

# **South Asia Regional Workshop on “Cross Border Electricity Trade”**

**24th – 25th September 2014  
New Delhi**

**Upali Daranagama  
Ministry of Power and Energy  
Sri Lanka**

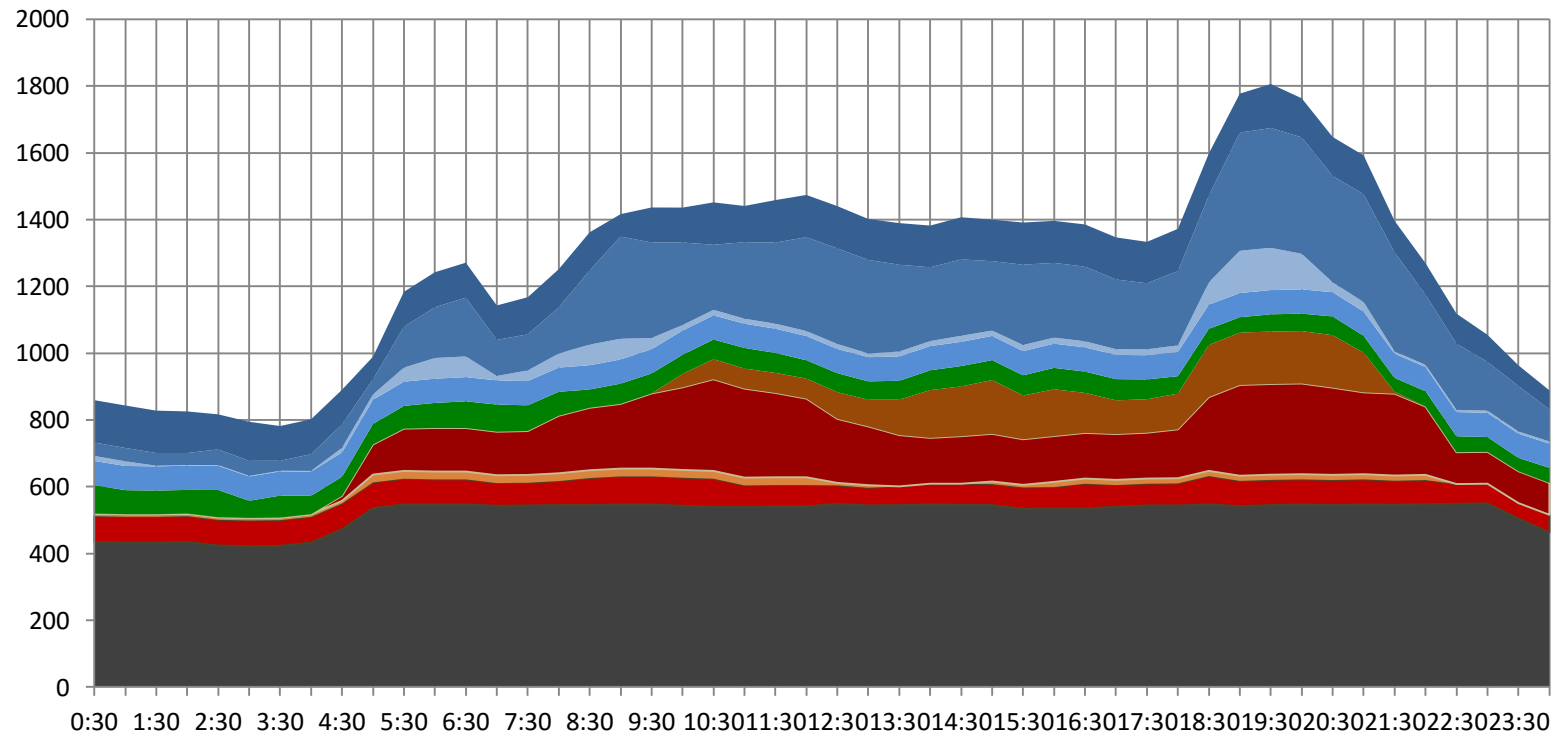
# Power Sector at a Glance

- **Peak Demand** **2,164 MW**
- **Installed Capacity 2014**
  - Hydro (CEB owned) 1,361 MW
  - Thermal (CEB Owned) 1,464 MW
  - Thermal (IPP) 771 MW
  - NCRE (IPP) 367 MW
- **Total Installed Capacity** **3,963 MW**
- **Electricity Generation 2013**
  - Gross Generation** **11,954 GWh**
    - Hydro 50%
    - Oil 28%
    - Coal 12%
    - NCRE 10%
- **System Loss** **10.6%**
- **Electrification Level of Households** **96%**

# The Load Curve

03/06/2014 -Wet day

■ LAXAPANA ■ MAHAWELI ■ SAMA ■ KUKULE ■ RENEWABLE ■ KPS ■ IPP ■ CHUNNAKAM ■ SAPU ■ CEB COAL



# India – Sri Lanka Electricity Transmission Interconnection

## Background

- Under consideration since mid 1970's
- Pre-feasibility study conducted with the assistance of USAID/SARI Energy in 2002
- Review of the Pre-feasibility study with assistance of USAID in 2006 by Nexant/ Power Grid Corporation of India
- Considered under SAARC and BIMSTEC Regional Grid

# India – Sri Lanka Electricity Transmission Interconnection

## Background

- Bilateral discussions by Secretary , Ministry of Power and Energy Sri Lanka and Secretary Ministry of Power, India in Dec 2006.
- Appointed a Steering Committee Co-Chaired by Secretaries of Power Ministries and a Task Force for technical, commercial, regulatory and legal aspects.
- A MOU on Feasibility Study for India- Sri Lanka Electricity Grid Interconnection was signed among GOSL, GOI, CEB and Power Grid Corporation of India Limited (POWERGRID) on 9th June 2010. Executing Agencies; CEB and POWERGRID are jointly carrying out the feasibility study

# Proposed Interconnection Option

- + 400kV HVDC line from Madurai to Anuradhapura
- Part-I (Land Route - Indian Territory)
  - Madurai to Indian Sea Coast Pannaikulam HVDC overhead line 150km
  - HVDC Terminal at Madurai
- Part-II (Sea Route)
  - India Sea Coast Pannaikulam to Sri Lankan Sea coast Thirukketiswaram, Mannar HVDC Submarine Cable 127km
- Part-III (Land Route - Sri Lankan Territory)
  - Sri Lankan Sea Coast Mannar to Anuradhapura HVDC overhead line 110km
  - HVDC Terminal at Anuradhapura

# Proposed Electricity Grid Interconnection

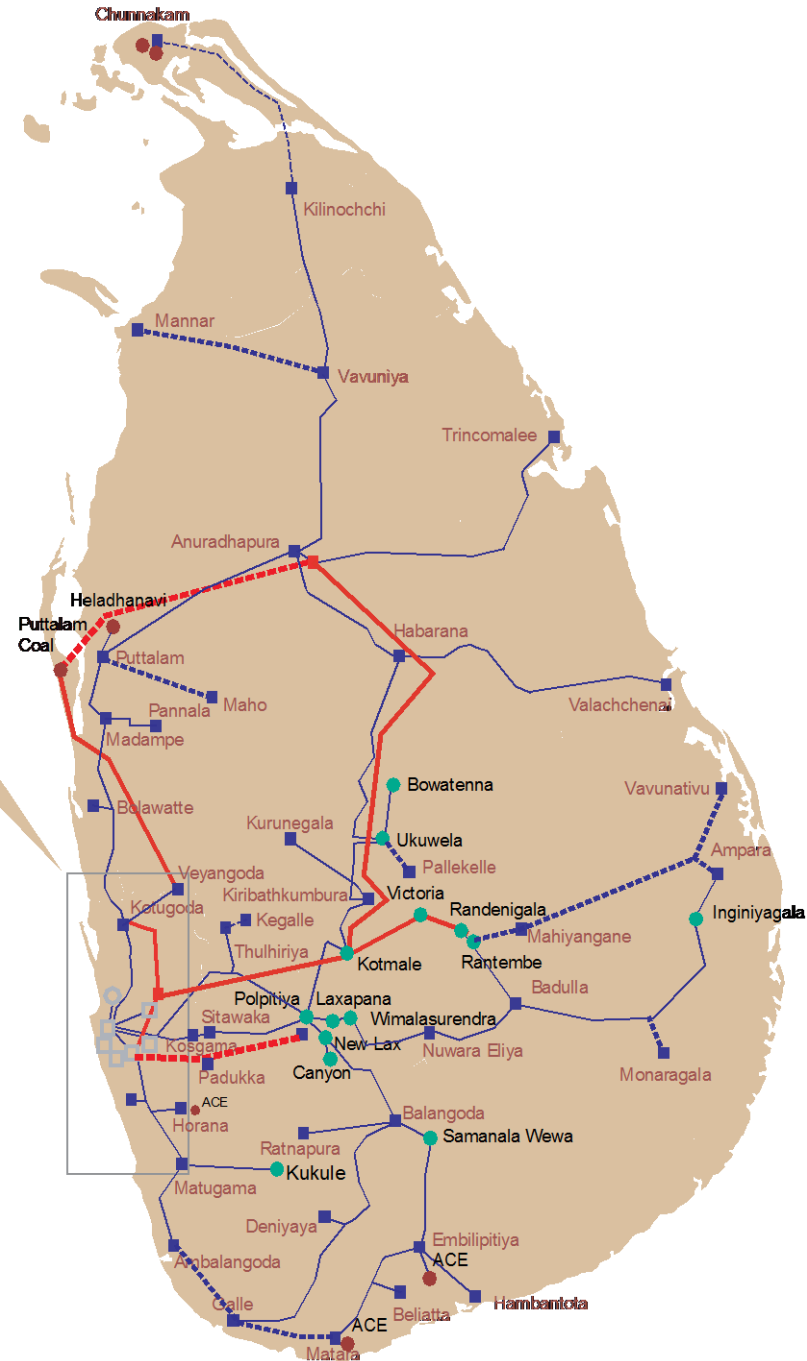
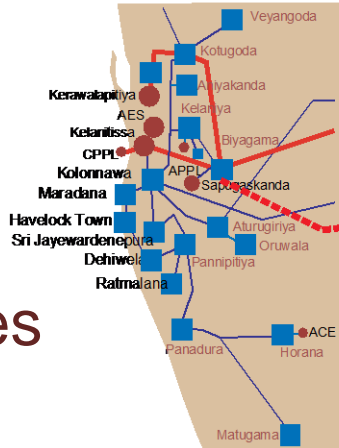


# Transmission Network

CEB Transmission Network 2012

- 220 kV
- - - Under implementation
- - - 132 kV
- ■ 220 kV/ 132 kV Grid Substation
- Hydro Power Plant
- Thermal Power Plant

CEB owns and operates the entire transmission network that operates at 220 kV and 132 kV



<b>220 kV</b>	<b>501 km</b>
<b>132 kV</b>	<b>1,935 km</b>
<b>Grid Substations</b>	<b>62</b>



# Options Considered for Technical Feasibility Study

## – 4 different construction options

- Option-I : 4x250MW in two stages
  - Stage I : 2 x 250MW
  - Stage II : 2 x 250MW
- Option-II : 2x500MW in two stages
  - Stage I : 1 x 500MW
  - Stage II : 1 x 500MW
- Option-III : 2x500MW in single stage
- Option- IV : 1X500MW
- In all the options, the under sea cable will be laid for the full capacity at the beginning itself.

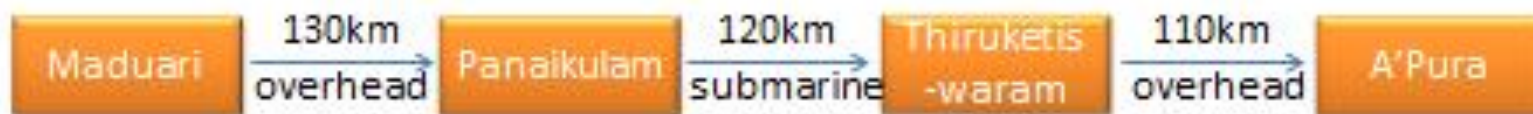
## – 2 different technologies

- Conventional Line Commuted Conversion
- Voltage Source Conversion (VSC)

# Outcome of the Technical Feasibility Study

conducted by POWERGRID 2011

- Line Route



# Potential for Power Exchange Contracts

- **Short term contracts**
  - During peak hours, Sri Lanka can make use of the lower cost Indian short term market
  - During off peak, the excess coal based generation in Sri Lanka could be sold to the Indian short term market
- **Long term contracts**
  - Owing to economies of scale, Sri Lanka signing up with an Indian UMPP could be cheaper than building own plants
  - Similarly, if Sri Lanka can build an UMPP, it can also serve the Indian base load, owing to the persistent shortfall in India

# Ownership Structure of the Interconnection

- **3 Ownership models were considered**
  - **Model 1:** POWERGRID and CEB separately owning the two portions of the interconnection
  - **Model 2:** BOO by a joint venture between POWERGRID and the CEB.
  - **Model 3:** BOO by an entirely private third party
- **Corresponding financing and cost recovery mechanisms**
  - **Model 1:** long term concessionary financing available for the state utilities.
  - **Model 2:** soft financing with lesser repayment period and the recovery will be through the power trade benefits
  - **Model 3:** commercial financing and the recovery of costs will be in the form of power transfer fees

# Benefits and Opportunities

- Meeting growing power demand with imported power
- Improved load profile - valley filling, peak shaving
- Improved system reliability
- Enhanced Energy security
- Access to electricity from cheaper sources of power generation in the South Asia Region
- Opportunity to enter into India Power Exchange for energy trading
- Reduction in operational cost through better resource management

**Thank You**