



London Economics International LLC

Distributed Energy Resources: Regulatory Framework and Ratemaking Considerations

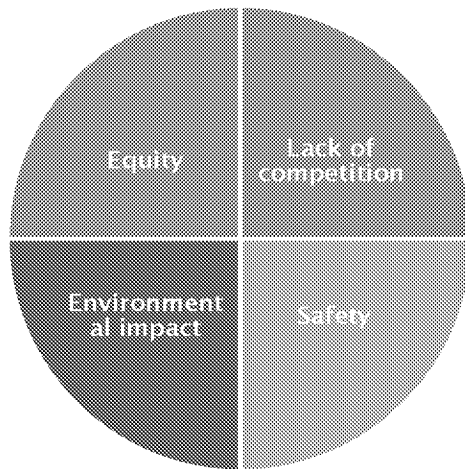
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**CAMPUT 2017 Conference
CEA Electric Utility Regulatory Innovations Workshop**

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DERs raise the question not only of what to regulate, but also who the regulator is

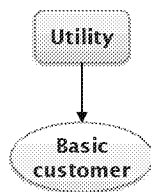
Reasons to Regulate



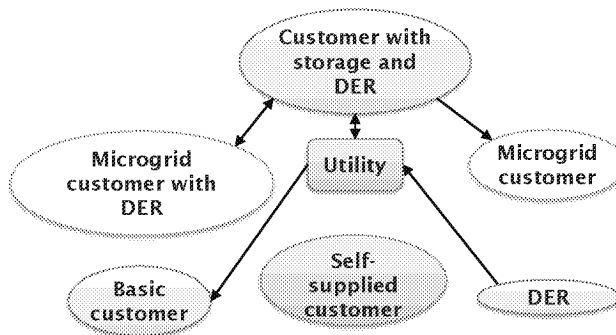
- ▶ It is useful to stand back and ask “why do we regulate?”
- ▶ As electricity becomes less “special”, arguments for unique regulator may wane, particularly as competition intensifies
- ▶ If DERs become like refrigerators (i.e., a common consumer appliance), are consumer protection and product safety regulators all that is needed?
- ▶ Periods of technological change can increase risk of regulatory capture as incumbents seek to protect status
 - Consider the hotel industry vs. AirBnB; when do calls for a “level playing field” constitute rent-seeking?
 - Are AirBnB hosts offering the same “product”?

Technology is challenging the concept of electric utilities as natural monopolies

Today's Grid



Tomorrow's Network



DER = Distributed Energy Resource

- ▶ Falling cost of renewables, storage will ultimately reshape utility-customer relationships, putting pressure on regulators and effectively serving as a cap on rates
- ▶ Customer reliability needs are more diverse than current regulatory model allows
- ▶ Evolution of microgrids should complement, rather than supplant, grid but this outcome is only possible if regulators and utilities change their mindsets

Will discuss perspectives: regulated utility developer, customer;

Graphic?

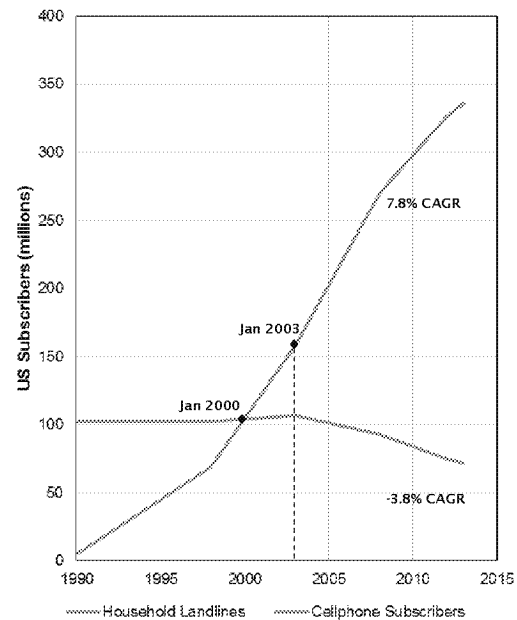
Need to work in smart grid

Paradox – more smart grid encourages change in customer behavior, the less utilities will be able to profit

Collapse of land line subscriber base in US shows how quickly landscape can change

- ▶ **Number of landlines is falling steadily**
 - It took a decade for cellular subscriptions to pass the number of landlines
 - 3 years later, the number of landlines began to fall
- ▶ **Customers have been willing to trade reliability for independence and convenience**
- ▶ **Lending schemes for solar make distributed generation more accessible, just as “free” handsets did for cellular**
- ▶ **“Utility in a box” solutions will become viable as storage questions are resolved**
- ▶ **While uncoordinated microgrids would fail to achieve optimal efficiency, customers may opt for them regardless**

Cellphone Subscribers vs. House Landlines (1990-2015)



Source: CTIA - The Wireless Association, US Census Bureau

No network is irreplaceable; significant evolution of the regulatory framework was required to enable railroads to recover

- ▶ Like electric utilities today, railroads faced significant subsidized competition
- ▶ Tariff setting was complex, and based on a "value of service" principle which drove away the highest margin customers
- ▶ Ability to better tailor rates to specific customers while dropping unprofitable service enabled railroads to become profitable again
- ▶ Efficiency improved as network shrank, with freight volumes today at historic

Pre-Reform Regulations	Post-Reform Regulations
Maximum and minimum rates and service standards published and set by Interstate Commerce Commission (I.C.C.)	Confidential rate and service contracts negotiated by customer and rail firm
Inter- or intra-modal rate competition was generally not possible	Rate competition possible
Innovation was restricted if it was deemed anti-competitive	Upper rate limits set for customers served by a single rail firm (so called 'captive customers')
Ownership of firms in other transportation modes generally not allowed	Innovation no longer regulated (except for safety measures); Cross-modal ownership permitted
Route abandonment subject to stakeholder challenges and slow approval process	Procedures relaxed; route and track abandonment procedures streamlined
Tough requirements for mergers, divestitures and alliances	Rules and standards eased particularly for small firms
Often lengthy hearings and approval processes	Procedures for mergers, divestitures and alliances were streamlined

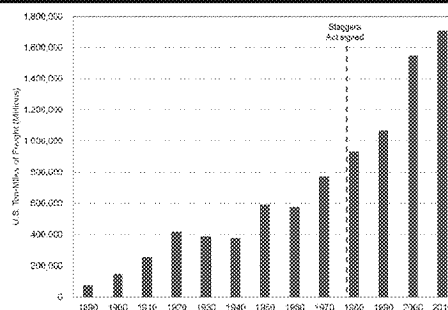
Railroad Mileage ('000 miles, 1840-2015)



Sources:

B. Cramer, *North American freight rail: regulatory evolution, strategic rejuvenation, and the revival of an ailing industry*. 2007
American Association of Railroads ("AAR")

Railroad Freight Tonnage (millions, 1890-2010)



Utilities will need new tools to respond, which may force reconsideration of regulatory principles

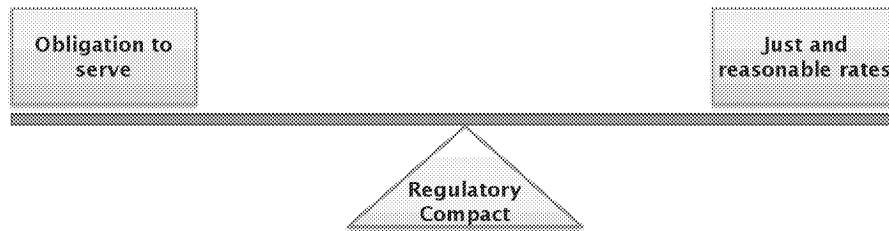
- ▶ **Regulators find it more difficult to think in terms of “value” instead of cost**
 - Value differs by customer, but rates do not
 - Current regulatory initiatives focus on value relative to externalities, rather than customer perspective
- ▶ **Utilities need to be able to align pricing with customer perceptions of value**
 - Ability to deviate from tariff
 - Increased responsiveness
 - Less rigid customer classifications

Traditional ratemaking principles:

Non-discrimination

Cost causation

Transition raises questions regarding stability of existing regulatory compact



ISSUES TO ADDRESS

Weakening of ratebase	Customers reducing or eliminating service means remaining customers potentially face higher rates
Change in billing determinants	Fixed components will need to make up larger proportion of bill. <i>LEI research suggests that some utilities generate more than 70% of their revenues through volumetric rates</i>
How to pay for regulator	If regulator is self-funding, how do we fund the regulator if microgrids are largely unregulated?
Utility social mandates	New approaches for funding low income customers and other public policy goals such as energy efficiency may need to be found

Standby exit fees

Rates

Fixed vs. volumetric

Role of regulator (protect poor)

Reliability may be overrated, and may no longer be sufficient justification for additions to ratebase; customers may differ in level desired

- ▶ Phone customers appear to be happy to trade quality and reliability for portability and flexibility
- ▶ Customers who have cut the cord, eliminating land lines entirely, have chosen to accept potentially lower levels of reliability in their home in exchange for the portability that cell phones offer
- ▶ Further, customers may be paying more for cell phones – once cost of the smartphone is considered – than they were for their landlines
 - Despite poorer call quality and inconsistency on a cell phone than a landline, customers place greater value on other features provided by cellphones
 - For the telephone industry, independence, flexibility and portability supplanted reliability and quality

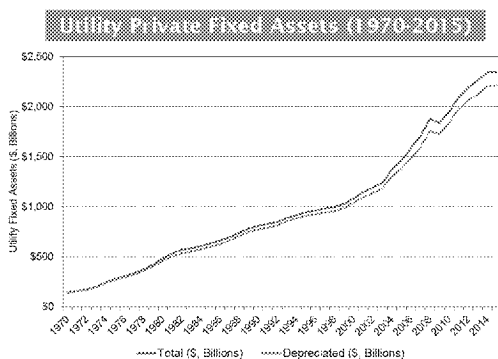
Portability vs Consistency

- ▶ The IEEE Spectrum describes the trade-off customers make for portability of cell phones as a result of the compression of voice data from the dedicated 64kb/s of landlines to lows of as much as 5-10kb/s in cellphones.
- ▶ Compression is performed automatically by cell phones, often at the expense of the user experience
- ▶ FCC only monitors customer complaints without imposing direct quality-of-service standards
- ▶ Despite lack of regulatory requirement, competition has forced US phone networks to improve

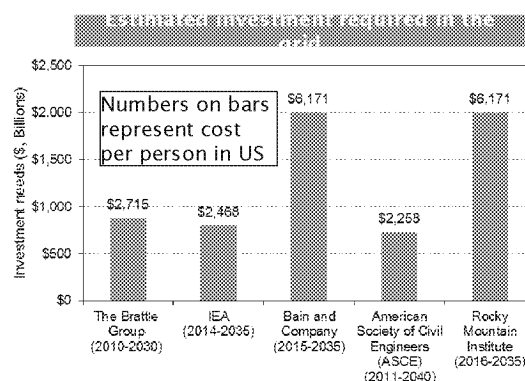
Source: IEEE Spectrum, Mobile Voice Quality, Will S. and Robert, 2001, IEEE Spectrum

Stranded costs are inevitable, and potentially unrecoverable

- ▶ **Significant new investment in wires has an increasing risk of being stranded as customers become more comfortable with DERs**
 - Estimates of future infrastructure spending requirements may be exaggerated if they do not take into account the possibility of DERs as substitutes
- ▶ **Utilities may be fooling themselves that a retreat to “regulated” businesses will provide stable revenues**
 - Dividends are likely to be reduced as profit margins come under pressure
- ▶ **While stranded cost recovery during transition to wholesale competition was allowed as market opening was a government action, and thus a potential “taking” of property, regulators did not cause technological change**
 - If customers are fleeing the network, who remains to pay the stranded cost rider?



Sources: Bureau of Economic Analysis



Regulators may need to seek other sources of funding such as DER taxes, or license fees, to fund social mandates

The BBC License

- ▶ The British Broadcasting Corporation ("BBC") is funded via an annual compulsory television license currently priced at £147
- ▶ A license is charged to every household where television programs are watched, irrespective of the signal method (terrestrial, satellite, cable or online) or the receiving device
- ▶ Failure to pay the license fee is a criminal offence, enforced through a provision in the Communications Act of 2003
- ▶ It will be increasingly difficult to use utilities as vehicles for social mandates
- ▶ Items like support for low income customers, energy efficiency, and renewables will likely need to be funded from some form of tax
- ▶ While such taxes could be targeted directly at DER users, this may be counterproductive
- ▶ Pleas to utilize taxpayer funding to reimburse utilities for stranded costs should be carefully scrutinized, given that utilities are already compensated for risk

Rethinking the BBC License

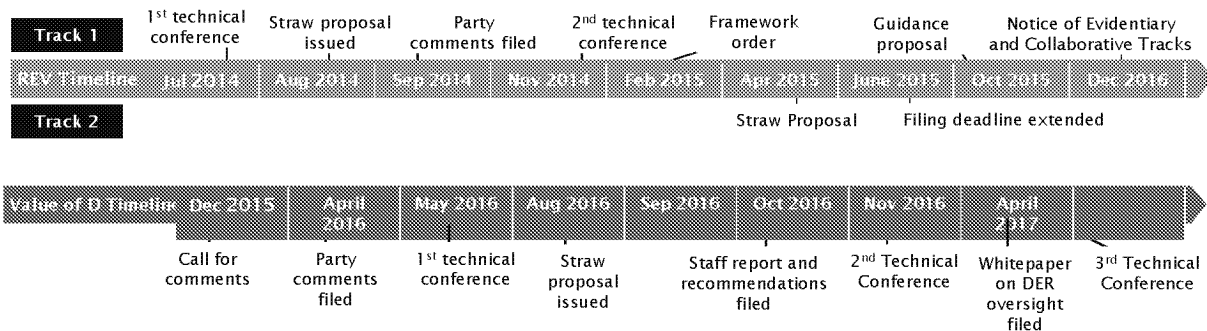
- ▶ The advantages of the BBC license are its simplicity, the fact that it is a secure and predictable source of income, and that it allows independence from advertisers' influence
- ▶ However, it is seen as regressive, is expensive to collect – costing the BBC up to £100 million annually – and there is no choice even for users who do not use the BBC services
- ▶ The British parliament is currently discussing alternative funding methods for the BBC, including a subscription model, an income-related tax, or an advertiser-funded model

Sources: House of Commons. *Future of the BBC: 4th Report*. 2015

BBC
Worldwide

However, regulators need to be careful that in responding to trends they neither create more bureaucracy nor embed incumbent advantages

- New York has committed to two major DER programs: Reforming Energy Vision (“REV”) and the Value of DER (“Value of D”)



A plethora of paperwork in New York

- The NYPSC has undertaken a lengthy and poorly coordinated stakeholder process in designing its DER programs:
 - **REV Process:** since it began in April 2014, the REV docket has recorded **1,176 filings**, attracted **5,672 public comments**, and currently counts **300 interested parties**. There have also been **18** public statement hearings
 - **Value of D:** since docket creation in December 2015, this docket has accumulated **407 unique filings**, **3,280 public comments**, **93 interested parties**; the filing that opened the docket indicated that there was no deadline for completion of development of the methodology.

Like customers and system operators, regulators will need to adapt

Regulators	Customers	System operators
▶ Accept <i>that network rates may need to be deregulated</i> as DG will set effective price cap ▶ Revisit franchise and license agreements to <i>eliminate barriers to competition</i> ▶ Focus on <i>access for vulnerable customer</i> classes ▶ Create regulatory <i>niche for storage</i> ▶ Recognize that <i>stranded costs</i> may arise ▶ <i>Resist utility efforts</i> to both manage and own DG, microgrids	▶ Recognize that <i>load is also a resource</i>, with potential for revenues as well as costs ▶ Think carefully about <i>level of reliability</i> needed and the associated cost ▶ Avoid being <i>seduced by technology</i>, spending on jazzy projects which fail to produce results ▶ <i>Don't view utility as only option</i> ▶ Focus on <i>peak shaving</i> before cutting the cord	▶ Position themselves as <i>natural optimizers</i> of central grid and microgrid ▶ Assure that <i>storage, demand response, and ancillary services</i> market designs work effectively to integrate intermittent generation ▶ Recognize that <i>load forecasting will become more complicated</i> ▶ <i>Avoid incumbency privilege</i> ▶ Consider <i>non-transmission alternatives</i>

What does this mean for future regulatory arrangements?

REGULATORY VISION 2030

- ✓ Rate regulation sets ceilings, not floors
- ✓ Less focus on capping ROEs if rates below the ceiling
- ✓ Open access at distribution level
- ✓ Exclusive franchises eliminated
- ✓ Taxpayer funding of social mandates

- ▶ While multiple actors will be involved, some *common standards will be required*
- ▶ *Roles of utilities and ISOs will need to be clarified* with regards to microgrid asset ownership and coordination
- ▶ Policy makers will need to *explore whether new license categories are necessary* for microgrids, storage, and small scale generation
- ▶ Standby rates need to reflect the *value of optionality* rather than simply costs
- ▶ If moving to enhanced time of use rates is impossible, other *incentive programs need to be explored*
- ▶ DER developers themselves should be encouraged to propose means of *minimizing grid impact* and *firming power*

How DERs, legacy networks, and renewables will work together:

- ✓ ISOs and utilities will coordinate behind the meter resources
- ✓ Utility rates regulated primarily for vulnerable groups
- ✓ Storage encouraged, with costs charged to intermittent generators
- ✓ Time of use meters deployed with super peak/off peak differentials 4:1 or more
- ✓ Stand-by charges and obligation to serve revised
- ✓ Utilities allowed on a competitive basis to engage in DG and microgrids if not charged to ratepayers AND if not also coordinating microgrids integrated with their system

A.J. Goulding serves as President of London Economics International, where he leads several of the firm's engagements on a variety of issues



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Recent publication:
*Railroads, Utilities and
Free Parking: What the
Evolution of Transport
Monopolies Tells Us
About the Power
Network of the Future.*
November, 2016.
Columbia Center on
Global Energy Policy

- ▶ A.J. Goulding manages a *growing international consulting firm* focused on finance, economic, and strategic consulting to the energy and infrastructure industries
- ▶ With *over twenty years of experience* in evolving electricity and natural gas markets, A.J.'s diverse background enables him to work effectively in both emerging markets and OECD countries.
- ▶ In North America, A.J. has been *articulate in describing market relationships* between wholesale power marketers, merchant plants, aggregators, DERs, and the existing investor owned utilities
- ▶ In emerging markets, A.J. has *considerable experience* dealing with the challenges of mixed private and public ownership, difficulties in creating credit-worthy distribution and retail entities, and the realities of line losses, unreliable fuel deliveries, and politicized labor relations
- ▶ A.J. has an MA in International Business from Columbia University, where he currently serves as an adjunct professor, *teaching a graduate course on electricity*

LEI is a global economic, financial and strategic advisory firm, specializing in analysis of the energy sector

London Economics International LLC ("LEI") combines detailed understanding of specific network and commodity industries, such as electricity generation and transmission, with sophisticated analysis and a suite of proprietary quantitative models to produce reliable and comprehensible results.

LEI has extensive experience in several areas, including:

GENERATION:

- working with generation owners to forecast market conditions and evaluate future revenues
- Assessing the impact of new generation resources on capacity and energy prices

TRANSMISSION:

- Helping in the assessment of the establishment of independent transcos
- Evaluating the market impact from proposed transmission projects

RENEWABLES:

- Working with developers to value potential revenue streams from Renewable Energy Credits ("RECs") and/or emissions offsets
- Counseling governments and regulators on creating policies which efficiently incentivize investment in renewable energy

NATURAL GAS:

- Assessing the synergies between the natural gas and electric power industries
- Examining performance-based ratemaking and total factor productivity for natural gas distribution companies

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