Q. Please explain how the planning of additional power generation in the IIS will be impacted by the predicted reliability and availability of the LIL. In the response include:

- the impact of doubling the assumed pole outage rate, retaining the same average outage time
- the impact of doubling the assumed pole outage time, retaining the same average outage rate
- the impact of doubling the assumed bipolar outage rate, retaining the same average outage time
- the impact in of doubling the assumed bipolar outage time, retaining the same average outage rate
- the impact in each case of reducing the available emergency power from ML from 300MW to 150MW

In each case, please state how the LOLH would change if the original assumption was used but the different conditions were to apply.

Please also state how the provision of additional generation resources would change if the planning assumptions were changed to provide for the different conditions listed.

A. Planning of additional power generation on the IIS will be impacted by the predicted reliability and availability of the LIL. On an LOLH basis, the greater the predicted reliability and availability, the less additional generation will be required, and vice-versa.

In order to calculate the LOLHs for the sensitivities requested, the LIL outages were converted to an equivalent forced outage rate per pole for the LIL. From *GRK-NLH-060 (Revision 1, Mar 2-15)*, the bipole is forecast to have 9.5 hours per year of downtime (Table 3-2). For loss of a single pole (monopole), the forecast is 70.6 hours per year. This gives a total of 80.1 hours per year of downtime, which, when divided by 8760 hours per year gives a base forced outage rate of 0.91% (Table: Combined – Forced Outage Rates). This forced outage rate was used then for each pole of the bipole.

In this case, Case 1,

- the impact of doubling the assumed pole outage rate, retaining the same average outage time,
- the impact of doubling the assumed pole outage time, retaining the same average outage rate,

both situations lead to doubling the Downtime or Outage hours per year, so the resulting Forced Outage Rate is the same.

For Case 2:

- the impact of doubling the assumed bipolar outage rate, retaining the same average outage time,
- the impact in of doubling the assumed bipolar outage time, retaining the same average outage rate,

the same holds true.

See Table 1 for the Forced Outage Rate calculations.

Calculation of Forced Outage Rates

Case	Downtime (hrs/yr)			Hours in one Year	Total Forced Outage Rate
	Bipole	Monopole	Total		
Base	9.5	70.6	80.1	8760	0.91%
Case 1 - Pole Outage	19	70.6	89.6	8760	1.02%
Case 2 - Bipole Outage	9.5	141.2	150.7	8760	1.72%

Table 1

Table 2 indicates how the LOLH would change if the different conditions were to apply. Within the period 2020 – 2035, applying the different conditions does not produce an LOLH that exceeds 2.8. Therefore, under existing LOLH criteria, provision of additional generation resources would not change if the planning assumptions were changed to the different conditions listed. However, as the LOLHs are greater for Case 1 and Case 2 than in the Base Case, applying the different conditions eventually would lead to the requirement for additional generation earlier.

Calculation of LOLHs

YEAR	Peak Demand	MIL @300 MW LIL Forced Outage Rate			MIL @150 MW LIL Forced Outage Rate		
		Base	Case 1	Case 2	Base	Case 1	Case 2
		0.91%	1.02%	1.72%	0.91%	1.02%	1.72%
	MW	LOLH	LOLH	LOLH	LOLH	LOLH	LOLH
2020	1725	0.14	0.17	0.49	0.14	0.17	0.49
2021	1733	0.15	0.18	0.52	0.15	0.18	0.52
2022	1744	0.15	0.18	0.53	0.15	0.18	0.53
2023	1754	0.15	0.18	0.53	0.15	0.19	0.53
2024	1767	0.15	0.19	0.54	0.15	0.19	0.55
2025	1783	0.16	0.20	0.59	0.16	0.21	0.59
2026	1803	0.17	0.21	0.61	0.18	0.23	0.65
2027	1821	0.18	0.23	0.65	0.20	0.25	0.70
2028	1842	0.20	0.25	0.70	0.22	0.28	0.78
2029	1862	0.23	0.29	0.81	0.33	0.40	1.05
2030	1874	0.24	0.30	0.85	0.36	0.44	1.14
2031	1894	0.25	0.32	0.89	0.41	0.50	1.26
2032	1911	0.26	0.33	0.91	0.44	0.54	1.34
2033	1927	0.28	0.35	0.97	0.51	0.61	1.50
2034	1944	0.30	0.37	1.02	0.58	0.70	1.67
2035	1961	0.31	0.39	1.06	0.64	0.77	1.80

Table 2