**Firm Power Generation: Approach**

- Assumption: VREs are relatively inexpensive compared to storage
- Optimisation of LCOE based on installation costs
- Objective: How to achieve cost optimally 100% Renewables

(A) LCOE of uncurtailed PV

(B) LCOE without any curtailment (all is stored)

(C) Sweet spot
Curtailment & Overbuilding lowers average LCOE significantly.

Description of “High VRE penetration” (firm power) studies: Switzerland, USA, Europe, Italy and “Entry-level studies” (firm predictions): USA and Italy.

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Firm Power Generation: Key Takeaways

• 100% VRE power grids with full renewable resource adequacy guaranteeing 24x365 firm availability are not only possible but would also be economically sound, insofar as supply and demand are concerned.

• VRE overbuilding and operational curtailment (i.e., implicit storage) are key to achieving economically acceptable firm power solutions.

• It is essential that optimal implicit storage configurations be enabled by appropriate market rules and remuneration vehicles favoring firm power.