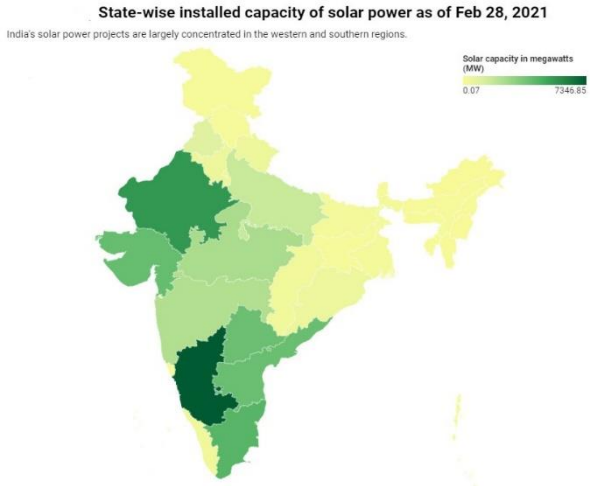
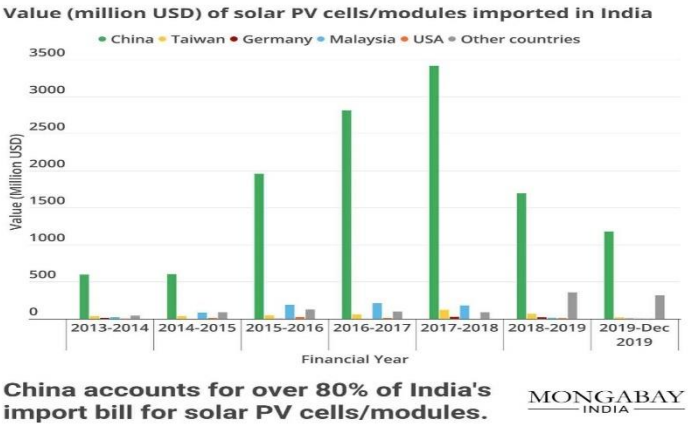
Challenges

- **Issues with transmission** - Transmission challenges include **new bottlenecks inside states and limited capacity** available across states (interstate transmission lines) as **solar and wind sites tend to be concentrated in certain regions** within states and also in certain states within India.
    - For example, many states **lack real-time solar and wind generation** data, and the accuracy of solar and wind forecasts must improve. Regulations often allow for forecast errors of +-15%.



- **Lack of regulation** - There is a **lack of regulatory frameworks** to allow adequate remuneration of demand response and storage technologies such as batteries.
- **Integration of renewable with other systems** - Renewable integration affects the financial stability (costs and revenue streams) of the DISCOMs, which need to pay the **fixed charges of coal plants** bound by long-term PPAs even when using solar and wind, while also being bound by national renewable purchase obligations.
- **Investment affected by COVID -19** - Influenced by Covid-19, **power sector investment in India fell by USD 10 billion year-on-year to USD 39 billion in 2020**, including a decline in solar and wind investment. Improving investor confidence will be an important factor in the coming years as India will need to increase power system investment
- **Policy instability** - Companies that produce solar panels, wind turbines, electric motors and batteries using imported minerals, as their supply chains can quickly be affected **by regulatory changes, trade restrictions or political instability** in a small number of countries
- **Reliance on imports** - India's solar sector is heavily reliant on imports of solar equipment due to poor manufacturing base. The domestic manufacturing of solar PV cells/modules is behind due to reasons such as lack of manufacturing chain and skilled workforce and higher cost of production. Government has also noted instances of certain countries dumping solar cells and modules to kill the nascent domestic industry.

Suggested solution to achieve the targets



- **Demand creation for renewable energy** - On demand creation, the ambitious targets need to be converted to **legally binding renewable portfolio standards**, at the level of not only states but also large central generators. These standards, when designed appropriately, are very effective in driving large-scale renewable deployment in an effective manner.
- **Revenue certainty for renewable energy power projects** - India needs to continue auctioning **renewable capacity at fixed (on inflation adjusted) price long-term power purchase agreements** (PPAs). This revenue certainty, ideally over the lifetime of renewable energy power plants, **allows low-cost financing of capital-intensive assets** where the auctions, in turn, enable provision of lowest cost renewable power to consumers.
- **Risk reduction for development, construction, and operation of these projects** - There is continued need to keep operational and project development risks low, to ensure there is **adequate supply of low-cost capital** available for renewable energy projects. While these projects are in operation, India needs to ensure that these **PPAs are paid on a regular basis**.
- **System integration of variable and intermittent renewable energy supply** - On system integration, India needs to make sure that the renewable energy is appropriately supported by **increased transmission**