From Airbnb to Solar: Toward a Transaction Cost Model of a Retail Electricity Platform

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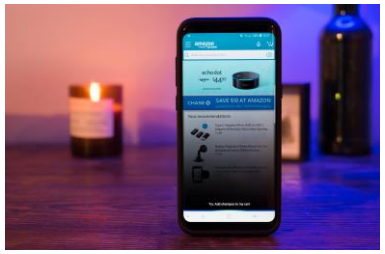
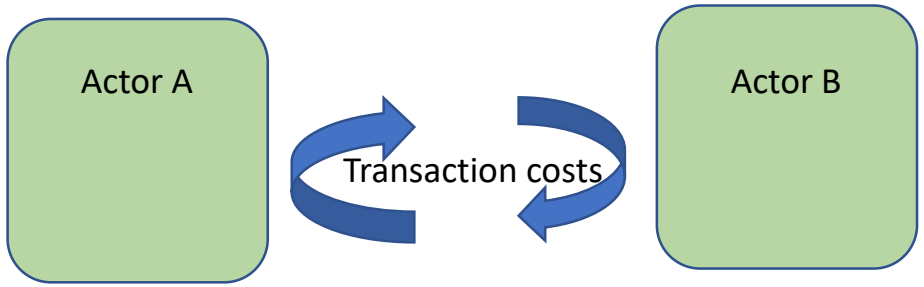
An increasingly digital world



Digital technologies are transaction cost reducers

Falling transaction costs



Digital devices, commerce, exchange

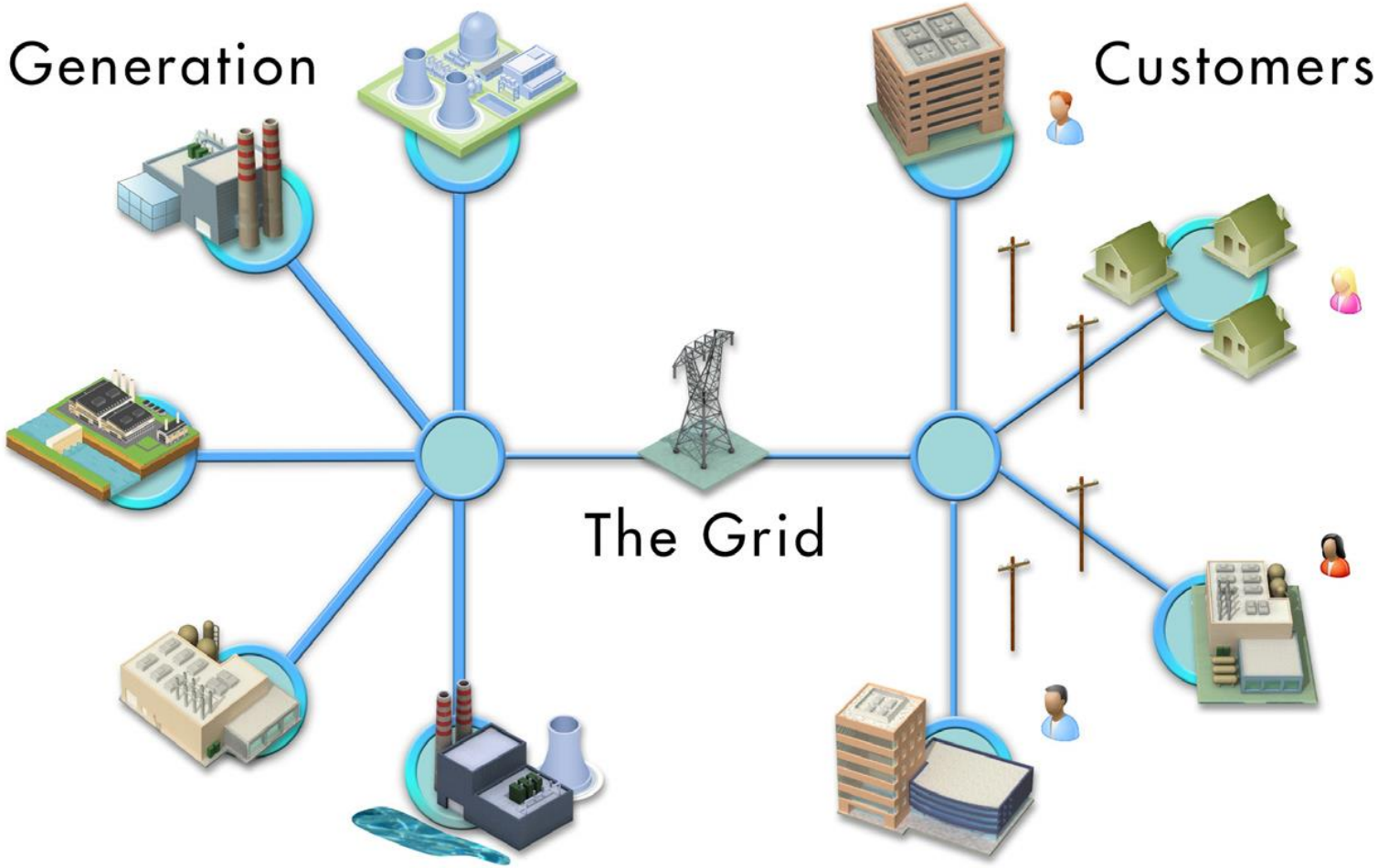
Source: digital.gov

Creative destruction – Joseph Schumpeter

The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers' goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates. [...] This process of Creative Destruction is the essential fact about capitalism. It is what capitalism consists in and what every capitalist concern has got to live in.

How does this relate to the electricity industry?

Today's power system



Source: EPRI (2014), p. 8

Disruptive home energy technologies & evolving consumer choices shape the need for and pace of grid modernization

Source: http://www.thefabricofthings.com/2016/07/22/smart-kitchen-appliance/

Source: https://www.ecobee.com/ecobee4/

"A smart … appliance does more; it saves time, energy and money, and all with exceptional levels of performance. … By delegating more tasks and options to the appliance, we can save time and effort, as the appliance will even choose the best time to operate and the most economical program to use, taking away the worry of selecting the most economical program."

Source: https://www.tesla.com/solarroof

Energy cap is likely to dim switching rates, warns Ofgem

Emily Gosden, Energy Editor

September 8 2018, 12:01am,
The Times

The number of people shopping around for cheaper energy bills could halve in a worst-case scenario because of the price cap, according to Ofgem's impact assessment

ANDREW MILLIGAN/PA

Energy switching rates are likely to fall by 30 per cent once the price cap is introduced, analysis by the industry regulator suggests.

Big Six price cap on standard tariff

Energy price cap could be a muddle that satisfies no one

Nils Pratley

Think of the price cap as a command to companies to shed costs – meaning jobs

Source: https://www.theguardian.com/business/nils-pratley-on-finance/2018/sep/06/ofgems-energy-price-cap-could-be-a-muddle-that-satisfies-no-one

Littlechild proposal: require Big Six to sell 10 percent of market share to entrants

Business

An energy price cap will damage the industry. Here's a viable alternative

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9 JANUARY 2018 • 8:00PM

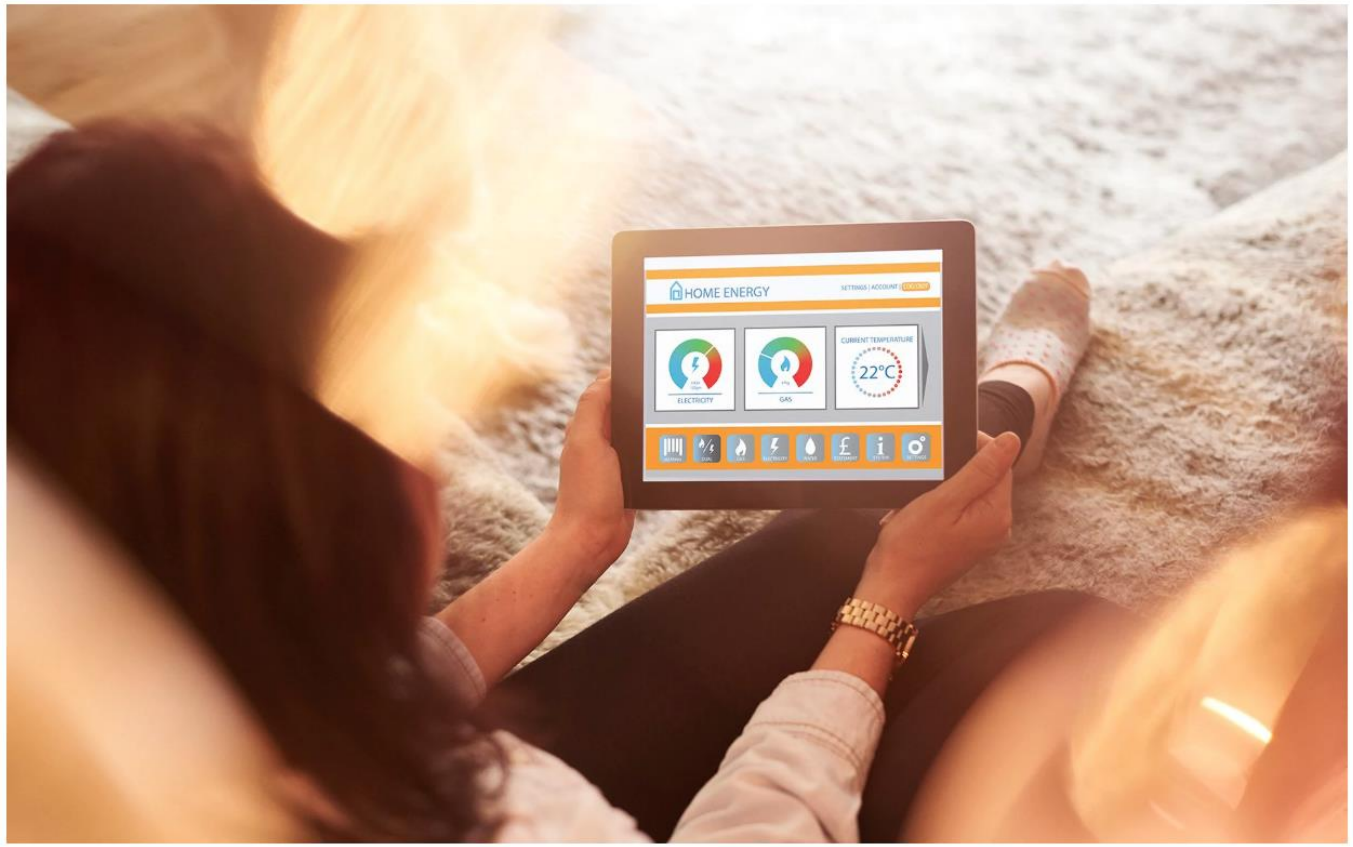
Source: https://www.telegraph.co.uk/business/2018/01/09/viable-alternative-damaging-energy-price-cap/

News

Millions of smart meters may need replacing due to IT blunder

share

Save 51



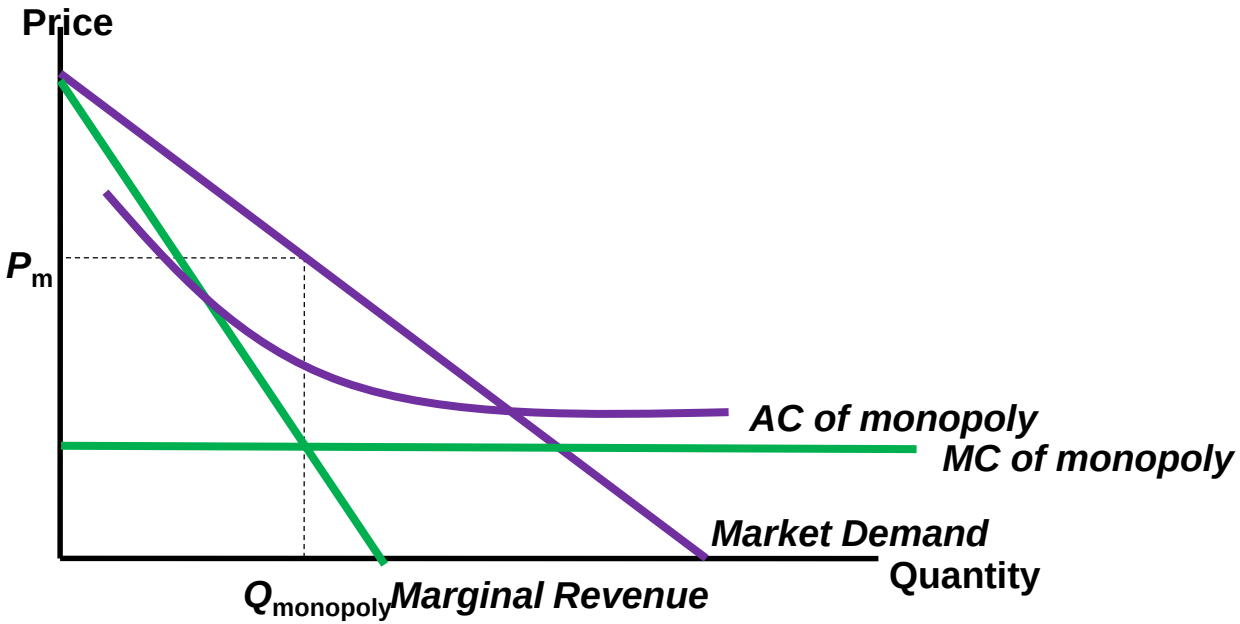
Under the Government's £11bn smart meter programme every household in the UK will have been offered a device by 2020 CREDIT: GETTY

Source: https://www.telegraph.co.uk/news/2017/05/05/millions-smart-meters-may-need-replacing-due-blunder/

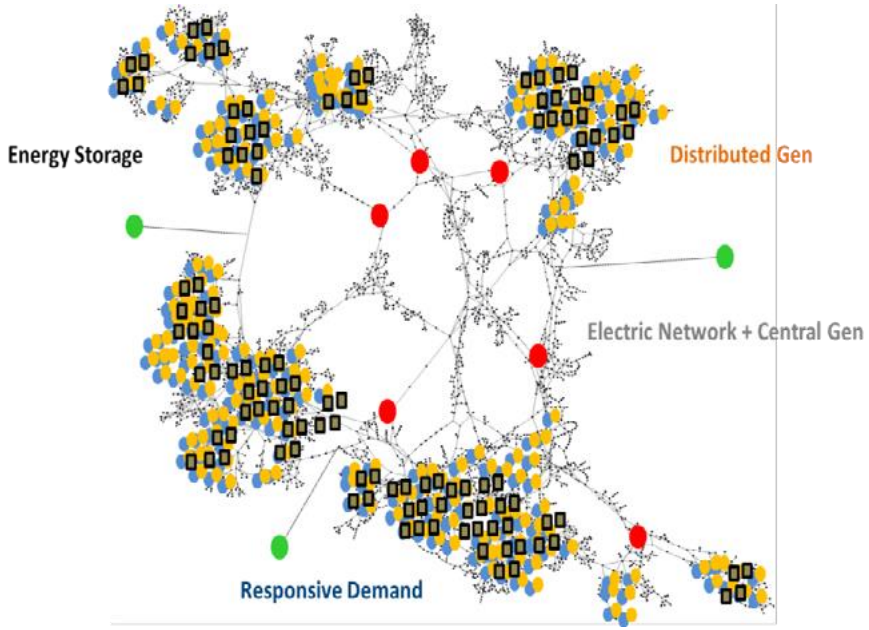
Thinking differently about our economic dynamism yields different policies

Grid economics are evolving

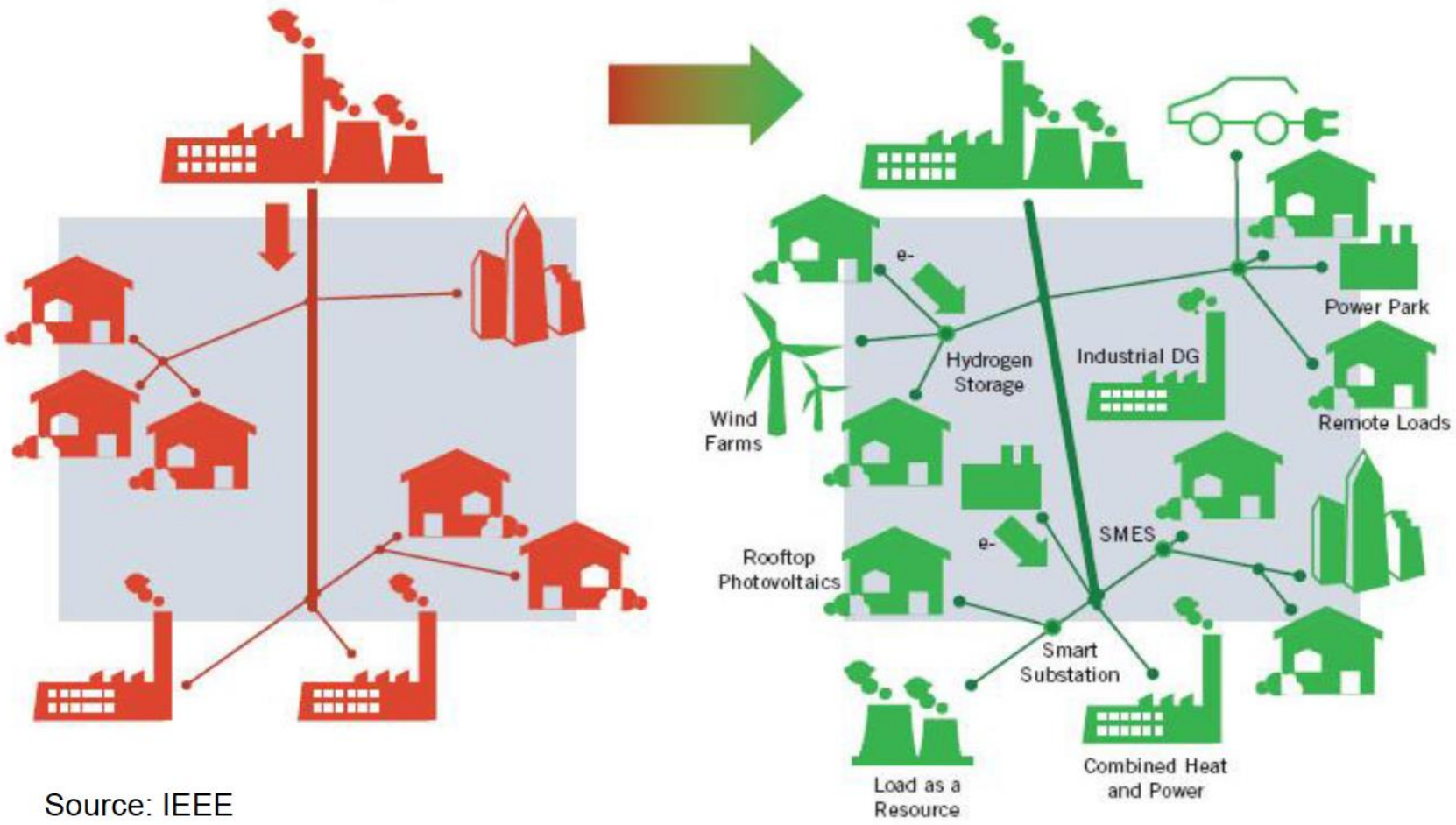
From economies of scale …



… to network economics



From a one-way road to the grid of things: Regulated wires company as a grid services platform



Source: IEEE

A platform business model: Airbnb

The paper's research questions

- What are the effects on asset ownership when transaction cost reductions make a decentralized rental market possible?

- How do these general effects manifest themselves in the case of residential digital home energy management and distributed energy resources (DERs)?

A transaction cost model

- Building on Horton & Zeckhauser (2015), adding an outside option
- Economy with n agents, subjective preferences over asset ownership and substitutability
- Stage 1: asset choice
  - Asset market
  - Agent chooses to purchase asset or not
- Stage 2: energy choice
  - Given Stage 1 decision, agent chooses (1) how much to consume and (2) own supply if an owner or grid supply, or both
  - Two cases in this stage: no rental market, rental market
- Solve the model by backward induction in two different cases
  - Without a rental market
  - With a rental market, after transaction cost-reducing innovation

Implications for asset ownership decision

- Without rental market
  - Subjective individual parameters (α,λ) matter for asset ownership decision
  - If own-supplied and grid-supplied energy are perfect substitutes, ownership only occurs if asset has a low price relative to the outside option

- With rental market
  - Ownership decision no longer depends on agent's individual use of the asset (α), so the option to rent using a market platform changes the ownership decision
  - Existence of rental market makes the opportunity cost of excess capacity salient
  - Subjective preference over substitutability (λ) drives ownership – preference for green power, preference for local/community

Parameter heat maps show combinations of use intensity (α) and substitutability preferences (λ) that lead to increased DER ownership with platform markets

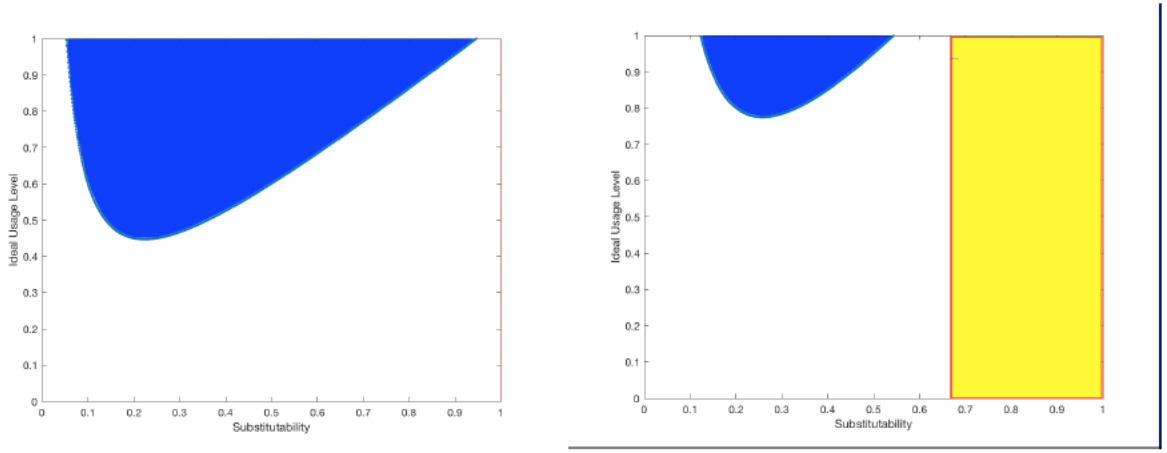


Figure 3: (α, λ) space; for $p_a = 0.2, p_g = 0.2$ and $p_a = 0.6, p_g = 0.4$, respectively. Regions with ownership in the absence of a rental market in blue, regions without ownership with a rental market in yellow.

Conclusion

- Digital technologies reduce transaction costs

- Apply to the electric distribution utility, which is facing disruption
  - Innovation at the distribution edge and distributed energy resources
  - Price caps and existing retail market design will not bring innovation, automation, or savings to small customers
  - Reinvigorate the value of distribution assets by the utility becoming a grid services platform company

- We model a platform business model arising from this transaction cost reduction
  - Creates new market in excess capacity & new gains from trade
  - Shifts the distribution of asset owners
  - Increases asset capacity if net ownership increases

Thank you for your time and attention!