



## KERALA STATE ELECTRICITY BOARD LIMITED

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To

- ✓ 1) Sri. Pardeep Jindal  
Director  
System Planning & Project Appraisal Committee  
Central Electrical Authority  
Sewa Bhavan, R.K Puram  
New Delhi - 110066.
- 2) The Director (Projects)  
Power Grid Corp. of India Ltd  
"Saudamini", Plot no.2, Sector - 29  
Gurgaon 122001, Hariyana.

Sir,

Sub: Deliberations in the 38<sup>th</sup> Standing Committee on Power System Planning and Joint SCPSP - 2000MW HVDC corridor to the State of Kerala - assessing evacuation capability and transformer augmentation needs - reg.

Ref: Letter from CEA 55/1/2015-SP&PA/1388 dated 12.06.2015

This is with reference to the discussions carried out in the SCPSP regarding the 2000MW HVDC terminal at Madakathara and the observations made therein on the determination of the evacuation capability for the same and the identifying required transformer augmentations and system strengthening.

In this context detailed system studies has been carried out to assess the capability of the near vicinity and downstream transmission system to evacuate power from the ISTS HVDC node and to determine the requirements for strengthening the intra state transmission system as per the above observations. The Transmission system have been evolved assuming that the HVDC corridor will be available by 2018-19, giving due consideration to the planned Inter-State and Intra-State asset additions during the above period. Theoretically, for the evacuation of 2000MW power, minimum of five 400kV circuits are required (considering the N-1 condition). At present the transmission system at 400kV Substation, Madakathara (Trichur North) consists of the following:

- 400kV Madakkathara - Palakkad D/c – Twin Moose
- 400kV Madakkathara - Cochin D/c – Quad Moose.

In addition to the above, 400kV Quad D/c corridor from Tirunelveli to Cochin East is under implementation and is expected to be available during the time frame. Further a 400kV D/c is also planned towards Areekode and is expected to be taken up using the RoW of the Madakkathara – Areekode 220kV S/c as soon as the 400kV Mysore – Areekode D/c line is commissioned. Though another 400kV Quad D/c link from Uduppi – Mylatty – Areekode is also planned to take up in the very near future and is expected to be available around the time frame under consideration, the same is not considered for assessing the evacuation ability of the available transmission so as to have a pessimistic approach. These links are already approved in the Standing Committee for Power System Planning of Southern Region.

Also a detailed analysis has been carried out to assess the impact of outage of one or more elements in the above transmission system. The report containing these detailed studies is enclosed herewith as per the requirement. The major conclusions from the studies are as follows:

- 2000MW from the HVDC terminal can be evacuated without any major constraints under normal conditions by LILO of both circuits of existing 400kV Trichur North (Madakathara) – Cochin East Quad D/c circuit at the 400kV AC yard of HVDC Station along with the existing and the planned 400kV transmission system from 400kV Substation at Madakathara (KSEBL).
- Under (n-1) contingency, the available transmission system is still capable of evacuating the power though with a higher loading.
- Under (n-1-1) contingency, the transmission system for evacuation is observed to be satisfying the criteria. But under outage of both circuits from the 400kV HVDC station to Madakathara (Trichur North), the ICT's at 400kV Substation Cochin East and downstream elements are seen overloaded. Accordingly the efficacy and security of the transmission system can be increased by providing an additional 400kV Quad D/c link from the 400kV AC Switchyard of HVDC station to 400kV Substation Madakathara (Trichur North) of PGCIL (approximately 5km).

- Accordingly two more 400kV feeder bays in addition to the planned four AC feeder bays are required at the HVDC Station and two more 400kV feeder bays are required at 400kV Substation Madakathara (Trichur North-PGCIL). In this context it may be noted that KSEBL is planning to take up the execution of the 400kV Madakathara – Areekode D/c feeder along the RoW of existing 220kV Madakathara – Areekode S/c feeder shortly after the commissioning of 400kV Areekode substation. Already two bays are planned for accommodating the above feeder at Madakathara (Trichur North (PGCIL)). These bays can be utilized for terminating the additional d/c feeders from HVDC station by shifting the termination of the Areekode d/c feeder to the 400kV yard of KSEBL substation at Madakathara. Since both 220kV and 400kV multi circuit feeders are planned for the above corridor, termination of the above feeder at KSEBL's substation is a better option.
- The 220kV Single circuit from Idukki to New Pallom is seen to be loaded to its limits in all the scenarios. Further the demand in Central Kerala is also showing an exponentially growing trend where the major share of the load is at present met through 220kV Substation Pooventhuruthu. Hence, for improving the reliability and availability of power in the Central region of Kerala, it is recommended that a 400kV Substation may be planned at Kottayam (Ettumanoor) by LILO of the under execution 400kV Tirunelveli – Cochin East Quad D/c feeder and providing 2x315 MVA transformers. The above line is crossing the existing 220kV Idukki – New Pallom S/c feeder at a location near Ettumanoor and is traversing very near to the existing 220kV Pallom – Ambalamughal and Sabarigiri – Ambalamughal D/c feeder. These 220kV feeders can be dropped at the above 400kV Substation very easily for which six 220kV outlets are required. It is also recommended that both the 400kV circuits may be LILO-ed at the above substation so as to balance the loading.
- *The 220kV Idukki – New Pallom S/c feeder is expected to be taken up for conversion to Double Circuit at a later stage wherein a 400kV corridor may also be planned along this RoW using multi circuit multi voltage towers. The 400kV D/c link is envisaged for providing connectivity to the 400kV Substation planned at Idukki in the event of enhancing the installed capacity of Idukki Power House from its present capacity of 780MW. This can also be interlinked with Tirunelveli and Udumalpet at a later stage by LILO of 400kV Tirunelveli- Udumalpet D/c at*

*the proposed 400kV Substation at Idukki which will facilitate evacuation of Renewable energy in the area. Under a long term plan perspective and from the view point of absorbing the renewable energy generation a 220kV link is also planned from 400kV Kottayam substation to 220kV Substation Theni by LILO of 220kV Theni – Sabarigiri S/c Feeder to the proposed 400kV Substation Kottayam, so to have an East – West Power Corridor.*

- Considering the loading of various ICT's, it is observed that the ICT's at 400kV Substations at Cochin East and Areekode are ideal candidates for capacity enhancement. One more 315MVA ICT at Cochin East may have to be provided and additional 220kV outlets are to be planned for containing the overloading of the existing 220kV downstream system from this node.
- The ICT's at 400kV Areekode substation may be enhanced to 3x315MVA from the existing 2x315 MVA or 2x500MVA considering the space constraints at the location for providing additional bays. Although the loading of the ICT's at Areekode is seen to be reduced once the 400kV Uduppi – Mylatty comes into existence, the above capacity enhancement can be thought as a part of system security strengthening.
- Although 400kV Uduppi – Mylatty – Areekode D/c is planned during the time frame under consideration, the same was not considered while assessing the evacuation capability of HVDC power so as to adopt a more pessimistic approach. But a sensitivity analysis was carried out to determine the effect of the above corridor on the network. With the availability of 400kV Uduppi – Mylatty – Areekode D/c Link, the loading of the 400kV Transmission system in the North is seen further relieved.
- Considering the difficulties in obtaining new RoW for the 400kV transmission system it is planned to utilize the existing corridors by converting them to multi-circuit multi voltage system. Further four more 400kV feeder bays in addition to existing two will be required at 400kV Substation at Areekode for terminating the 400kV Uduppi – Kasargode (Mylatti) – Kozhikode and Madakathara – Areekode D/c feeders.
- *Alternatively in the event of any difficulty to obtain additional bays as above at 400kV Substation Areekode, the sanctioned 400kV Uduppi – Kasargode (Mylatti)*

– Kozhikode and under execution 400kV Mysore – Areekode schemes may be redesigned as follows:

- Construction of a 400kV Substation at Neeleswaram (Mylatty, Kasargode) with 2x500 MVA Transformers by LILO of both circuits of the planned 400kV Udappi – Areekode (Kozhikode) D/c feeder as per the original scheme sanctioned in the SCPSP for SR.
  - The routing of this feeder to 400kV Substation Areekode substation will be through a new switching station as proposed below.
  - Construction of a new 400kV Switching Station at Anjukunnu (Kattikulam, Wyanad) near to the crossing point of 400kV Mysore – Areekode D/c and 66kV Kaniampetta – Anjukunnu S/c feeders. LILO of both circuits of 400kV Mysore – Areekode D/c at this switching station.
  - Construction of 400kV Neeleswaram (Mylatty) – Anjukunnu (Wayanad) D/c feeder.
  - With the above arrangement RoW of existing 400kV Mysore – Areekode portion inside the State can be effectively utilized for constructing a corridor from North Kerala.
- The Kerala consumption for the year 2014-15 is about 21750MU. Assuming 5% growth in consumption, the energy requirement for 2018-19 could be around 26,000MU. The hydro generation being around 7000MU, the import required is roughly 19000MU. It may also be noted that the import requirement increases in almost the same rate as that of consumption year over year. Thus effective utilization of the planned ISTS including the HVDC terminal is ensured. During the initial period, there could be low loads on the 400kV ISTS, but would increase consistently.
  - In order to facilitate further dispersal of power downstream to the ISTS nodes proposed as above, following 220kV Nodes and links are under execution / planned for implementation to cater the expected demand during the time frame under consideration without creating any system constraints. The availability of all these schemes is, however, not essential for (n-1) security of the study horizon.

- Construction of a new 220kV D/c corridor (along with the planned 400kV D/c using multi-circuit multi-voltage towers) from 400kV Substation Madakathara to 220kV Substation Malaparamba and then onwards to 220kV Substation Areekode.
- Construction of a new 220kV corridor from Mylatty to Kanhirode and additional 220kV interlinking to new 220kV substations at Thalassery, Kunnamangalam, Kakkayam etc
- Conversion of Wolf conductors in the existing 110kV circuits from Nallalam to Orkattery and Kakkayam to HTLS Helsinki
- Construction of a 220kV Substation at Elamkur (Malappuram) by LILO of existing 220kV Madakathara – Areekode feeder.
- Construction of a 220kV Substation at Chalakkudy by LILO of one circuit of existing 220kV LP – Madakathara D/c feeder.
- LILO of 220kV Elappully (Palakkad) – Madakathara feeder at 220kV Substation Shornur
- Upgradation of existing 110kV Substation Aluva to 220kV, by constructing a 220kV D/c feeder from 220kV Substation Kalamassery using the RoW of existing subs transmission system.
- Upgradation of existing 110kV Substation Kaloor to 220kV, by constructing a 220kV D/c feeder from 220kV Substation Brahmapuram.
- Inter-linking of 220kV Substations at Aluva and Chalakkudy
- Construction of a 220kV Substation at New Muvattupuzha by LILO of second circuit of existing 220kV LP – Madakathara D/c feeder.
- Construction of a 220kV Substation at Kothamangalam by extending the erstwhile 220kV Idukki – Madakathara feeder to Kothamangalam.
- Upgradation of the existing 66kV Transmission system from Pallivasal to Kothamangalam and Aluva to 220kV/110kV D/c corridor

- Construction of a 220kV substation at Ettumanoor by LILO of 220KV Pallom – Ambalamughal feeder and upgrading of the associated 66kV transmission systems to 110kV
- Construction of a 220kV Substation at Parippally and interlinking with 220kV substations at Kundra and Pothencode using the RoW of existing 110kV feeders
- Construction of a 400kV Substation at Kollam (Kundra) by LILO of 400kV Tirunelveli – Cochin East feeder at Edamon and using the RoW of existing 110kV feeder from Edamon to Kundra.
- Capacity enhancements at various 220kV substations are also proposed for facilitating unconstrained evacuation of power.

A detailed transmission plan proposed for the period 2015-23 is attached herewith for reference.

In this context it may be noted that a special task force under the control of a Deputy Chief Engineer has been constituted for the effective implementation of the above proposals in the Northern region of Kerala on a war footing basis with in the envisaged time span. Same exercise is also proposed for executing the works in Southern region also. It is further requested that additional strengthening of the upstream ISTS corridors may be suitably assessed and considered in the perspective plan under preparation for alleviating any bottlenecks / corridor congestion that may arise on account of the import of power required by the State for the study period. The same may please be included in the perspective transmission plan for the Southern Region.

Yours faithfully,

  
DIRECTOR  
(Transmission & System Operation)

Transmission Plan Proposal for the Kerala System for the Period 2015-23

Sl.No	Name of work	Voltage Level	Capacity	Length of line or Number of Bays in	Target Year
1	Double Circuit 400kV line additional from New HVDC substation to existing PGCIL switching station at Madakkathara for ensuring power flow under N-1 condition	400	Quad Moose	5km	2017-18
2	Two 400kV (Areekode-Madakkathara-2 circuits) and One additional Transformer bay at PGCIL substation at Areekode to accommodate (Space available in the present substation), One more 220kV bay in KSEB substation to accommodate Thrissur- Areekode-additional circuit by converting existing 220kV Madakkathara - Malaparamba - Areekode SC line.	400	(2X400kV Bays+1X315MVA) additional		2017-18
3	400kV DC line from Uduppi (Karnataka) to Mayilatty/Neeleswaram(Kerala)	400	Quad Moose 400kV Line	320km	2020-21
4	400kV Bay at Madakkathara for Areekode-Madakkathara 400kV line	400	2nos 400kV bays and Bus extension		2016-17
5	400/220kV/110kV substation at Neeleswaram by LILO from existing 220kV Kanjirode-Mylatty line (First phase) and 400kV(second phase) by LILO of 2 circuits from 400kV Mysore-Areekode line (From switching station at Kattikulam/Wayanad) and 2 circuits from Future Uduppi 400kV line to be constructed by PGCIL and 2 Circuits from Cheemeni Power Station(Future), and 220kV feeders to Kanjirode, Mayilatty, Solar power station etc	400/220/110	2000MVA in 400kV and 500MVA in 220kV under N-1. Quad Moose for 400kV and Twin Moose for 220kV or equivalent	10Nos 400kV bays and 10Nos 220kV bays, 8Nos 110kV Bays, 2 x 500MVA and 2 x 200MVA / 120km line	2017-18



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6	400kV Kattikulam switching Station for dropping 400kV Mysore -Areekode lines for taking to Neeleswaram 400/220/110kV substation	400/220	Only switching station	6Nos 400kV bays and 6Nos 220kV bays	2017-18
7	Convert Malaparamba-Areekode 220kV SC line to 400/220kV MCMV line	400/220		55	2017-18
8	Convert Existing 220kV DC line from Areekode to Kanjirode up to the crossing pint of Areekode Kaniyampetta SC line to 400/220kV MCMV line for bringing the new 400kV line from Malpparamba to PGCIL substation at Areekode	400/220		15	2017-18
9	Convert Madakkathara-Malaparamba 220kV SC line to 400/220kV MCMV line	400/220		45	2016-17
10	220 kV Switching Station at Panjal, Thrissur to Enable switching of 220kV feeders among Palakkad, Shoranur, Areekode and Madakkathara	220/220	10 Bay considering the future	Switching purpose	2017-18
11	LLO of Kanjirode-Mayilatty 220kV feeders at Neeleswaram substation for charging phase 1 as per item 2 above ( i.e 220/110kV side.)	220/110	Double Circuit with Single Moose ACSR-800Amps	5	2015-16
12	220kV Neeleswaram - Kanhirode D/c line through the existing RoW of 110kV D/c using Multi Circuit-Multi Voltage line	220/110			2018-19

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13	Thalasseri 220/110kV Substation and 220kV D/c line from Kanhirode and Kakkayam using the RoW of existing 110/66kV feeders by using Multi Circuit / Multi Voltage Towers	220/110	Four 220kV Bays and 110kV bays as required	2X100MVA	2019-20
14	Converting 66kV Kaniampetta - Nedumpoil - Kanhirode line to 220/110kV line in existing ROW	220/110	220kV with Single Moose and 110kV with wolf ACSR	100	2020-21
15	Kunnamangalam 220kV substation by LILO of 220kV Areekode -Orkattery line through a DC 220/110kV line using the existing RoW of 110kV feeders	220/110	Four 220kV Bays and 110kV bays as required	2X100MVA	2016-17
16	Establish 220kV AIS/GIS at Kakkayam for evacuation of Power at 220kV level by interlinking with 220kV Thalassery S/s using the RoW of existing 110kV feeders and by using Multi Circuit / Multi Voltage Towers	220/110	6 Nos 220kV Bays and 110kV bays spare	2X200MVA	2016-17
17	220kV Manjeri Substation including LILO line from 220kV Madakathara - Areekode feeder	220/110	6Nos 220kV Bays and 110kV bays as required	2X100MVA	2016-17
18	220kV Vettathur Substation by LILO of 220kV Madakathara - Areekode feeder	220/110	6Nos 220kV Bays and 110kV bays as required	2X100MVA	20120-21
19	Wadakkancheri - Kunnamkulam 220/110kV line using the existing 66kV ROW by LILO of 220kV Madakathara - Malaparamba line near Wadakkanchery	220/110		25	2019-20
20	Kunnamkulam 220kV substation	220/110	5 bays of 220kV and necessary 110kV bays	2X100MVA	2019-20

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21	220kV Substation Chalakkudy AIS by LILO of 220kV Lower Periyar - Brahmapuram	220/110	8Bays of 220 and 2X100MVA Txer	2X100MVA	2016-17
22	220kV line from Chalakkudy to Aluva by upgrading Aluva-Chalakkudy 66kV line stage by stage to 220/110kV MCMV line	220/110	Single Moose for 220kV and Single wolf for 110kV	50	2017-18
23	Wadakkanchery-Viyyur 220/110kV MCMV line in the ROW of 66kV line	220/110	Single Moose for 220kV and Single wolf for 110kV	50	2019-20
24	Viyyur 220kV substation by conversion of Viyyur Madakkathara 110kV line to 220/110kV line for future enhancement of Viyyur substation	220/110	Single Moose for 220kV and Single wolf for 110kV. 6Bays of 220 and 2X100MVA Txer	2X100MVA	2020-21
25	Conversion Kakkayam-Nallam 110kV Line to HTLS	110	HTLS wolf equivalent Helsinki-ACCC	2X50kM	2015-16
26	Changing conductor of one circuit of Chevayur -Orkattery DC line with HTLS fully up to Orkattery on left side (including LILO through Koyilandy, Vadakara etc)	110	HTLS wolf equivalent Helsinki-ACCC	70	2016-17
27	Interlinking Mannarkad 110kV substation to Melattur(Pattikkad) to have reliability of Mannarkad supply	110		32	2018-19
28	Construction of 110kV D/c Link from Kanjikde to Malampuzha	110		20kM	2019-20

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29	220kV S/s Kattakada	220	1x200		2016-17
30	220kV Pothencode-Kattakkada D/c line.	220		27.4	2016-17
31	220 / 110 kV Kattakada-Balaramapuram-Vizhinjam Multi circuit-Multi Voltage line (MCMV upto Balaramapuram)	220		20	2016-17
32	Upgradation of 110kV Vizhinjam to 220kV	220			2016-17
33	Upgradation of 110kV Kundara-Parippally D/c to 220/110 kV D/c using MC/MV towers	220		21	2017-18
34	Construction of 220kV Substation Kakkad by LILO of 220kV Sabarigiri-Edamon S/c line with 2x100MVA 220/110 transformer	220	2x100	2.5	2017-18
35	Upgradation of 66kV S/s Kothamangalam to 220kV with transformer capacity of 2x100MVA, 220/110kV	220	2x100		2017-18
36	LILO of erstwhile 220kV Idukki-Madakkathara S/c feeder at Karukadam to Kothamangalam along the Row of 66kV Kothamangalam-Koothattukulam S/c feeder using 220/110 kV MC/MV towers	220		4	2017-18
37	Construction of 220kV S/s Kuyilimala by LILO of 220kV Udumelpet- Idukki S/c feeder and with transformer capacity of 2x100MVA 220/110kV and 1x40MVA 110/66kV (to backfeed 66kV Sengulam and Moolamattom lines)	220	2x100 + 1x40	500m	2017-18
38	Upgradation of 66 kV Attingal-Palode S/c line to 220kV D/c upto the crossing point with 220kV Edamon - Pothencode D/c feeder and providing LILO on one circuit of 220kV Edamon-Pothencode D/c line	220		11	2017-18

### Transmission Plan Proposal for the Kerala System for the Period 2015-23

39	Upgradation of 110kV Attingal-Parippally D/c feeder to 220/110 kV D/c using the existing ROW and Multi circuit multi voltage towers	220		15.3	2017-18
40	Construction of 220kV S/s Parippally with 2x100MVA 220/110kV Transformers	220	2x100		2017-18
41	Upgradation of 110kV S/s Eramallur to 220kV with transformer capacity of 2x200MVA	220	2x200		2018-19
42	New 220kV D/c line from Brahmapuram to Eramalloor	220			2020-21
43	Upgradation of 110kV S/s Kaloor to 220kV with transformer capacity of 2x200MVA, 220/110kV	220	2x200		2018-19
44	220kV Brahmapuram-Kaloor D/c feeder (OH+UG)	220		25	2018-19
45	Upgradation of 110kV S/s Aluva to 220kV with transformer capacity of 2x200MVA, 220/110kV	220	2x200		2018-19
46	Upgradation of 66kV Kalamassey-Aluva line to 220/110kV multicircuit-MultiVoltage Towers.	220		7	2018-19
47	220/66kV Substation at Ambalamugal and with transformer capacity of 2x50MVA 220/66kV transformer	220	2x50		2018-19
48	Upgradation of 110kV Edamon-Ambalappuram - Kottiyam - Kundara S/c line to 400kV using 400/110kV MC/MV towers	400		39	2018-19
49	400kV Sub station at Kundara with an installed capacity of 2x315MVA 400/220kV Transformer	400	2x315		2018-19
50	400kV S/s Kottayam (near to Kulathurmuzhi) with 2x315 MVA, 400/220kV Transformer	400	2x315		2018-19
51	LILO of 400kV Thirunelveli-Cochin East to 400kV S/s Kottayam	400		0.5	2018-19

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52	LILO of 220kV Pallom -Ambalamughal and Sabarigiri-Ambalamugal at 400kV s/s Kottayam	220			2018-19
53	Construction of 220kV S/s Pallivasal by LILO of 220kV Udumalpet-Idukki feeder and with transformer capacity of 2x50MVA 220/66kV	220	2x50	0.5	2018-19
54	Upgradation of 66kV Aluva-Edayar-North Parur D/c line to 220 / 110 kV using MC/ MV Towers with 110kV LILO to 110kV Edayar S/s	220		16	2019-20
55	Upgradation of 110kV North Parur S/s to 220kV with 2x200MVA Transformers	220	2x200		2019-20
56	Construction of 220kV North Parur - Kodungalloor D/c Line for Interconnection of 220kV S/s North Parur and Chalakkudy via Kodungalloor (MC-MV towers already envisaged in Chalakkudy - Kodungalloor sector during upgradation of 66kV Chalakkudy - Kodungalloor D/c feeder to 110kV)	220		11	2019-20
57	Upgdn of 110kV Ettumanoor to 220kV By LILO of 220kV Pallom-Ambalamughal feeder	220		1	2019-20
58	Upgradation of 66kV Pallivasal-Aluva DC line to 220/66kV Multi circuit Multi voltage line (multi circuit in Pallivasal to Irttukanam and Aluva to Edathala portions). One 220kV circuit will be direct o Aluva and the second circuit will be LILO-ed at Thottiyar (40MW) SHEP Switchyard (using the Row of existing 66kV LILO line to Karimanal S/s) and Kothamangalam S/s	220		83	2019-20
59	400kV Sub station at Edamon with 2x315MVA Transformers	400	2x315		2020-21

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60	Upgradation of 110kV S/s Pathanamthitta to 220kV with transformer capacity of 2x200MVA	220	2x200		2020-21
61	Construction of 220kV line from Edappon to Pathanamthitta by multi circuit multi voltage (220 & 110kV) using the RoW of existing 66kV Edappon-Adoor D/c and 66kV Adoor-Pathanamthitta S/c	220		28.6	2020-21
62	Interlinking of proposed 220kV S/s Eramallur and 220kV S/s Punnpra through 220/110kV Multi circuit Multi Voltage Line by using the RoW of existing 110kV Punnpra - Aroor D/c feeder	220		52	2021-22
63	220kV LILO from the location near Thannithodu of 220kV Sabarigiri - Edamon S/c feeder to 220kV S/s Pathanamthitta	220		16	2021-22
64	220kV S/s TechnoCity with 2x100 MVA 220/110kV Transformers,	220	2x100		2021-22
65	220kV Pothencode-Technocity feeder	220		4	2021-22
66	Upgradation of 110kV Kundara-Edappon S/c to 220kV D/c upto Sasthamkottah	220		14	2022-23
67	Construction of 220kV S/s Sasthamkotta with 2x100MVA 220/110kV Transformers	220	2x100		2022-23
68	Doubling of 220kV Idukki - NewPallom S/c Line	220		54	2022-23
69	Upgradation of 66kV S/s Vandiperiyar to 220kV by LILO of 220kV Sabarigiri-Theni S/c feeder and with transformer capacity of 2x50MVA, 220/66kV	220	2x50	6.5	2022-23
70	220kV S/s Thodupuzha by LILO of 220kV Idukki-Kothamangalam feeder and with transformer capacity of 2x50MVA, 220/66kV	220	2x50	4.5	2022-23

**Transmission Plan Proposal for the Kerala System for the Period 2015-23**

71	Upgradation of 110kV Sasthamkotta-Edappon S/c line to 220kV D/c	220		18.6	2023-24
72	Construction of 220kV S/s at Rayamangalam by terminating IDMD 220kV feeder at Loc 157 and transformer capacity of 2x100MVA	220	2x100	0.5	2028-29



Sl.No.	Name of Substation	Existing 220/110kV Transformer Capacity	Proposed 220/110kV Capacity Addition / Enhancement	Target Year	Remarks
1	Kattakada	1x200MVA	1x200	2016-17	Cap Addition
2	Edamon	2x100MVA	2x200	2017-18	Cap Enhancement
3	Edappon	2x200MVA	3x200	2016-17	Cap Addition
4	Kundara	2x200MVA	1x200	2016-17	Cap Addition. Land Constraint
5	Pallom	2x200MVA	1x200	2016-17	Cap Addition
6	Kalamassery	3x200MVA+1x120MVA	1x200	2016-17	1x120MVA enhanced to 1x200MVA
7	Nallalam	2x100MVA+2x60 MVA	2x200	2016-17	2x60MVA+1x100MVA replaced by 2x200MVA, 1x100MVA retained
8	Areakode	1x160MVA	2x160	2016-17	Cap Addition. Land Constraint
9	Palakkad	2x160 MVA	2x200	2018-19	Cap Enhancement
10	Mylatty	2x100MVA	2x200	2018-19	Cap Enhancement. Not required if 220kV S/s Neeleswaram materializes
11	Talipparamba	2x100MVA	2x200	2018-19	Cap Enhancement. Not required if 220kV S/s Neeleswaram materializes
12	Malapparamba	2x100MVA	2x200	2016-17	Cap Enhancement
13	Shornur	2x100MVA	2x200	2018-19	Cap Enhancement

पावर ग्रिड कारपोरेशन ऑफ इंडिया लिमिटेड  
(भारत सरकार का उद्यम)  
POWER GRID CORPORATION OF INDIA LIMITED  
(A Government of India Enterprise)



केन्द्रीय कार्यालय : "सौदामिनी" प्लॉट सं. 2, सैक्टर-29, गुडगाँव-122 001, हरियाणा  
फोन : 2571700 - 719 फैक्स : 2571760, 2571761 तार 'नेटग्रिड'  
Corporate office : "Saudamini" Plot No. 2, Sector-29, Gurgaon-122 001 Haryana  
Tel. : 2571700 - 719, Fax : 2571760, 2571761 Gram : 'NATGRID'

संदर्भ संख्या / Ref. Number C\CTU-Plg\S\CEA\Dharmapuri

Date: 20<sup>th</sup> April, 2015

**Shri K.K Arya**  
Chief Engineer (SP & PA),  
Central Electricity Authority  
SewaShawan, RK Puram  
New Delhi - 110 066.

**Subject: Utilization of Salem – Dharmapuri 400kV Quad D/c line along with Dharmapuri (Salem New) Pooling Station – reg.**

Sir,

This is to bring to your kind notice that 765/400kV Dharmapuri (Salem New) Pooling Station (initially charged at 400kV) along with Salem – Dharmapuri PS 400kV Quad D/c line is being implemented by POWERGRID and ready for energization. However, other transmission lines associated with Dharmapuri (Salem New) Pooling Station are under various stages of implementation and may take some more time for completion. Under this scenario, it would be prudent to utilize Salem – Dharmapuri 400kV Quad D/c line for system improvement. For this it is proposed to LILO one circuit of MTPS Stage-III – Thiruvalem 400kV D/c line (which is being constructed by TANTRANSCO) at Dharmapuri (Salem New) Pooling Station. The proposed LILO shall involve construction of 6 km of D/c line and the LILO can be terminated at the existing bays constructed for Dharmapuri – Somanhally 400kV D/c line.

Study results are enclosed at **Annexure-I**. From the study results following benefits are observed:

- Reduces the congestion between S1-S2 areas and enhance the TTC between S1-S2 areas by 100 MW which shall be instrumental in transferring the much required power to the S2 area.

पंजीकृत कार्यालय : बी-9, कुतब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली-110016 दूरभाष : 26560121 फैक्स : 011-26560039 तार 'नेटग्रिड'  
Registered Office : B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi-110016 Tel. : 26560121 Fax : 011-26560039 Gram : 'NATGRID'

स्वहित एवं राष्ट्रहित में ऊर्जा बचाएं  
**Save Energy for Benefit of Self and Nation**

- The over loading on Kolar-Hosur 400kV D/c line gets relieved to some extent.
- Provides additional path for feeding the loads at Salem.

In light of the above facts it is requested to grant In-principle approval for the above proposal and the same may be taken up in the next SCPSPSR.

Thanking you,

Yours faithfully,

*Mukesh Khanna*  
20/4/15  
**(Mukesh Khanna)**  
**AGM (CTU-Planning)**

**Copy to**

**Director (TANTRANSCO)**  
Tamil Nadu electricity Board (TNEB)  
6th Floor, Eastern Wing, 800 Anna Salai,  
Chennai – 600 002.

*Dhar ... - Somashekhar*  
*- Row.*

*Salem - Medh*

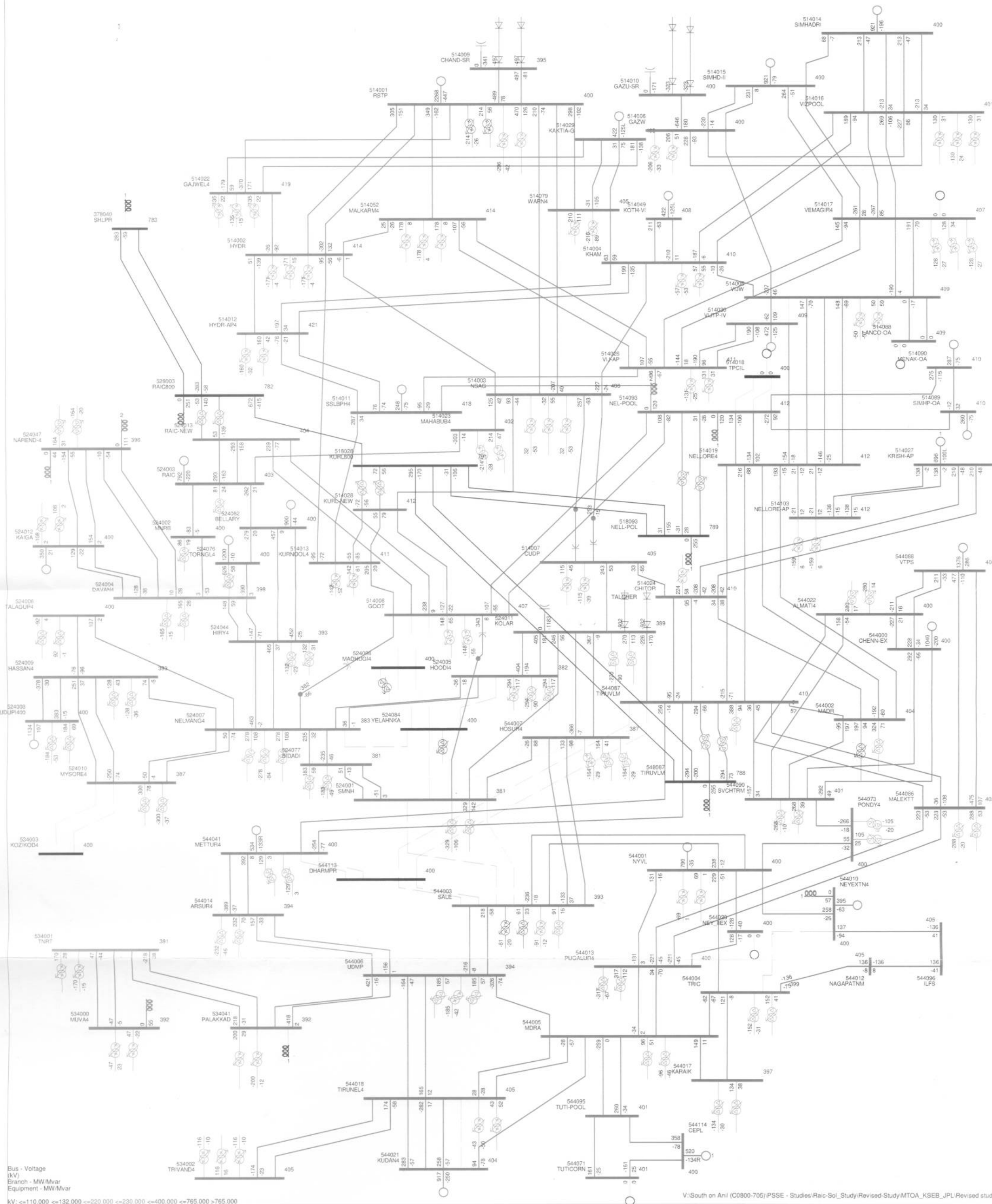
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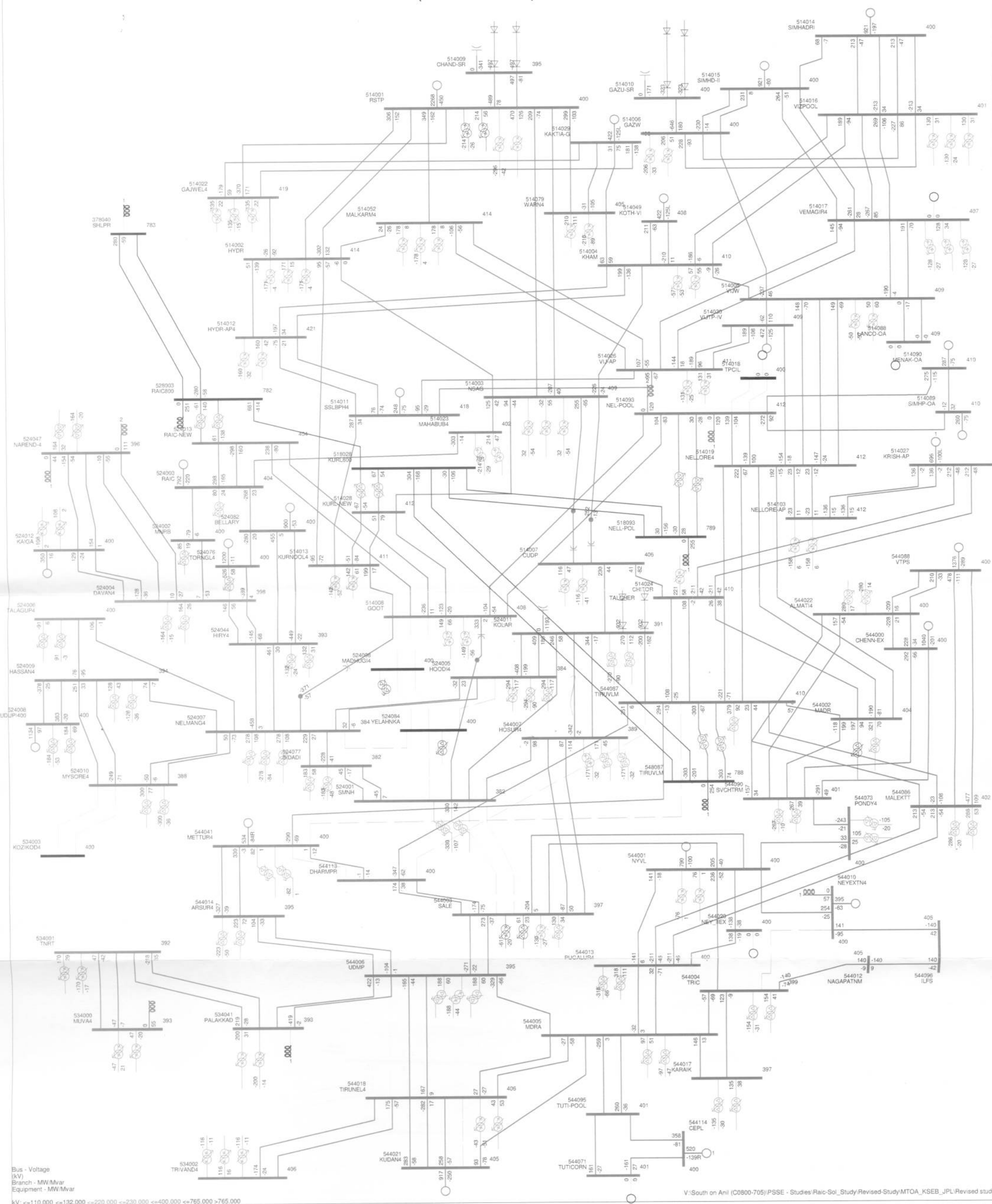
SYSTEM STUDIES (2015 TIME FRAME)



Bus - Voltage (kV)  
Branch - MW/Mvar  
Equipment - MW/Mvar  
kV: <110,000 <=132,000 <=220,000 <=230,000 <=400,000 <=765,000 >765,000

# LILO of one ckt of Mettur-Thiruvalem 400kV D/c line at Dharmapuri

## SYSTEM STUDIES (2015 TIME FRAME)



Bus - Voltage (kV)  
Branch - MW/Mvar  
Equipment - MW/Mvar

kV: <110.000 <132.000 <220.000 <230.000 <400.000 <765.000 >765.000

**TAMILNADU TRANSMISSION CORPORATION LTD.**  
(Subsidiary of TNEB Ltd.)

From

K.Rangaraj, B.E.,M.C.A.,F.I.E.,  
Managing Director,  
TANTRANSCO,  
144, Anna Salai,  
Chennai -2.

To

✓ The Member (Power System),  
Central Electricity Authority,  
Sewa Bhavan, R.K.Puram,  
New Delhi 110 066.

Lr.No.CE/Plg.&R.C/SE/SS/EE1/AEE1/F. Standing Committee/D. 187 dt. 19.05.15

Dear Sir,

Sub: Utilization of Salem – Dharmapuri 400kV Quad D/C line along with  
Dharmapuri (Salem New) Pooling Station – PGCIL submission to CEA  
-reg.

Ref: PGCIL's letter addressed to CEA ref:C/CTU-Plg\S\CEA\Dharmapuri  
dated 20.04.15

\*\*\*\*\*

1.0 The comments of TANTRANSCO in the letter under reference cited  
above are indicated below.

- i. The commissioning of Somanahalli – Dharmapuri (New Salem) 400kV DC line, would provide an alternate path between Karnataka and Tamilnadu. The commissioning of the above line with Dharmapuri 765/400kV SS and Dharmapuri (New Salem) – Salem 400kV DC line only helps in easing the S1-S2 transmission congestion.
- ii. All the above three elements be commissioned together to derive the full benefit of the Dharmapuri 765kV SS and S1-S2 ATC would get enhanced.
- iii. The study results also shows that there is not much benefit due to commissioning of the Dharmapuri 765/400kV SS and Dharmapuri (New Salem) – Salem 400kV DC line with LILO of one of the Thiruvalem – MTPS

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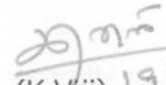
~~M(PS)  
CE (SP/PA)~~

~~shs PJ  
D. Rangaraj  
KK Arjo  
21/5/15~~

Stage III 400kV DC Quad line (as per PGCIL suggestion) without commissioning of Somanahalli – Salem 400kV DC line.

- iv. As Salem 400kV substation is well connected with NLC II switchyard and Shoolagiri 400kV substation, as such there is no problem for feeding the Salem loads.
- v. SRPC has also recorded that all the three elements be commissioned together to derive the benefits during the 24<sup>th</sup> meeting of SRPC held on 15<sup>th</sup> March, 2014.

Hence it is suggested that PGCIL Dharmapuri 765/400kV SS and Dharmapuri (New Salem) – Salem 400kV DC line may be commissioned in the same time frame of Somanahalli – Dharmapuri (New Salem) 400kV DC line.

  
(K.Viji) 19/5/15

Chief Engineer/Planning & R.C  
For Managing Director/TANTRANSCO

2/2

## TAMILNADU TRANSMISSION CORPORATION LTD

From

R.Kalaiselvan,  
 Director/Transmission Projects,  
 Tamilnadu Transmission corporation Ltd,  
 1<sup>st</sup> Floor, 5B Block, Electricity Avenue,  
 144, Anna salai,  
 Chennai- 600 002.

To

✓ Shri.K.K.Arya,  
 Chief Engineer (SP & PA)  
 Central Electricity Authority,  
 Sewa Bhavan,  
 Rama Krishna Puram,  
 New Delhi – 110 066.  
 e-mail: kkarya\_2001@rediffmail.com  
 Fax: 011-26102945

**Lr.No.CE/C/TR/SE/C I/TR/EEC/F.KFW FUNDING/D.341/15 dt.18.05.2015**

Sir,

Sub: Green Energy Corridor Scheme – Intra State Transmission Schemes of TANTRANSCO - Non availability of bays at Koilpatty PGCIL Substation for terminating the proposed Kayathar – Koilpatty 400KV DC Quad line.

- Ref:1) Minutes of Meeting of 38<sup>th</sup> Standing Committee on Power System Planning of Southern Region held on 7.03.2015 at Delhi.  
 2) TANTRANSCO Lr.No.CE/Plg.&RC./SE/SS/EE1/AEE1/F.38<sup>th</sup> Stg Comm Modification/D.172 dt.5.5.15.

Your kind reference is invited to the above mentioned subject. In the 38<sup>th</sup> Standing Committee on Power System Planning of Southern Region held on 7.03.2015 at Delhi, PGCIL has informed that at Koilpatty space is available for only one bay and the termination of 400KV DC line from Kayathar may be considered at Tirunelveli pooling station (PGCIL) instead of Koilpatty SS. However, TANTRANSCO suggested that instead of Kayathar – koilpatty 400KV DC Quad line, the ongoing Kanarpatty – Abisekapatty 400KV SC line on DC tower may be converted to 400KV DC line on DC tower.

As such, as PGCIL has informed of the non-availability of bays at Koilpatty PGCIL Substation, the proposed Kayathar – Koilpatty 400KV DC Quad line for termination at

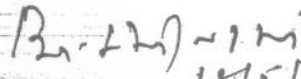
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 P.J  
 KK Arya  
 29/5/15



Koilpatty SS could not be taken up by TANTRANSKO. The above line is proposed for execution under KfW funding (Tranche-I) which is a part of the line work covered under KfW Package-II. The tenders for KfW Package-II have been opened on 16-04-2015 and the techno-commercial evaluation is under process. Hence, the KfW authorities are to be informed about the non-execution of the above line scheme.

Therefore you are requested to send your concurrence in this regard urgently to proceed further at our end.

Yours faithfully,

  
(N.Srinivasan) 18/05/15

Chief Engineer/Civil/Transmission  
for Director/Transmission Projects

Copy to the Chief Engineer/Planning & RC/Chennai-2.(SE/System Studies)

Copy to the Chief Engineer/Transmission/Chennai-2.

Copy to the Chief Engineer/Civil/Transmission/Chennai-2.

Copy to the Chief Engineer/Transmission Projects-II/Mannarpuram, Trichy-20

**TAMILNADU TRANSMISSION CORPORATION LTD.**  
(Subsidiary of TNEB Ltd.)

From

K.Rangaraj, B.E.,M.C.A.,F.I.E.,  
Managing Director,  
TANTRANSCO,  
144, Anna Salai,  
Chennai -2.

To

The Member (Power System),  
Central Electricity Authority,  
Sewa Bhavan, R.K.Puram,  
New Delhi 110 066.

CE (SP&PA)

MSL  
15.04

Lr.No.CE/Plg.&R.C/SE/SS/EE1/AEE1/F. Solar park- Adani/D.141 dt.13.04.15

Dear Sir,

Sub: Transmission Scheme for evacuation of 1000MW Solar Park to be developed by M/S.Adani at Kamuthi, TN - CEA In Principle approval - requested - reg.

Ref: Lr.No.CE/Plg.&R.C/SE/SS/EE1/AEE1/F. Solar park- Adani/D.112 dt.25.03.15

\*\*\*\*\*

A kind reference is invited to the above, wherein it has been requested to accord in principle approval for the following for the proposed 1000MW solar park at Kamuthi by M/S.Adani

- i. Establishment of 400kV substation at Kamuthi for pooling the proposed 1000MW solar park to be established by Adani.
- ii. 400kV DC line from proposed Kamuthi solar park to the sanctioned Kamuthi 400/230-110kV SS (TANTRANSCO).
- iii. 400kV DC line to the sanctioned Thoppakundu 400/110kV wind substation from the sanctioned Kamuthi 400/230-110kV SS (TANTRANSCO).
- iv. 2X80 MVar bus Reactor at Kamuthi 400/230-110kV SS (TANTRANSCO).

S/M (PS/111)  
15/09/15

Ms. Shivam) By  
12/4/15

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Load flow study has been conducted for the proposed 1000 MW solar park at Kamuthi and the results along with single line diagram is also enclosed herewith.

It is once again requested that in principle approval may be given for the above scheme.

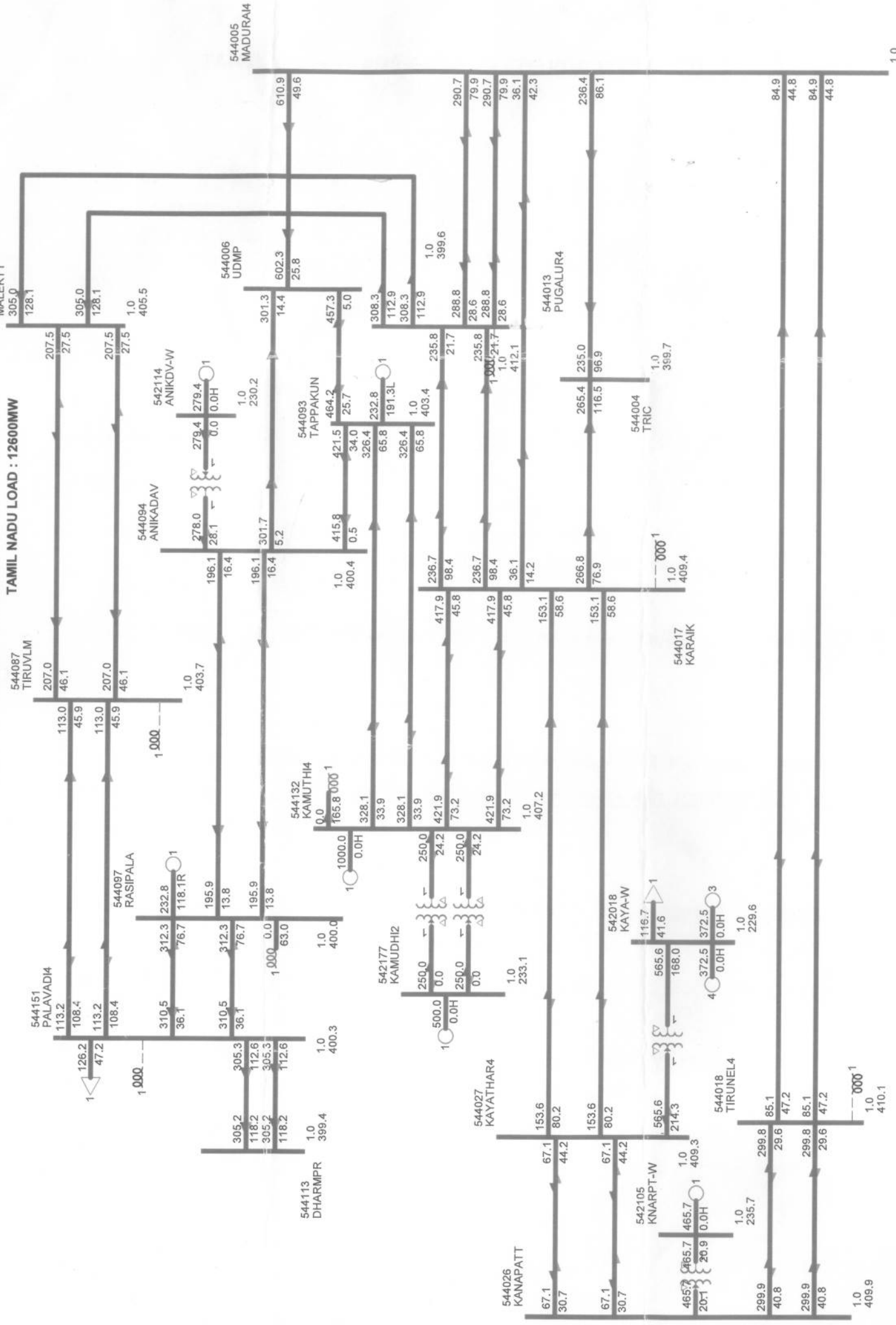
S. Srinivasan  
Chief Engineer/Planning & R.C. <sup>U/W</sup>  
For Managing Director/TANTRANSKO

Encl: AS above

# TAMIL NADU : 2016-17 YEAR CONDITION RENEWABLE ENERGY STUDY

## NORMAL LOAD WITH FULL DESPATCH FROM WIND AND SOLAR PROJECTS

TAMIL NADU LOAD : 12600MW



Annex - 31/2



भारत सरकार/ Government of India  
विद्युत मंत्रालय / Ministry of Power  
केंद्रीय विद्युत प्राधिकरण/ Central Electricity Authority  
प्रणाली योजना एवं परियोजना मूल्यांकन प्रभाग  
System Planning & Project Appraisal Division  
सेवा भवन, आर.के. पुरम, नई दिल्ली - 110066  
Sewa Bhawan, R.K. Puram, New Delhi - 110066



[ISO : 9001 : 2008]

No : 56/23/2015-SP&PA/ 901-902

Dated: 15-04-2015

To

Shri K. Rangaraj,  
Managing Director,  
TANTRANSCO,  
144, Anna Salai,  
Chennai-2.

**Sub:** Transmission Scheme for evacuation of 1000 MW Solar Park to be developed by M/S Adani at Kamuthi- CEA In Principle Approval.

**Ref:** TANTRANSCO letter no CE/Plg.&R.C/SE/SS /EE1/AEE1/F.Solar park- Adani/D.112 dated 25.03.2015.

Sir,

1) This has reference to your letter conveying that M/S Adani has proposed to develop 1000 MW Solar Park at Kamuthi in Ramnad district of Tamil Nadu within a period of one year. It has been further proposed that TANTRANSCO would enter into PPA with M/S Adani for buying 1000 MW of solar power. Accordingly, TANTRANSCO has requested CEA for in-principle approval for following transmission system:

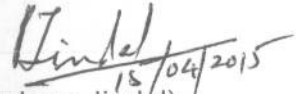
- Establishment of 400kV substation at Kamuthi for pooling the proposed 1000 MW solar park to be established by M/S Adani.
- 400kV D/C line from the proposed Kamuthi Solar park to the sanctioned Kamuthi 400/230-110kV S/S (TANTRANSCO).
- 400kV D/C line to the sanctioned Thoppakundu 400/110kV wind substation to the sanctioned Kamuthi 400/230-110kV S/S (TANTRANSCO).
- 2x80 MVAR bus reactor at Kamuthi 400/230-110kV S/S (TANTRANSCO).

2) In this regard, it is requested that TANTRANSCO may furnish following

documents/information to study the above proposal:

- a) Copy of application(s) by M/S Adani seeking Connectivity and Long term Open Access from the STU of Tamilnadu required in accordance with the regulations 'Grid connectivity and Intra state Open Access regulations, 2014' of TNERC.
- b) The studies carried out by TNEB, in support of above proposal and as per requirements of TNERC regulations, corresponding to the time frame of 2016-17 and 2018-19 for transmission network in Tamilnadu. It is requested that the study results in SLD and PSSE load flow file may be sent by email. The studies may be carried out for high wind/ high solar/ no wind -no solar dispatch scenarios.
- c) The status of execution of the Kamuthi substation and associated transmission lines along with their expected date of commissioning.
- d) During the 37th SCPSPSR, establishment of Kamuthi 400/230-110 KV Substation (3x 315MVA 400/230kV ICTs and 2x200 MVA, 400/110kV ICTs) was inter-alia agreed as part of evacuation of power from Udangudi Power Project (2x660MW+1x800MW). During this meeting, it was also agreed that a maximum of 1000 MW of solar power would be injected at Kamuthi. Accordingly, it is also requested that copies of the Connectivity and LTA application(s) of generation projects totalling to 1000 MW, that were earlier proposed to be connected at Kamuthi, may also be furnished.

Yours faithfully,



(Pardeep Jindal)

Director(SP & PA)

Copy to:

COO(CTU-Planning),  
PGCIL,  
"Saudamini", Plot No. 2,  
Sector-29, Gurgaon-122001