ASIA CLEAN ENERGY FORUM 2025

Empowering the Future: Clean Energy Innovations, Regional Cooperation and Integration, and Financing Solutions

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ADB

Prof. Udayanga Hemapala

Secretary
Ministry of Energy, Sri Lanka

Featured Speaker

STATE-OF-THE-ART SUBSEA POWER CABLES: UNLOCKING THE FUTURE OF GLOBAL ENERGY TRADE

INDIA – SRI LANKA POWER INTERCONNECTION

STATE-OF-THE-ART SUBSEA POWER CABLES: UNLOCKING THE FUTURE OF GLOBAL ENERGY TRADE

BACKGROUND

- At present, exchange of power between India and neighbouring countries (Nepal, Bangladesh, Bhutan and Myanmar) is taking place in synchronous as well as in asynchronous mode. Transmission links (at 11 kV, 33 kV, 132 kV and 400 kV levels) have been established between the border states of Bihar, Uttar Pradesh, Uttarakhand, Tripura, West Bengal and Assam.

- Some interconnections are under construction and several cross-border interconnections have been planned. At present, about 4,100 MW of power is being exchanged with the neighboring countries through cross-border links and the same is likely to increase to about 7,000 MW by the end of 2026-27.

- Under the One Sun One World One Grid initiative, interconnection of the Indian Electricity Grid with the electricity grids of Maldives, Singapore, UAE, Saudi Arabia, etc. is under discussion.

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BACKGROUND

- Governments of India and Sri Lanka signed a Memorandum of Understanding (MOU) in 2010 to conduct a feasibility study for the interconnection of the electricity grids of the two countries. Initial studies were carried out jointly by CEB and Power Grid Corporation Indian Limited (POWERGRID).

- The main objective of the studies were to provide the necessary recommendations for implementation of 1,000 MW HVDC interconnection project

- Consequently, several India-Sri Lanka Joint Technical Team studies has been conducted with changes in routes and options on overhead as well as undersea sub marine cable options.

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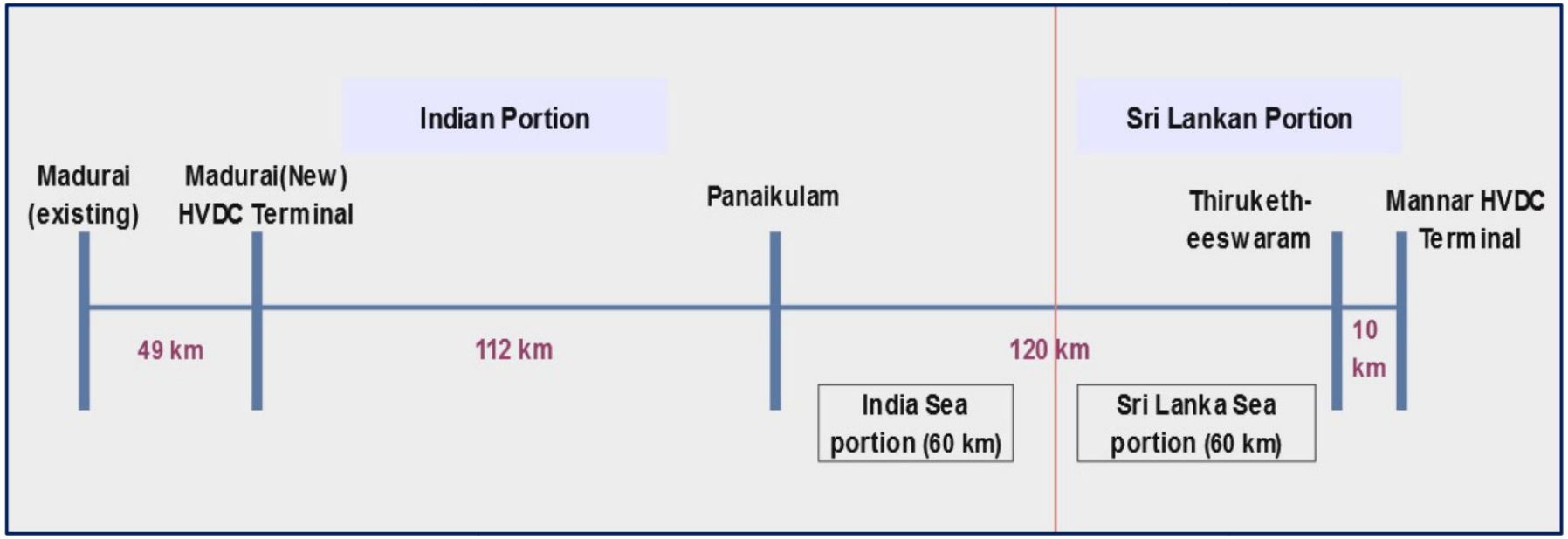
OUTCOMES OF LATEST PROPOSAL (DPR 2023)

- The DPR in 2023 proposes a ±320 kV, 1,000 MW (Phase 1: 500MW, Phase 2: 500MW) VSC HVDC Bipole along with Dedicated Metallic Return (DMR) based interconnection between India and Sri Lanka electricity grids. This results in 240 km HVDC transmission system between Madurai-New (India) and Mannar (Sri Lanka)



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OUTCOMES OF LATEST PROPOSAL (DPR 2023)

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BREAK DOWN OF THE COSTS

Project Cost :
1,225 Million USD (With IDC)
1,095 Million USD (Without IDC)

	India portion (million USD)			Sri Lanka portion (million USD)			
	Base Cost	Taxes & Duties	Total	Base Cost	Taxes & Duties	Total	Total (million USD)
Special tools and plants	2.55	-	2.55	2.55	-	2.55	5.10
Survey, land, compensation	6.57	-	6.57	6.57	-	6.57	13.14
Civil works	2.50	-	2.50	2.50	-	2.50	5.00
Transmission line-Over land	28.90	5.07	33.97	1.91	0.69	2.60	36.57
Transmission line-Under sea	185.78	41.20	226.98	185.78	67.76	253.54	480.52
HVDC terminals, AC substations & Telecommunication system	178.12	37.71	215.83	180.29	77.54	257.83	473.66
Overheads	40.35	-	40.35	40.35	-	40.35	80.70
Total (million USD)	**444.77**	**83.98**	**528.75**	**419.95**	**145.99**	**565.92**	**1094.67**

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POSSIBLE BUSINESS MODELS

- Model 1 : Ownership of respective section of the interconnectors by respective country's public sector
- Model 2 : Formation of an independent special purpose vehicle (SPV) company with respective country's public sector entities
- Model 3 : Public Private Partnership (PPP) Model
- Model 4 : Development through complete private ownership/ private entity as a majority shareholder

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ANNUAL REVENUE REQUIREMENT AND TRANSMISSION CHARGES

	Model-1	Model-2A	Model-2B	Model-3	Model-4
First year annual revenue requirement (USD Mn)	190.89	196.78	221.94	216.69	199.14
Levelized annual revenue requirements (USD Mn) for useful life (35 years)	175.76	179.11	193.35	188.07	180.45
First year transmission charges (UScts/unit)	7.49	7.72	8.71	8.50	7.81
Transmission charges (levelized) (UScts/unit)	6.88	7.02	7.62	7.40	7.07

Uniform utilization for 35 yrs.	Levelized transmission charges for Model-2B (UScts/unit)
40%	11.43
45%	10.16
50%	9.15
55%	8.32
60%	**7.62**
65%	7.04
70%	6.53
75%	6.10
80%	5.72
85%	5.38
90%	5.08

Revenue Requirement has been considered on a cost-plus basis taking into account respective ROE across the proposed development models.)

As Procedural Norm, total cost is expected to be recovered through primary beneficiary (i.e. country importing more electricity) as in Interconnection arrangements of India – Nepal and India – Bangladesh

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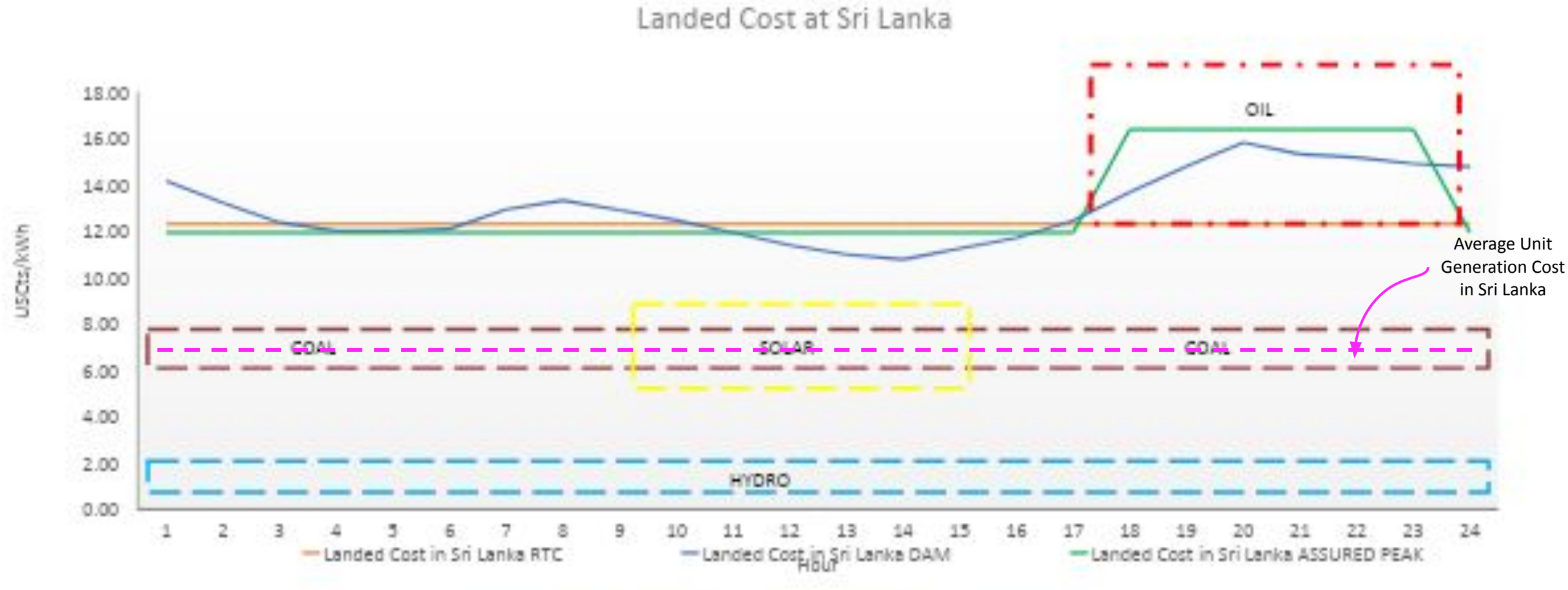
UNIT COST COMPARISION



Assuming 60% Utilization of Interconnector is allowed

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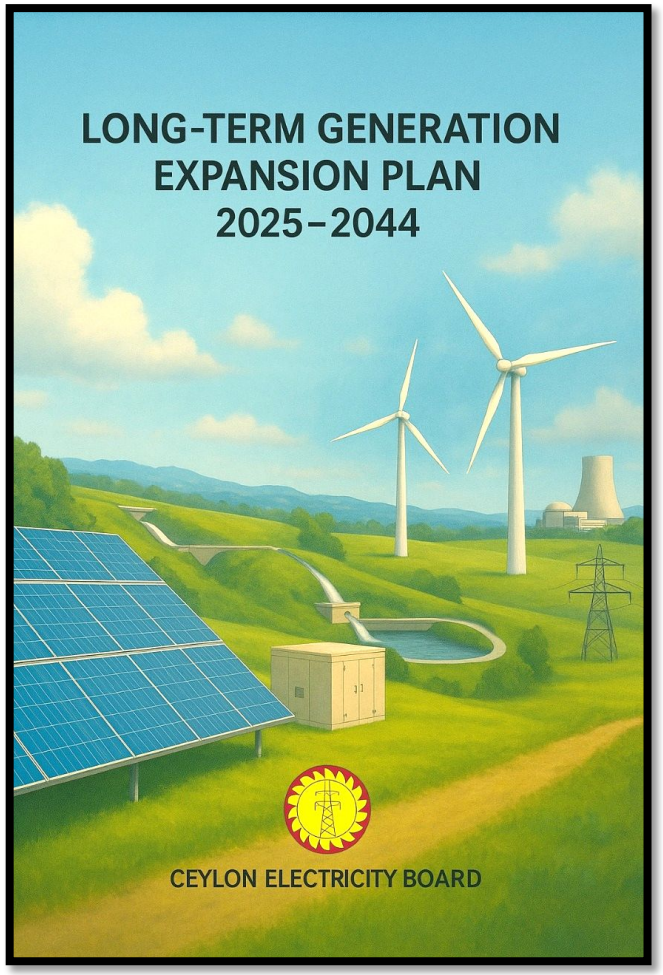
NEXT STEPS



- Project Identified to be developed in latest PUCSL approved Long Term Generation Expansion Plan by year 2039.
- Electricity demand expected to grow to approximately 35,000 GWh by 2039, with over 1,500 GWh of excess renewable generation.
- Project is required to maintain 70% electricity generation by renewable energy sources, while laying pathway to achieve carbon neutrality by 2050.
- Hence construction of the project expected to start by at least year 2032.
- Rasing funding and financing , environmental approvals, land clearances and regulatory frameworks with suitable business models are to be developed in preconstructions stage from 2026-2031.

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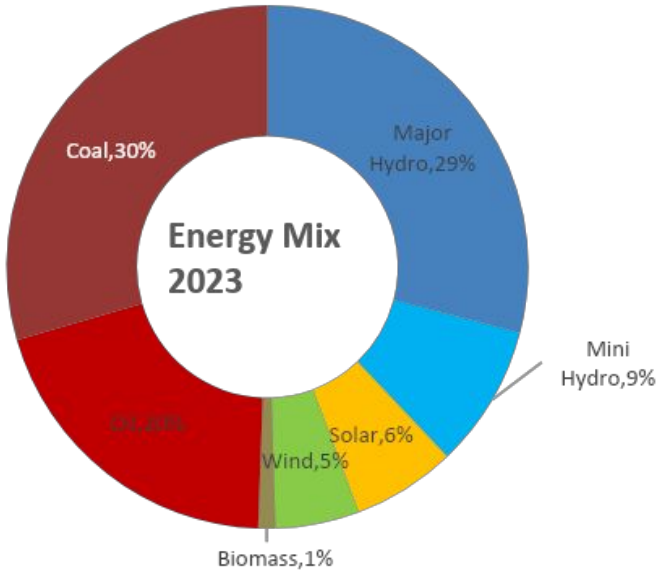
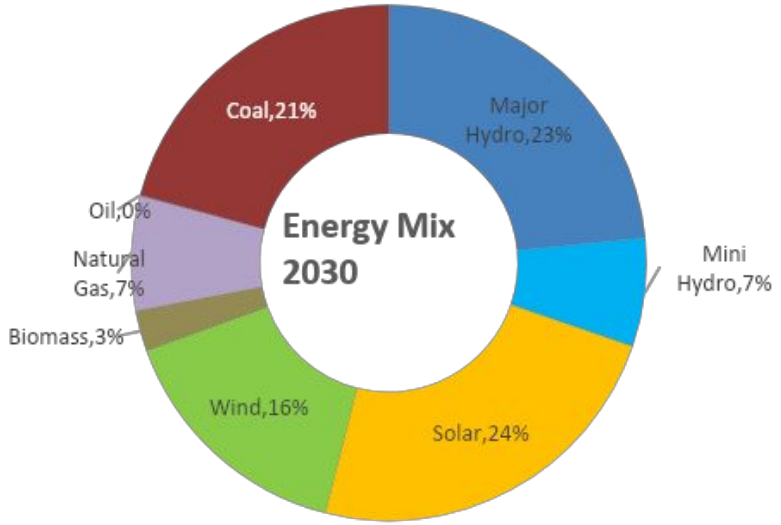
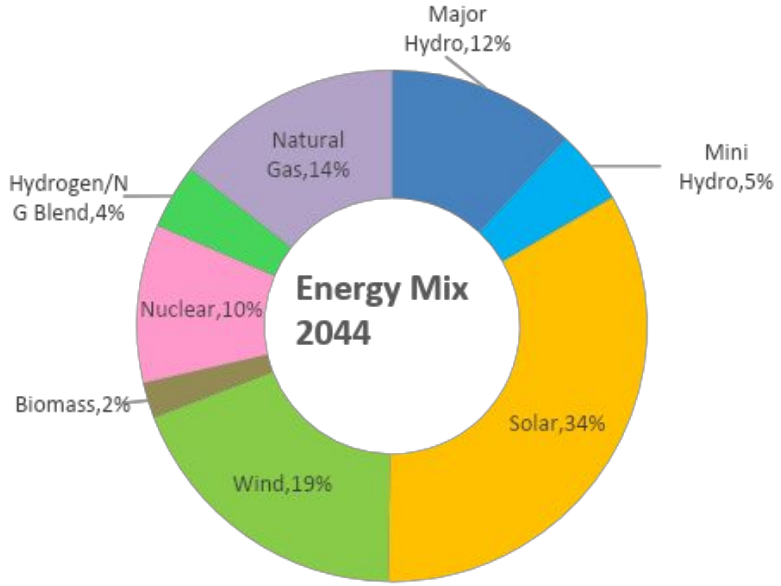
ENERGY MIX FROM 2023 TO 2044







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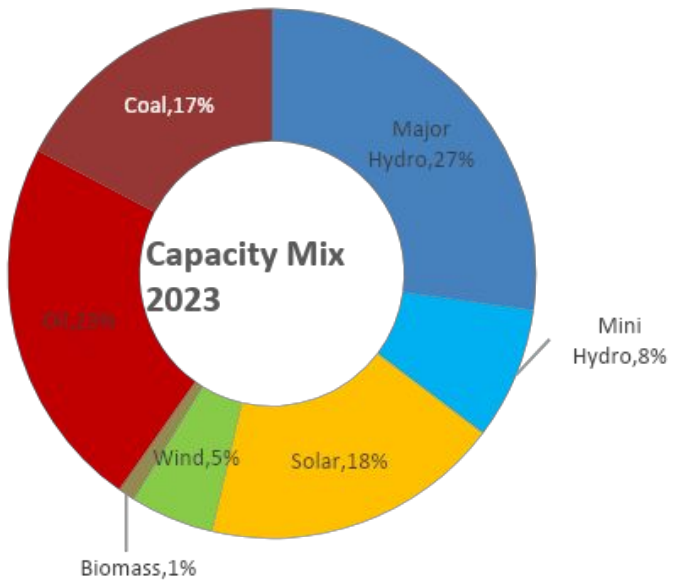
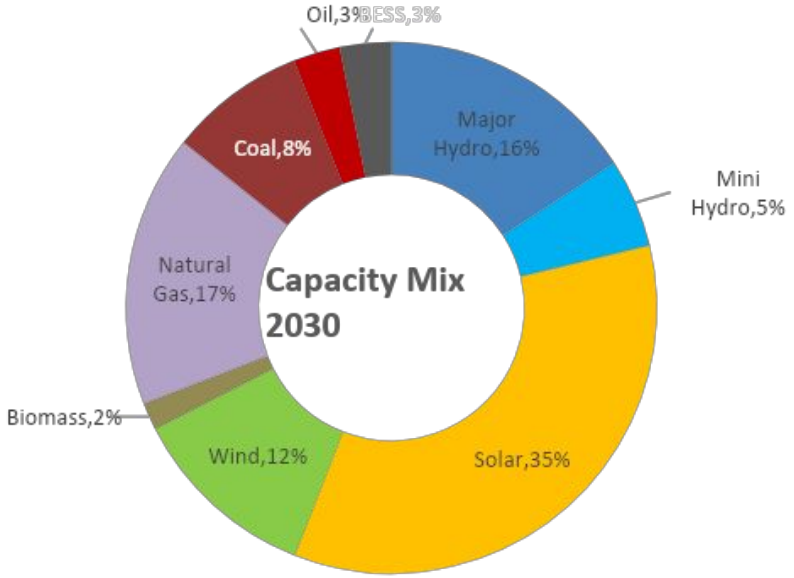
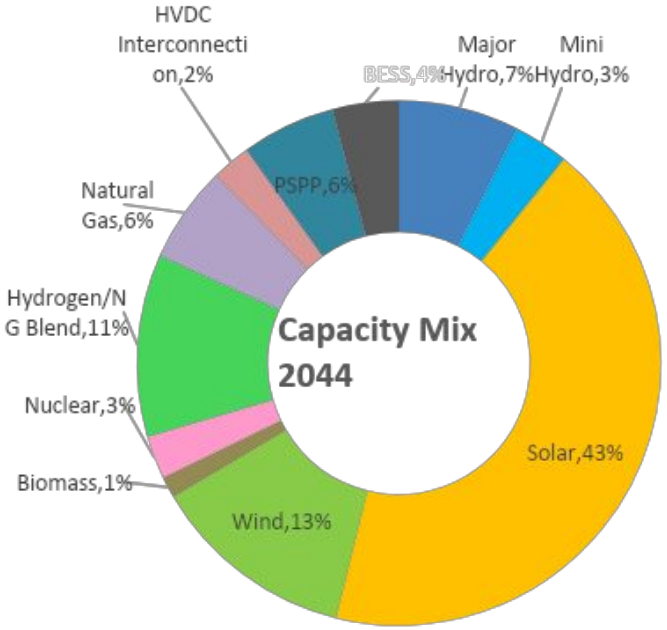
CAPACITY MIX FROM 2023 TO 2044







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IMMEDIATE ACTIONS

- Evaluate potential cost reduction.

- Negotiate method of cost recovery of Interconnection Infrastructure on cost sharing model based on regional integration goal.
    - Split the cost recovery equally or proportionally based on the cost to each side.
    - Asses the capability of financing through concessionary loans for Sri Lankan side investment.

THE END