

Smart Grid and its Challenges Faced in India

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Abstract— The main objective of this article is to point out the challenges that usually come across while implementing the applications of a Smart Grid especially in a country like India. What could be the possible challenges faced by the employees in the present scenario and what are the possible solutions for this.

Keywords— Smart Grid, Challenges, Implementation, Solutions

I. INTRODUCTION

A simple understanding of the word Smart Grid would be basically a fundamental reengineering of the present electricity services in the country. It is an electrical grid which we can say includes a variety of operations and energy measures including smart distribution boards, smart meters, and appliances with proper control over their working, etc. Yes if we talk about Smart Grids then we also try to focus more on the use of renewable energy sources. The objective of this work is to learn about the challenges faced while the application of Smart Grids especially in India. Despite having all the possible technologies like LADDER LOGICS, SCADA, PLC, etc. why is it creating such a huge problem to get this set up and work? Are there any other factors where we should focus on which we are neglecting? We will discuss this in detail.

II. LITERATURE SURVEY

- This article [3] focuses on tracking usage for each household so the provider gets a fine-grained picture of where the energy is going. Where exactly is the power pay for being used? And could an automated system within the home continuously optimize that usage is being discussed.
- According to this article [4] the international consultants will be the knowledge partner and guide in the implementation of the projects as approached by BESCOM. Bangalore Electricity Supply Company Limited (BESCOM) is responsible for the distribution of electricity in 8 districts and commenced its operations from 1st June 2010.
- This article [5] discusses the issue of a group of about 200 people who decided to sue Pacific Gas & Electric, claiming that newly installed smart meters had jacked up their usage.
Later the study shows the meters worked just fine, and that higher utility bills were a result of hotter temperatures during the heat wave of 2009.
- Here is an example of Xcel Energy's Smart Grid City project. This project-based in Boulder, Colorado was supposed to become a smart grid hub by enabling distributed generation technologies such as plug-in hybrid electric vehicles through wind turbines and solar panels. But that does not happen as only 43% of residents had smart meters. It is hard to say what caused the failure but the company claims lack of public awareness and poor project management was the main reasons for this.
- Here this article [2] focuses on a complete switch to automation. There have been discussed many problems such as lack of infrastructure, efficiency is not up to the mark. It also discusses the T and D losses and power theft problem problems that used to be going on for a while. Here they also focused on the lack of awareness in the public.

▪ CURRENT SCENARIO IN INDIA-

- National Smart Grid Mission by Indian Ministry of Power on 27 March 2015.
- 14 Smart Grid projects including West Bengal, Punjab, Gujarat, Kerala, Assam, Maharashtra.
- These projects are at the basic and initial level of contract and finalizing budgets.

- Also above are the pilot projects to see if organizations manage the upcoming circumstances.
- In may 2016 Maharashtra, Chhattisgarh, Kerala, and Rajasthan were canceled due to a lack of poor project management.
- April 2021 report suggests that the Chandigarh project has been shelved off due to a privatization issue.

III.METHODOLOGIES-

• Fear of privacy data leaking into the public-

So if talk about the latest example that people were ready to leave the WhatsApp application and move to a newer application called Signal because of some privacy issue. Similarly, The government should adopt high securities over this issue because a simple hack could even take over a year to solve as pieces of equipment being smart they will be connected all together. And also the consumer data can be collected by unauthorized third parties.

• Increase of awareness –

If people are not aware of the current technologies then why would they care? They would start thinking about this issue only when they are made aware of the current scene and give them reasons to switch to a newer system. It is not a one-day task but a little success here can lead us to a greater future for society. The importance of consumer education shouldn't be underestimated. This is because it will enable them to share data with the official authorities for the fare use and also the formation of user-friendly products and services will play an important role in making aware society of Smart Grids.

• Efficiency improvements -

This would result in a reduction of losses, peak load demand, and thereby decreasing generation as well as consumption of energy. By this, it would enable the energy flow in a much more convenient and efficient way.

• Proper set of rules and guidelines –

This is the most important point and it is the prime motive to enable smart technologies in India. Policymakers and regulators need to implement a framework that optimally spread the danger over the entire value chain i.e. To guard the investors against risk and to yield the result at a lower cost to the purchasers. Technological and delivery risks related to Smart Grid are significant. And this will be overcome over the due course of your time as more issues arise and are addressed.

• Working on skill development –

So like an ATC Officer who works continuously to ensure that everything is going fine and their one silly mistake could lead to a huge unwanted danger. Similarly, the proper training should be given to workers and employees at under or postgraduate levels where complete focus would be on practical knowledge and real-time problem dealings to avoid any future circumstances.

• Broader level of approach –

As the Smart Grid will replenish the conventional ways of individual needs to bigger sector investments, that means shifting to a completely new digital system will be the prime approach for the success of Smart Grid in India.

• Upcoming storage challenges –

As the power generation is not uniform i.e., intermittent and variable, they may demand varying storage. Battery, the foremost common memory device, has a very short lifetime of 4–5 years. Other storage facilities like thermal storage, hydrogen storage, etc. have their respective varying concerns. Pumped storage technique, which is in regions, China, Japan, India, and Norway, has efficiencies within the range of 70–85%. We want this because we do not want our produced energy to get lost like this. The problem with pumped storage techniques is that it requires large areas as reservoirs which are generally available in hilly and mountain ranges only. Therefore finding new ways of storing and power distribution could ease the long-term challenges faced in Smart Grid implementations.

IV.CONCLUSION –

In this paper, an effort has been made to research the key challenges in implementing the Smart Grid concept in India. Indian resources and technologies are still lagging far behind when compared to other developed countries. In most of the advanced countries, Utilities have made major achievements in terms of productivity, reliability, and efficiency through the utilization of Smart Grid technology. The utilities will get to invest heavily in new hardware, software,



business process development, and staff training. In the end, it would help the country to achieve bigger goals in the upcoming years.

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