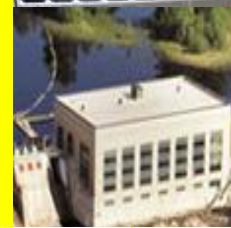


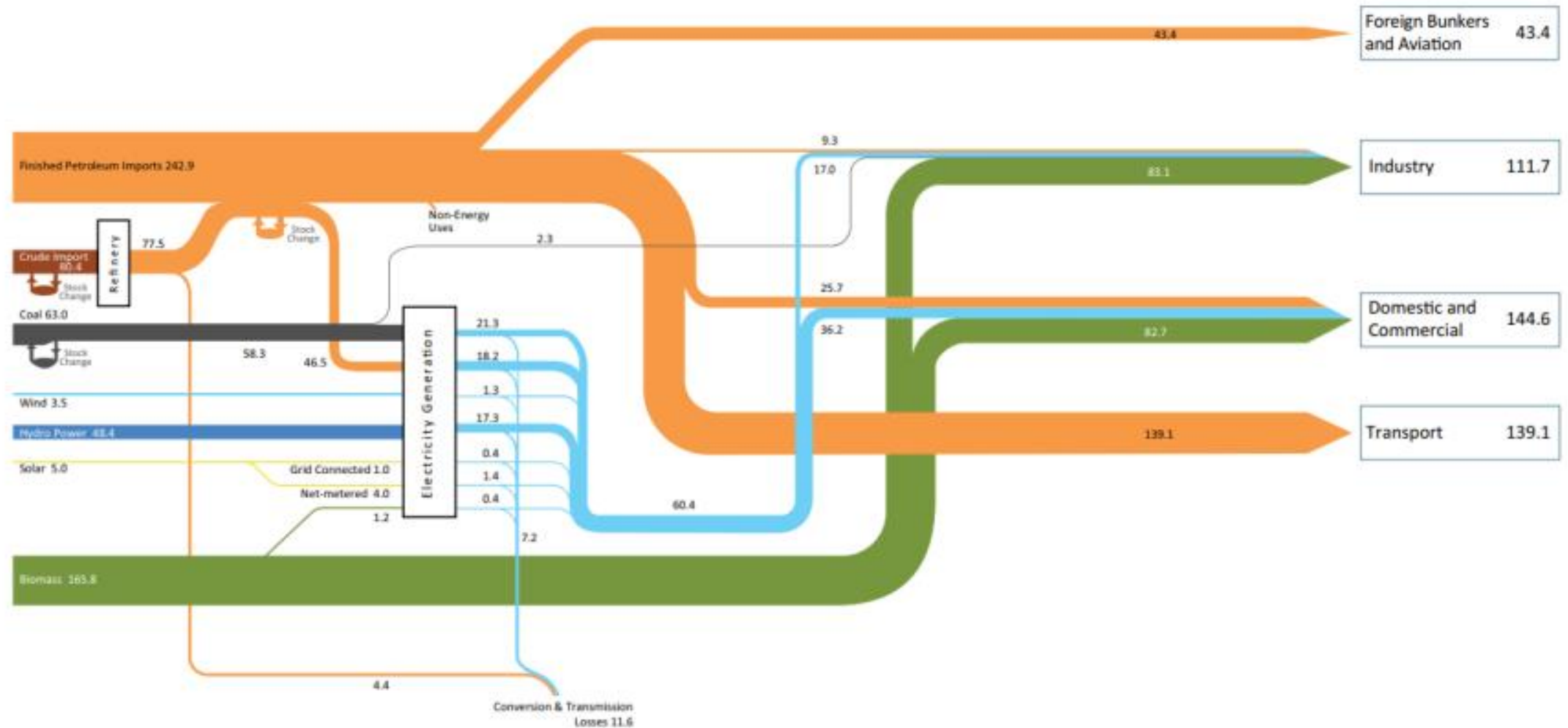
The Importance of Renewable Energy for Future Energy Security and Economic Growth

Eng Parakrama Jayasinghe
Past President Bio Energy Association of Sri Lanka
24th Jan 2024

Chamber of Construction Industry Sri Lanka

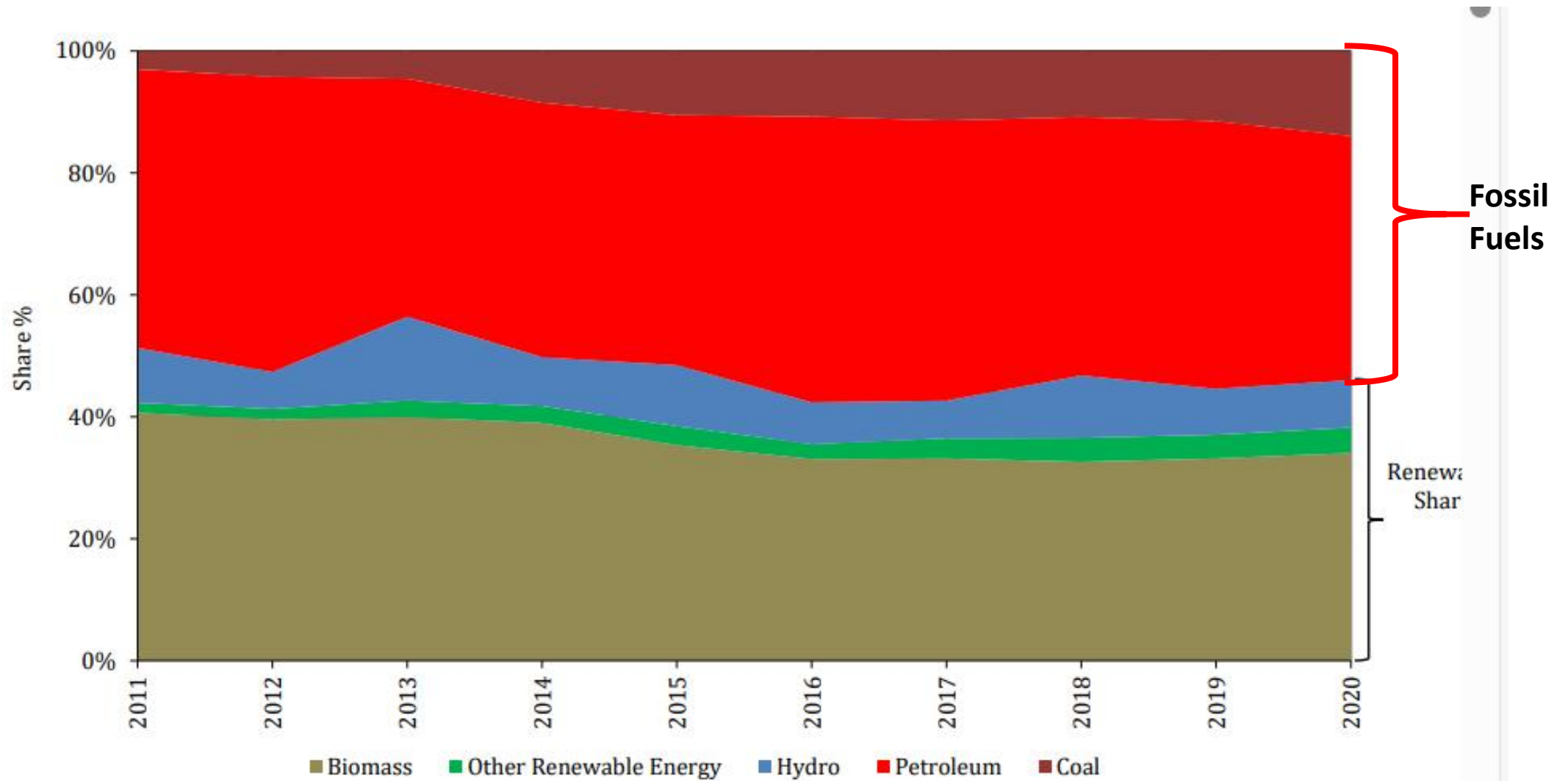


Sri Lanka's Energy Profile



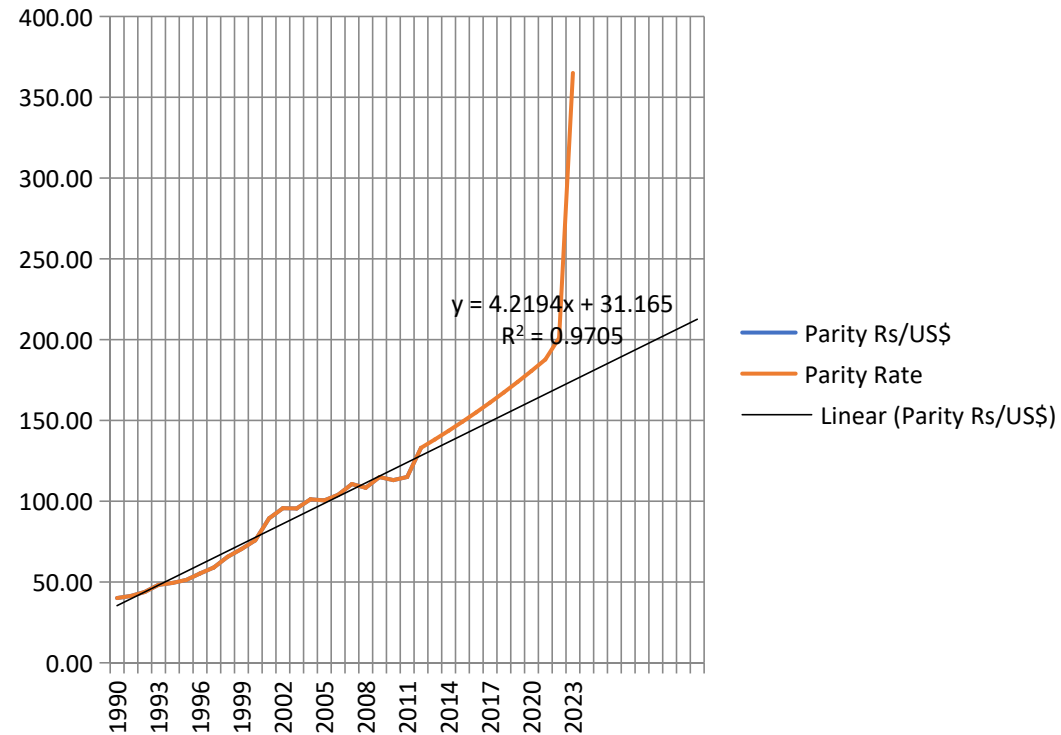
Ref: Sustainable Energy Authority – Energy Balance 2019

Sources Of Energy catering to the demand

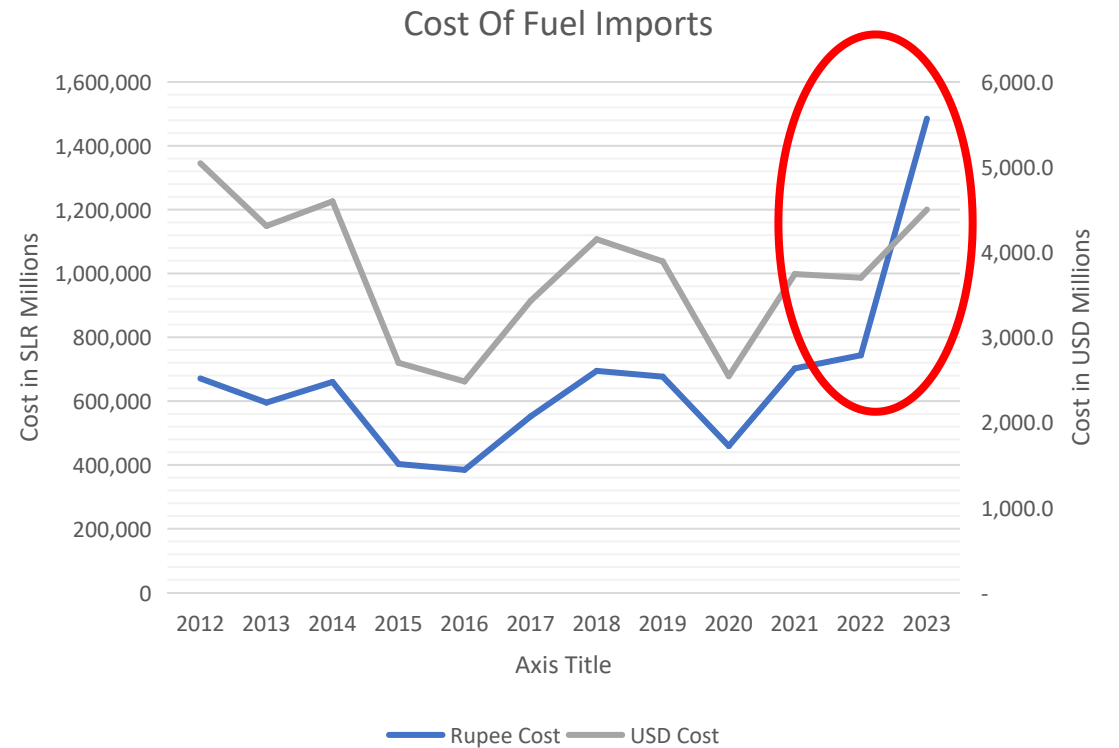


The Financial Impact

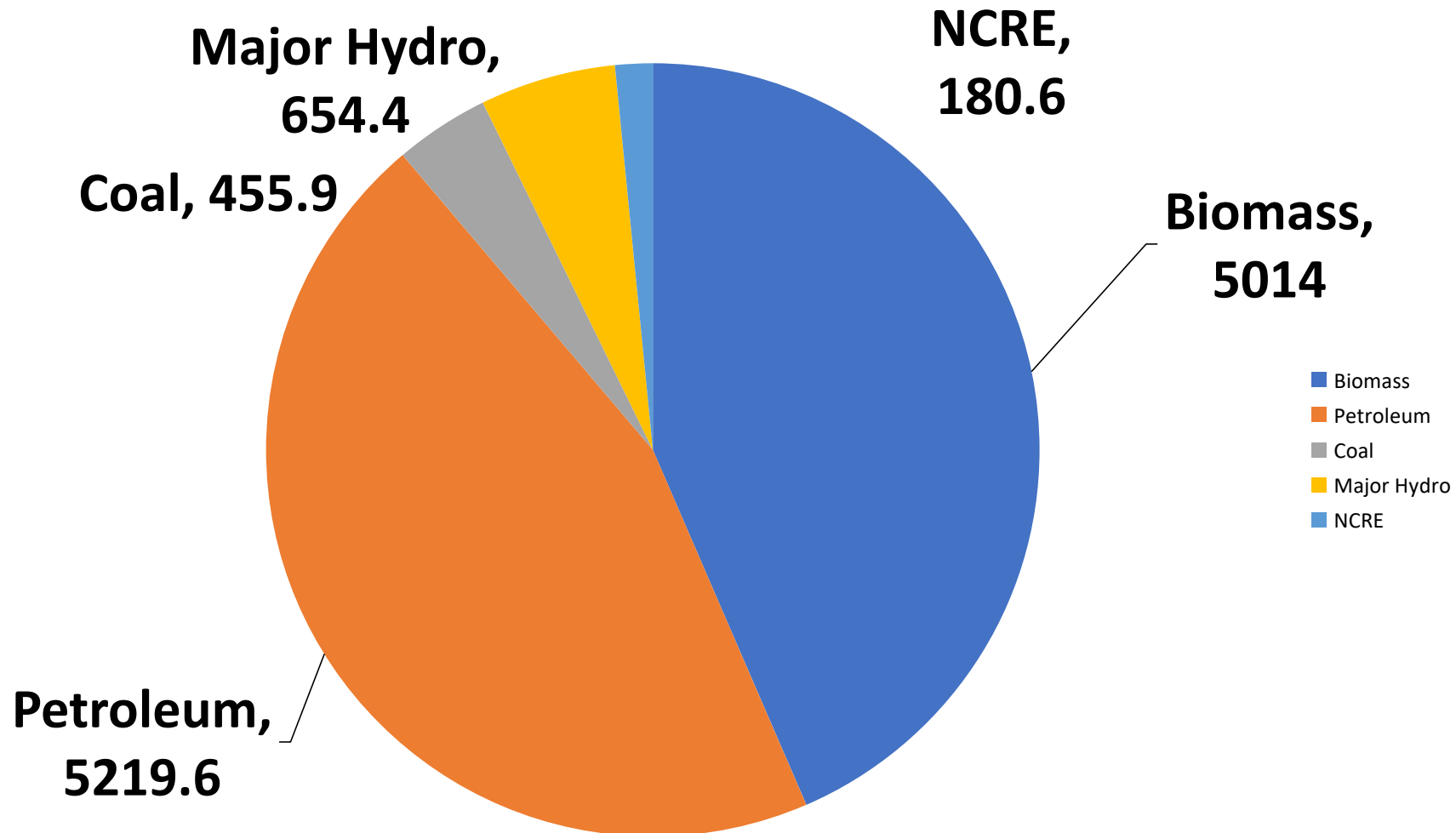
Change in USD Parity



Real cost in SLR



Current Resources in use for National Energy

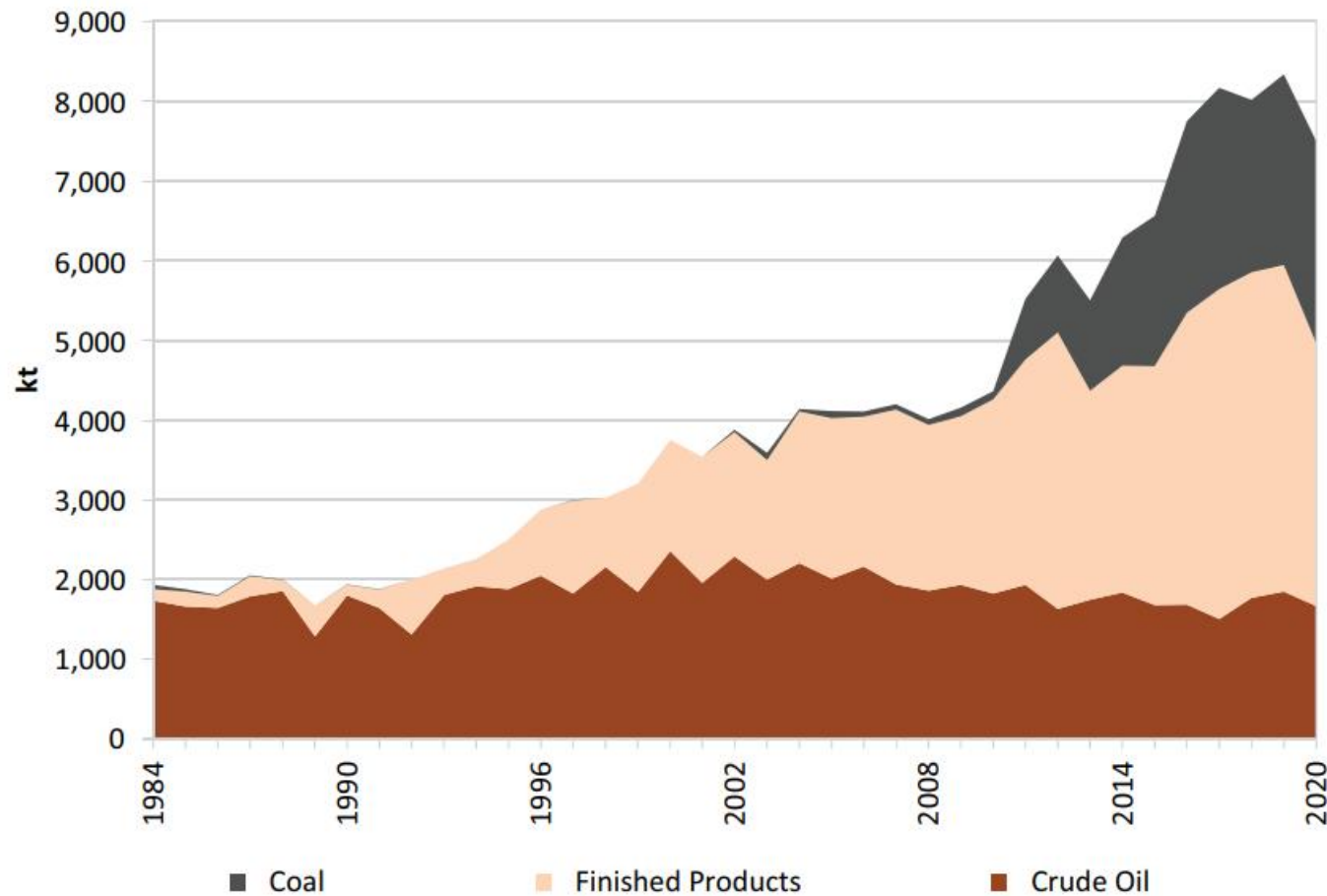


Sri Lanka Primary Energy Supply

Energy is Not Electricity Only !!!

But Electricity should be the major form of Energy in the future !

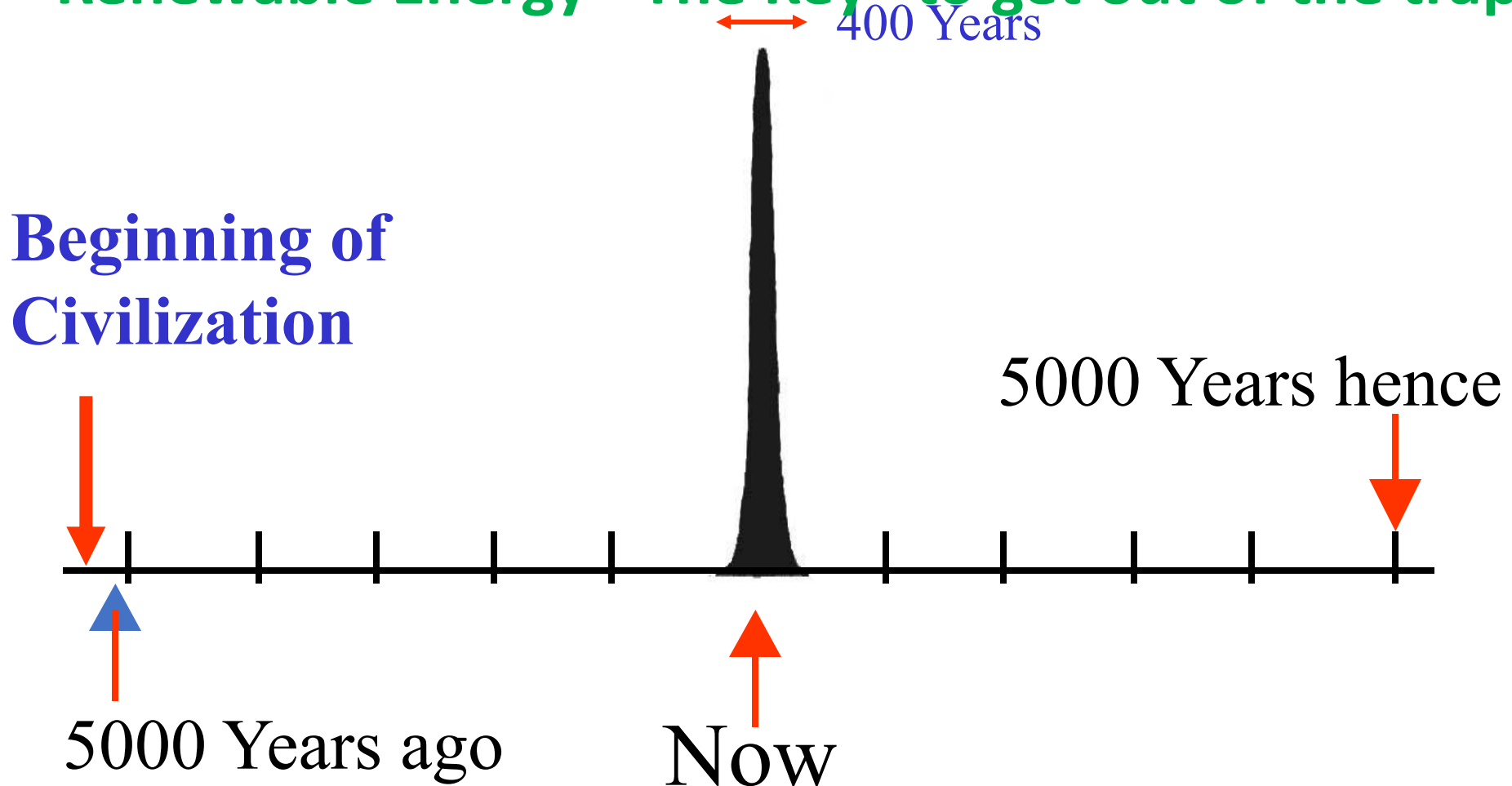
Unacceptable trend in growth of fossil fuels usage



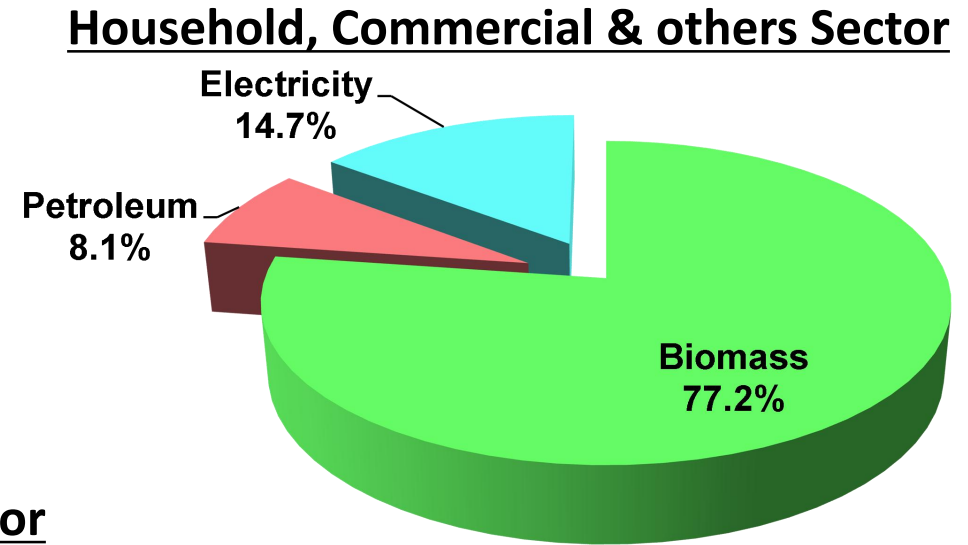
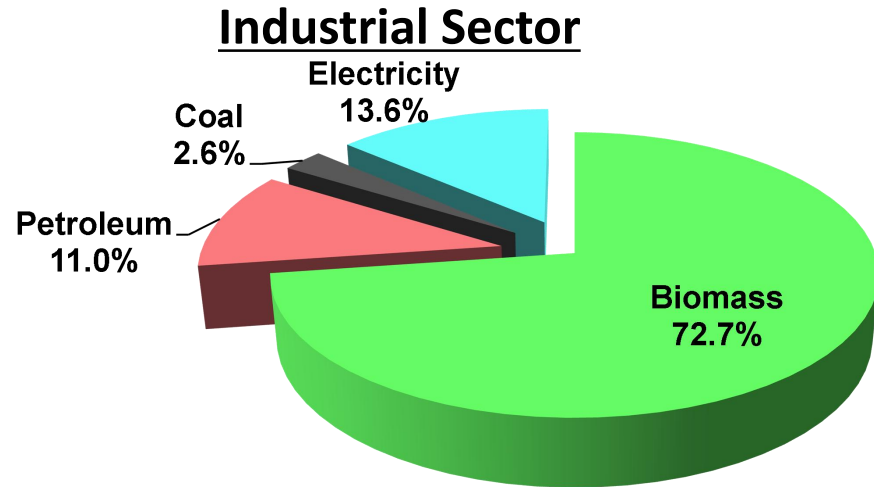
Mankind's use of fossil fuel

We too are trapped in the blip - Not wanting to get out ?

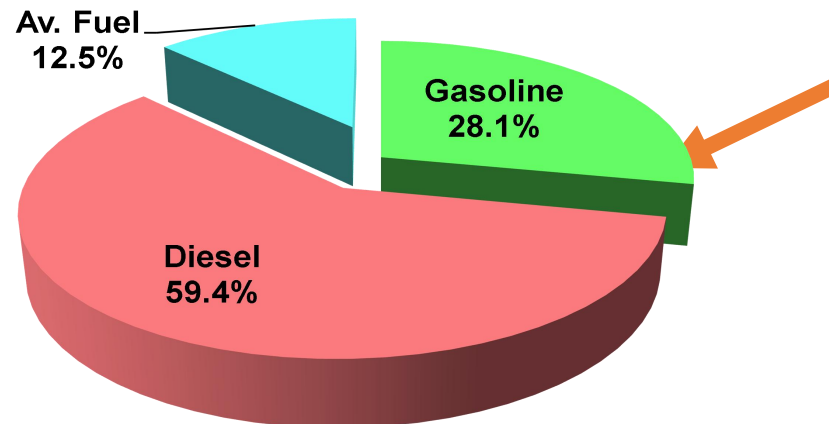
“Renewable Energy - The Key to get out of the trap”



■ Sectoral Energy Supply by Source -

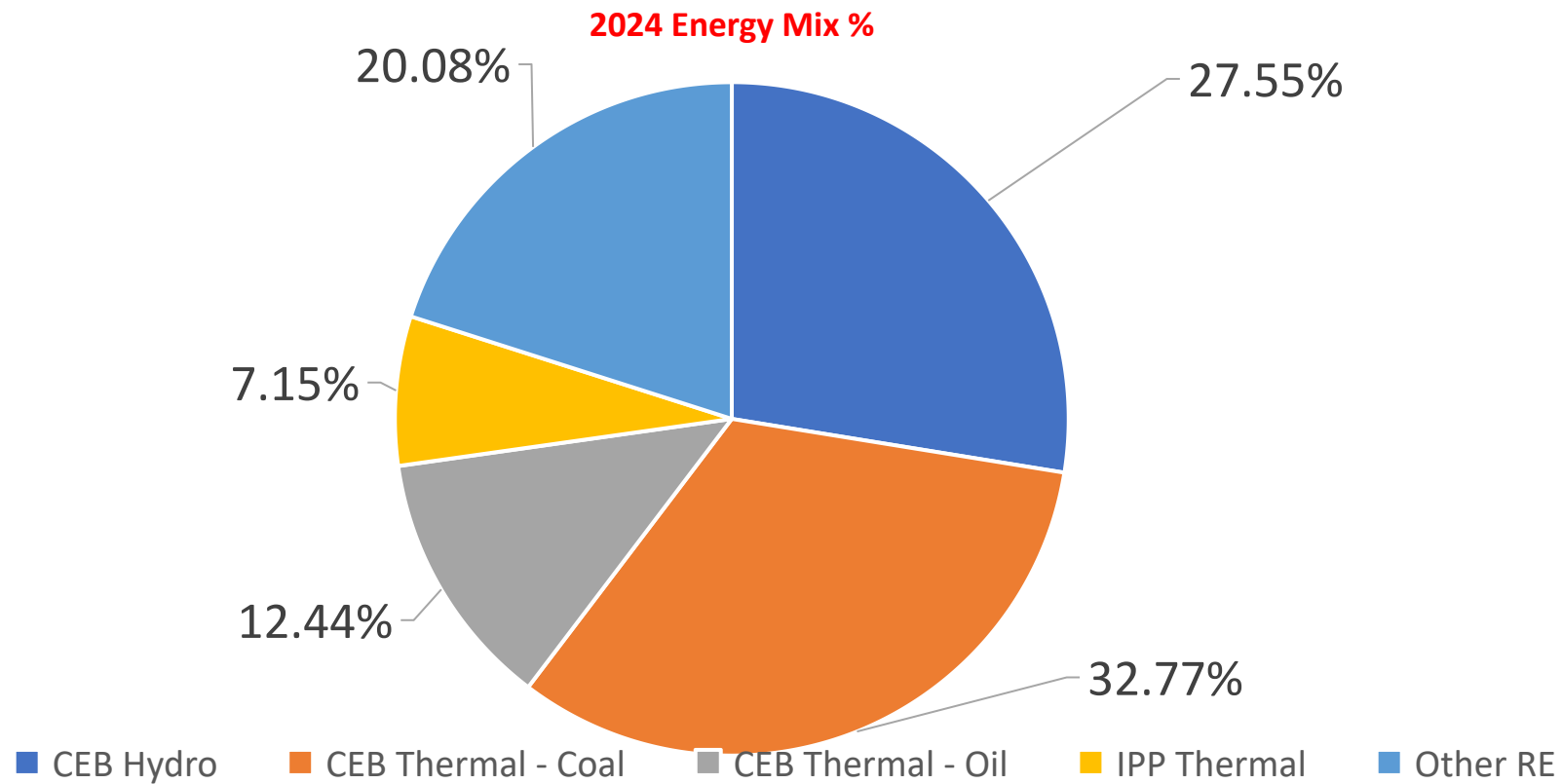


Transport Sector Entirely Oil Based



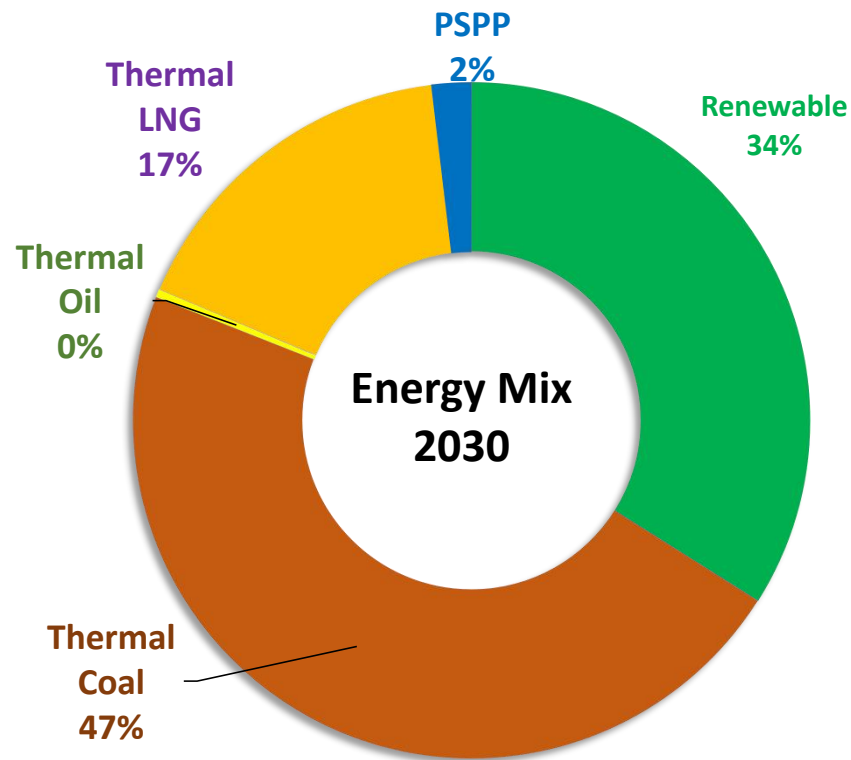
Elephant in the Room !!

CEB Projected Energy Mix for 2024

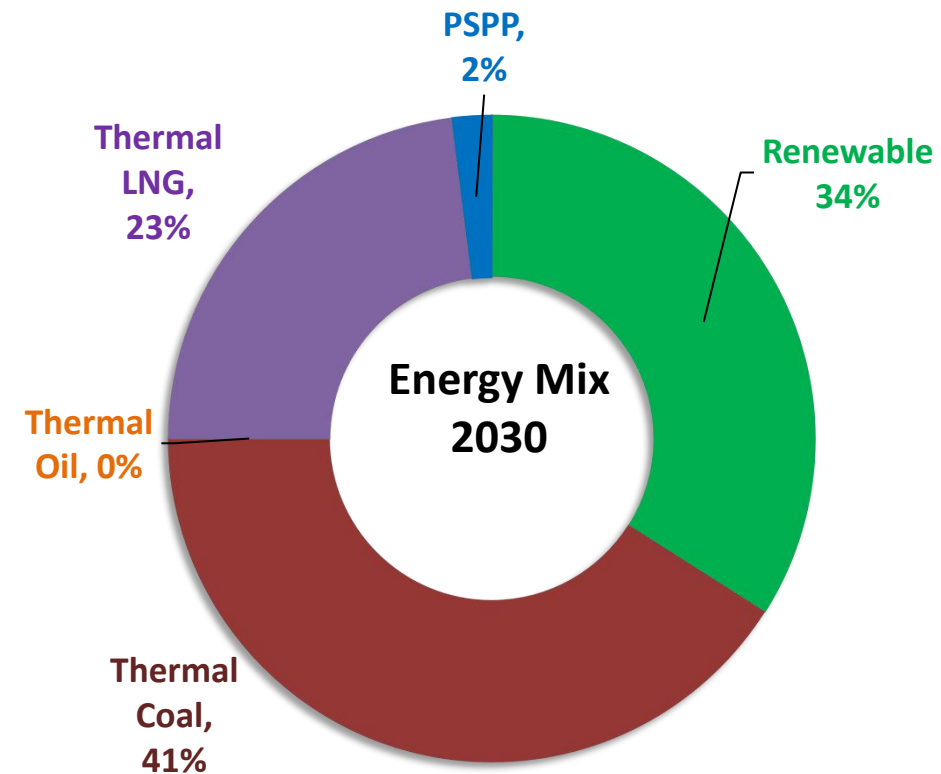


LONG TERM GENERATION EXPANSION PLAN 2018-2037

Base Case Energy Mix by 2030 (Base Case LTGEP 2018-2037)



Base Case Energy Mix by 2030 (Revised Base Case LTGEP 2018-2037 as per Oversight Committee on Energy)

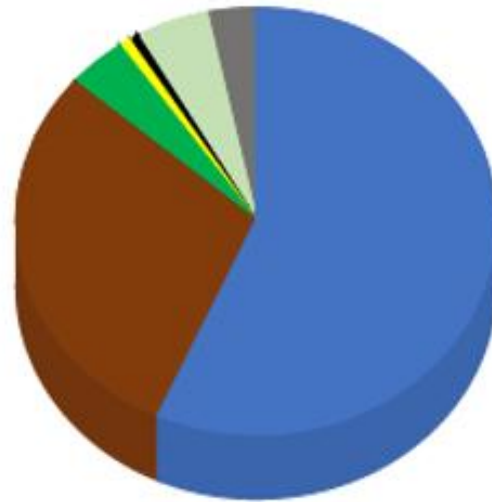


Glimmers of Hope !

DAILY ELECTRICITY GENERATION

Date: Monday, October 17, 2022

Total Energy		Peak Demand	
	36.39 GWh		1945.0 MW
• Renewable	25.60 GWh (70.36%)	• Renewable	1407.0 MW (72.3%)
• Fossil Fuel	10.79 GWh (29.64%)	• Fossil Fuel	538.0 MW (27.7%)

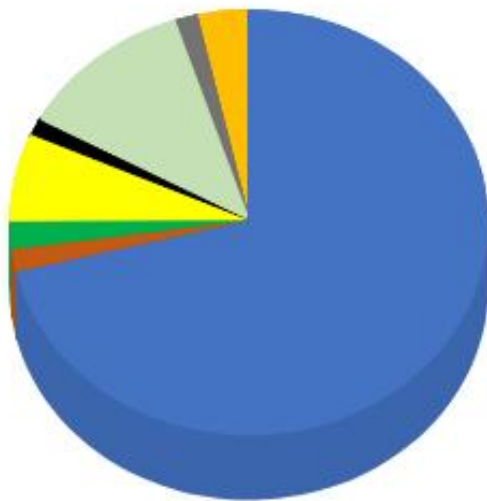


CEB Hydro	20.62 GWh
CEB Thermal Coal	10.79 GWh
CEB Thermal Oil	0 GWh
CEB Wind	1.46 GWh
SPP Solar ¹	0.28 GWh
SPP Biomass ²	0.23 GWh
SPP Minihydro	1.8 GWh
SPP Wind	1.22 GWh
IPP Thermal Oil	0 GWh

DAILY NET ELECTRICITY GENERATION

Date: Saturday, January 13, 2024

Total Net Energy	40.24 GWh	Peak Demand	2112.3 MW
• Renewable	32.68 GWh (81.21%)	• Renewable	1482.8 MW (70.2%)
• Fossil Fuel	7.56 GWh (18.79%)	• Fossil Fuel	629.4 MW (29.8%)



CEB Hydro	24.53 GWh
CEB Thermal Coal	5.75 GWh
CEB Thermal Oil	0.58 GWh
CEB Wind	0.73 GWh
SPP Solar ¹	2.31 GWh
SPP Biomass ²	0.43 GWh
SPP Minihydro	4.14 GWh
SPP Wind	0.53 GWh
IPP Thermal Oil	1.23 GWh



Essential Elements Requiring Non-Dependence for National Security

- Food
- Health
- Education
- Defense
- **Energy**



For Sri Lanka Renewable Energy is no longer a Choice

but an unavoidable imperative !

- **We have no proven fossil fuels oil or coal**
- **We have more than enough indigenous renewable energy resources**
- **The technologies are proven and available in commercial scale**
- **There is adequate local expertise to make the change**
- The Promise of NG from Mannar is yet to be monetized and commercialized
- We will spend \$ 5000 million annually for import of fossil fuels
- This consumes over 30% of the Export earnings
- Import substitution is far easier than gaining export earnings to ease the pressure on the SL Rupee

We have already proven our capacity for change

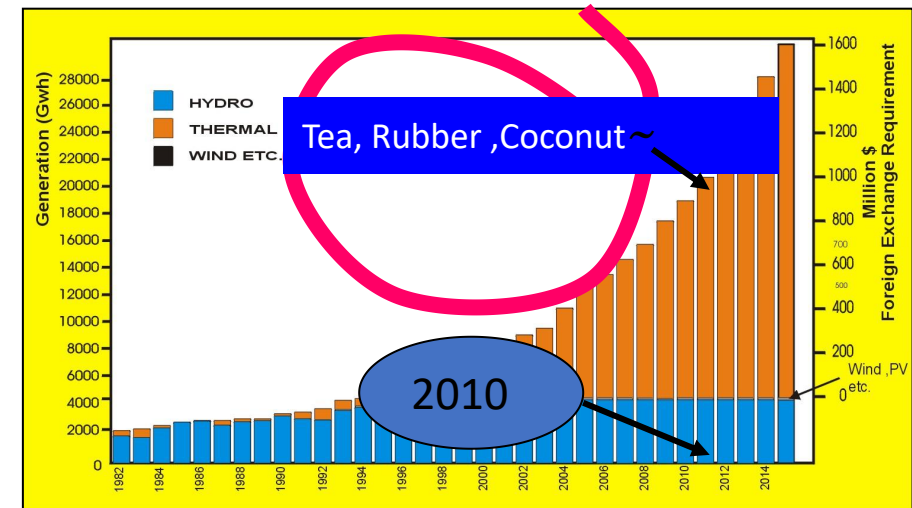
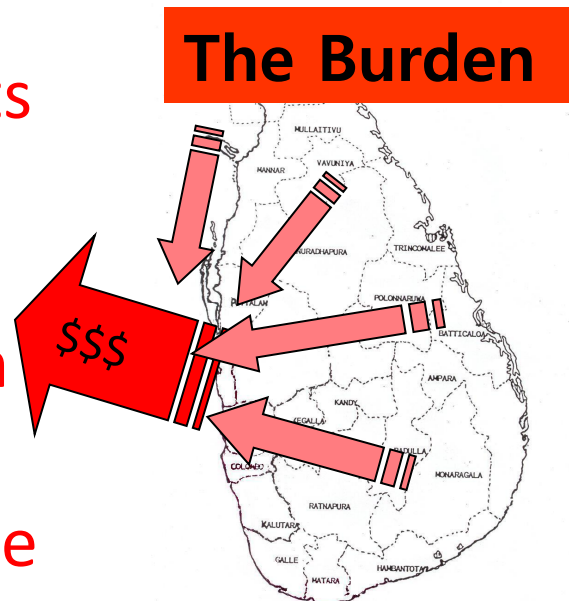


Why is this a problem ?

- Danger of imminent Power Shortages
- Intolerable pressure on balance of payments driving down the Rupee due to extensive imports of fossil fuels currently consuming over 30% total FE earnings



Cost of Fuel Imports
for Electricity and
Transport -
> US \$ 5000 Million
in 2023 and will
continue to increase



Current Status of RE Additions (NCRE)

Resource	2016	2017	2018	2019	2020	2021	2022	2023
Mini Hydro	337.9	353.6	362.0	399.6	402.9	414.2	429.0	434
Solar	21.4	51.4	51.4	57.4	75.4	100.4	130.0	140
Rooftop solar	50.4	93.7	176.4	261.4	337.9	499.0	656.971	747
Biomass	24.1	26.1	37.1	40.1	40.1	40.1	50.0	50
Wind	128.5	128.5	128.5	128.5	148.5	148.5	248.5	263.5
Total RE (MW)	562.3	653.3	755.4	887	1004.8	1202.2	1514.5	1,634.50

The Capacity Contribution - 39%

Energy Contribution - 19%

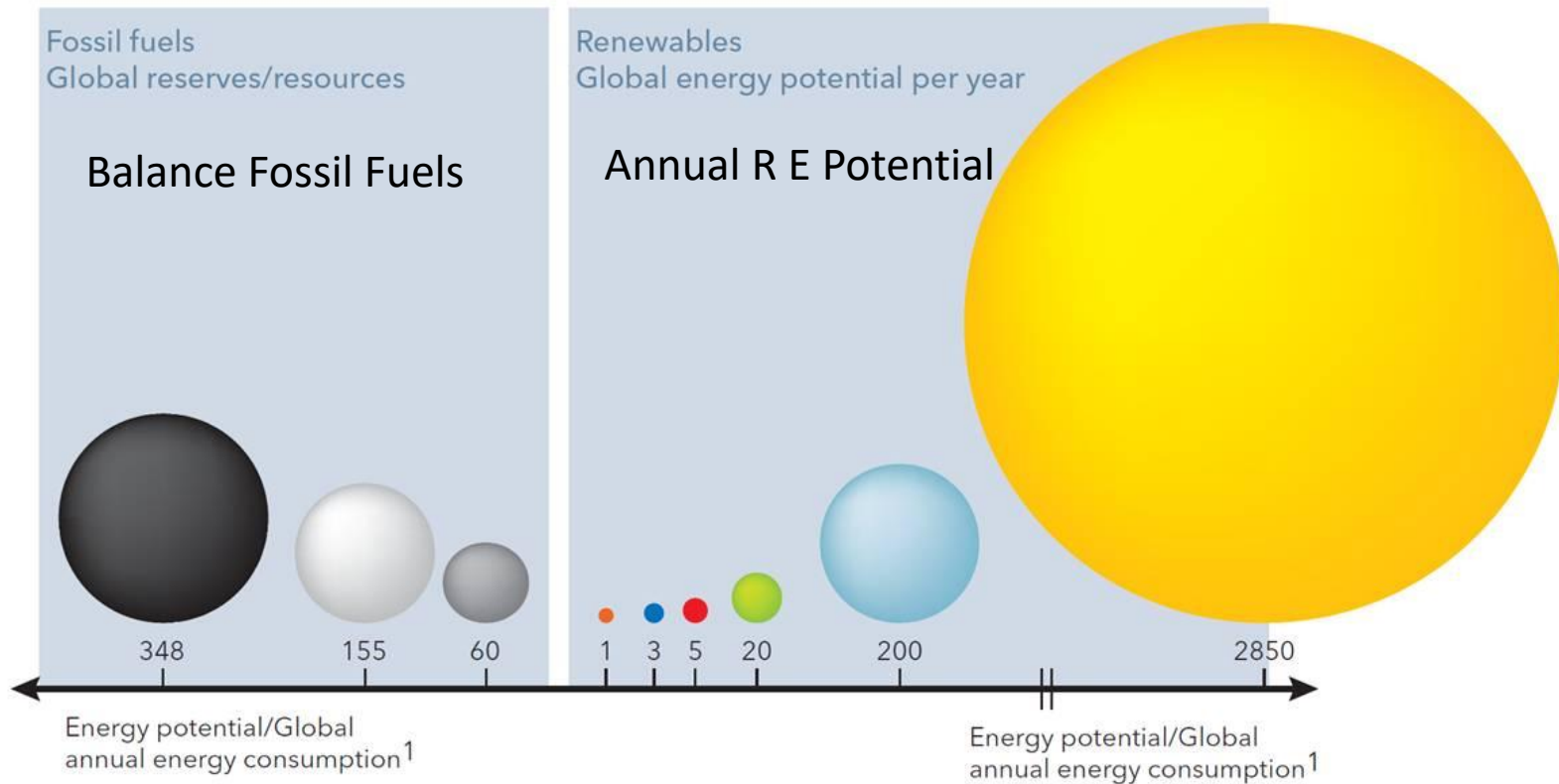


**The Sun –
The Source of All Energy Forms-
and it is free**

**Let us harness this Bounty of nature
effectively**



The Unlimited Renewable Energy Resources !



The Earth receives in one hour of solar power more than the consumption in a year **Annually 90,000 Tera Watts Vs 25 Tera Watts**

	Energy potential Reserves/Resources ²	Thereof conventionally utilizable ²
Coal	~ 135.000 EJ	
Natural gas	~ 60.400 EJ	~ 12.000 EJ
Crude oil	~ 23.000 EJ	~ 9.800 EJ
Global energy demand 2006:	~ 470 EJ	

	Energy potential (amount of energy p. a.) ²	technologically utilizable (state of the art) ²
Solar radiation	~ 1.111.500 EJ	~ 1.482 EJ
Wind energy	~ 78.000 EJ	~ 195 EJ
Biomass	~ 7.800 EJ	~ 156 EJ
Geothermal	~ 1.950 EJ	~ 390 EJ
Hydro/tide power	~ 1.170 EJ	~ 78 EJ

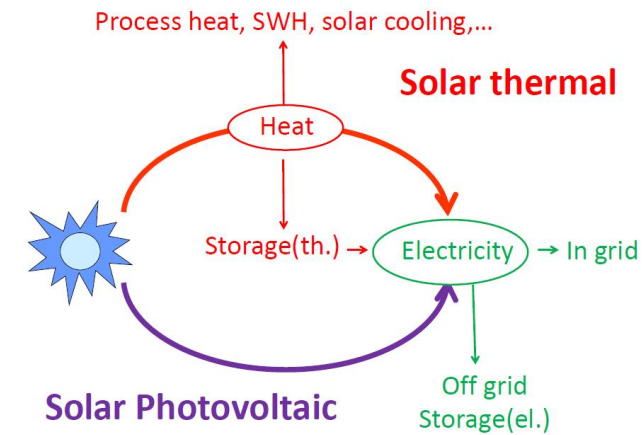
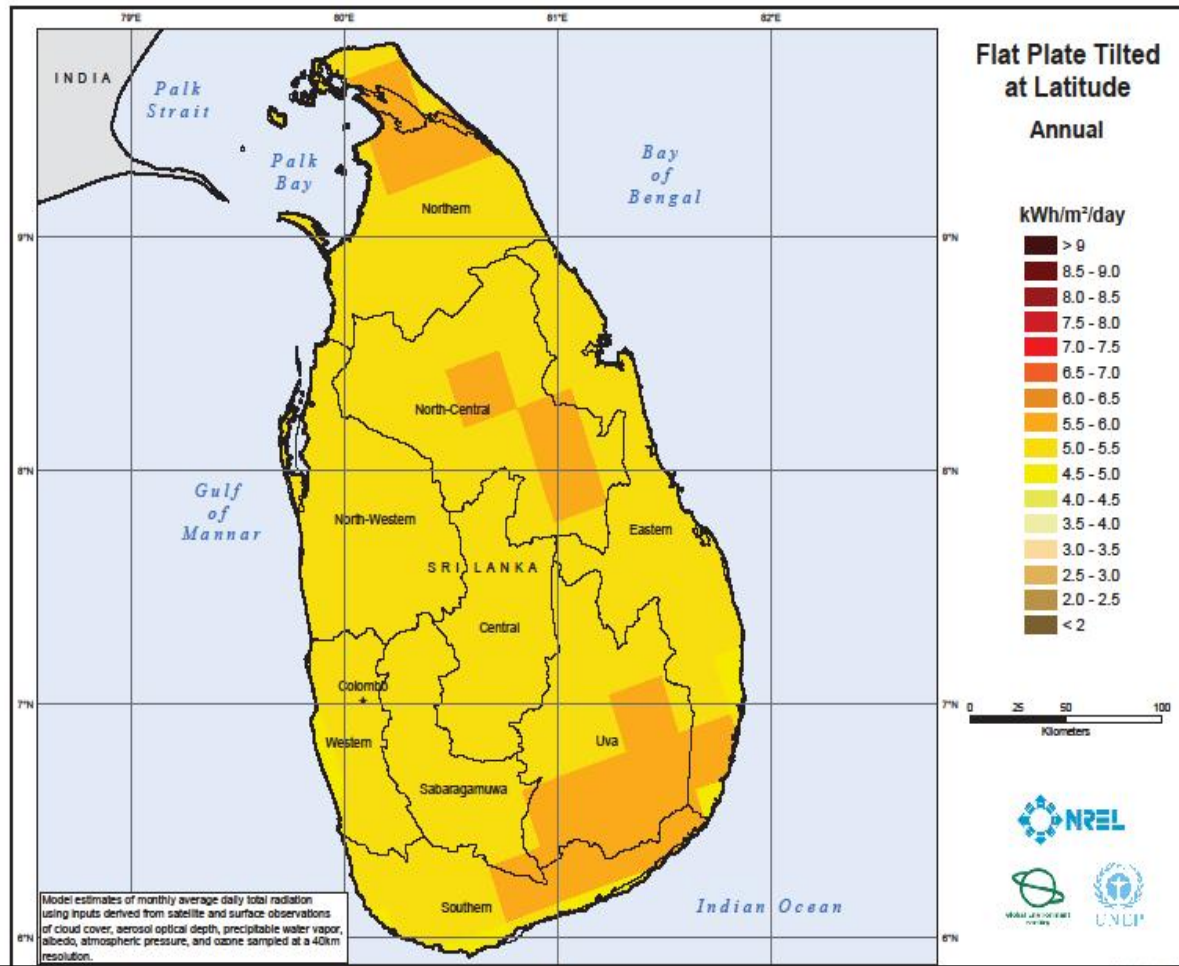
Sri Lanka enjoys a very fair share of this bounty

- Solar
- Wind
- Bio Mass
- Mini Hydro
- Wave
- Ocean Thermal

Some of these are very low hanging fruits

What About Sri Lanka ?

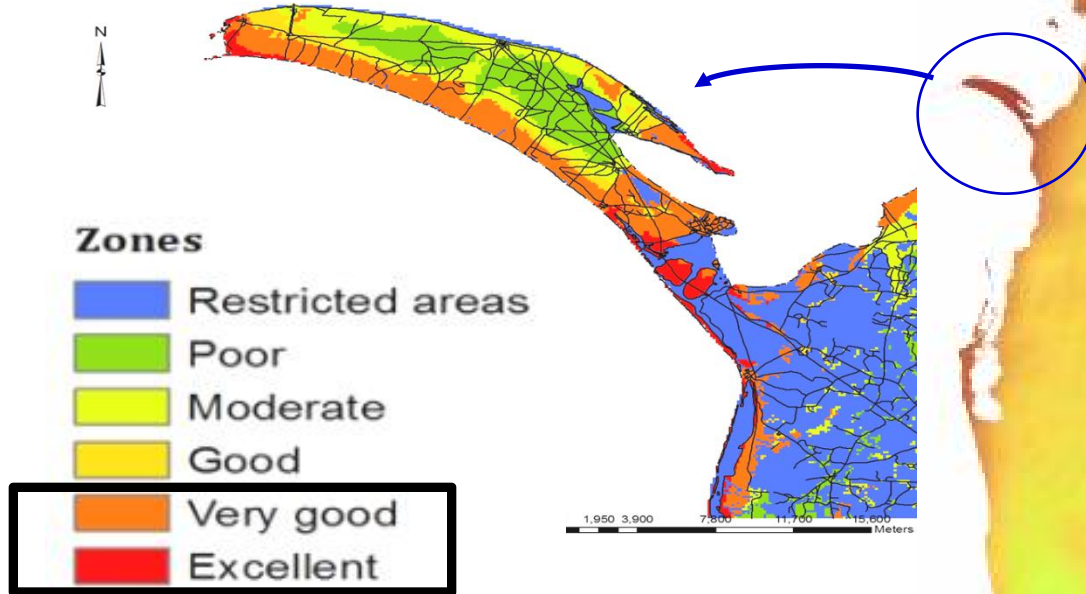
- Annual Electricity Demand 2020 15,000 GWh
- Solar Insolation @4.5 kWh/m²/day 106,762,500 GWh
- We have at least 7000 times our need to play with



WIND ENERGY RESOURCE

Resource Maps

Mannar Region



Spatial distribution of annual average Wind Speeds (m/s) at 80 m



Conservative potential
100,000 MW

Classification	Extent (km ²)	Wind power potential (MW)	
Excellent	13	65	360 MW
Very good	59	295	
Good	13	65	
Moderate	41	205	
Poor	42	210	
Restricted	152	760	

Source: NREL 1997



Gliricidia to Electricity The Role of Dendro



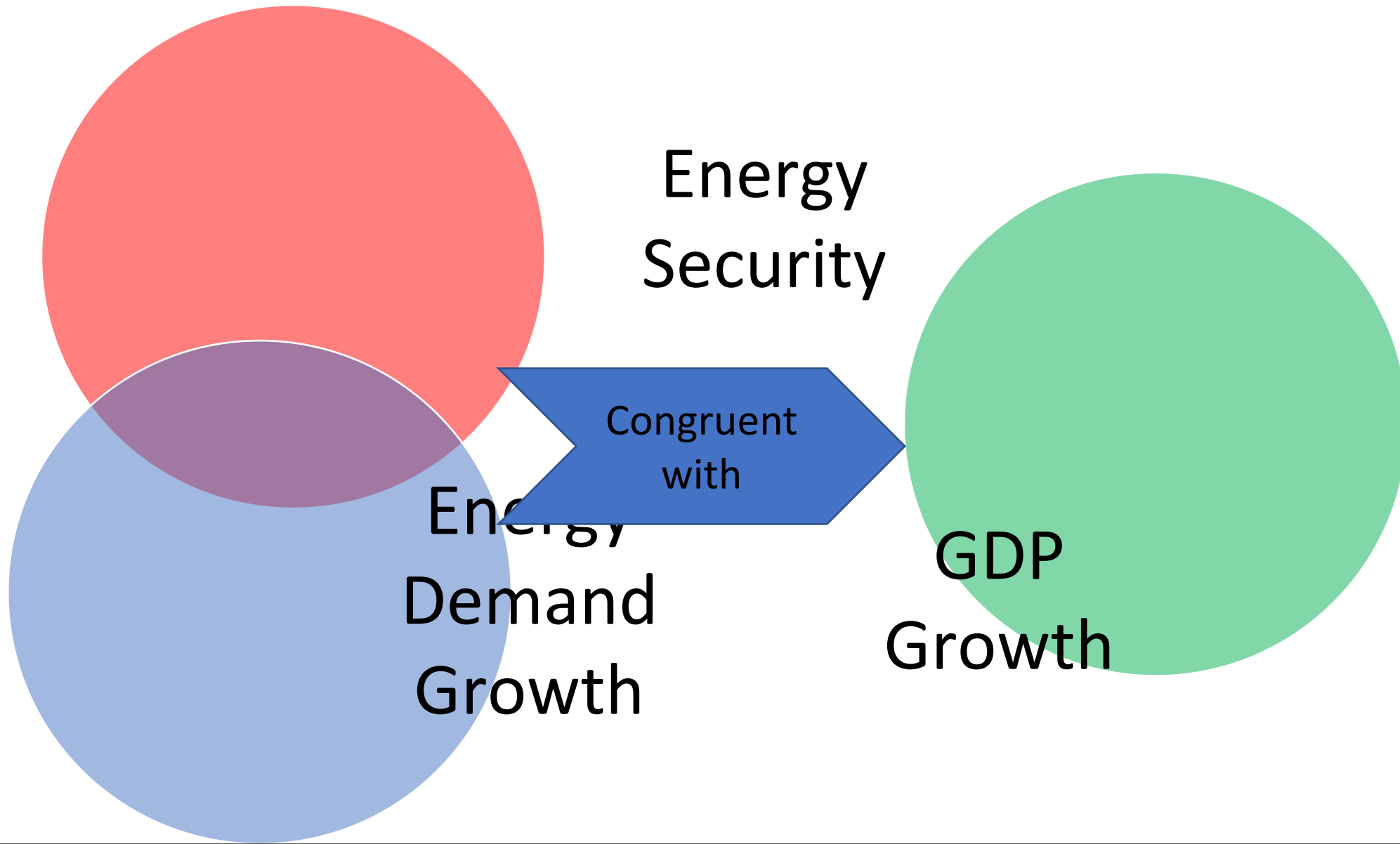
ADB and JAICA Projections
2500 MW
BEASL Estimate 4000 MW



How can Sri Lanka benefit from this bounty of nature ?

- A National Consciousness of this gift of nature
- Recognize that Sri Lanka no longer needs to depend on imported fossil fuels
- We are an energy rich nation with massive resources which can be developed with already proven technologies and commercially proven
- A holistic **National Energy Policy** mandated to be abided by all , both public sector and private sector including individual citizens
- A much more vibrant role by Sri Lanka Sustainable Authority making full use of the powers granted to them
- A paradigm shift in the way we look at energy as shown below.

The Conventional Wisdom !!



A New Paradigm !!

The Energy Sector to be a Sri Lankan Industry



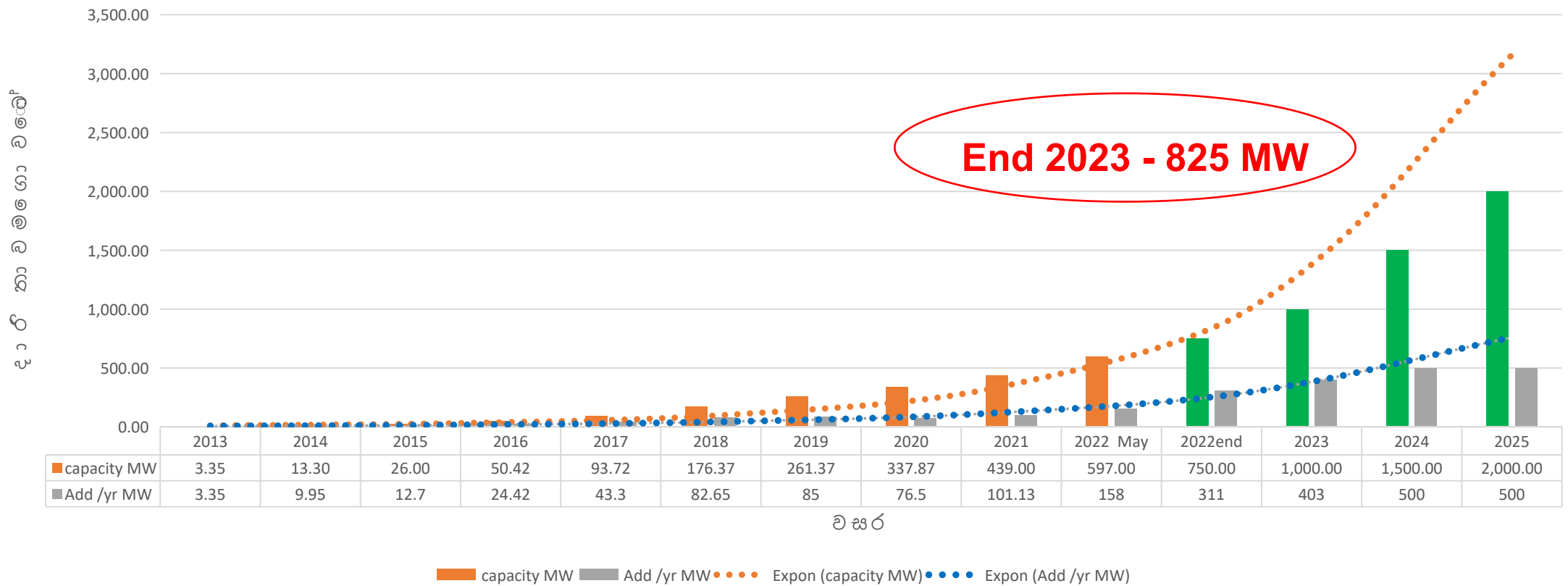
Every Roof Top a Power Plant
Every Garden an Energy Plantation
The Consumer to be a “ Prosumer”

Essential features to achieve this change

- None dependence on external inputs **Get rid of oil double quick**
- Maximization of utilization of indigenous resources
- Energy generation in addition to transmission and distribution to be a National Industry in control of Sri Lanka
- Maximizing the benefits to all stakeholders – **spin off benefits and Prosumer Concept-** using Bio Energy and Solar Roof Top PV
- Gliricidia offers the best and immediate opportunity for commence this resolution
- **Roof Top Solar PV has already shown its potential and vibrancy**

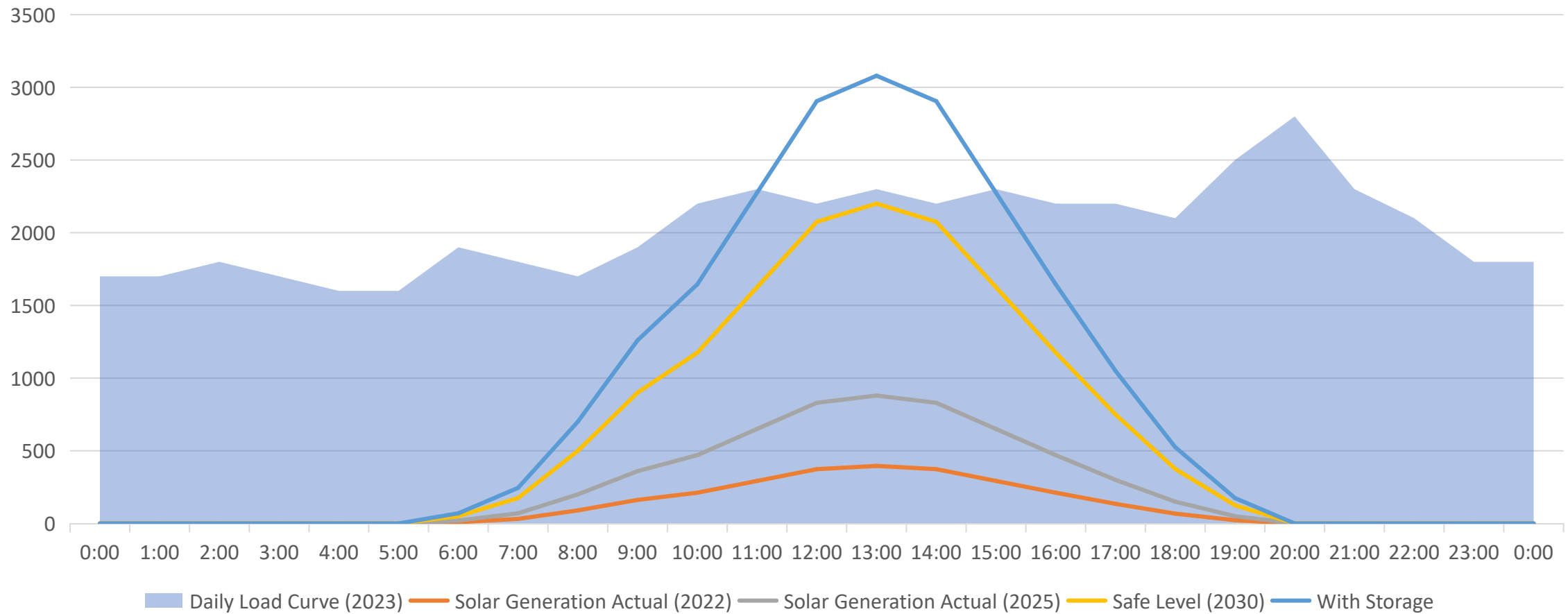
The low hanging fruit – Roof Top Solar PV

Growth of Solar RT - Capacity and Annual Addition MW



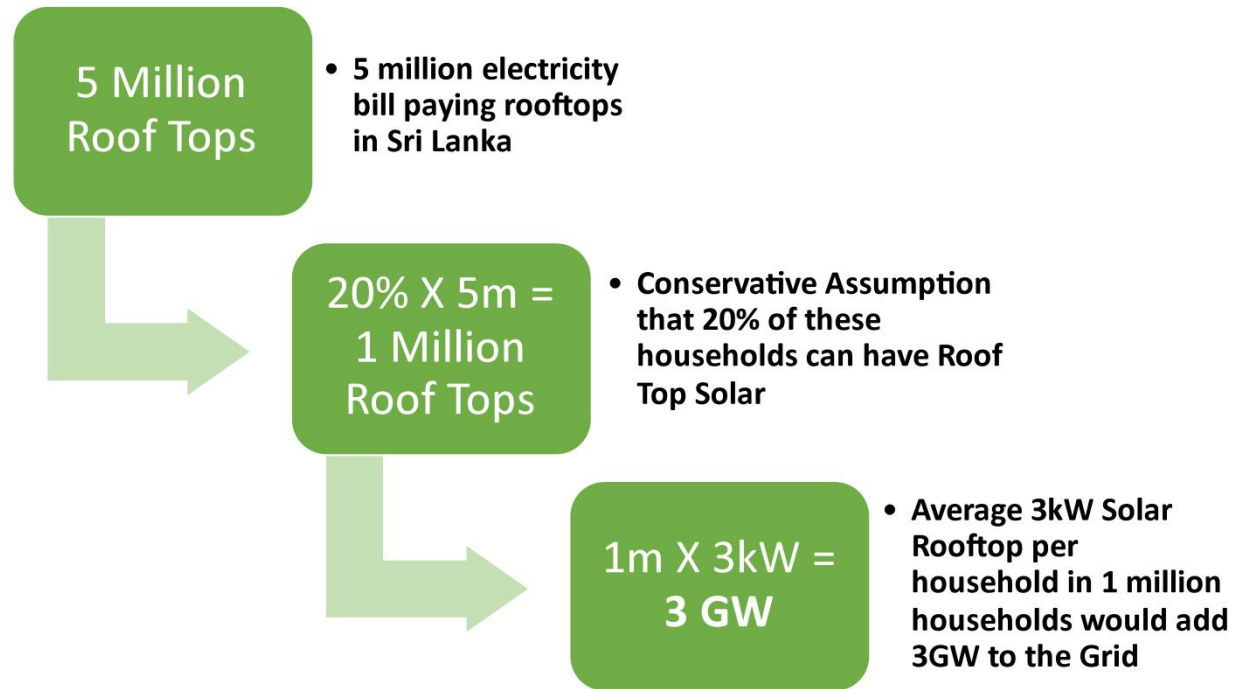
End 2023 - 825 MW

Future Possibilities



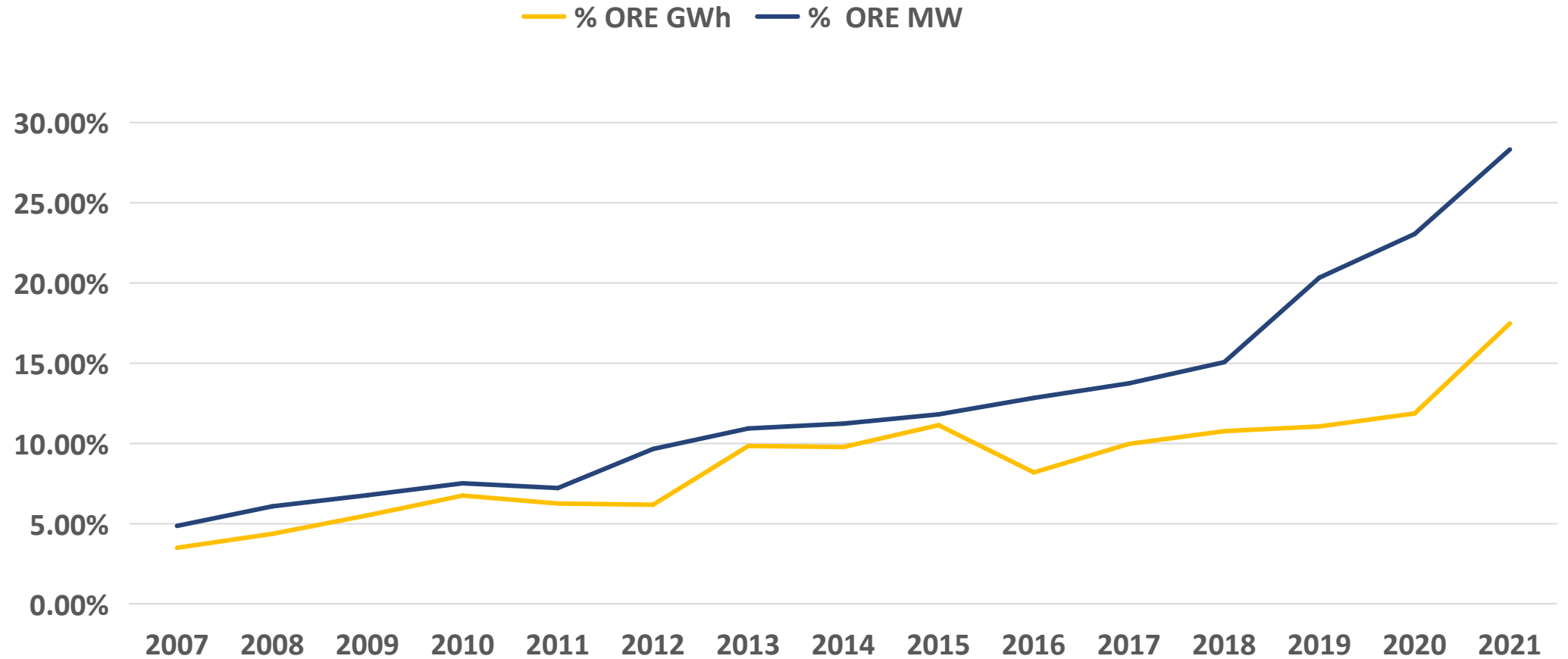
Tantalizing way forward

Target - 3 GW Roof Top Solar



Growth of ORE - We are on track

Growth of ORE



The immediate benefits possible only by replacing oil for power generation

CEB Projection for 2024

Base Case 2024	From Presentation by DGM		
2024 Forecast	GWh	Rs/kWh	Cost Rs Mn
Energy Source			
CEB Hydro	4,417.70	4.50	19,879.56
Thermal Complex	1,994.50	63.00	125,653.50
coal	5,254.40	32.00	168,140.58
CEB NCRE	300.00	4.00	1,200.00
Private NCRE	2,169.00	26.00	56,394.00
Private Thermal	1,147.00	64.00	73,408.00
Roof Top Solar	750.00	32.00	24,000.00
Average Cost /kWh	29.23	16,032.60	468,675.64
Cost of Fin Tra and Dist			204,000.00
Total			672,675.64

If we dump oil ?

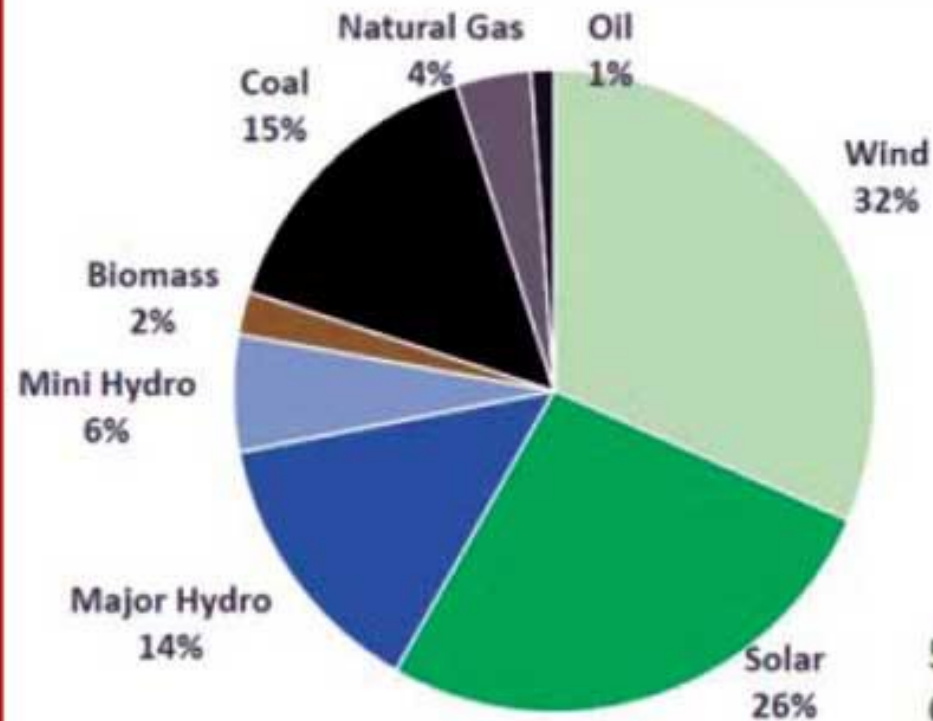
2024 Forecast Ver 2	GWh	Rs/kWh	Cost Rs Mn
Energy Source			
CEB Hydro	4,417.70	4.50	19,879.65
Thermal Complex	0.00	63.00	0.00
coal	5,254.40	32.00	168,140.80
CEB NCRE	300.00	4.00	1,200.00
Private NCRE	3,300.00	26.00	85,800.00
Private Thermal	0.00	64.00	0.00
Roof Top Solar	2,500.00	32.00	80,000.00
DSM	-300.00	0.00	0.00
	15,472.10		355,020.45
Cost of Fin Tra and Dist			204,000.00
Total			559,020.45
		Saving of Cost	72,853.50

What do we need to add ?

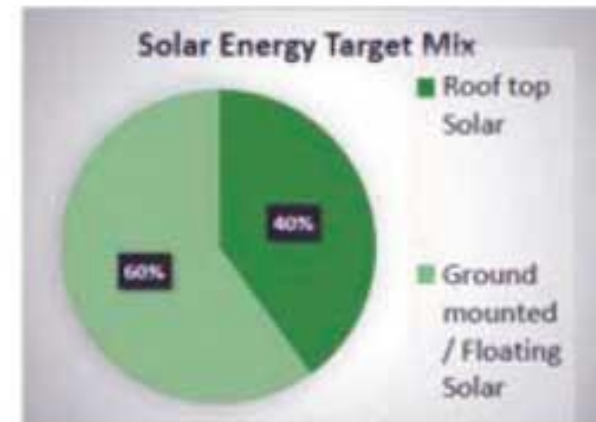
- 1400 GWh of Roof Top Solar PV from 1000 MW addition
- 3015 GWh NCRE –
 - Wind, 1380 GWh from 450 MW addition
 - Solar Parks 350 GWh from 250 MW addition
 - Bio Mass, 375 GWh from 50 MW addition
 - Mini Hydro 275 GWh from 70 MW addition
- DSM 300 GWh
 - Replace 20 Million CFL bulbs with LEDS
 - Replace old motors with Energy Efficient motors

2030 - Energy Mix Forecast

- 80 % Renewable Energy as the basis



5 GW of Solar Capacity by 2030



Current Projects in pipe line outside NCRE scope

RE Development Plan 2022 - SLSEA

Table 8.2: Details of planned Energy Park projects

Project Details			Project Development Period	
Project Name	Type	Capacity (MW)	Initiation	Ready for Tendering
Mannar (Phase 3)	Wind	100	2021	2023
Pooneryn (Phase 2)	Wind	120	2022	2024
Puttalam	Wind	100	2022	2025
Northern (N collector-Vadamarachchi)	Wind	130	2023	2026
Hambantota & Thissamaharama	Solar	100	2021	2023
Northern	Solar	50	2022	2024
Northern	Solar	50	2024	2026
Hambantota	Solar	50	2024	2026

450 MW

250 MW

The two illegal unsolicited wind and solar projects promoted by the Ministry are ignored

The potential windfall possible

“According to a study by the Sustainable Energy Authority,
Sri Lanka has a bounty of nature

- The On Shore and Off Shore wind Potential – 102,000 MW
- The Solar Potential - 106,000 MW
- We need only 10,000 MW to meet the domestic needs
- Let us target monetizing of only 25% of the excess

Stage 1 – Year 2030 for internal energy security

Year		MW	PF	MWh	GWh		Oil Savings @\$ 0.21 US\$
2030	Solar	5000	0.16	7,008,000	7,008		1,471,680
	wind	4000	0.35	12,264,000	12,264	19,272	2,575,440
	Bio Mass	500	0.85	3,723,000	3,723		781,830
	Mini Hydro	500	0.45	1,971,000	1,971		413,910
		10000		24,966,000	24,966		5,242,860

Stage II – Export Potential to tap the Pot of Gold

Export Potential of Renewable Energy				
Source	Capacity addition Target by 2030 MW	Plant Factor Average %	Annual Energy Input to Grid GWh	Potential Earning annually @ \$ 80 /MWh
Solar PV	25,000	0.16	35,040,000	2,803,200,000
Wind	20,000	0.35	61,320,000	4,905,600,000
			96,360,000	7,708,800,000

Is this a pipe dream?

- India is chronically short of power in spite of vast strides in recent years
- So theoretically an immediate market exists
- An international transmission link is not a technical marvel with many such connections already in existence
- But is this a prudent option?
- Sri Lanka has come second best in all our FTAs due to the incompetency of our negotiating teams, particularly with India.
- Can we meet the level of costing to match India's own cost structure?
- Is there other alternatives to monetize our bounty?

Some essential firm policy decisions are needed for a Secure Energy Future

- 1. Energy is Sri Lanka's own asset and belongs to the citizens**
- 2. Ensuring future energy security, which is essential for national security, depends on achievement of none dependence on imported fossil fuels and to be a Sri Lankan Industry controlled and governed by Sri Lanka**
- 3. While any foreign investments are welcome and encouraged to make the transition smooth and on target, they must be compensated under the existing systems of BOI investments and there shall be no tariff paid in foreign exchange when the consumption is for local usage**
- 4. Electricity industry should be viewed not merely as serving the energy needs of other sectors of the economy , but as a sector which can contribute heavily to the economy and GDP growth with employment generation, high level skills development and technical advancement.**
- 5. The well recognized bounty of renewable energy many fold over the needs of the country should be developed as a means of earning foreign exchange, which is the segment to invite foreigners to invest in this sector , who can be paid in foreign exchange while ensuring the fair share of the benefits to flow to the national economy as done by the middle eastern countries with their oil reserves.**

Is there a Stage 1 A ?

- Sri Lanka continues to ignore the Elephant in the Room – The Transport fuels- taking up 75% of imported fuels
- The world will stop manufacturing ICE vehicles by 2035
- The Current Energy Policy states that 25% of Light vehicles should be EVs by 2023, once more ignored by everyone
- But that change can be done by consumers themselves
- Out of Current Population of light vehicles (2020)
- Private Cars 708,000
- Three wheelers 988,300
- Motor Cycles 2,990,000t

The Elephant in the room !

Potential Savings from Electrification

Assume conversions to comence from year 2023

Rate of coversion 20% of new Registrations

Increasing percentages of Conversion on old fleet

Only Cars, Three Wheelers and Motor Cycles Considered

All new registrations to be EVs by 2028

Conversion of old fleet

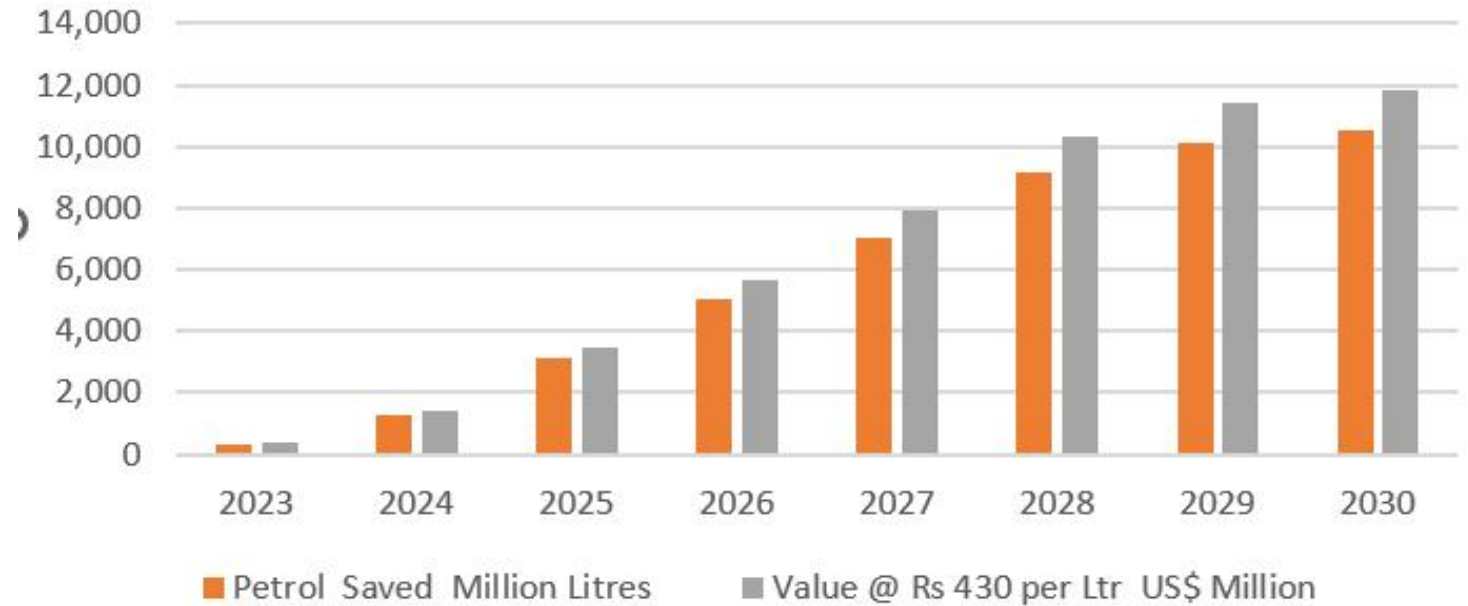
Cars 75% by 2030

Threew Wheelers 100% by 2028

Motor Cycles 100 % by 2029

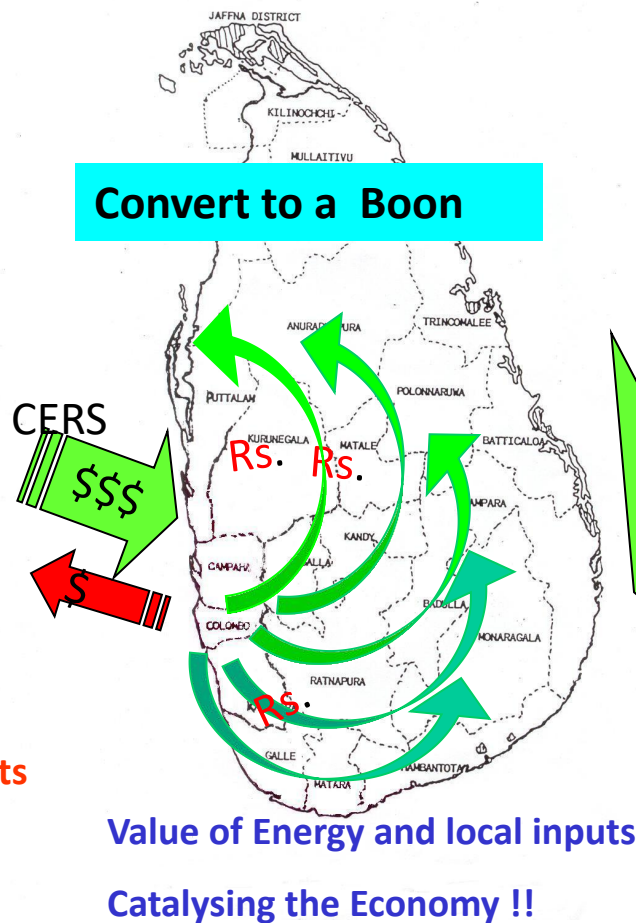
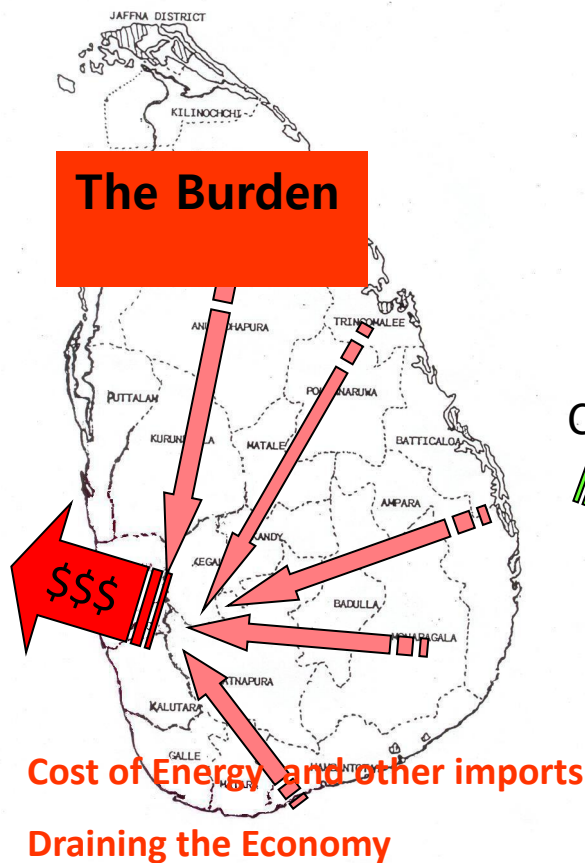
Cumulative Total for All categories l/yr	314,600,000	1,277,133,333	3,108,133,333	5,040,933,333	7,049,333,333	9,159,533,333	10,149,500,000	10,527,566,667
Total saving Million L/yr	315	1,277	3,108	5,041	7,049	9,160	10,150	10,528
Cumulative Saving in US\$ Millions @ Rs 360/l of petrol	354	1,437	3,497	5,671	7,931	10,304	11,418	11,844

Potential Savings in MillionLtrs and US\$ Millions

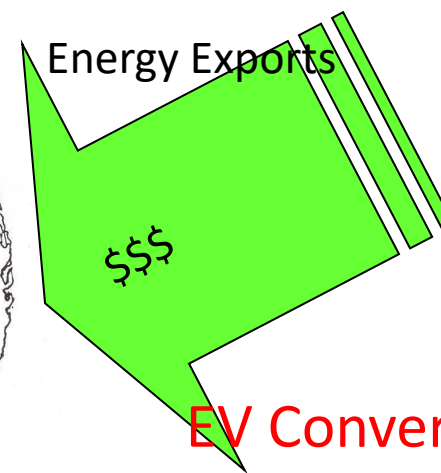


Converting the Drain to a 'Spin'

Cost of Fuel Imports for Electricity and Transport
US \$ 5000 Million and will continue to increase



Export Potential
Minimum \$ 7.8
Billion Annually



EV Conversion \$
11 Million saved
Annually

The Comparisons in Context- CBSL Report 2022

CURRENT ACCOUNT deficit declined sharply in 2022, supported by the moderation of trade deficit and earnings from tourism...

US\$ -1.5 bn 2022

▲ -1.9
As a % of GDP

US\$ -3.3 bn 2021

▼ -3.7



Who could make this change?

- Sri Lankan Entrepreneurs big and small can do this
- The State policies should be aligned to facilitate this
- But the **Prosumers** can provide the initial impetus
- The Banking Sector has a major role to play by at least allocating a fair share of their loan portfolio to support the renewable energy sector
- **Creating the awareness that our national bounty should be to our benefits and not to be grabbed by foreigners**

Let him too
participate and
benefit from
the energy
economy



**Power for the
People by the
People
make Energy a
Consumers business**

