Predictable and intermittent power plants

A balanced mix

The development of new forms of renewable electricity generation has been quick in the recent years and must be continued to reach the ambitious environmental targets set by the European Commission. Because of the intermittent resource they use, however, these new power sources cannot maintain the stability and flexibility of the electric supply we expect.

Biomass, hydroelectric, fossil fuelled, and nuclear power plants provide a stable output of electricity because they use a predictable source of energy. This contrasts with wind and solar energy, which cannot be controlled.

Reliable Power in shortfall periods

A network that relies on large amounts of energy from these intermittent and unpredictable producers must therefore be prepared for sudden changes in energy supply. This is problematic as demand will normally remain the same and cannot be reduced in spite of the lack of power. When such a shortfall occurs biomass, hydroelectric, fossil fuelled, and nuclear power plants must be ready to make up for the deficiencies of intermittent energy sources. In this way they represent the backbone of European electricity production, safeguarding the supply.

Thermal and hydroelectric energy suppliers are the ones who conciliate the fluctuating demand from customers and the unpredictable output from the intermittent energy producers. To achieve this, they must dedicate new resources and sacrifice economic and environmental efficiency.

It is therefore necessary that the development of Wind and Solar energies be made along with the construction of new predictable power plants in order to support them. These are required to absorb the fluctuating demand and balance the intermittent supply. It is today technically impossible to do otherwise if we want to guarantee a stable supply of electricity at all times at acceptable prices.

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Developing the Future

Balanced Mix of Energy sources: Intermittent and Predictable Power Plants

European Power Plant Suppliers Association

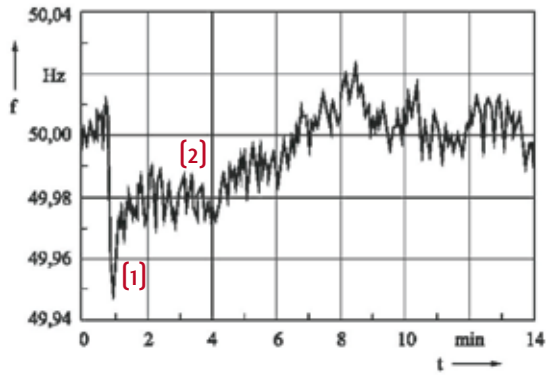
Basics of Electricity supply

Secure electricity supplies depend on the operation of power networks, which connect consumers to sources of electricity generation (power plants, wind turbines, etc). Since, with present technologies, only a very small amount of electricity can be stored (in pumped storage schemes), the fundamental requirement of network operation is to maintain electricity generation continuously equal to electricity demand despite the variation of demand and the variability of supplies from intermittent sources (such as wind and photovoltaic) or unforeseeable breakdowns of plants. It is necessary to maintain both voltage and frequency within prescribed limits. This therefore requires an appropriate mix of generation sources.

Normal power network operation

At all times, power plants are providing consumers with electricity even though the demand for electric energy varies greatly. In order to ensure a continuous flow of energy to the clients, both power plants and network must be very reliable no matter the level of demand for electricity.

For example, if you turn on a light, a power plant somewhere will have to increase its electricity output. No client is connected to and fed by only one plant, but by the whole interconnected network. Increasing production to power one additional light bulb might not seem so impressive, but power-generating facilities have to be able to provide any amount of electricity in order to meet demand.



Constant Network Supply

When a power plant fails to provide electricity, other power plants must boost their production within seconds in order to compensate this gap.

Compare it to riding a tandem bicycle up a steep hill. You maintain a steady speed by pushing the pedals. If you stop pedalling, your partner will immediately have to work twice as hard in order to maintain the momentum of the vehicle.

It is similar for power plants. If a power plant stops suddenly, the normal network frequency of 50 Hz will drop (1) and other power plants will have to provide an extra effort to bring the frequency back to 50 Hz (2). If the frequency drops below 49 Hz, certain parts of the network must be cut off to avoid a total blackout, occurring at 47.5 Hz.