

Input Data for Long Term Planning studies 2027-2046

1) Candidate Thermal Technologies

The cost related details of candidate thermal technologies are tabulated in Table 1.

Table 1: Cost details of candidate thermal technologies

Plant	Pure Unit Cost (USD/kW)	Construct. Period (Years)	Unit cost with IDC (USD/kW)	Fixed O&M cost (USD/kW year)	Variable O&M cost (USD/MWh)
50 MW IC Engine	1,039	2	1,106	15.6	6.57
100 MW IC Engine	972	2	1,035	15.6	6.57
200 MW IC Engine	938	2	999	15.6	6.57
50 MW Gas Turbine (Aero)	1,078	2	1,149	18.7	5.50
100 MW Gas Turbine (Aero)	785	2	836	18.7	5.50
50 MW Gas Turbine	907	2	966	8.1	5.26
100 MW Gas Turbine	695	2	741	8.1	5.26
200 MW Gas Turbine	567	2	604	8.1	5.26
300 MW Gas Turbine	495	2	528	8.1	5.26
300 MW Combined Cycle	1,117	3	1,268	14.3	2.99
400 MW Combined Cycle	1,043	3	1,184	14.3	2.99
500 MW Combined Cycle	989	3	1,123	14.3	2.99
300 MW High Efficient Coal Plant	2,091	4	2,478	47.5	5.26
600 MW Super Critical Coal Plant	2,249	4	2,666	47.5	5.26
600 MW Nuclear Power Plant	5,383	5	6,664	141.5	2.77

Sources: (Gas Turbine World Handbook 2025, OEM data, Feasibility Studies)

Note: All IC Engine, Gas Turbine and Combined Cycle power plants are designed to operate on dual fuel

The operational characteristics of candidate thermal technologies are tabulated in Table 2.

Table 2: Characteristics of candidate thermal technologies

Plant	Max Load (MW)	Min Load (MW)	Heat Rate (kcal/kWh)		Full Load Efficiency (Net, HHV) %	FOR %
			Full	min		
50 MW IC Engine	47.1	2.12	2,098	3,063	41.1	2.5
100 MW IC Engine	101.9	3.71	2,100	3,174	41.0	2.5
200 MW IC Engine	203.8	3.59	2,099	3,275	41.0	2.5
50 MW Gas Turbine (Aero)	49.5	24.8	2,349	3,053	36.7	8
100 MW Gas Turbine (Aero)	128.4	64.2	2,411	3,134	35.7	8
50 MW Gas Turbine	41.1	16.4	2,921	3,798	29.5	8
100 MW Gas Turbine	106.4	53.2	2,548	3,312	33.8	8
200 MW Gas Turbine	191.9	76.7	2,568	3,338	33.5	8
300 MW Gas Turbine	268.6	61.8	2,519	3,275	34.2	8
300 MW Combined Cycle	288.5	115.4	1,751	2,276	49.2	8
400 MW Combined Cycle	439.9	176.0	1,565	2,034	55.0	8
500 MW Combined Cycle	534.5	213.8	1,557	2,024	55.3	8
300 MW High Efficient Coal Plant	270	135	2,241	2,547	38.4	3
600 MW Super Critical Coal Plant	564	338	2,082	2,246	41.4	3
600 MW Nuclear Power Plant	552	497	2,685	2,723	32.1	0.5

Power Plant Capacities are based on Net Capacity and Heat rates are based on HHV

Sources: (Gas Turbine World Handbook 2025, OEM data, Feasibility Studies)

Furthermore, additional plant technologies are being investigated to be considered in line with target of achieving carbon neutrality goal by year 2050. However, these power plant technologies have not yet reached technological maturity for commercial level deployment. Hence, at present sufficient cost and operational details of these technologies, are not available to model them accurately.

Following candidate technologies are being pursued to be used in long term planning studies once sufficient data is available.

1. Nuclear SMR
2. Natural gas operated open cycle and combined cycle with CCS
3. Hydrogen /Ammonia operated open cycle and combined cycle
4. Hydrogen /Ammonia operated IC engines
5. Fuel Cell

2) Fuel Prices

PUCSL during input data submission for LTGEP 2025-2044 requested to use only forecasted values to derive fuel prices. Following is the latest version of published fuel price forecasts available for consideration.

Table 3: Sources of fuel price forecast

	Report	Forecast Period
World Bank	World Bank Commodity Price Forecasts, October, 2025	2025-2027
IEA	World Energy Outlook, 2025	2035 , 2050

The World Bank forecasts are limited to the early years of the planning horizon, while the IEA provides price projections only for two discrete reference years (2035 and 2050). To ensure consistency across the full planning period, the available forecast data were extended through interpolation between the reference years. Based on the resulting price trajectory, and fuel quality being imported to Sri Lanka, a representative average fuel price for the 20 year planning horizon is derived.

The handling fee for coal is 29.17 US\$/Mton based on handling fee for 2024/2025 season and handling fee for oil based products are based on CPC prices. Even though LNG infrastructure cost is most appropriate to be modeled as capital cost, due to the uncertainty of way forward of LNG infrastructure development, it is planned to be modelled as handling fee. The handling fee associated with LNG Infrastructure remains volatile due to the variability of required fuel quantities and is represented as below.

1. ISO tankers / FSRU option (0.25 - 0.8 MTPA) ~ 3.5 USD/MMBtu
2. FSRU option (above 0.8 MTPA) ~ 2.5 USD/MMbtu

Note: MTPA - million tonnes per annum

The derived fuel prices for long term planning studies under the above projections are tabulated in Table 4.

Table 4: Forecasted fuel prices (with handling charges)

	Coal	Natural Gas	Diesel	Furnace Oil	Naptha
	US\$/Mton	US\$/MMbtu	US\$/bbl	US\$/bbl	US\$/bbl
Fuel Price	124.7	14.9 (max) 13.9 (min)	120.5	119.6	87.7

3) Candidate ORE Technologies

The cost related details of candidate ORE technologies are tabulated in Table 5.

Table 5: Details of candidate ORE technologies

ORE Technology	Pure Capital Cost (USD/kW)	Capital Cost with IDC (USD/kW)	Fixed O&M Cost (% of the capital cost)	Construction years
Solar (Large Scale)	525	559	1.5 %	1.5
Solar (Distributed)	567	591	0.9 %	1
Floating solar	683	727	1.5 %	1.5
Onshore Wind	856	931	2.5 %	2
Offshore Wind (Fixed Bottom)	2,852	3,530	2.5 %	5
Offshore Wind (Floating)	5,063	6,267	2.5 %	5
Biomass	1,871	1,993	4.0 %	1.5
Mini hydro	1,932	2,058	2.5 %	1.5

Sources: (IRENA Renewable Power Generation Costs 2024, CSIRO GenCost 2024-25, Latest Tender and Market Prices)

4) Candidate Storage Technologies

The cost details of Candidate Storage Technologies are tabulated in Table 6.

Table 6: Details of candidate Storage technologies

Technology	Pure Capital Cost (USD/kW)	Capital Cost with IDC (USD/kW)	Fixed O&M Cost (USD/kW year)	Construction years
BESS (2 hour)	297	316	5.1	1.5
BESS (4 hour)	565	602	8.1	1.5
PSPP-Maha (6 hour)	1,110	1,374	6.5	5
PSPP-Wewathenna (6 hour)	1,907	2,360	6.5	5

Sources: (Lazard LCOE + 2025, Feasibility Studies)

5) Externalities

Estimating externality costs of specific power generating technologies and fuel options is a challenging task due to the difficulty in isolating the contribution of power industry from the impacts from all other industries. Furthermore, electricity accounts only about 14% share of the total energy usage in the country. Literature suggest that monetizing the externalities is highly subjective and could vary within a wide range depending on the income level of the country, population density around the power plants etc. Therefore, a country specific study needs to be conducted to evaluate the externality cost applicable to Sri Lanka. Furthermore, externality cost should be estimated for both thermal and renewable power generation on a same basis to be comparable.

In the event, a country specific study is not available, the report "Environmental Externalities from Electric Power Generation, The Case of RCREEE Member States,

September 2013” is proposed to be used as a source for externality cost for conducting sensitivity analysis in long term planning studies 2027-2046. The report has summarized the range of externalities estimation from previous studies for most of the fuel options and renewables.

6) Base Demand Forecast 2027-2051

Demand forecast 2027-2051 was derived as a combination of medium term and long-term econometric forecast. As for the medium-term forecast, time series model in monthly time step has been used to evaluate the variations in demand due to end user tariff increase, weather conditions, and any other seasonal factors.

For the long-term forecast, an econometric modelling approach was adopted to capture historic demand pattern. Unlike in previous planning cycles, the Central Bank of Sri Lanka (CBSL) does not currently publish medium-term GDP growth projections. Further, the World Bank growth forecasts used in the previous base case demand forecast were subsequently observed to be conservative, with actual economic growth exceeding forecast values. Table 7 compares the latest GDP growth projections from CBSL and the World Bank. Hence, the projected GDP growth path for the planning horizon reflects an initial recovery phase followed by a period of growth driven by structural reforms and investment led expansion, before gradually converging to a lower long term trend rate consistent with macroeconomic stability.

Major development projects, vehicle electrification initiatives, and demand-side management measures were also incorporated in deriving the final demand forecast. Table 8 presents the resulting base demand forecast. World Bank GDP growth projections are expected to be considered for the low-demand scenario (if further update is available this will be used at the time of preparation of low demand forecast).

Table 7: GDP Growth Projection (%)

Year	Sri Lanka Development Update The World Bank October 2025	CBSL December 2025
2025	4.6	4.5
2026	3.5	4.0-4.5
2027	3.1	-

Table 8: Base Demand Forecast 2027-2051

Year	Demand ¹	Net Loss ²	Net Generation	Day Peak Demand	Night Peak Demand
	GWh	%	GWh	MW	MW
2027	18,515	8.50	20,234	3,299	3,247
2028	19,539	8.00	21,238	3,466	3,395
2029	20,621	7.50	22,293	3,642	3,549
2030	21,763	7.49	23,525	3,847	3,731
2031	22,967	7.48	24,824	4,063	3,922
2032	24,144	7.47	26,093	4,275	4,107
2033	25,320	7.46	27,361	4,488	4,290
2034	26,593	7.45	28,733	4,718	4,489
2035	27,902	7.44	30,145	4,954	4,692
2036	29,266	7.43	31,615	5,201	4,902
2037	30,699	7.42	33,160	5,461	5,123
2038	32,220	7.41	34,798	5,734	5,364
2039	33,835	7.40	36,539	6,025	5,620
2040	35,481	7.39	38,312	6,321	5,880
2041	37,264	7.38	40,233	6,642	6,161
2042	39,053	7.37	42,160	6,964	6,443
2043	41,013	7.36	44,271	7,318	6,751
2044	43,059	7.35	46,475	7,687	7,071
2045	45,201	7.34	48,781	8,073	7,406
2046	47,403	7.33	51,153	8,471	7,750
2047	49,330	7.32	53,226	8,820	8,047
2048	51,250	7.31	55,292	9,167	8,342
2049	53,187	7.30	57,375	9,519	8,638
2050	55,180	7.29	59,519	9,880	8,942
2051	57,118	7.28	61,603	10,233	9,235
5 Year Avg Growth	5.5%		5.2%	5.3%	4.8%
10 Year Avg Growth	5.2%		5.1%	5.2%	4.7%
20 Year Avg Growth	5.1%		5.0%	5.1%	4.7%
25 Year Avg Growth	4.8%		4.7%	4.8%	4.5%

¹ In the process of developing the demand forecast, all embedded generation that is not metered real time at NSCC is evaluated to reflect the actual demand and generation.

² Net losses include losses at the Transmission & Distribution levels and excludes Generation (including auxiliary consumption) losses. Loss forecast will vary depending on the renewable thermal generation mix of the future.