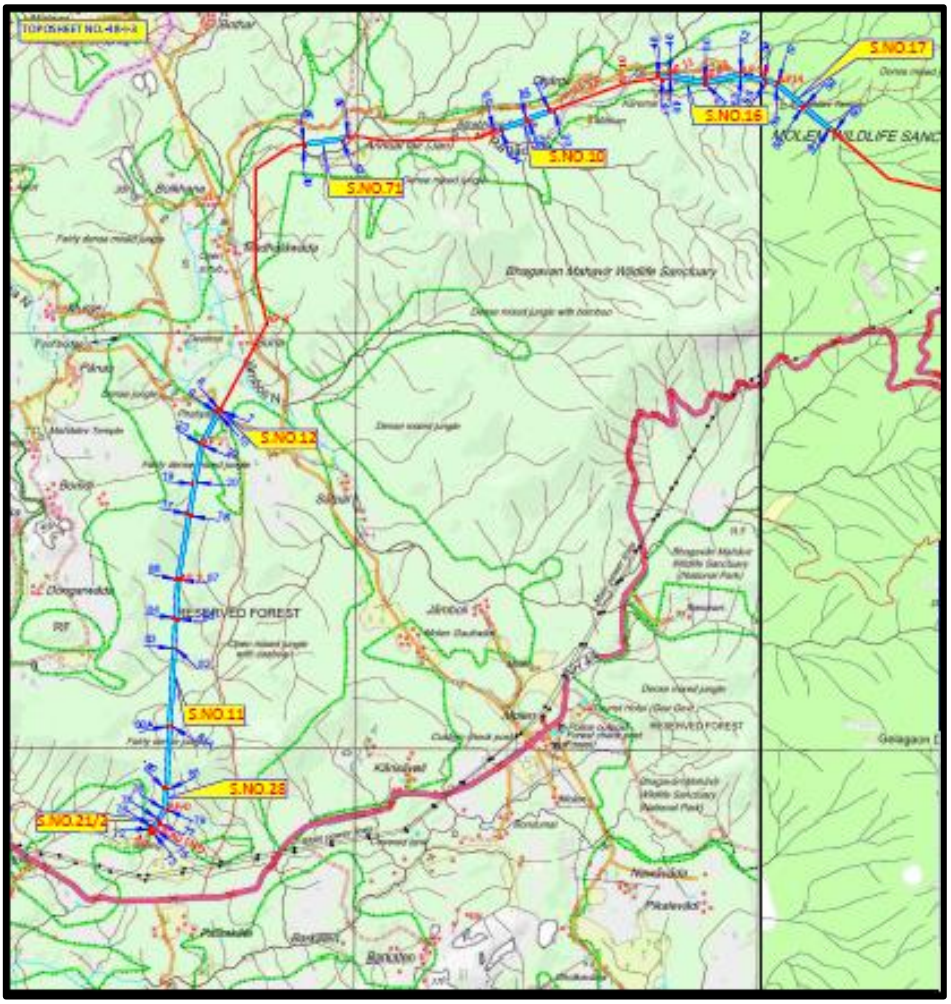
Urgent Need to Review Infrastructure Interventions in Mollem National Park and Bhagwan Mahaveer Sanctuary in Goa

Large Impacts, Unrealistic Benefits, Options Not Studied



A Note by Manthan Adhyayan Kendra, Pune

21 Feb 2021

Urgent Need to Review Infrastructure Interventions in Mollem National Park and Bhagwan Mahaveer Sanctuary in Goa

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Manthan Adhyayan Kendra, Pune[1]

A. Introduction and Background

Three infrastructure projects are being planned in the state of Goa which will pass through the Mollem National Park (NP) and the Bhagwan Mahaveer Wildlife Sanctuary (WLS), apart from other sensitive areas. These projects are the Additional 400 kV High Tension Power Transmission Line from Narendra (Dharwad) to Xeldem (south Goa), the widening of Goa-Belgaum highway NH748/NH4A and the double tracking of the Vasco-Hospet railway line. All three projects, though so-called "linear" projects will have serious environmental impacts, including on the protected areas through which they are to pass.

The projects are being justified on account of several benefits that they will bring to the state, as well as the sometimes explicit, sometime implied argument that they are inevitable, and that there are no options to these projects.

This note examines these assumptions, particularly with respect to the transmission project. We start by looking at the broad electricity demand-supply situation in the state, the projections for next 10 years and more, and the various options considered and not considered for meeting the demand projections. We also look at the position of the Government of Goa especially as articulated through its two White Papers on the subject.

We find that there are several options that could help meet Goa its electricity needs over the coming years, even without undertaking the construction of the proposed transmission line. We find that these options have not been considered in any serious and meaningful manner, and that in assessing the viability, desirability and cost/benefits of the transmission line as it is being built today, ecological and environmental criteria were completely ignored.

Given this, we urge that transmission project be suspended and be urgently reviewed, along with a comprehensive assessments of the various options available. This should be done though a transparent and participatory process, with place for social, environmental and developmental criteria and experts alongside technical and financial criteria and specialists.

Last but not the least, while we have not analysed the other two projects in-depth in this note, we note that there are similar strong arguments in favour of the review of these projects too, and we also mention some of them. Further, since any environmental impact assessment needs to include cumulative impact assessment of all existing and proposed interventions in an area, the other two projects also need to be included as a part of such a cumulative impact assessment.

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[1] Manthan Adhyayan Kendra is a centre set up to research, analyse and monitor water and energy issues from the perspective of just, equitable and sustainable development.

B. Electricity Demand-Supply, Projections and Options for Goa

Current Demand

In the year 2019-20, the estimated Sales of Electricity by the Goa Discom (Distribution Company; in case of Goa it is the Goa Government's Electricity Department) were 3837 million units (MU). This is as per the Aggregate Revenue Requirement (ARR) filing[2]. These sales are a good proxy for the electricity demand of the state. The actual demand will include sales, plus losses and other electricity that was not "sold" but distributed. Moreover, electricity provided by captive power plants is not included in this. The break up for some of the important and major user categories was as follows:

Electricity Sale in Goa FY 2019-20 (MUs) Estimated, for Major Consumer Categories		
	FY19-20 (Estimated)	As % of Total Sales
LTD/Domestic	1,173.53	31%
LTC/Commercial	430.09	11%
LTI/Industrial	83.24	2%
Public Lighting	23.69	1%
HTC Commercial	113.57	3%
HTI Industrial	1,442.60	38%
High Tension-Ferro/SM/PI/SR	481.83	13%
Sub-Total	3,748.55	98%
Out of total of	**3837.30**	**100%**

LT=Low tension (or low voltage), HT = High Tension

Thus, industry is by far the biggest user of electricity, followed by domestic users followed by commercial users.

To supply 3837 MU of electricity, the state needed[3] to purchase 4509 MU of electricity. From this, the total losses were 149 MU (for interstate transmission) and 523 MU (within state distribution losses up to final consumer)[4].

During the same year (2019-20), the maximum or peak demand was 653 MW, in the month of April 2019[5].

It may be pointed out that Goa has among the highest per capita electricity usage in the country[6].

[2] *PETITION FOR APPROVAL OF TRUE-UP FOR FY 2015-16, ANNUAL PERFORMANCE REVIEW OF FY 2019-20, AND REVISION OF AGGREGATE REVENUE REQUIREMENT & TARIFF DETERMINATION PROPOSAL FOR FY 2020-21* by the Goa Electricity Department, submitted to the JOINT ELECTRICITY REGULATORY COMMISSION GURGAON. Page 29, Table 5.2 Note that this is an estimate for the full year, based on the actual sales for the first half of the same year.

[3] Actual for first half of the year, estimated for second half

[4] Page 32 of ARR (pdf page 47)

[5] Reply by Shri Nilesh Cabral, Minister for Power, to Starred L.A.Q. No. 005C by Shri. Digambar Kamat, MLA (Margao) to be answered on 27/01/2021 in the Goa State Assembly

Future Projections

The Electric Power Survey (EPS) carried out every five years by the Central Electricity Authority (CEA) of the Government of India is generally considered as the basis for projections of future electricity requirements.

The Goa Government has not brought out any official document that puts out its projections for the future requirements of electricity. Even its recent "White Paper on the Complete Status of Power Situation in Goa" [7] does not give any figures for the expected power demand over next years. In view of this, we can assume that the Goa Government would be using the EPS projections for its planning purposes. For example, when the Government of Goa brought out its "24X7 Power For All", it justified its electricity projections (done only up to the year 2018-19) by pointing out[8] that they were in line with the projections of the 18th EPS (then the latest one).

However, it also generally acknowledged that the EPS projections have been significant overestimates. We look here at the EPS projections for Goa as well as try and understand how realistic they are likely to be.

The EPS projects in detail electricity demand for the next ten years disaggregated state-wise/user category wise and for another 10 years at a more aggregated level. The 19th EPS is the latest such EPS and was published in January 2017. The projections of the 19th EPS for Goa are given below.

Energy and Power Demand Projections for Goa as per 19th EPS

	2021-22	**2026-27**	**2031-32**	**2036-37**
Energy Demand (MU)	4757	5951	7095	8460
Energy Demand (MU) at Bus Bar	5593	6932	8170	9630
Peak Power Demand (at Bus Bar) MW	858	1096	1361	1604

The demand at bus bar means it is at the supply end, which means it is inclusive of any transmission and distribution losses. This above table does not include the demand / use of electricity from captive power plants. The category wise projections up 2027 are given below. The EPS projections also affirm that the current trend of industry-commercial consumption being the highest category followed by domestic consumers is expected to continue in the future.

[6] In 2011-12, the per capita electricity use in Goa was 2025 kWh (units), as compared to 884 kWh for India. "24x7 Power For All – A Joint Initiative of Government of India and Government of Goa" Page 4. http://goaelectricity.gov.in/Regulations/24by7Goa.pdf

[7] At http://www.goaelectricity.gov.in/Regulations/White%20Paper.pdf

[8] In the Executive Summary

Category Wise Electricity Demand Projections for Goa, 19th EPS

Category Wise Projections (At Demand Centre, in MUs)	2015-16	2019-20	2021-22	2026-27
Domestic	906	1168	1280	1548
Commercial	380	462	509	650
Public Lighting	39	39	39	39
Public Water Works	164	214	237	294
Irrigation	25	25	25	25
Lt (Low Tension) Industries	100	117	127	154
HT Industries	1589	2221	2486	3173
Railway Traction	0	0	0	0
Bulk Supply	40	49	54	68
TOTAL	**3243**	**4295**	**4757**	**5951**

As the biggest demand category is industry, the industrial policy and which industry is to be encouraged will have an impact on the projected demand.

The EPS projections represent a 5% compounded annual growth rate for electricity demand (MU) at bus bar, and a 5.8% compounded annual growth rate for peak demand over 2016-17 to 2026-27. It is important to note that all EPS have consistently been over-estimating projections. As the 19th EPS report itself notes,

> "The actual growth of electrical energy requirement and peak electricity demand in the country has been less as compared to the 18th EPS projections." (Page 77).

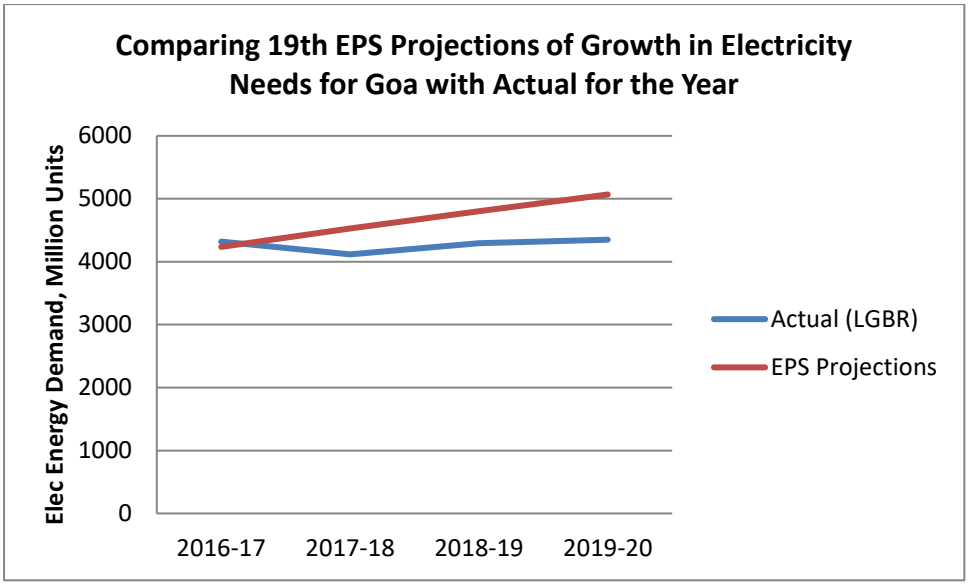
The 19th EPS too has overestimated the projected demands for Goa, as the data from CEA shows. The data for actual electricity demand and peak demand in Goa for last 7 years, taken from CEA[9] shows a rate of growth that is consistently well below the projections of the EPS (Table below). The growth rates for electricity requirement (MU) and for peak demand since 2013-14 to 2019-20 are just 1.88% and 2.82%.

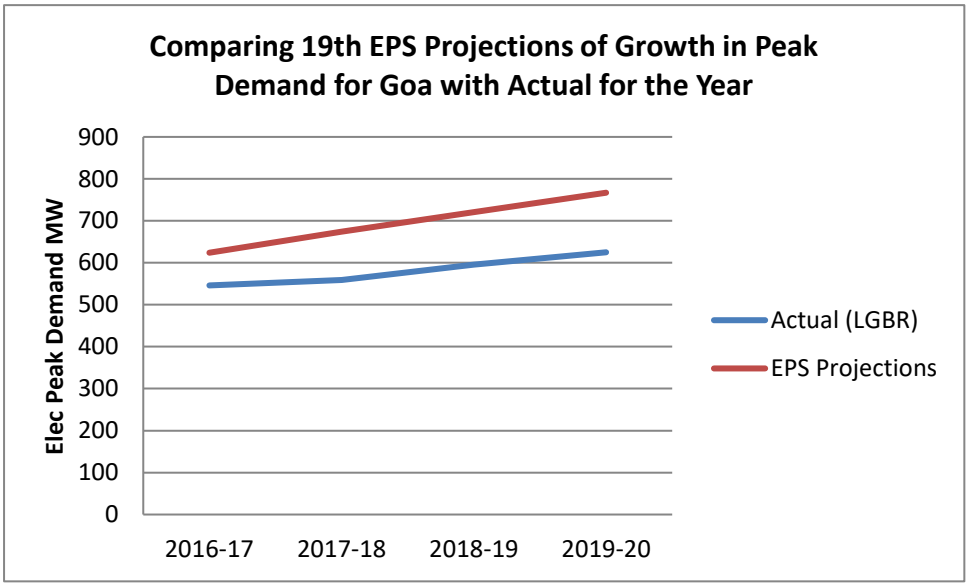
Actual Requirement of Electricity (Energy) and Peak Demand for Goa Over the Years (Source: LGBR, CEA)

Year	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Growth Rate
Electricity Requirement (MU)	3890	3969	5120	4321	4117	4295	4350	1.88%
Peak Demand (MW)	529	501	583	546	559	596	625	2.82%

The Charts given below give a comparison of the actual electricity requirement and peak demand and what the 19th EPS had projected for these years.

[9] CEA's Load Generation Balance Reports for various years.





Interestingly, the EPS is not the only one in overestimating future demand. The Goa Government's own projections also seem to be following this trend. As per the "24x7 Power for All" report, the peak demand for 2018-19 was projected at 934 MW, whereas as mentioned above, actual was only 596 MW[10].

The rate of growth of projected demand is a very important parameter as infrastructure expansion carried out based on unrealistic assumptions can not only lead to higher and wasteful expenditure and higher ecological costs, but will also result in stressed assets as additional infrastructure runs the risk of being unused.

Further, with the disruptions caused by the Covid situation, electricity demand is likely to be subdued for the next couple of years.

[10] According to ARR, peak demand in 2018-19 was 657 MW, which is still significantly lesser than 934 MW. The reason for this discrepancy between the CEA and Govt of Goa figures is not clear.

Source of Electricity – Current Situation

As per the Goa Government's Department of Electricity[11] "Goa does not have its own generation and is fully dependent on the allocation from Central sector generating stations Western & Southern region…This power is wheeled through Powergrid network & neighbouring state's grid.(Karnataka)".

The same website[12] also gives the list of plants from which Goa receives it power. An extract below gives some details.

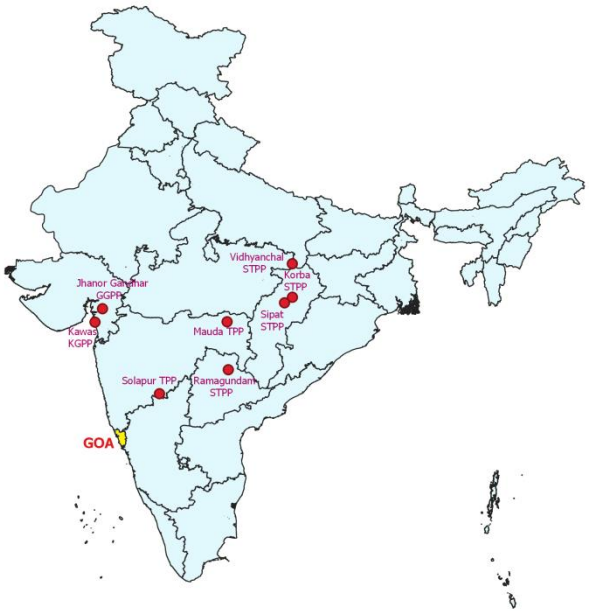
Present Central Sector Stationwise allocation of power to Goa w.e.f 22-09-2018

Sr. No	Station	Peak Time Hours Allocation (18.00 to 22.00) in MW	Off Peak Hrs. (00 to 18.00 & 22.00 to 24.00) in MW
1	Korba STPS	215.86	216.03
2	Korba STPS-7	7.36	7.44
3	Vindhyachal STPS-I	40.34	40.49
4	Vindhyachal STPS-II	16.03	16.14
5	Vindhyachal STPS-III	14.03	14.14
6	Vindhyachal STPS-IV	16.91	17.07
7	Vindhyachal STPS-V	8.04	8.12
8	Sipat Stage-I	21.09	31.83
9	Sipat Stage-II	13.82	13.93
10	Mouda STPS-I	16.91	17.07
12	Mouda STPS-II	22.04	22.25
11	Kawas Gas PP	12.42	12.41
12	Gandhar Gas PP	12.68	12.67
13	Solapur STPS	11.32	11.43
14	KAPP	17.72	17.18
15	TAPP3&4	17.66	16.33
15	Ramagundum STPS	100	100
	Total	**564.23**	**574.53**

As the table shows, the maximum contribution is from Korba super thermal power station (in Chhatisgarh, 38%) and Ramagundam STPS (in Telengana, 18%).

The map shows the locations of these power plants (the atomic power plants are not shown).

[11] https://www.goaelectricity.gov.in/# File named *Gen and PowPurchase.pdf*
[12] File named *ALLOCATION 22 sept 18.xls*



In addition to the allocations from central plants, the state also purchases power from the market and also some renewable power to meet its Renewable Purchase Obligations (RPOs). The ARR[13] gives Renewable purchase of 463 MUs and open market purchase of 156 MU for FY 2019-20. There is also some in-state generation (from co-gen plants) of about 30 MW[14], and in 2019-20 energy purchased from these was 174 MU.

Sources of Electricity – Near Term

The Annual Revenue Requirement (ARR) filed by Goa Electricity department presents the power to be purchased for FY2020-21 as 4874.19 MU Million Units (MUs) [15], and this power is available from the existing sources listed in the ARR.

The ARR was filed in Nov 2019, and did not take into account the Covid situation. With the impact of the covid pandemic, it is likely that demand will be subdued for next couple of years. The 19th EPS projections are also seen as overestimates.

Given all this, the current sources of allocation from central plants, market purchase and the others sources together appear to offer enough electricity to meet the demand for the next few years at least.

Sources of Electricity – Medium and Long term

To look at the next 10 years so, we can take the 19th EPS projections of electricity requirement as the basis, even though these are clearly over-estimates. But this will give us a conservative assessment.

[13] Page 32 (pdf page 47)
[14] https://www.goaelectricity.gov.in/# File *Gen and PowPurchase.pdf*
[15] Page 57 of ARR (pdf page 72)

We also assume that current sources will continue to remain available. This will give us an indication of the additional sources that would be needed in the coming 10 years or more.

Based on this, we can see that by 2026-27, Goa would need an additional 532 MW of peak time power and 2114 MU of additional electricity, and by 2036-37, 1040 MW of peak power and 4623 MU of electricity, *as additional* to what is available today. (Power at bus bar, electricity at use end).

The Goa Government's only "plan" to meet this demand seems to be to obtain this power from outside the state. This is clear from the White Paper of the Goa Government, which in fact indicates that this is the "plan" for the next 30-40 years! (See the Annexures to this note for our detailed comments on the two White Papers). Unfortunately, this is in spite of the fact that the White Paper itself acknowledges the difficulties involved in getting the power from outside the state, particularly when there is a fault in the transmission lines outside the state, as the state has no control on how soon the problem is addressed.

However, there several various options for meeting the electricity requirements of the state that do not seem to have been meaningfully examined, and these include generation within the state and importing electricity from outside the state. Note that these options are not mutually exclusive and a combination of these can also be the optimal solution. Further, the list below is not exhaustive.

1 Source of electricity within the state

Right now the within state sources are around 30 MW, and all of them are co-generation plants. However, the state had good renewable energy potential.

- Solar energy potential[16] in Goa is estimated at 16,000 MW, with 3000 MW of it from so called "wasteland".
- Roof-top solar can provide excellent option for dispersed commercial centres like hotels, shopping centres etc. and even residential uses, and can significantly reduce land requirement as well as transmission and distribution line requirements.
- Using even a part of this potential can provide significant electricity to Goa.
- A word of caution here is that lands classified as or referred to as "wasteland" are often far from waste; they harbour rich biodiversity, can be catchments/ feeder for water bodies, and the source of livelihoods and sustenance for local communities. So this needs to be examined when choosing a land based solar option.
- If all of the additional electricity needed for Goa by 2036-37 (15 years from now) i.e. say 5000 MU (4600 MU at user end plus 10% losses), is to be generated from solar, this would need about 2800 MW of solar capacity[17], which should be possible given the potential.
- Solar power prices have fallen significantly and solar power is likely to be cheaper than any new coal or hydro based power source Goa wants to tie up with. Solar "parks" in the range of several hundred to 2000 MW are already a reality in the country.
- Grid scale battery storage can eliminate the main disadvantage of solar, namely intermittency and lack of night time power. Such storage prices are also falling rapidly and a

[16] http://darpan.cstep.in/reatlas/visualize

[17] Note that given that solar's CUF - capacity utilisation factors - are less than coal, the dominant source of electricity today. (CUF = number of hours in a day that it can operate out of 24). This means that solar capacity needed to replace coal will be around 3-3.5 times equivalent coal capacity in MW. But electricity will still be cheaper, and impacts lesser. We have assumed a 20% Capacity Utilisation Factor for solar for this calculation.

solar PV and battery combination is also likely to provide cheaper power than new coal or hydro[18].

- Solar power plants take only a couple of years to install, and are modular[19] offering ease of planning, flexibility to accommodate uncertainties in demand, and quicker returns on investment[20].
- Adding solar capacity in the state also means employment generation in the state (as compared to buying power from outside).
- Adding in-state capacity also means avoiding long transmission lines and cutting down transmission losses of electricity transported from long distances.
- Capacity within state means that it is in the control of the state agencies and faults can be addressed faster.
- Wind energy potential in the state has been identified as around 1000-1300 MW[21]. Wind energy often has large environmental impacts as it is normally in eco-sensitive areas, hill tops, forested areas, so wind as an option needs to be taken carefully.

2 Increase the power being drawn from existing sources

- Since transmission lines are already there from these power plants to Goa, part of Goa's projected needs over next ten years could be met by increasing allocations from the plants from where it is already drawing power. This would be subject to capacity of existing transmission infrastructure.

3 Identify new sources outside Goa

These sources can include more allocations from central plants, purchase from other state owned or private plants or new sources outside Goa.

- New sources outside the state need not only be coal or conventional; can also be renewable, especially solar, whose prices are falling sharply.
- Such new sources can possibly be located in areas from where power could be transmitted via line that may not need to go through ecological sensitive areas.

[18] https://www.prayaspune.org/peg/publications/item/462-estimating-the-cost-of-grid-scale-lithium-ion-battery-storage-in-india.html

[19] Modular means, can be added in small batches as the demand increases instead of a lumpy addition of 500 or 1000 MW like coal which take 7 -10 years for construction, with no power for all these years and then addition of a large capacity as a single big chunk at one time. This lumpiness means large investments get locked in for years without and return, and there is little flexibility for planning and allowing for uncertainties in demand. Modularity of solar and short gestation period on other hand means that returns start almost immediately in a couple of years of investment, and capacity addition can be tailored as demand trend becomes clearer.

[20] Note that grid scale solar has its own issues in terms of land requirement (land needed will vary depending on solar radiation and other factors, can range from 2.5 acres to 7 acres per MW. E.g. Rewa Solar Park in MP has 5 acres per MW, Pavagada in Karnataka has 6.5 acres per MW.) Moreover, the land to be used may also be ecologically important, and diversion for solar could have adverse impacts. However, innovative approaches can be designed to allow some multiple uses of land, lease models that don't need land to be acquired etc. to minimise social and environmental impacts.

[21] http://darpan.cstep.in/reatlas/visualize

4 Transmission options which are not through the Protected Area or no new cuttings through the PA along the existing 220 KV and 110 KV line.

- There is enough material from official documents to show that even when power is to be drawn from outside the state, there are route options for transmission lines that do not have to pass through the protected area as is proposed now; or route options that can use the right of way already created through the protected area by some existing lines, and thus avoid any additional cutting into the protected areas. We discuss this in detail in the next section on the transmission lines.

5 Structural Changes in the Economy

- While strictly speaking this is not a "source", it can act like a source by changing the demand. As the main demand for electricity is from industry, changing the type and extent of industry in the state can have a significant impact on the demand. This is policy choice that will depend on what the state sees as its important economic potential and preferred economic activities.

C. Issues Related to the Proposed Transmission Line

Alternatives Exist, Deliberately Ignored by Excluding Forest and Environmental Criteria

One of the most important issues in this entire debate is that the Government of Goa argues that in bringing power from outside the state, it has no option but to take the transmission lines through the protected areas. This is not a tenable argument, as official documents themselves show and as we elaborate below.

It is clear from the records that the decision to adopt the current route for the transmission line from Narendra to Xeldem was taken based only on the criteria of optimising power sector related aspects. While this is important, a decision like this needs to allow for other key issues – in this case the issue of cutting through and causing more damage to protected areas. It is clear that not only was this issue recognised, but there were at least two options discussed seriously to avoid this problem of damage to the protected areas. Unfortunately, both seem to have been dropped without any clear reasons.

As per 39th Meeting of Standing Committee on Power System Planning in Western Region[22] held on 30.11.2015, it was pointed out that:

> "400 kV D/C line at Narendra (existing) 400 kV substation would not be possible. Narendra (existing) – Xeldam 400 kV D/C line would pass though forest areas of Western Ghats. In the past also during forest clearance process of Kaiga-Narendra 400 kV D/C line a lot of resistance from various activists and NGOs was faced. The forest clearance was recommended by Karnataka Government in 2002 only after joint confirmation from POWERGRID and CEA that no further transmission line shall be laid in the area. Therefore, laying of Narendra (existing)-Xeldam 400 kV D/C line may be resisted by activists/NGOs and obtaining forest clearance and actual implementation of the line may be delayed as in case of Mysore- Kozikode 400 kV D/C line. (Emphasis added)

[22] https://cea.nic.in/old/reports/committee/scm/wr/minutes_meeting/39th.pdf

So it is clear that not only was the issue of forest loss known, but it was known that an earlier permission had been obtained only on the condition that "no further transmission line shall be laid in the area". The decision to approve the Narendra-Xeldem line (Goa as well as Karnataka section) is in clear contravention of this assurance or condition.

To address this issue, and subsequent to discussions in the 38th meeting of the Standing Committee, the idea of using the Kolhapur-Mapusa route was also discussed. The Minutes of the 39th Meeting noted:

> "Subsequently, POWERGRID has suggested Kolhapur (PG) – Colvale (Mapusa) 400kV (Quad/HTLS) 2nd D/c line and Colvale (Mapusa) - Xeldem (New) 400 kV (Quad/HTLS) D/c line along with re-conductoring of Sholapur (PG) – Kolhapur 400kV D/C line (with HTLS conductor) as the second 400 kV feed to Goa." (Emphasis added)

This clearly shows that there was an alternative available to the line going through the wildlife sanctuary and eco-sensitive areas. Further, Member, CEA suggested that "that amongst the alternatives suggested, the alternative involving minimum forest clearance problems may be finalized as second 400 kV feed to Goa"; but then the meeting discussed and opined that "in all the alternatives [including the Kolhapur-Mapusa line] crossing of Western Ghats (forest area) was involved, therefore the alternative which is best from power flow point of view could be finalized." This shows that the decision was clearly based by ignoring and deliberately neglecting the criteria of impacts on forests; for if that criteria was to be considered, then it was not enough to says that "in all alternatives forest area was involved"; it would have been necessary to consider how much area would be affected in each route, the quality of the forest area impacted in each options, the nature and extent of such impact, and then choose the one with minimum impact. Instead, a superficial argument that "in each case forest area was involved" was used to then choose "the alternative which is best from power flow point of view".

Last but not the least, the meeting also noted that "In case of difficulty in getting RoW [Right of Way] for implementation of Narendra (existing)-Xeldam 400 kV D/C line, the RoW of the existing Supa-Ponda 110 kV D/C line (presently the line is not in use) could be used."

Thus, there were two specific options available for the transmission line apart from the Narendra-Xeldem route and it is clear that neither of them has been examined, before being rejected. Thus, the decision was taken without any due consideration of the forest and environment angle.

It is strongly recommended therefore, given the serious issues being raised of the impacts of the current alignment on protected areas, that the current work be stopped immediately, and the two alternative options (along with any others) be thoroughly examined, in a participatory manner, with all the requisite environmental and forest studies in place.

Alternatives are Understood in a Narrow Sense

In presenting alternatives to the transmission lines, alternatives have been understood and presented only as alternative routes. But the alternatives of strengthening or upgrading capacity of existing lines, or doing away with the transmission altogether (that is, looking at other sources of electricity) have not been looked at all.

Need to be Treated as a Single Project

Even though the transmission line is from Tamnar to Goa, the line is being treated as many different components. Even the Narendra to Xeldem section is being treated as two different projects with the Karnataka section as a separate project and the Goa section as a separate project.

This is totally unacceptable as this does not capture the full impact of the project. So for the purpose of carrying out all impact assessments and for the purposes of clearances, they need to be treated as a single project[23].

The Cost/Benefit Study is Completely Flawed

First of all, the very idea of putting a monetary value on the "ecosystem services" of the forest, putting monetary costs for habitat fragmentation etc. is flawed. Moreover, the costs attributed to such ecological losses are ridiculously low. Altogether, this fundamentally skews the balance against the environment. However, since this is the part of legal regime and the FC guidelines, we have to take it as given as of now.

But otherwise also, there are serious problems even on the "benefit side" in this cost-benefit analysis[24].

Benefits for "1200 MW increase in productively (sic)" is given at Rs. 4562208 lakhs and it mentions that project will "illuminate thousands of families". Total "Benefit to economy due to the specific project" is Rs. 4565473.5.

The short summary sheet in the FC application does not give any basis for these numbers. However, even if one were to take these numbers at their face value, the fact is that this benefit is due to the *electricity* that will illuminate homes and increase productivity. Thus, this benefit accrues due to the totality of a number of projects taken together - the transmission line (not just in Goa but from Tamnar Chhatisgarh, to Karnataka to Goa), the power plant which provides the electricity and the coal mine that provides the coal. However, the B/C calculation attributes the benefits of all these projects to that one section of the transmission line in Goa! No wonder it shows a cost benefit ratio of 4138!

This gross flaw is confirmed when we see that the same benefit of 1200 MW increase in productivity (Rs. 4562208 lakhs) is also given in the B/C ratio for the Karnataka project[25] – this is a double counting of the benefits.

In fact, this B/C ratio is completely flawed and it clear that it is being submitted only to complete the formality.

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[23] As is acknowledged even by the GTTPL company, part of Sterlite https://www.sterlitepower.com/project/goa-tamnar-transmission-project-limited

[24] Cost Benefit Analysis for the "Diversion of 69.41 Ha. of Forest land for laying of LILO of one ckt. of Narendra (existing) –Narendra (New) 400kV D/c quad line at Xeldem in the State of Goa" accessed from http://forestsclearance.nic.in/viewreport.aspx?pid=FP/GA/TRANS/35354/2018

[25] Accessed from http://forestsclearance.nic.in/viewreport.aspx?pid=FP/KA/TRANS/37754/2018

Last but not the least, if the benefits are really 4000 times the cost, then it would be viable to re-route the entire transmission line around and outside the eco-sensitive areas even if it meant several hundred kilometres detour!

Not Just Towers, But also Access Road

It should be noted that the transmission line is not just towers but would have some sort of road from where vehicles will access the towers for inspection and maintenance. This is clear from the following excerpt from the "BIA and BMP for 400 kV Transmission Line Corridor Passing through Protected Area of Goa State" (Final Report, March 2019, Page 13).

> "Routine ground patrols to inspect structural and conductor components. Such inspections generally require either an all-terrain vehicle (ATV) or pickup and possibly additional support vehicles on access and service roads and may rely on either direct line-of-sight or binoculars. In some cases, the inspector may walk the ROW. Follow-up maintenance is scheduled depending on the severity of the problem either as soon as possible or as part of routine scheduled maintenance."

Project Already Finalised so Wildlife and Forest Clearances a Formality

All project documents[26] show that the project was designed, finalised, bids called for and project awarded to the winning bidder before[27] it even went for Forest or Wildlife clearances. Under such circumstances, the FC or Wildlife clearance becomes a formality since commercial contracts have already been awarded.

D. Doubling of Railway Line

The one page justification[28] given for the doubling of railway line (in the Wildlife Clearance application, Karnataka section, Castlerock – Kulem, this is also the justification for the entire line Hospet-Castlerock-Kulem-Vasco) is hardly a justification but rather just an assertion that

> "Also both Goa and Hospet are tourist destinations. Due to Industrial growth and growth in tourists, the existing Railway single line capacity is saturated. To meet the increasing demand and future growth, the existing Railway single line has to be doubled so that more and more Goods trains/Passenger trains can be run to meet the increasing demand. To minimize the land acquisition, this rail doubling is being done parallel to the existing single line. …"

We have not been able to locate any detailed reports that give any analysis or figures and projections to substantiate this.

However, it is clear that significant part of the line is meant for transport of coal and iron ore. The Biodiversity and Environmental Assessment report[29] clearly states

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[26] For example, the Order of the Central Electricity Regulatory Commission dated 19 June 2018 in Petition No. 95/TL/2018

[27] As per the CERC order "PFCCL in its capacity as the BPC initiated the bid process on 21.12.2016 and completed the process on 14.3.2018 in accordance with the Guidelines. M/s Sterlite Grid 5 Limited was selected as the successful bidder having quoted the lowest levelized transmission charges…. The application for FC was made on 24 August 2018.
(http://forestsclearance.nic.in/timeline.aspx?pid=FP/GA/TRANS/35354/2018)

[28] "Justification for Locating the Project in Forest Land" , by Office of Chief Engineer (Construction), Hubli, South-Western Railway. Dated 05.04.2016 No. PIU/UBL/CLR-QLM/LA/651

> "This proposed doubling work is aimed to assuage the traffic on the existing route and increase number of passenger and freight trains to facilitate efficient transport of coal and iron Ore." (Page 175).

This doubling of the railway line also seems to be clearly linked to the expansion of the jetties at Mormugao Port for import of coal and export of iron ore.

The EIA (2017) for the Capital Dredging at Mormugao Port[30] clearly states

> "MPT expects that substantial efficiency in performance and reduction in shipping cost due to economy of scale can be achieved, if larger vessels can be serviced at the Port. However, a very big factor for MPT's growth is the doubling of the South Western Railway (SWR) network which is presently choked. Doubling of the rail network coupled with MPT's expansion plan will open up a lot of opportunities for investments in the hinterland particularly for the steel and power sectors."

The main cargo handled here will be iron ore (export) and coal. Destination for most of the coal will be Karnataka.

The Draft EIA for the port expansion[31] gives the commodity-wise forecast for the cargo handling at the port. This shows that by 2030, coal (thermal and metallurgical), will constitute 61% of the total cargo handled at the port, while iron ore will constitute 16%. All of the coal is imports, whereas, interestingly, iron ore handled is projected to constitute 8.5 million tons of export and 4.6 million tons of import. Coal handled is projected to consist of 14.37 million tons of thermal and 36.7 million tons of coking coal.

E. Cumulative Impact Assessment Necessary

While each of the projects through the eco-sensitive areas – transmission line, road, rail - has had some sort of EIA / BIA (Biodiversity impact assessment) done (whatever the quality), each EIA / BIA is separate; whereas all the projects together will have impacts greater than the sum of the parts. So a cumulative impact assessment is very necessary. Cumulative impact assessments need to be studied for the transmission line between Goa and Karnataka as well.

F. Conclusions and Recommendations

All the three projects will have serious impacts on the protected and other eco-sensitive areas.

Focussing on the transmission line, we see that the project is being justified on account that there is no other option for the state to meet its electricity requirements, particularly in light of the growth in the electricity demand expected in the future.

However, even official figures show that the extent of growth has been highly over-estimated. Planning for such overstated growth rates will not only mean higher financial costs, higher social

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[29] "Biodiversity and Environmental assessment of proposed doubling of railway track between Kulem and Castlerock in Goa-Karnataka" , Prof. R. Sukumar and Prof. T.G. Sitharam, Indian Institute of Science, Bangalore. August 2017

[30] Page 2-2, Pdf Page 30.
http://www.environmentclearance.nic.in/writereaddata/EIA/25032019M9V2G3VHEIA.pdf

[31] https://www.goa.gov.in/wp-content/uploads/2018/03/DraftEIA-min.pdf Table 2.4, Page 21

and environment impacts but ultimately will result in wasted investments and stressed assets as the infrastructure created will be in excess of requirements, and will lie unused.

In particular, taking more realistic assessments of future electricity demands cast doubts on the very justification of the need to have the additional transmission capacity especially if it needs to be taken through protected areas.

Even if additional transmission capacity is needed, we find that the current proposed line has been decided without considering in any meaningful way clearly available options of alternative routes and alignments which would have much lesser impacts. Further, the criteria to make the choice about the transmission line alignment has completely excluded ecological and forests related criteria.

At a broader level, there are several options that could help meet Goa its electricity needs over the coming years, options which have far less environmental and social impacts than those currently proposed, and options which appear even more attractive if we consider the more realistic rates of growth in electricity demand. These options include supply options within the state like solar power installations; being within the state, they will not need any additional transmission lines. Further, being located in the within the state, they also offer numerous other advantages like employment generation, ease of management etc.

There are other options which involve importing power from outside the state, but without the need of routing transmission lines through eco-sensitive or protected areas, and with minimal impacts.

We find that these options have not been considered in any serious and meaningful manner.

Given this, we urge that transmission project be suspended and be urgently reviewed, along with a comprehensive assessments of the various options available. The assessment of options should start with a more realistic assessment of future demand projections. The entire process should be carried out as a transparent and participatory process, with place for social, environmental and developmental criteria and experts alongside technical and financial criteria and specialists.

Lastly, any impact assessment of any of the three projects must include a cumulative impact assessment of all the three interventions taken together.

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ANNEXURES: Comments on the two White Papers on Electricity put out by Goa Government

White Paper on the Complete Status of Power Situation in Goa.

Available at http://www.goaelectricity.gov.in/Regulations/White%20Paper.pdf

This White Paper calls itself a white paper on "Complete Status of Power Situation" but in fact does not address most aspects or elements of the power situation at all. The paper is almost entirely about the transmission and distribution infrastructure (sub-stations and lines). While this is an important part of the electricity supply infrastructure, the main issues therein seem to be only about upgrading older infrastructure and putting in place some newer infrastructure at places. All of this is within the state and does not seem to affect any eco-sensitive areas, at least not new ones.

The White Paper makes only a passing reference to one of the most important questions, namely, what will be the source of electricity for the state in the coming years. On this topic it merely says

> "Per se there is no shortage of Power. However, the difficulties are in transmitting the said Power to Goa and receiving the same at various Extra High Voltage (EHV) stations. All the EHV Sub-stations are heavily loaded and cannot transmit / distribute the required Power at many places. The transformers and Sub-stations as a whole are loaded and cannot cater to the loads of the consumers. These EHV Sub-stations being the heart of our system, unless and until these Sub-stations as well as the transmitting network lines are strengthened and additional capacities are built, no amount of work done on the distribution network will give much relief."

In fact it makes a very strong and bold statement that "once [the work of these transmission network is] completed shall take care of the State's growing demand for the next at least 30 to 40 years." (Emphasis added).

This clearly indicates that about the future demand for next almost half century, the Government seems to have planned to rely entirely only generation and sources outside the state. There are some important assumptions implicit in this "plan" of the Government. These are

(a) that such power from outside will always be available
(b) that it will be available in quantities that are needed (i.e. there are no limits to how much power that could be imported) and
(c) that such power will always be available cheaply and at affordable rates.

None of these assumptions are made explicit. It would have been important for the White Paper to provide data and information based on which the Government has the confidence that these assumptions would hold. But clearly the matter seems to have been treated in a casual manner.

Thus, Goa Government has a simple and one point plan for meeting all its power demands for the next 40 years – "we will get it from outside the state". The only difficulty that is seen in this plan is "transmitting the said Power to Goa and receiving the same at various Extra High Voltage (EHV) stations".

But this difficultly is not discussed any further in terms of how it will be addressed. The rest of the paper is mainly about the transmission infrastructure *within the state*.

The issues, problems, feasibility and trade-offs involved in getting the power transmitted from outside the state are not even mentioned in the White Paper, let alone discussed.

The only interstate element discussed in the White Paper pertains to the Xeldem Sub-Station, which the White Paper notes "receives Power from the220 KV Ambevaddi-Ponda-I through the Southern Grid from Karnataka."

It is interesting and important that the main problem mentioned with respect to this import of power from Karnataka is

> "The main source of Power at 220 KV is from Amdevaddi-Ponda line which is passing through Dense Forest Areas and deep valley due to which there are lot of transient tripping."

This indicates the variety of problems that can come up in transmitting lines bringing power from outside the state, especially those coming through forest areas. In this context, the White Paper also mentioned the great difficulties faced in addressing this situation precisely because the power is coming from outside the state which leads to the involvement, coordinating with and getting permissions from various other state and central agencies. It says:

> "Out of 80 kms of these above mentioned Inter-State Ambevaddi-Ponda lines, 45 kms is under the control of Karnataka Electricity Board (KEB). In view of the same, as and when there is any fault in Karnataka Jurisdiction, a lot of time is taken to restore the same and despite best efforts by Goa Electricity Department (GED) the same is beyond the control of this Department of Goa. Secondly, since these are Inter-State lines, any transient tripping takes a minimum of 45 to 50 minutes to complete the formalities with different Authorities like Western Region Load Dispatch Centre (WRLDC), Southern Region Load Dispatch Centre (SRLDC) and National Load Dispatch Centre (NLDC) for taking the codes and recharging the lines."

Yet, these issues (related to transmission of power from outside the state) are not even touched upon in the White Paper.

The White Paper does not have a date.

White Paper on the Electrical Load Demand in Goa for the Last Ten Years

Available at http://www.goaelectricity.gov.in/Regulations/White%20paper1.pdf

This White Paper is a highly misleading one. This gives the category wise connected load (in KW or MW) but does not give the actual electricity consumed by each category of consumers (in MU). Undoubtedly, connected load is an important parameter, but equally important is the electricity actually consumed. By not giving this second aspect, it is clear that the aim of the White Paper is to create a misleading impression that domestic (household and agricultural) consumers are making the maximum demand on the electricity supply. This is a distorted picture. In terms of actual consumption of electricity, industrial and commercial use is much higher than the domestic use. Domestic use in FY 2019-20 as per Goa Government's own Petition to the Joint Electricity Regulatory Commission was estimated around 1173 MU, while industrial and commercial was around 2551 MU.

The White Paper has used the misleading device of presenting only half the information to imply that domestic users are higher consumers. The fact that the White Paper clearly misleads is seen from the

choice of the language/words in its conclusion that "domestic consumers consume more than 60% of the load that Goa requires." (Emphasis added). When one talks about the connected load (MW), then "consume" is a wrong word to use; at least the White Paper should have used the word "accounted for".

Second, this White Paper talks about the electric load demand in the last ten years, which is useful to know but would be more of academic interest and for learning lessons. What is really important for future planning and decision-making in that context is the future requirements and the plans to meet them. The White Paper does not talk about them.

What Both the White Papers Miss Out

In fact, both the White Papers essentially miss critical questions like:

(a) What is, according to Government is Goa's future electricity demand, say for next 7 to 10 years or more. Estimated in both, load (MW) terms and electricity consumption (MU) terms.
(b) What does this demand (MW and MU) look like for different categories (category-wise demand projections)
(c) What is the basis for these projections, what are the assumptions for these projections including the type and scale of industrial growth envisaged, population growth assumed etc.
(d) What are the Government's plans to meet this demand (the first White Paper answers this in one line – get it all from outside, for next 30-40 years. This is highly inadequate)
(e) What are the options they have studied before coming to the conclusion that this is the way we can meet the demand (even if the Government concludes that the best way to meet all the electricity demand is to import it from outside the state, this conclusions should be reached after examining several different options and their cost/benefits and trade-offs. A White Paper should present the options examined and the cost/benefits of each).
(f) What are the trade-offs and cost benefits they have considered in assessing electricity sources for future
(g) What are the trade-offs and issues of concern in getting the power from outside the state, including financial costs, management issues, environmental impacts etc.
(h) Have they considered solar generation (decentralised as well as centralised) within state since Solar electricity generation is rapidly emerging as the cheapest source with least environmental and social impact and could provide other benefits like local employment.

A White Paper should really be addressing all these issues.

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