The purpose of this article is to illustrate the optimal load scheduling technique to lessen the operating cost and diminish the voltage regulations. There are specific confinements that have arisen in the current distribution system due to voltage fluctuations. Due to these fluctuations, the reliability and efficiency of the power system will be reduced which creates a drastic impact on the overall economy of the system. To overcome this issue, the optimal load scheduling technique with renewable generators is practised to reduce the overall operating cost and to increase the efficiency of the power system. In this article, we discuss what is optimal load scheduling, its importance, usage of renewable generators in Optimal Load Scheduling[[1]](#footnote-1), advantages, and its disadvantages.

## What is Load Scheduling and Optimal Load Scheduling?

### Load Scheduling

The approximation of load that is being generated and utilized in a power system is termed to be the load scheduling[[2]](#footnote-2) process. In this process, at the generation end, the size of the equipment, ratings, and the amount of generation is noted. At the same time, at the load end, the amount of power consumed is noted both at peak and non-peak hours. This collected data is scheduled effectively to meet the required power demand is known as load scheduling.

The following two factors are considered for load scheduling:

* Unit Commitment
* Economic Load Dispatch

#### Unit Commitment

The amount of power utilized varies at different hours, unit commitment helps in deciding which unit or generator should be operated at that specific time interval to meet the load demand.

For example, consider two plants with two generating units U1 and U2 respectively. U1 and U2 both can generate 50MW but their operating costs are different due to their ageing. To use the effective generating station, Unit Commitment concept is utilized such that overall operating cost can be controlled.

#### Economic Load Dispatch

The primary goal of load dispatching[[3]](#footnote-3) is to meet the load demand with minimum fuel cost by varying the real and reactive power of generating units within certain pre-defined limits.

### Optimal Load Scheduling (OLS)

It is a technique used to meet the power demand by utilizing the scheduled data such that it should deliver the output with the minimal operating cost is known as OLS. It helps in reducing the operating costs, saves energy, increases efficiency, and reliability by recording regular energy consumption details at different time intervals.

## Importance of Optimal Load Scheduling

Even during the installation of any power plant load scheduling plays a vital role in analyzing installed capacity, the amount of active, reactive, and apparent power generated, estimating operating costs, estimating the load demand before delivering the power. This way OLS plays a key role in lessening the costs otherwise, the revenue of the power plant will be affected.

### Usage of Renewable Generators in Optimal Load Scheduling

The two main drawbacks of the thermal power plant is the fuel used i.e., coal which is not abundant and the high operational costs whereas hydropower plant utilizes water as its fuel which is available free of cost. The hydel plants use renewable generators for generating power with a less operating cost which is an advantageous point for OLS. This advantage is utilized effectively in meeting the load demand. As we know that Load demand in power system is not stable at every point of time it varies from time to time.

To overcome these difficulties, renewable generators[[4]](#footnote-4) are utilized to avoid the high operating costs by connecting both thermal and hydel plants to the grid via bus bars to maintain a reliable power supply with less operating costs. As per this concept, the thermal power is utilized during the off-peak time and hydel power is utilized during the peak load time. This can be achieved by following Hydrothermal Coordination[[5]](#footnote-5) technique that satisfies certain system constraints.

By this way, power is supplied constantly making use of hydel power during the peak time and thermal power during the off-peak time such that the overall operating cost is decreased avoiding voltage fluctuations.

### Advantages

* Reliability increase
* Amount of expenditure decreases
* Efficiency increases
* Peak load demand is met
* Operating cost[[6]](#footnote-6) decreases

### Disadvantages

* Instability
* Regular power demand is to be tracked

Thus, in this article, we have discussed what is optimal load scheduling that decreases the operating cost and increases the revenue of the power plant following a process of estimating the amount of power generated and required load demand.

1. <https://www.slideshare.net/mayankjecrc/optimal-load-scheduling-32998747> [↑](#footnote-ref-1)
2. <http://engineering.electrical-equipment.org/electrical-distribution/load-scheduling-power-systems.html> [↑](#footnote-ref-2)
3. <https://shodhganga.inflibnet.ac.in/bitstream/10603/117969/4/chapter%202.pdf> [↑](#footnote-ref-3)
4. <https://ieeexplore.ieee.org/abstract/document/6486037> [↑](#footnote-ref-4)
5. <https://wireilla.com/engg/ecij/papers/2113ecij01.pdf> [↑](#footnote-ref-5)
6. <https://www.e-education.psu.edu/eme801/node/530> [↑](#footnote-ref-6)