

## **Managing a Renewable Energy Transition**

Everyone should seek to transform their electricity system to a renewable one, in every region of the world, but not unthinkingly - otherwise the consequent blackouts and price increases would blacken the name of renewable energy. There are a number of steps, including:

- ◆ Identify sources and destinations of renewable energy, and upgrade the grid / build new lines and substation capacity / resilience accordingly
  - ◇ Include the electrification of heating, transportation and industry
- ◆ Identify the longest period there will be with minimum low-carbon generation, then build storage accordingly:
  - ◇ Capacity (MW) is (max demand plus 10% capacity margin) minus (all dispatchable renewables)
  - ◇ Volume (MWh) is (total demand over this extreme weather period plus 10%) minus (all the generation we can 99% expect over the period)
  - ◇ Duration will be a mix of short (demand side, batteries), medium and long, with the long being the full duration of the weather period plus 10% margin
  - ◇ The 10% margins are to allow for any of the back-up plant to fail in some way, or demand to reach extraordinary levels
- ◆ Don't rely on interconnectors because your neighbours' times of system stress (high demand and/or low generation) will mostly coincide with yours
- ◆ Build the storage in a balanced way (balanced by building very roughly proportionate amounts of each duration)
- ◆ Create a legal definition of storage as storage, not as generation or consumption: it generates no new electricity and is a grid service that moves electricity in time; with such a definition, contracts can be let for "storage services" of different types and groupings
- ◆ Change the regulatory environment to encourage revenue stacking, and to favour low-carbon sources - one way of doing so is outlined in Storelectric's proposal, A 21st Century Electricity System, in which capital investment, clean energy and the introduction of innovations are all incentivised without a penny of subsidy
- ◆ Refuse to give in to the power of incumbents to threaten to cause blackouts by closing power stations prematurely: have contingency plans, and encourage the incumbents to invest in clean energy technologies
- ◆ All this needs to be done with cross-party political support as it's a 30-year program