

RECENT DEVELOPMENTS OF SMART GRID PROJECTS IN INDIA

V. Saravanan^{1*}, M. Arumugam¹, Andrey V. Brazhnikov², Igor Bolvashenkov³

¹Department of Electrical & Electronics Engineering, Arunai Engineering College, Tiruvannamalai (Anna University, Chennai), Tamilnadu, India

²Department of Electrotechnology & Electrical Engineering, Polytechnic Institute, Siberian Federal University (SFU), Krasnoyarsk, Russia

³Institute for Energy Conversion Technology, Technical University of Munich (TUM), Munich, Germany

**vsaranaec@yahoo.co.in*

Introduction

A smart grid is a digital, self healing electrical energy system. It is used for improving reliability, efficiency, sustainability, flexibility and security of the existing electrical grid system. It has the features of observability, controllability, integrity to ensure reliable power and reduced carbon emissions. Details about various functionalities of smart grid and their functional units are described. Smart grid pilot projects of India are also detailed. Prospects, benefits, challenges and recommended policies of smart grid are explained. Scope of future research of smart grid and conclusions are briefed.

Suggestions recommended for smart grid project development in India

Indian power sector configures with conventional hydro, thermal, gas turbine schemes, nuclear; and renewables like wind, solar, bio-mass, bio-gas, tidal, geo-thermal etc. The plants are located at scattered locations and of various capacities. The conventional fuel plants are of different capacity, different make, served different periods. The renewable plants are upcoming with different configurations with their own intrinsic properties. The existing electric grid comprises of utility and private owned ones. They all have different level modernization but functioning as a grid catering to the public. The introduction of smart grid technology should address all this diverse nature of equipments which should be easily integrated and it must be user friendly. The selected communication/ internet technology, computer hardware/software should take all these in to account and function accordingly to realize the ultimate smart grid objectives. Recommended policies for smart grid implementation are: i) Strong policy measures and integration of utilities/industries and R&D agencies supported with good infrastructure, ii) Provision of central/state funds, iii) promotion of global and regional trade agreements, iv) Implementation of stringent regulations and controls, v) Strengthening the protection of intellectual property rights, encourage large manufacturers to set up

R&D centers and vi) Encouragement for intellectual resource planning. vii) Consumer participation. Various strategic R&D opportunities for the smart grid are also suggested.

Following are the suggestions recommended for smart grid project development in India:

1. Detailed analytical study of all the communication technology/software related to smart grid deployment has to be done with reference to Indian conditions. Based on the studies, standardization has to be done for better interoperability. It is suggested to employ open source softwares than custom build private softwares, as open source offers freedom and continuous improvements at free of finance components.

2. One of the components of SG is provision of smart meter/electronic meter. Already the public is feeling that after installation of this type of meter the bill has increased. Before this , impart education to the people to understand that they should move towards greener power/cost saving technologies like LED bulbs, staggering of loads, new drives matching the loads, etc., and avoid using rewound motors/equipments, coil/oil starters, fixed capacitors, incandescent lamps. Also it is needless to say the training and knowledge building activity so that right persons are available at right time at right quantity to meet the societal requirements.

3. Utilities should deploy AMI for all customers on a feeder which will help substantial reduction in AT&C losses through online energy auditing, faster detection and restoration of outages. Latest technologies such as remote metering, anomaly in meter detection should be incorporated to account various losses. Utilities should explore innovative business models to reduce the capital costs as well as technology risk through engagement of AMI services providers/OEMs/vendors at regular intervals at mutually agreed service level agreements. Hence it is recommended to appoint a Nodal agency (either at central or state level) for procurement of meters and other communication equipments, so that meters costs will come down.

4. Indian user is expected to conserve water, oil, power air, the SG should take all these in to account and address the needs of public service, utility, planners. All participants user, government, implementers, contractors, R&D organizations should have understood ultimate aim and work towards the supreme goal of creating a livable atmosphere free of toxic chemicals emissions and conserving natural resources. They should simply sacrifice the simple profit to achieve a better earth. The successful implementation of this concept can be exported to other needy countries also.

Smart grid technology should be properly incentivized through regulatory, R&D support and consumer engagement. Appropriate business models should be made with public and private partnership to provide reasonable profit to the investors and value to the end consumers.