Market design for an integrated and RE-based energy system: Introductory remarks

Xavier Garcia Casals
Liberalized versus regulated power system set-ups

Liberalized & Unbundled

Regulated & Integrated

Transition challenges

- CAPEX intensive / low OPEX generation
- DER
- Flexibility requirements
- System integration
- Higher social involvement

Regulation

Markets

Collaboration
Bottom-line session’s subject:
Making power system setup fit for the transition’s goal

Current power system set-up
- FF-based
- Centralized
- Unidirectional

Transition

Fit power system set-up
- RE-based
- Decentralized
- Bidirectional

Fixes

Barriers ➔ Failure

Synergies ➔ Success

IRENA INNOVATION WEEK
The TRANSITION is changing the power system context

- **Disruption context**: RE deployment disrupting power system setups & energy system integration implications
- **Current advances**: Insights and suitability of mechanisms already implemented to support the transition and address its preliminary impacts
- **RE-fit context**: Market design for RE-based systems

Discussion

Available session’s Context Note: If interested, please contact XCasals@irena.org
Additional subjects for the discussion

• Grid / Load defection
• Role and accommodation of new stakeholders
• Collaboration beyond competition
Grid / Load defection: Cost driver opening a new context

Grid Prices

Grid and utilities need to **CONVINCE** of its **VALUE**

DER costs

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**NORTHEAST POTENTIAL LOAD DEFECTION**

COMMERCIAL

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Grid / Load defection: Drivers go beyond costs

Price / Value ratio

Grid electricity vs. PV+battery

Justification

- Cost stability
- Environment
- Ancillary provision, deferral of grid upgrades
- Trust in utility, resilience, ...
Adapting & potentiating synergies: Integrated Power Market

Failure to adapt and convince of grid value
Grid / Load defection: Current choices and attitudes set the path

POSSIBLE TRAJECTORIES FOR ELECTRICITY GRID EVOLUTION

PATH 1  INTEGRATED GRID
One path leads to grid-optimized smart solar, transactive solar-plus-battery systems, and ultimately, an Integrated, optimized grid in which customer-sited DERs such as solar PV and batteries contribute value and services alongside traditional grid assets.

PATH 2  GRID DEFECTION
Another path favors non-exporting solar PV, behind-the-meter solar-plus-battery systems, and ultimately, actual grid defection resulting in an overbuilt system with excess sunk capital and stranded assets on both sides of the meter.

Solar PV and batteries play an important role in the future electricity grid, but decisions made today will encourage vastly different outcomes.
Grid / Load defection: Potential social value of T&D grids

• Avoid increasing energy and wealth inequality
  • Grid price spiral imposed on those that cannot afford defecting
• Facilitate sharing-economy collaborative approaches
  • System services from DER
  • Minimize transition costs and underutilized assets (on both sides of the meter)
• Facilitate citizen’s involvement
  • Community-based generation
  • Enabling P2P trading
• Overall energy system integration
  • Faster and deeper RE deployment in Transport & Heating sectors
  • Higher flexibility
• Value for different stakeholders
  • Pro-user price contention
  • upgrade deferrals, congestion relief, ancillary services
New stakeholders: Role and accommodation

A successful transition requires the participative and synergic interaction of many stakeholders

- Current status & barriers
- Setting the appropriate context
  - Regulation
  - Markets
  - Participation
Collaboration beyond competition

Room for overcoming competitive drawbacks through proper balance with collaboration and regulation:

- Increase participation
- Reduce inequality
- Align competitive drivers with social goals
Thank you!

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