Panel: Decentral or Central Power Generation: Quo Vadis?

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Motivation: Global Transition to Low Carbon Technologies

- Global energy system is undergoing transition to low carbon technologies

- Energy transition is coupled to transformations in other sectors including mobility, urban infrastructure and demographics

- Novel agent-based, holistic simulation framework developed at ETH to enhance strategic decision-making in this complex environment
  - Applied to more than 80 case studies
EnerPol – Facilitating Data-Driven Strategic Decision-Making

- Scenario-based assessment tool
- Resolve details (that is, bottom-up) and aggregate at top
- Continental scale and holistic
- Develop rank ordering valuation
- Strategic decision making is data-driven
EnerPol – Detailed Physical Models Linked To Big Data

Conventional generators
- Coal
- Lignite
- Natural Gas
- Nuclear

Renewable generators
- Hydro
- Biomass
- Solar
- Wind

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Transmission Lines
- 110 - 230 kV
- 380 - 750 kV
EnerPol Outcome – Market not Substantially Improved for Gas Power Plants in 2030

- Nuclear and coal will be substituted by wind and solar in 2030

- Gas will achieve only 15% increase in market penetration by 2030
EnerPol Outcome – Unsubsidised Renewable Projects with Reasonable Financial Returns

- With no feed-in tariffs (and assumed power prices), renewable projects across Europe are suited for long-term investments challenging access to capital for gas power projects.
Ancillary services markets become more important for future gas power plants, accounting for 35% of revenue in 2045.
EnerPol Outcome: Sector Coupling Is Beneficial In Selected Markets

- In Italy, France and Germany, gas power plants can offer heat at prices below that of gas/oil heaters

- In Spain, few hours of CHP generation results in high prices for heat delivery

- CHP requires that gas power plant operates in part-load condition necessitating that future gas power plants have increased part-load efficiencies
EnerPol Outcome: Gas Power Plants Benefit Most from Increase In Partload Efficiency

- For gas power plants, starts (+15%) and ramps (+25%) are moderately increased in 2030.
- 28% revenue increase for 3% part-load efficiency increase.
- Part-load efficiency increase more beneficial for gas power plants in 2030.
Thank You.

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