EUORAB 2

STAFF REPORT

ANALYSIS OF POWER SUPPLY ALTERNATIVES

June 10, 2008

Following the initial presentation of the Power Supply Study prepared by Burns & McDonnell, staff has begun to analyze various future options for the electric utility.

The challenge before us is to determine how we can best meet our future energy and capacity needs. The current capacity of our power plant totals 153 MWs. Given that Unit #7 is over 41 years old, the first question is how to best maintain this base load capacity.

Current estimates reflect the need for an additional 25 MWs of capacity over the next 17 years (2025). Therefore, the second question is how to best satisfy this future growth in demand for electricity.

Attached is a list of options, estimated costs, and the pros and cons associated with each alternative for meeting our projected energy and capacity demands. The first page lists options to maintain the existing 153 MW of capacity. The remaining pages list options to cover future growth.

Option Discussion – to meet **current** requirements (Keeping Unit 8, How do we meet our existing requirement?)			
Option/Activity	Cost (20 years)	Pro	Con

Purchase 40 MW **Ownership** from Sutherland 4 Unit – the project is more commonly called the Marshalltown Project. Alliant Energy is leading a group of utilities to build a new 650 MW coal-fired. Estimated in-service date is 2013.	Estimated to be $2,850 per KW capital cost or $114,000,000 plus interest . . . energy costs $0.02 per kWh or $126,144,000
	
	(Have not included possible transmission costs.)
		o 25% more efficient than Ames' existing generation
		o New plant
		o Lower operating cost
		o Reduced NOx, SO2, Hg, CO2
		o Increase generation reliability due to separate power sources, separate coal contract/delivery
		o Energy prices relatively low and fairly stable
			o Obligation to pay entire capital up front before 1 kWh is produced
			o Risk that plant will not get permitted/built
			o Contract signing required within 30 days
			o Deliverability study will not be completed for over a year.
			  o May not have firm delivery
			  o May require additional transmission investment
			o Earliest on-line 2013
			o Large rate increases to meet up front capital demands ($114,000,000 needed in first 5 years)
			o Plant not under COA control
			o Only covers existing, still need additional 25 MW

Power **Purchase Agreement** for 40 MW from Sutherland 4 Unit – (see above)	Estimated Demand Cost $20/kW-month or $192,000,000 over 20 years . . . . energy costs $0.02 per kWh or $126,144,000
	
	(Have not included possible transmission costs.)
		o (same as all above)
		o Risk removed if plant is not built
		o No up front cash needs
			o Long lead time for plant could leave us 4 years behind on capacity solution if plant ends up not getting built
			o Will cost more in the long run than ownership, and yet will have less to show for it when term of agreement is done
			o Deliverability study will not be completed for over a year.
			  o May not have firm delivery
			  o May require additional transmission investment
			o Earliest on-line 2013
			o Plant not under COA control
			o Only covers existing, still need additional 25 MW
			o Contract signing required within 90 days

Unit #7 **Maintenance**	Cost: < $5,000,000 . . .energy costs $0.035 per kWh or $220,752,000	o Relatively low cost	o May need to meet future EPA guidelines o Does not provide any new capacity o Fuel delivery and storage costs higher than options above o Little/no life left after 20 years

Option Discussion – to meet **future** requirements Supply Side Keep unit 8, and 40 MW from either unit 7 or Sutherland purchase			
Ownership 10-20 MW from Sutherland 4 – (see above)	Estimated to be $2,850 per KW capital cost or $28,500,000 - $57,000,000 plus interest energy costs $0.02 per kWh or $31,536,000 – $63,072,000	o (same as above Sutherland options on page 1) o Not all eggs-in-one basket o Reduced rate shock o Accommodates future capacity needs o Mitigates/improves some coal delivery and coal costs.	o (same as above Sutherland options on page 1)
Power **Purchase Agreement** 10-20 MW from Sutherland 4 – (see above)	Est. Demand Cost $20/kW, or $48,000,000 to $96,000,000 energy costs $0.02 per kWh or $31,536,000 – $63,072,000	o (same as above Sutherland options on page 1) o Not all eggs-in-one basket o Reduced rate shock o Accommodates future capacity needs o Mitigates/improves some coal delivery and coal costs.	o (same as above Sutherland options on page 1)
Install/Purchase 25 MW Combustion Turbine generation –	Estimated to be $1,000 per KW capital cost or $25,000,000 plus interest energy costs **(mkt purchase)** $0.059 per kWh or $129,210,000	o Lower cost method to meet capacity needs o COA control o Backstop for weak transmission system o More environmentally acceptable than coal o May be designed to burn alternative fuels (renewable)	o Sighting/permitting required o Higher energy costs, plan to run very little o Energy prices volatile o May require routing of new gas line o Still has some CO2 footprint o "front loading" of capital investment o Capacity installed in one piece
Unit # 7 Repower – Replace existing boiler with "high pressure" add front end turbine	Cost: Estimated $50,000,000 plus interest energy costs $0.03 per kWh or $47,304,000	o Gain approx. 15 MW to meet future capacity needs o Enhance value of existing generation o New boiler	o New Source Review Requirements – Permitting uncertainty o Same coal issues
Use Capacity/Energy Market – Perform a Request for Proposal to sign long term contract for capacity and/or energy	Cost: TBD	o Simple & straight forward	o Sellers market, may not be available or too costly o Typically longer the term the higher the price o Difficult to get a fixed price

Install/Purchase more Wind (Renewable) generation – exceed EUORAB directive to supply additional 10% of COA electrical needs though renewable generation	Estimated energy cost in the 0.055/kWh range Or at 10 MW at 35% availability over 20 years $33,726,000	o Environmentally sound o Could be "local" generation o Typical pricing based on output and may not require capital investment o Could offset carbon foot print, CO2 o Valuable renewable Energy Credits	o Most prominent type of generation is wind o Non-dispatchable o Typically not available at high peak periods o Long lead times on turbines and sighting studies o Purchase of too much wind, centered at one sight could cause dispatch problems with coal generation o No/little new capacity
Improve existing plant efficiencies – Look for efficiencies within the power plant support systems to reduce auxiliary energy consumption.	Study cost: $50,000 Capital/Operating budget additions: TBD	o Make more of the plant output available for sales o Modernize equipment o Low cost "capacity"	o Need to study payback o Limited to < 2.0 MW peak reduction
Energy Storage	Cost: ?	o Uses off peak to charge/available on peak o delay new on peak generation	o New technology, unproven
Diesel Engine/Generator	$700/kW energy costs (mkt purchase) $0.059 per kWh or $129,210,000	o Add capacity incrementally o Used units available o Low capital investment o Relatively simple installation	o Multiple projects o Energy costs extremely high if operated, so energy purchased from open market o Increase in carbon footprint when operated

Option Discussion – to meet **future** requirements Demand Side Keep unit 8, and 40 MW from either unit 7 or Sutherland purchase			
DSM, Rate Design, Time of Day Rates – Purchased/produced energy costs are not directly reflected in the rates COA charges. TOD rates can send pricing signals to consumers to encourage behavior changes through the pocketbook.	Rate Study - $40,000; Meter replacement - $2,200,000	o Effective method of changing electric use habits through incentives o Closer link between energy cost and rate o Gives some cost control in the hands of the consumer o Encourages the development of new DSM programs	o Will take multiple years to implement o Difficult to determine full impact prior to implementation of the program o Rate Design should be done after a cost of service study o Public Perception of the rate o Must be willing to set a high disincentive rate for critical periods
DSM – Rate Design, Demand based on kVa rather than kW – Provide price incentives for "demand" customers to correct power factor.	Cost of Service Study - $75,000; Rate Design $75,000	o Can be part of a system-wide rate study o Eliminates artificial level of "ok" power factor o Can be matched up with DSM capacitor bank rebate o	o Will require educational campaign for customers o Requires study to determine correct rate to encourage customer facility modifications
DSM – Rate Design, Interruptible Rates – Provide an incentive for a customer to curtail energy usage at time of COA peak through a temporary shift in work pattern or use of peaking generation.	TBD – Through customer/Utility discussions the program could be structured to meet both parties needs	o Puts some cost control back in the hands of the consumer. o Rate(s) could be customizable to meet the needs of the customer	o Limited customer base for which this program will work. o Effectiveness uncertain o Rules would need to be clearly defined, penalty for failure to comply o Good rate design should be completed after a Cost of Service Study
DSM – Create Electric Efficiency Consulting Services – Extension of "The Energy Guy" who's role is to work with customers to find specialized project to reduce peak/use electricity more wisely	$100,000/year; part of utility savings used to pay costs	o Further enhance DSM efforts o Greater relationship between Utility and large Customer base o May expand into Water efficiency o Perceived potential for effectiveness is great	o Actual effectiveness subject to desires of the customer base – implementation can be supported with good rate design and DSM dollars o Effectiveness uncertain o Lot of Staff Time
New Generation Technologies; distributed Generation – Fuel Cells, micro turbines, solar	Cost: ?	o Can create customer/utility partnerships o Extend services provided into heat/hot water (high efficiencies) o Increased value from fuel source o Match added capacity to demand growth	o Highly specialized program (engineering & economics) o Labor/staff intensive to market, design, implement o Limited in potential kW reduction

STAFF RECOMMENDATIONS FOR NEXT STEPS:

- Invest in maintenance of Units #7 and #8 to prepare for long-term operation.
- Issue Request For Proposal (RFP) for new coal delivery service
- Initiate discussions/negotiations with Alliant Energy regarding a possible Power Purchase Agreement for capacity & energy (less than 25 MW) from the newly proposed Sutherland 4 Plant to determine costs and risks associated with this option
- Perform a Transmission Study to determine the feasibility of receiving energy from outside sources (Sutherland 4 Plant, wind farm, or other purchased power)
- Pursue participation in wind/renewable/biofuels generation with the Iowa Municipal Utilities Association and/or other entities (at 33% availability, need 26 MW installed to meet 10% goal in 2015).
- Issue a Request For Proposal (RFP) for capacity and/or energy from a source other than the newly proposed Sutherland 4 Plant (short or longer term)
- Expand "Prime Time Power" program (expand to small commercial entities and require for all new construction or if receiving incentives under one of our demand-side management programs)
- Continue aggressive Demand Side Management
- Explore for opportunities with larger customers for the possibility of distributed generation
- Perform "Cost of Service" Study/ Rate study (estimated 3 year process)

  -Time Of Use Rates

  -Interruptible Rates

  -Specialized Rates (to capture unique qualities of select customers)