

## Literature Review on Renewable Energy Sources in North-eastern states of India

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### Abstract

Renewable Energy is the Current demand in the energy sector. The North-eastern states have a huge Potential in the Solar, Wind, and Biomass energy sector. Renewable energy is the energy generated from natural resources. Even for the decentralized system, the growth of solar power lanterns has been increased by more than 300%. In this paper, the discussion is mainly on the issues of how north-eastern states can be the hub of the renewable energy sector. The power generated from Bio methanation to Solar Photovoltaic Plant in the north-eastern states has a huge capacity. A study has been made on the Dual Power mode which can be used in Various North Eastern states for the generation of Power.

Keywords: Solar Energy, Assam, PV Plant.

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### 1. Introduction

In the previous couple of years, constant efforts have been made by the Indian States to boost liveability, sustainability & economic development. Power generation from renewable energy sources in India reached 127.01 billion units in the last financial year. Talking of wind energy, the Govt of India has installed over 800 wind monitoring stations. The recent assessment indicates a gross wind power potential of 302GW in the country at 100 m above ground level [10]. Gujarat, Maharashtra, Karnataka, Andhra Pradesh, Tamil Nadu are among the few Windy States in India. Wind generation represents 10.1% of the total installed power capacity in India.

A major development in Solar energy came when Cabinet approves Kisan Urja Suraksha Evam Utthan Mahabhiyan (KUSUM Project) which deals with Solar Powered Agriculture Pumps. This Scheme adds a Solar Capacity of 25,750 MW by 2022 to the Agriculture Sector. The Government of India targets 175GW of renewable energy by 2022 Of which the targetComprises 100 GW of Solar Power,60 GW of wind power,10 GW of Biomass Power, and 5GW of Small Hydro Power. For a 3% increase in social acceptance of Bioresources, there was a 65% decrease in Solar PV Utilization and to that extent, bio-resources were introduced (L. Suganthi & A. Williams,2000).

Smart Cities Count on top approach how it focusses on technology. In Cities like Bengaluru, technology drive towards Urban Ecosystem Planning. Many studies have shown us that Cities Rank according to Social, economic, and environmental criteria.

M.Barman et al. study shows that there is a reduction in Consumption of Kerosene and an increase in an improved standard of living with high quality of light. The study also found

that there is no major awareness conducted by the institution for which the study was Conducted in Four districts.

## 2. Methodology

According to Survey Carried by National Institute of Solar Energy (NISE) Assam has a very high Potential of generating energy from Solar among all the OtherNorthern States. It has an estimated Capacity of 14GWp which is a very huge number. Ministry of Renewable Energy. Solar Energy is not only a very important Potential For future Energy Source but also it has the advantage of enabling the advantage of decentralised distribution of electrical energy thereby empowering man power at grass root level. The below map from Ministry of New & Renewable Energy shows the data that assam has a great Potential for Renewable Energy



Fig 1:Renewable Power Generation Capacity(Source:MNRE).

### 2.1. Recent Developments of Assam in Renewable Sector

Recent development shows that the installation of Solar PV cells was achieved at a faster Pace. Some of the recent developments are listed below.

Sl. No	Development	Capacity (Mw)
1	Solar PV Plant Project in Namrup	25
2	Lower Kopili Hydroelectric Power	70
3	Tezpur University Roof Top Solar Plant	90
4	Floating Solar Power Plant at Morigaon district	0.01

Fig 2: Table for Recent Development in Assam Up to17<sup>th</sup> Feb 2021[2].

### 2.2. Solar Grid Connectivity in North- Eastern States

North East India has an immense potential for Solar Energy. According to Pankaj Kalita et al. the Location of Guwahati and Gangtok provide a high-Performanceratio of 0. 855.Aizawl Provides the minimum unit cost of electricity generated at a Value of 3.88 INR/Unit. Their analysis also reveals that Aizawl and Guwahati are most Suitable for installation of Solar Photovoltaic power Plant. The Implementation of feed in tax system for Solar Energy has Already gained momentum in India [1]. The Government of India has made constant efforts to improve the energy convenience of its citizen. Furthermore 500 million people lack access to electricity. Moreover, the Control of thermal power in India is still a Major Concern while solar energy is quite popular in north eastern states and all over the India for the reason the Sun Shines Abundantly throughout the year. Each and every generation of energy from Solar is most underrated source of renewable energy. The aggregate capacity of till 2019 of Assam has been calculated up to 41.23 and Assam having a Potential of 14000Mw which is highest among all Other North-Eastern States. The Below Graph Shows the Potential and aggregate Capacity of North Eastern States Also Known as 7 Sisters.

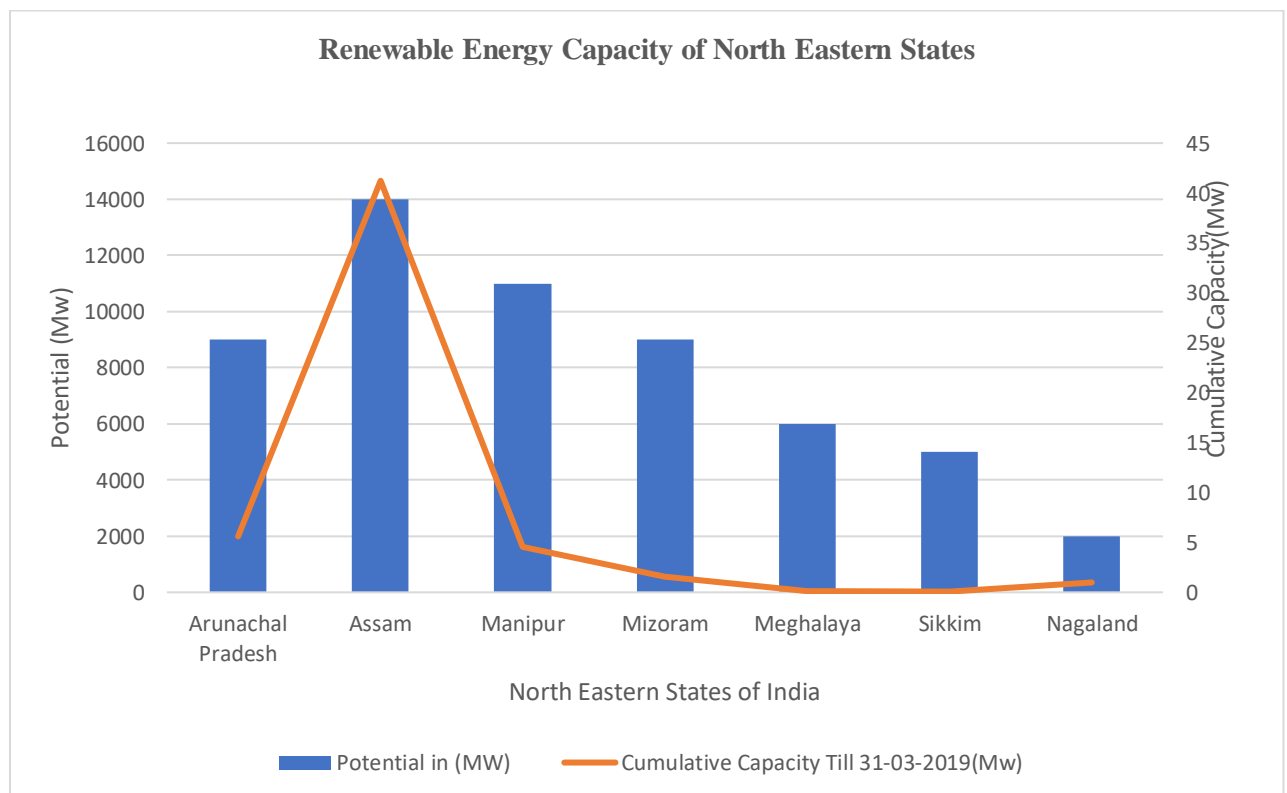


Fig 2.1: Potential vs Cumulative Capacity till March 2019.

### 3.Study Area of Bio methanation

A. Brahma et al. study found that electric Power generation Potential of a newly constructed bio methanation Plant in Sonitpur district of Assam. Spatial availability of Biomass feedstock for methaneneration using GIS.The GIS is also used for Optimal Biomass Collection and transportation network design. Energy extracted from this process will play a vital role in Socio-economic development of mankind. The Common problem associated with the fossil fuel that they are exhaustible in nature and take millions of years to decompose. Moreover, fossil fuel-based energy sources are responsible for Global warming. study is to review various initiatives in renewable energy sector with focus on climate

change concerns and power generation under various components of NAPCC [5]. The initiatives under the plan are critically examined and gaps in the implementation are identified. The current state of utilization of renewable energy sources namely solar, wind, hydro and bio-energy are presented considering technological developmental challenges. The need for effective inputs on resource and technological development mechanisms for renewable energy exploitation in the country are highlighted. The issues discussed in the study will be beneficial for long-term economic development of the country besides addressing climate change concerns.

### 3.Evaluation of Distribution among Wind & Solar Energy

The most common approach in India has been the centralised grid-based electrification, Recently Solar detection Photovoltaic System are in increase in demand as a Cost-effective mode. The development and utilisation of renewable distribution system has been recently observed worldwide. The reliability impact of the high variable energy source is an important aspect that needs to be addressed as renewable power penetration becomes increasingly Significant.

Following Control Strategies are applied in the distribution study:

- 1.Renewable DG Units are Controlled to operate Power factor
- 2.Windpower of Solar Irradiance data used for average hourly basis
- 3.Only dispatchable DG unit are allowed to supply reactive power [7].

Natural rural electrification in assam and several other states led to a raft of policy initiatives followed by funding both national and through international funding agencies. All the North Eastern are also endowed with excellent biomass and small hydro energy, there has been limited effort inharnessing this potential. An estimated Peak loading in currently over electrified village in upper and central assam analysis shows that there are around 600 villages that have a peak load of 50Kw for 80%. There is also various in technology and Some of safety issues that confirmed to the source of concern.So, we must focus to the use of Dual mode renewable energy system. Each of the Districts in North Eastern states can adapt the following stepwise method for control strategies in Electrification of Renewable Sources.

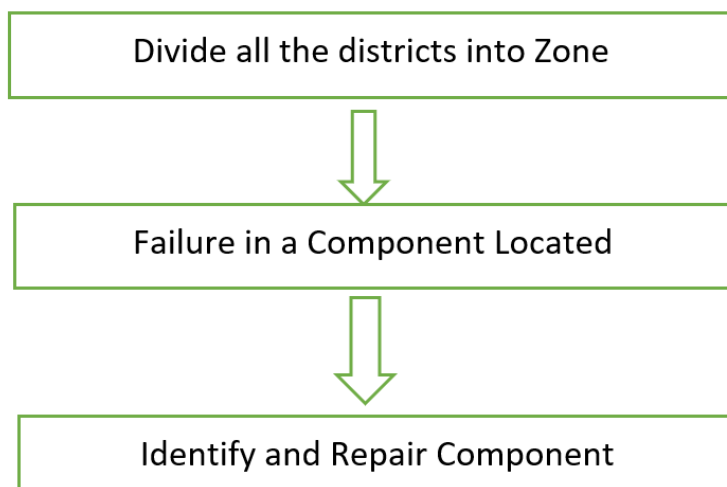


Fig 3:Schematic diagram for set up of Dual Mode Power Generation in North Eastern states.

#### 4. Off Grid Solar & Biomass Combination

Combination of Solar PV and Biomass in Central Assam district with good feature. There has been a good quality biomass including Crop Residues that can ensure sustained biomass Production.

Off Grid facility because of difficulty in getting network access through forest areas and Cost of distribution of network. The Size of Solar Panel to be used is as Cost effective [8].

#### 5. Conclusion

There is a massive program that is going on for years that are in theory of electrifying cities and villages. All the extensive Program survey concluded that there is a huge Potential in Assam and all other Northeastern states for the development of renewable energy. As for the time being blended mode of fuel can be used which will help us to save tons of fuels. Likewise Constant efforts has been going on for blended mode of fuel like Petrol and Hydrogen fuel which can be considered as Alternative fuel for IC Engine. The discovery of renewable diesel in 2020 helps lot of refineries and can be termed as under modern fuel but the focus has to be on achieving nearly 100% of energy derived from Non Renewable Sources.

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