

Adoption of Smart Grid Technologies: Results of a Survey of U.S. Electric Utilities

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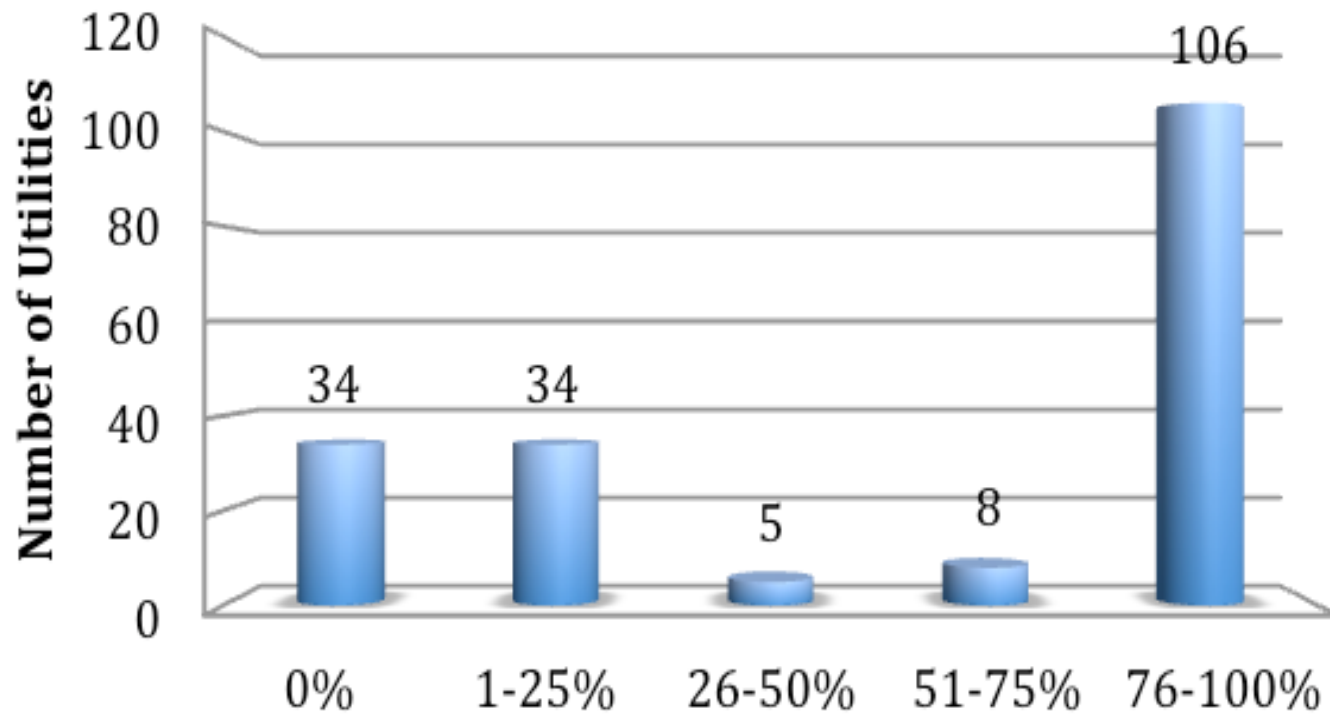
Research questions

1. What is the level of deployment of different smart grid technologies among U.S. electric utilities?
2. What are the main motivations for smart grid deployment?
3. What are the main obstacles to deployment?
4. What are the main organizational impacts of smart grid adoption?
5. How do IOUs, municipals and cooperatives differ in terms of adoption rate, motivations and organizational factors?

Research methods

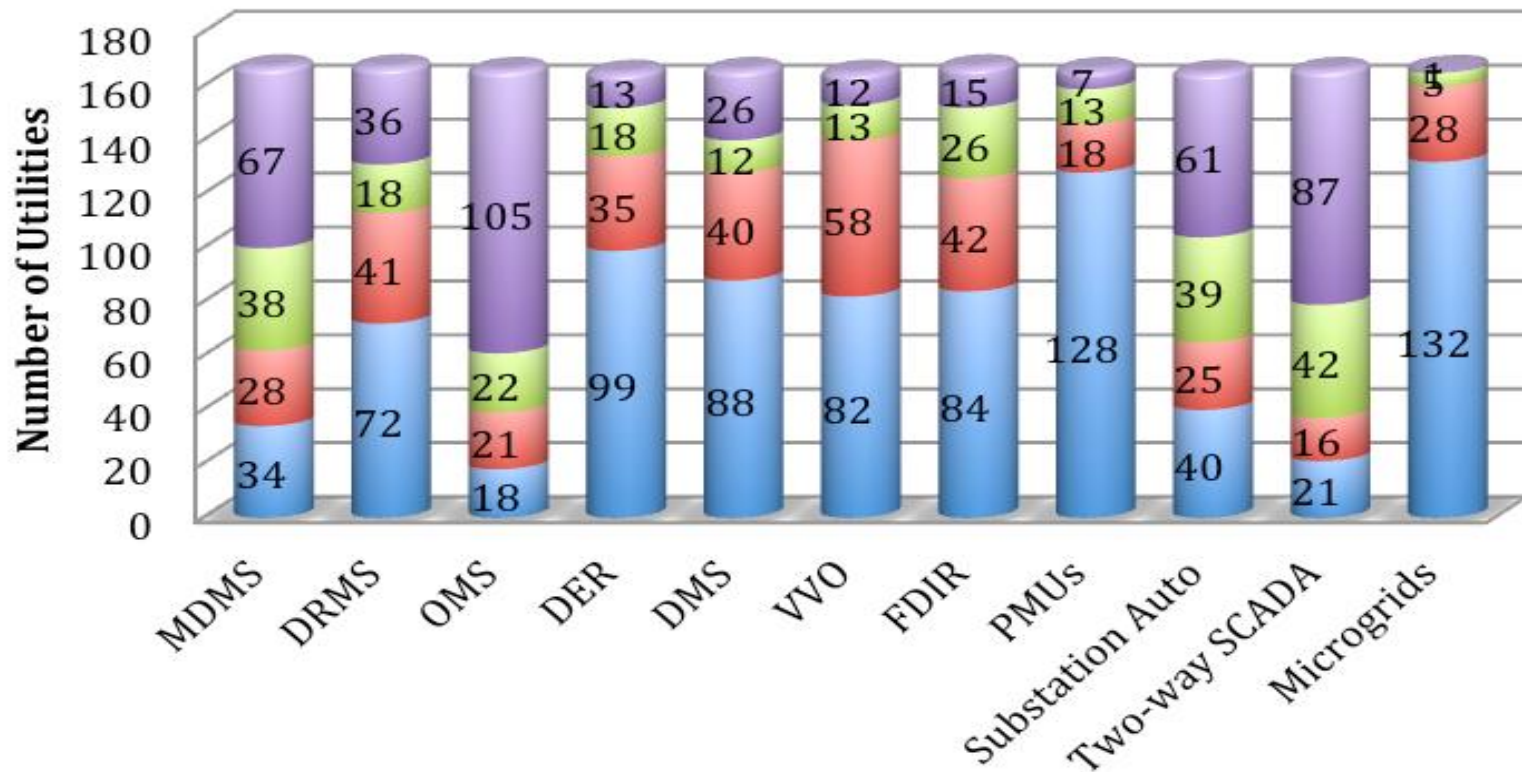
- ❖ Survey of 217 representatives of 198 U.S. electric utilities
- ❖ 38 IOUs, 64 municipals, 96 cooperatives
- ❖ 31 didn't answer any questions, so 186 usable surveys.
- ❖ Not all answered all questions, so N varies by question.

Level of deployment: AMI



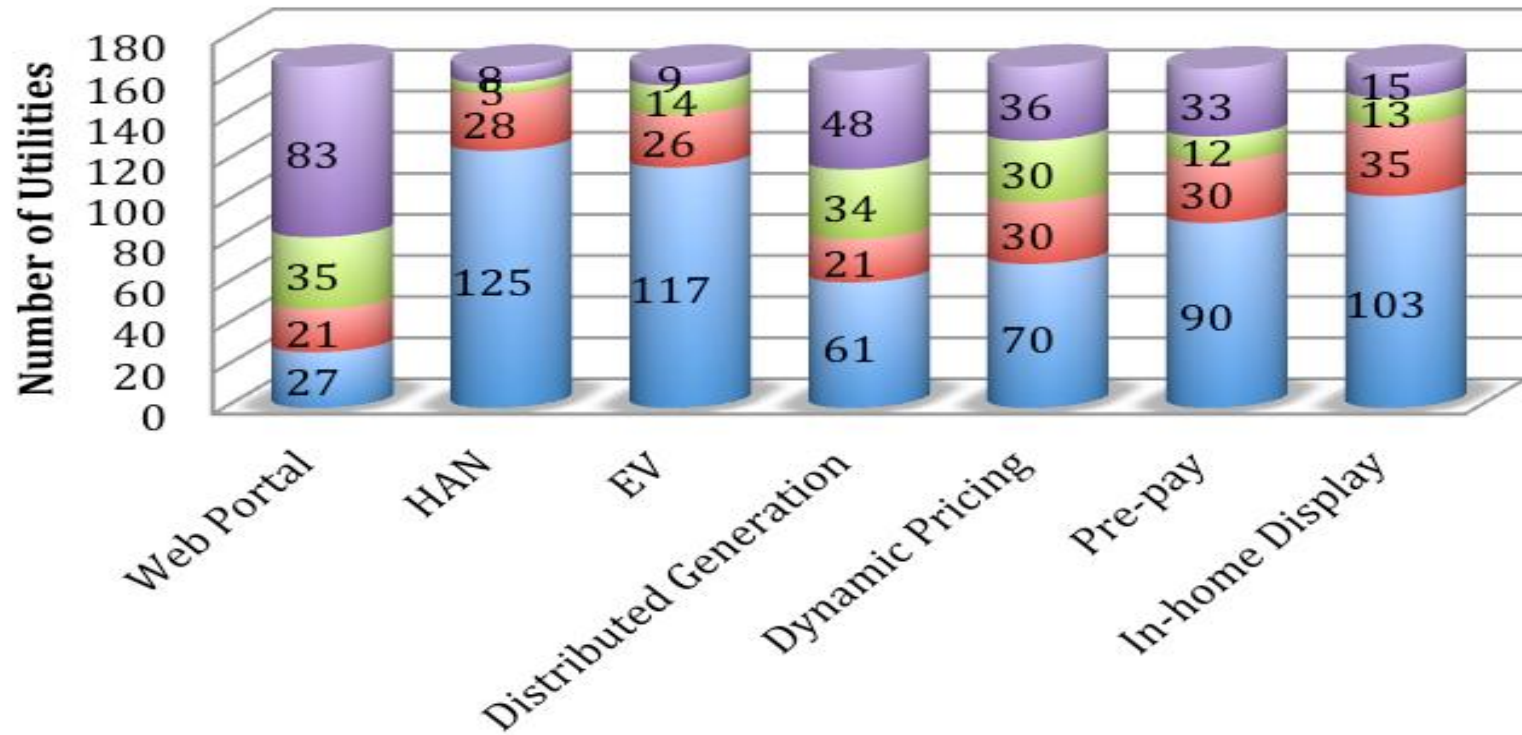
Level of deployment: grid-side technologies

■ None ■ Documented Plan/Piloting ■ In Deployment ■ Full Deployment

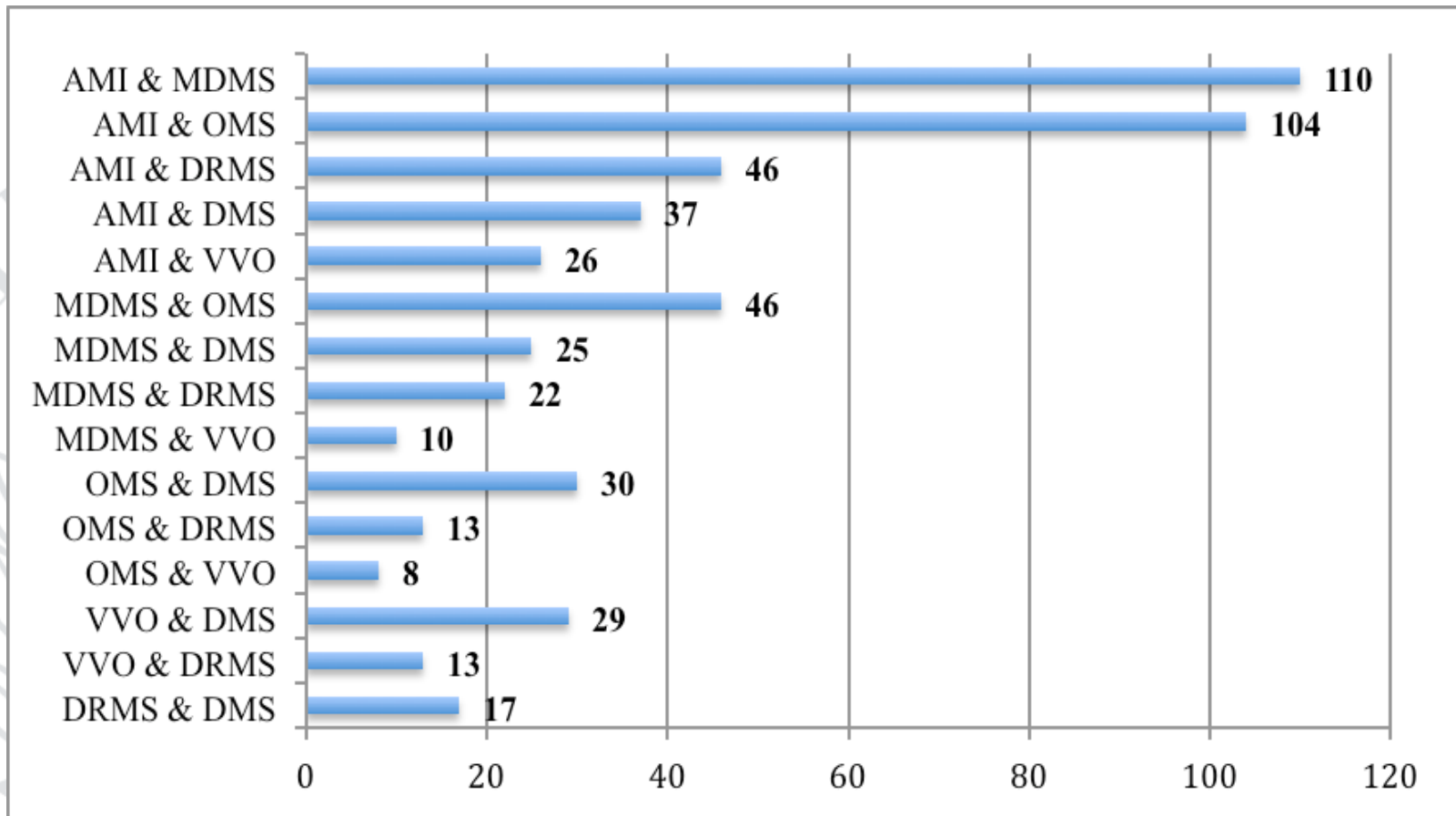


Level of deployment: customer – side technologies

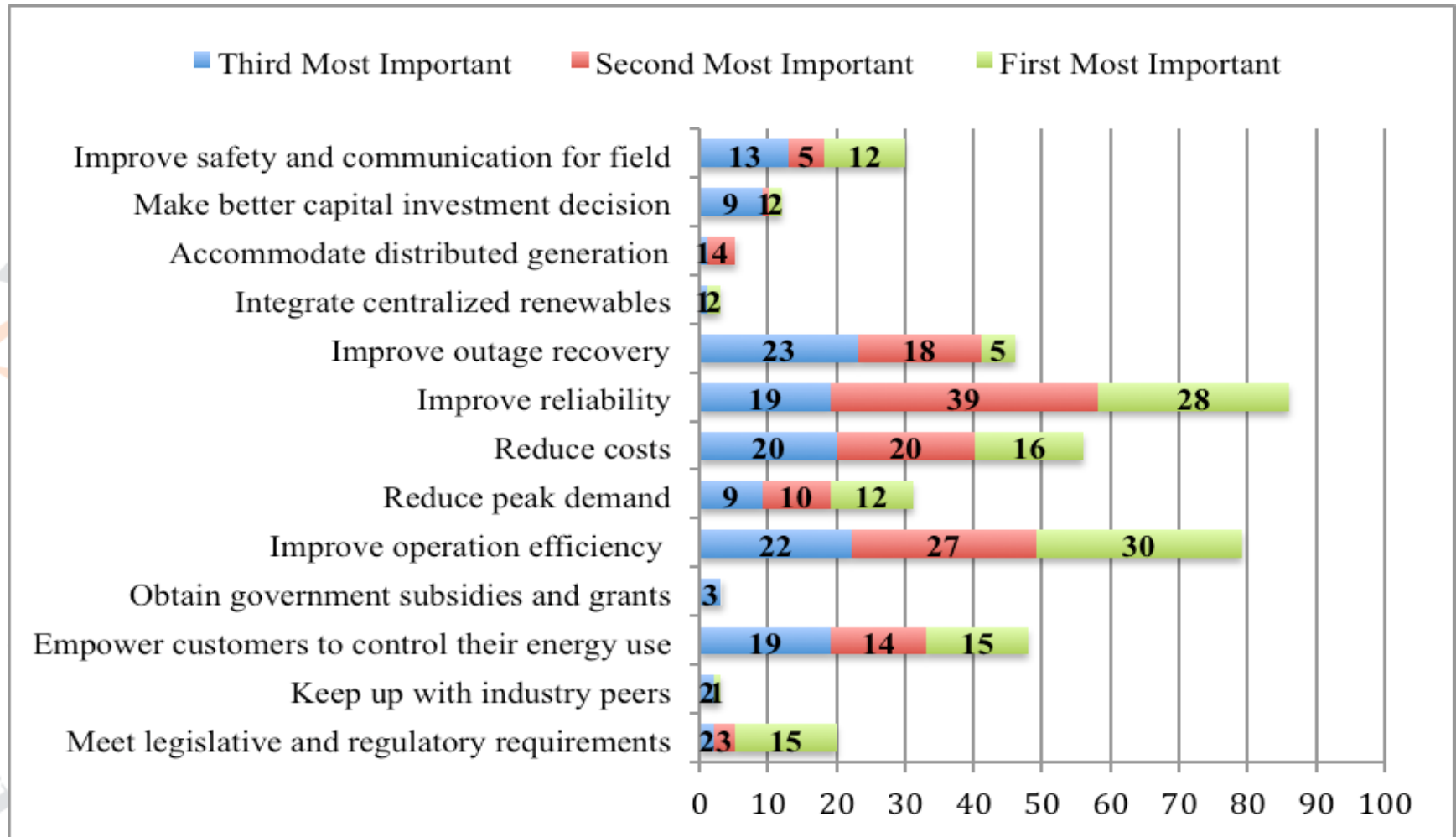
■ None ■ Documented Plan/Piloting ■ In Deployment ■ Full Deployment



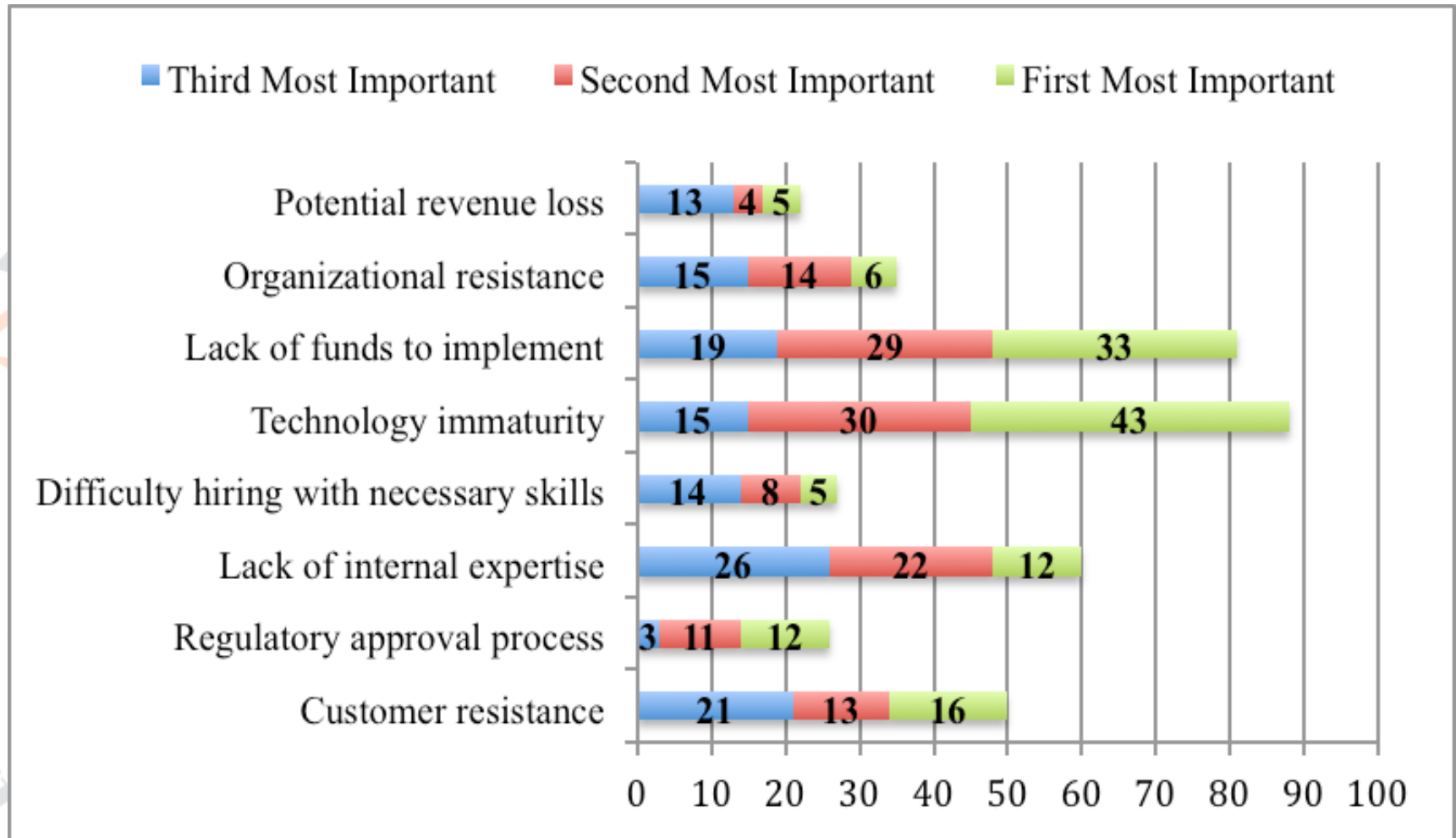
Integration of smart grid technologies



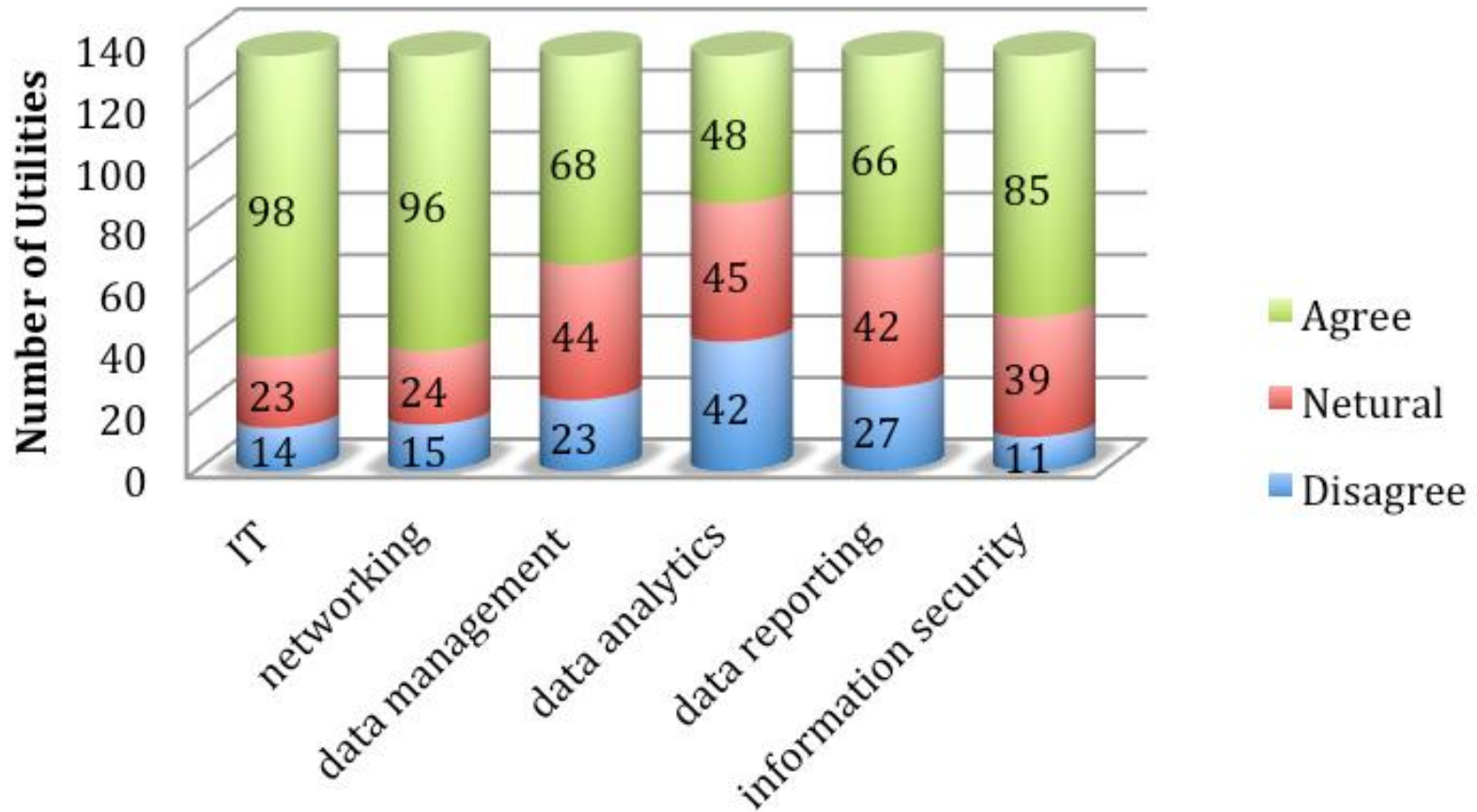
Motivations to adopt smart grid



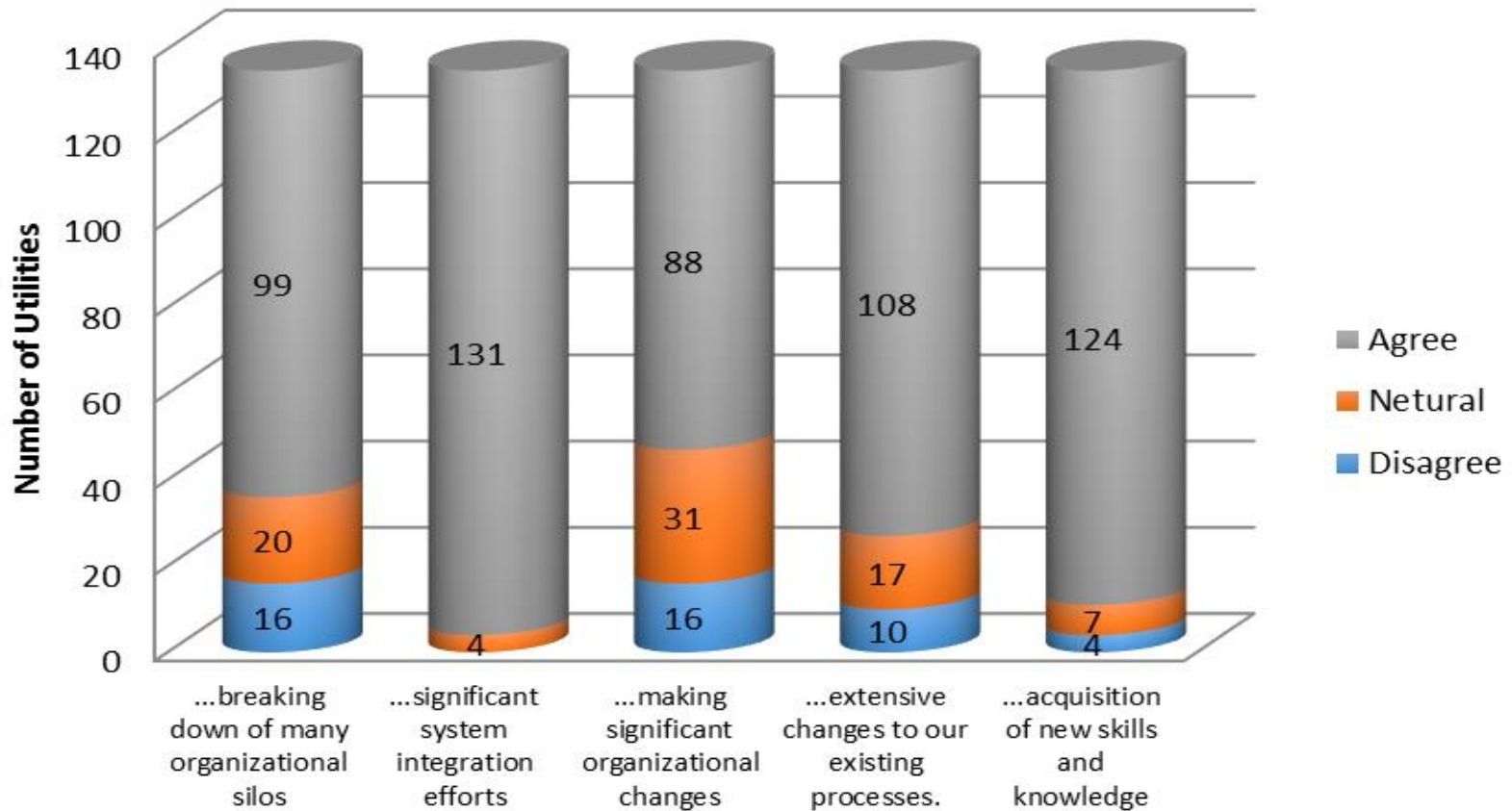
Obstacles to smart grid adoption



We have a high level of expertise:



Organizational impacts



IOUs, municipals and co-ops

- ❖ No difference in AMI deployment
- ❖ IOUs have significantly higher deployment of grid technologies, e.g., MDMS, OMS, DER, DMS, VVO, PMU and microgrids.
- ❖ IOUs have higher deployment of HAN, EV, dynamic pricing and in-home displays. Co-ops have higher use of pre-paid pricing.
- ❖ No significant differences in motivations, obstacles, expertise or organizational impacts.

Other factors influencing adoption

- ❖ Initial regression results on adoption of grid-side technologies.
 - ❖ Ownership
 - ❖ Expertise
 - ❖ Organizational monitoring and responsiveness to technology changes
 - ❖ Inconclusive on attitudes of regulators or board members.

Conclusions

- ❖ Smart grid adoption varies widely across utilities and across technologies.
- ❖ Main motivations are cost savings and operational improvement. Main obstacles are technology maturity and cost.
- ❖ Regulatory/policy factors somewhat less important than expected.
- ❖ Adoption requires significant change in organizational structure and processes.

Smart grid research projects at Syracuse

1. Smart grid adoption by U.S. utilities
2. Data privacy and smart meters
3. Big Data analysis of consumer electricity use

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