

Needs For and Alternatives To

APPENDIX 4.1

Manitoba Hydro Generation Planning Criteria

This page is intentionally left blank.

Manitoba Hydro Generation Planning Criteria

Manitoba Hydro's generation planning criteria provides the basis for determining when new resources are required to ensure an adequate supply of capacity and energy for Manitoba.

The purpose of the generation planning criteria is to determine what quantity of resources is required to meet the forecast demand, including the determination of the quantity and the timing of any resource additions. In applying the generation planning criteria, only physical generation and load parameters are considered. Economic parameters (the capital and operating costs of the generation resources) are not considered in this stage. Hence by applying the generation planning criteria one can determine the quantity of resources that is required to meet the forecast demand - a process also referred to as resource adequacy analysis. The selection of the type or particular mix of generation resources is a separate process that occurs once the quantity and the timing of any resource additions have been identified.

Manitoba Hydro's generation planning criteria is stated in Manitoba Hydro Policy G195, Generation Planning. The generation planning criteria consists of two components, both of which must be satisfied. First, there is a capacity criterion which is used to determine the minimum quantity of generation capacity required. Second, there is an energy criterion which is used to determine the minimum quantity of energy required to meet the demand. These two criterion are outlined in the following sections.

Capacity Criterion

Manitoba Hydro's Capacity Criterion, as stated in Manitoba Hydro Policy G195, requires that:

“Manitoba Hydro will plan to carry a minimum reserve against breakdown of plant and increase in demand above forecast of 12% of the Manitoba forecast peak demand each year plus the reserve required by any export contract in effect at the time.”

Hence Manitoba Hydro must plan its system capacity to maintain a reserve margin of generation above its peak load, which is expressed as a percent of peak load. This reserve margin is intended to protect against capacity shortfalls resulting from breakdown of generation equipment, or increases in peak load due to extreme weather conditions.

Historically, the reserve margin of 12% has been adequate for Manitoba Hydro's predominantly hydroelectric generation based system because of relatively low outage rates combined with the relatively small size of hydro generating units. In comparison, reserve margins in predominantly thermal generation based systems are typically in the 15% range. The maximum demand for capacity in Manitoba occurs in the winter season, and therefore the winter peak capacity is used to determine the value for capacity demand.

Such a capacity criterion is typical of North American utilities or market regions. Manitoba Hydro is a member of the North American Electric Reliability Corporation (NERC). NERC's mission is to ensure the reliability of the North American bulk power system. According to NERC:

“Achieving reliability in the bulk electric systems requires, among other things, that the amount of generating capacity resources exceed customer demands by some amount. That amount (expressed as a percent of peak demand is termed a reserve margin and when expressed as a percent of generating capacity is termed capacity margin) must be sufficient to cover planned maintenance and unplanned or forced outages of generating equipment, deratings in the capability of demand-side and supply-side resources, system effects due to reasonably anticipated variations in weather, variations in customer demands or forecast demand uncertainty, delays in the construction of generating capacity, and other system operating requirements.” (NERC Resource and Transmission Adequacy Recommendations, June 15, 2004)

Energy Criterion

In addition to a capacity criterion, Manitoba Hydro has an energy criterion which recognizes the energy constrained limitation of hydraulic generation during drought conditions. This criterion requires that the Manitoba Hydro system be capable of supplying sufficient dependable energy resources, as measured in gigawatt-hours, to meet firm energy demand in the event of a repeat of the lowest historic hydraulic system inflow conditions. The firm energy demand is determined from the base level of forecasted Manitoba load and from existing export contracts. Historic hydraulic system inflows are derived from the available record of river flows (1912 to 2010) which have been adjusted to represent present use conditions and to account for systemic changes due to expected future water use and withdrawals upstream of Manitoba.

Such an energy criterion is typical for a predominately hydro region as noted by NERC:

“In areas where the majority of supply-side resources are energy-constrained (such as the hydro-dominated Northwest¹), achieving reliability may also require that the energy available to the area is, at least, equal to the customer demand and some reserve requirement during a certain critical design period for the constrained resources.” (NERC Resource and Transmission Adequacy Recommendations, June 15, 2004)

¹ Manitoba Hydro notes that Manitoba, like the Northwest region of the U.S., is also energy constrained.

Specifically, Manitoba Hydro's Energy Criterion, as stated in Manitoba Hydro Policy G195, requires that:

“The Corporation will plan to have adequate energy resources to supply the firm energy demand in the event that the lowest recorded coincident water supply conditions are repeated. Imports may be considered as dependable energy resources provided they utilize Firm Transmission Service and are sourced from either an Organized Power Market or a bilateral contract. The total quantity of energy considered as dependable energy from imports shall be limited to that which can be imported during the Off Peak Period, and shall not exceed the quantity of export contracts in effect at the time plus 10% of the Manitoba load.”

The following definitions are also part of the Energy Criterion:

Firm Transmission Service – full path transmission service of the highest priority that that may not be interrupted unless all lower priority levels of service have already been interrupted

Organized Power Market – a centrally operated market which collects generation offers and dispatches generation to meet forecast loads, including exports from the market region, and which will provide physical energy to external market participants such as Manitoba Hydro on a non-discriminatory basis

Off Peak Period – The following hours in a week during which the market load is typically lower than the weekly average load: Overnight- 7 days x 8 hours / day; Weekends- 2 days x 12 hours per day; Total = 80 hours per 168 hour week.

Manitoba Hydro's Energy Criterion was updated with modifications to the wording to clarify the treatment of imports as result of a review of the generation planning criteria that was

completed in July 2012. The modifications to the wording regarding the treatment of imports clarified that sourced from either an Organized Power Market or a bilateral contract may be considered as dependable energy provided they are imported utilizing Firm Transmission Service. There are ample energy resources available from the 130,000 megawatt (MW) of generation in the MISO market footprint in the off-peak period, when the MISO market loads are on the order of 60,000 MW or less, to ensure the availability of imports to the firm transmission import limit of 700 MW into Manitoba. The requirement that imports not serve more than 10% of the Manitoba load under the critical flow/ dependable energy conditions remains in the revised energy criterion.

The dependable energy available in the Manitoba Hydro system is the total of energy supplied from:

- Hydroelectric generating stations,
- Thermal generating stations,
- Wind generation,
- Projected demand side management savings not already accounted for in the load forecast, and
- Imports from neighbouring utilities.

The energy criterion limits the extent that imports can be relied upon to supply Manitoba demand.