

# Enhancing Of Smart Grid With Collobaration Of Dsm

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**Abstract:**Smart grid is proposed due to efficient communication process and very interactive like monitoring, analyzing, reduce energy consumption and cost compare to conventional grid. Smart grid can be collaborated in four ways to develop the coordination process. The first one is to collaboration between the smart grid technology and physical grid, second is to coordination of transmission, distribution and dispatching with smart grid. Third one is to upgrade the technologies which are associated with management revolution. Fourth one is to update the industries emerging with smart technology. In this paper, we will focus on coordination between the smart grid and normal gird by using DSM. We will analyze electrical consumption at demand side (load performance at various loads) with adverse effect of smart grid.

**Index Terms-** Smart Grid, Demand side management, loads dispatch.

## 1. INTRODUCTION TO SMART GRID

Smart Grid is modern and important energy infrastructure integration with fast communication network to improve the grid efficiency. By this grid, technology changes will occur in normal grid and it will reflect on future economy.

Mainly, Smart Grid will provide high efficiency for electrical equipments like energy saving due to their clean transmission energy which is very useful for integration of energy equipments and it will reduce harmful carbon emissions. It will play a major role in safety conditions and optimization of energy structure. The Smart technology can schedule the projects of smart grid which is suitable to measure the local conditions.

### 1.1. Objectives for Smart Grid Technology:

- Useful to meet up the new demands like Electric Vehicles.
- High level smart applications are required at the time of grid dispatching.
- It should be very interactive between the consumer side and grid side.
- Peak demands will reduces which is used to get low electricity rates.

## 2. COLLABORATION OF SMARTGRID TECHNOLOGY TO VARIOUS SYSTEMS.

The Collaboration of smart grid technology can be done in four ways as the first is to relate the influence of smart grid to normal physical grid which is used to enhance the regulation and efficiency at demand side. Second one is to integration between smart grid and transmission, distribution, consumption and dispatching which is very complicated process because of their planning and designing to transmit the power without any interruptions and highly securable with in considerations of protection also. Here, communication plays a major role to gather the massive data of total transmission and distribution process. Third one is to managing between the conventional grids for future management mode with

inevitable choice like marketing mode to meet the changing in the market conditions with grid. Fourth is to increase the efficiency on productivity of industries with the coordination of smart grid with low electricity prices by maintaining unity power factor. We can update the industries with new technologies which is associated with smart grid like ADR's etc.

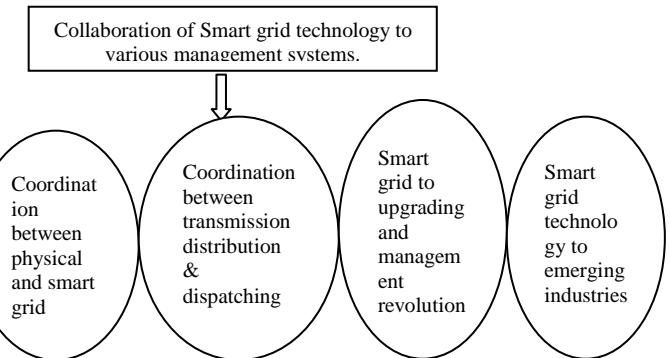


Fig.1.Smart grid coordination to various systems

In the collaboration of conventional grid to smart grid, we will analyze the consumption of electricity at demand side as demand side management.

It can guide the changes occurring at the time peak load and off peak load conditions, by this gap between these loads can be reduced to optimize the load performance. Now-a-days, electric vehicles are the new technology whose power demand is totally controlled by smart technology to enhance the efficiency and regulation of the system.

## 3. DEMAND SIDE MANAGEMENT:

As the day begins homes offices, industries & famers plug in various appliances the demand for electricity steadily build up later in the evening has also AC's, lights and almost all the appliances are switched on electricity demand will increase and reaches to the peaks, The demand for Electricity not only goes for up and down it varies on weekends and festival days.

Demand also varies depending on seasons, Geography, climatic conditions and all life styles of people. So then how can a utility fulfill its responsibility of providing reliable and affordable power to its consumers? It can only do so through DEMAND SIDE MANAGEMENT. It is a concept which helps to better manage the demand by either reducing the electricity consumption or shifting it from peak to off-peak hours.

1. DSM opportunities can be identified through comprehensive load research this involves understanding the load curve of a utility, mainly expulsions of daily and seasonal variations of demand and the behavior of different consumer categories are essentially drawn from a consumer survey to know which loads are contributing to peak demand.

2. In a recent study done by MESCOM IN 2017 of power utility in Karnataka comprises domestic, agriculture, industry and commercial sectors the load research availed significant seasonal variations. Monsoon month shows the least demand followed by winter. The summer month from March-May has peak demands primarily because of the Domestic & Agriculture load. The study also revealed different consumer behaviors.

3. For example the consumer survey found out most of the small and medium enterprisers has the enormous opportunities to replace energy inefficient motors with efficient ones. In agriculture too small and medium farms uses more than 10 years old pump sets in some cases motors are rewound more than 3 times.

4. Based on these insights the Demand side management plan encouraged the industries to go through cluster based and use energy efficient motors. By using IT enable services that allow industry to reduce consumption dynamically at the time of system peak and shift it to off peak hours.

5. In agriculture sector it is suggested to install energy efficient pump sets along with renewable energy. For domestic purpose it is suggested to wide adoption of Energy efficient Air conditioners and LED lightning.

- The concept of DSM in India is not new but even today this is yet to pick up because of lack of proper metering and unavailability of digital records of data. However DSM is predictable lead of the hour indeed it saves utilities from purchasing power to meet the peak demand. The consumer has no need to suffer from power cuts and government can deliver 24\*7 of power.
- So DSM reduces the need to generate more power that often comes from fossil fuels. The big promise from DSM is clean, green and safer environment flow.

### **3.1. Merits of DSM:**

1. Less effect of CO<sub>2</sub> emissions on environment and sustainable in renewable source based generation.
2. It is used to generate bulk amount of electricity from a particular location under fossil fuel based plants.

3. In peak power plants, it ensures that it controls the load fluctuations.

4. In load shedding process, easy to surplus the energy demand and it protects from blackouts

### **3.2. Demerits of DSM:**

1. At demand side, peak plants are expensive to install.

2. Sometimes load management leads to discomfort to consumers at the time of blackouts.

3. Generation of electrical power by using renewable sources is somewhat difficult compared to conventional energy source.

### **3.3. Technology options of DSM:**

1. Substitution of fuel

2. Improvement of energy efficiency

3. High rated ceiling fans and air conditioners

4. Agricultural pumps and solar street lighting

5. Motivational programs on load dispatch or research

6. Usage of CFL/LED lighting

7. Energy efficient HVAC systems

So, here we are enhancing the efficiency of smart grid by using the effective loads (lights, Fans) at demand side from the following analysis.

Table.1. Analyzing the energy saved cost by using different lights.

Parameters	Units	Tungsten lamp	CFL	LED
Luminous Efficiency	Lumens/Watt	11	60	130
Rated Voltage	Watt	60	16	9
Luminous Flux	Lumens	750	695	700
Cost	Rupees			
Life of bulb	Hours	950	7950	350000
Operating hours per day	Hours	12	12	12
Cost of power	Rs/Kwh	6	6	6

So, from the above analysis, we can save energy consumption by taking different loads.

To reduce the electricity prices at demand side and to increase the efficiency across the input side, we have to select the efficient component .From the above table, compact fluorescent lamp (CFL) is better than general purpose light like tungsten lamp in efficient wise, cost, intensity etc., like wise Light emitting diode is better than CFL in intensity wise, cost purpose and operating hours etc.,

Table.2.Analyzing the energy saved cost by using different Fans.

Parameters	Units	General Ceiling Fan	5 star rated fan	Super efficient fan(BLDC )
Power	Watts	70	55	40
Span	mm	1300	1300	1300
Speed	RPM	500	400	400
Air Delivery	m <sup>3</sup> /min	250	230	230
Cost	Rupee	1500	2000	2500
Energy Consumption	kwh	250	150	120

From the above analysis, star rated ceiling fan is better than general ceiling fan in terms of energy consumption, cost and efficiency etc., like that BLDC ceiling fan is better efficient than star rated ceiling fan.

Table.3.Analyzing the energy saved cost by using different Air-conditioners

Parameters	2 star rated split AC	4 star rated split AC	5 star rated inverter split AC
Cost(Rs)	40000	56000	70000
Hours/day	8	8	8
Life/years	10	10	10
Cost of power(Rs/Kwh)	5	5	5
Energy Efficiency ratio(EER)	4	4.5	5
Capacity(TR)	1.5	1.5	1.5
Power consumption(Kwh)	3500	3000	2500

So, From the above analysis , 4 star rated split AC is better than 2 star AC in terms of power consumption and 5 star rated inverter split AC is better than 4 star AC.

So, from the above three load analysis, we can save/ enhance more power across grid or input side with collaboration with demand side management.

#### 4. CONCLUSION

Smart grid is used to overcome the weakness of conventional grid by using smart grid technology which is in collaboration with physical grid, transmission, distribution and dispatching of loads. It is also coordinated between management process and industries. In this paper, we will analyze to improve energy consumption with different loads like Lights, Ceiling fans and Air-conditioners. So, by using high efficient/daily usage equipments, we can save so much of power consumption and that should enhance the

efficiency of the grid. Hence, we are concluding that enhancing of energy at grid side with collaboration of demand side by managing the equipments.

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