Causes for Higher Electricity Cost & Our Possible Vulnerability to Climate Change

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Content

Installed Capacity (As of 31/12/2024)

Source	Capacity (MW)	Percentage (%)
Major Hydro	1,535	26%
Solar	1,569	26%
Wind	267	4%
Mini Hydro	430	7%
Biomass & Other	59	1%
Total RE	**3,860**	**64%**
Total Thermal	**2,206**	**36%**
Total Capacity	**6,066**	

Provisional data as of 05/03/2025

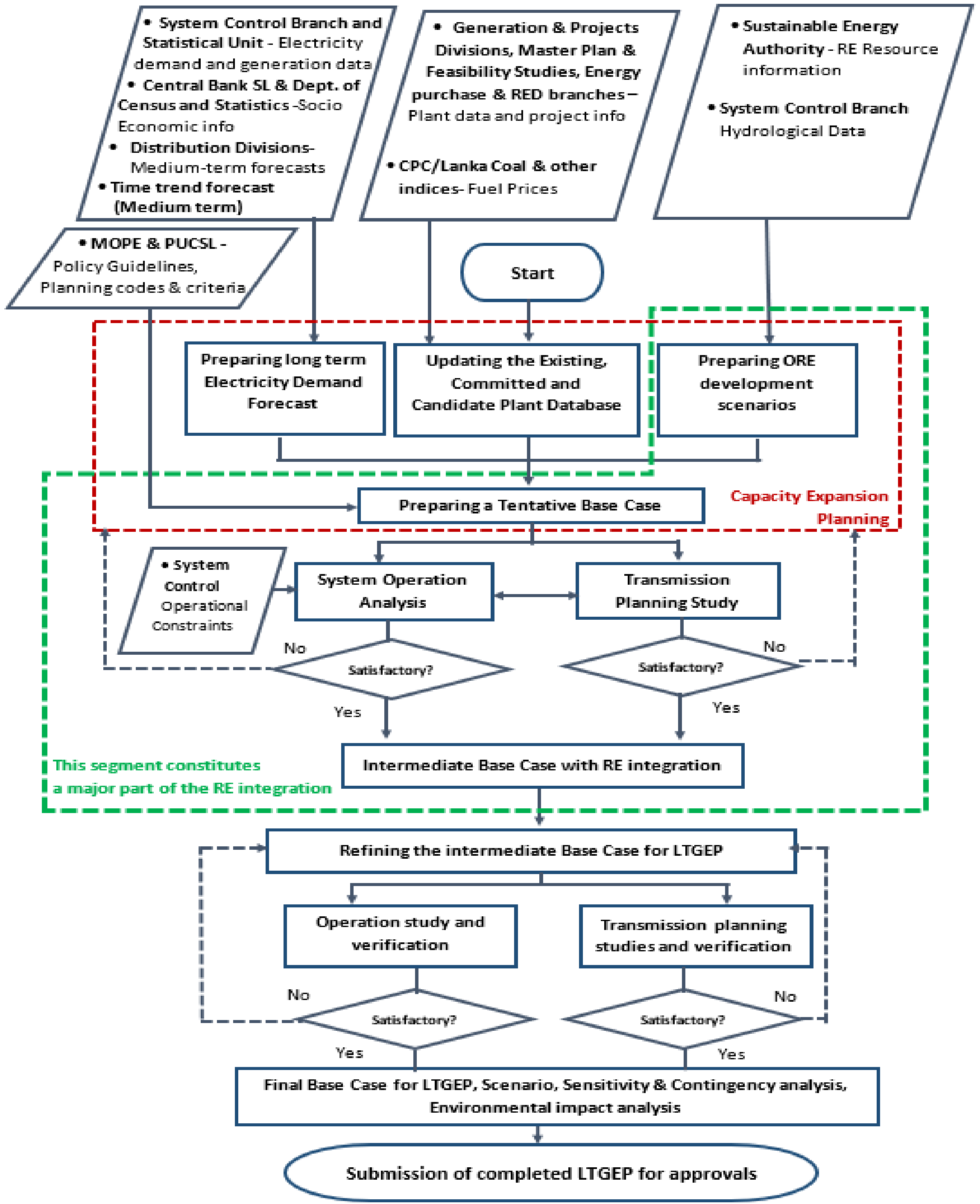
Generation 2024 (Provisional)

Source	Generation (GWh)	Percentage (%)
Major Hydro	5,426	31%
Solar	1,757	10%
Wind	792	5%
Mini Hydro	1,294	8%
Biomass & Other	148	1%
Total RE	**9,417**	**55%**
Total Thermal	**7,820**	**45%**
Total Capacity	**17,237**	

Rooftop solar generation is estimated
Provisional data as of 05/03/2025

General Policy Guidelines on the Electricity Industry – 2022

- Achieve 70% of electricity generation by 2030 from renewable energy Sources
- Achieve carbon neutrality in power generation by 2050
- Cease building of new coal-fired power plants
- New addition of firm capacity will be from clean energy sources such as re-gasified liquefied natural gas (RLNG)
- Energy storage options such as Pumped Hydroelectric Energy Storage (PHES) and Battery Energy Storage Systems (BESS) will be introduced to ensure reliability and quality of electricity supply



•Generation Planning Process with RE Integration

Demand Forecast Methodology

- 25 Year Electricity Demand Forecast =

Medium Term Forecast + Long Term Forecast

Time Trend Analysis, Time Series Distribution Division Forecast Analysis

Econometric Demand Forecast Approach

(Statistical approach which develop the relationship between dependent variable and set of independent variables)

- Electricity Generation Forecast =

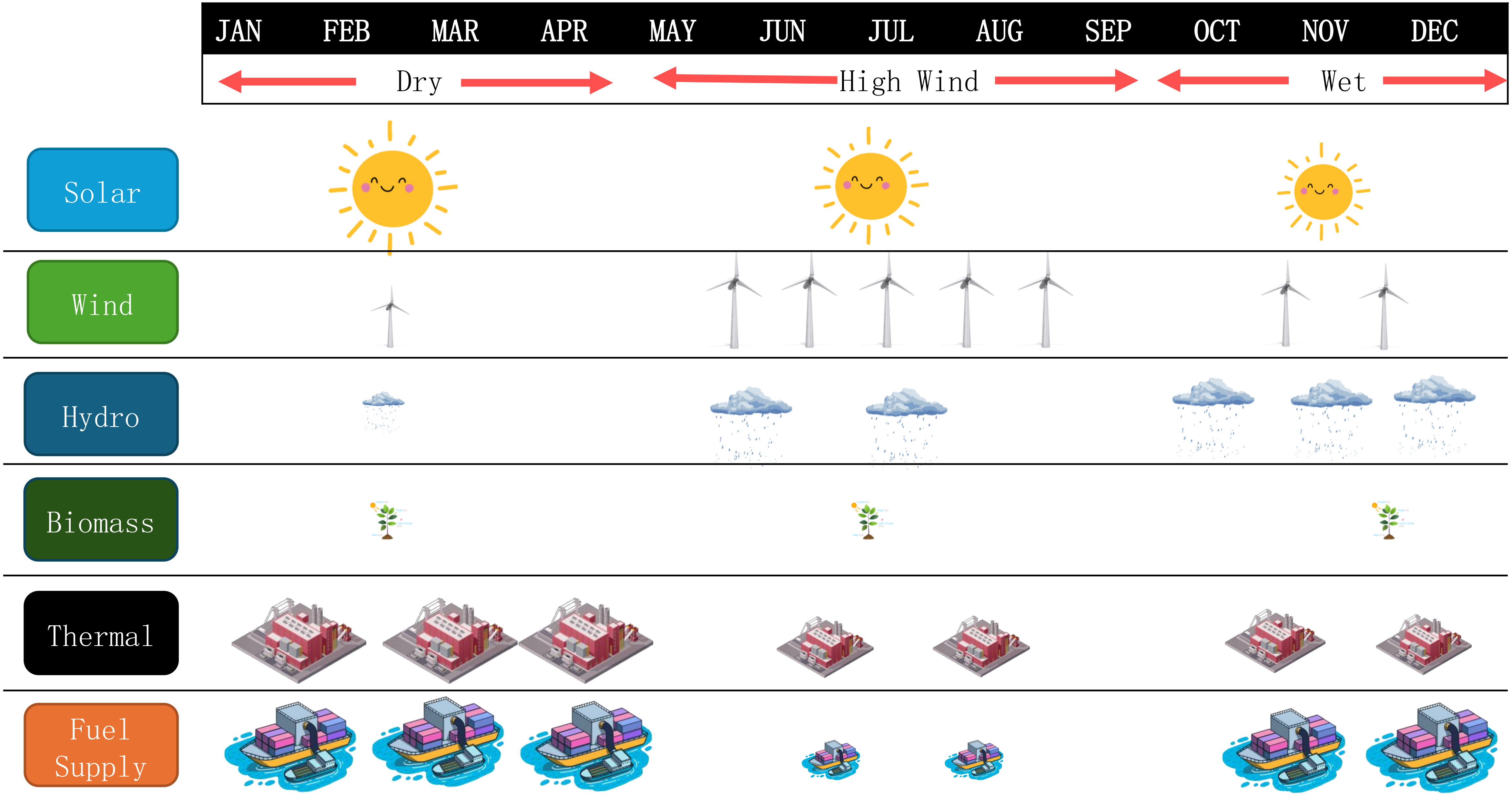
  Electricity Demand Forecast + Total Losses Forecast

- Peak Forecast = $\frac{\text{Final Generation Forecast}}{\text{(Load Factor Forecast x 8760)}}$

Demand Forecast – Draft LTGEP 2025–2044

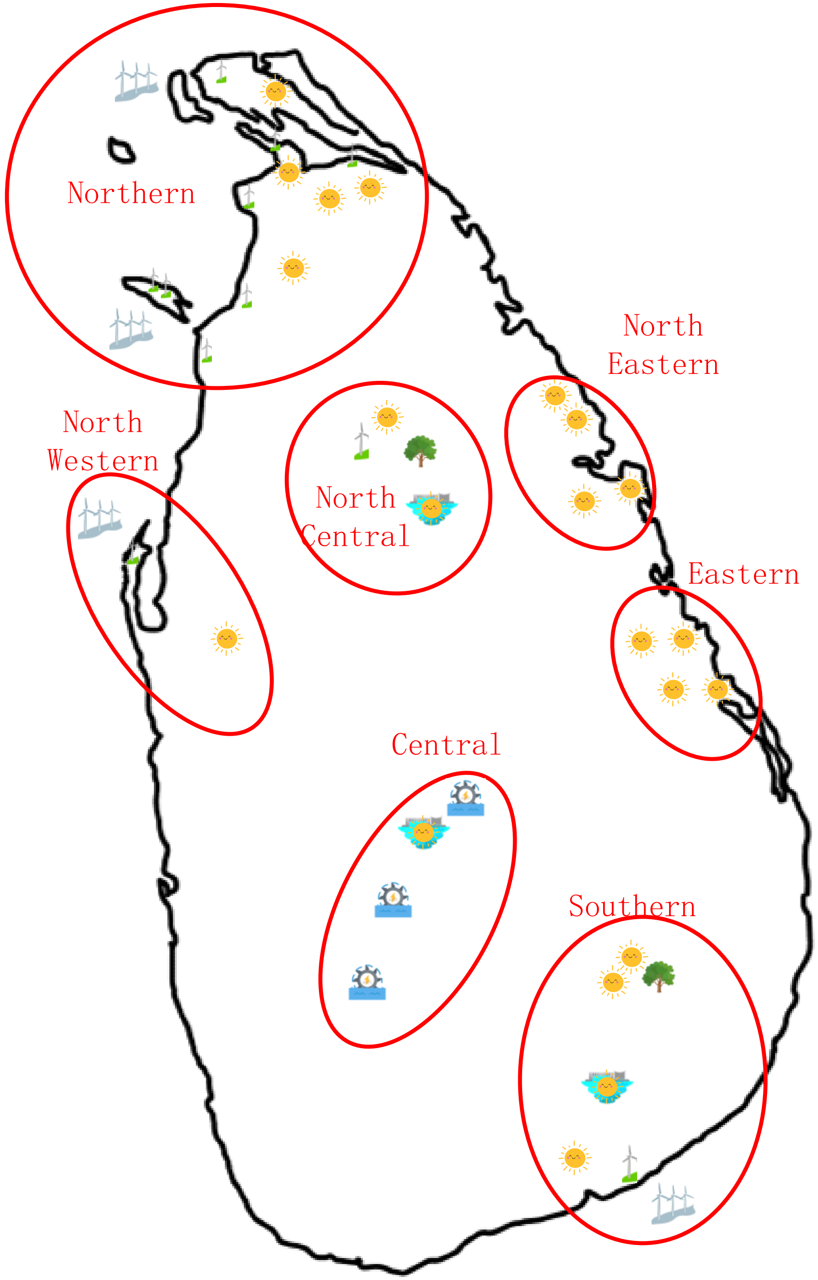
Year	Demand	Net Loss	Net Generation	Day Peak Demand	Night Peak Demand
	GWh	%	GWh	MW	MW
2025	16,319	7.93	17,725	2,727	2,696
2026	17,203	7.76	18,650	2,872	2,824
2027	18,135	7.62	19,630	3,027	2,959
2028	19,118	7.48	20,662	3,190	3,101
2029	20,153	7.34	21,750	3,362	3,250
2030	21,245	7.34	22,927	3,548	3,411
2031	22,264	7.33	24,026	3,722	3,560
2032	23,329	7.33	25,174	3,904	3,714
2033	24,438	7.32	26,369	4,094	3,874
2034	25,602	7.32	27,624	4,294	4,041
2035	26,842	7.31	28,961	4,507	4,219
2036	28,188	7.31	30,411	4,738	4,412
2037	29,619	7.31	31,953	4,985	4,616
2038	31,141	7.30	33,594	5,247	4,833
2039	32,702	7.30	35,275	5,516	5,055
2040	34,338	7.29	37,038	5,798	5,286
2041	36,058	7.29	38,892	6,095	5,528
2042	37,798	7.28	40,767	6,397	5,772
2043	39,582	7.28	42,689	6,706	6,020
2044	41,424	7.27	44,673	7,026	6,275
5 Year Avg Growth	5.4%		5.2%	5.4%	4.8%

Seasonality with Source of Generation



Renewable Energy Resources Potential

Renewable Energy Zone	Potential Absorption Capacity (MW)						
	Solar		Wind				
	Ground Mounted	Floating	On Shore	Off Shore	Mini Hydro	Biomass	Total
Northern	1,700	10	1,400	2,500	–	15	5,565
Northeastern	1,800	40	10	–	–	25	1,875
Northwestern	50	–	200	500	–	10	760
North Central	50	620	200	–	–	45	910
Eastern	1,200	30	–	–	–	30	1,260
Southern	400	100	50	1,000	–	60	1,560
Central	–	700	–	–	300	15	1,090
Total	**5,200**	**1,500**	**1,860**	**4,000**	**300**	**200**	**13,000**



Capacity Additions Till 2030 – LTGEP 2025 – 2044(Draft)

Year	Peak Demand (MW)	Gross Capacity Addition (MW)							
		Gas Turbines	IC Engines	Combined Cycle	Nuclear	Battery Storage	ORE	Total	Existing Plant Retirements
2025	2,727					5	230	235	
2026	2,872			115		100	485	700	(115)
2027	3,027			235			690	925	
2028	3,190		200	115		100	690	1105	
2029	3,362					100	640	740	
2030	3,548	130				50	640	820	
Total		130	200	465		355	3375	4525	

Renewable Energy Additions: LTGEP 2025 – 2044 (Draft)

Type	Major Hydro	Mini Hydro	Wind	Biomass	Rooftop Solar	Grid Connected Solar	Total Solar
As of (2023 Dec)	1,413	419	267	54	810	139	949
2024	151				145	14	159
2025		10	10	10	150	50	200
2026		10	90	15	150	**220**	370
2027		10	260	20	150	**250**	400
2028		20	200	20	150	**300**	450
2029		20	150	20	150	**300**	450
2030		20	150	20	150	**300**	450
Total Addition	151	90	860	105	1,045	1,250	2,479

Mandatory Grid Interventions

Battery Energy Storage Systems

1. 100 MW / 100 MWh BESS at Kolonnawa in 2026 (✔)
2. 100 MW / 400 MWh BESS at Southern Region in 2028
3. 100 MW / 400 MWh BESS in 2029
4. 50 MW / 50 MWh BESS in 2030
5. 100 MW / 400 MWh BESS in 2031
6. 200 MW / 800 MWh BESS in 2032

Primary Frequency Regulation
Fast Frequency Response
Energy Shifting
System Restoration

Pumped Hydro Storage Systems

1. 3x 200 MW PSPP at Maha in 2034

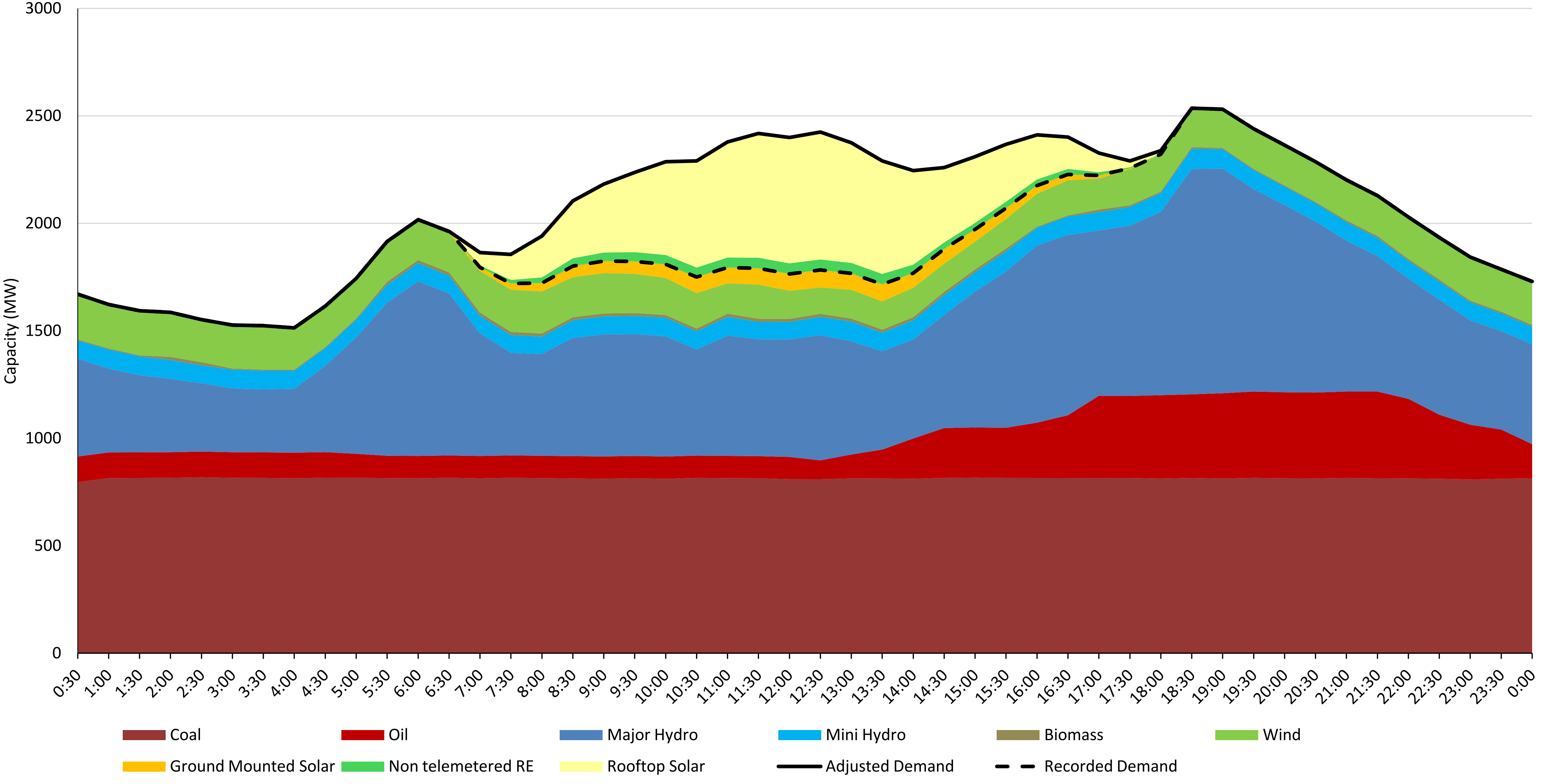
→ Energy Shifting , Inertia support

Synchronous Condensers

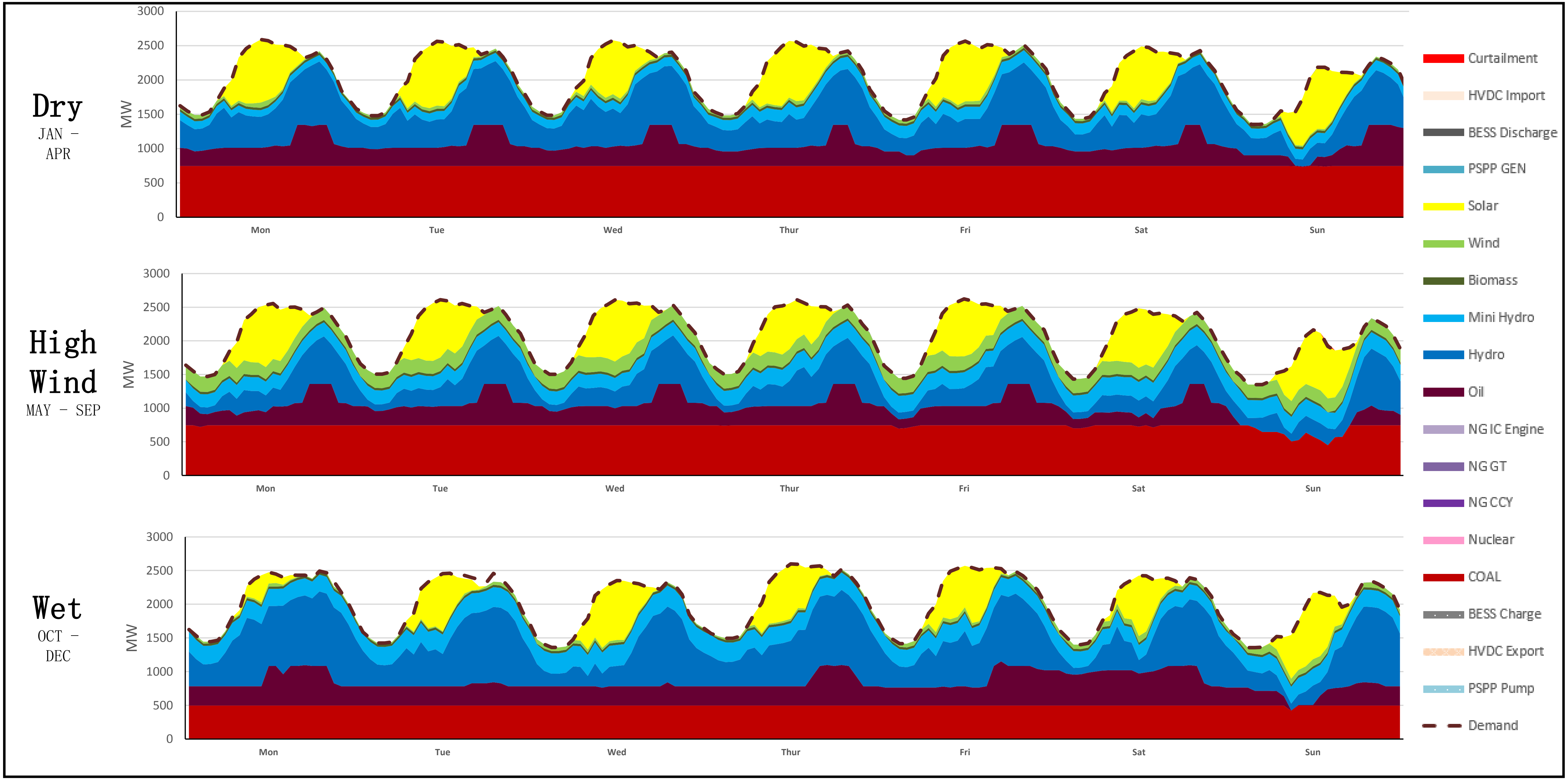
1. 300 Mvar STATCOM at Padukka 220kV GSS in 2026
2. 200 Mvar STATCOM at New Kolonnawa 132kV GSS in 2028
3. 70 MVA Synchronous Condensers at Mannar in 2028
4. 70 MVA Synchronous Condensers at Habarana in 2028
5. 125 MVA Synchronous Condenser Unit at N Collector in 2030

Inertia Support
Fault Current Requirements

Demand Curve of a Typical Day 2024



Generation Pattern year 2025



Factors Affecting Electricity Costs

Factors Affecting Electricity Costs

Dealy in Projects

- LTGEP proposes most economical & technically feasible generation mix for the country constrained by prevailing policies
- LTTDP presents the transmission infrastructure development plan to evacuate power from the power station while ensuring system stability and reliability
- It is essential to timely implement the projects identified in the plans to provide affordable electricity
- Delay in projects identified in plans has resulted in significant losses to the country and in turn increase generation costs as in the absence of the expected generation plants and transmission infrastructure, the most economical generation mix can not be reached
- Challenges in finding funds have been increasingly difficult

Factors Affecting Electricity Costs

Cancellation of Matured Projects

- Generation & transmission projects are projects with long gestation periods.
- Must plan well in advance to complete feasibility studies, land acquisitions, handle legal disputes, environmental studies, settle social concerns, design, procurement and construction etc
- Cancellation of matured projects be it for political reasons or social concern or financial concern or environmental concern, costs millions of dollars to the economy due to large upfront c ure generation using alternate high cost sources

Factors Affecting Electricity Costs

Inconstancies in policies

- Sudden and significant changes in policies are difficult to cope in power sector due to the nature of the sector
- Gradual transitions are preferred in the power sector while safeguarding the system stability and maintaining generation and transmission costs at the minimum
- Sometimes sector experts’ comments are disre
- Ad-hoc changes comes with higher costs

Factors Affecting Electricity Costs

Weather/Climate Changes

- Sri Lanka has a high share of hydro capacity which is highly dependent on weather patterns
- During prolonged dry periods generation costs increases due to combustion of fuel in generation plants. Specially peaking plants are operated in high cost fossil fuels

Factors Affecting Electricity Costs

Reliance on High Cost Fossil Fuel and Unavailability of Natural Gas

- When there is a reduction in renewable energy and for reliability purposes thermal fleet is required to run
- Due to the absence of low cost thermal generation plants, which were delayed or canceled, some times system operators are compelled to run high cost plants increasing generation costs

Climate Change and Its Impacts to Sri Lanka

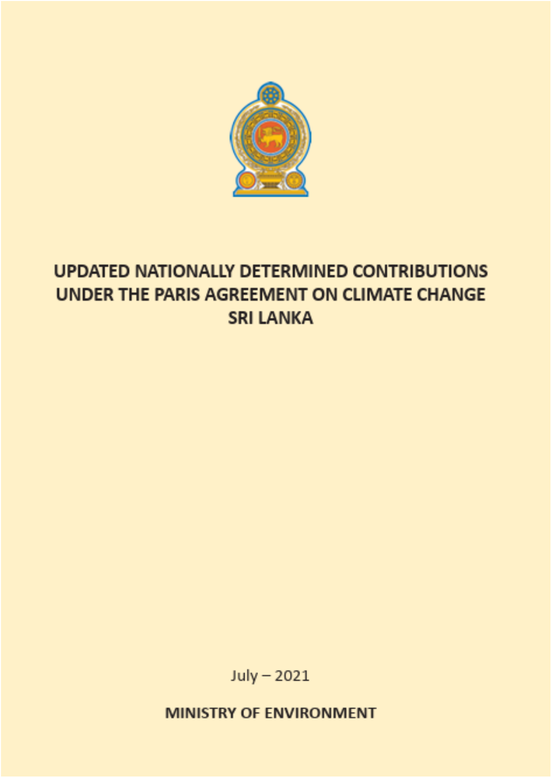
Climate Vulnerability of Sri Lanka

- Sri Lanka faces high climate vulnerability due to its location as a tropical island, making it susceptible to extreme weather events like droughts, floods, landslides, and cyclones, impacting its economy, ecosystems, and communities.
- Sri Lanka is consistently ranked among the top countries at risk from extreme weather events

Nationally Determined Contributions (NDCs)

NDC 1.0 (2016)
Sri Lanka's targets of reduction of emission targets are 20% in electricity (4% unconditionally and 16% conditionally)

NDC 2.0 (2021)
A GHG reduction of 25% in the electricity sector is envisaged (5% unconditionally and 20% conditionally) equivalent to an estimated mitigation level of 9,819,000 MT unconditionally and 39,274,000 MT conditionally (total of 49,093,000 MT) of carbon dioxide equivalent during the period of 2021-2030. (Compared to the BAU scenario of the Long-Term Generation Expansion Plan 2013-2032 of Ceylon Electricity Board published in October 2013).


UPDATED NATIONALLY DETERMINED CONTRIBUTIONS
UNDER THE PARIS AGREEMENT ON CLIMATE CHANGE
SRI LANKA

July – 2021

MINISTRY OF ENVIRONMENT

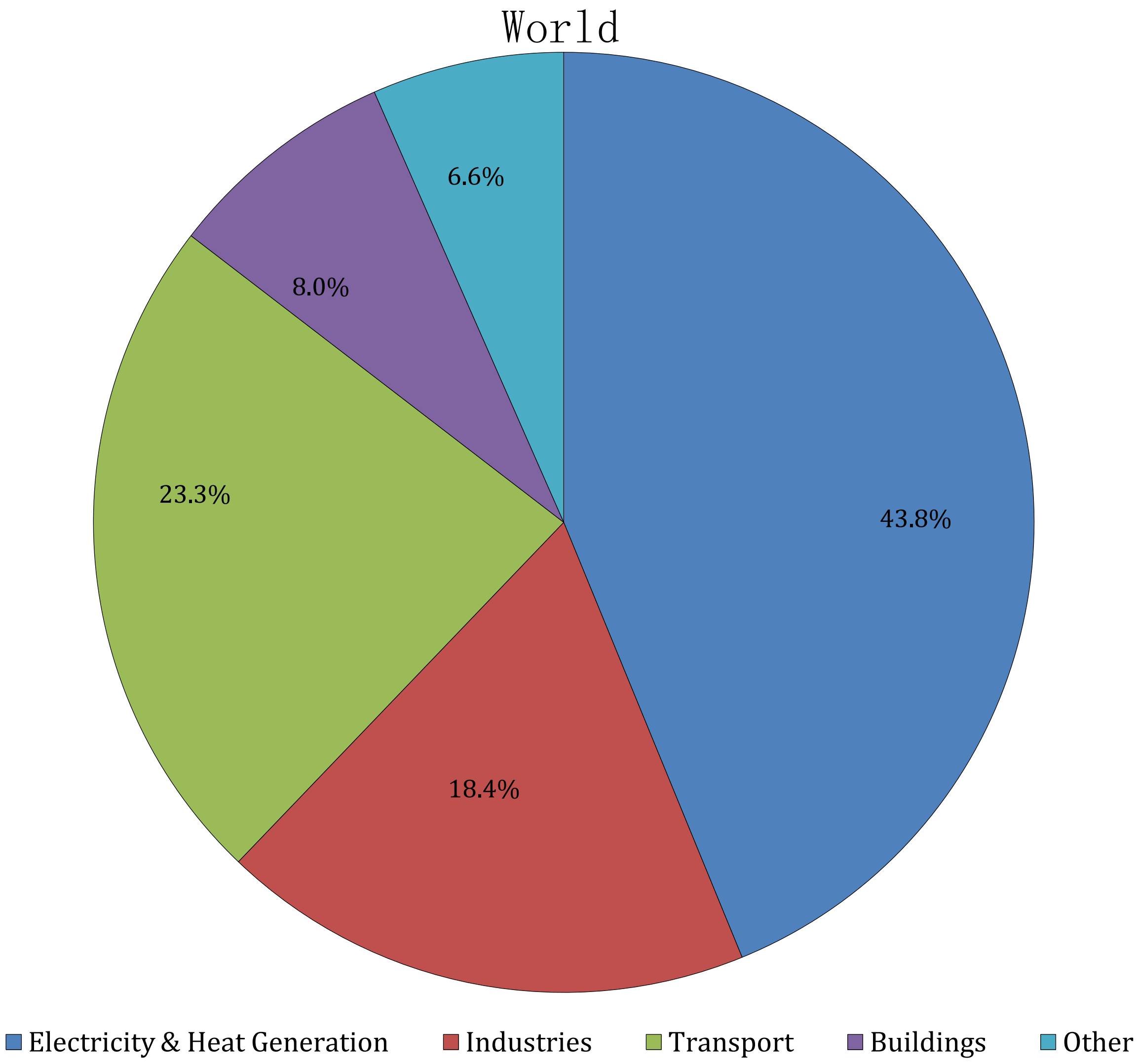
NDC 3.0 (2025)
Preparing is in progress

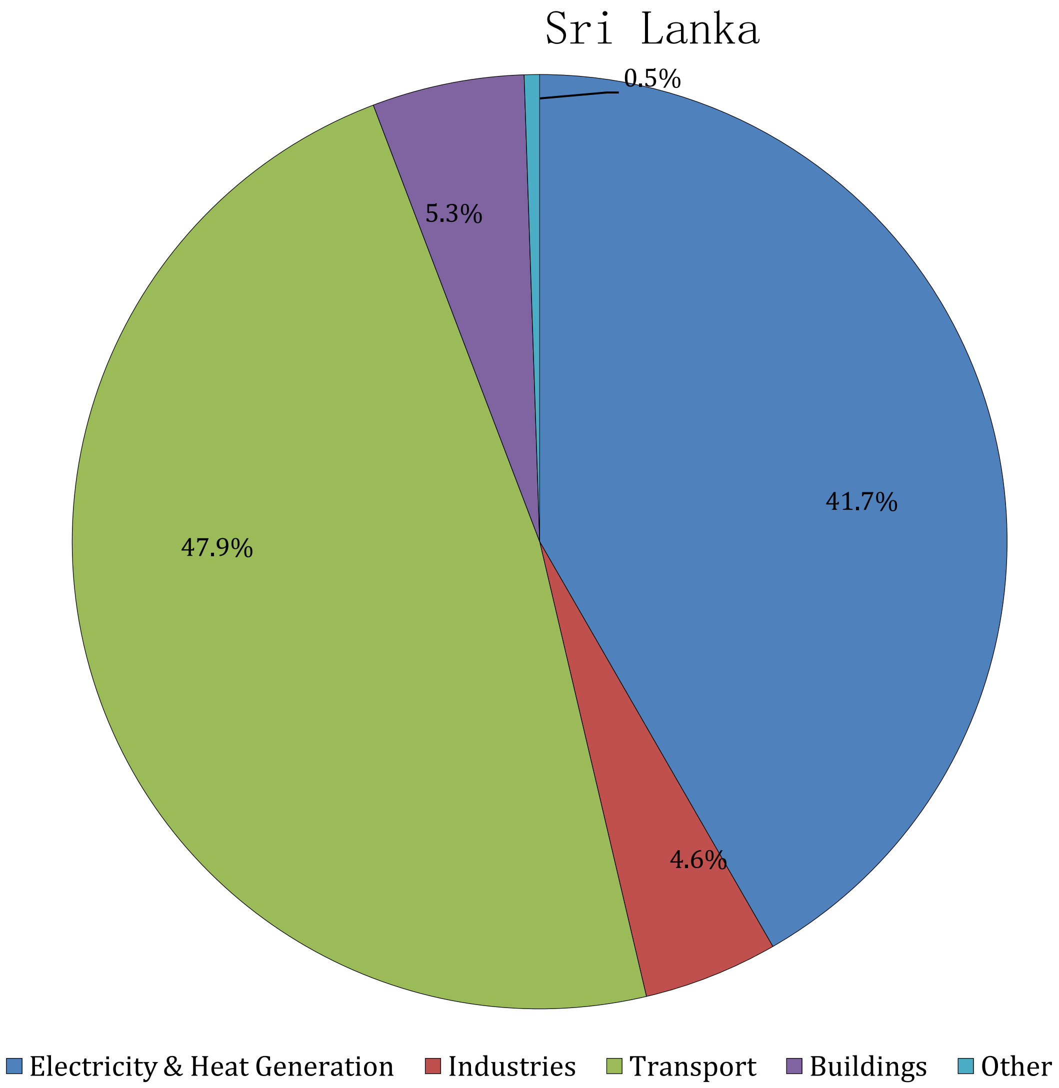
Comparison of Emissions from Fuel Combustion (2022)

Country	Total GHG Emissions – Fuel Combustion ($MtCO_2eq$)	CO_2 Emissions per Total Energy Supply (tCO_2/TJ)	CO_2 Emissions per Unit of GDP (PPP) ($kgCO_2$/2015 USD)	CO2 Emissions per Population (tCO_2/capita)
Sri Lanka	20.9	41.7	0.1	0.8
Pakistan	232.6	41.9	0.2	0.9
India	2,651.9	59.2	0.2	1.8
Bangladesh	112.8	49.3	0.1	0.6
Indonesia	663.3	59.7	0.2	2.4
Malaysia	243.3	57.9	0.3	7.1
Thailand	255.9	44.8	0.2	3.5
China	10,750.8	66.7	0.4	7.5
Japan	982.5	59.3	0.2	7.8
France	289.6	32	0.1	4.1
Denmark	27.7	41.2	0.1	4.5
Germany	621.7	53.9	0.1	7.3
Switzerland	32.7	33.4	0.1	3.6
United Kingdom	314.1	48.3	0.1	4.6
Russia	1,635.1	48	0.4	11.3
USA	4,677.8	50.6	0.2	13.8
Canada	530.4	42.1	0.3	13.4
Australia	358.6	66.6	0.3	13.6
South Africa	398.8	76.3	0.5	6.6
Brazil	439.2	32.9	0.1	1.9
World	34,981.2	54.8	0.2	4.3

Source : International Energy Agency Statistics

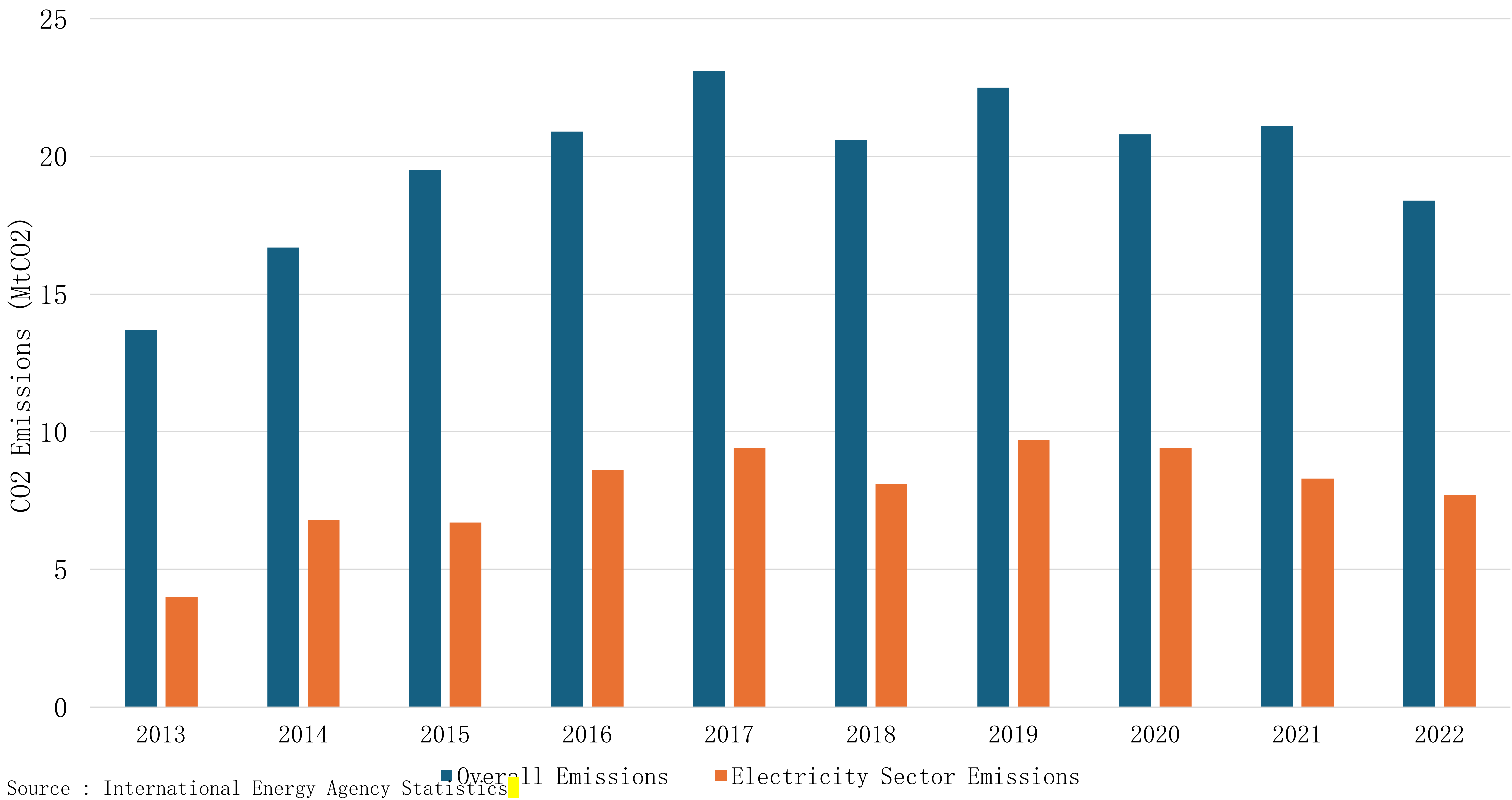
Sri Lanka CO2 Emissions from Fuel Combustion 2022





Source : International Energy Agency Statistics

Sri Lanka CO2 Emissions in the Recent Past



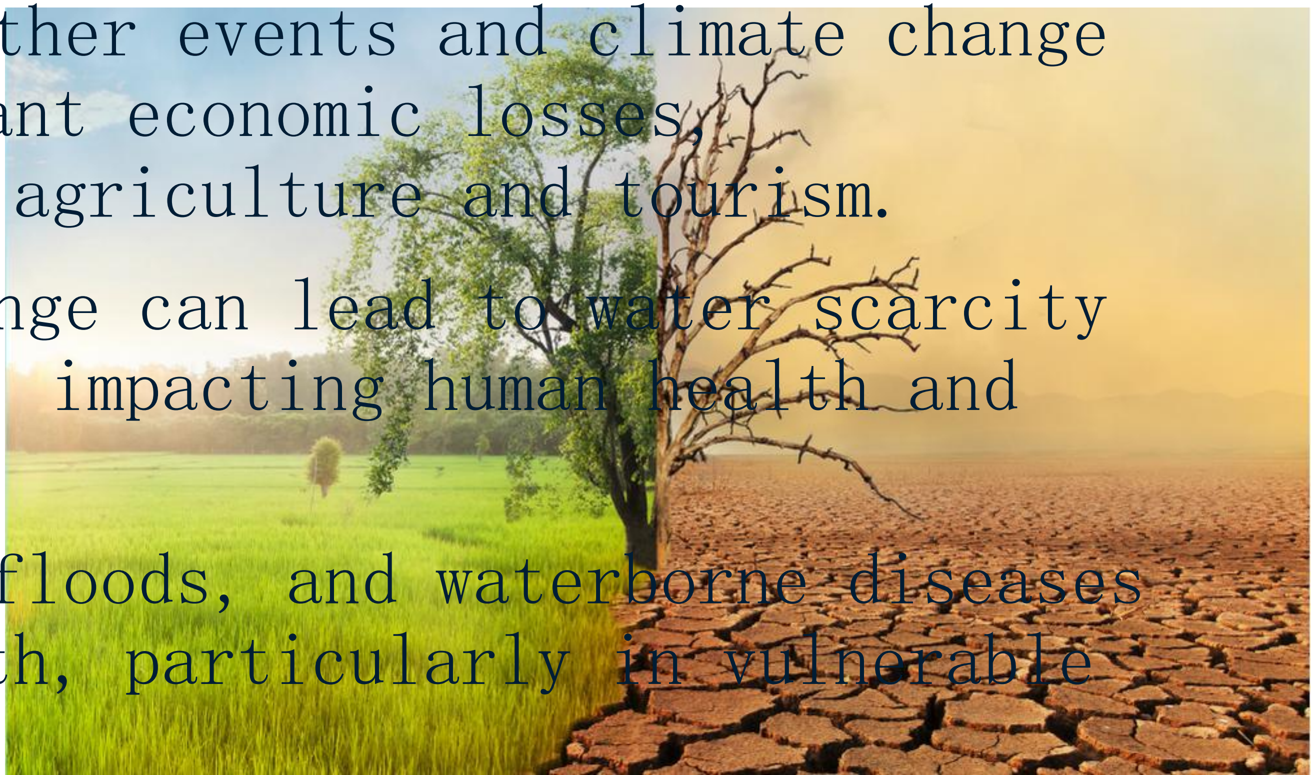
Source : International Energy Agency Statistics

Key Climate Risks

- **Droughts and Floods:** The country experiences both droughts and floods, impacting agriculture, water resources, and livelihoods.
- **Landslides:** Landslides are a frequent hazard, particularly in mountainous areas, causing damage and displacement.
- **Cyclones:** Sri Lanka is located in an area prone to cyclones, which can cause widespread damage and disruption.
- **Coastal Erosion:** Coastal areas are vulnerable to erosion, threatening infrastructure and communities.
- **Extreme Heat:** The number of days with temperatures exceeding 35°C is projected to

Impacts

- **Agriculture and Food Security:** Climate change impacts on rainfall patterns and water availability threaten agricultural productivity and food security, especially in the Dry Zone.
- **Economic Losses:** Extreme weather events and climate change impacts can lead to significant economic losses, particularly in sectors like agriculture and tourism.
- **Water Resources:** Climate change can lead to water scarcity and changes in water quality, impacting human health and sanitation.
- **Human Health:** Extreme heat, floods, and waterborne diseases can pose risks to human health, particularly in vulnerable communities.



Climate Vulnerability of Sri Lanka

Vulnerable Populations:

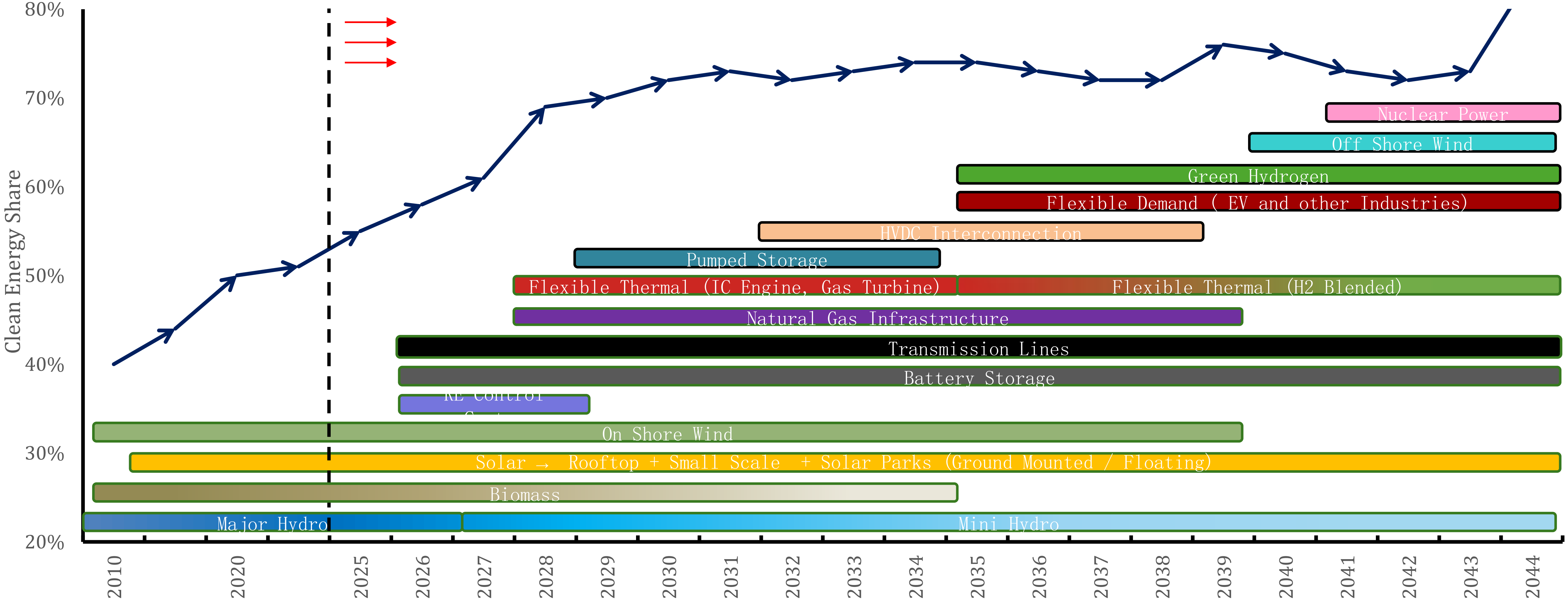
- A large portion of the population, including smallholder farmers and those living in coastal and rural areas, are particularly vulnerable to climate change impacts.

Adaptation and Mitigation:

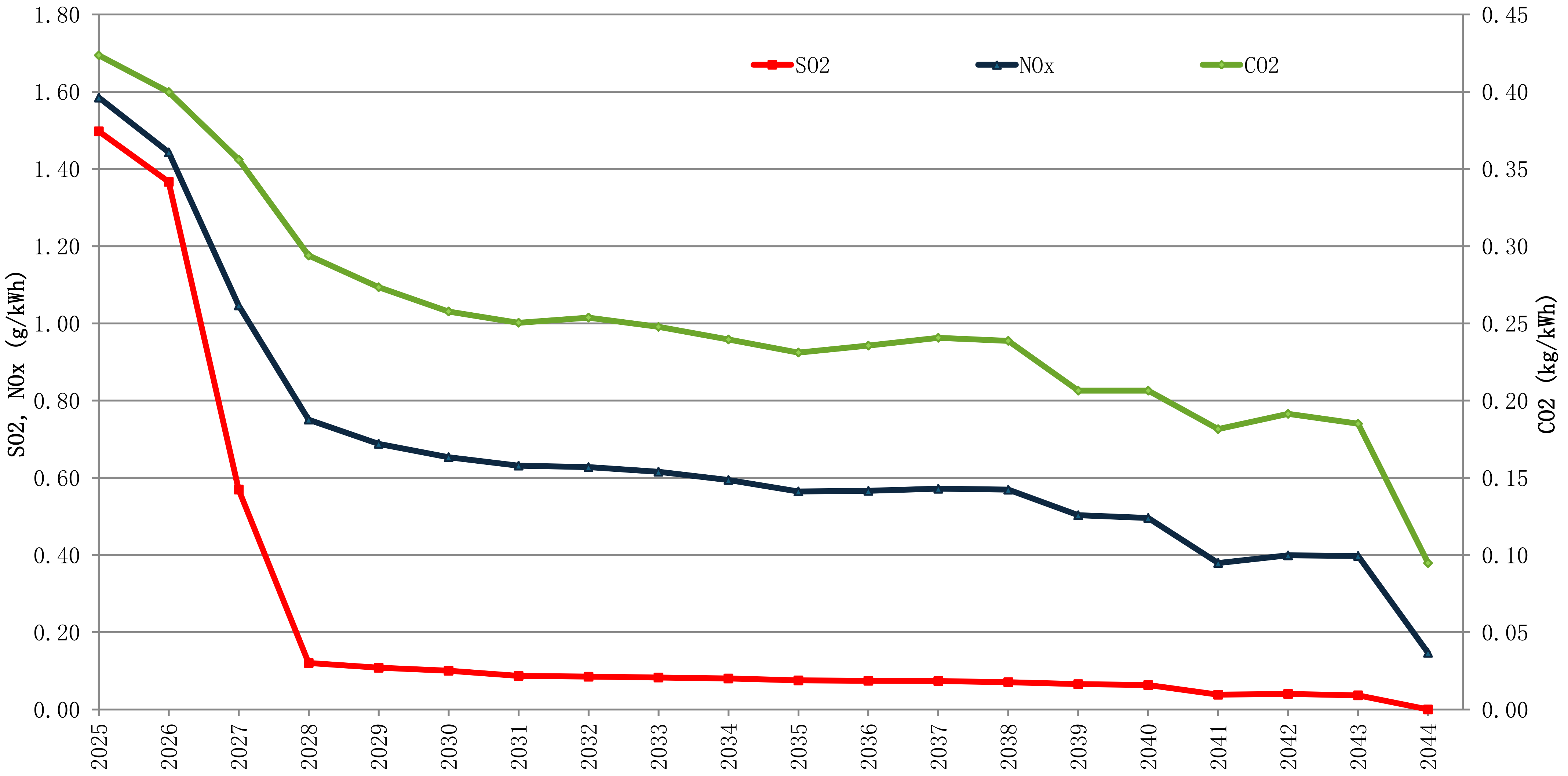
- Sri Lanka needs to invest in adaptation and mitigation measures to build resilience to climate change impacts, including strengthening water management, improving infrastructure, and promoting sustainable land management practices.

Way Forward in Carbon Neutrality in Power Generation

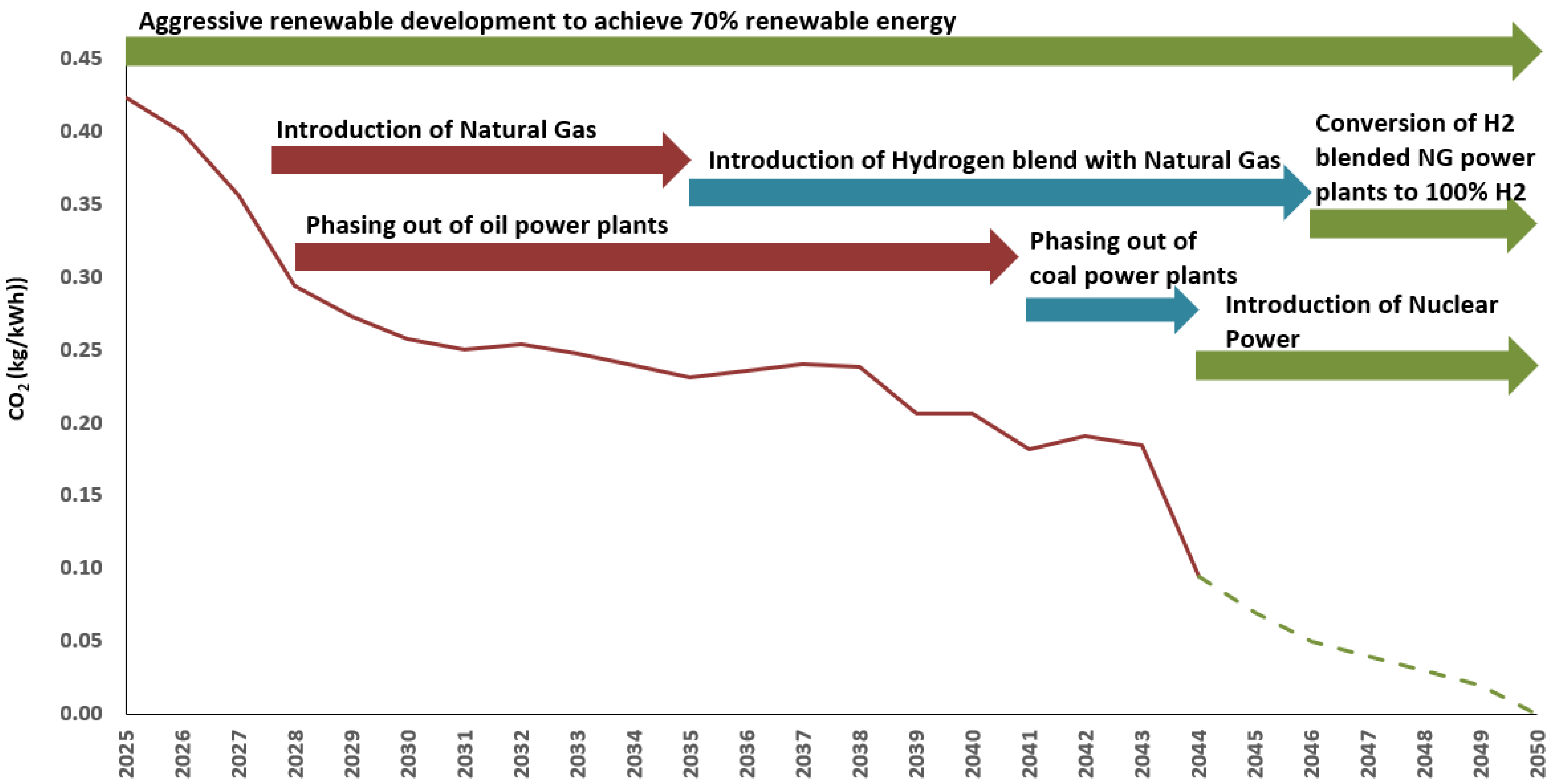
Snapshot of Base Case Plan (Draft LTGEP 2025 - 2044)



Emissions of the Base Case Plan (Draft LTGEP 2025 – 2044)



Pathway to Carbon Neutrality (Draft LTGEP 2025 -2044)



Thank

You