

Improving Reliability and Efficient Utilization through Load Management

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Abstract: *Today our country Pakistan is in the grip of serious energy crisis. Various operation were carried out but the problem is still existed. In this thesis we focus on consumer side. Load should be manage in such a way that power should be more reliable. The construction of hydro electric power plant is not feasible. It take 20-25 year. Small hydro electric power plant can't fulfill our requirement therefore the problem is still exist. With generation of power a number of problem is associated i.e global warming and increase in temperature. Therefore we focus on management of load. The management of load is the feasible way to solve this burning issue.*

Keywords: Management of load, consumption of energy, management of power system, power system economics, Demand side management

1. Introduction

Due to increase load various countries around the globe faces some problems. After 2000 the whole scenario of the world has been changed. Load continuously increases due to over population and industrialization. Generation of energy cannot meet demand. Therefore our country Pakistan is in the grip of power shortage[1]. But there is also some problem associated with generation of power .Due to these method of power generation various other problem created for example global warming. In global warming very toxic gases release due to which the average temperature of globe is increases[2].

The word DSM (Demand side management) was popular among the people in power shortfall. In DSM we focus on management of load. There is gap of approximately 5000 MW between generation and demand. Tariff is another term which is use in energy sector. The rate at which consumer is charge is changes with the demand of power.The problem statement here is that ,that up to various operation were carried out but the problem is still exists .The construction of large hydro electric power plant is not feasible. It takes 20-25 years. Large investment is required for hydro electric power plant. The economic condition of Pakistan is not good. If we consider nuclear or thermal power plant .Its initial as well as running cost is very high. Due to the generation of power other problem also arises. The only feasible way is the management of load .In management of load all the operation are done on consumer side. We manage the consumer load in such a way that the problem is reduce. Various method of cooling is adopted in order to tickle the problem.

2. Demand Side Management

DSM is used for the analysis and management of customer load. In this method the timing of power is change. Various steps are introduce to minimize the utilization of power. If government and non government organization focus on the management of load then of to some extent the problem of energy crises should be solve. Through management of demand the over all system would be more reliable and

efficient [3].The cost of tariff would also be reduce .In this way environment would be protected and on the other hand management of demand would be take place.

Power short fall is regularly increases due to load increases. Since 2005 there was exponential upsurges in power shortfall. There is direct relation between the power and economy. After 2005 there was certain decrease experience in the economy of Pakistan [4]. Actually the previous government can not given any attention toward the power generation therefore the problem is still present. The second main reason behind energy crises is that, that private sector can never participate in power generation.

The overall generated capacity of power is 19860 MW. The power with PEPCO is almost 11000 MW and our current demand is 14600 MW. There is gap between generation and consumption of power. This gap causes energy crises. From 2000 there was no development take place in power sector. A very small fraction of budget is given to energy sector[5]. Some works in renewable energy started but the problem is still because renewable energy cannot fulfill our requirement. Small hydro electric station are under construction . Recently Khan Khwar hydro electric power plant is completed, but small hydro electric power plant is not the solution of problem. If we focus on large hydro electric power plant then it take to long time i.e 20-25 year. Other problem like salinity and water logging ia also associated with hydro electric power plant. In large hydro electric power plant there is also problem of costly land. Government cannot afford the huge cost of land. There is also decline in the economy of our country.

Thermal power plant is also very costly[6].Per KW cost of thermal power plant is also very high. So in this critical juncture focus on energy management is also very necessary. It is very easy way to solve this problem.

In management of load various method and terminology arte adopted in order to tickle the problem. Various method of cooling of equipments is also very necessary. Old equipments can be replace with new one, so in this way the consumption of load can be reduce [7].

2.1 Step Involved For DSM

Various step for DSM is given below

1. Type of load: In type of load we focus on the nature of load and which type of load is constantly increases. Survey of load is also very necessary.
2. Nature of load :In nature of load we consider domestic load, commercial load and industrial load and various step should be adopted in order to manage these load[8].
3. Energy saving devices: Various energy saving devices should be added to the system in order to improve the overall system. .

Total k watts = 4212.842kwatts.

The total k watts of the feeder = 4212.842 k watts

We perform DSM on the 10% of the total k watts by using energy savers.

In this case we replace tube light of 40 watts with 23 watts energy saver.

10% of the total k watts = $(10/100) * 421.28$ k watts

40watt = 1 tube light.

And $421280/40$ watt = 10532 tube lights

Using energy savers $421280/23$ watt = 18316.5 energy savers

We require 10532 energy savers corresponding to tube lights

So, K watts consumed using energy savers = $23 * 10532 = 242236$ watts

While tube lights were using = 421280 watts

Saving of k watts = $421280 - 242236 = 179044$ watts = 179.044 k watts.

Saving of k watts of the given feeder = 4.25%

2.2 Augmentation of Existing Network

Augmentation of any network refers the two techniques

- 1) Reconducting
- 2) Installing transformer of high rating

Performing the analysis on a practical system having 100 kVA transformers with loading 200 amps using fdrana software.

Resulting KWH = 11952 .

Transformer loading = 152%

Applying augmentation on the same network by installing 200 KVA transformer with recon ducting at suitable locations. Replacing the existing conductor with Wasp.

This result in, Transformer loading = 76%

KWH = 10371kWH

Benefits = 1581kWH

Savings = 13.4%

So the result shows that saving of kWh with more efficient transformer performance can be obtained from augmentation technique.

There will some installation of conductors and transformers. So the cost increases. And we take the savings equal to 0.5%.

3. New Technologies Use for Demand Side Management

DSM is the study of management of load. The most important method is the cooling of load. Now various technique use in building in order to cool the load, on the

other hand energy consumption should be reduce and proper income to the country should take place[9].

The cooling load factor (CLF) for a typical hot day varies from 0.98 for light weight, 0.94 for medium weight and 0.87 for heavy weight construction. Thus, choice of type of construction has significant impact on cooling loads[10].

So the various technologies for DSM are shading coefficient, wall insulation, Roof insulation, sunlight reflecting paints, variable speed devices, variable supply and ventilation air fan controls, occupancy sensors, high efficiency gas and water heaters, efficient building envelope, skylight throughout the building, day lightening from fiber optic, light emitting diodes, rope accent lightening, heat recovery in handling units, evaporative cooler in combination with exhaust fans, dehumidifier-cum-evaporator cooler, extraction of heat, solar windows aaaaaaand roof and thermal storage using phase change materials.

4. Power Sector Related Solutions

For power sector related technologies the following solutions may be mentioned:

- Technical analysis of real time data.
- Power quality improvement.
- Application of (Energy Saver).
- Ring main distribution.
- Various distributed generation system.
- Zero energy building.
- Addressing Power quality issues.
- Power quality solution.
- Using of various FACTS devices in transmission.
- Focus on smart grid.
- Focus on renewable resources.
- Applying various tariff schemes.

5. Conclusion

There is electricity deregulation due to which generation can,t meet demand . DSM(Demand side management) is used for the analysis and management of customer load. In this method the timing of power is change. Various steps are introduce to minimize the utilization of power. If government and non government organization focus on the management of load then of to some extent the problem of energy crises should be solve.

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