

# ENVIRONMENTAL IMPACTS OF POWER GRID TOWERS IN DHARMAPURI DISTRICT – A CASE STUDY

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**Abstract** - To meet the future demand on electricity, Government of India involved in implementing various new power generation projects and its transmission projects around different places of our Country. In India most of the transmission projects are done through overhead transmission by erecting towers. This transmission towers and its cables are passing through many agricultural lands, ecological areas and reserved forest areas causing various impacts on Environment and Agriculture. Most of the towers are erected on agricultural land in Dharmapuri district results in cutting of various trees. Trees help in maintaining the atmosphere temperature and ecology. Hence this study involves in assessment of Environmental impacts of HVDC electrical towers in Dharmapuri district of Tamilnadu and includes the study of measures to resolve the impacts.

**Key Words:** Environmental impacts, Transmission towers, Agricultural lands, cutting of trees, Ecology.

## 1. INTRODUCTION

Based on the 18<sup>th</sup> Electric Power Survey (EPS) of Central Electricity Authority (CEA), the expected power demand of Southern region by the end of XII and XIII plan would be about 57,200MW and 82,200MW respectively. To meet this demand many of the power transmission projects are proposed by Government of India (GoI). Transmission of electricity can be done by two methods which are practiced worldwide namely, overhead transmission of power lines and underground transmission of power lines. In India, most of the power transmission is carried through overhead transmission method with use of towers and conductors over the towers. To face the power deficit of southern region, the new power transmission project named 800kV Raigarh – Pugalur HVDC bipole link is proposed by Power Grid of India. This transmission project planned to pass through five states namely, Chattisgarh, Maharashtra, Andhra Pradesh, Telangana and Tamil Nadu. In Tamil Nadu, the transmission lines passing through eight districts namely, Vellore, Krishnagiri, Dharmapuri, Salem, Namakkal, Erode, Karur and Tripur. Overhead transmission of power lines includes various Environmental impacts and on impacts on Agriculture and mainly on farmers. This study carried out the assessment of Environmental impacts due to the 800kV Raigarh – Pugalur HVDC bipole link project in

Dharmapuri district of Tamil Nadu state and the study concludes with analyzing the remedies for the impacts due to overhead transmission of power lines.

### 1.1 Objective of the study

The study has two main objectives:

- To assess the Environmental impacts due to overhead transmission of power lines.
- To analyze the remedies for the impacts due to overhead transmission of power lines.

### 1.2 About 800kV Raigarh – Pugalur HVDC Bipole Link Project

As decided during the Joint meeting of the Standing Committee on Power System Planning of Southern Region meeting and Western Region held on 20th April, 2015, the project shall be built as three separate schemes as follows:

**Scheme #1:** Raigarh - Pugalur 6000 MW HVDC System

**Scheme #2:** AC System strengthening at Pugalur end

**Scheme #3:** Pugalur - Trichur 2000 MW VSC Based HVDC System

The Project objective is to improve import capability of Southern Region. The Project costs about **Rs. 14416.51 Crores** at **April 2015** Price Level. The alignment of the Project extends for **1749.775 km** from Raigarh of Chattisgarh to Pugalur of Tamilnadu.

In Tamilnadu, the alignment of tower lines involves **11.40 Hectare** of forest area. Agriculture is the main source of livelihood in Tamilnadu with around 5139832 ha (Hectare) of area under cultivation. The proposed Project alignment crosses Highways in 40 places, Railways in 19 places and river crossings around 19 areas. Compensation costs of **84.30 crores** had allotted for Non forest areas at the rate of 5lakh/km and **1079.92 crores** for acquired tower base land and **87.92 crores** for Forests areas at the rate of 20lakh/ha. The maximum width acquired for Right of Way (RoW) is **69 meters** and minimum clearance between trees and conductors are **10.6 meters** as per

Ministry of Environment, Forest and Climate change (MoEF) guidelines. The land required for construction of Substations varies from **30 to 100 acres** based on voltage levels, no. of bays, topography of land and other technical parameters.

## 2. ENVIRONMENTAL IMPACTS OF TRANSMISSION LINES

Transmission line Projects are creating impacts towards the Environment, Ecology of the species and making discomfort in humans both during the construction stage of the project and during the operation stage of transmission. At the construction of the overhead towers and lining electrical conductors over the towers, trees are cuts in large numbers along the alignment of the project and in some places the alignment includes forest areas which are main habitat of many species. Hence it destroys the ecology of the species. While at the operation stage of transmission, the electromagnetic fields such as electric and magnetic fields are generated from transmission lines while large amount of current passes through the conductor. This electromagnetic fields will cause severe health effects in human. Some of the Environmental impacts of Transmission lines are listed below:

- Destroying of trees
- Limitations in Agriculture
- Change in Atmospheric temperature
- Destroying habitat of species
- Human Health impacts
- Land value depreciation

### 2.2 Human Health Impacts

Electromagnetic fields (emf) generated during transmission of current will cause short term and long term health problems in humans:

#### Long Term Health Problems

- Risk of damaging DNA
- Risk of Cancer
- Risk of Leukemia
- Risk of Neurodegenerative disease
- Risk of Miscarriage

#### Short Term Health Problems

- Headaches.
- Fatigue
- Anxiety
- Insomnia
- Prickling and/or burning skin
- Rashes
- Muscle pain

## 3. IMPACTS FACED BY PEOPLE OF DHARMAPURI DISTRICT

A survey was conducted about the impacts of transmission lines with the peoples of Dharmapuri District at different villages and towns where the tower lines are aligned.

### 3.1 Major trees felled down for the project

Large numbers of trees are cuts for the transmission line project along the alignment. The proposed transmission line mostly passes through agricultural lands which results in cutting of many valuable trees. In Dharmapuri District, the major flora found are Mango (*Mangifera Indica*), Coconut (*Cocos nucifera*), Neem (*Azadirachta indica*), Tamarind. Most of the Coconut trees, **Neem trees, Mango trees, Tamarind trees, Drumstick plants** and other cultural plants are felled down for the project where the agricultural lands are encountered.

### 3.2 Limitations in Agriculture

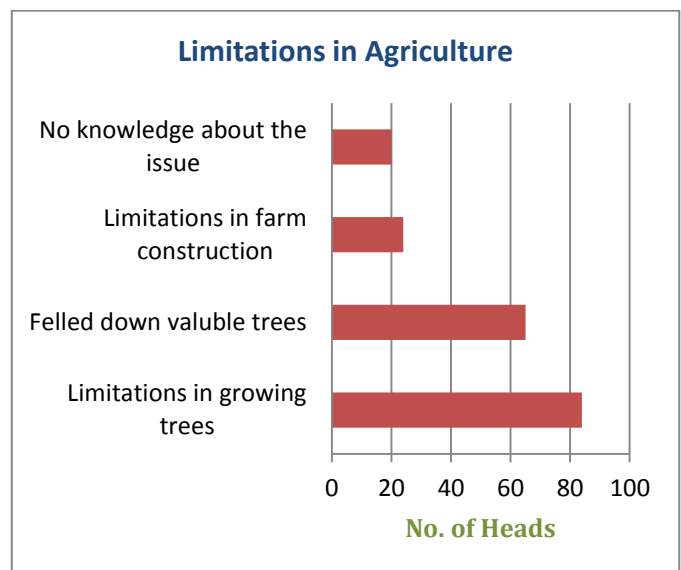


Chart -1: Limitations in Agriculture

### 3.3 Land value depreciation

The value of land through which transmission lines passes are depreciated because the construction works and plantation of trees are restricted by government or project undertaken company. Particularly the land in which tower are erected are facing trouble in ploughing with tractors and restricted in using machineries for harvesting.

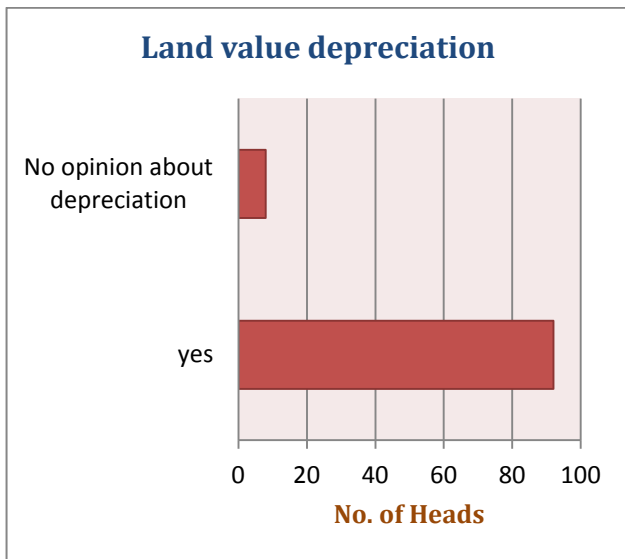


Chart -2: Land value depreciation

### 3.4 Increase in Atmospheric temperature

Trees play a huge role in the carbon cycle. They convert the CO<sub>2</sub> in the air to oxygen, through the process of photosynthesis, and in this way, they can be looked at as a natural regulator of the carbon dioxide. More trees less carbon dioxide in the atmosphere and the more oxygen.

Since, carbon dioxide is very abundant in the atmosphere released through cars, industries and power plants. Trees fulfilling their part in the environment and take some of the excess carbon dioxide out of the air. Unfortunately, many trees are destroyed for various development projects leads to increase the carbon dioxide level in atmosphere. With more carbon dioxide in the atmosphere, more of the sun's radiation is being reflected back to earth, instead of space, and this causes to rise the atmospheric temperature.

### 3.5 Suggestion given by the People

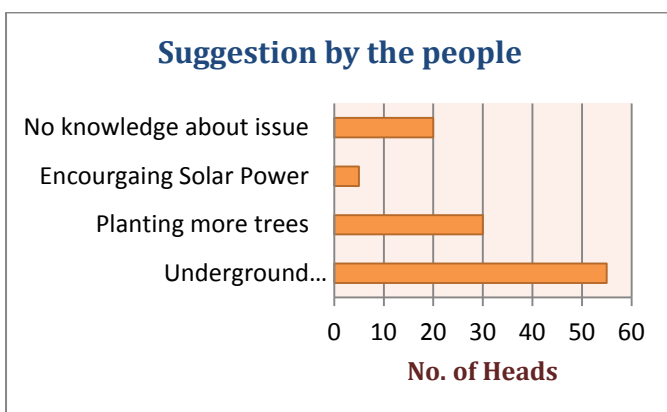


Chart -3: Suggestion given by the People

Farmers and people of Dharmapuri District who are facing the impacts of transmission lines suggests the mitigation measures to overcome the impacts.

## 4. ANALYSIS OF THE MITIGATION TO OVERCOME IMPACTS

Impacts caused by the transmission lines can be overcome by taking proper mitigation measures and effective designing of transmission lines.

### 4.1 Underground transmission

Overhead transmission of power lines requires large areas for the tower base construction and right of way for overhead conductors. Practically, this transmission lines passes through many agricultural lands and ecological forests areas leads to some restriction in land use and destroying habitat of many species. The compensation costs given for the overhead transmission line project is more in places of agricultural lands. This compensation cost can be minimized by preferring underground transmission along the roads sides. When the transmission is done through underground along roads it will prevent the destroying of forests areas, occupation of agricultural lands, cutting of many valuable trees in agricultural lands. Agriculture is the main source of income for most the peoples in village areas, occupying agricultural lands for development projects will affect the livelihood of farmers. Research said that burying of transmission lines can eliminate the exposure of human to the electric fields. Human exposure to the electromagnetic fields will cause severe health effects to human, underground transmission can overcome this health impacts on human. Eventhough underground transmission costs high and its difficulty in design and construction, it have more benefits to human and environment than overhead transmission.

### 4.2 Plantation of more Trees

Cutting of trees for the project will increase the atmospheric temperature and in turn results in deficit of average annual rainfall. Average Annual Rainfall report of Tamilnadu for the year 2018 reported that high deficit of annual rainfall was found in many districts of Tamilnadu and in some districts the annual rainfall was found increased than normal. In the year 2018, Dharmapuri District received 49% less rainfall than the average annual rainfall. Dharmapuri District placed the first in deficit of rainfall in Tamilnadu. Hence planting more trees will conserve the environment from various impacts. Various studies concluded that plants will weaken the electric fields, so planting trees will preserve the humans from the impacts of electric fields.

### 4.3 Encouraging use of renewable energy

**Tamil Nadu** has the highest installed solar power capacity in India. Kamuthi Solar Power Project near Madurai is the world's second largest solar park. The state of **Tamil Nadu** is also the largest producer of Wind Energy in India. If peoples come forward to install solar power units at their households then it will reduce the necessity of new power generation and transmission project. Solar energy is the renewable source of energy and it is also pollution free rather than the other power generation system such coal power generation plant. Though the installation cost for solar plant is high it cuts the monthly power consuming charges. Government also giving 50 - 80% grants for the installation of solar plants at households.

### 5. CONCLUSION

The main cause for new power generation and power transmission projects are increase in large power demand. Hence its every citizens responsibility to save power by avoiding unnecessary use of power. Use of low power consuming electronic appliances and electric bulbs will help in power consumption. Increasing use of renewable energy sources and planting more trees are preserves our environment not only from impacts of transmission lines but also from various environmental impacting problems.

### REFERENCES

- (1) Electrical Notes and Articles, "Effect of High Voltage Transmission Lines on Human and Plants"
- (2) Initial Environmental Assessment Report (IEAR) for 800kV Raigarh to Pugalur HVDC bipole link
- (3) Public Service Commission of Wisconsin, "Underground Electric transmission lines"
- (4) Regional Metrological Centre, Chennai. "Annual Rainfall Report of Tamilnadu"
- (5) Wikipedia, Electrical sector in India

### BIOGRAPHIES



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