Executive Summary

Introduction

In May of 2006, the BWL released its second integrated resource plan (IRP). The 2006 IRP was based on data through 2005 and examined the BWL's need for additional electric generating resources given the advanced age and the increasing difficulty of meeting air emissions regulations at the Eckert plant. The 2006 IRP recommended that the BWL "further evaluate the option of adding some new generating facilities over the next 10 years." This IRP follows up on that 2006 recommendation and also recognizes the unexpected strong increases in energy growth recently experienced by the BWL and the rapid changes occurring in the electric utility industry. These changes, along with additional information regarding the potential cost of maintaining the Eckert units, prompted staff to undertake this IRP update.

The overall goal of comprehensive electric energy planning is to assure that the BWL will have sufficient resources over the planning horizon to provide its customers with safe, reliable power at affordable rates while managing future risks and uncertainty. A reliable, affordable source of electric generation is essential to the economic vitality and welfare of the Lansing community. Electricity played a major role in development of manufacturing facilities that fueled Lansing's economic progress in the 20th century. Today, electricity continues to fuel the region's economic growth. Major data centers, financial firms, and other new service industry participants as well as traditional industrial customers make up Lansing's evolving twenty-first century economy. The recent sale of the BWL's Ottawa Street Generating Station exemplifies Lansing's economic transformation. Originally constructed to supply electric energy to Lansing's growing manufacturing economy in the 1940s and 1950s, it will soon be the home of the Accident Fund Insurance Company of America. Firms of the 21st century rely more than ever on a reliable and competitively priced supply of electric power. Major data centers can consume nearly as much electricity as an automobile assembly plant and new uses for electricity that could not have been anticipated even 15 or 20 years ago, like cell phones, plasma televisions, iPods, also contribute to the need for a growing and reliable supply of electricity. Although annual growth of electric use today is far from the 5 to 10% figure experienced in the 1940s and 1950s as Lansing's manufacturing base grew, growth continues at a modest rate. For

example, the BWL's annual electric sales growth was an unexpectedly rapid 4% in 2007 over 2006, despite a continued sluggish economy in the mid-Michigan region. By contrast, our long-term energy sales growth forecast is 1.4% annually.

IRP Methodology

This integrated resource plan update represents a comprehensive planning process, evaluating a broad set of resource options while analyzing future risks and uncertainties.

Extensive modeling served as the foundation for the plan's recommendations. Modeling began with development of a Base Case, which encompassed forecasts of demand and energy growth, fuel price escalation rates, resource costs, air emission regulatory compliance costs, wholesale market prices and other important factors. Several sensitivities and scenarios that incorporate additional resource options, like energy efficiency, and that adopt alternate forecasts for important modeling variables, such as high fuel costs or low demand growth, were also developed and analyzed. In total, 37 separate scenarios and sensitivities were examined, and each one created over 1,000 possible future resource plans to meet the BWL's generating requirements. From among all the plans produced by each scenario and sensitivity was a least-cost plan. Analyzing the resources in common among the least-cost plans from each scenario and sensitivity provides planners with valuable information on which resources can assure both affordable rates and minimize exposure to future risks. This best set of resources served as the basis for staff's recommendation in this IRP.

Ventyx, a widely recognized energy consulting firm, was retained to perform the modeling for the plan. The Firm used its Strategist model, a powerful dynamic programming model, as its principal analytical tool. The Strategist model analyzed thousands of potential resource plans over a twenty-year period to identify the least cost plan for each scenario and sensitivity.

The planning process involved four steps:

(1) Determine the BWL's future resource requirements through a long-term forecast of the BWL's annual peak demand and energy sales, and an assessment of whether the BWL's generating assets can meet the future requirements
(2) Compile an inventory of resource options that can be used to meet future generating needs
(3) Develop scenarios and sensitivities to evaluate future risks and uncertainties, and perform electric generation modeling
(4) Recommend a resource plan to meet future BWL electric generating needs

Determine the BWL's Future Resource Requirements

For modeling purposes, we have adopted a 14% planning reserve margin. This margin has been adopted by the Planning Reserve Sharing Group (PSRG) as the planning reserve margin required for electric reliability in this region of the country.[1] All members of the PSRG, which includes the BWL, are required to maintain this reserve margin. The need to maintain this reserve margin, together with a long-term annual energy growth rate of 1.4% and a peak growth rate of 1.6% cause the BWL to need additional short-term generating capacity in 2016. Additional longer-term generating capacity is required to maintain electric reliability and stable electricity prices with the retirement of the Eckert Generating Station units, beginning in 2017.

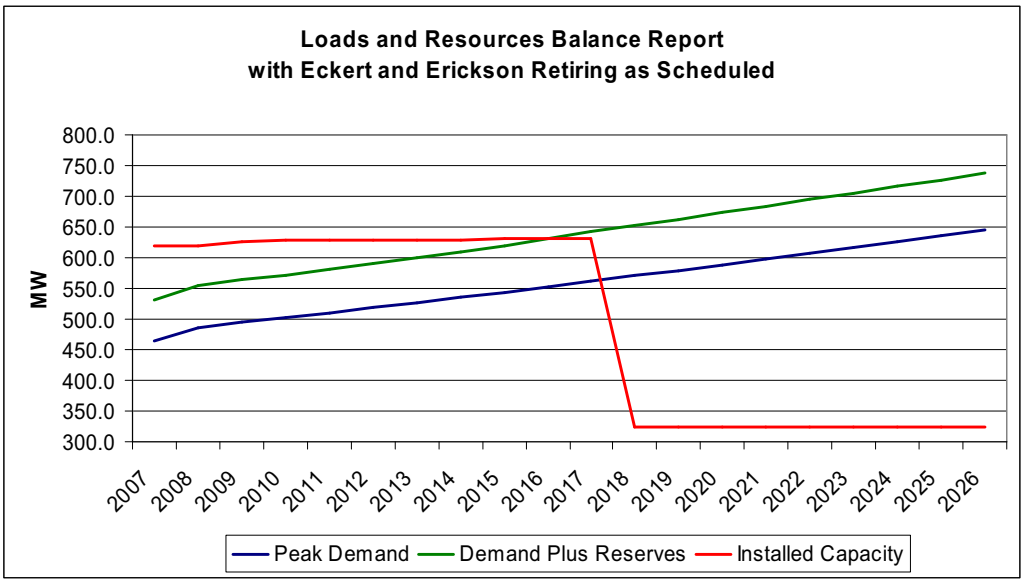
The BWL's inventory of generating resources includes six units at the Eckert plant totaling 350 MW's of capacity, the Erickson generating station with 165 MW's of generating capacity, 150 MW's of capacity from Detroit Edison's Belle River generating station, and approximately 26 MW's of renewable energy and black start capacity owned or controlled by the BWL. The older Eckert units are now over a half-century in age and are operationally inefficient. These units were originally expected to be in service for 40 years, but have continued to serve the BWL long after their intended service lives. However, rising operation and maintenance costs along with the expense of complying with air emissions regulations have caused us to assume that units 1-3 will be removed from service in 2017. We have also assumed that units 4-6 will require

[1] The PSRG was created to meet Reliability First Standard Bal-502-RFC-01 and is administered by the Midwest Independent System Operator (MISO).

approximately $260 million (2007 dollars) in environmental investments by 2017 to remain in service.

The BWL's future needs are shown in Figure 1 below. From this chart, it is evident that additional generating capacity will be required beginning in 2016, when the BWL's generating capacity is expected to fall below required reserves.

Figure ES1 – Loads and Resources Balance Report



Compile Resource Options

To meet future needs, the BWL could construct a traditional central station generating plant, undertake energy efficiency and load management programs, acquire additional renewable energy, purchase capacity from the Midwest wholesale market, or acquire any combination of these options. For this study, we have undertaken a major modeling effort to forecast both capacity and energy prices in the Midwest wholesale market. Purchasing from this market is one alternative strategy to constructing generation. We have included all these options in this IRP in order to determine which set of resources best meets future BWL resource needs.

Develop Scenarios and Sensitivities

In order to investigate the cost and risk tradeoffs among various resource options, the staff developed several scenarios and sensitivities. The scenarios and sensitivities were intended to evaluate risks associated with (a) demand growth, (b) air emissions costs, (c) construction cost escalation, and (d) natural gas price escalation. We also included a scenario in which we assumed that other municipal utilities might partner with the BWL in a new generating plant. This type of partnership lowers the cost and risk of new plant construction for the BWL's customers. To accomplish this scenario, we have added hypothetical municipal loads and resources to the BWL's loads and resources. Scenarios were also included to estimate the impact of future greenhouse gas (GHG) regulations on the BWL and the cost of relying on market purchases of capacity and energy to meet future BWL generation needs.

The results of the scenarios and sensitivities indicate that energy efficiency options can lower the total cost of meeting generation needs. Numerous modeling efforts performed in Michigan have demonstrated the important role that this option can play in meeting customer needs and managing future risks.

All scenarios and sensitivities select additional baseload generation as the least cost method of replacing the Eckert plant. Reliance on natural gas generation results in costs that are more than 5%, or $120,000,000, higher than the baseload option over a twenty year period on a present value basis. This amount, however, masks the much larger cost differential that occurs after 2017. Because the higher cost of natural gas generation doesn't occur until after 2017, when a new unit is needed, the present value calculation makes the higher cost of natural gas generation appear more modest than it will actually be in those later years.

If the BWL does nothing and relies on market purchases of capacity and energy, the cost would be 15%, or $341,486,000, higher than building a baseload replacement for Eckert, over a twenty year period on a present value basis. As with the natural gas option, this present value number masks the larger cost impact of reliance on market purchases after 2017. In 2018, for example, the cost of relying on wholesale market purchases is projected to be 34% higher than constructing a baseload replacement for the Eckert units.

All scenarios and sensitivities, except one, include a greenhouse gas (GHG) tax beginning in 2013. Although it is difficult to predict the exact outcome of current GHG legislative initiatives, proposed federal legislation as well as Governor Granholm's support for GHG controls through the Michigan Climate Action Council make it likely that some form of GHG controls will be imposed within the planning horizon. Since the largest volume of greenhouse gas is emitted as CO_2, and electric generating plants comprise the largest stationary source of CO_2 in Michigan, it is prudent for the BWL to plan for this contingency. Carbon comprises approximately 70% of the coal burned in the BWL's generating stations.[2] Therefore, the impact of a GHG tax on the BWL could be substantial.

For comparison purposes, the analysis included one model run comprising all Base Case, conditions except no GHG tax was assumed to be imposed for CO_2 emissions during the planning period. The twenty-year present value revenue requirements of the no-GHG tax scenario was nearly $1 billion, or 55%, less than the Base Case with a GHG tax. While it is impossible to determine the precise financial impact of future GHG legislation on the BWL at this time, it is, perhaps, the most important planning contingency facing the BWL and the electric industry today.

Major Findings

- Annual electric energy growth is forecast to be approximately 1.4% annually
- Annual peak electric demand is forecast to be approximately 1.6% annually
- The BWL's resources are presently sufficient to maintain reliability and provide competitively priced electricity
- Additional electric generating capacity will be needed in 2016 to meet reliability requirements
- Total costs are lowest when energy efficiency programs are added to the resource mix
- All scenarios and sensitivities select new baseload construction with the retirement of the Eckert units
- It is not cost-effective to undertake a large investment program to keep Eckert units 4-6 in operation after 2017

[2] On a dry weight basis

- Wholesale market prices are forecast to continue increasing over the planning horizon, and relying on this market raises the cost of providing electricity and exposes BWL customers to significant risks
- Future costs vary widely from scenario to scenario, but the most significant future cost exposure arises from potential greenhouse gas regulations, and proposed GHG legislation creates a strong disincentive to continue operating older units, like the Eckert plant.

Recommendations

The use of scenarios and sensitivities along with extensive modeling serve to provide valuable insight and information on the impact of likely future events on the BWL's electric operations. This information serves as a guide in formulating a plan to meet the BWL's future generation requirements.

Based upon the results of our planning process, we recommend a bold and innovative plan to provide competitively priced electricity and protect the BWL's ratepayers from future cost exposure resulting from GHG, other environmental cost increases, fuel cost increases, wholesale market prices and other planning risks.

In the near term, we recommend the BWL undertake comprehensive energy efficiency and load management programs to meet reliability needs, which should satisfy the need for short-term peaking generation or the purchase of short-term capacity from the market in 2016. Together with an expanded renewable energy program, we recommend that the BWL develop programs to meet all of its future electricity growth with energy efficiency and renewable energy options.

With the retirement of the Eckert units, we recommend that the BWL construct a replacement baseload plant. Further, we recommend the development of a hybrid biomass/coal baseload facility. Co-firing a new, more efficient generating plant with biomass will help reduce its GHG emissions, and limit the BWL customers' exposure to future GHG costs. This plan also protects customers from other air emissions regulations and future fuel cost escalation. The best technology for meeting this goal is a circulating fluidized bed (CFB) plant. A CFB plant can burn a wide variety of fuels, including biomass, to produce electricity. In order to realize economies of scale and minimize financial risk, we recommend inviting other municipal utilities

to participate in the new baseload facility. Depending on how many municipal utilities may choose to invest in a new BWL plant, we anticipate a need for 350 MW's (250 MW's for the BWL, 100 MW's for other municipal utilities) of capacity at the new unit.

Given the long lead times necessary to permit and construct a baseload unit, we recommend that the permitting and pre-construction work begin immediately. Based upon current experience, a new plant would be operational approximately the same time that the Eckert units are retired from service.

One goal of this plan is to set the BWL on a path to reduce its GHG emissions in order to comply with likely future GHG regulations. Our recommendations are expected to reduce the BWL's CO_2 emissions significantly by 2025. This plan will provide protection from GHG costs and may actually provide an opportunity to realize revenue through the sale of carbon credits, depending on the final form that GHG regulations may take. A reduction in GHG by 2025 will present a major challenge for the BWL. Nevertheless, considering the potential exposure presented by GHG regulations and the options available to the BWL, staff believes that this goal is realistic for planning purposes.