

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

The Undersigned was sworn in as a Cabinet Minister in the Government of Goa on 24.09.2018 and was allotted the Portfolio of Power, among other Portfolios. He assumed charge of the Portfolios under his Administrative Control on 27.09.2018 and since then till date is the Minister for Power.

After taking charge as the Minister for Power, he held a complete review of his Department and also conducted various site visits all over Goa to see and acquaint himself with the working of the Department and also personally understand the Power procurement, the Intra-State transmission lines bringing Power to Goa from other states, the Distribution and transmission networks within Goa, the Extra High Voltage (EHV) Sub-Stations, the 33/11 KV Sub-stations, the distribution transformers etc and know its exact status vis-à-vis the requirement of Power in each respective area, the current capacity of each installation or line, the shortcoming in each installation or line due to which the respective consumers in the area were suffering on account of frequent outages/interruption and the solutions for the rectification or upgradation of the same to provide uninterrupted and reliable power supply to the People of Goa.

Goa does not have any Power generation of its own and is dependent totally on CGSs (Central Generating Stations) for Power. Presently the State is receiving 392 MW from the Western Region (WR) and 100 MW from the Southern Region (SR). The total allocation from the Ministry of Power as on today is 492 MW. The present Power requirement of Goa is around 572 to 610 MW. The Department is procuring the balance requirement from the open IEX (Indian Energy Exchange).

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. Hence, my focus is primarily on strengthening /building the main transmission network across Goa and since these are all major works it will take a lot of time for the same and once completed shall take care of the State's growing demand for the next at least 30 to 40 years.

The following is the complete summary of the exact status of the above mentioned EHV Stations as on the date of taking over i.e. 27.09.2019, the shortcoming, the solution found to rectify the shortcoming and the exact status of the solution. As on 27.09.2018 the following was the exact status of the 07 EHV stations that are there in Goa and through which the entire State of Goa is fed Power supply. These EHV stations are at Tivim (220 KV station), Amona Sub-station (220 KV station), Kadamba Plateau near Panjim (110 KV station), Verna Sub-station (110 KV), Cuncolim Sub-station (220 KV), Ponda sub-station (220 KV) and Xeldem (220 KV station).

### **A. Tivim 220 KV Sub-Station**

**Introduction :** This Sub-station receives Power from the Colvale Power Grid 400 KV Sub-station via double circuit 220/110/33 KV Sub-station. This Sub-station feeds the entire of North Goa and the 110 KV Kadamba Sub-station. There are 3x100 MVA, 220/110 KV Power transformers and 2 x 50 MVA, 110/33 KV Power transformers, 2 x40 MVA, 110/33 KV Power transformers catering in all about 200 MW of Power.

**Existing Problem** : There are two major constraints at Tivim Sub-station (1) shortage of land required for expansion as the current sub-station is already overloaded (2) Single-Bus system due to which any addition of transformers as well as working on Bays for maintenance etc. is not possible without long shutdowns (long could mean a minimum six months shutdown without supplying load to the existing consumers). Hence no alterations are possible within the existing setup, which is already overloaded beyond its peak capacity.

**Solutions**: The only way out is to first build a separate Sub-station with all the design considerations for the existing and future growth of load (next 30 years Plan) with maintenance flexibility. The land identification and acquisition process is initiated and it is anticipated that the same as well as the new/expanded Sub-station shall be ready by 2023 end.

**Short Term Arrangement**: Since the above mentioned solution will take about 03 to 04 years for complete implementation, in order to do away the difficulties faced by the consumers, side by side in addition to the long term solutions, a short-term arrangement of creating some extra capacity on the existing Sub-station has been planned and already initiated. The short term arrangements are as follows:

- 1) Replacing one of the existing old 40 MVA, 110/33 KV Power transformer with an enhanced new 50 MVA, 110/33 KV Power transformer. This will allow an additional capacity of 15 MW at this Sub-station. The work order for the same has already been placed after following all codal formalities and the same shall be installed and commissioned before November' 2019.
- 2) Shifting the existing 33 KV load of Bicholim areas to the under loaded Amona sub-station by laying an underground 33 KV cable from Amona to Bicholim. This will create another additional capacity of 10 MW at Tivim Sub-station. This work shall be completed by May, 2020.
- 3) Shifting the loads of Corlim sub-station to the under loaded Amona sub-Station. This will again create an additional capacity of 10 MW at Tivim Sub-station. This shall be completed before December'2019.

The above 3 arrangements shall create an additional capacity of 35 MW in the existing sub-station which will go a long way in doing away with load shedding to both the LT & HT consumers of North Goa, which in turn will give more reliable and stable Power supply to the consumers.

## **B. Amona Sub-station (220 KV)**

**Introduction** : This sub-station was built in 2009 and it has got a capacity of 2x50 MVA, 220 KV/33 KV Power transformers.

**Existing Problem** : This Sub-station was actually built to cater to the areas of Bicholim and its surrounding which are currently fed by 2x220 KV Kolapur Amona Line-I and Tilari Amona Line – II and to reduce the load on Tivim sub-station. This Sub-stations also receives Power from Colvale sub-station through Mapusa-Ponda line. Unfortunately the Amona Sub-station was built and commissioned without planning the distribution and networking system due to which till today the Sub-station is loaded to only 50 percent of its capacity.

**Solution** : To load this Sub-station to its optimum capacity and fulfill the aim for which it was built, the Bicholim Sub-station needs to be connected to this Amona Sub-station. Also the part loads of Corlim Sub-station should be connected to the Amona Sub-station. There is no need for any short term arrangement here and the arrangements that shall be made will be permanent in nature. As far as shifting the load from Bicholim is concerned, work order for

laying 2x33 KV underground cables from Amona Sub-station to Bicholim Sub-station has been given which will get completed by May, 2020 and with this work 10 MW of load from Tivim Sub-station will get transferred to Amona Sub-station. For shifting the Part load of Corlim sub-station on Amona Sub-station, 2x33 KV underground cables from Amona to Marcel are being laid which will get completed by December, 2019.

### **C. Kadamba Plateau sub-Station**

**Introduction:** This is a 110/33Kv Sub- Station fed from Tivim/Ponda sub-station through double Circuit Lines. This Sub-Station has 4x40 MVA, 110/33Kv Power Transformers catering load to Corlim & surrounding areas, Panjim & surrounding areas, Talegao & surrounding areas, Bambolim & surrounding areas and Pilar & surrounding areas.

**Existing Problem :** There is no problem as far as the Main Sub-Station capacity is concerned. However, considering the Rapid Growth in these above mentioned areas, this Sub-Station will have to be upgraded to a 220KV Sub- Station because currently this Sub-Station is fed from Thivim Sub- Station which as mentioned earlier is heavily over loaded and therefore shall require its independent connectivity.

**Solution :**In order to give Stable and reliable Power Supply to the above areas, besides upgrading the said 110/33Kv Sub –Station to 220/110/33 Kv Sub-station, it will also have to be linked to Colvale Power Grid Sub-Station and Cuncolim (220Kv) Sub-Station through upcoming Verna (220Kv) Sub-station. This arrangement once completed will cater comfortably for the next 50 years. The estimates for the same upgradation and linking are in progress and this work shall be completed by December 2023.

### **D. Verna Sub-Station**

**Introduction:** This is a 110/33Kv Sub-Station having capacity of 2x40 MVA, 110/33KV and 1x 50 MVA, 110/33Kv Power Transformer. This Sub-station draws power from Ponda sub-station and Xeldem sub-station. This sub-station caters to Verna & surrounding areas, Majorda & surrounding areas, Sancoale & surrounding areas, Cortalim & surrounding areas, Verna Industrial Estate, Sancoale Industrial Estate, Vasco & surrounding areas and parts of Margao & Fartorda Constituencies.

**Existing Problem :** The 110Kv lines from Xeldem to Verna and Ponda to Verna are heavily overloaded due to which there are constraints in feeding loads as required. Further any tripping on either of the lines renders half the consumers relying on these two lines as mentioned above severely effected thereby causing outages in these areas for long durations. The transformers are also over-loaded and soon will not be able to cater to the increasing needs of the Industrial as well as Domestic Consumers.

**Solution :** Since the existing 110 KV lines from Xeldem to Verna and Ponda to Verna are Overloaded and cannot carry any additional Power in the event of tripping of any of the above lines, both the lines should have independent capacity to supply the total requirement of the Verna sub-Station independently thereby increasing its reliability and ensuring that long duration of outages are things of the past. To do this, work order for changing the above said conductors to HTLS conductors which has got capacity to carry double the capacity of the existing lines has been issued and this work shall get completed by December,2019. Similarly to enhance the capacity of the Sub-station both the 40 MVA Power transformers shall be replaced to higher capacity of 63 MVA each for which the estimates are already prepared and this work shall be completed by December, 2020. With this arrangement the Sub-station capacity shall be enhanced by 46 MW, which shall comfortably cater for the next 5 years by which time the

new Verna 220/110/33 KV Sub-station for which the tender has been opened today shall be completed. This new 220/110/33 KV sub-station will take care of these area for next 30-35 years. This new Sub-station is designed to be Ring fed from both Colvale as well as Cuncolim which draws Power from Ponda via Xeldem Sub-station. This will make sure that outages are minimal.

#### **E. Ponda sub-Station**

**Introduction:** This is a 220/110/33 KV Sub-station having capacity of 3x100 MVA, 220/110 KV Power transformers, 2x40 MVA, 110/33 KV Power transformers, 2x30 MVA, 110/33 KV Power transformers and 1x50 MVA, 220/33 KV Power transformers. This is a 50 years old main receiving Sub-station which caters to entire Ponda Taluka, Dharbandora Taluka, Kundaim Industrial Estate, Madkai Industrial Estate, Bethora Industrial Estate, part of Kadamba Sub-station load, part of Margao & Fatorda constituencies, Verna 110 KV Sub-station, entire Xeldem Sub-station. In short the Ponda Sub-station directly and indirectly caters to the entire South Goa District. This Sub-station receives Power from Colvale Sub-station through 220 KV Mapusa-Ponda-I line and Mapusa-Ponda-II line and Kolapur-Ponda-I and Tilari-Ponda-II. These four lines are fed from the Western Region Grid.

**Existing Problem :** Since this Sub-station is very old and has completed its useful life, it requires a major overhaul/upgradation. Out of the above mentioned Power transformers, four transformers are 50 years old. As per the standards as well as methods of good practice, the life span of any Power transformer is maximum 35 years.

**Solution :** There is an urgent requirement to replace the old transformers with enhanced capacities. Hence estimates are already prepared to replace 1x100 MVA, 220/110 KV Power transformer to 1x160 MVA, 220/110 KV Power transformer and also to replace 2x30 MVA, 110/33 KV Power transformers to 2x40 MVA, 110/33 KV Power transformers thereby increasing the capacity of this Sub-station by 80 MW besides replacing the old associated equipment, which in turn will reduce interruption to a very large extent. All this work shall be completed by December, 2021. Besides, current loads of Verna and Xeldem Sub-station shall be relieved from this Sub-station in view of the independent 220 KV Sub-station at Verna and 400 KV new Sub-station at Darbandora. Hence the above solution at Ponda Sub-station shall be able to cater to its consumers for next 25 to 30 years.

#### **F. Xeldem Sub-Station**

**Introduction:** This is a 220/110/33 KV Sub-station having capacity of 2x100 MVA, 220/110 KV Power transformers and 1x50 MVA, 220/33KV Power transformer and 2x40 MVA, 110/33 KV Power transformers. This Sub-station receives Power from the 220 KV Ambevaddi-Ponda-I through the Southern Grid from Karnataka. The second source to this Sub-station is from 220 KV Ponda-Xeldem radial feed (PXR line). Besides above 220 KV lines, this Sub-station also receives Power at 110 KV from Ponda Sub-station. This Sub-station feeds Power to Cuncolim 220 KV Sub-station, Navelim Constituency, Velim Constituency, Cuncolim Constituency, Canacona Constituency, Curchorem Constituency, Sanvordem Constituency, Sanguem Constituency, Quepem Constituency, curtorem constituency, Benaullim Constituency and parts of Margao and Fatorda Constituency.

**Existing Problem :** 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. These lines are 2x80 km double circuit lines out of which one line is directly connected to Xeldem Sub-station and the other line is connected to Ponda Sub-station which is kept idle right from its inception. This line ought to have also been rightly connected to Xeldem and not

to Ponda and if so, would have been utilized fruitfully thereby increasing the supply of 220 KV Power at Xeldem and thus increasing the reliability of Power in case of failure of any one of the line. 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. Since Xeldem sub-station receives Power from both the S.R. as well as W.R. Grids complete utilization of the lines is not achieved.

**Solution** : In view of repeated crisis in every ensuing monsoon on the KEB lines, a decision was taken to temporarily club 220 KV AP-II line with 220 KV AP-I line at Darbandora Goa after insulating the section towards Karnataka (KEB) and since 18:00 hrs on 15.06.2019 Xeldem has started receiving Power from Ponda Grid (WR) alone. Since then, Xeldem has been supplying more stable Power to South-Goa. This arrangement shall continue till end of October, 2019 or till fair weather, when the condition of the AP-I line is more reliable than during the monsoons. Getting the clubbing of these above mentioned two 220 lines was not easy as it requires various permissions from Authorities like WRLDC, SRLDC, NLDC, SRPC (Southern Region Power Committee) and WRPL (Western Region Power Committee) as the above lines are Inter-State and with repeated liaisoning we have succeeded in getting the permissions to avail Power from the single Grid (Western Region). After closely monitoring the benefits of the above arrangement and if this arrangement benefits the consumers by way of reliable Power supply, the matter will be taken up with the above authorities for a permanent solution until the Darbandora 400 KV/220 Sub-station is commissioned. The order for the Darbandora Sub-station is already placed and work is in progress and this Sub-station shall be operational by December, 2024.

As far as the 33 KV /11 KV sub-stations are concerned, wherever the transformers are over-loaded new transformers orders have to be placed. New transformers shall be installed and commissioned between end of December, 2019 and February, 2020 at Vasco, Sancoale, Bambolim, Panjim, Porvorim, Mapusa, Madkai. Similarly, orders for another ten number of 10 MVA transformers and another ten 6.3 MVA transformers shall be placed shortly and the tenders for these have already been opened and expenditure sanction shall be obtained shortly. This will help in tackling the over-loaded 33 /11 KV Sub-station in the State of Goa.

As far as capacity enhancement for distribution network is concerned, wherever required estimates have been prepared for putting HTLS conductors which will carry double the Power of which the current existing conductors are carrying. The estimates for these have been prepared and these works shall be completed before end of December, 2020.

As far as the over-loading of various feeders are concerned, estimates have already been sanctioned for bifurcating them and work has already begun on a lot of feeders. All such works will be completed before December, 2020 and once completed will do away with Power shedding that has been going on for several years now, especially during the peak hours.

All 11 KV and 33 KV lines in the State of Goa shall be made underground in a phased manner by giving priority to areas where it is most required. This will reduce interruptions to a large extent.

As detailed and mentioned above doing the transmission lines/capacity building of EHV takes a long time. On the distribution side, depending on the requirement capacity building can be done very fast. My Department will do the same as and when required depending on the consumer needs and the increase in consumer base.

I solicit your support and the support of the People of Goa to implement the above plan for delivering uninterrupted and reliable Power supply to the People of Goa.

Thanking you,

**NILESH CABRAL**  
**Minister for Power, Environment,**  
**Science and Technology & Non-Conventional Energy**