The Role of Information in DER Deployment

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Motivation

- Debates about DER policies and compensation are intensifying
- Information problems are not usually taken into account in economic & engineering models that inform policy discussions
- Similarly strategic interactions between stakeholders are not usually taken into account
Questions

• What are some information problems that are important to the stakeholders in this space?

• How do these problems affect the efficiency of outcomes?

• What are the implications of these problems for the expected outcomes under different DER compensation policies?
Methodology

Stakeholder Interview/Surveys
- Categories of information problems
- Importance of these problems

Modeling
- Multi-stage game theoretic models
- Imperfect foresight
- Belief functions

Analyses
- The effect of information on DER deployment
- The effect of information on the efficiency of different compensation mechanisms

The effect of information on the DER deployment
- The effect of information on the efficiency of different compensation mechanisms
Papers

• “Value of Information for Optimal DER compensation”, (with Y. Dvorkin and A. Khan)
• “Value of Information in DER rollout”, (with Y. Dvorkin and A. Khan), under review
• “Impact of Imperfect Foresight on the Optimal DER Deployment, Remuneration and Policy”, (with J. Kim, S. Bialek, and Y. Dvorkin), under review
• “Who knows what: information barriers to efficient DER roll-out”, (with J. Kim, S. Bialek, Y. Dvorkin), under review
• “Energy Transition, Distributed Energy Resources, and the Need for Information”, IAEE Energy Forum, Third Quarter 2020, (with S. Bialek, J. Kim, and Y. Dvorkin)
Key Insights from the Project

• There are substantial but heterogeneous information problems across the country, mostly about distribution network and consumer demand data

• In the baseline cases with no information asymmetry:
  \[ SW^{DLMP} > SW^{VS} > SW^{NEM} \]

• Imperfect foresight and information asymmetry about hosting capacity or consumer demand generally reduce social welfare due to sub-optimal DER roll-out

• However, this welfare loss is not sufficient to erase all the efficiency gains achieved by more accurate compensation of DERs based on their energy, capacity, and environmental values
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