UTILITY COMMITTEE
A G E N D A

NOVEMBER 25, 2013 - 5:00 P.M.

CITY HALL COUNCIL CHAMBERS
15 LOOCKERMAN PLAZA
DOVER, DELAWARE

Public comments are welcomed on any item and will be permitted at appropriate times. When possible, please notify the City Clerk (736-7008 or e-mail at CityClerk@dover.de.us) should you wish to be recognized.

AGENDA ADDITIONS/DELETIONS

1. **Electric Supply & Generation**
   - **A. McKee Run Units 1 & 2 - Cost/Benefit Analysis**
   - **B. VanSant Generating Station Capacity Increase - Cost/Benefit Analysis**
   - **C. Purchase Power Agreement - Calpine**
   - **D. Discussion - Joint Agreement with the Delaware Municipal Electric Corporation (DEMEC) for New Generation**

2. **Adjournment by 5:55 p.m.**

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THE AGENDA ITEMS AS LISTED MAY NOT BE CONSIDERED IN SEQUENCE. THIS AGENDA IS SUBJECT TO CHANGE TO INCLUDE THE ADDITION OR THE DELETION OF ITEMS, INCLUDING EXECUTIVE SESSIONS.

Cost/Benefit Analysis for City of Dover

McKee Run Units 1&2

Prepared by: Robert Trinnear

11/08/13

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Introduction

- PJM provides multiple revenue sources for electric generators.
- Dover relies on two primary sources of revenue from PJM to maintain and operate its generation fleet:
  1. Energy Payments
  2. Capacity Payments

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Energy Payments

- Dover's McKee Run units are older and less efficient than the average unit in PJM
- This means that it costs Dover more to produce a single megawatt-hour when compared to other generators
- For this reason, the McKee Run units do not generate electricity very often
  - Only in times of high energy prices within PJM
  - Typically when loads are high and/or other generation is unavailable
  - Dover's existing units are a physical hedge to potentiality high energy market prices

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Capacity Payments

- HOWEVER, Dover's generation units are still valuable as capacity resources
  - Capacity = **capability to produce** electricity when needed, whether or not electricity is produced
- When Dover generating units participate in the PJM capacity market:
  - PJM makes capacity payments to Dover
  - Dover has an obligation to insure its generating units are available when dispatched by PJM

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Capacity Market - Introduction

- In order to understand how and why PJM pays Dover for its Capacity, it's helpful to understand the basics of the PJM capacity market
- PJM must ensure that it has adequate generation capacity to meet the combined peak load, plus reserves, of Load Serving Entities (LSEs) within PJM
- To accomplish this, PJM administers a capacity market

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Capacity Market - RPM

- PJM clears the auction using its Reliability Pricing Model (RPM)
- Capacity auctions determine
  - The price that the LSEs will pay to fulfill their capacity obligations and
  - the price that generators will be paid for committing their capacity to PJM
- The prices are locational
  - Dover historically pays and gets paid a premium based on the physical limitations of PJM's grid serving the Delmarva Peninsula

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Capacity Market – How Does it Work?

- Three types of participants in the capacity market:
  1. **Load Serving Entities (LSEs)** - PJM requires each LSE to purchase enough capacity from the market to meet its peak obligation
  2. **Suppliers** – those with installed or planned generation must offer their resources into the capacity auction
  3. **Demand Resources** - customer owned generation and interruptible load
- Dover is both an LSE and a Supplier

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Capacity Market – Dover as a Generator

- Dover is paid the RPM auction clearing price for every MW of generation that it has available (currently 175MW total)
- Dover's Capacity Price has averaged $141 per megawatt-day (MWd) since the 2014/15 planning year
  - **Average annual capacity revenue for Dover:**
    175(MW) X 365 (days) X 141 ($/MWd)
    = About $9,000,000/year
  - **To obtain that revenue, Dover spends an average of $7,700,000 on Operating, Maintaining and Improving its generation fleet**

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Capacity Market – Dover as an LSE

- As a Load Serving Entity in PJM, Dover has an obligation to provide (or purchase) its share of capacity
- Dover generally participates as a buyer in the PJM capacity auction
- Dover is budgeted to pay PJM $15.8M for capacity in FY 2013-14

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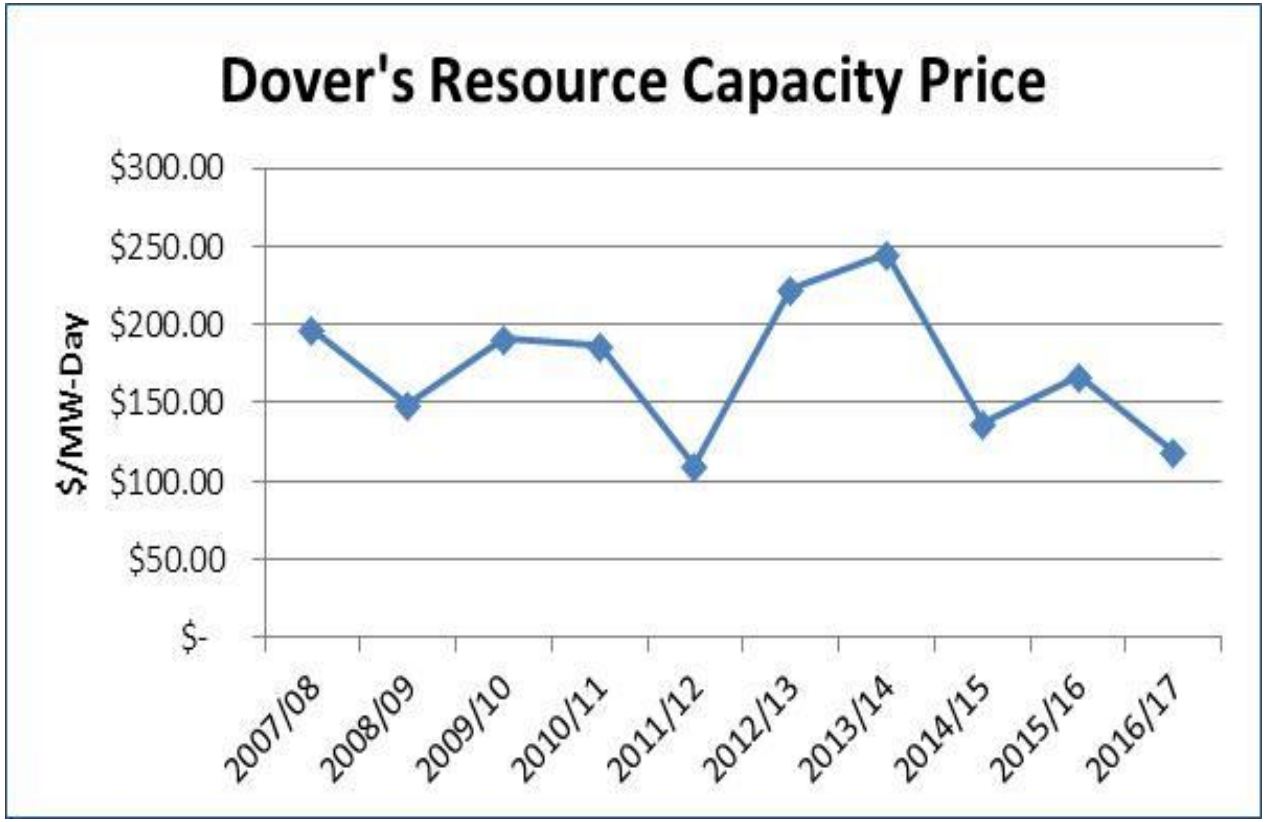
Capacity Market – Timing Risks

- PJM's capacity auction is held each May for a one year planning period that begins 3 years in the future
  - In May 2014, PJM will conduct a capacity auction for June 1, 2017 – May 31, 2018
- Generators are committing that their units will be available 3 - 4 years from the auction date
- Given the age of Dover's units, capital improvements will be required to ensure that the units will be operable 4 years beyond the auction date

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Capacity Market – Price Risks

PJM's capacity market prices swing wildly from year to year



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Current Situation

- Dover will need to make significant capital investments in McKee Run units 1 & 2 to insure their continued operability
- Capacity prices faltered in the last three auctions
  - The most recent year was significantly less than the auction clearing price for 2013/14 in Dover's Capacity Zone

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Capacity Market – Operational Risks

- Generators must ensure that the units will be able to produce electricity when called upon by PJM
  - Requires trained & experienced staff all-hours
  - Requires maintenance & renewals (capital improvements)
- Failure to maintain operational status results in the utility having to replace its capacity in subsequent auctions (or from other sources) and having to pay a penalty for non-performance
  - While well-maintained, the age of Dover's McKee Run Units 1 and 2 (approx. 50 years old) means this risk of operational failure is always increasing

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Current Situation (cont.)

- Insurer-recommended turbine overhauls of Units 1 and 2 are estimated to cost *at least* $2.7M (Included in Dover's five year capital improvement plan for FY2017/18)
  - There's a chance that these could be needed sooner if problems arise
  - This cost estimate can change significantly, depending on what is discovered during inspection
  - The turbine overhauls are in addition to other capital improvements planned for Units 1 and 2 (~$1.4 million over the next five years)
  - It is uncertain what the impact on insurance premiums will be if this work is deferred

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Decision Timeline

- PJM's next capacity auction for the Planning Year 2017/18 opens on May 7, 2014
- Units 1 and 2 are already committed to PJM through May 31, 2017
- Next auction would commit them to PJM through May 31, 2018
- Dover is required to notify PJM by December 1, 2013 if it is considering not offering Units 1 and 2 into the capacity auction for 2017/18 planning year

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Decision Methodology

- Estimate total cost of keeping the units active over a projected timeframe
  - Include Base Case
  - Average 5 year Capital Cost Scenario
  - Average 10 year Capital Cost Scenario
- Estimate what savings (if any) would be realized if Units 1 and 2 were retired or mothballed (mothballing or decommissioning cost have not been considered in this evaluation)
- Calculate target capacity price that will keep the units revenue positive

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Decision Methodology (cont.)

- Estimate likelihood that PJM capacity prices will meet or exceed target price over the projected timeframe
- Consider qualitative inputs as well:
  - Depth of market: Can PJM sustain the loss of these units in the (usually) constrained area?
  - Alternatives for supply (PJM auction, contracts with other suppliers)
  - Regulatory uncertainty in the RPM market design (FERC has started an investigation under Docket AD13-7)
  - Long-term plan for the Utility
  - Other?

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Assumptions

- McKee Run Unit 3 & VanSant Unit 11 will continue to be operated and are therefore not considered in this study
- Capital improvement dollars are shown in the year that the work is planned to be completed by the operator
  - This is based on the limitation that PJM's capacity market clears one year at a time

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Base Case

- Base Case Description:
  - Known Capacity Revenue through May 31, 2017
  - Projected *incremental* operating costs for Units 1&2 (2012 projection) – escalated by 3% annually
  - Planned Capital Improvement Projects – Dover 5 year plan

Dover Capacity Study McKee Runs Units 1&2	BASE CASE					
	2014/15	2015/16	2016/17	2017/18 Est	Average Annual Cost Using 5 Year Levelized Capital Cost	Average Annual Cost Using 10 Year Levelized Capital Cost
Capacity Revenue	$ 1,693,965	$ 2,078,179	**$ 1,476,790**	**$ 1,476,790**	**$ 1,476,790**	**$ 1,476,790**
Operating Costs	$ (927,704)	$ (955,535)	$ (984,201)	$ (1,013,727)	$ (1,013,727)	$ (1,013,727)
Capital Costs	$ (52,000)	$ (578,750)	$ (246,500)	$ (2,847,375)	$ (773,175)	$ (478,675)
Net Cash Flow	**$ 714,261**	**$ 543,893**	**$ 246,089**	**$ (2,384,312)**	**$ (310,112)**	**$ (15,612)**
Unit 1 and 2 Break Even Capacity Price ($/MWd)	**$ 78.94**	**$ 123.63**	**$ 99.17**	**$ 311.13**	**$ 143.99**	**$ 120.26**
Actual Capacity Prices	**$ 136.50**	**$ 167.46**	**$ 119.00**	**Unknown**	**Unknown**	**Unknown**

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Base Case - Findings

- Break even capacity prices:
  - ~$124/MWd (2015/16)
  - ~$99/MWd (2016/17)
  - ~$311/MWd (2017/18)
- 2016/17 Capacity Auction Price
  - ~$119/MWd (2016/17)
- 5 & 10 year Average Capital Cost Scenario
  - ~$144/MWd – 5 year
  - ~$120/MWd – 10 year
  - Smooth out elevated capital cost in 2017/18
  - Exceeds last Capacity price of $119/MW-Day
- Note: Turbine overhauls would typically be performed every 10 – 15 years on units operated like Units 1 & 2

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Conclusions

- McKee Run Units 1&2 will be cash flow negative for 2017/18 capacity year
- Smoothing out major capital cost in 2017/18 still results in a breakeven capacity price that exceeds the latest capacity price
- Operational risks are not insignificant
  - Forced Outage this summer
- Increased Capital Cost Risk
  - Once open up machine

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Recommendations

- Short-term: Do not offer Units 1 & 2 into PJM's capacity auction for the 2017/18 delivery year
- Rationale:
  - Current projection of capital improvements and operating expenses result in a strong negative cash flow in the known years
  - TEA has low confidence that the next auction will clear above Dover's break even amount

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Recommendations

- Perform a comprehensive analysis that lays out all the decision options for City of Dover
  - Complete a similar analysis on other parts of the generation portfolio
  - Survey all supply options
    - new generation projects in/around Dover
    - PPA opportunities

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Cost/Benefit Analysis for City of Dover
UPDATE

VanSant Generating Station
Capacity Increase

October 29, 2013

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Background

- VanSant Capacity Increase Project proposed in December 2011
- McHale & Associates retained to evaluate 8 technology options
- Initial economic analysis eliminated high capital cost options and indicated reasonable payback ratios for various inlet cooling options
- $1,500,000 was included in FYE 2014 - 2016 capital budgets

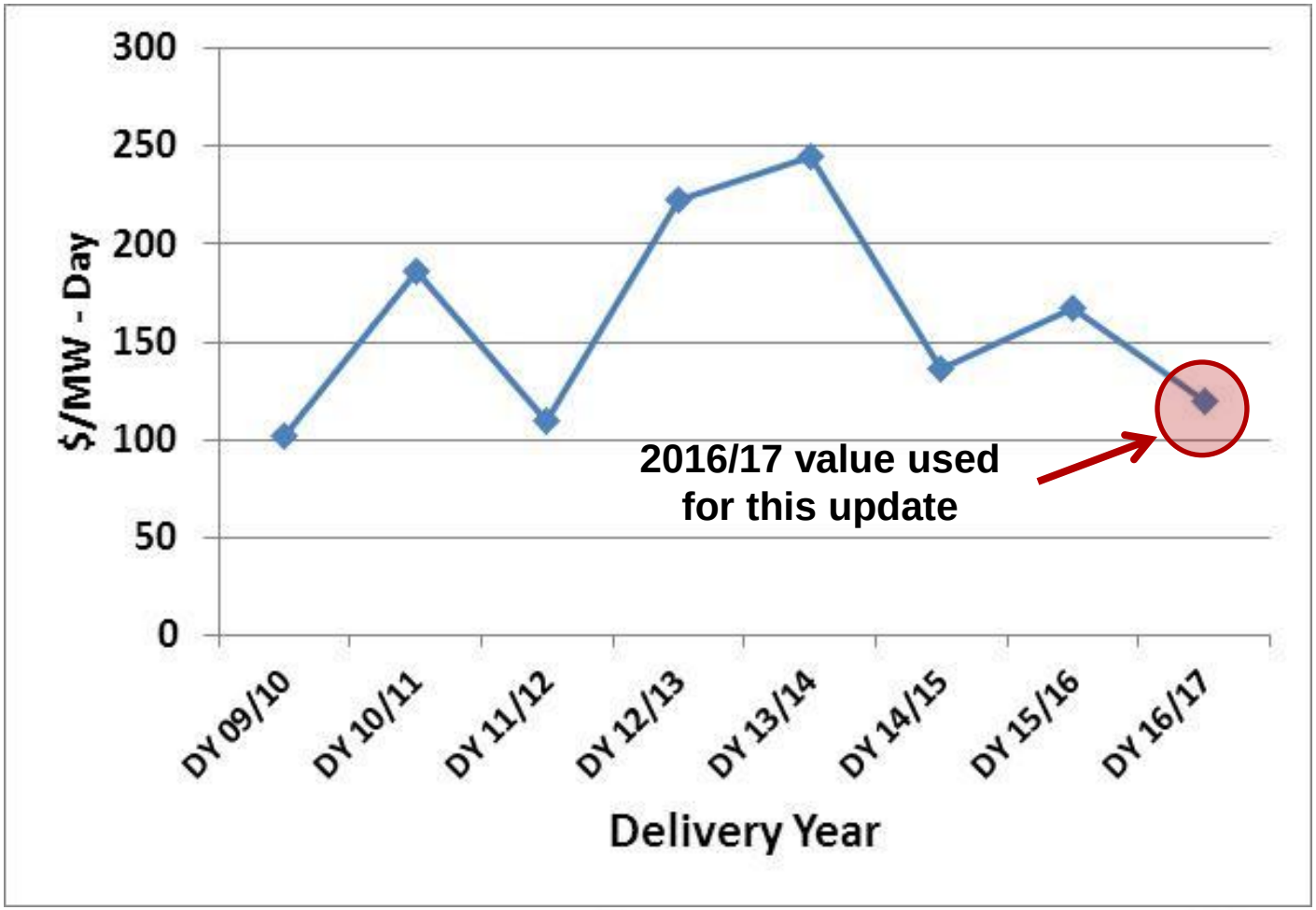
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What Has Changed

- Dover/NAES are preparing to commit to expenditures for permitting and PJM interconnection requirements assessments
- PJM Capacity Auction results for 2016/17 released May 24th, 2013
- Auction clearing price was significantly below assumptions used in original economic analysis

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PJM Base Residual Auction Clearing Price History - DPL South Zone



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Why are Capacity Prices Lower?

- Little load growth in region
- Capacity additions – more supply

  (e.g. Calpine's Garrison Energy Center)
- Transmission improvements relieving congestion
- Increased capacity resources from outside PJM included in auctions
- Increased participation from Demand Side Resources

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Summary of Updated Economic Analysis

UPDATED ANALYSIS USING 2016/2017 PJM CAPACITY CLEARING PRICE							
				Using Estimated PJM Capacity Payments Only		Using Estimated PJM Capacity and Energy Payments	
	Alternative	Summer Capacity Increase (MW)	Capital Cost ($000)	Average Annual Net Return on Investment ($000)	Payback Ratio (Years)	Average Annual Net Return on Investment ($000)	Payback Ratio (Years)
2	Evaporative Coolers	1.9	$294	$83	4.6	$103	2.8
3	Inlet Fogging	2.0	$840	$87	12.2	$110	7.6
4	Wet Compression @ 0.5%	3.7	$1,498	$162	10.7	$216	6.9
6	Wet Compression @ 1.5%	6.0	$1,498	$261	6.3	$360	4.2

PREVIOUS ANALYSIS (March 2013)							
				Using Estimated PJM Capacity Payments Only		Using Estimated PJM Capacity and Energy Payments	
	Alternative	Summer Capacity Increase (MW)	Capital Cost ($000)	Average Annual Net Return on Investment ($000)	Payback Ratio (Years)	Average Annual Net Return on Investment ($000)	Payback Ratio (Years)
2	Evaporative Coolers	1.9	$294	$171	1.9	$172	1.7
3	Inlet Fogging	2.0	$840	$178	5.2	$184	4.6
4	Wet Compression @ 0.5%	3.7	$1,498	$333	4.8	$365	4.1
6	Wet Compression @ 1.5%	6.8	$1,498	$605	2.6	$697	2.1

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Observations

- Using 2016/17 Capacity Auction Clearing Prices, expected payback ratios have increased significantly
- The planned wet compression project payback ratio has increased to 6.3 years without any energy production and to 4.2 years with a 10% annual capacity factor

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Recommendation

- Continue to proceed with project implementation
- Reassess economics……
  - After bids for project installation are received
  - Before submitting offer into PJM 2017/18 capacity auction on May 12, 2014
    - (PJM to be notified of intent to bid in Units 1 & 2 by March 1, 2014)

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Risks

- Actual capacity increase will be less than estimated
- Capital cost is greater than estimated
- PJM capacity market prices decrease further
- PJM's exemption for self-supply is eliminated before 2017/18 auction

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Decision Timeline

- Decision to upgrade VanSant can be made anytime in the future
- Dover should not bid the incremental capacity into PJM's BRA until it has committed to the project and will be able to complete the project for the appropriate BRA capacity year
- If Dover commits to project and appropriate approvals are received, total time to construct estimated by McHale:
  - Chiller: 14 months
  - **Other inlet cooling methods: 4 months**
  - Heat recovery options: 15 – 21 months (plus permitting time)

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Next Steps
Assuming Dover Decides to Construct Project

- Submit interconnection request to PJM (10/31/2013)
- Submit application for permit review (Consultant retained)
- Develop & issue bid documents (McHale retained)
- Select best bid and submit recommendation to City Council for approval
- Execute Contract
- Contractor:
  - Order & receive materials
  - Schedule labor
  - Install system
  - Test system

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