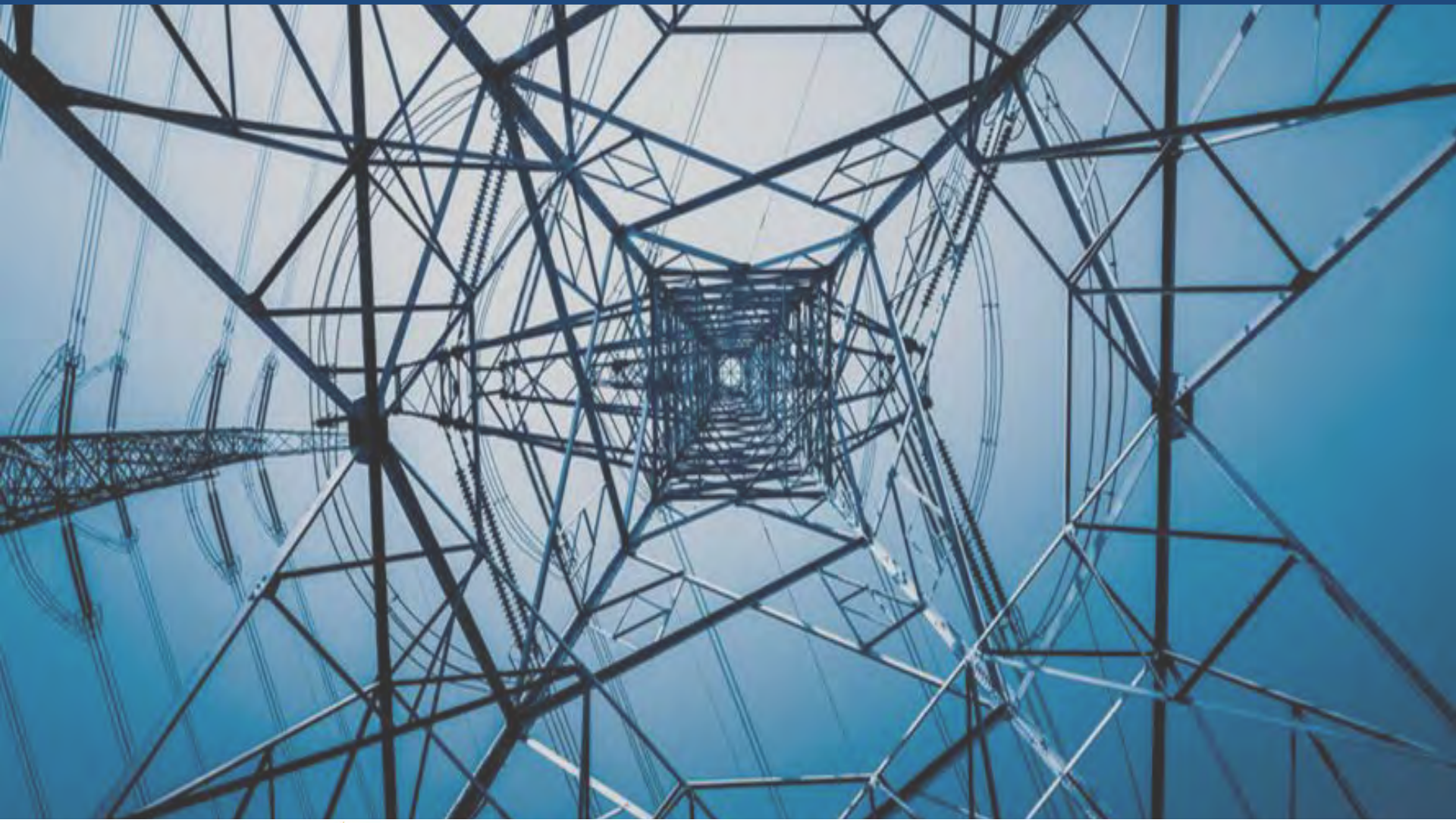
Business models for distributed energy resources: value pricing and efficient tariff design

Scott Burger



What we will speak about today

1. The power sector is evolving…
2. What is a business model, anyway?
3. The structure of DER business models
4. Tariff design and the economics of distributed PV and storage businesses
5. Q&A

The power sector is evolving…

Today, four trends are forcing the power sector to evolve once again…

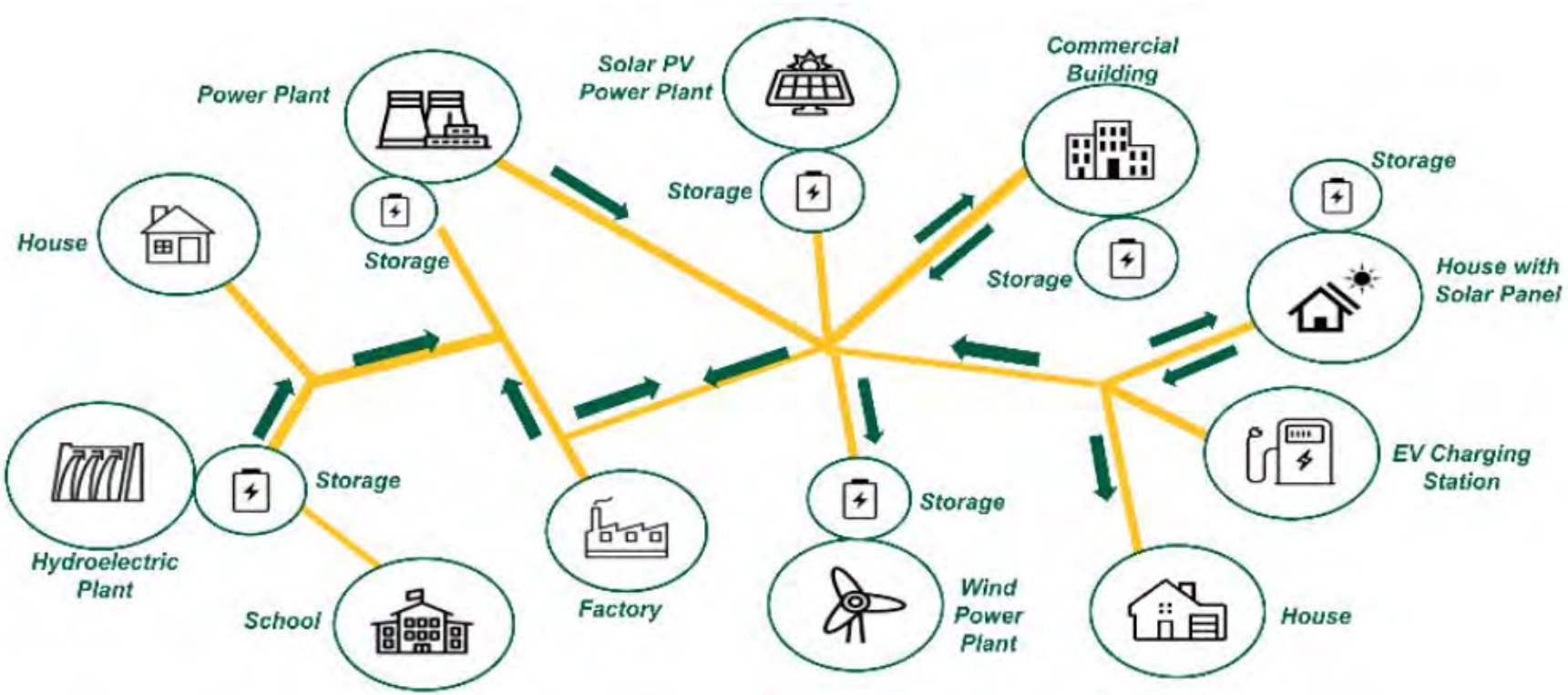
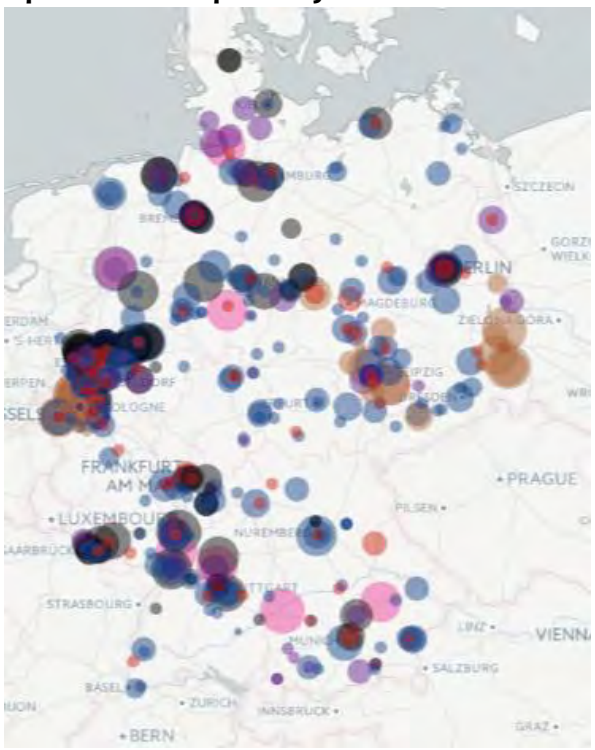


Image source: NYISO, 2016. "Distributed Energy Resources Roadmap for New York's Wholesale Electricity Markets"

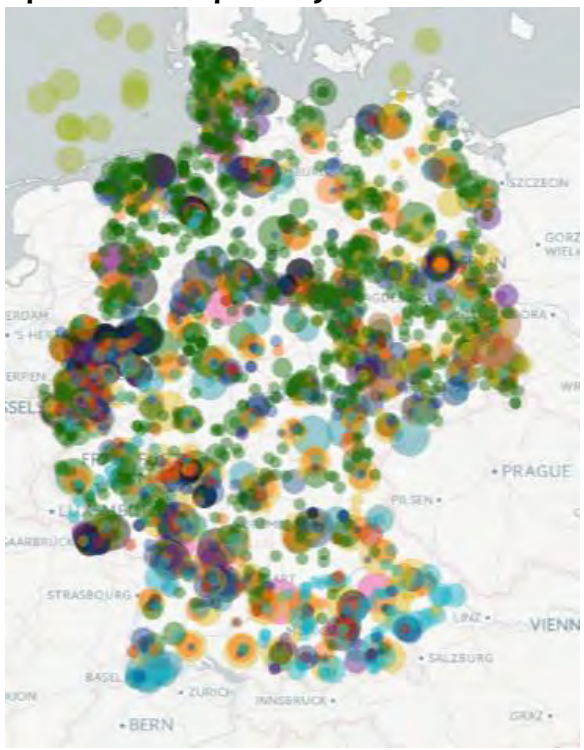
1. The power sector is decentralizing…

Many emerging resources are inherently more distributed than incumbent resources

Germany's non-renewable power capacity



Germany's complete power capacity

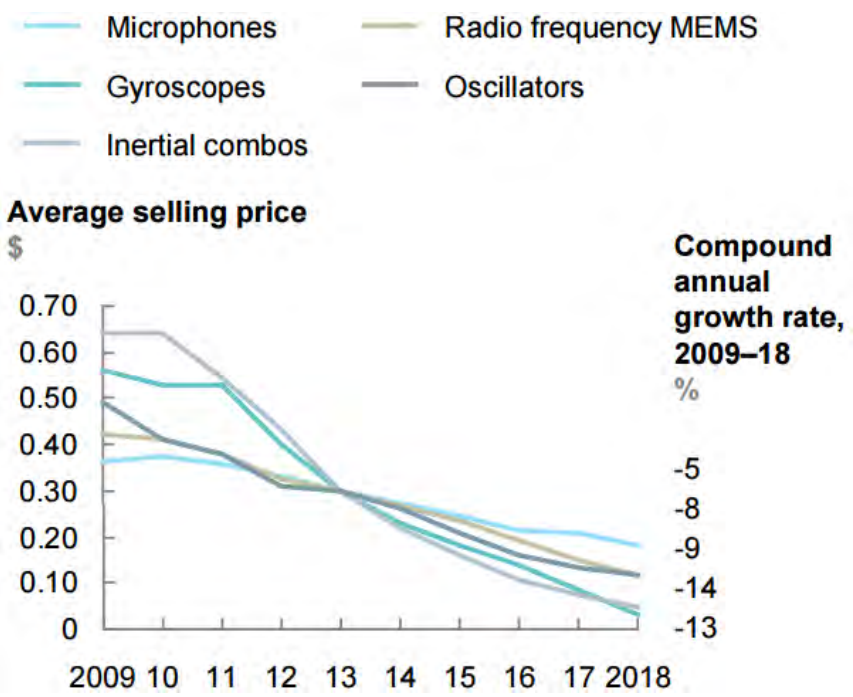


Source: Carbon Brief, 2016. "Mapped: How Germany generates its electricity"

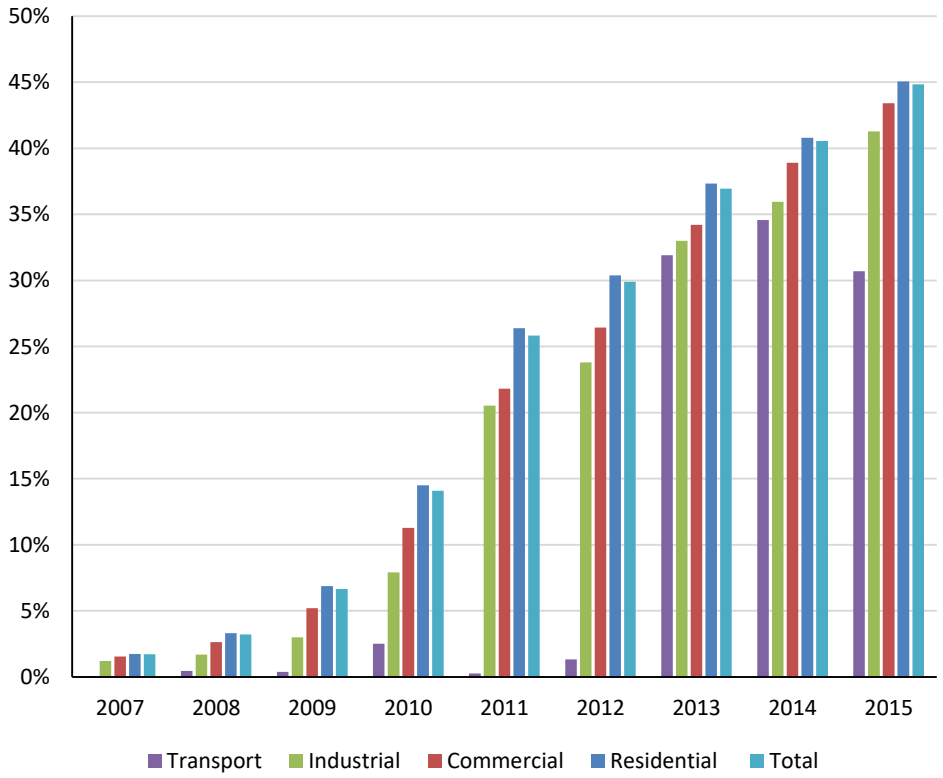
2. The power sector is digitizing…

Deployment of information and communication technologies is rising as costs plummet

Average selling prices of various MEMS devices



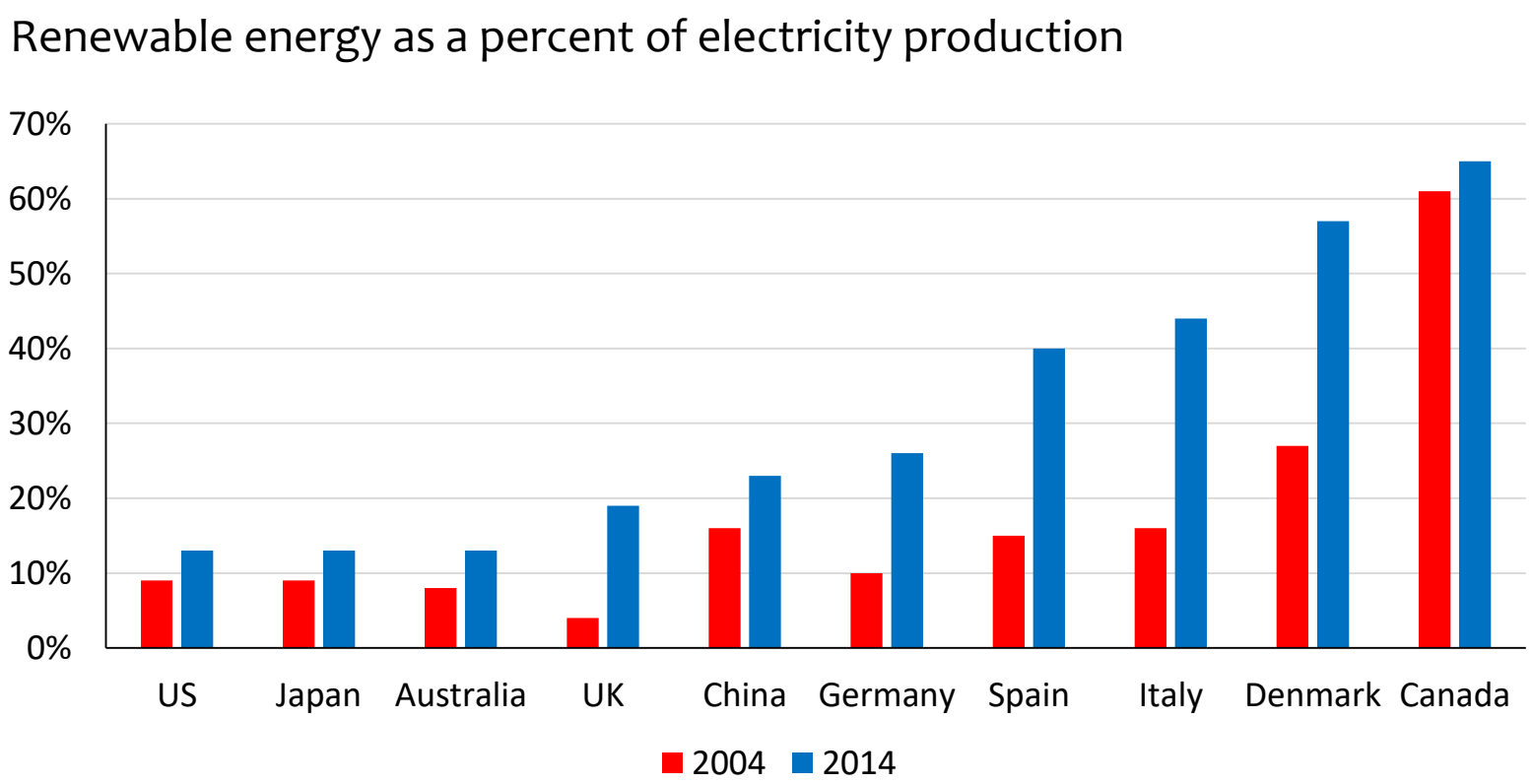
AMI deployment as a % of metered sites in the U.S.



Left image source: McKinsey, 2015. "The Internet of Things: Mapping the Value Beyond the Hype"; Right: MIT analysis of EIA data

3. The resource mix is changing…

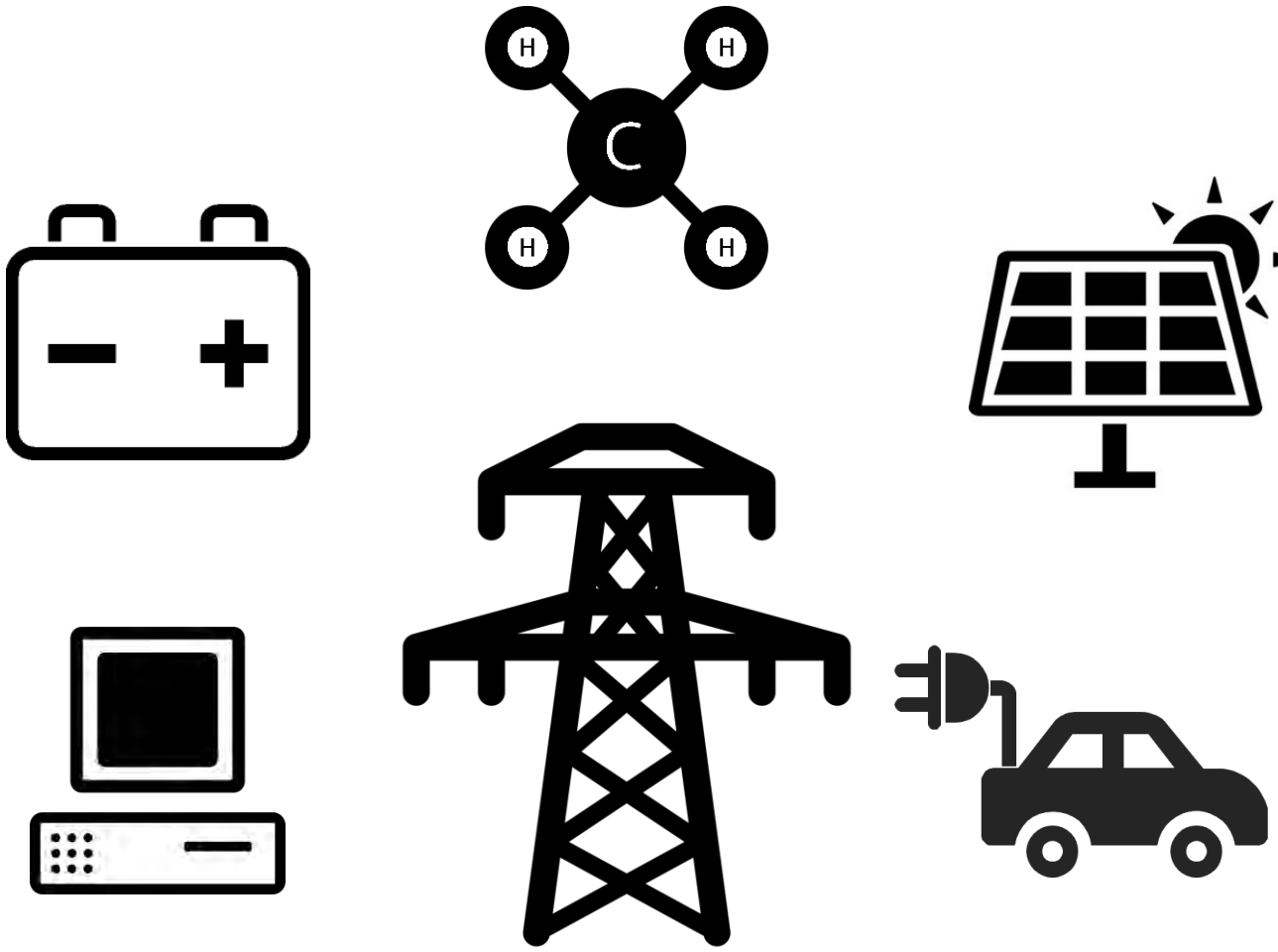
Renewable energy resources are on the rise globally



Source: MIT analysis; BP Statistical Review of World Energy data

4. The power sector is increasingly interconnected…

The fate of the electricity sector is increasingly tied to transportation, heat, computing, and more



What is a business model, anyways?

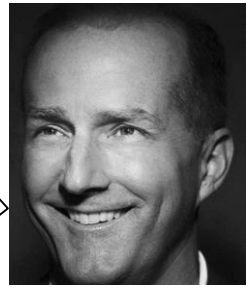
These four trends are placing major pressure on utilities globally – This financial pressure is spurring restructuring, new business models, and more

Stock price relative to May 24th, 2011
%

Source: Yahoo Finance

This pressure drives many to predict dramatic change to the business structures used to deliver energy services – This change is often depicted as being potentially disruptive or deadly

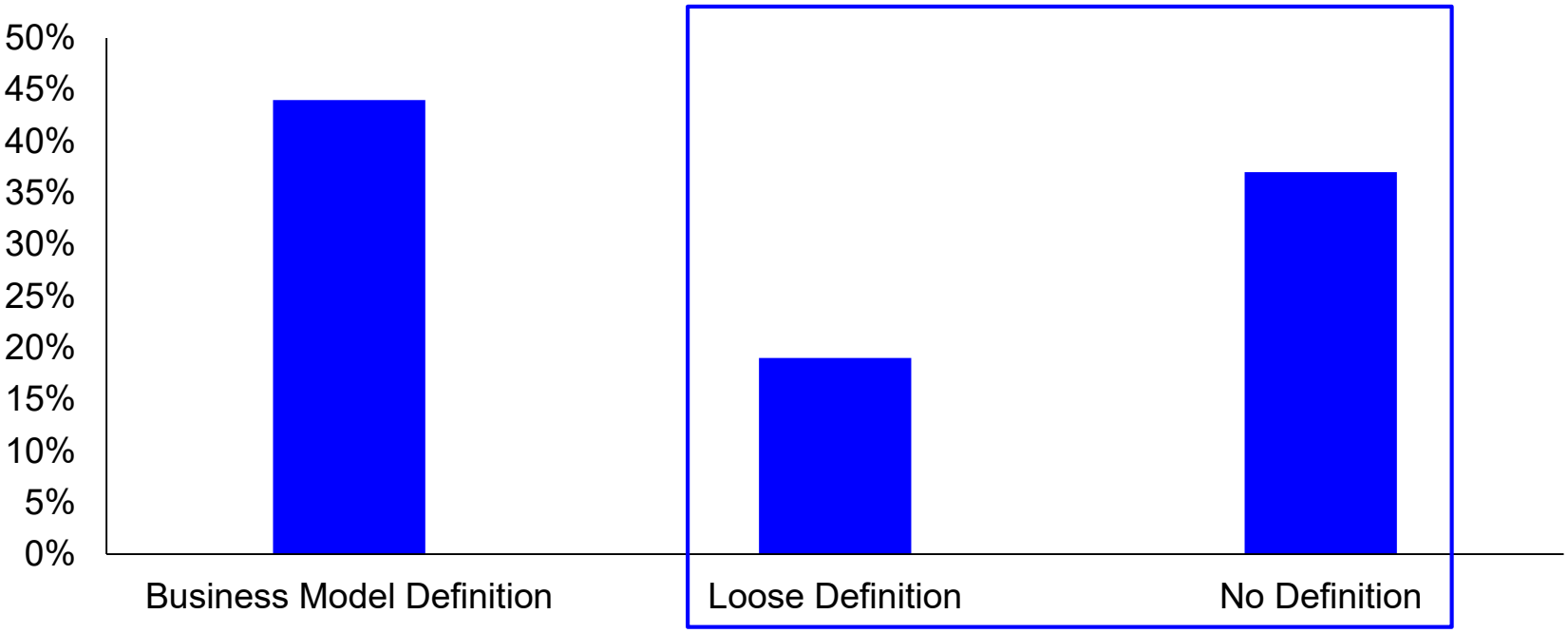
"Regulators set rates; utilities get guaranteed returns; investors get sure-thing dividends. It's a model that hasn't changed much since Thomas Edison invented the light bulb. And it's **doomed to obsolescence**." – David Crane



"It would be foolish to dismiss the potential for **major changes** in the utility business model" – Theodore Craver, Jr.

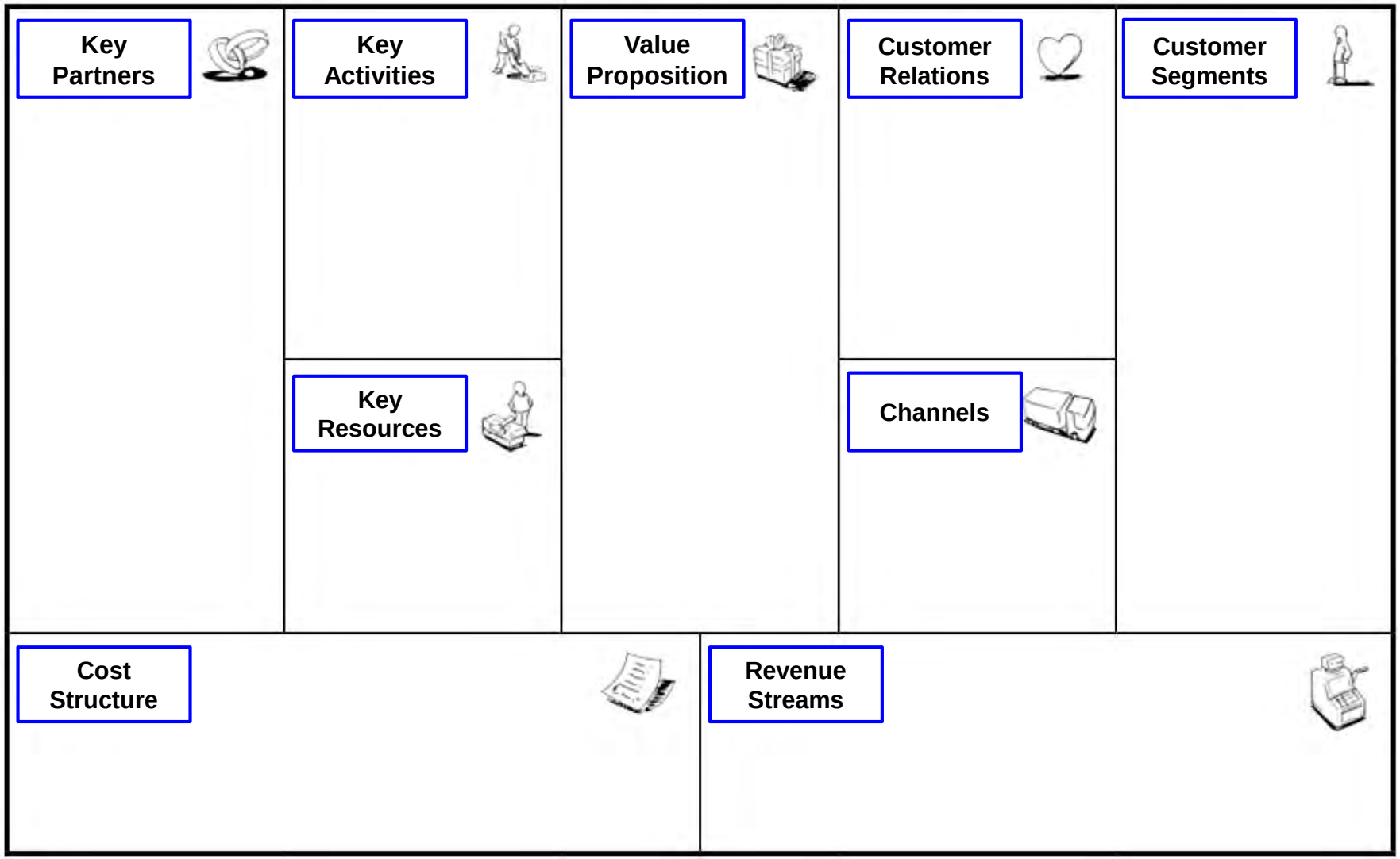
Despite the focus on changing business models, there is still a lack of clarity around what exactly is changing – in one review, 56% of studies did not provide only a loose definition or no definition at all of a business model

Percent of studies of business models that explicitly define the business model



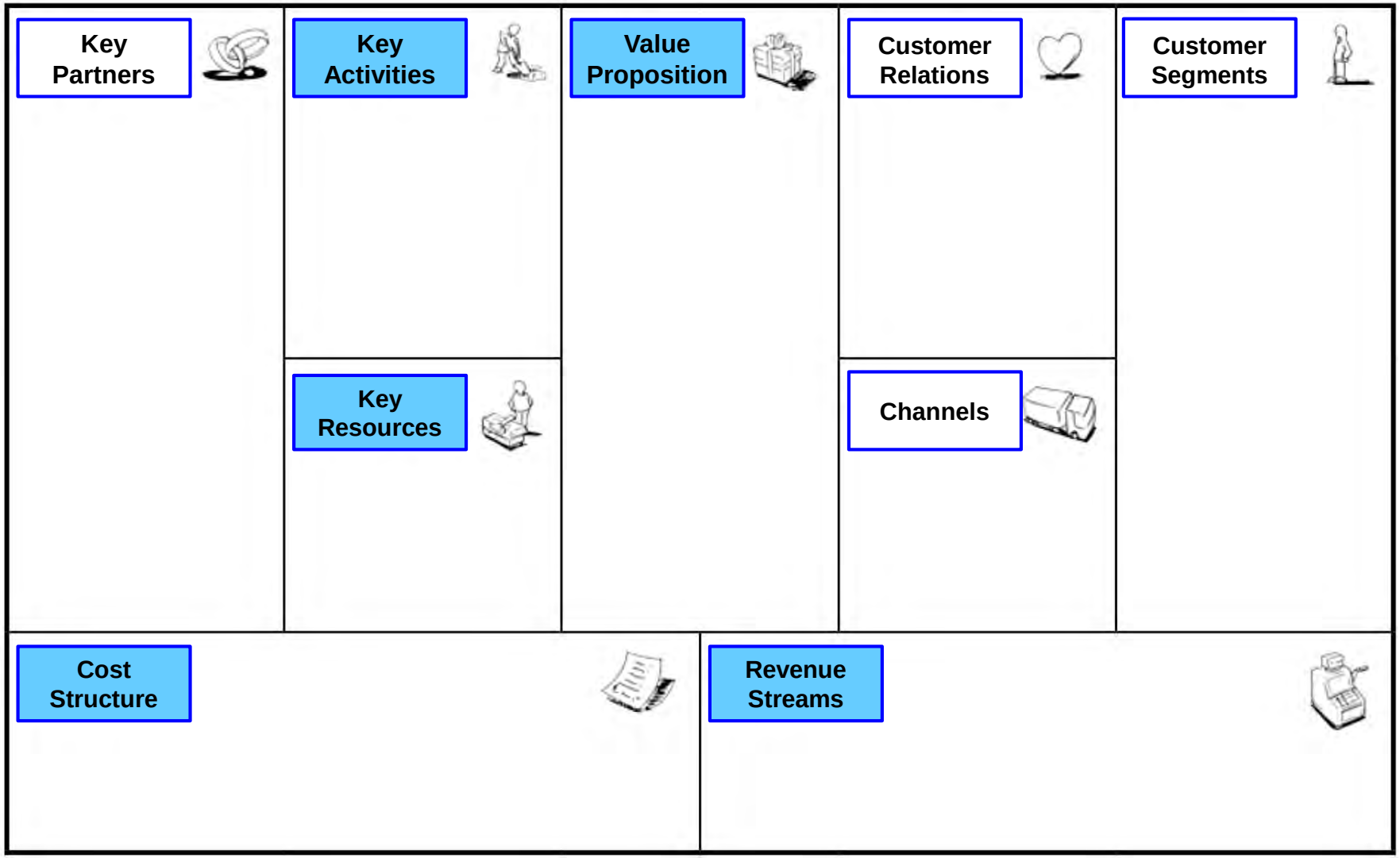
Source: Zott et al., *The Business Model: Recent Developments and Future Research*, Journal of Management, 2011

Using a simple business model framework can help us contextualize ongoing changes – Business models are not monoliths



Source: Osterwalder & Pigneur, *Business Model Generation*, John Wiley and Sons, 2010

Distribution utility business models are fundamentally different than competitive energy service businesses – Activities, resources, costs, revenues, and, as a result, value propositions, are all regulated due to monopoly power



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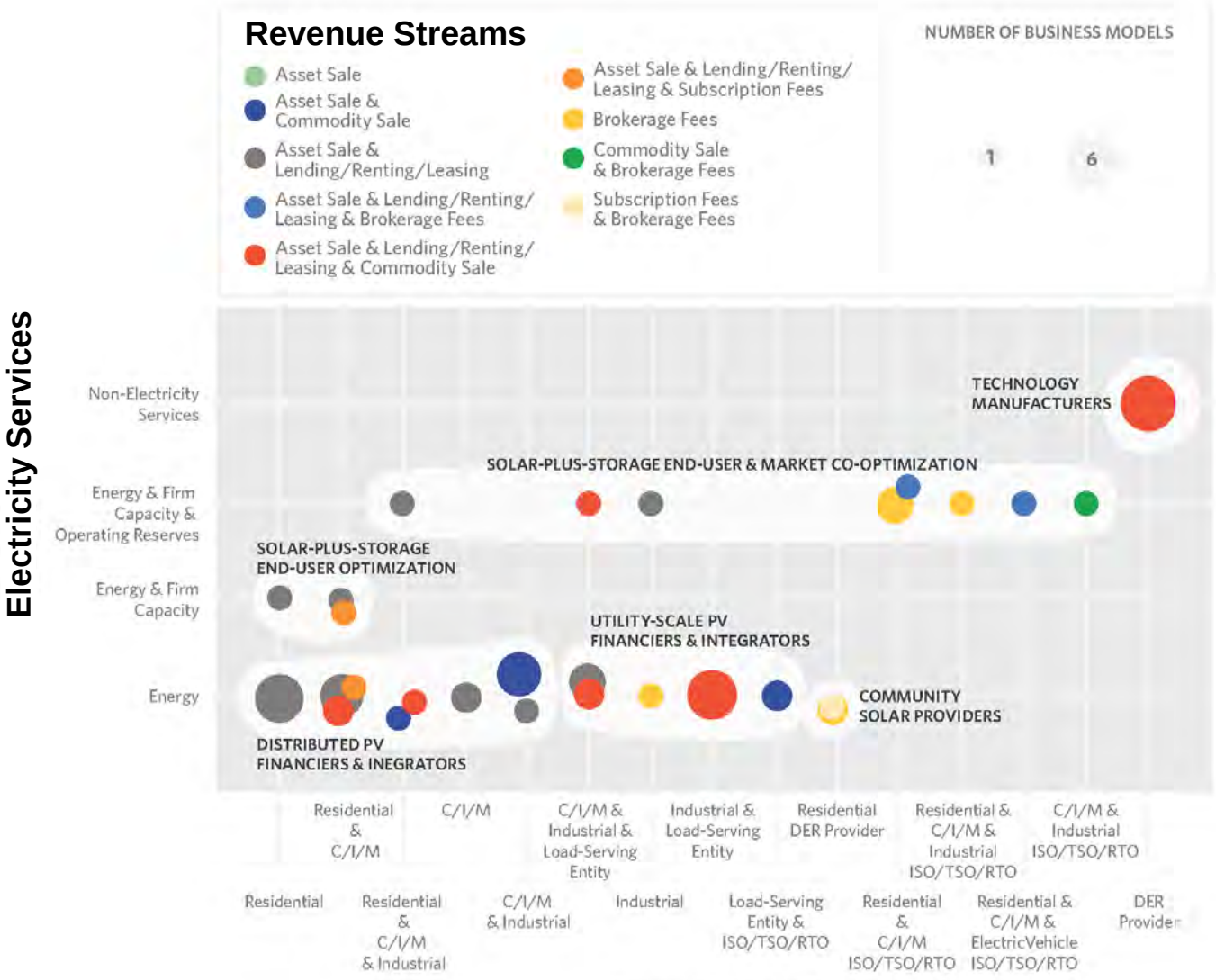
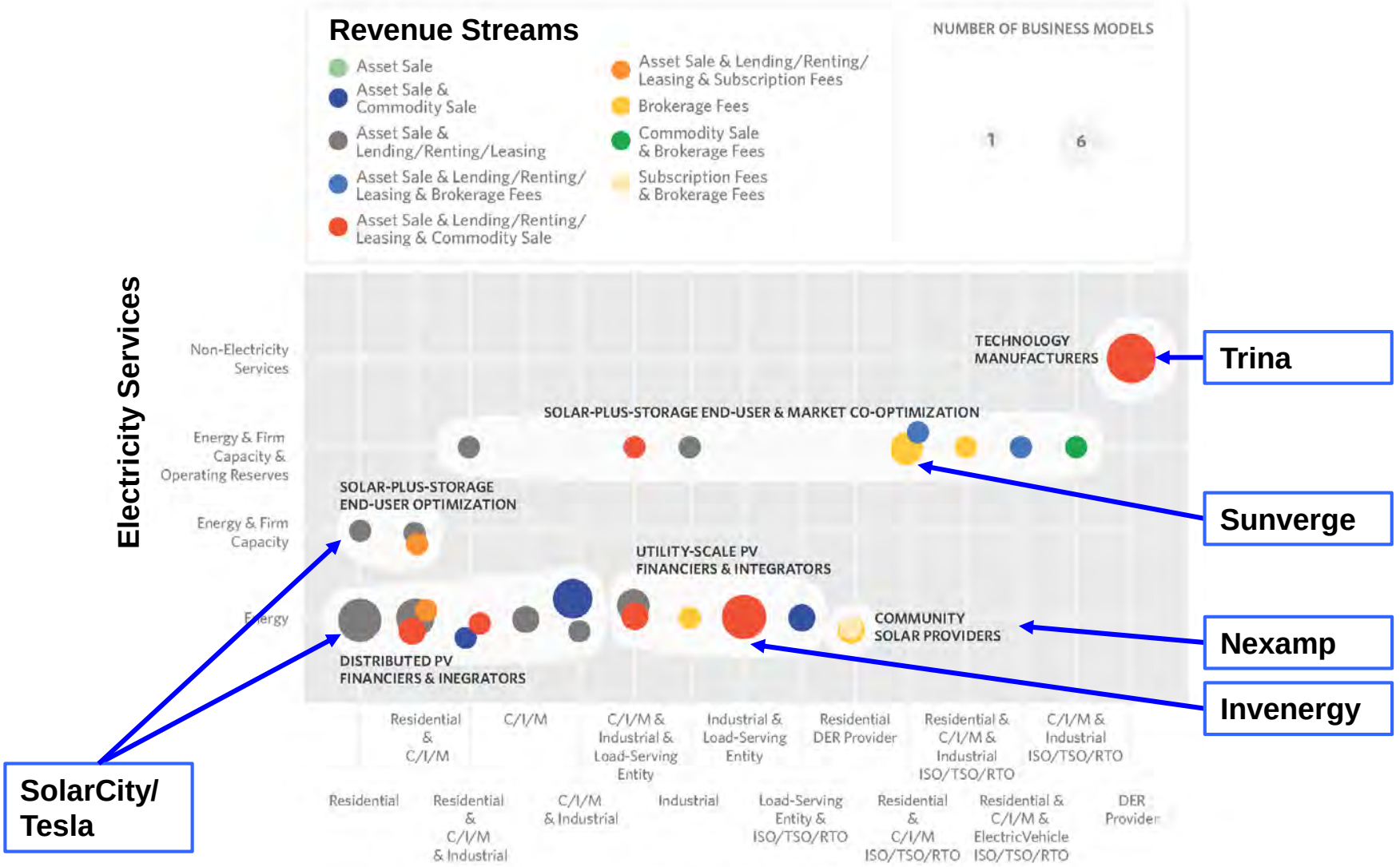
The structure of DER business models

Solar PV and Solar-plus-storage business models rely heavily on value pricing – These business models reflect differing degrees of market integration



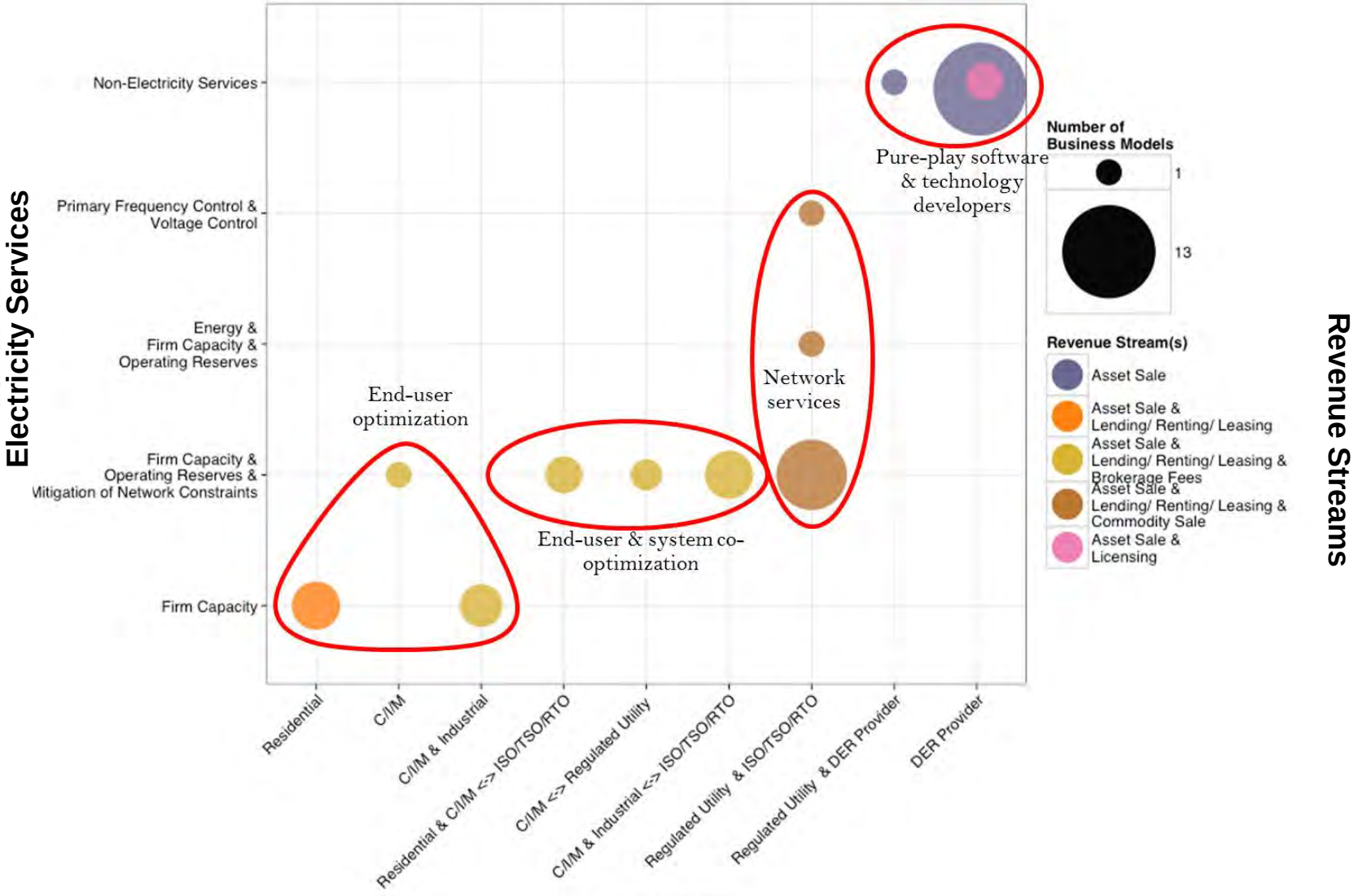
Source: MIT Utility of the Future Study Analysis

Solar PV and Solar-plus-storage business models rely heavily on value pricing – These business models reflect differing degrees of market integration



Source: MIT Utility of the Future Study Analysis

Energy storage is proliferating across the value chain, from the utility to the distributed scale – Similarly, energy storage business models reflect differing degrees of market integration



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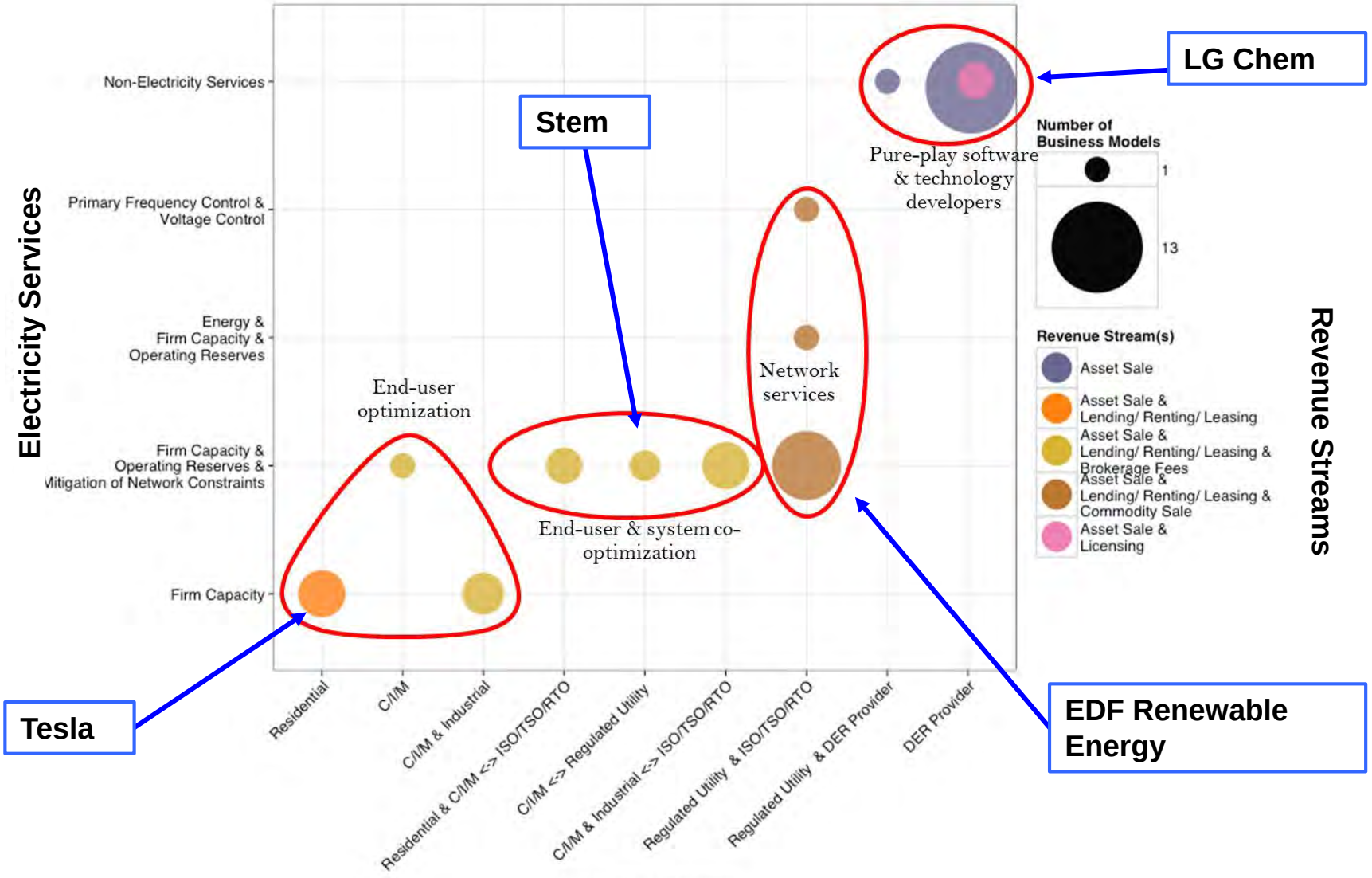
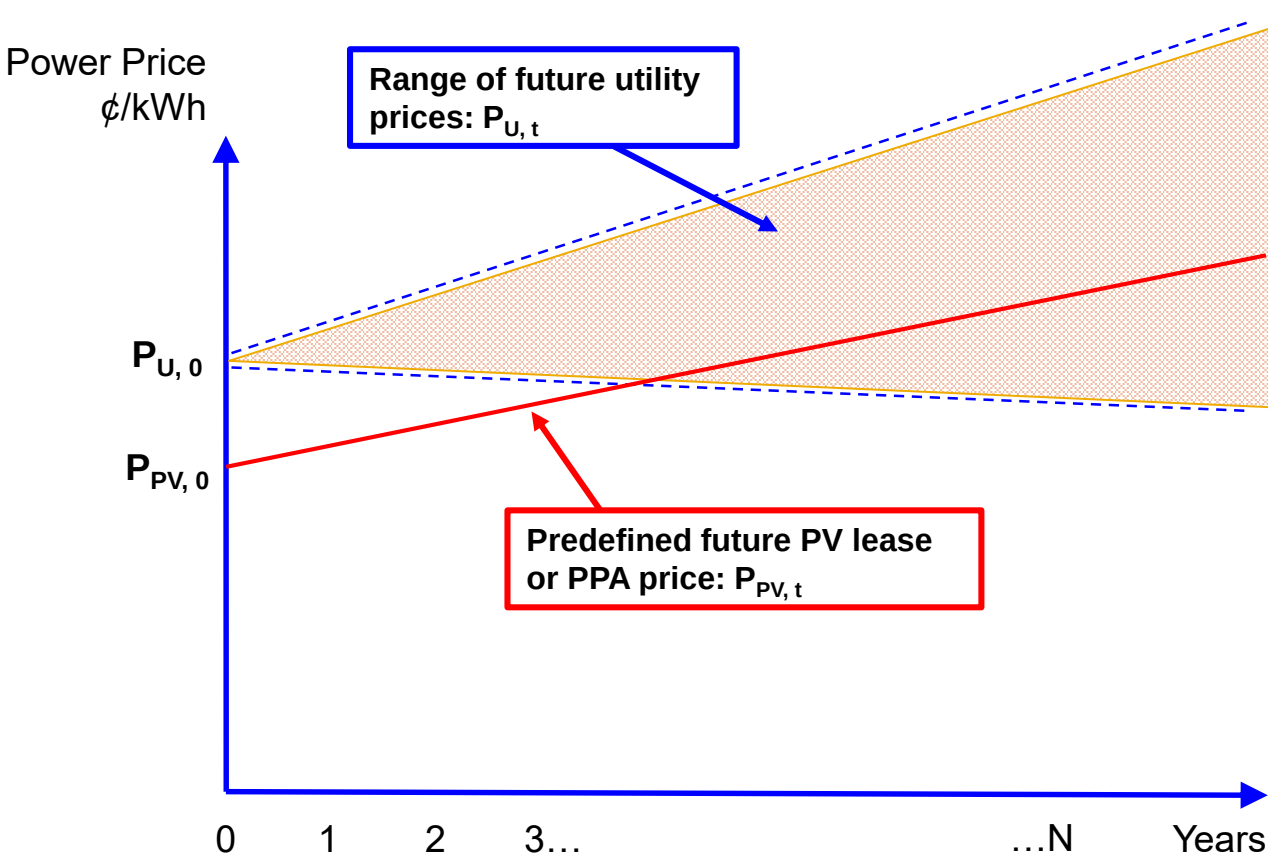


Source: MIT Utility of the Future Study Analysis

Tariff design and the economics of distributed PV and storage businesses

A critical feature of PV and storage business models is that their pricing is not structured to reflect underlying system costs, but to offer value relative to utility supplied power – Naturally, these systems are sensitive to utility tariff structures



SolarCity

Portfolio Average Metrics:

- Generation: 1,391 kWh/kW
- PPA Price: $0.13/kWh
- PPA Escalator: 2.2%

"We believe that our primary competitors are traditional utilities that supply energy to our potential customers" – SolarCity 10k

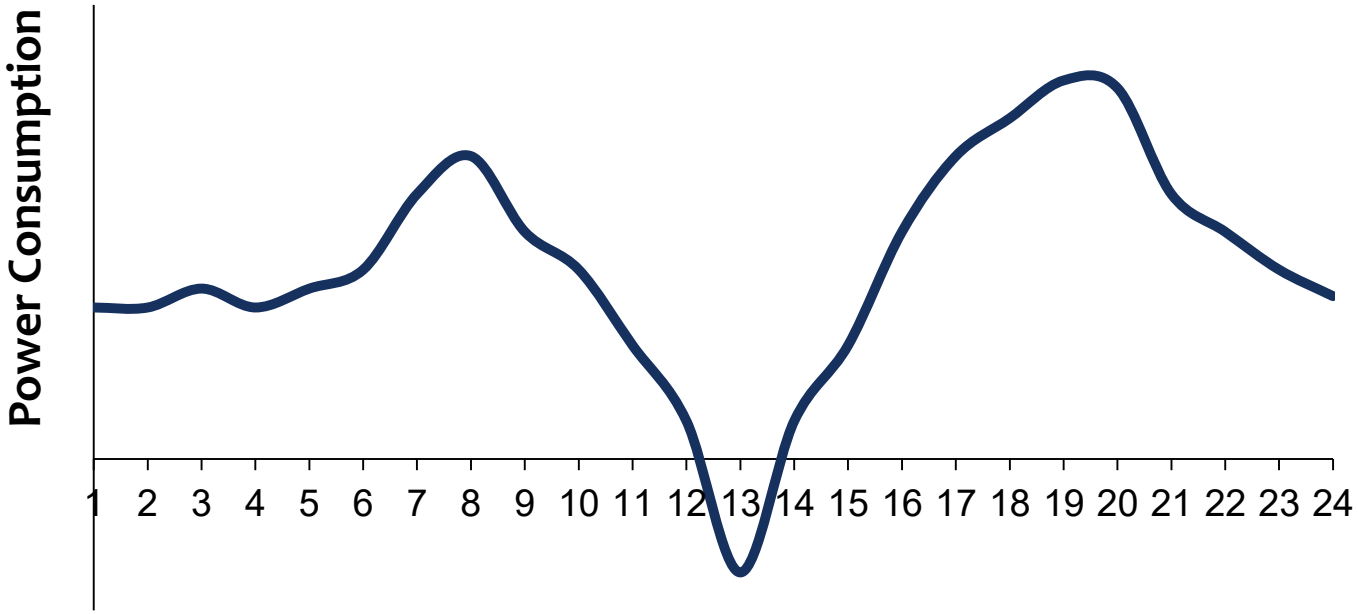
Source: MIT Analysis, United States Department of Energy, Company filings

These emerging business models require the creation of a level playing field for *all* resources

The best way to **create a level playing field** (and thus more affordable electricity) is to **dramatically improve prices and regulated charges** for electricity services.

1. Ensure that all prices and charges are non-discriminatory, technology neutral, and symmetrical

Electricity rates should be based *only* on the injections and withdrawals of electric power – this requires the use of improved metering infrastructure



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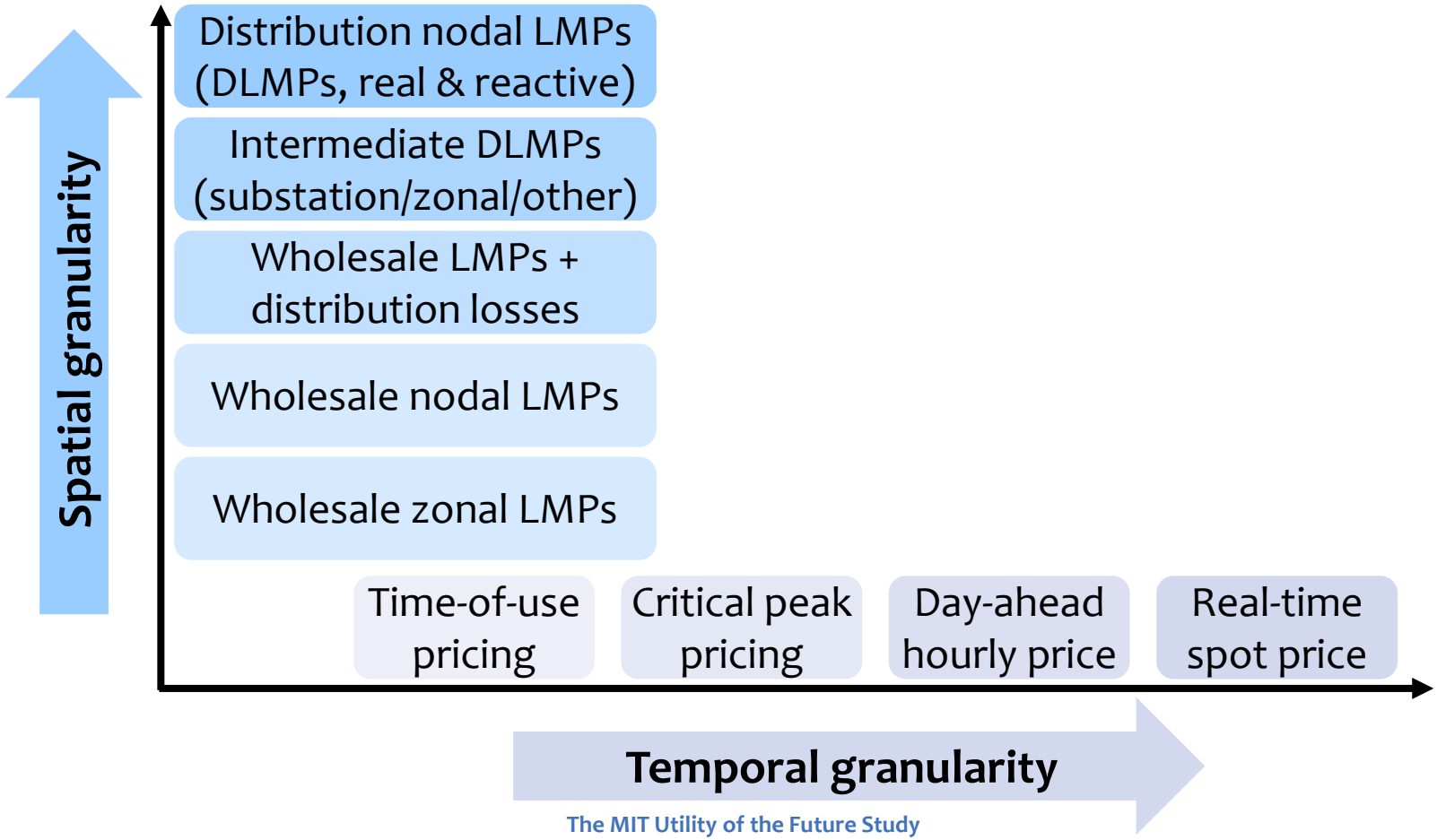
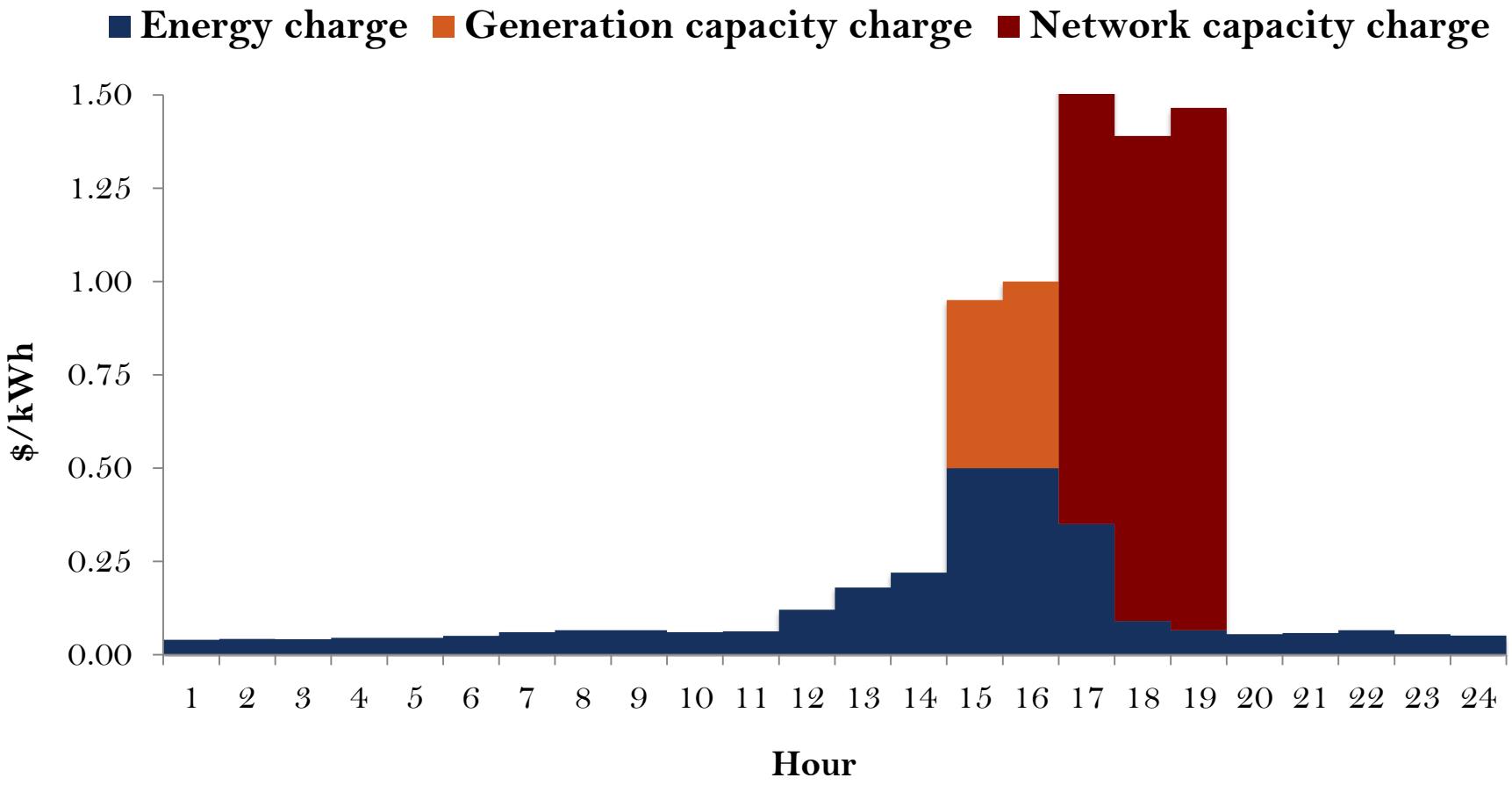
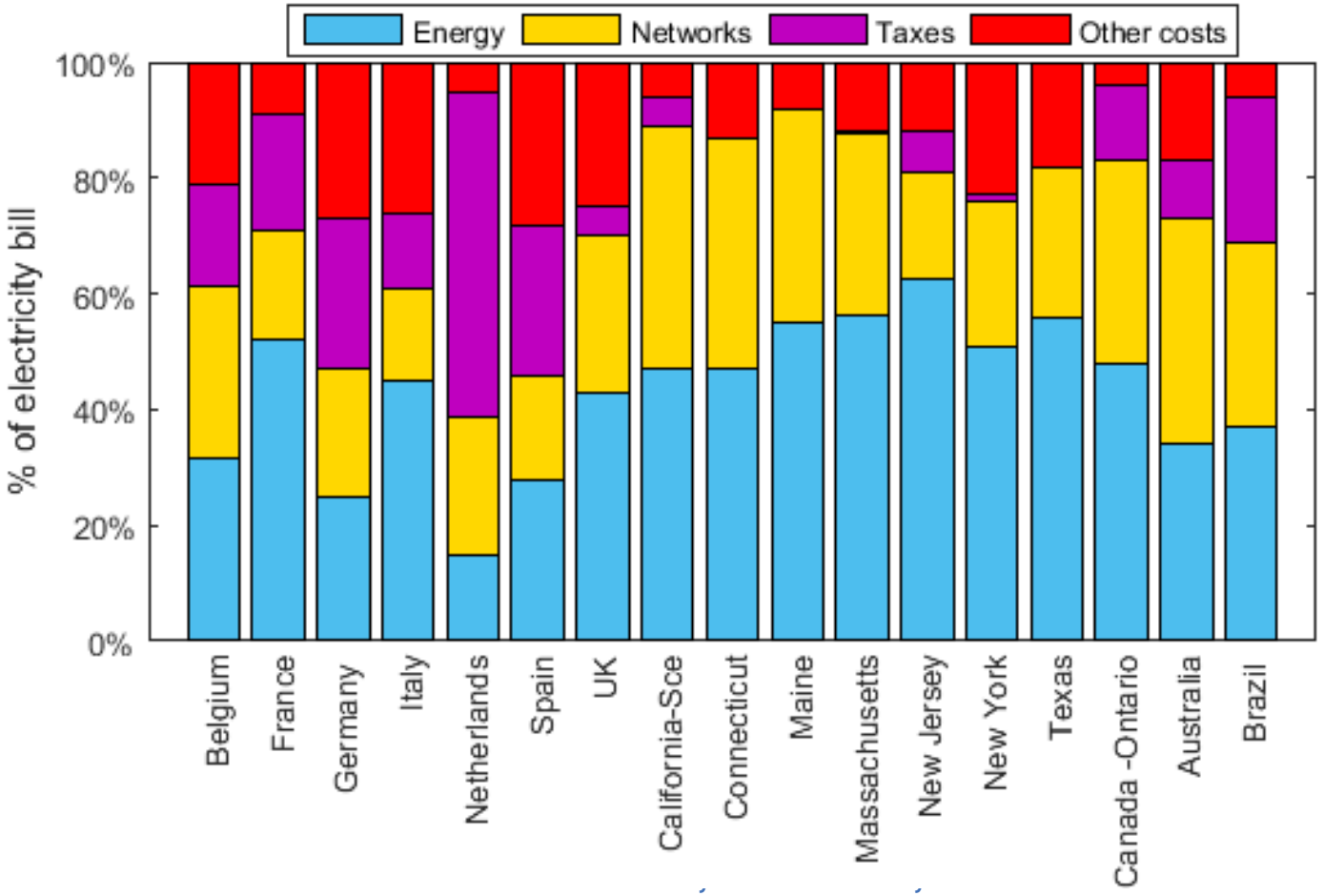
2. Progressively improve the granularity of price signals with respect to both time and location



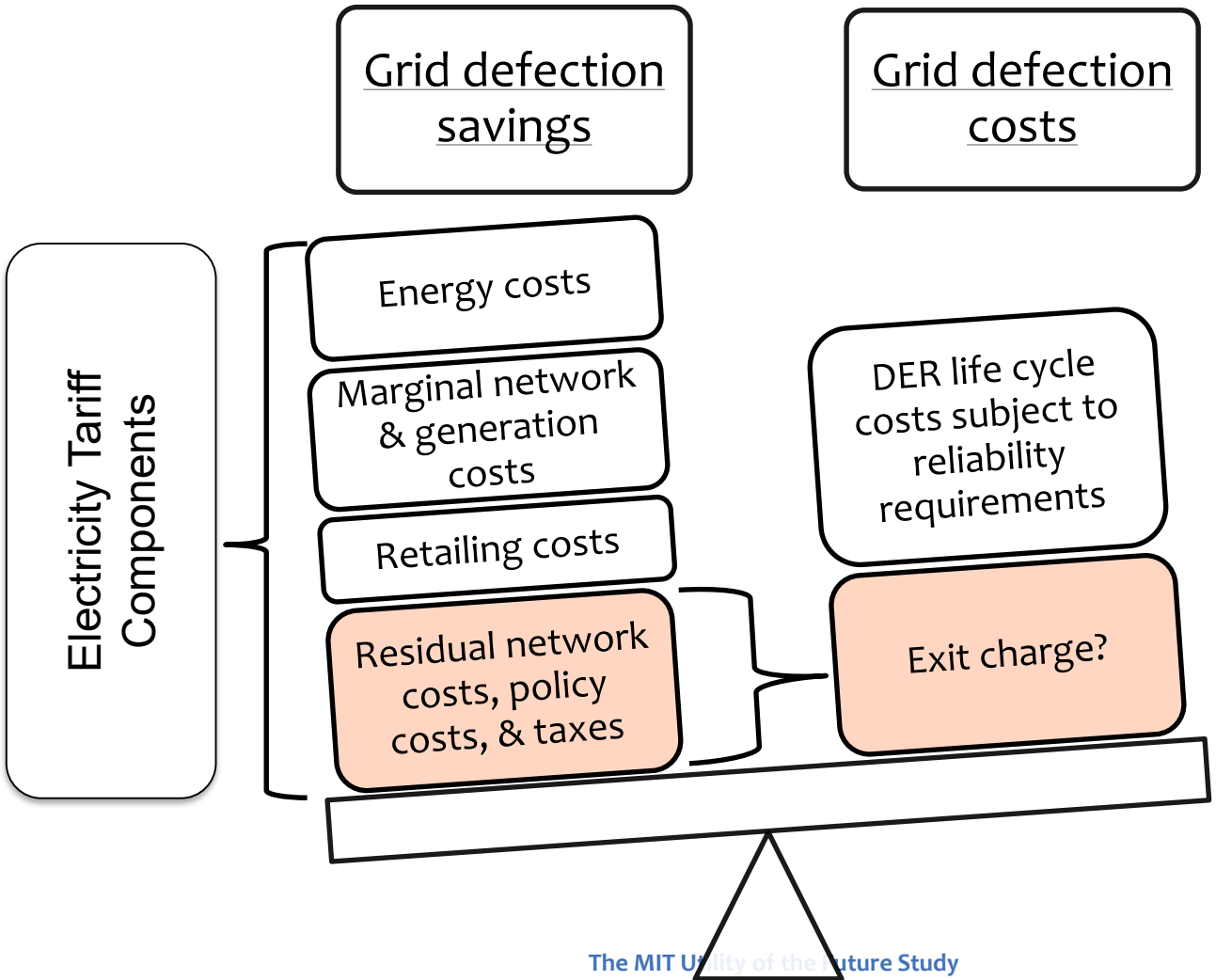
3. Implement forward-looking peak-coincident network charges and scarcity-coincident generation charges to align consumer decisions with system costs



4. Recover “residual” network and policy costs without distorting marginal consumption or production incentives



5. Carefully consider which costs are included in fixed electricity tariffs to avoid inefficient grid defection



6. Explore new methods for addressing distributional & implementation challenges without sacrificing efficient signals that reduce costs for all

1. **Cross subsidies**: Lump-sum bill credits or surcharges can restore desired cross-subsidies
2. **Spatial and temporal variability**: Pre-payments and hedging arrangements can address bill variability
3. **Low income support**: Assistance to those that can prove need can augment subsidies built into today's tariffs

Thank you!

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