

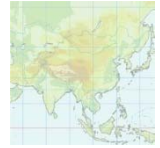


Strategic Low Carbon Energy Portfolio for India: Economic Assessment of Targets, Subsidies and Nuclear Future

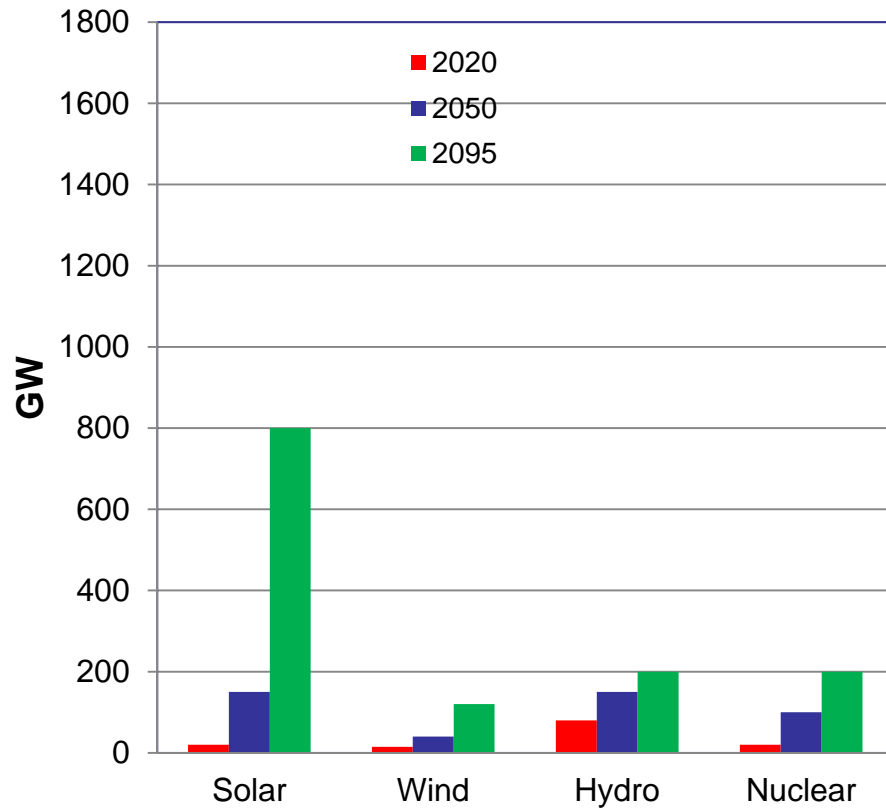
Priyadarshi R. Shukla
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November 12
COP19, Warsaw

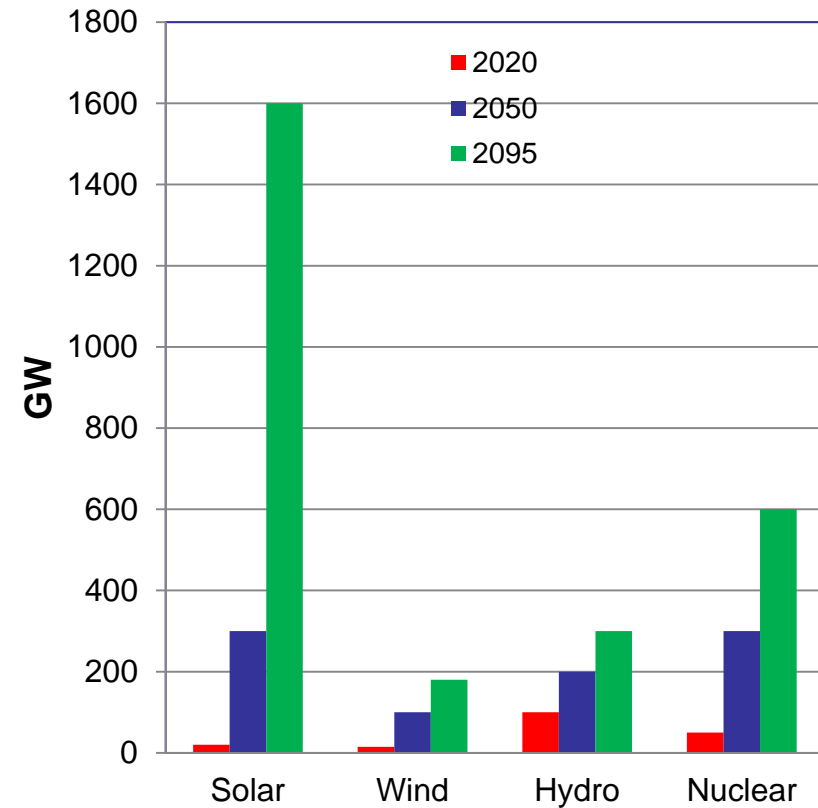
Low Carbon Energy Supply Technology Targets



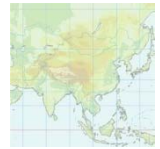
BAU - Capacity Targets



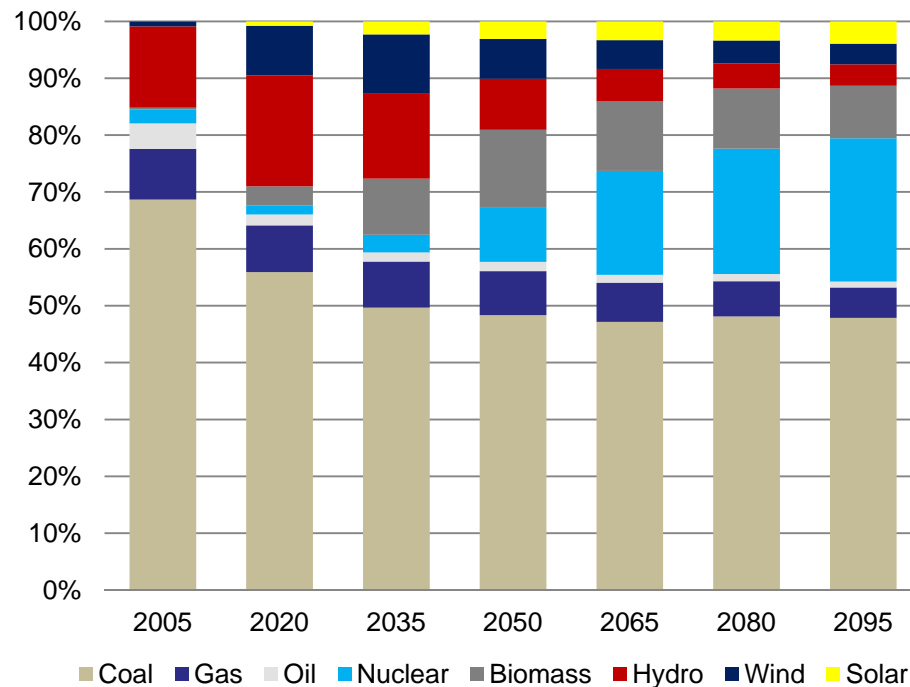
2°C Stabilization: Capacity Targets



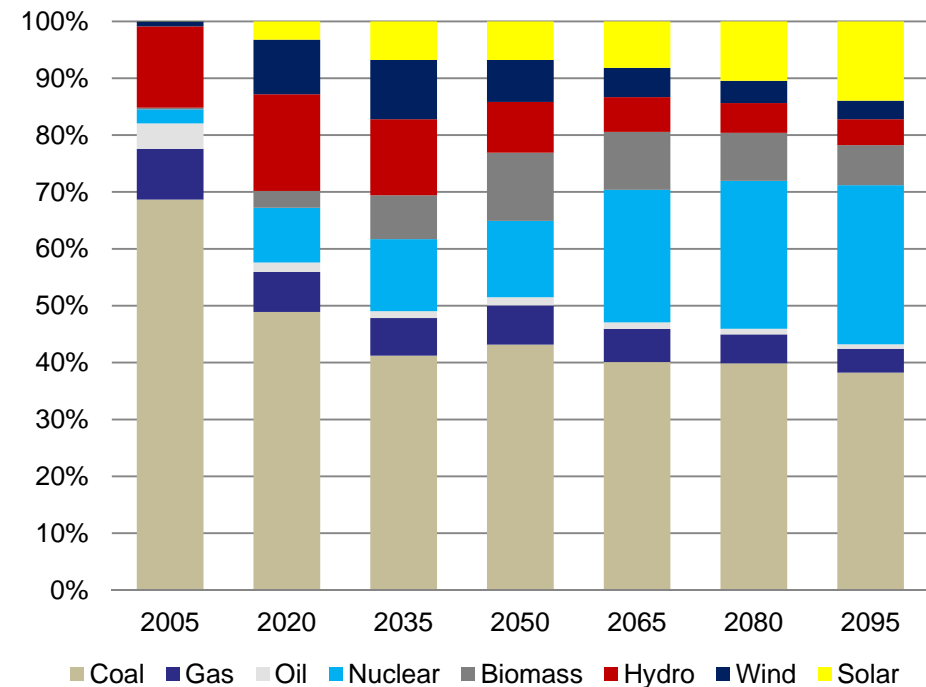
BAU Scenario with & without Technology Targets



Technology share - BAU



Technology share - BAU with targets



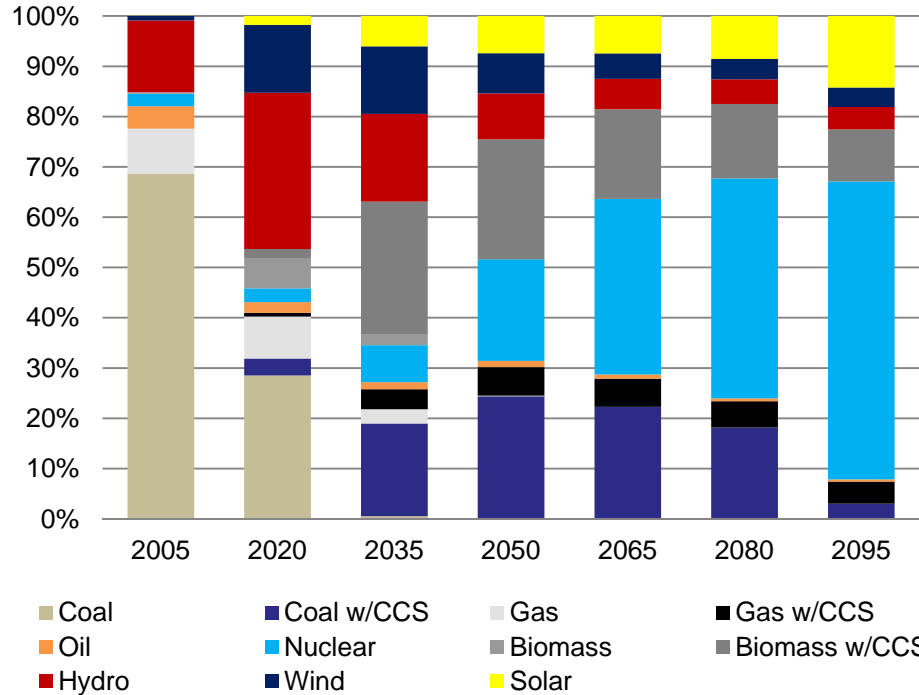
Under BAU

- In case of share of **Nuclear**, the technology targets have strong effect in the short to medium-run (2035) but little influence in the long-run
- In case of solar, the technology targets are important to drive the penetration through the century
- The technology specific targets create competition **among** the low carbon technologies rather than competition with fossil technologies

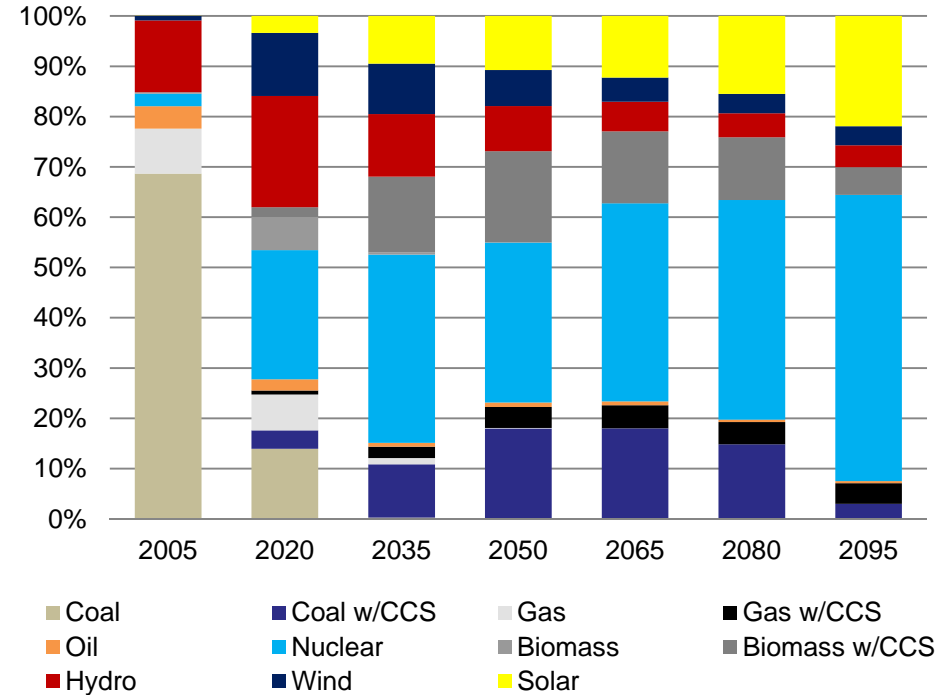
2°C Stabilization Policy with & without Technology Targets



Technology Share - 2°C Stabilization

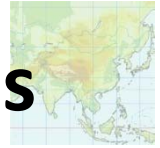


Technology Share- 2°C Stab. with Targets

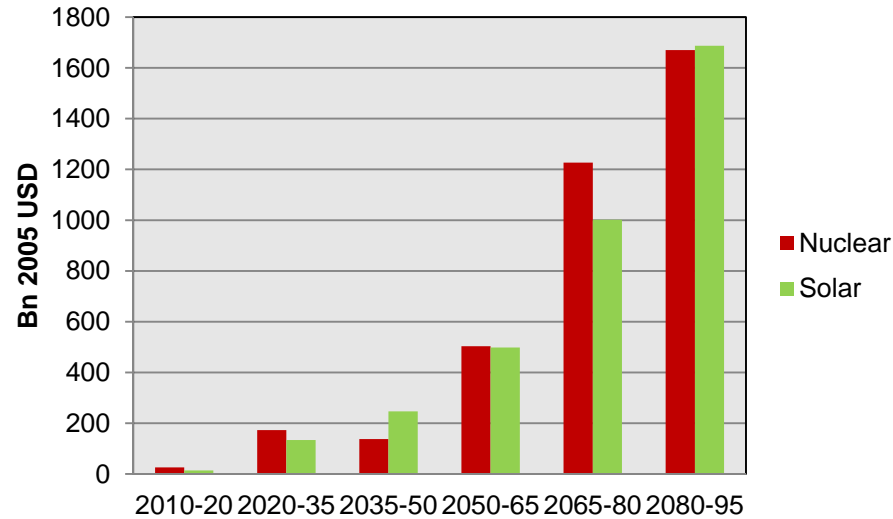


- **2°C Stabilization policy alters significantly** the share of Low Carbon Technologies; i.e. renewables, nuclear and CCS
- Under 2°C Stabilization policy, **targets have little effect** on share of technologies
- Carbon price hence has greater impact on technology penetration than subsidies

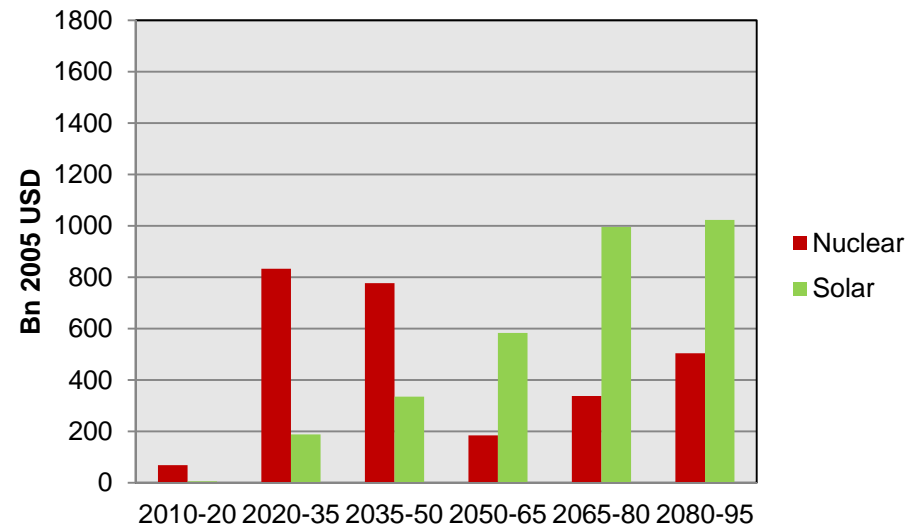
Cumulative Subsidy for Low Carbon Technologies



Cumulative Subsidy - BAU with targets

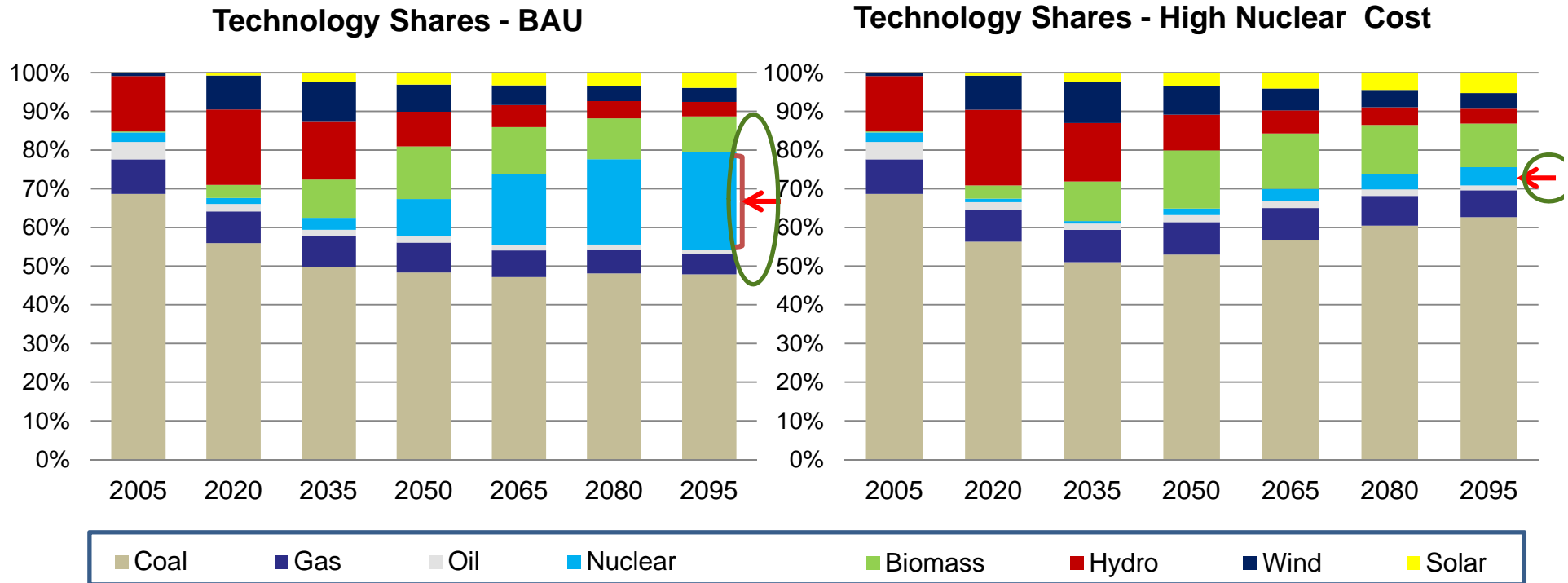
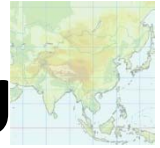


Cumulative Subsidy - 2°C Stab & targets



- In BAU: Very high subsidy to push Nuclear and Solar through the century
- In 2°C Scenario: Subsidies are lower than in BAU; Nuclear needs more than Solar
- In the short run (2010 to 2020), cumulative subsidy for Nuclear and Solar shall be:
 - BAU: 40 Bn USD
 - 2°C scenario: 73 Bn USD

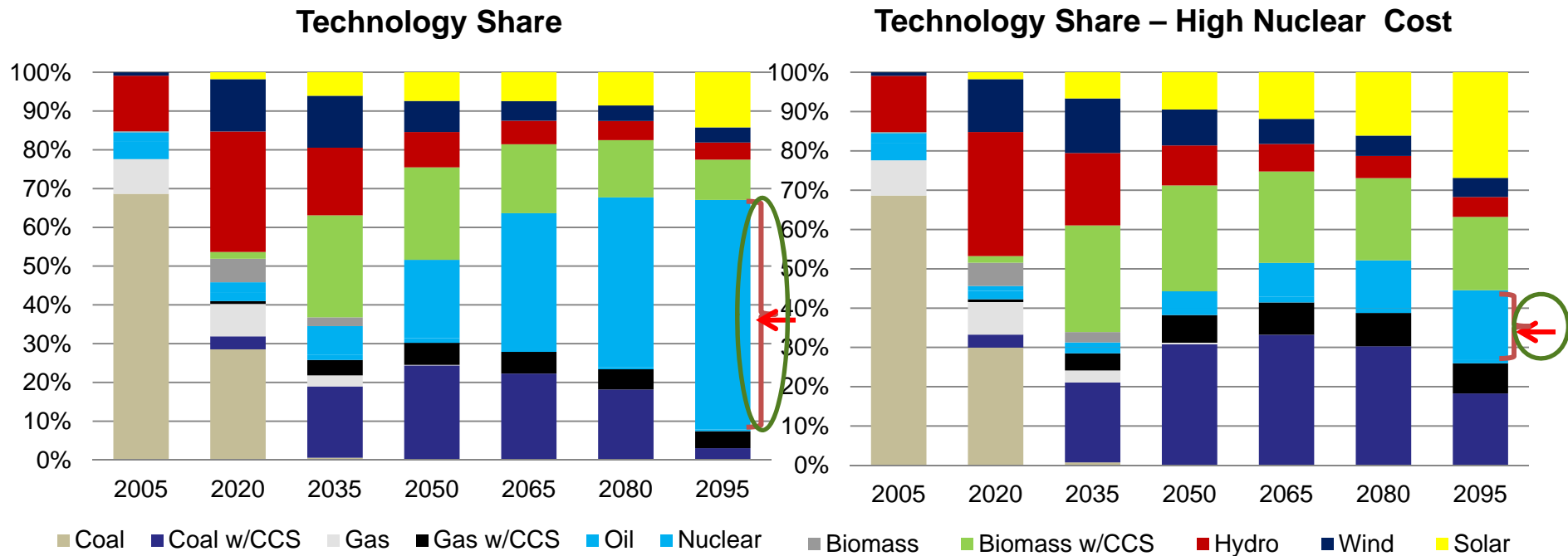
Post- Fukushima Nuclear Price Sensitivity - BAU



- Assumes 50% higher capital cost of nuclear plant to account for unforeseen risks
- Higher nuclear capital cost **reduces share of Nuclear significantly** in BAU



Post Fukushima Nuclear Price Sensitivity – 2°C Stabilization



- Higher capital cost **reduce share** of Nuclear **significantly** also in the **2°C Scenario**
- **Solar** technology share increases considerably under this scenario
- These results are **sensitive** to the feasibility (i.e. risks) of **Biomass with CCS**

Conclusion: Nuclear Risk Perception



- **Targets and Subsidies**

- Current (Implicit) Targets would need sizable subsidies under BAU scenario
- Subsidies will be lower under 2°C Stabilization Scenario
- Nuclear will need even less subsidy than solar

- **Nuclear Risk Perception has huge impact**

- Under BAU: Post-2050, Quarter of final energy would be nuclear
- Under 2°C Stabilization: Post-2050, 60% of final energy would be nuclear
- Nuclear share goes down significantly under high risk perception (e.g. risk higher than half overnight investment cost)

- **Nuclear Competes with Renewables and CCS**

- Learning rates of RETs have significant implication for Nuclear
- Mitigation and Communication of Nuclear Risks is vital
- Nuclear will remain a part of the strategic energy portfolio in India

Thank you