

A Review of Smart Grid Technology Transmission and Distribution

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Abstract: The present electric grids use the technology of 1970's. But with the advancement in various concepts of power generations, problems associated with power outages and thefts, and also due to increase in demand, we require a modernized grid to avail all the needs of customers even in the situations of hype which can be called a "smart grid". The smart grid performs various functions such that it increase grid stability, reliability, efficiency and ultimately reduces line. Also the smart grids are designed to allow the two-way processing of electricity from consumers that have distributed generations. Various technologies like sensing and measurement, usage of advanced components are to be used for successful functions; technologies used in smart grids are discussed.

Keywords: Generation, Transmission, Distribution, power grid and smart grid

I. INTRODUCTION TO ELECTRIC GRID

The electric generally refers to all are the smart grid, in a nutshell, is a way to TRANSMIT AND DISTRIBUTE ELECTRICITY by electronic means. The electric grid delivers electricity from points of generation to consumers. the electricity delivery network functions via two primary networks: TRANSMISSION SYSTEM and the distribution system . The transmission system delivery electricity from power plants to distribution substations while distribution substations to consumers.

The grid also encompasses myriads of local area networks that use distributed energy resources to several loads and/or to meet specific application requirements for remote power, municipal or district power, premium power, and critical loads protection.

II. INTRODUCTION TO GRID

A smart applies technologies tools and techniques available now to bring knowledge capable of making the grid work far more efficiently:

- Highly reliable controllable & efficiently.
- Fully accommodating renewable and traditional energy sources

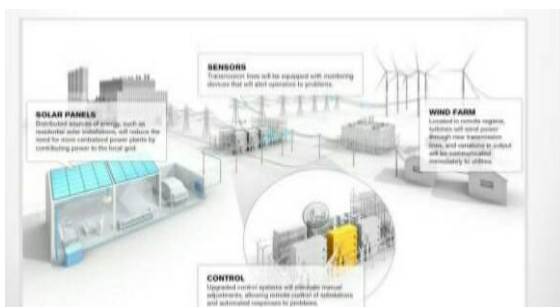
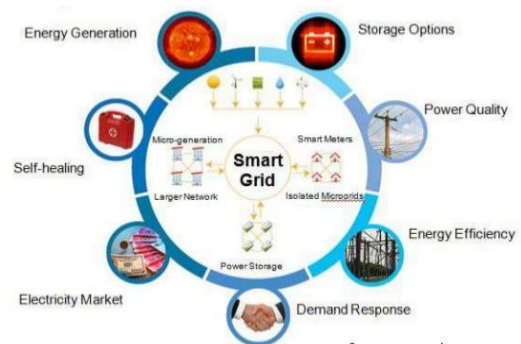


Fig.1grid

The "smart grid" is a term used to describe the rapid infrastructure replacement of the electrical wiring system in the United States. Smart grid lacks a standard definition, but enters on the use of advanced of technology to increase the reliability and efficiency. Of the smart grid is a better electricity delivery infrastructure.

Smart Grid Deployment

The 'Smart' in a Smart Grid is an Information Communication Technology (ICT) that brings together a variety of computing and telecommunications technologies. The ICT enables the Smart Grid's envisioned benefits to become a reality.



Source: www.siemens.com

Fig.2.smartgrid

Smart grid implantations dramatically increase the quality, connectivity, automation and coordination between and networks and use of data available from advanced sensing computing and communications hardware and software. In addition to being outdated power plants and transmission lines are aging , meaning they have difficulty handling current electricity needs , while demand may not be reduced any time , but it can still be increasing continuously . one solution could be to add more power lines , but the aging system would still be overwhelmed.



So instead of a quick of flux, a more reliable, permanent solution is needed. Perhaps the most fundamental aspect of transitioning to a smarter electricity system is the smart meter.

III. WHY MODERNIZATION OF ELECTRIC GRID IS REQUIRED?

The Major Driving Forces to Modernize Current Power Grids can be divided in Four, General Categories:

- A. Increasing reliability efficiency and safety of the power grid
- B .Enabling decentralized power generation so homes can be both an energy client and supplier.3

IV. WHY MODERNIZATION OF ELECTRIC GRID IS REQUIRED?

- A. Increasing reliability, efficiency and safety of power grid.
- B. Enabling decentralized power generation so homes can be both an energy client and supplier.

V. SMART GRID FUNCTION



Architecture

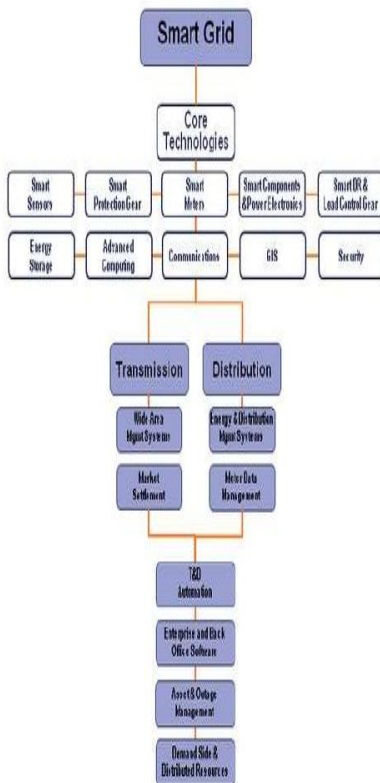


Fig.3. Function

The integrated system of the smart grid has two scopes.

VI. ONE SCOPE IS TRANSMISSION MONITORING AND RELIABILITY AND INCLUDES THE FOLLOWING CAPABILITIES

- A. Real time monitoring of grid conditions.
- B. Improved automated diagnosis of grid disturbances, and better aids for the operators who must respond to grid problems.

VII. THE SECOND SCOPE IS CONSUMER ENERGY MANAGEMENT

- A. At a minimum the ability to signal homeowners and business that power is expensive and/or tight in supply.
- B. The next level of implementation of would allow the utility to automatically reduce the consumer’s electricity consumption when powers expensive or scarce.

VIII. TECHNOLOGY - INITIAL FOCUS

Smart grids rely on information technology advancements across tally communications and operations.

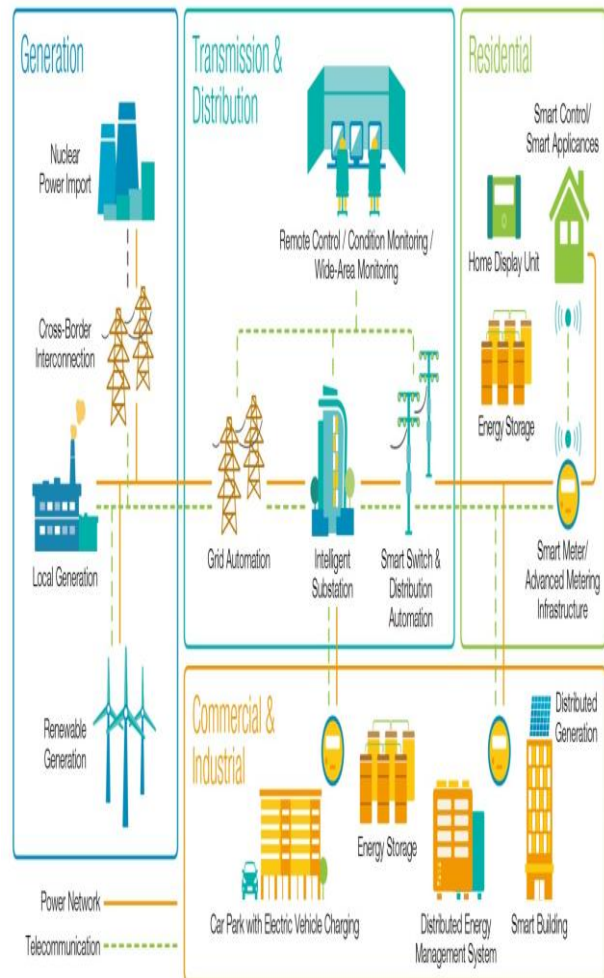


Fig.4.modernization



IX. WIRE-FOCUSED SMART GRID PROJECTS COMMONLY INVOLVE

- A. One of the components to smart grid would be the replacement of the aging power lines with high-temperature superconducting lines.
- B. The new wires could be installed underground to avoid cluttering up the already congested cityscapes.

SMART GRID STANDARDS:

- A.IEEE is a key player in smart grid standardization
- B.IEEE has over 100 smart grid-related approved standards:
 - a. <http://smartgrid.ieee.org/standards/approved> –ieee-smart-grid-standards.
- C.IEEE also several smart grid-related pending standards:
 - A. <http://smartgrid.ieee.org/standards/proceeded-standards-related-to-smart-grid>.

X. SENSING AND MEASUREMENT:

In smart metering an advanced metering infrastructure (AM)of interval meters and two-way communications systems serves as a gateway for utility/customer interaction.

CONCLUSION

The major source of energy for human beings is electricity. Without electricity no technology or science could have been possibly developed. But they are many problems associated with effective functioning of the electric grids which cause a serious loss of power and may even create severe scarcity in generation of electricity from renewable sources also require a means for effective utilization. So, keeping in view of these , for better performance of the grid , smart grids should be developed all over the world so that we have a more transparency reliable system that allows Consumers to save money and utility companies more accurately control electricity. Thus smart grid technology paves way for increased utilization of green power

REFERENCES

- [1] Vision of Future Energy Networks. Project Homepage, availableon<http://www.eeh.ee.ethz.ch/psl/research/vofen.html>
- [2] P. Favre-Perrod, M. Geidl, G. Koeppel, B. Klöckl: A Vision of Future Energy Networks. IEEE Inaugural Conference and Exposition in Africa, Durban, South Africa, 2005.
- [3] M. Geidl, P. Favre-Perrod, B. Klöckl, G. Koeppel: A greenfield approach for future power systems. CIGRE Session 41, Paris, France, 2006.
- [4] G. Koeppel: Reliability Considerations of Future Energy Systems: Multi-Carrier Systems and the Effect of Storage. PhD thesis, ETH Zürich, February 2007
- [5] M. Geidl and G. Andersson; Optimal Power Flow of Multiple Energy Carriers, IEEE Transactions on Power Systems, Vol. 22, No. 1, February 2007, pp 145 – 155