

## AUDIT OF ELECTRIC HOPKINS UNIT 2 REPOWERING PROJECT

*The Hopkins repowering project is 97% completed and has been successful to date; on time, under budget, no safety accidents, and working as intended.*

### WHAT WE CONCLUDED

We are pleased to report to the Commissioners, executive management, and citizens that the Hopkins repowering project has been successful to date (the project is approximately 97% completed). We concluded that project management over the repowering project was very strong, as evidenced by:

- The major construction on Unit 2 was completed without any major medical incidents (i.e., worker accidents).
- To date, the project is currently under the \$156 million budget and management anticipates the project will close under budget.
- Unit 2 started generating power when expected, on June 2, 2008.
- Unit 2 is generating power as expected. The City has been able to produce power for 30% less fuel per kilowatt hour (kwh) plus produce an additional 72 MW.

The Electric Utility utilized a hybrid contract strategy that incorporated best practices from both the fixed price and cost reimbursable strategies of contracting. This strategy provided the project team more control over the quality of the finished deliverables; encouraged the contractor to meet (or even beat) the project schedule; expedited the project schedule by performing multiple project activities in parallel, rather than sequentially; and provided Hopkins employees hands-on operational and maintenance training during the construction.

There are some outstanding items and activities related to specific equipment that need to be completed, including closeout of two major contracts, conversion of fuel tanks to hold diesel (#2 fuel oil), and finish modifications to the grounds and repowered unit during the fall and a planned spring 2009 outage. Management anticipates completing all remaining on-site work and project closeout activities by June 2009.

We would like to acknowledge the full and complete cooperation and support of management and staff from the Electric Utility and project contractors during the audit and development of this audit report.

Office of the City Auditor

# Audit Report



Sam M. McCall, CPA, CGFM, CIA, CGAP  
City Auditor

## Electric Hopkins Unit 2 Repowering Project

Report #0901

October 21, 2008

### Summary

We conducted an audit of the City's Arvah Hopkins Power Plant (Hopkins) Unit 2 repowering project during the construction phase. Based on the results of our audit, we were able to determine that adequate project controls were in place to assure that project activities incorporated project management best practices and complied with City policies and procedures and contract requirements.

Our audit was conducted during the construction phase of the repowering project. Our objectives were to provide assurances and advisory services related to project management activities; report on the project status and accomplishments; and provide an independent assessment of risk management, project controls, project goals, and expected deliverables.

**We are pleased to report to the Commissioners, executive management, and citizens that the Hopkins repowering project has been successful to date (the project is approximately 97% completed). We concluded that project management over the repowering project was very strong, as evidenced by:**

- The construction was completed without any major medical incidents (i.e., worker accidents).
- To date, the project is currently under the budget and management anticipates the project will close under budget. As of September 30, 2008, approximately \$144 million (92%) of the \$156 million budget has been encumbered and/or expended. The Electric Utility utilized a unique overall contracting strategy for the project allowing the City to separately procure major equipment, engineering design services, and

construction services. Additionally, the construction contract was structured as a hybrid, consisting of a fixed component for administrative costs; a cost reimbursable open-book component on equipment, material, and subcontractors (at cost with no mark up); and a shared savings/cost and fluctuating incentive component on the labor component. By structuring the project and construction contract in this manner, management believed they could shorten the overall project length, increase savings and improve the quality of the final product.

- Power started being generated when expected. The unit was commissioned on June 2, 2008 (one day after the project target date of June 1, 2008). Shortly after commissioning, the unit did experience a mechanical failure that was repaired within two weeks. The unit has been operating consistently since June 18, 2008.
- Power is being generated as expected. Hopkins Unit 2 has been incorporated into the City's electric power configuration for power generation as needed. During July and August, the Unit 2 was available to generate power at full load in combined cycle for 99.4% and 100% of each month (higher is better), and actually generated a monthly total of 134,558 megawatt (MW) hours and 138,836 MW hours, respectively. Initial estimates indicated that the City would be able to produce power for 30% less fuel per kilowatt hour (kwh) plus produce a small increase in power.
- There are no action plan steps needing to be performed by management in response to this audit report. Our assessment indicated that there were adequate controls in place to minimize project risks.

Remaining work to be completed in this project includes closeout of two major contracts, conversion of fuel tanks to hold diesel (#2 fuel oil), and finish modifications to the grounds and repowered unit during the fall and a planned spring 2009 outage. Management estimates that all project work will be completed by June 2009.

We would like to acknowledge the full and complete cooperation and support of management and staff from the Electric Utility during the audit and development of this audit report.

### ***Scope, Objectives, and Methodology***

The Office of the City Auditor reviewed the Hopkins repowering project to provide assurance and advisory services related to project management activities to assist Electric Utility management during the project construction phase. This audit was included in our 2008 Audit Plan. Our fieldwork was performed during the period January 1, 2008, through September 30, 2008.

Our objectives for this audit were to:

- Report on the project status and accomplishments as of September 30, 2008;
- Determine compliance with City policies and procedures and contract requirements; and
- Provide an independent assessment of risk management, project controls, goals, and expected deliverables.

Our audit scope included examining selected project management activities during the construction phase. The planning and acquisition phases had already been completed and were not included in our scope. Additionally, the audit scope did not include an evaluation of the adequacy and quality of the engineering design and/or construction of the repowering of Unit 2.

To achieve our objectives, we reviewed key documentation, including City Commission agendas and meeting summaries, project manager periodic status reports and budget reports, contracts, contractor project and financial status reports, support documentation for transactions, and electrical system acceptance documentation. We observed project management meetings with the major contractors, and conducted interviews with the project manager, project team members, contractors, executive management, and other key

City staff with project related responsibilities. We also tested the appropriateness and compliance of project purchases of goods and services.

We conducted this audit in accordance with the International Standards for the Professional Practice of Internal Auditing and Generally Accepted Government Auditing Standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

### ***Background***

#### **Project Phases**

All City capital projects follow similar life cycle phases. The phases related to the repowering project include:

Planning Phase – defining business problems; determining resource needs; identifying risks, costs, and benefits associated with each solution; developing a project plan; and obtaining funding.

Acquisition Phase – developing requests for proposals and evaluation criteria; evaluating proposals; selecting vendors; and negotiating contracts.

Construction (or Implementation) Phase – managing contracts and project staff; procuring equipment and materials; documenting project transactions and all changes to building designs; planning, performing, and documenting acceptance testing; preparing technical and user documentation; and putting the system into production (e.g., “commissioning”).

Post-Implementation Evaluation Phase – determining whether the completed product meets the planned and designed performance requirements; and measuring and evaluating the project successes and challenges (e.g., lessons learned) for future projects.

#### **Electric Utility**

The City started in the utility business in 1902 and is one of over 2,000 public power utilities in the United States. The City serves approximately 112,000 residential and business customers located within a 221 square mile service territory. One of

the City's primary goals in the operation of all of its utilities is to provide reliable, cost-effective, and environmentally sound service to its customers.

The Electric Utility is responsible for operation and maintenance of the City's electric generation, transmission, and distribution systems. The Electric Utility maintains over 2,700 miles of transmission and distribution lines, including 1,600 miles of underground distribution lines, and employs 290 individuals.

The Production Division consists of three electric plants capable of generating a net of 745 megawatts (MW) of power (prior to the repowering project).

- The C.H. Corn facility is a hydroelectric generating plant located 20 miles southwest of Tallahassee on Lake Talquin. The Corn Plant is capable of generating 12 MW of power.
- The Purdom Power Plant (Purdom), originally built in 1952, underwent a major renovation in 2000 to incorporate a "combined-cycle" system using state-of-the-art technology to generate power at a rate 30% more efficient than the City's older generating systems. Purdom Unit 8 uses a system called Combined Cycle Technology, which effectively uses the energy from the burned fuel twice. The Purdom Plant is capable of generating 301 MW of power.
- The Arvah Hopkins Power Plant (Hopkins), originally built in 1971 and expanded in 1977, has two conventional steam generators, each with a boiler and turbine that could produce a total of 304 MW. Additionally, four smaller simple cycle combustion turbine "peaking" units were added (the last two added in 2005) to provide additional power during peak usage times. These peaking units combined can produce up to 128 MW. Prior to the repowering project, Hopkins burned fuel to convert water to steam in two huge boilers. The steam was used to drive two turbines that were in turn connected to power generators

(See Figure 4 on page 5). The plant operates 24 hours a day, 365 days a year under the supervision of a team of engineers and operators who monitor the plant's efficiency and cleanliness. Prior to the repowering project, Hopkins units combined produced up to 432 MW.

The electricity generated at the plants is moved through power lines through the community's transmission and distribution system. This system is made up of a network of high voltage lines and lower voltage lines to deliver usable and safe electricity to businesses and homes.

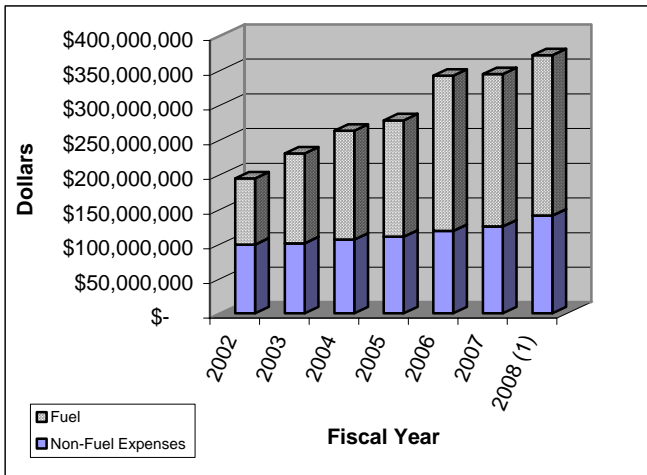
## ***Project Description***

### **The Hopkins Unit 2 Repowering Project**

The City's Electric load forecasters predicted that summer peak demand would grow at a rate of approximately 1.4% over a 20-year planning horizon. Based on this growth rate, the City identified a need for additional capacity to meet the growing customer demand. The purpose of the repowering of Hopkins Unit 2 into a combined-cycle system was to increase the efficiency of the power production, minimize the cost of power to City electric customers, and decrease the environmental impact through reduced emissions. An added benefit with the repowering was additional generating capacity. After the repowering project, Hopkins will be able to generate approximately 72 more MW, bringing Hopkins total net power generation to 504 MW. Unit 2 will also be capable of utilizing either natural gas or diesel (#2 fuel oil). Diesel (#2 fuel oil) is more environmentally friendly and produces less emissions than the fuel currently used, Bunker C (#6 fuel oil).

From FY 2002 through FY 2008 (through August), fuel costs used to generate, purchase, and transmit power represented between 49% and 65% of the total Electric Utility expenses (see Figure 1).

**Figure 1**  
**Fuel Costs and Total Electric Expenses**  
**for FYs 2002 - 2008**



Fiscal Year	2002	2003	2004	2005	2006	2007	2008 (2)
Percent Fuel of Total Expenses	49%	56%	60%	60%	65%	64%	64%

Source: City Accounting Reports

Notes: (1) The total expenses for FY 2008 are budgeted.

(2) Actual expenses through August 31, 2008.

On October 1, 2005, a \$130 million capital project to be allocated across four fiscal years was approved to fund the Hopkins repowering project to convert Unit 2 from a 228 MW conventional unit to a 300 MW combined-cycle generating unit to gain efficiency and fuel savings. Upon completion, Hopkins Unit 2 was expected to operate similarly to Purdom Unit 8. The conversion was to be accomplished by retiring the existing Unit 2 boiler and replacing it with a combustion turbine generator (CTG) and a heat recovery steam generator (HRSG).

On October 17, 2005, the City Commission approved accelerating the first phase of the Hopkins repowering project. The reason for the acceleration was to realize the additional savings as soon as possible. The Hopkins repowering project consists of three phases shown in Table 1.

**Table 1**  
**Project Phases and Descriptions**

Phases	Description of Phase Activities
I	Permitting and preliminary engineering Major equipment procurement
II	Detail design Construction contract award
III	Construction Commission

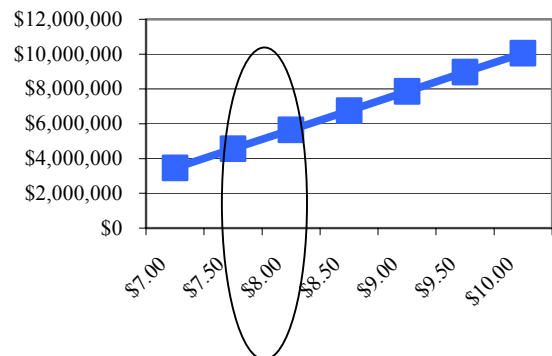
Source: City Commission Minutes

In anticipation of the savings in fuel costs, the City Commission and Electric Utility wished to expedite the repowering project. To accelerate the project, City staff simultaneously procured the major equipment and evaluated construction company proposals while the engineering firm developed the detailed engineering designs. Management estimated that by working on these major elements of the project in parallel, the project completion would be accelerated by approximately 12 months. Additionally, by procuring the combustion turbine generator (the highest cost equipment item, \$26 million) early in the project schedule, management estimated that they saved over \$10 million. The same combustion turbine generator increased from \$26 million in October 2006 to \$39 million in December 2007. Management indicated that the price increase was most likely due to market demand (i.e., more power production projects were in progress needing more generators to be built).

When the repowering is completed, Hopkins Unit 2 will generate power 30% more efficiently than prior to the repowering. Overall operational savings increase when the City’s fuel costs increase and/or production capacity factor increase. As shown in Figures 2 and 3, management estimates that at 30% capacity factor, when fuel is \$8 per BTU (British Thermal Unit), the net savings, considering debt and operation and maintenance (O&M) costs, will be approximately \$5 million annually. [Note: A BTU is a basic measure of heat energy.]

**Figure 2**

**Total Annual Net Savings versus Fuel Cost**  
**(Fuel minus Debt & O&M @ 30% Capacity Factor)**

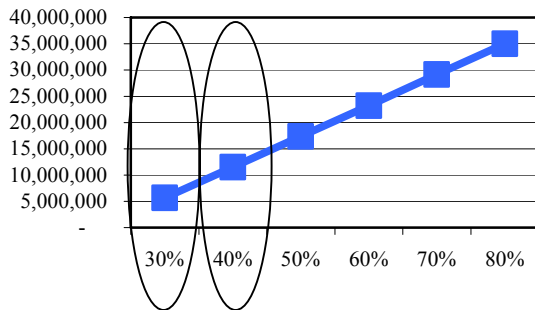


Source: Electric Utility

Additionally, Figure 3 shows that the City expects greater annual savings as the capacity increases (i.e., more power is generated). Electric planners anticipate operating Unit 2 at approximately 37-42% of capacity over the next three years. Management estimates that at 40% capacity, when fuel is \$8 per BTU, the net savings, considering debt and operation and maintenance (O&M) costs, could be approximately \$11 million annually.

**Figure 3**

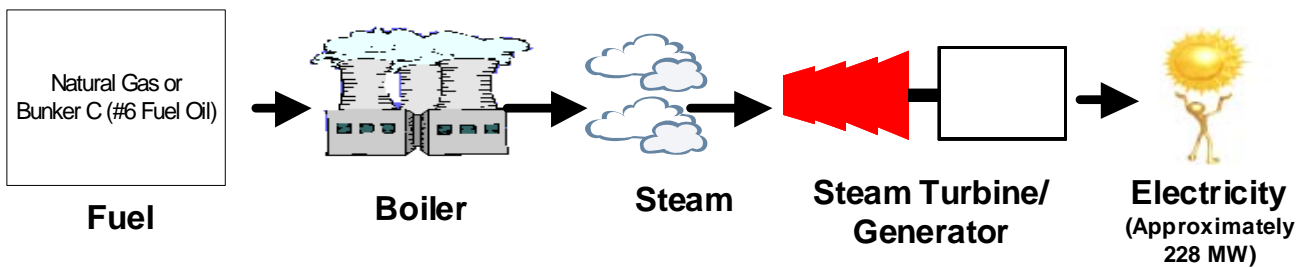
**Total Annual Net Savings versus Capacity Factor**  
(Fuel less Debt and O&M @ \$8 gas)



Source: Electric Utility

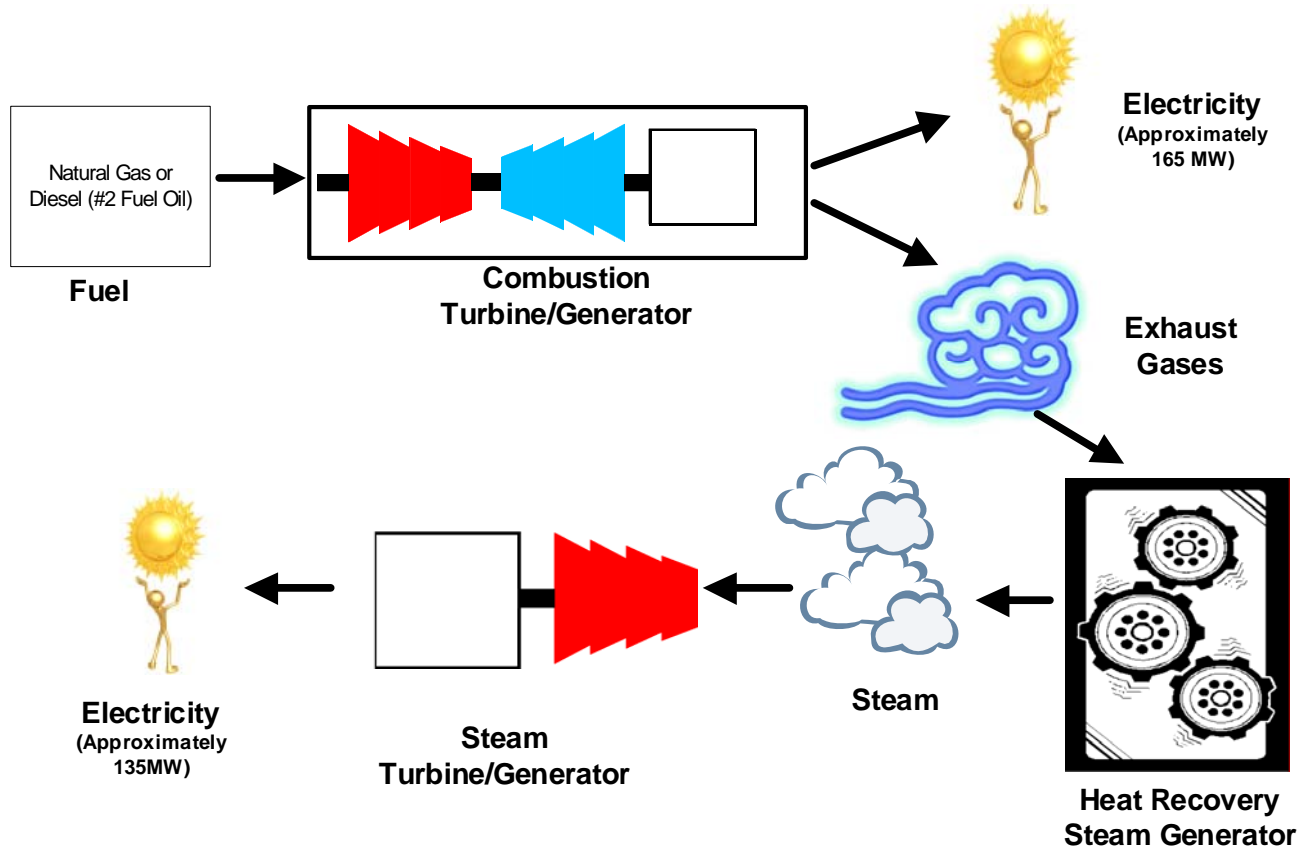
Prior to the repowering project, Hopkins Unit 2 produced power using a conventional steam generation system (illustrated in Figure 4). After the repowering project, Hopkins Unit 2 generates power using a combined cycle steam generation system (illustrated in Figure 5). An additional 72 MW of power can be generated using the same amount of fuel in a combined cycle generator design than in the conventional steam generation design. With the additional 72 MW, the City will be capable of generating a net of 817 MW of power.

**Figure 4**  
**Conventional Steam Generation**



Source: Electric Utility and Audit staff

**Figure 5**  
**Combined Cycle Steam Generation**

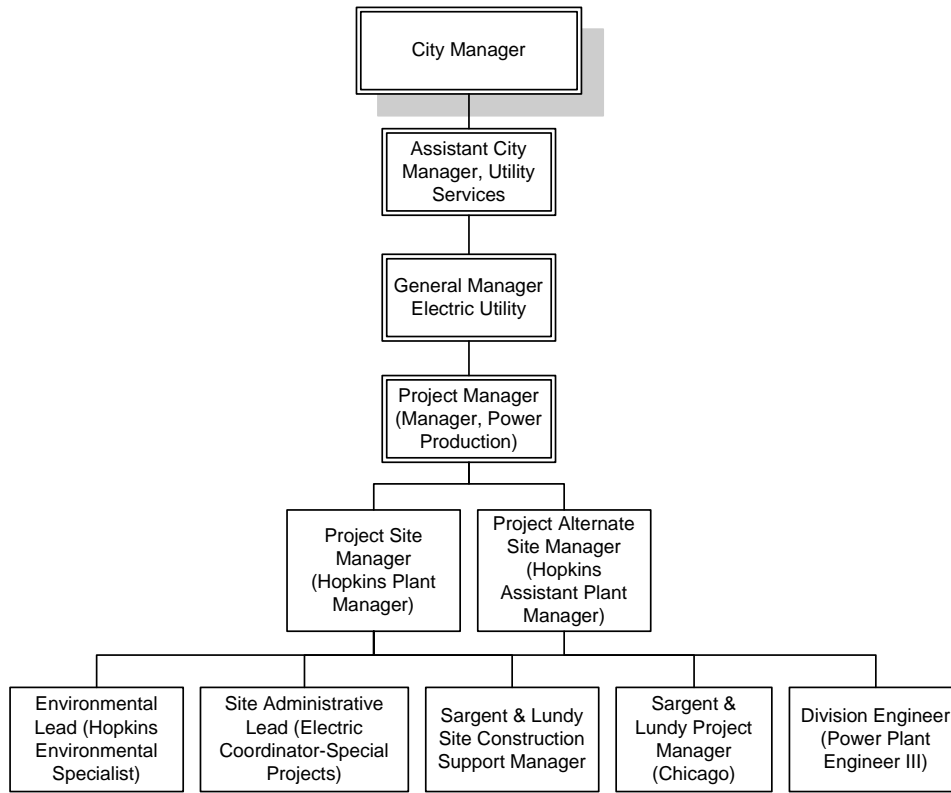


Source: Electric Utility and Audit staff

The repowering project is managed in the Electric Production Division. The Electric General Manager, Assistant City Manager for Utility Services, and City Manager provide executive management oversight. The project team is led by the Electric Production Manager and consists of

Hopkins Plant managers, engineers, administrative coordinator, and contracted Sargent & Lundy consultants providing construction and project support. Figure 6 provides an organization chart of the project management.

**Figure 6**  
**Repowering Project Management Organization Chart**



Source: Electric Utility and Audit Staff

On January 17, 2007, the City Commission approved additional funding of \$26 million for the project, increasing the total project funding to \$156 million. The \$26 million was needed to fund additional equipment replacements that were identified during the engineering design phase and an additional 19% increase in prices over the estimated budget the project was experiencing due to market conditions. Table 2 shows the breakdown of the appropriations for the project, authorized by the City Commission, and Table 3 shows the source of funds for the project.

**Table 2**  
**Authorization of Funding**

Authorization	Amount
FY 2006 Capital budget	\$130,000,000
January 17, 2007 City Commission Meeting	\$ 26,000,000
<b>Total Project Funding</b>	<b>\$156,000,000</b>

Source: City Commission Minutes

**Table 3**  
**Source of Funds**

Source	Amount
2007 Revenue Bond Issue (1)	\$151,000,000
2005 Electric System Revenue Bond Construction	\$ 5,000,000
<b>Total Funds</b>	<b>\$156,000,000</b>

Source: City Financial System

Note: (1) Originally funded from the Future Revenue Bond Fund

Table 4 shows the proposed budget for the project. Over half of the budget (\$80.6 million) is for engineering and construction services and approximately 39% (\$62.3 million) is budgeted for equipment.



**Table 4  
Hopkins Repowering Project Budget**

Description	Amount
Equipment	\$ 62,300,000
Engineering/construction support	\$ 15,300,000
General construction contractor	\$ 65,300,000
General construction contingency and sales tax	\$ 9,500,000
City costs and overall project contingency	\$ 3,600,000
<b>Total project budget</b>	<b>\$156,000,000</b>

Source: Electric Utility

The project utilized over 80 different vendors during the repowering construction. The majority, \$134,380,906 (85%) of the project total of \$156,000,000, was contracted with ten vendors. These ten vendors accounted for 98% of total contracts and as of September 30, 2008, accounted for 94% of all project expenditures and major construction activities and equipment (see Table 5 below).

**Table 5  
Highest Ten Hopkins Repowering Project Contractors as of September 30, 2008**

Contractor	Goods or Services Provided	Contract Amount	Expended as of September 30, 2008
BE&K Construction, Inc.	General construction services	\$ 65,300,000	\$ 62,606,233
General Electric Energy	Combustion turbine generator	\$ 26,670,000	\$ 26,341,464
Nooter Eriksen	Heat recovery steam generator	\$ 15,305,750	\$ 15,263,790
Sargent & Lundy, LLC	Engineering services	\$ 15,282,000	\$ 12,856,659
Powell Electrical System, Inc.	Power distribution building	\$ 3,237,407	\$ 3,144,557
Florida Gas Transmission Company, LLC (1)	Natural gas yard and lateral upgrades	\$ 2,721,714	\$ 2,726,714
Hyundai Heavy Industries Company, Ltd.	Main power transformer	\$ 1,808,090	\$ 1,808,090
BendTec, Inc.	High energy piping	\$ 1,498,309	\$ 1,752,318
Ed Waters & Sons Contracting Company, Inc.	Piling and site work	\$ 1,560,942	\$ 1,527,942
Flowserve Spain, S.A.	Boiler feed pump and drives	\$ 996,694	\$ 995,106
<b>Totals</b>		<b>\$134,380,906</b>	<b>\$129,442,830</b>
<b>Percent of total contracts and expenditures</b>		<b>98%</b>	<b>94%</b>
<b>Total of all Contracts in Project</b>		<b>\$ 136,354,383</b>	
<b>Total project expenditures to date</b>			<b>\$ 137,596,517</b>

Source: Contracts and City Financial System

Note: (1) The payment to Florida Gas Transmission Company was pre-paid. Construction was completed and there is potential for a refund.

The major project contract, as shown in the above table, was with BE&K for the provision of general construction and installation services. This approved contract with the City was unique in that it is a hybrid consisting of a fixed component (includes contractor’s home office support, temporary offices, site security, and consumables); a cost reimbursable-open book component on the equipment, materials, and subcontractors (at cost with no mark up); and a shared savings/cost and fluctuating incentive arrangement on the labor component.

Under the above contracting strategy:

- The City has more responsibility and control for the project.
- The City procured the major equipment.
- The project schedule was compressed by the overlap of the design engineering and the general contractor’s work.
- The City takes the market risk for any cost changes for materials, equipment, and labor rates.
- All of the contractor’s work is done on a cost reimbursable-open-book basis, meaning that staff was able to review and provide input into the decisions that were made.
- The Contractor takes the risk for performance of the contractor personnel and schedule.

- The City and the contractor share savings or additional costs resulting from being over or under the target man-hours. The “target man-hours” for the construction work is set at 372,904, plus or minus scope changes.
- Rather than the general contractor, the City procured the Builders All Risk insurance policy to ensure coverage over construction and commissioning activities.

Management indicated that while this hybrid contracting strategy may involve greater risks than a fixed-price contract, it also has the potential for greater savings and higher quality.

Another step taken to assist in expediting the construction process, the City Commission authorized the City Manager to approve contract

amendments up to a total of \$9.3 million, which represented 20% of the non-firm price portion of the \$65.3 million contract price.

### *Project Status and Accomplishments to Date*

Table 6 provides the total project encumbrances and expenditures as of September 30, 2008. Eighty-seven percent of the total project budget to date consisted of construction and engineering services (47% and 9%) and equipment (31%). As of September 30, 2008, approximately \$144 million (92%) had been encumbered and/or expended in the Hopkins repowering project.

**Table 6**

**Project Encumbered and Actual Expenditures by Account as of September 30, 2008**

Account Description	Encumbered	Expended	Total Encumbered and Expended	Percent of Total Project Budget
Contractual Services	\$ 3,120,146	\$ 70,529,662	\$ 73,649,808	47%
Equipment	\$ 392,744	\$ 47,823,461	\$ 48,216,205	31%
Contract Engineering Services	\$ 2,541,066	\$ 11,853,017	\$ 14,394,083	9%
Supplies	\$ 31,793	\$ 2,708,102	\$ 2,739,895	2%
Building & Structures	\$ 0	\$ 2,526,770	\$ 2,526,770	2%
Salaries, Overtime & Direct Overhead	\$ 0	\$ 1,439,210	\$ 1,439,210	1%
Miscellaneous Expenses (1)	\$ 67,191	\$ 716,295	\$ 783,486	1%
<b>Totals</b>	<b>\$ 6,152,941</b>	<b>\$137,596,517</b>	<b>\$143,749,457</b>	<b>92% (2)</b>
<b>Total Project Budget</b>			<b>\$156,000,000</b>	

} 87%

Notes: (1) Miscellaneous expenses included office related expenses, insurance, travel and training, rent, legal services, temporary, etc.  
(2) Management expects the project to be completed under budget after all project activities and billings have been finalized.

Source: City Financial System

As of August 31, 2008, the project is approximately 97% completed. The repowered Unit 2 was commissioned on June 2, 2008, only one day after the target date of June 1, 2008. Table 7 provides the completed project milestone activities, those

activities remaining to be completed, and the estimated completion month/year.

**Table 7**

**Completed Project Milestones and Remaining Planned Activities**

Month/ Year	Description
<b>Completed Project Milestones</b>	
October 2005	Project funding of \$130 million was allocated. Permitting and preliminary engineering task order completed and approved (Sargent & Lundy).
January 2006	City purchased the combined turbine generator (GE).
March 2006	Detail design task order completed and approved (Sargent & Lundy).
November 2006	Site certification modification approved and piling contractor mobilized and began work.

January 2007	BE&K contract approved. Additional project funding of \$26 million was allocated to cover increase in market prices and added project activities identified in engineering design phase.
February 2007	BE&K mobilized and began construction.
July 2007	Combined turbine and generator delivered by rail (GE).
August 2007	Heat recovery steam generator equipment and materials delivered (Nooter Eriksen).
September 2007	Power distribution building delivered and installed (Powell Electrical Systems).
November 2007	New natural gas lateral and metering station are installed (Florida Gas Transmission).
January 2008	Detail design engineering was completed and approved. BE&K notifies the City they will not meet the March 15, 2008, target date for mechanical construction completion. The target completion date was moved to April 15, 2008. The project team developed contingency plans in case Hopkins Unit 2 was not ready for planned commissioning on June 1.
February 2008	Hopkins Unit 2 removed from service and final conversion work commences. City staff initiated commissioning and start-up activities.
March 2008	City and GE execute a new long-term service agreement for the new combined turbine generator.
April 2008	Main power transformer is energized for the first time.
May 2008	Mechanical completion is achieved by BE&K. Combined turbine generator is started for the first time and then at full load. Combined turbine generator operated in steam bypass mode at full load. Operated in combined cycle mode (combined turbine generator and steam turbine generator) for the first time, and then at full load.
June 2008	June 2 –Unit 2 was commissioned and released for commercial operations. June 3 –Unit 2 was partially damaged due to a mechanical failure and removed from service. June 18 –Unit 2 repairs were completed and it was returned to service. Environmental compliance testing began (must be completed within 60 days of commissioning, August 1, 2008).
July 2008	Environmental compliance testing was completed successfully. Combined turbine generator met performance standards (GE). City and GE conducted contract closeout meetings and finalized the contract. Heat recovery steam generator met performance standards (Nooter Eriksen). City began negotiating contract closeout with BE&K.
<b>Remaining Planned Activities</b>	
October 2008	City will conduct contract closeout meetings with Nooter Eriksen (heat recovery steam generator) and Sargent & Lundy (engineering and project consulting services).
October 2008	Convert the older oil tanks to hold diesel (#2 fuel oil) for the turbine generators (they currently hold Bunker C (#6 fuel oil)).
February 2009	Remove Hopkins Unit 2 from service for approximately six weeks and replace some temporary parts that were used in order to begin service in June, including modifying blades in the steam turbine to address some temperature issues.
March 2009	GE needs to complete some rework, including preparing the unit to receive diesel (#2 fuel oil) after the oil tanks are converted.
By March 2009	Install a concrete slab that can support a large crane for future maintenance work.
By June 2009	Finish painting Hopkins Unit 2.
By June 2009	Complete other miscellaneous work that was postponed in order to begin service in June including adding more support stairwells and platforms, and expanding the grating.
By June 2009	Sell or dispose of remaining unnecessary and leftover equipment, materials, and supplies.

Source: Electric Utility

Lastly, the old Hopkins Unit 2 equipment that was replaced and is no longer being used will need to be dismantled and disposed of. Currently, the dismantling of the older equipment is not in the project scope. Electric Utility management indicated that they would request approval and funding through a separate capital project in the near future or request an amendment to add these activities to the scope of the current project.

### Project Goals

Electric Utility management's four goals for the Hopkins repowering project are in line with the goals of the Electric Utility. As of September 30, 2008, the Hopkins repowering project has met, or is meeting, all of the project's four goals. Table 8 lists the four goals applicable to this project and the determination as to whether the goals were met.

**Table 8**  
**Project Goals and Status**

Project Goal	Description	Met?
Safety	To complete the project in a safe manner, and not have any major medical case accidents or lost time due to accidents.	Yes (1)
Schedule	To have the unit in a dispatchable mode (i.e., to rely on the unit to meet customer demand) of operation on or before June 1, 2008.	Yes
Cost	To complete the budget at or under the current approved budget of \$156 million.	Yes (1)
Product	The final product meets performance expectations related to the quantity and efficiency of MW generated and level of environmental emissions.	Yes (1)

Note: (1) As of September 30, 2008.

Source: Electric Utility and City Financials System

The success of the project as of the end of September 30, 2008, can be summarized as follows. There were no major medical accidents or lost time due to accidents. Hopkins Unit 2 was commissioned on June 2, 2008. The project is currently under budget and is projected to continue to be under budget when the project closes in June 2009. Management will evaluate the final product performance when all outstanding items have been completed (see the remaining planned activities in Table 7 on pages 8 and 9).

### ***Project Management Controls and Compliance with Policies and Procedures***

The most important factor influencing the outcome of a major construction project is how the project is managed. The City has two prevalent policies and procedures related to construction project management, Administrative Policy and Procedure #630, "Internal Control Guidelines" and City Commission Policy #218, "Capital Projects." These policies provide guidance to managers regarding basic controls and procedures that should be incorporated into project management processes.

Table 9 provides a listing of those relevant policies, controls, and project management practices, and a description of how management has incorporated the control into the project processes. Additionally, we indicated whether the control was in place. A "√" indicates the control was in place and the activity was completed. A "◆" indicates the control was in place to date and activities are on-going.

**Table 9**  
**Policies, Procedures, Controls, and Practices  
for Managing Major Construction Projects**

Relevant Procedures & Controls	Status/Comments
<b><i>Administrative Policies &amp; Procedures (APP) #630, "Internal Control Guidelines" and City Commission Policy #218, "Capital Projects"</i></b>	
There is direct activity management – including clear communication regarding team members' roles and responsibilities, staff accountability, approving work at critical points.	√ Project team members are assigned responsibilities and are involved in relevant meetings. The project manager was on-site overseeing construction activities and was directly involved in daily decision-making, authorizing changes, and approving vendor invoices.

<p>Management compares actual performance (i.e., expenditures, funding) to budgets and forecasts, and tracks major initiatives to measure the extent to which targets are being reached.</p>	<p>√ The project manager regularly compared budget to actual performance using cost and schedule reports provided monthly by BE&amp;K (general contractor). Example reports included costs by project accounts, labor man-hours worked, and cable and piping installed; and planned project schedule to actual status. Additionally, the project manager monitored costs associated with scope changes and rework that would be back-billed to the respective contractors.</p>
<p>Transactions and events relating to processing deliverables and contract payments are properly executed, classified, and recorded in a timely manner.</p>	<p>√ We selected a sample of 12 transactions, 7 randomly selected, and 5 judgmentally selected. Many of these 12 transactions consisted of multiple purchases. Overall, the 12 transactions totaled \$12,223,396 and represented 11% of the \$107,758,748 expended (in 2,427 total transactions) as of February 8, 2008. We determined that all transactions processed through the project management team materially complied with City policies and procedures and were properly executed, classified, and recorded in a timely manner.</p> <p>√ Additionally, testing activities were performed by “acceptance teams” (consisting of Sargent &amp; Lundy, BE&amp;K, and City project team members) to thoroughly test each identified subsystem within the overall operations of Unit 2 to ensure that the construction and equipment performed as expected prior to acceptance of the individual deliverables and the overall completed construction of Unit 2.</p>
<p>Key duties and responsibilities in authorizing, processing, recording, and reviewing transactions and events should be segregated among individuals to reduce the risk of error or inappropriate actions. No one individual should control all key aspects of a transaction or event.</p>	<p>√ Based on our understanding and review of the processes and testing of sampled transactions, the procurement processes implemented during this project utilized a proper segregation of duties related to authorizing, approving, and recording transactions, receiving goods and services, making payments, and reviewing transactions.</p>
<p>Equipment, inventories, securities, cash, and other assets should be secured physically (by location, tagging, restricted access), and periodically counted and compared with amounts shown on control records.</p>	<p>√ The construction site, located within the fenced and locked compound at the Hopkins Power Plant, housed all major equipment and assets for the project. BE&amp;K provided gate security to monitor all deliveries and workers entering and exiting the premises. There were a few minor security breaches at the construction site that prompted the project team to install security cameras and increase monitoring on the grounds during holiday weekends. Overall, the security was adequate to protect the site, equipment, materials, and supplies.</p>
<p>On-going monitoring should be performed to ensure that employees, in carrying out their regular activities, obtain evidence as to whether the system of internal control is continuing to function.</p> <p>Department Director, or designee, shall encompass facilitation and oversight of project completion and management, execution and monitoring of project appropriation, opening, encumbrance, expenditure, transfers, supplemental appropriations, purchases, contracts, change orders, balance</p>	<p>√ There was evidence to support that the project manager and project leads were monitoring the project activities, work quality, schedules, expenditures, contract requirements, and disposal of replaced equipment and materials. Additionally, there was evidence to support that the executive management, consisting of the Electric General Manager, Assistant City Manager for Utility Services, and City Manager, provided oversight during the project.</p> <p>√ The project manager is working with the Procurement</p>

<p>activities and project closing to effectively complete projects in the timeliest manner.</p>	<p>Director and Warehouse Supervisor to sell and dispose of unnecessary leftover equipment, material, and supplies.</p> <ul style="list-style-type: none"> <li>◆ There are still some outstanding items related to specific equipment that need to be completed (see the remaining planned activities in Table 7 above). Management will be able to determine whether these deliverables meet the expected deliverables when all products (equipment installed and services provided) in the project are completed.</li> </ul>
<p>Reviews should be made of actual performance versus budgets, forecasts, and prior periods. Major initiatives are tracked to measure the extent to which targets are being reached.</p>	<p>√ The project manager regularly compared budget to actual performance using monthly reports, scope changes, and rework that would be back-billed to the respective contractors. Additionally, as the construction began, the project manager communicated status, issues, and accomplishments.</p>
<p>Department directors are responsible for ensuring that all aspects of their projects comply with City policies and legal requirements, and that funds are expended for that which the project was intended.</p>	<p>√ Our audit scope included examining project activities during the construction phase. Our audit procedures and testing indicated that procurement transactions during the project complied with City policies and procedures. Additionally, there is evidence to support that the City has taken steps to be in compliance with environmental laws and requirements.</p>
<p>Department directors will be responsible for prohibiting deficits in their respective projects' total budget. Action should also be taken by department directors to avoid deficits in sub-projects and to correct them in a timely manner if they occur.</p>	<p>√ The project manager closely communicated with executive management regarding issues that impacted the budget throughout the project. The project has not exceeded the allocated budget and management expects to complete the project under budget.</p>
<p>Department directors will be responsible for maintaining project completion dates on a current basis. This provides for a monthly review and update of project reports to ensure that no project is beyond its completion date as reflected in the PeopleSoft Financial System.</p>	<p>√ The project manager managed the overall project schedule. The construction schedule was managed by BE&amp;K, with updates made regularly. The construction schedule was monitored closely by the project management team and discussed during weekly construction status meetings.</p> <p>√ The project manager provided monthly updates on the construction progress. These updates included accomplishments during the month, photographs showing progress, and potential issues and the steps being taken to attempt to resolve the issues. For example, at one point the project team informed executive management that the commissioning date may need to be postponed due to delivery delays of major equipment being manufactured in Boston, Brazil, and England. The updates addressing these potential delays also included the steps project management was taking to monitor the manufacturers on-site by project team members and/or local consultants, and contingency plans in case the issues were not resolved.</p>
<p>Department directors will be responsible for ensuring the use of change order forms or contract amendment documents to fund change orders to contracts. The use of purchase orders as a device for contract change orders is prohibited.</p>	<p>√ The project manager, project site managers, and administrative lead closely managed change orders within the project. Executive management was notified of all proposed major changes and appropriate approvals were obtained for cost increases.</p>
<p>When the Commission approves a contingency for a project, the City Manager may authorize non-scope change orders up</p>	<p>√ The commission authorized the City Manager to approve contract amendments not to exceed \$9.3</p>

<p>to the amount of the contingency. Any proposed non-scope change orders exceeding this amount shall trigger the need for Commission approval.</p>	<p>million, 14% of the \$65.3 million contract with the major contractor, BE&amp;K Construction.</p> <p>To date, the total amendments to the BE&amp;K contract have not exceeded the \$9.3 million, and the City is in negotiations to close out the BE&amp;K contract within the originally budgeted \$65.3 million.</p>
<p>Internal Control requires the design and use of adequate documents and records to help ensure the proper recording, design, and use of transactions and events.</p>	<p>√ Sargent &amp; Lundy managed documentation control related to construction design and major project construction meetings. BE&amp;K managed documentation control for the official accounting activities. The City project team had access to all documentation, project and accounting, at all times. Additionally, the project administrative lead reviewed and maintained documentation related to all contract payments, and project manager and site managers maintained meeting notes for future reference during the project.</p>
<p>Performance indicators that related different sets of operating or financial data to one another should be periodically analyzed.</p>	<p>√ Performance criteria to measure the success of the project were developed that tied in directly to the Electric Utility Departmental performance measures. The measures related to 1) safety, 2) schedule, 3) cost, and 4) product. As described in this report, page 11, the project is meeting three of these measures to date and will re-evaluate all measures when work is completed and the project is finalized.</p>
<p>Department directors or their designees to serve as managers of their respective capital projects. This responsibility shall encompass facilitation and oversight of project completion and management, execution and monitoring of project appropriation, opening, encumbrance, expenditure, transfers, supplemental appropriations, purchases, contracts, change orders, balance activities and project closing to effectively complete projects in the timeliest manner.</p>	<p>√ The designated project manager was the Electric Power Production Manager. The project manager provided on-site management and monitoring over all construction and contract activities with the assistance of the project team members (consisting of Sargent &amp; Lundy consultants and City staff skilled in the areas of engineering and accounting). Examples of these activities included assessing and managing project risks, monitoring contract deliverables (timing, cost, and quality), monitoring the project budget, managing and monitoring change orders, communicating with executive management, and facilitating contract close-out activities with major contractors.</p>
<p><b>City Commission Direction</b></p>	
<p>At the January 17, 2007 City Commission meeting, commissioners “requested that the staff emphasize the Commission’s desire to use local suppliers and manpower as much as possible, and that the staff keep track of that and attempt to meet the local goals and MBE expectations.”</p> <p>Two of the major contracts required MBE involvement, Sargent &amp; Lundy (\$15.2 million contract for engineering services) and BE&amp;K (\$65.3 million contract for construction services).</p> <ol style="list-style-type: none"> <li>1) Sargent &amp; Lundy’s MBE goal was 5,000 hours of engineering services (hours were used instead of dollars for their MBE goal). Due to Sargent &amp; Lundy being located in Chicago and the special skills and experience associated with designing power plants, Sargent &amp; Lundy was approved by the City’s MBE Office to achieve their MBE participation using firms in the same city as Sargent &amp; Lundy’s home office in</li> </ol>	<ul style="list-style-type: none"> <li>◆ Measuring the MBE participation for each of the firms required by contract to utilize MBE firms is still in process. Typically, contractors declare their participation by providing affidavits indicating their participation with each MBE firm. The City holds their last payment to the contractor until the MBE affidavits are received and verified.</li> </ul> <ol style="list-style-type: none"> <li>1) Sargent &amp; Lundy - reported they used 7,355 hours of engineering services from MBE firms in the Chicago area (this has not yet been verified by MBE Office).</li> <li>2) BE&amp;K – as of July 1, 2008, BE&amp;K reported that they had expended \$7.1 million (and \$7.7 million committed) for materials, equipment, and services from seven MBE vendors in the local (four county) area (this has not yet been verified by MBE Office).</li> </ol>

<p>Chicago, Illinois.</p> <p>2) BE&amp;K's MBE goal was \$4.17 million.</p>	<p>The MBE Office indicated that they would verify the MBE participation with the respective vendors when they receive the affidavits from each contractor.</p> <p>√ Regarding supporting local businesses, BE&amp;K reported, as of July 1, 2008, they expended over \$10 million for local materials, services, and rental equipment. While a process was in place to verify MBE involvement, there is not a process in place to verify the reported extent that local suppliers were utilized. Therefore, the amount reported has not been and will not be verified by City staff.</p>
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Table Legend:     √   Control in place and activity completed

◆   Control in place to date; activity is on-going

## Conclusion

Our report described the repowering project phases, strategies, and activities; communicated the project's status and accomplishments as of September 30, 2008, and known subsequent events; and evaluated the status of the project's goals and expected deliverables.

Based on our audit of the project's construction phase, we concluded that there were adequate project controls in place to assure that the project activities complied with City policies and procedures and contract requirements and incorporated project management best practices.

We are pleased to report to the Commissioners, executive management, and citizens that the Hopkins repowering project has been successful to date (the project is an estimated 97% complete). We concluded that project management over the project was very strong, as evidenced by the construction being completed without any major medical incidents, and Unit 2 was operating as expected, when expected, and within the cost expected (the project is currently under budget and estimated to be completed under budget).

Our assessment of project controls indicated that there were adequate controls in place to minimize project risks, therefore, there are no action plan steps needing to be performed by management in response to this audit report.

Additionally, we agreed with Electric Utility management that the hybrid contract strategy seemed to incorporate the best practices from both the fixed price and cost reimbursable strategies of contracting. The project manager felt that the hybrid contracting strategy worked best for this project. The hybrid strategy used:

- 1) Provided City project team more control over the quality of the finished deliverables since they were responsible for managing the overall project, not a contractor.
- 2) Encouraged the contractor to meet and even beat the project schedule by introducing labor cost-sharing provisions in the contract.
- 3) Expedited the project schedule by simultaneously contracting to have the major equipment built to the City's specifications while receiving and evaluating construction proposals (a fixed price contract would have performed these tasks sequentially, rather than parallel).
- 4) Provided Hopkins employees the opportunity to learn how the repowered unit operates during the project making them more knowledgeable during operational and maintenance activities.

We would like to acknowledge the full and complete cooperation and support of management and staff from the Electric Utility and project contractors during the audit and development of this audit report.

## Appointed Official's Response

### **City Manager Response:**

I am pleased to see the positive results of the recent audit for the Hopkins Unit 2 Repowering project. This major project provides immediate and significant benefits to our electric utility customers through reduced fuel costs as a result of the increased efficiency of the generating unit. As one of the largest construction projects in the City's history, having the project completed on time, under budget, with no major safety incidents and meeting the project objectives is a testament to the



dedicated staff of our electric utility. In what may be a historic accomplishment by itself, I am especially pleased to see that no action items were identified during the course of this audit. In a time where many believe that government cannot effectively manage major projects; this audit report

confirms the commitment of our government to fiscal responsibility and management of complex projects. I want to thank the Auditor's staff for conducting this audit while the project was ongoing to provide a real-time review of the overall project activity.



This picture shows the majority of the constructed equipment added to repower Hopkins Unit 2.

Copies of this Audit Report #0901 may be obtained from the City Auditor's website (<http://talgov.com/auditing/index.cfm>) or via request by telephone (850 / 891-8397), by FAX (850 / 891-0912), by mail or in person (Office of the City Auditor, 300 S. Adams Street, Mail Box A-22, Tallahassee, FL 32301-1731), or by e-mail ([auditors@talgov.com](mailto:auditors@talgov.com)).

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