ලංකා විදුලිබල මණ්ඩලය
இலங்கை மின்சார சபை
CEYLON ELECTRICITY BOARD

සංවත්සරය
ஆண்டுவிழா
ANNIVERSARY
1969 - 2019

Your ref: My ref: DGM/(CS&RA)/GEN/5-1 Date: August 7, 2019

2307.
08 AUG 2019

Director General
Public Utilities Commission of Sri Lanka
6th Floor, BOC Merchant Tower
No.28, St, Michael's Road
Colombo 3.

Submission of Responses to the Clarifications Requested by PUCSL on Draft LTGEP 2020-2039

This has reference to your letter dated 2019-07-15 on the above.

I enclose herewith the responses of Transmission Licensee (Annex I) for your observations on Draft LTGEP 2020-2039.

Eng. S D W Gunawardana
General Manager

① Sunil / Pls. [illegible]
② Nalin.
08/08/19

General

Se. No	Section Name	PUCSL Observation/ Comment	CEB Clarification
1		Oil power plant capacity is not sufficient to comply with the government policy target for 2030	Government policy stipulates the inclusion of 15% from furnace oil and renewable energy sources that can be considered as firm power. Firm capacity shares for Hydro, Coal and Natural Gas sources in 2030 are 26%, 30% and 34% respectively. The balance 10% of firm capacity share contribution is achieved from furnace oil, biomass and Pumped hydro storage technologies to meet the required frim capacity requirement. Dual fuel feature is also considered for natural gas fired combined cycle plants that provides enhanced supply security. More firm capacity through renewable energy is expected to realize once the 100MW battery storage is installed by 2030. The detail design stage of battery integration, will determine the level of renewable contribution that could be considered as firm capacity. This will enhance the present 10% share.
2		Is Renewable curtailment s required in case of hydro reduction	Curtailment requirement is expected with the planned renewable capacities due to seasonal characteristics, low demand period such as weekends. The wind and solar curtailment requirement is observed throughout planning period irrespective of the hydrological variation.

Chapter 2

Se. No	Section Name	PUCSL Observation/ Comment	CEB Clarification
3.	2.1.1 (b) Renewable Plants Committed	Moragahakanda is an existing plant	Will be corrected

4.	Table 2.4 Plant Retirement Schedule	Compared to previous plan, retirement years of Small GTs, Sapugaskanda A Plants, Sapugaskanda B (2nd 4 units) are delayed, but Sapugaskanda B (1st 4 units) is advanced by 1 year	The observation seems incorrect as only the retirement years of small GTs and Sapugaskanda B (2nd 4 units) are delayed. None of the retirements have been advanced. Plant retirements are based on the information provided by respective generating stations after analyzing present situation and ongoing status of the projects.
5.	Table 2.6 characteristics of existing and committed CEB owned thermal plants	Full load heat rate of Kelanithissa Combined cycle Plant 1,837 kCal/kWh is significantly lower than that in tariff filing 2,589 kCal/kWh (naptha)	Values used in this planning cycle are almost same as LTGEP 2018-2037.
6.	Table 2.6 characteristics of existing and committed CEB owned thermal plants	Comparison – FO rates and maintenance years with LCLTGEP 18-37	Plant maintenance days are determined based on the information provided by the respective power plants

Chapter 3

Se. No	Section Name	PUCSL Observation/ Comment	CEB Clarification
7.	E.1/ Table 3.3	2020 loss level (8.78%) in the plan is higher than the loss target issued by the PUCSL (7.5%)	Net loss determined based on the transmission and distribution loss of the system in the years of 2017, 2018 and projections provided by the respective Distribution Divisions. In addition, loss will vary and depend on the source of generation.
8.	Figure 3.7	Rapid increase in load factor till 2027	It is observed that day peak growth rate is significant than the night peak growth rate. Accordingly, it is assumed that by 2027 day peak exceeds the night peak and until that, the system load factor will increase.
9.	Table 3.4	Impact of EV penetration. This is identified in MAED demand forecast Table 3.4	EV projection derived based on the information collected from Department of Motor Traffic for past 5 years and assumed a growth rate compared with other forms of transportation in MAED model.

① ~~Demand peak~~ & limit overall explain
② Responses on previous plans

Chapter 4

	Section Name	PUCSL Observation/ Comment	CEB Clarification
10	4	Previous plan CEB used average of last two years fuel prices. Period concerned in this plan is not given ***Which period's average fuel price is used in the plan?***	For preparation of LTGEP 2020-2039 weighted average of fuel prices from 2016-2018 have been used with more prominence to recent year to reperesent and reflect with internationally accepted fuel forecasts of World Bank and IMF.
11.	4.1	Capital costs of plants have been decreased in both real and nominal terms **Justification**	Table 4.1 does not depict variation of capital costs in real and nominal terms. Only capital costs of Gas turbines and Combined cycle plants have been updated considering data from recent trends. Capital cost of other Power plants have been adjusted from previous plan considering local and foreign economic indicators.
12	Table 4.3	Basis of Oil prices changed (Actual spot prices was used in previous plan, where in this plan Brent prices are used) **Reason for change the basis and the breakdown of the figure (Brent price+ freight &insurance)?**	In LTGEP 2018-2037, oil prices were presented based on Market prices and LTGEP 2020-2039 considers economic prices (cost delivered to power plant without taxes) for all fuels. All other fuel prices are based on international indexes. Hence, oil prices have been derived based on the Brent Index. Oil Price = Brent + Freight + Local Cost Local Cost were determined based on reasonable assumptions since CPC have not disclosed the actual prices upon request.
13	Table 4.4	Basis for Coal cost: index API 4. Basis of previous plan was on actual prices from Lanka Coal Company ***Reason for change the basis? Give the calculation of fuel***	Coal is procured to Sri Lanka, by Lanka Coal Company and indexed to the API 4 index which is based on Richards bay of South Africa. CEB has subscriptions for the API 4 Index. Coal Price is calculated based on weighted average from 2016-2018 of API 4 index and Handling charge of 15.16US$/Mton to

		price (relationship to the index and any premium added)	Lakvijaya and 12.96 US$/Mton to Foul Point.
14.	4.2: Fuel Cost -Coal	Coal capital cost increased compared to 2018-37 plan ***Justification***	Question is unclear. There is no capital cost associated with fuel cost.
15	4	Generation studies- no recent studies available ***Clarification***	Question is unclear. Typical Generation studies shall take 2-3 years to complete.

Chapter 5

	Section Name	PUCSL Observation/ Comment	CEB Clarification
16	5.2.2: Committed Hydro Power Projects	Gin Ganga plant is not identified as a Committed / candidate plant Reason?	Gin Ganga Project is under the purview of Ministry of Irrigation and Water Resource Management and no proper information has been conveyed regarding the progress as they are revisiting the feasibility of the project.
17.	Table 5.1: Characteristics of Candidate Hydro Plants	Capacity cost of Seethawaka power plant is increased Reason?	According to the recent feasibility studies, configuration of the Seethawaka power plant has been reviewed and costs have been updated accordingly.
18	5.4.3.1	Government policy not fully incorporated 2025 target of Solar Sangramaya. Reason?	Optimum capacity of solar integration based on demand growth and system stability has been incorporated after system operational and transmission stability studies. This figure has been increased from 685 MW in 2018-2037 plan to 730 MW in 2020-2039 Plan.
19	5.4.3.2	60MW and 90 MW solar capacity is tendered. LOIs were not issued to the total capacity Tendered The awarded plant capacity is required to be indicated	The LTGEP is prepared for information based on 2019-01-01 and 1 MW scale Solar PV projects is one of the concepts for scattered solar development.
20	5.4.3.3	No time estimate for commissioning of Solar parks Clarification ?	Large scale Solar Developments need to conform to sensitive EIA process as large land area shall be involved. SEA has started the initial environmental studies for proposed sites including EIA process.

21	Table 5.9	Two columns with the heading Capital Cost Pure ($/kW) What is the difference?	The two columns are to be corrected as Pure cost and the cost including IDC (Interest during Constriction). This shall be corrected in the final Report.

Chapter 6

	Section Name	PUCSL Observation/ Comment	CEB Clarification
22	6.7	Coal plant construction and the feasibility studies takes 8 years ***Is 2023 is a feasible commissioning year for coal plant? Justification?***	The first unit of Coal is expected to be commissioned within the LVPS premises. Initial studies have indicated that timeline is achievable if all project milestones and approvals are obtained on time. It is necessary for all stakeholders to work in unison and act on time.
23	Base case Plan: Footnote	Indicated in the foot note that "Battery storage is proposed to be added to the system in phase development" ***How is this modeled in studies? Why is not identified in the plan?***	Battery storage has been identified to facilitate ramp rate controlling, frequency support services, power smoothing and shifting purposes. Initial studies identified a capacity of 50 MW in 2025 and 100 MW in 2030 to support the operational flexibility Details of exact implementation dates are to be finalized after further detailed studies. As indicated in the footnote of Table E.2, it is in the base case plan. Note that the base case plan is inclusive all footnotes indicated in the plan.
24	6.9.7	10% discount rate is a higher value when plan is prepared based on USD ***Justification***	In capacity expansion planning, for generation projects, economic analysis is carried out using constant currency terms. Generally, for developing countries discount rates in the range of 10%-12% are used for the economic analysis. For LTGEP 2020-2039, 10% discount rate has been used as a general value

			and a separate sensitivity analysis has been carried out to study the impact in the variation of discount rate.
25	6.9.4	ENS is escalated. ***What is the basis of escalation***	ENS has been adjusted based on the CCPI movement.
26	Executive Summary	Additional Reserve margin cost of 43 million ***Provide the basis of calculation of cost***	The NPV value of cost difference between the two casesis USD 43 million. Case 1: RM value of Min 2.5% and Max 20% Case 2 : RM value min 10% and Max 25%
27		Coal plant dispatch during off peak is not clear. ***Load curves net and gross with renewables (including data) are required***	During the planning studies it has been verified that proposed Coal Plants would be dispatched during off peak times. However the actual operation shall be decided by the system operator based on the available capacities at the particular given time.
28	6.9.9	It has been assumed that all new ORE Plants are capable to curtail the generation when necessary. **Further clarification on this statement.**	Would be corrected as all Solar and Wind (Intermittent) power plants will have the provision for curtailment.

Chapter 8

	Section Name	PUCSL Observation/ Comment	CEB Clarification
29	8.1	Comparison between candidate technologies used in new plan and previous plan Additions • 35MW NG GT • 300MW High Efficient Coal • 600MW NG Omissions • 35MW & 105MW Diesel GT • 150MW Diesel CCPP • 300MW Coal ***Reasons for changes in candidate technologies considered?***	Candidate plants are selected as most appropriate technology, capacity and fuel type for the planning cycle. 300 MW Coal plant is the same High Efficient coal plant elaborated in both LTGEP 2020-2039 and LTGEP 2018-2037.

30	Table 8.1	• Lakvijaya Phase II is repeated in 2024 • Foul Point Phase I is repeated in 2028 • Foul Point Phase II is repeated in 2033 • Foul Point Phase III is repeated in 2039 ***Out of 8 x 300MW Coal plants proposed in Base case plan, 5 x 300MW are proposed in Lakvijaya site and Trinco Foul point. What are the other identified sites to build the rest of 3 x 300MW plants***	There is no discrepancy in locations as phased development could consist of one or more power plants. Table 8.1 clearly states the locations of every New Coal Power Plants. All 8x 300 MW coal plants are to be implemented at as Lakvijaya extension and at Foul Point.
31	8.2: Policy 5	If the target is for 1/3 of total energy, 2500MW capacity is not adequate. ***Is this policy target is for 1/3 of capacity or energy? Clarification for the same.***	This is only an extract of approved Cabinet Memorandum titled "Deciding of the Composition of Electricity Generation of Sri Lanka" Refer Clause 30 of the Amended "General Policy Guidelines in respect of the Electricity Industry" in March 2019.
32	8.3	Is it possible to accommodate another 2 x 300MW plants in the existing Lakvijaya site area of 103 ha with more area for ash disposal and with a 43 ha buffer zone? ***Justification?***	Initial studies revealed that it is possible to accommodate 2x300 MW plants in the Lakvijaya area.
33	Table 8.5	O&M of ORE is one third of thermal plants ***Clarifications? Give the assumptions used for running cost and capital cost***	Question not clear, All values related to O&M and capital cost of candidate power plants are depicted in Table 4.2 and Annex 5.3 and are calculated accordingly.
34	Base case	Are 2x300MW NG plants practically possible in 2022? ***Justification. (refer comments in Chapter 13)***	The process was initiated in 2016 and, it is possible to commission the plants by 2022 if all stakeholders work in unison and act on time.
35	Figure 8.7	Figure includes thermal plants ***Figure is not all renewables***	Agreed. Will be modified accordingly.
36	Base Case	Years considered for fuel conversion to NG in Westcoast and Sojitz plants are not given. ***Clarification?***	Please refer footnote of Table 8.1 which clearly states the conversion years of each power plant.

Chapter 10

Se. No	Section Name	PUCSL Observation/ Comment	CEB Clarification
37.	Figure 10.2	Results in Oct 2016 given. Actual SOx emissions of LVPS is higher than this.	This data is based on test results carried out by a third party institute (NBRO) in October 2016. Emissions of the power plant under normal operating conditions are within Sri Lankan standards. Also the recent average emissions under normal operating conditions are represented by the values in this report in October 2016.
38.	10.4	Close loop cooling cost	Sea water cooling is proposed for coal plants at identified locations and the cost is included in capital cost.
39.	10.4	Norm for low Sulphur coal is : S content < 1%. The coal used in LVPS has more than 1% Sulphur content. If no FGD Low Sulphur coal is required.	According to the specifications, Sulphur content of coal to be procured should be less than 1%. FGD are incorporated to further reduce the SO_x emission levels.
40.	10.7	2016 Emission factor for LVPS is used	Recent average emissions under normal operating conditions are represented by the values in the third party verified report in October 2016. Also maximum emissions of power plant under normal operating conditions do not exceed Sri Lankan standards.
41.	DSM	DSM programmes are not accounted for in demand forecast	Chapter 3 Section 3.8 mentioned the reasons for non-consideration of demand reduction due to DSM program in long term expansion planning It is foreseen that there may be considerable practical restrictions on smoother implementation on the DSM measures as it need very strong commitment from all the stakeholders, which is lacking in practice we have experienced. The analysis indicated that the benefits could be obtained and implementation should be ensured by policy decisions by the Government. Hence, if DSM Case is selected as the Base Case Plan it may lead to under-estimation of the requirement of power and inadequate development of the power plants to meet the actual future

			demand and may lead to "un-served energy" situations.
42.	10.9	Environmental and Social Management Framework (ESMF) for renewable energy Plants are to be introduced. However, Environmental Management Plans under EIA are not fully executed	CEB has introduced the ESMF to streamline and address environmental and social impacts during the implementation stage of power projects.
43.	10.10.1	Coal dust, fugitive emissions and high ground water extraction not addressed	Closed conveyors and Closed coal storages shall minimize the issue on coal dust. Other matters are addressed during the EIA process of every power project.

Chapter 13

Se. No	Section Name	PUCSL Observation/ Comment	CEB Clarification
44.	13.1.3 Case 1: Delays of NG fired power plants till 2022:	This is no longer a contingency, but the reality situation. Now there is a possibility that these plants getting delayed even beyond 2022. This should be considered as a contingency	The planned implementation of natural gas fired combined cycle plants due in 2019 and 2021 have been delayed without a definite implementation timeline. Therefore, this delay has been considered as a contingency event that necessitate short term capacity requirement. Different contingency scenarios could be analyzed based on reasonable assumptions as and when required.
45.	13.1.3 Case 1: Delays of NG fired power plants till 2022:	In 2020 only one 300MW base load power plant is due as per the previous plan. There is a contingency requirement of 345 MW in new plan?	In addition to the delay of 300MW combined cycle plant, there are other factor such as changes in demand forecast, plant parameters including commissioning dates can affect the capacity requirement. The security criteria considered in this is 10% of minimum reserve margin and 1.5% of maximum LOLP limit.
46.	Table 13.6: Breakdown of the capacity additions identified for 2019-2021 period	Contingency analysis in LCLTGEP 2018-37 identify 150 MW requirement for 2019 in simultaneous occurrence of 3 risk events, here it is considered as required in single contingency event (plant delay).	The total contingency capacity requirement identified by LTGEP 2020-2039 for the year 2020 is 345MW (Table E.2). The table 13.6 will be corrected to reflect the total capacity identified by LTGEP 2020-2039 for the year 2020.

47.	13.2.2	Plant requirements for the following cases not Identified What is the requirements if hydro reduction and LVPS out? What is the requirement if plant delay and LVPS out?	Contingency analysis has been carried out for most likely worst-case scenarios. Different contingency scenarios could be analyzed based on reasonable assumptions as and when required. Final decisions on procurement will also consider situational reports of the system performance at that point of time.