

A Secure Energy Future for Sri Lanka

With

Renewable Energy and Indigenous Natural Gas

Introduction

The Vistas of Prosperity and Splendour, the policy manifesto of the President Gotabaya Rajapaksha and SLPP states the following with respect to energy (Chapter 7 page 58).

We also anticipate that hydro and renewable energy together would account for 80% of the overall energy mix by 2030.

The manifesto also speaks of 2 more gas powered plants and some renewable projects. Manifesto does not mention any new coal power projects. Longstanding policy of 100% renewable energy by 2040 stands.

To achieve these targets, Sri Lanka cannot build any additional fossil fuel plants (gas, oil or coal), beyond the 2 gas plants in the manifesto, and must embark on an aggressive large scale renewable energy programme. This will save our foreign exchange spent on imported fuel, generate large number of jobs in the country, put money spent on fuel in the hands of Sri Lankan citizens of all income levels and preserve the environment. Reliance on indigenous energy will also ensure energy security and self-sufficiency.

These targets are achievable.

Coal power projects require public sector investment and taking on more debt. Natural gas and renewable projects can be fully financed by private sector funds, so that state sector funds can be invested in more critical areas such as education that will transform our country to reach its potential.

Each coal plant added to the grid reduces the amount of renewable energy that can be absorbed – hence most countries are closing their coal plants to support renewable energy. CEB generation plans REDUCE the amount of renewable energy from current 40% to 30% by 2040!

To achieve the targets, we must change the sector planning approach, bring in global expertise to create skill needed to run a heavy renewable grid, and be a center of global innovation. Sri Lanka can attract highly competent Sri Lankan citizens who are transforming the sector globally, along with companies like Tesla, AES, Samsung who lead market innovation. Creating a local market for product and integration innovation will also enable Sri Lanka to attract these leading tech firms to set up manufacturing and research in Sri Lanka for solar PV, battery storage and other supporting devices.

The Proposals made below are based on the following information and premises

1. Sri Lanka has more than adequate Renewable Energy Resources (ADB Study)
2. There are proven Gas resource in Mannar - Dorado + Barracuda Discoveries - 2 TCF (PRDS data)
3. The present grid can absorb up to 20% VRE without instability (NREL Study)
4. The Govt has a firm commitment to reach 80 RE by 2030 and a target to reach 100% indigenous energy by 2040
5. Based on above a firm policy statement will be issued not to install any more coal power plants
6. The CEB shall be given the executive order to comply with the above govt policy and shall provide the facilitation to achieve the set targets.
7. All present regulatory and legal impediments for development of RE shall be removed forth with
8. All tender documents prepared by CEB shall be whetted for adequacy, accuracy and compliance with procurement guidelines, before publication
9. A firm stage wise target for electrification of transport will be declared

Sector Transformation

Globally, a the energy paradigm is transforming to **distributed renewable energy** becoming central to the grid, with consumers also becoming producers (**prosumers**), shifting energy generation income to households and businesses. This shift away from large centralised generation also enables reduction in investment needed to develop long transmission networks. Such shift is enabled by technologies such as battery storage.

Sri Lankan business sector has demonstrated willingness to invest in renewables – from mini-hydro, dendro, wind and solar (rooftop and ground mounted through Surya Bala Sangramaya), as shown in installed projects and projects pending approval at SLSEA/CEB (over 2400MW).

Sri Lanka has more than adequate Renewable Energy Resources and a 100% renewable energy target feasible by 2040 (ADB Study).

- a. **Biomass 2400 MW,**
- b. **Mini Hydro 873 MW,**
- c. **Wind 5,653 MW and**
- d. **Solar 6,000 MW from just 1% of the scrub lands,.**

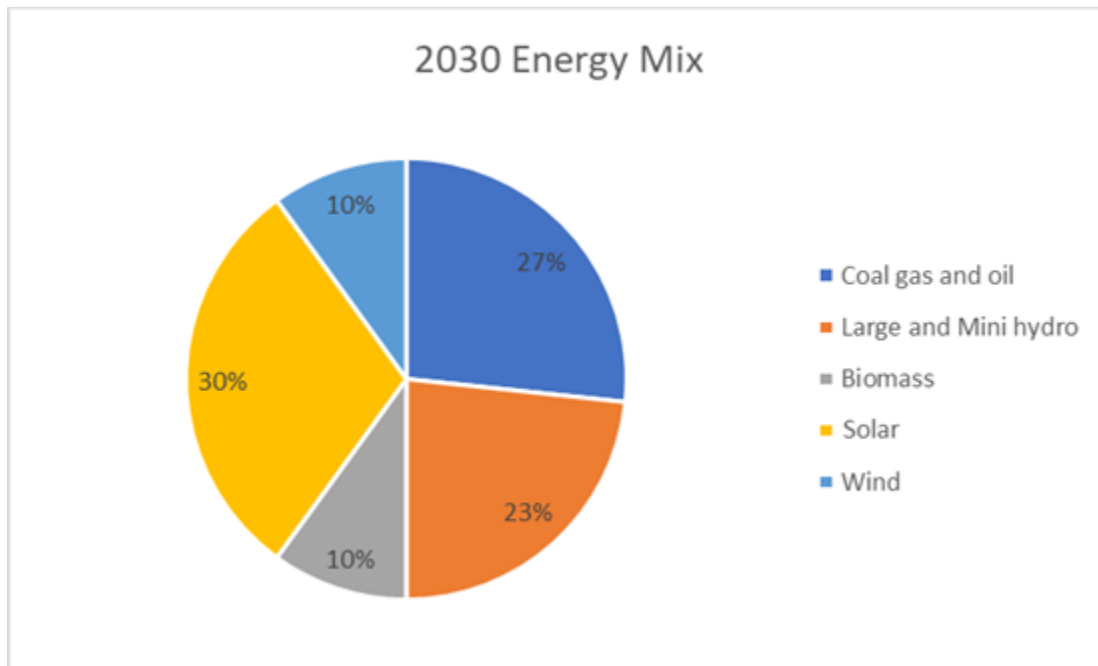
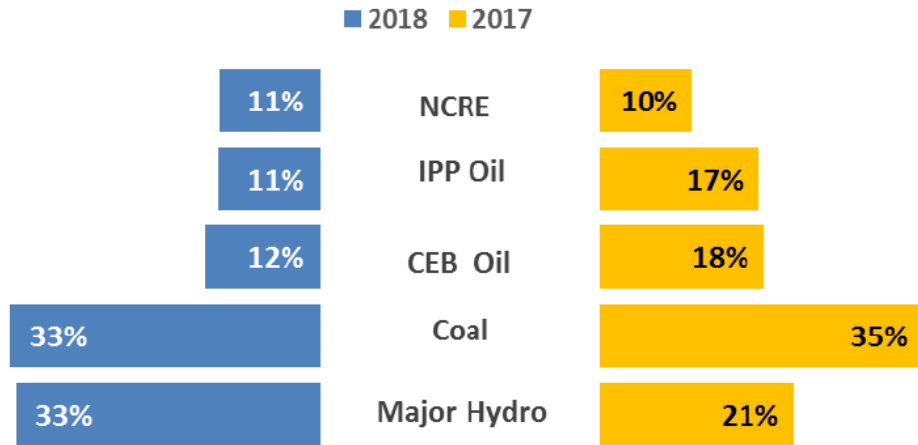
In addition is the **floating Solar Potential of 34,000 MW** with 25 largest reservoirs (15% coverage) and 30 largest lagoons (10% coverage). There are proven Gas resource in Mannar - Dorado + Barracuda Discoveries – of capacity 2 TCF according to Petroleum Resources Development Secretariat (PRDS).

USA National Renewable Energy Lab (NREL) has indicated the present grid can absorb up to 20% variable renewable energy (solar+wind) without stability issues or battery storage, based on a study in 2016. ADB study has indicated that 100% renewable energy target is feasible by 2050.

Based on Lazards and regional cost calculations, such a transition will REDUCE the cost of electricity for consumers rather than going for coal or fossil fuels. At present, cost of electricity from wind and large scale solar are approx. 50% cheaper than electricity generated through coal.

The energy from planned Norachcholai expansion can be met with a 1200 MW floating solar system in Puttalam lagoon, connected to the same transmission line.

Sri Lanka current energy mix and proposed mix for 2030 are given below.



The Master Plan

Estimated 2030 Energy Use – 30,000GWh, Daytime peak 8,000 MW

- a) Coal and NG – 8,000GWh (27%)
- b) Large hydro and mini hydro – 7,000 GWh (23%)
- c) Biomass – 3000 GWh (500 MW) (10%)
- d) Solar – 9,000 GWh (6 GW) (30%)
- e) Wind – 3000 GWh (1GW) (10%)

Short Term Response

1. **Fast track power plants listed in the manifesto – Natural Gas, solar, wind and hydro.**
2. **Promoting rooftop solar** : Fastest to build to overcome current shortages without resorting to emergency power.
 - a) Preserve existing Net Metering/NetPlus/NetAccounting/ tariff for 3 years removing pricing uncertainty created by previous government. A pricing committee to revise the same annually from 2023. Target 200MW per year for the first 3 years.
 - b) Annual 30MW target for state institutions (on a custom model where private investor commits capital, and savings are shared)
 - c) Request commercial/industrial scale businesses to convert their large rooftops into grid-connected solar PV systems rapidly, with active support from the CEB.
 - d) CEB to provide system approvals within a week (using transparent rules) and connection within a week of solar system applications (some approvals take more than 4 months now).
3. **Remove duty for battery storage for energy and introduce rules for use** : This will allow consumers to use storage in the night, reducing peak energy requirement. This can be done through a central scheme that can link batteries together as a mega-battery.
4. **Implement a 1800MW floating solar PV system (Puttalam lagoon, Victoria & Randenigala reservoirs and Chandrika Wewa) – 600 MW per year.** These locations already have accessible transmission grid. Adding solar in the grid will preserve hydro for night peak usage. **This can replace the proposed coal plant expansion in Norachcholai, and rapidly enhance grid capacity.**
5. **Remove current blocks placed by CEB for approved mini-hydro and biomass projects.** A cabinet decision and a CEB board resolution is needed or a minor amendment to the Electricity Act can be passed urgently.
6. **Immediate steps to develop local NG in Mannar basin.** NG based power plants planned to be constructed should use this source of gas for electricity generation once available.

7. **Begin LNG procurement through a Floating Storage and Re-gassification Unit (FSRU).** The contract should be designed to use this only until local gas is available. Natural Gas infrastructure to be planned to support local industries. The location of the FSRU should be targeting the larger centers of power generation and with extreme care about the safety aspects. The proposals to use LNG for domestic and commercial use and as a transport fuel is no longer an attractive or visionary option. The time for this change has been passed with the advent of electrical vehicles, which are far more economical and advantageous on many fronts.
8. **Minimum efficiency standards and energy efficiency.** Implement minimum efficiency standards to all appliances including TVs, Clothes washers, fans, refrigerators, pumps and ACs. Only inverter type A/C and refrigerators should be allowed.
9. **LED lamps :** Middle and low income households will be given low-cost LED lamps (4 per household) and costs charged to electricity bill. This will reduce evening peak demand.
10. **The low end 1.3 Million consumers pay only Rs 2.85 per kWh whereas the cost of generation is Rs 23.00 per kWh.** Support the low end consumers with consumption up to 60 kWh/month to install roof top solar with batteries. This can also be extended to the next level of consumers who consume only about 120 kWh per month. This will considerably lower the peak load demand and the loss to the CEB.
11. **The CPC is presently operating at a loss to provide the transport fuels.** Establish a promotional duty structure on electric vehicles and promote charging with solar PV or the national grid during off peak hours.

Planning for the larger systems transformation

12. **Develop a holistic and futuristic energy policy:** Energy policy should be developed holistically with stakeholder participation covering **all sectors of energy, including transportation and industry**, considering indigenous resources, decarbonization, energy security, environmental concerns, social equity and **lowest economic cost**.
13. **Develop a 100% renewable/indigenous roadmap :** Develop a 100% renewable/indigenous roadmap for 2040 with 80% in 2030. Use globally renowned Sri Lankan scientists (Manitoba HVDC Center, Dr Janaka Ekanayake etc) who are capable of developing the roadmap while attending to all technical aspects. Bring in technology pioneers such as Elon Musk (Tesla) to be part of the visioning. Explore options such as HVDC transmission grid, digital inertia, microgrid development etc.
14. **Develop a renewable centric generation plan:** CEB to redraw the planning to be consistent with the national vision and policy.

15. **Strengthen regulation and governance:** Better regulation and improved transparency meeting global standards. The role and the mandate of the PUCSL has to be clearly emphasized . This is critical to bring in low-interest financing from multilaterals such as ADB and WB among others. .
16. **Strengthening the CEB:** Develop capacity of the CEB to understand, execute the global energy sector transformation and become a global leader and innovator. Capacity improvement in strengthening the procurement processes with accountability.
17. **Sector reform to allow innovative models for grid supporting services and private sector participation :** Policy and business model enablement for innovation (reactive power, frequency balancing services, inertia, demand response and flexible power can be unbundled and provided for the grid through market mechanism)

Medium and Long Term implementation

18. **Develop 800MW of floating solar per annum :** Floating solar can be designed to optimize existing transmission grid and avoids land use complexity. It can be located in all parts of the country. Add storage where necessary from 2024 onwards based on the roadmap.
19. **Support addition of Rooftop Solar :** An annual target of 150MW annually beyond 2023. Schemes to be developed for low-income consumers to also be part of the energy revolution and to benefit from the same by providing them with roof tops solar and adequate battery storage to cover the peak load period. (this will also reduce investment for transmission grid upgrades).
20. **Develop 100MW wind power per year :** Sri Lanka has some of the most viable wind generation sites yet to be developed in the world. Harness the private sector interest and expertise in this field to attract investments
21. **Biomass based generation :** Develop the sector throughout grower support and with stability of supplies by allocating unused bare lands for cultivation. Create incentive schemes for farmers for participation through development of supporting infrastructure. Develop 50 MW biomass per year. This is a source of firm power and can be used to bolster the base load in the short term , until adequate battery storage is implemented to make solar and wind to be sources of firm power. Also this will enhance the rural economy very significantly.
22. **Distributed Battery Storage :** Create correctly incentivized programmes for the same, partnering with technical partners such as Tesla. Battery storage to be coupled as a larger mega battery to provide grid services to reduce cost impact.
23. **Deploy global innovative models for energy :** Tesla Virtual Power Plant, Flexible energy etc that can add specific benefits for the grid.

- 24. Demand Side Management :** SLSEA to develop the plan and be held accountable for delivery of the same. It is cheaper to reduce energy than build generation, and is related to higher job creation.
- 25. Supporting framework for dispatch:** Leverage the powerful new System Control Centre and move to sub-hourly dispatch to enable high renewable energy penetration with prediction and AI. Convert all systems to be run through rapid reaction governors to enable transition through management by the System Control Center .
- 26. Power Quality:** Rapidly implement power quality standards. This will also improve renewable absorption. LECO is on track while CEB has a long way to go.
- 27. Addressing seasonality, intermittency and grid stability:** Leverage global specialists (also of Sri Lankan origin) and develop and execute plan to address all grid related issues using technology, modelling, predictive and data analytics.
- 28. Microgrid/Minigrid deployment :** Microgrids and minigrids where deemed feasible and efficient. Pilot in Jaffna peninsula and outlying islands.
- 29. Innovation :** Sri Lanka will be promoted as a center for innovation for distributed energy technology development, providing test beds for development of smart meters, smart grids and microgrids by inviting top global companies to partner for the same with the CEB.
- 30. Introduce wheeling. Develop the facilities for wheeling using the national grid so that the major consumers in the urban areas can access their own renewable energy generators in remote areas where the facilities are favorable. For example the hotel sector**
- 31. Recycling :** Looking at the industry landscape, recycling facilities will be built in Sri Lanka to recycle Lithium batteries, solar panels and LED lamps.
- 32. Develop solar panel and battery manufacturing plants with global market leaders.**

Conclusion

It is clearly seen that the targets of reaching the stated goals of the government of 80% RE by 2030 and 100 % indigenous energy by 2040 are eminently feasible. However, it is essential that the national policy be clearly enunciated and the State Utility CEB and the other relevant state agencies be given the mandate of achieving the targets set. The facilitation to encourage and attract the private sector investment, which is essential for this purpose, should be the responsibility of such agencies. The pressure on the national exchequer to provide the capital required can be thereby relieved and any state funds available can be directed to modifications and improvements of the national grid and other essential structural changes only .

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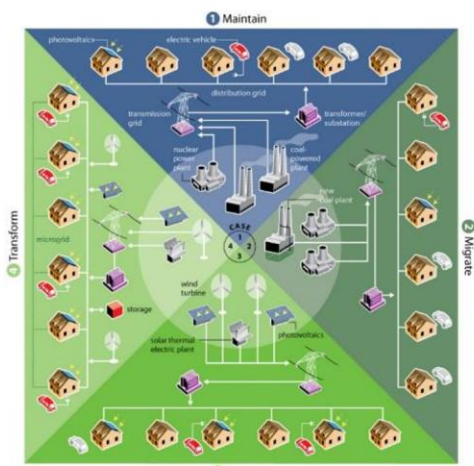
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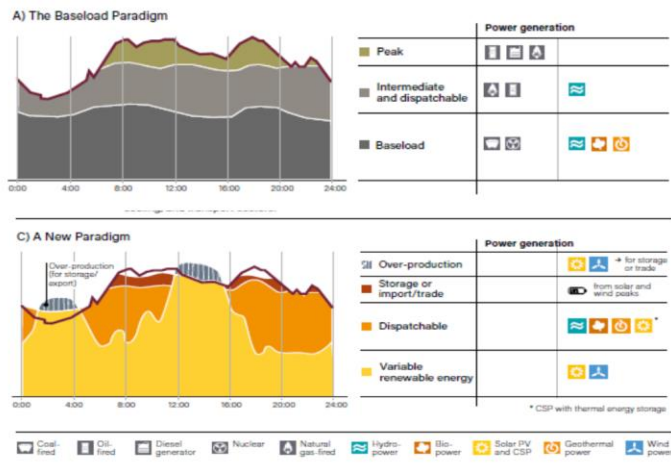
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The new model



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