



Investment in Infrastructure for Cross Border Electricity Trade

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"Cross Border Electricity Trade"

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Electricity Data

- Installed capacity - 3931 MW
- Peak Demand - 2163 MW
- Electricity Generated - 11980 GWh (2013)
- Generation Mix - Hydro 58% Thermal 40% NCRE 2%
- Capacity Mix - Hydro 41% Thermal 49% NCRE 10%
- Load Factor - 62.8%
- Access to Electricity - 96%
- Elec. Consumption per Capita - 515 kWh
- Avg. Cost per unit (at selling point) - 20.00 Rs/kWh
- Avg. selling price - 17.50 Rs/kWh



Base Demand Forecast

Year	Demand	Growth Rate	Net Losses	Generation	Growth Rate	Peak
	(GWh)	(%)	(%)	(GWh)	(%)	(MW)
2013	11104	4.0	11.6	12566	4.0	2451
2015	12834	6.3	11.6	14509	7.4	2894
2020	16937	5.4	11.0	19030	5.2	3731
2025	21737	5.0	10.5	24284	4.9	4717
2030	27581	4.8	10.0	30645	4.7	5893
2035	34652	4.6	9.6	38320	4.5	7294



Generation Expansion Plan 2013 - 2032

YEAR	RENEWABLE ADDITIONS	THERMAL ADDITIONS	THERMAL RETIREMENTS	LOLP %
2013	-	-	4x5 MW ACE Power Matara 4x5 MW ACE Power Horana 4x5.63 MW Lakdanavi	1.821
2014	-	4x5 MW Northern Power** 3x8 MW Chunnakum Extension** 1x300 MW Puttalam Coal (Stage II)		1.357
2015	-	1x300 MW Puttalam Coal (Stage II) 3x75 MW Gas Turbine	6x16.6 MW HeladanaviPuttalam 14x7.11 MW ACE Power Embilipitiya 4x15 MW Colombo Power	1.228
2016	35 MW Broadlands 120 MW Uma Oya	-	-	1.017
2017	-	1x105 MW Gas Turbine	-	1.483
2018	27 MW Moragolla Plant	2x250 MW Trincomalee Coal Power plant	4x5 MW Northern Power 8x6.13 MW Asia Power	0.399
2019	-	2x300 MW Coal plant	5x17 MW Kelanitissa Gas Turbines 4x18 MW Sapugaskanda diesel	0.080
2020	-	-	-	0.247
2021	-	1x300 MW Coal plant	-	0.162
2022	49 MW Gin Ganga ***	1x300 MW Coal plant	-	0.085



Trans-border Electricity Exchange

- ❖ Sri Lanka already developed cheaper source of electricity
- ❖ For Sri Lanka to get access to a South Asian Regional Electricity Grid, the only feasible connection is with India through a HVDC marine cable.
- ❖ 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
- ❖ Owing to economies of scale, Sri Lanka signing up with an Indian UMPP could be cheaper than building own plants

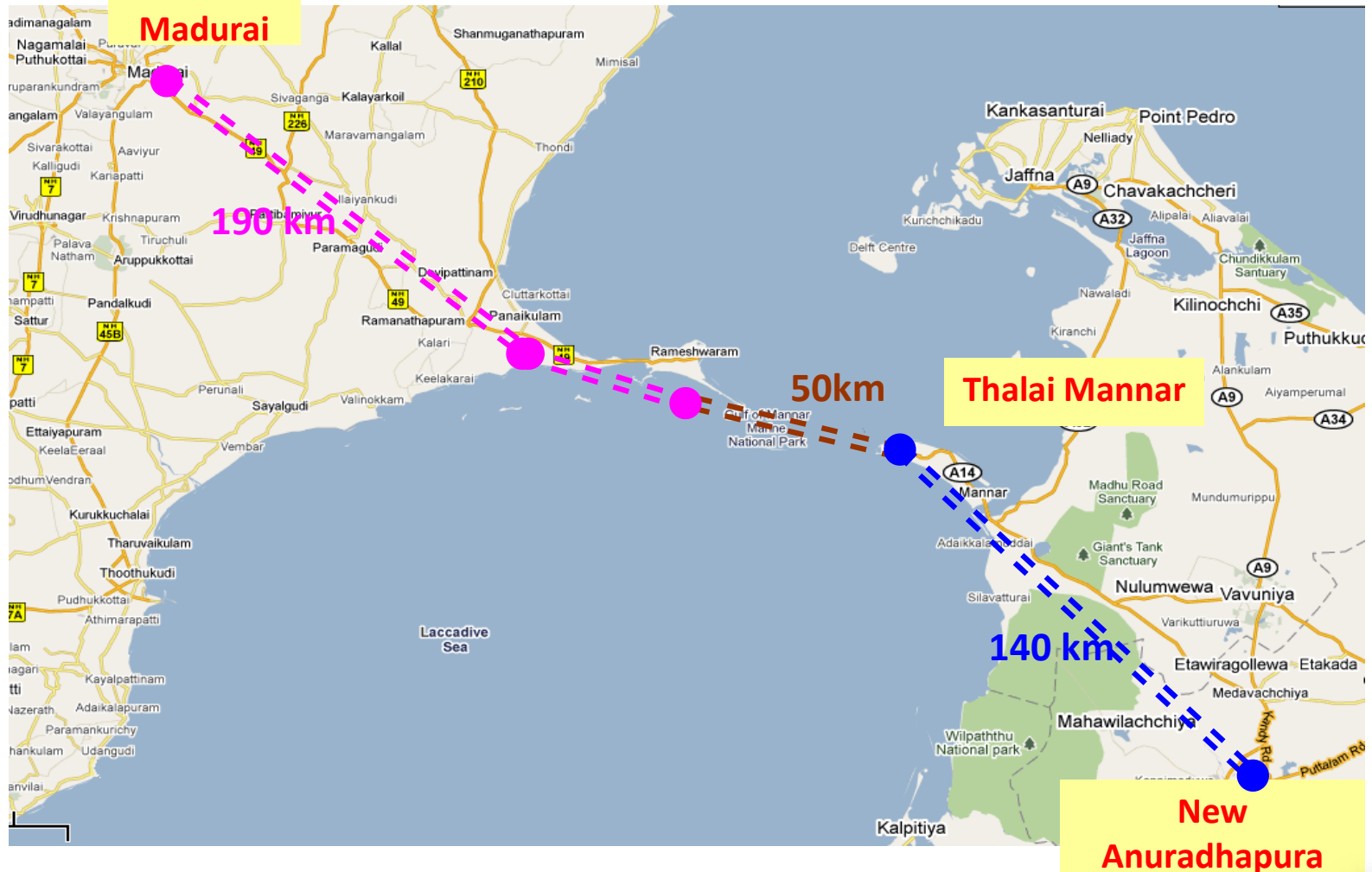


Configuration of the Interconnection

- ❖ High voltage direct current (HVDC), operating at ± 400 kV
- ❖ Length - 387 km - overhead line 337km (India 197km
Sri Lanka 140km)
- marine cable 50km
- ❖ Interconnection capacity - Stage I - 500 MW
Stage II - 500 MW
- ❖ Investment 500 - 700 MUSD



Revised Electricity Grid Interconnection



Electricity Market in Sri Lanka

- Sri Lanka does not have an operational power market
 - CEB operates as the single buyer
 - Meets customer demand at all times

Challenges in Power Exchange

1. Price of electricity
 - Contract price (Capacity cost + Energy cost)
 - Investment and operational costs of the interconnection
 - Transmission fees to be paid for transfers
 - Energy loss attributed to power transfers
2. HVDC Technology is new to Sri Lanka - Operation and maintenance of 400kV HVDC interconnection is challenging. Marine cable is involved - unique feature in interconnections of South Asia Region



Ownership Structure

1. Two transmission companies separately owning the two portions of the interconnection

long term concessionary financing available for the state utilities and the costs will be socialized to be recovered from the general tariff.

2. Joint venture between two transmission companies

soft financing with lesser repayment period and the recovery will be through the power trade benefits

3. Private Company

commercial financing and the recovery of costs will be in the form of power transfer fees



Power Transfer Models

1. Short term exchanges

No change to the existing investment plans but make use of the other country's power market to improve the operational efficiency of the power system

2. Long term exchanges

the full capacity of the interconnection to be used to transfer power on long term contracts in the form of PPAs

Under a long term contract, enabling deferment of investments (especially in Sri Lanka)

3. Combination of short term and long term power exchanges

portion of the interconnection capacity to be allocated for power exchanges under long term PPAs while the balance to be opened up for short term transfers



Regulatory and Bilateral Trade Issues

- Legal and regulatory framework related to the project
 - CEB needs to be empowered to enter into cross-border power transfers
 - Transmission and Bulk Supply license held by CEB is required to be amended
 - Dispute resolution in the Sri Lanka Electricity Act requires to be further strengthened,
 - CEB Act has to be amended to enable the functions of trader or broker
 - A new Act may also be prepared to enable the interconnection to be implemented, to address the impediments in the legal basis in which the present operations are conducted.
- Trade related issues and concerns
 - The India Sri Lanka Free Trade Agreement (ISFTA) does not mention electricity in any of its lists, but Sri Lanka Customs specifies a preferential duty rate of 1.8 per cent for electrical energy



To achieve project viability

- ❖ The project must be structured as a 500 MW monopolar interconnection
- ❖ Project cost needs to be further reduced by reconsidering the re-routing option
- ❖ Both countries should be allowed participation in the wholesale market in each others' country, with full options and freedom to participate in the short-term, day-ahead and unscheduled interchanges market
- ❖ Sri Lankan power system need to relax its maximum load share condition and allow the interconnection to supply at the optimal capacity level



Thank You

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