Q: On page 6 of the report Liberty notes that Hydro's loss of load hours (LOLH) measure of supply reliability of 2.8 is the equivalent of one failure in five years, and then states: "Most utilities in North America work to a standard of once every ten years." Please provide a list of utilities to support this statement, and identify also any other utilities that are known to work to a standard of one failure in only five years.

A. It is Liberty's understanding that a loss of load expectation (LOLE) of 0.1 is the widely adopted, although not universally applied, North American standard. A FERC report, prepared by the Brattle Group, confirms this understanding. Please refer to "Resource Adequacy Requirements: Reliability and Economic Implications", September 2013, which is available at:

http://www.ferc.gov/legal/staff-reports/2014/02-07-14-consultant-report.pdf

The data relevant to this RFI is included in Appendix A of that report, which is attached here as Attachment 1 for convenience.

A. Detail on Survey of North American Resource Adequacy Criteria

In this Appendix, we report additional detail from our survey of resource adequacy criteria used in U.S. and Canadian power systems, as summarized in Section I.C above. However, as noted above, to completely understand the nuances and complexities of these studies, one would need to discuss implementation details with the individuals responsible for implementing the studies. The public documentation of these studies is often insufficiently detailed or can easily be misinterpreted. Because we have not conducted such interviews to be able to document reliably the assumptions and the complexities of each study, our discussion should be interpreted as a summary of general industry practices, not a fully-verified documentation of any one region's approach.

1. Resource Adequacy Standards Used Across North America

Table 14 is a summary of resource adequacy standards across U.S. and Canadian power systems, as discussed in Section I.C.1 above.

Table 14
Survey of Resource Adequacy Criteria Across U.S. and Canadian Power Systems

Region	Standard	Model	Notes
PJM[(a)]	0.1 LOLE	PRISM and GE-MARS	The LOLE based target reserve margin and various other calculations provide key inputs into the PJM capacity market.
MISO[(b)]	0.1 LOLE	GE-MARS	Performed Annually by the ISO. Regional reserve margin of 16.7% but after diversity allows its load serving entities to carry an 11.3% reserve margin.
NYISO[(c)]	0.1 LOLE	GE-MARS	Resulted in a reserve margin of 16.1% for the period May 2012 to April 2013. Reserve Margin calculation includes nameplate of all resources including wind. Results are adapted to derated UCAP for implementation in the NYISO capacity market.
ISO-NE[(d)]	0.1 LOLE	GE-MARS	2012 ICR report calculates the requirement needed to meet its 1 day in 10 year standard, load uncertainty considers weather but not economic forecast error. Results used capacity market.
SPP[(e)]	2.4 LOLH	ABB Grid View	Capacity margin criterion of 12% for RTO members that are steam based and 9% for hydro based; results in capacity margin criterion above the 1 day in 10 year definition.
Maritimes [(f)]	20% RM and 0.1 LOLE	NPCC uses MARS	Maritimes uses a 20% reserve margin criterion for planning purposes but at the same time adheres to the NPCC requirement of not shedding firm load more than 1 day in 10 years.
Quebec[(g)]	0.1 LOLE	NPCC uses MARS	Based on an LOLE of 0.1, Quebec requires a 10% reserve margin for the 2012/2013 winter peak. By the 2015/2016 winter peak, Quebec requires a 12.2% reserve margin. Because of its dependence on hydro generation, Quebec also imposes an energy requirement to withstand 2 consecutive years of low water inflows.
IESO[(h)]	0.1 LOLE	NPCC uses MARS	The target for 2013 to meet the one day in 10 year target is 19.7% in which the region meets easily with an anticipated reserve margin of 40.1%.
Saskatchewan[(i)]	EUE Standard		Sask Power uses a 13% RM based on probabilistic analysis of Expected Unserved Energy.
Manitoba[(j)]	Both RM and energy standards due to hydro dependence		The energy criterion requires adequate energy resources to supply firm energy demand in the event that the lowest recorded coincident river flow conditions are repeated. The capacity reserve margin is at least 12%.
MAPP[(i)]	1 day in 10 years (LOLE of 0.1)		Some MAPP members self-impose a planning reserve margin of 15% based on the results of an LOLE study performed in 2009.
SERC/ General	No mandatory requirement		RA targets set by individual load serving members subject to regulatory review. With this approach, the criteria and final reserve margins vary across the region.
SERC/SoCo[(k)]	Economics	SERVM	The target is based on minimizing customer costs.

Region	Standard	Model	Notes
SERC/Duke Energy Carolinas[l]	0.1 LOLE and Economic Assessment	SERVM	Set minimum RM based on LOLE values but base target RM on an economic assessment, which is slightly higher than the LOLE target.
SERC/ Progress Energy Carolinas[m]	1 day in 10 years (LOLE of 0.1) and Economic Assessment	SERVM	Set minimum RM based on LOLE values but base target RM on an economic assessment, which is slightly higher than the LOLE target.
SERC/TVA[n]	Economics	SERVM	The target is based on minimizing customer costs.
SERC/Santee Cooper[o]	Economics	SERVM	The target is based on minimizing customer costs.
SERC/ LGE&KU[p]	Economics	SERVM	The target is based on minimizing customer costs.
SERC/ Entergy[i]	1 day in 10 years (LOLE of 0.1)	ERAILS	
SERC/ SCE&G[q]	12–18% RM		
FRCC[r]	0.1 LOLE	Tiger	"The FRCC has a resource criterion of a 15% minimum Regional Reserve Margin based on firm load. The FRCC assesses the upcoming ten-year summer and winter peak hours on an annual basis to ensure that the Regional Reserve Margin requirement is satisfied. Since the summer of 2004, the three Investor Owned Utilities (Florida Power & Light Company, Progress Energy Florida, and Tampa Electric Company) are currently maintaining a 20% minimum Reserve Margin planning criterion, consistent with a voluntary stipulation agreed to by the FPSC. Other utilities employ a 15% to 18% minimum Reserve Margin planning criterion."
ERCOT[s]	0.1 LOLE target (not mandatory)	Internal Model	ERCOT operates as an energy-only market and so does not mandate a RM; but performs one day in 10 year standard assessment to inform ERCOT and
WECC/ General[t]	No mandatory requirement		Individual balancing areas within WECC determine their own resource adequacy requirements in various ways and are subject to review by state regulators
CAISO[u]	15% RM		In January 2004, the CPUC established a long-term Resource Adequacy framework (D.04-01-050). This decision adopted a 15% to 17% planning reserve margin (PRM) and directed that each LSE is responsible for acquiring sufficient reserves to meet its own customer load. CAISO has since performed LOLE studies but the studies have not impacted the decision made in 2004 to maintain at a minimum 15% reserve margin
Northwest/ BPA[v]	Loss-of-Load Probability (LOLP) of 5%; and conditional value at risk (CVaR) to evaluate energy not served (ENS) events	Genesys Model	A completely different method from 1 day in 10 years. Method was developed in cooperation with the Northwest Council to take into account the predominantly hydro resource mix of the Northwest. For this use, LOLP is not defined as hours per year. It is instead a percentage of iterations that contain any EUE. The target allows no more than 5% of all iterations to contain EUE.
Southwest/ APS[w]	0.1 LOLE		APS 2012 IRP states that at 15% planning reserve margin criterion, LOLE is less than 1 day in 10 years.
Southwest/ PNW[x]	NM State Commission set target at 13%		Notes that reserve margin would likely increase if a one day in 10 year standard were used.
Southwest/ NV Energy[y]	1-in-10		Definition of 1 day in 10 years is not reported.
Alberta	No RA requirement		Intervention possible if expected EUE over a two-year outlook increases above 1,600 MWh.

Sources:

From regional resource adequacy studies: (a) PJM (2011); (b) MISO (2011); (c) NYSRC (2011); (d) ISO-NE (2011); (e) SPP (2010); (f) NBSO (2011); (g) Hydro-Québec (2011); (h) IESO (2012); (i) NERC (2011a); (j) Manitoba Hydro (2010); (k) Georgia Power (2010); (l) Duke (2012); (m) Progress (2012); (n) TVA (2011); (o) 2012 IRP, forthcoming; (p) LG&E and KU (2011); (q) SCE&G (2011); (r) FRCC (2012); (s) ERCOT (2012); (t) WECC (2011); (u) CPUC and CEC (2005); (v) BPA (2011); (w) APS (2012); (x) PNM (2011); and (y) Nevada Power (2012).