

Smart Fridge / Dumb Grid : Architecture for the Electricity Network of 2020

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Thanks to students & colleagues:

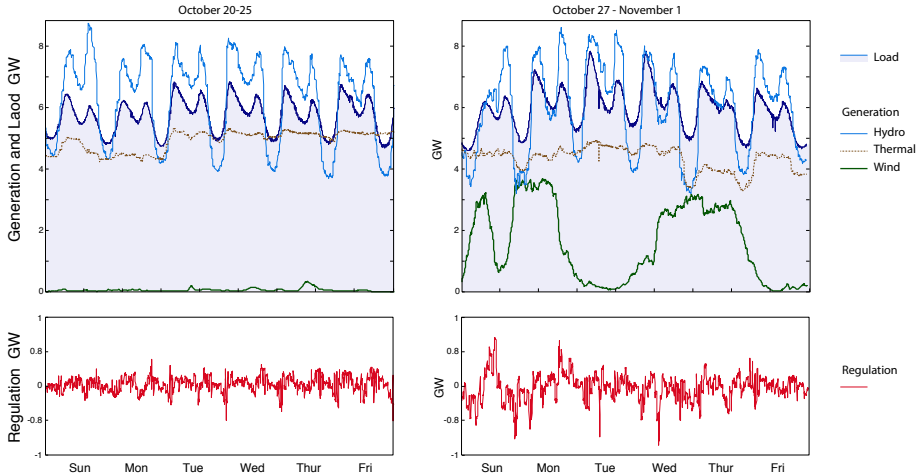
Prabir Barooah, Ana Bušić, Y. Chen, J. Ehren, R. Kaddah, and J. Mathias

and to our sponsors: NSF, DOE & Google

Challenges of Renewable Integration

What's so scary about volatility?

Volatility \implies greater regulation needs



Comparison: Flight control

How do we fly a plane through a storm?

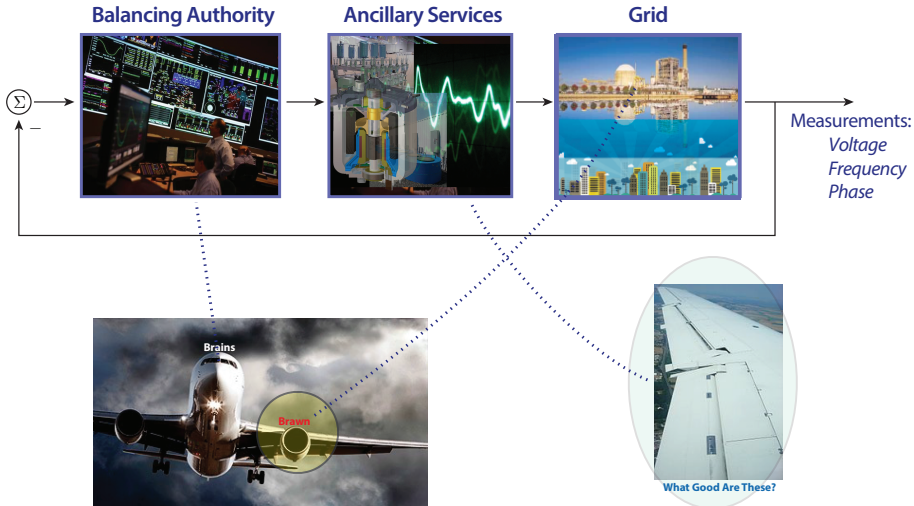


What Good Are These?



Comparison: Flight control

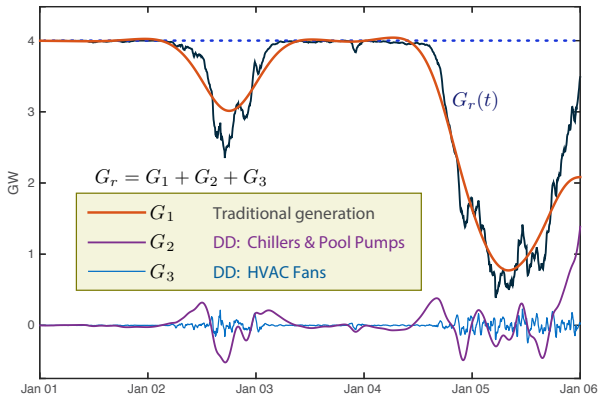
How do we operate the grid in a storm?



Control Architecture

Frequency Decomposition for *Demand Dispatch*

Flexible loads ramp up and down power consumption to serve the grid



No impact on service to customer

Loads are smart, not the grid

Selected References

More at www.meyn.ece.ufl.edu

This lecture:

<https://vimeo.com/album/3275353/video/120525110> (video)

<http://www.slideshare.net/spmeyn> (slides)

based on



A. Brooks, E. Lu, D. Reicher, C. Spirakis, and B. Weihl. Demand dispatch. *IEEE Power and Energy Magazine*, 8(3):20–29, May 2010.



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H. Hao, Y. Lin, A. Kowli, P. Barooah, and S. Meyn. Ancillary service to the grid through control of fans in commercial building HVAC systems. *IEEE Trans. on Smart Grid*, 5(4):2066–2074, July 2014.



S. Meyn, P. Barooah, A. Bušić, Y. Chen, and J. Ehren. Ancillary service to the grid using intelligent deferrable loads. *ArXiv e-prints: arXiv:1402.4600* and to appear, *IEEE Trans. on Auto. Control*, 2014.