Our problem statement asks us to come up with a concept (with implementation) of a smart grid. We have two forces:

1. Supply
2. Demand

While the two are related by factors like cost of electricity, for the time being we assume them to be independent. So, given some time series data regarding the supply and demand, we forecast the supply and demand for some pre-defined number of slots ahead.

There are already various algorithms that outline how we can go about forecasting.

Now, let us assume that we are done with forecasting. We are able to forecast the supply and demand for the next ‘n’ time slots. What next? Scheduling!

If the forecasted demand is greater than or equal to the forecasted supply, then we can’t turn off any of the sources of power.

However, in case, the supply is in excess, we would be compelled to either turn off the production through some sources, or store them in batteries.

Our decision should take into account **three** considerations.

1. Storage capacity and efficiency of each of the sources of renewable energy
2. Turn on/ turn off feasibility (associated time delays)
3. Cost of production of each form of renewable energy

From the point of view of the grid operators, the third factor shouldn’t weigh into the decision making process.

Based on factors 1 and 2, we should come up with a preference order that would indicate the source whose production can be shut down/ stored in batteries, with more logistical ease.

Once the preference order has been established, we are done. Almost.

In the methodology outlined above, it would seem that we have lumped all power plants producing electricity using the same source, into one big aggregate. But the demand doesn’t rise uniformly everywhere. So, we shouldn’t shut down, say, all the solar power plants, if the demand decreases in only one area.

Hence, the need arises to look into local variations in demand and supply and act accordingly. This needs to be looked into.