100% Renewable Energy Plan of Sri Lanka
1. Country at a Glance

- **Socio-Economic**
  - Population : 20.5 Million
  - Per Capita GDP : 3,600 US$

- **Energy Sector**
  - Primary Energy Supply by Sources:
    - Biomass : 43.3%
    - Petroleum & Coal : 49.8%
    - Large hydro : 4.3%
    - NREs (Small hydro, wind, solar): 2.6%
  - Total Consumption: 8.9 MToE
    - Industry : 25.4 %
    - Transport : 28.8 %
    - Domestic & Commercial : 45.8 %
  - Electricity Sector:
    - Total Installed Capacity : 3900 MW
    - Peak Load : 2200 MW
    - HH electrification : 98% (Grid - 95% + Off-grid - 3%)

**Generation by Source**
- Hydro : 30%
- Thermal : 60%
- NRE : 10%

**NRE Capacities**
- Small hydro : 290 MW
- Wind : 100 MW
- Solar : 10 MW
- Biomass : 20 MW
2. Energy Policy Framework

- National Development Policies and Strategies
  - Election Manifesto of New H.E. the President – Section 10: An Energy Secure Sri Lanka
  - Haritha Lanka Programme: Action plan of the National Council for Sustainable Development
  - Provincial Sustainable Energy Policies / Plans (in progress)

- Energy Sector Policies and Strategies
  - National Energy Policy and Strategies
  - National targets (20% grid electricity by NRE & 2000 GWh of electricity saving by 2020)
  - Sustainable Energy Policy / 100% RE Policy (draft)
3. 100% RE – The Rationale

- **Present Context – Unsustainable Scenario**
  - Energy & Transport Sectors heavily Foreign/Petroleum Dependent
  - Economic Burden in Long-term Context
  - Resource Depletion / Environmental Concerns

- **Welcoming Opportunities for Sustainable Scenario**
  - High Resource Potential
  - Technology Advancements / Competitiveness in RE
    - Solar PV Prices & Technologies
    - Storage Systems / Decentralized Systems
  - Energy Efficient Technologies / Energy Mgt. Systems
  - Knowledge Management / Sustainable Life Styles
  - Opening up of Green Financing Avenues
4. 100% RE – The Resource Base

Sources: NREL & SLSEA Resource Maps
4. 100% RE – The Resource Base (Contd.)

- **Strategic Approach**

**Resource Maps**
- Technical potential of NCRE
- Wind – 20,000 MW, Solar – Unquantifiable, Small Hydro – 800 MW, Biomass – 8,000 MW

**Resource Inventory**
- Exploitable RE potentials considering socio-environmental limitations
- Wind – 5,000 MW, Solar PV – 18,000 MW+, Small Hydro – 800 MW, Biomass – 1,000 MW

**Technology Road Map**
- A systematic framework to prioritize different RE Resource-Technology-Application options, focusing policy targets
5. 100% RE – The Overall Approach

✓ Strategic Approach
  
  Avoid
  
  Shift
  
  Improve

✓ End-use Sectors
  
  Industrial & Commercial
  
  Domestic
  
  Transport

RENEWABLE ENERGY
6. 100% RE – The Energy Use Scenario

- Stable population of around 23 million people, transformed to energy conscious society

- A transformed society
  - With full digital convergence
  - Integrated mostly electronically

- Developed, knowledge based economy → 18000MW demand
  - Lowered to 15,000MW due to low energy intensity of economy
  - Further lowered by EE gains to 10,000MW (≈ 10 kWh/person/day)

- Electricity system
  - Taken over the most aspects of the energy industry through an Internet Protocol (IP) based smart grid
  - Powered, mostly by centralized wind parks and distributed solar PV, assisted by storage hydro; Biomass, agro and municipal waste streams supporting firm power
  - Gradual virtual grid isolation using solar and battery storage
  - Gradual shift for EVs, etc. (around 30 kWh/person/day at fully developed stage)
7. Sectoral Approaches

**TRANSPORT**
- Complete electrification of transport realized
  - Most major cities will be predominantly pedestrian in character and will have only electric bicycles, scooters, E3Ws and E-taxis to support
  - Passenger transport dominated by electric trains and electric BRT supported by a fleet of EV taxis
  - Storage capacity of EVs used as a grid balancer
  - Hydrogen Fuel cell vehicles, Compressed air vehicles
  - Algae based bio-fuels and compressed biogas powering long haul transport

**RESIDENTIAL**
- Almost all homes isolated from central grid
  - Own roof top solar PV with advanced battery solutions
  - Energy efficient appliances, mostly connected to DC micro grids
  - Cooking energy, a combination of modern biomass and induction stoves
  - Solar water heaters
  - Waste converter (including biogas digester), a household appliance
7. Sectoral Approaches (Contd.)

**INDUSTRY**
- Industries are resource efficient low energy demand types
  - Thermal energy from improved biomass, biogas and RDF
  - Geothermal, Ocean thermal for low temperature thermal energy
  - Solar water pumping for lift-irrigation
  - Electricity from local grids, and assisted by central grid
  - DC motors taking over the role of preferred motive power source

**COMMERCIAL**
- Building innovations driven commercial sector
  - Most commercial centres cooled by district ocean thermal and geothermal assisted by ice storage
  - Most buildings energy efficient - zero / positive energy buildings
  - All buildings with advanced BMS systems and Building-Integrated Photovoltaic (BiPV) envelopes
  - Advanced technologies such as co-generation and tri-generation
  - Waste to Energy - fully materialized.

This is assisted by RE and EE Technology Roadmaps
8. Costs/Benefits and Barriers

- **Economic Impact**
  - Direct Cost assuming 100% Solar with 2/3 of energy storage US$ 150 billion (90% of the cost for storage)
  - 2/3 of GDP under US$ 10,000 per capita GDP scenario

- **Co-benefits**
  - Employment Creation
  - Value Addition for Local Resources
  - Local Expertise Development

- **Barriers**
  - Multi Stakeholder Involvement
  - Not a Major National Priority (like Poverty Alleviation)
  - Requirement of Coordination through a Sound Institutional Setup
Summing Up

Towards An Energy Secure Sri Lanka

Supporting Global 100% Renewable Energy Future

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Thank you!