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Transformative Energy Governance – is there cause for optimism?

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New Thinking For Energy



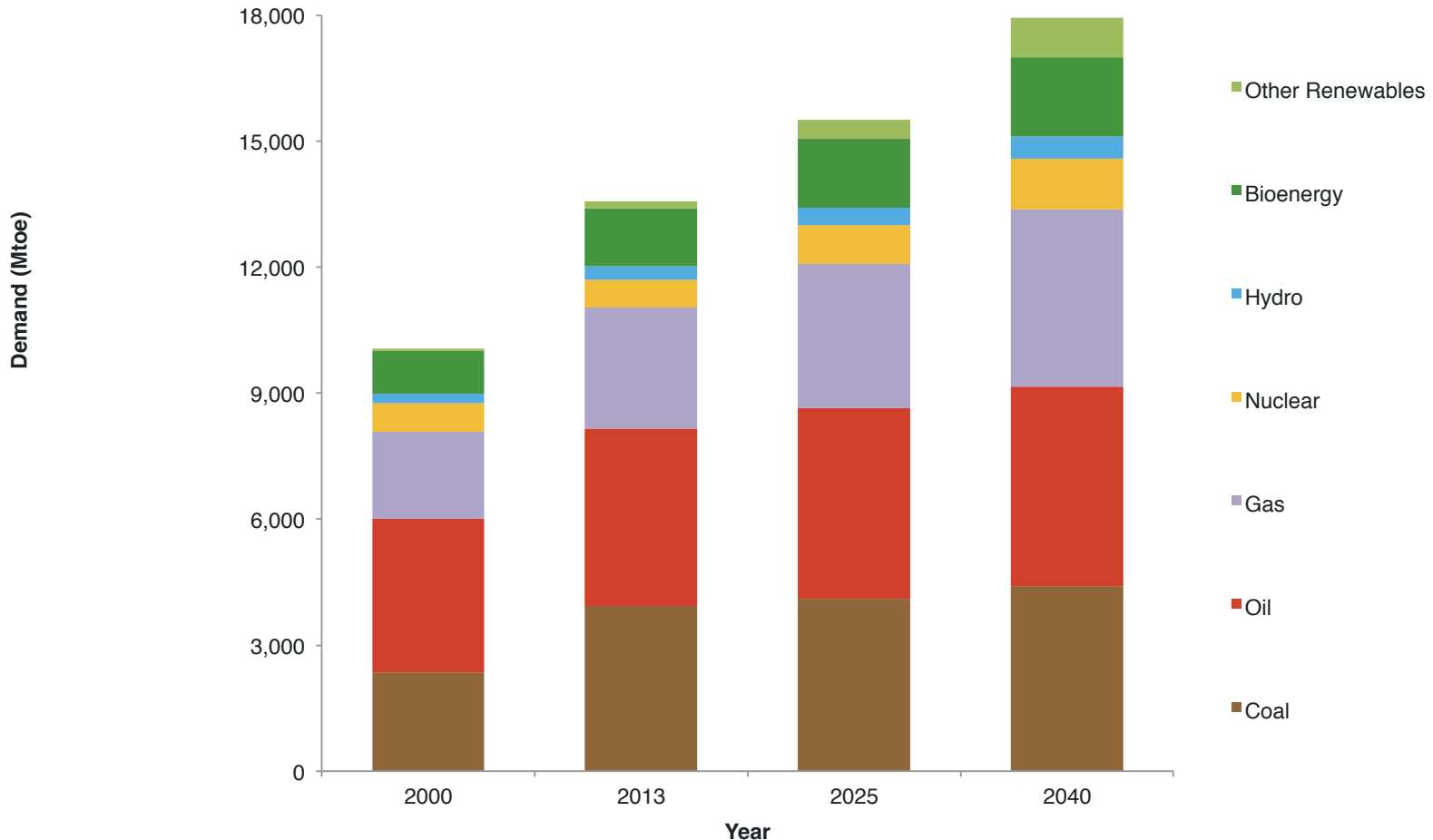
Introduction

- Apologies if too simple or too complicated energy-wise
- Currently working on the links between innovation and governance (IGov)
- What is energy governance?
 - Policies, institutions, regulations, rules and incentives of markets and networks – ie ‘the rules of the game’
- Why is governance so important?
 - Because it enables change, for example, by providing payment for new services; by providing access to grids; it changes Codes and Licenses as needed etc; but
 - it can also undermine or channel change
 - If it is inflexible, it can lag behind technological and economic change and social preferences, slowing transformation and potentially making it more costly

What is the energy issue?

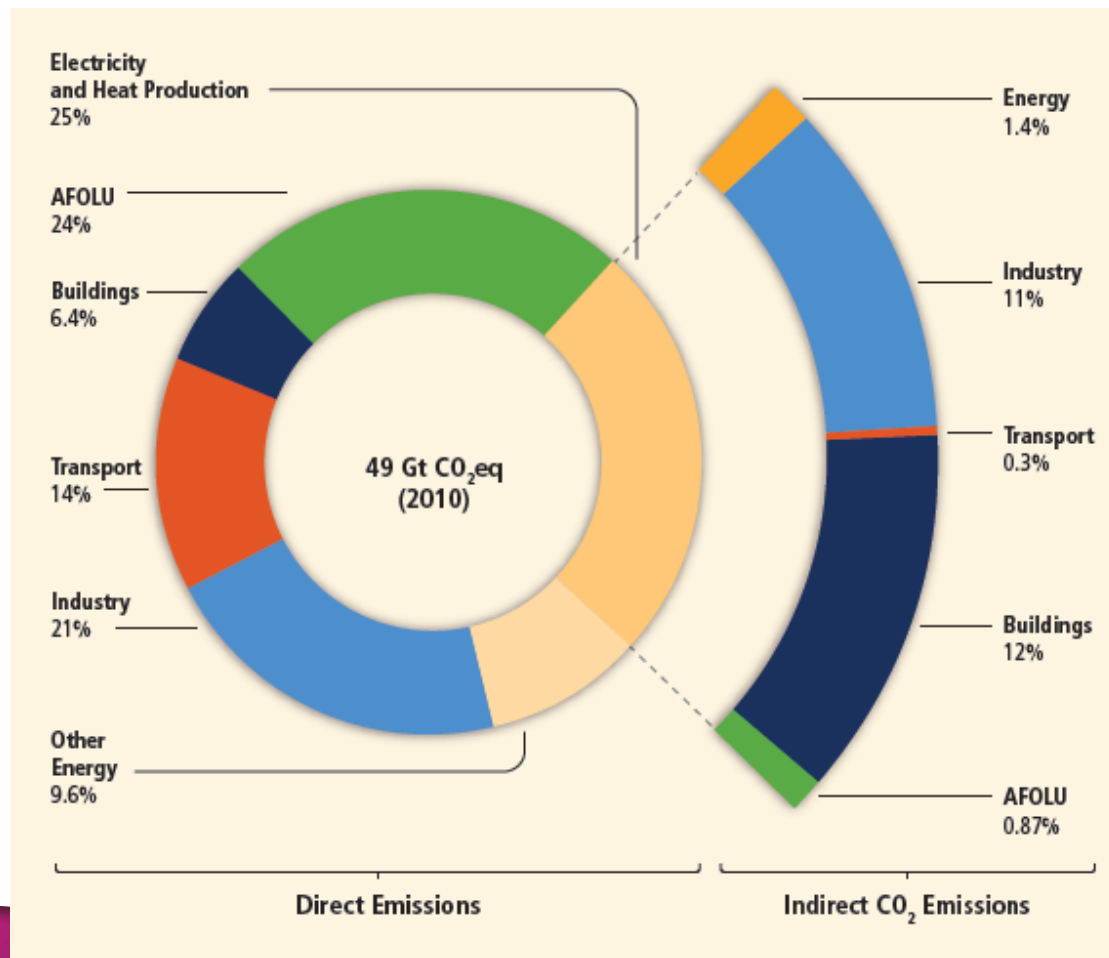
- Global energy use is rising; fossil fuels are still dominant but carbon emissions are broadly flat
- A very large proportion of climate change emissions derives from energy use (about 75%)
 - We have to reduce GHG emissions from energy by (conservatively) 80% from 1990 levels by 2050
 - Energy use is broadly electricity, heat and transport
 - We need to reduce global GHG emissions in all three areas; and
 - We need to increase the rate at which we reduce GHG emissions
- Governance needs to alter to enable that change

Total Global Energy Use is Rising and predicted to remain fossil dominated



IEA. *World Energy Outlook*. Paris: International Energy Agency; 2015. **Global Primary Energy Demand by fuel in 2013 and projected for 2040.** The fossil fuel dominated global primary energy demand in 2040 under the New Policies Scenario – the central scenario. This is the scenario which takes account of policies which have been announced as of mid-2015. It shows how demand changes until 2040, and where supply is coming from. Fossil fuels are still the dominant source of energy in 2040.

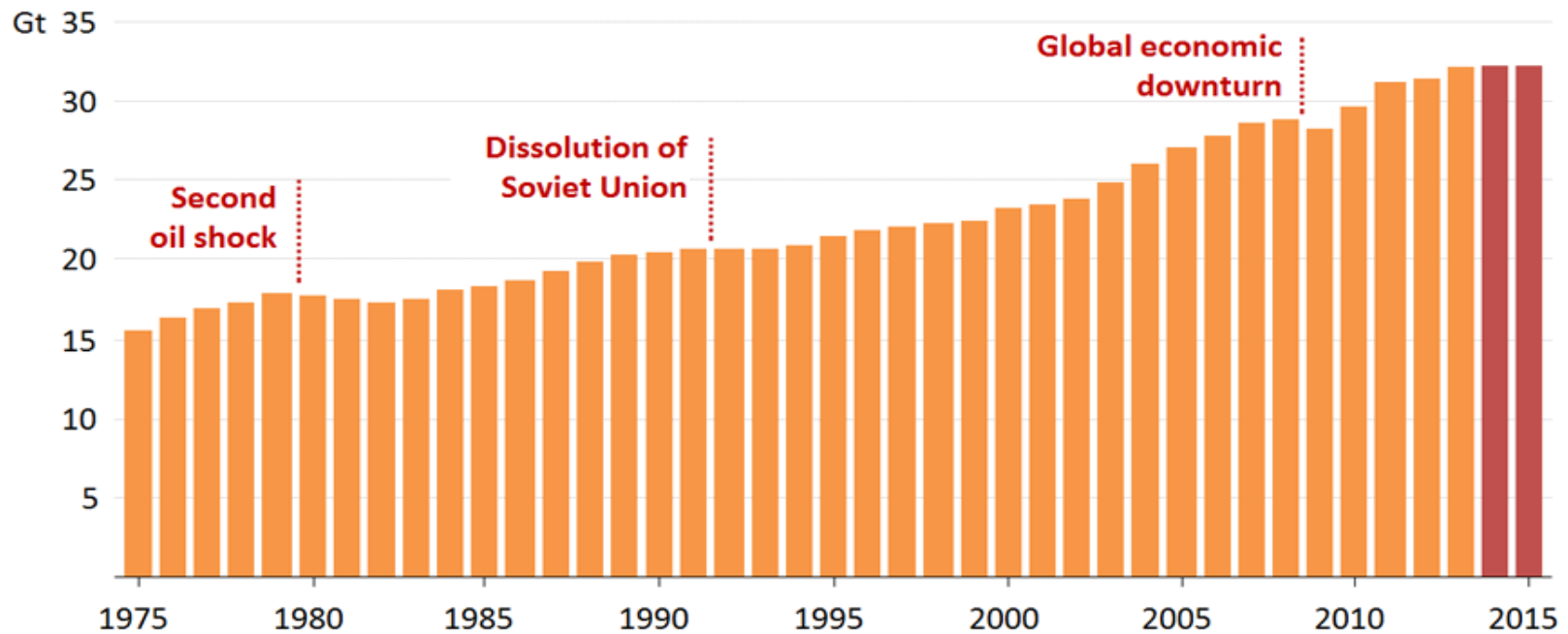
Energy use is the cause of ~76% of global GHG emissions, and it has to decarbonise to reduce emissions from all sectors http://fs-unep-centre.org/sites/default/files/publications/globaltrendsinrenewableenergyinvestment2016lowres_0.pdf (Fig SPM.2)



CO2 remained flat for 2 years which is good, now we have to increase the rate of reduction

(preliminary) <https://www.iea.org/newsroomandevents/pressreleases/2016/march/decoupling-of-global-emissions-and-economic-growth-confirmed.html>

Global energy-related CO₂ emissions



IEA analysis for 2015 shows renewables surged, led by wind, and improvements in energy efficiency were key to keeping emissions flat for a second year in a row

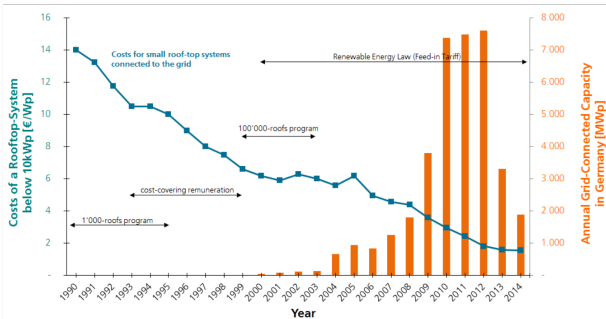
What are the challenges of increasing the rate of decarbonisation and transforming our energy systems (ES)?

- We need different ES: ones which meet our goals of sustainability, security and affordability, including using as little energy as possible, and using it more efficiently
- ES have to be resilient (one aspect of which is flexibility), to weather but also to changes which may occur (ie technological, operational, economic, social and political change; customer wishes and preferences)
- New entrant and customer wishes have to be enabled
- Infrastructure has to be upgraded, and paid for – so investment has to be attracted
- Flat or falling energy demand in some countries means less energy units of energy to add energy system upgrade costs to
- Need to keep prices as low as possible for customers
- All in a very rapidly changing energy world

There are already significant energy system changes (and opportunities) in some countries, viewed in different ways by different stakeholders

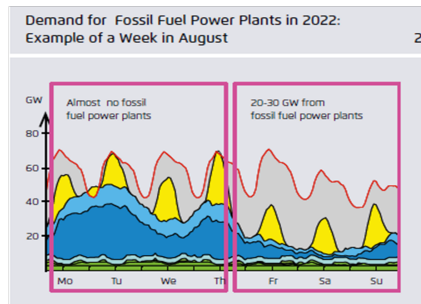
Some electricity systems are rapidly changing because of new technologies, changing economics, and changing social preferences

The cost of rooftop PV systems in Germany (Fhg, 2015)

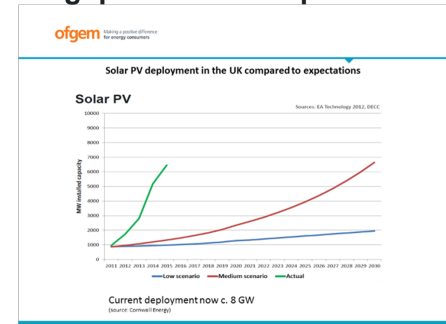


Increasing amounts of variable power alters operational needs of electricity systems considerably

Source: Agora's 12 Insights from Germany's Energiewende



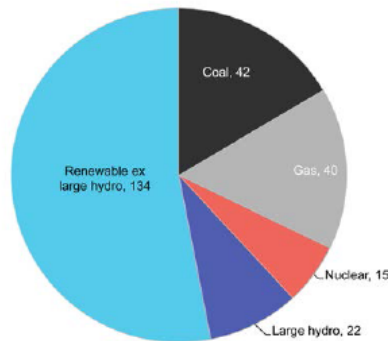
Even in countries without strong support, deployment of some renewables is happening quicker than expected



Changes are already having a major existential impact on European Utilities, leading to their restructuring

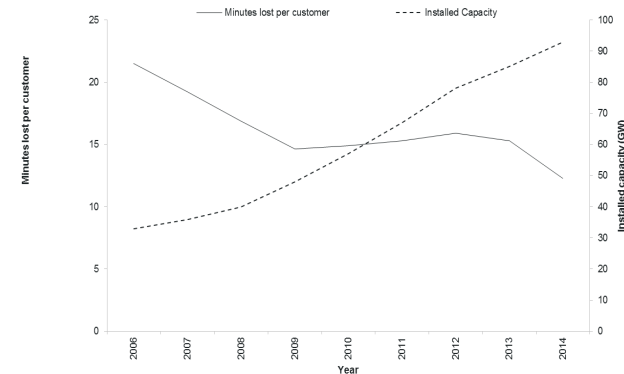


FIGURE 25. NET POWER GENERATING CAPACITY ADDED IN 2015 BY MAIN TECHNOLOGY, GW



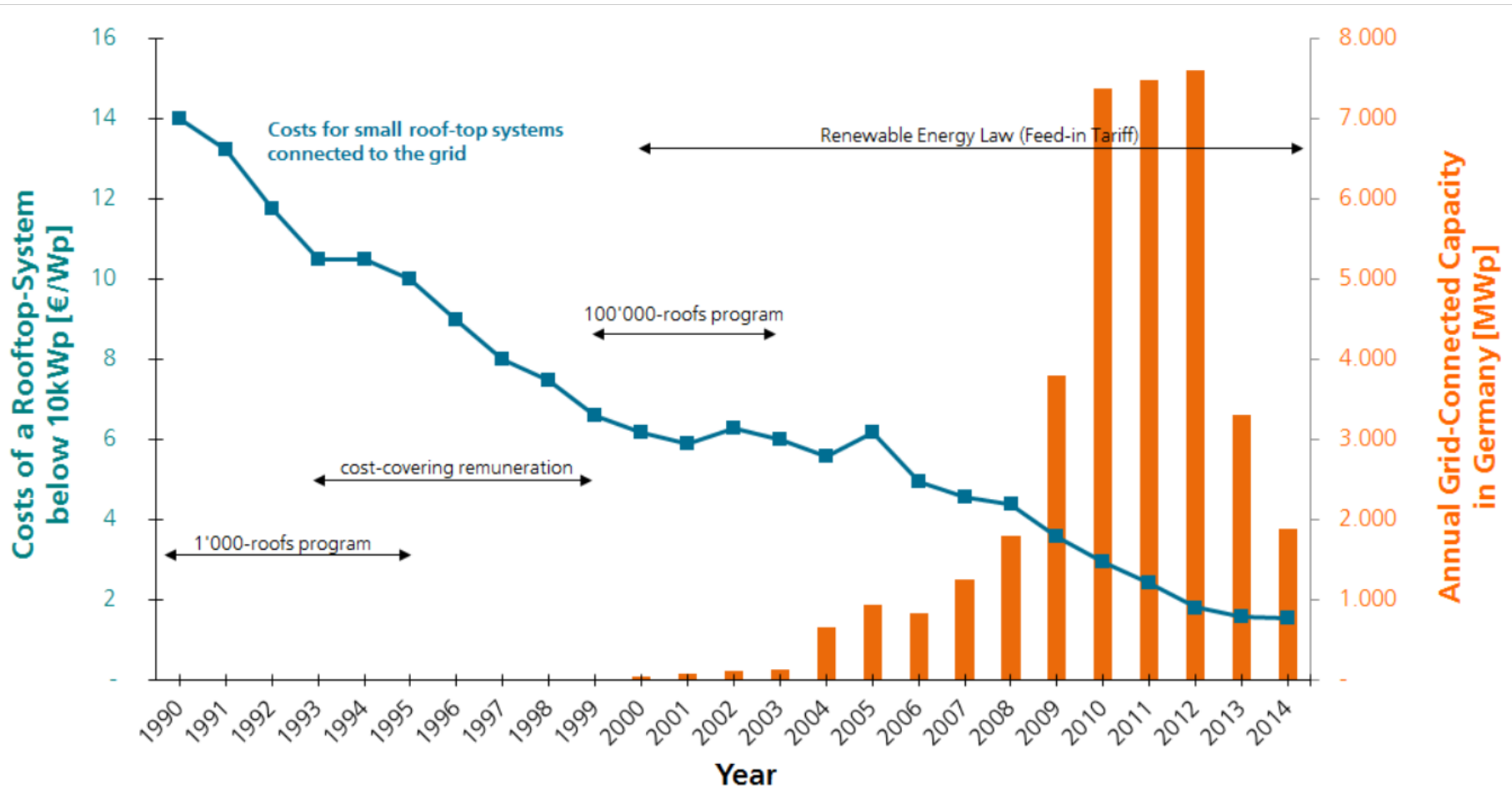
Source: Bloomberg New Energy Finance

Minutes Lost Per Customer in Germany Relative to Renewables GW Installed Capacity 2006-2014 Source: Mitchell 2016



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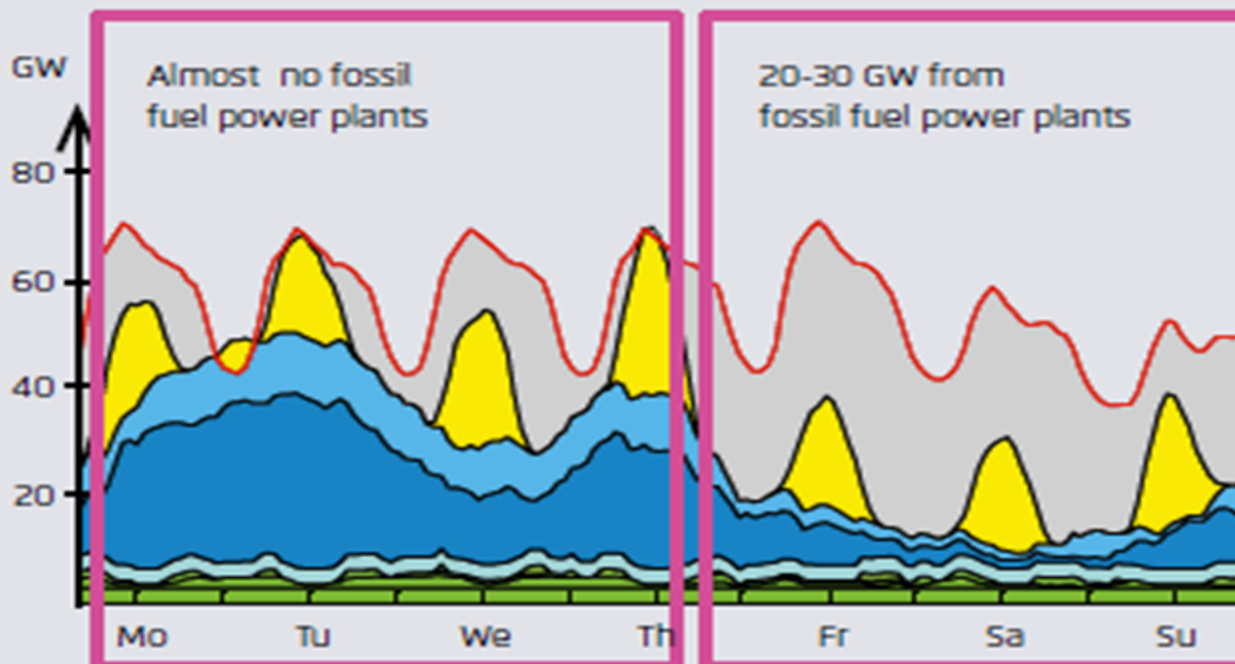


Increasing amounts of variable power alters operational needs and economics of electricity systems considerably

Source: Agora's 12 Insights from Germany's Energiewende

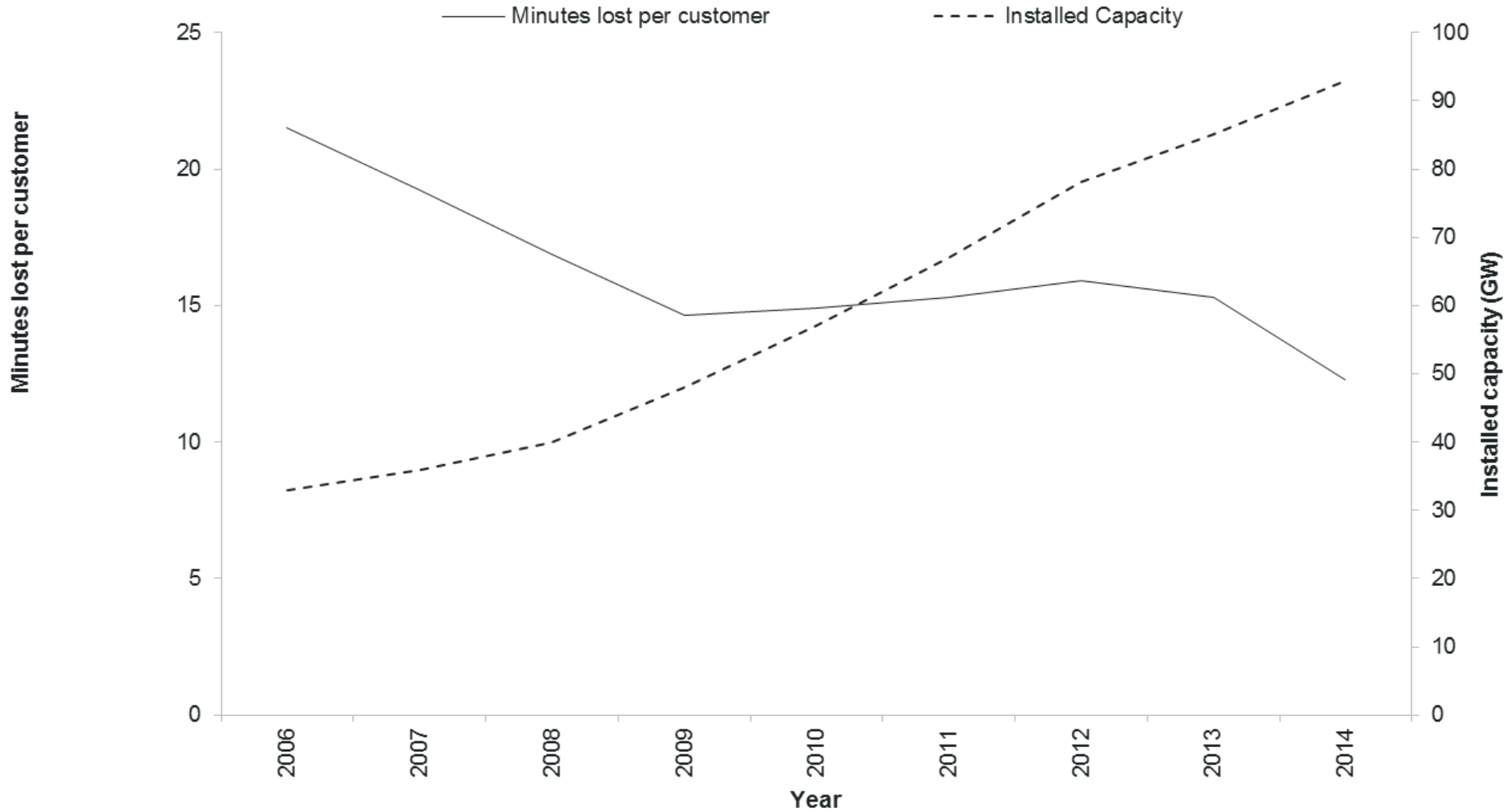
Demand for Fossil Fuel Power Plants in 2022:
Example of a Week in August

2



Minutes Lost Per Customer in Germany Relative to Renewables GW Installed Capacity 2006-2014

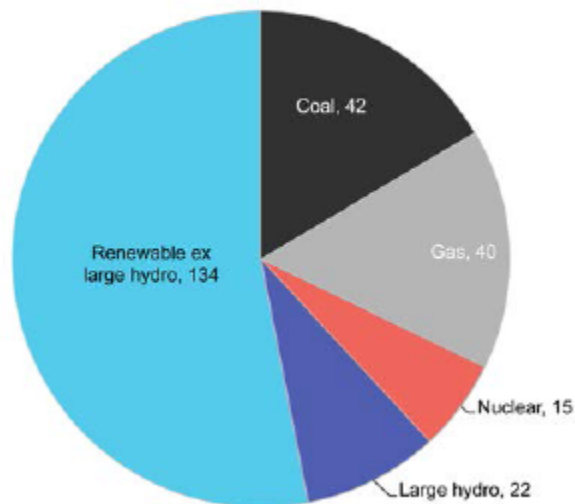
Source: Mitchell 2016



Changes are already having a major existential impact on European Utilities, leading to their restructuring

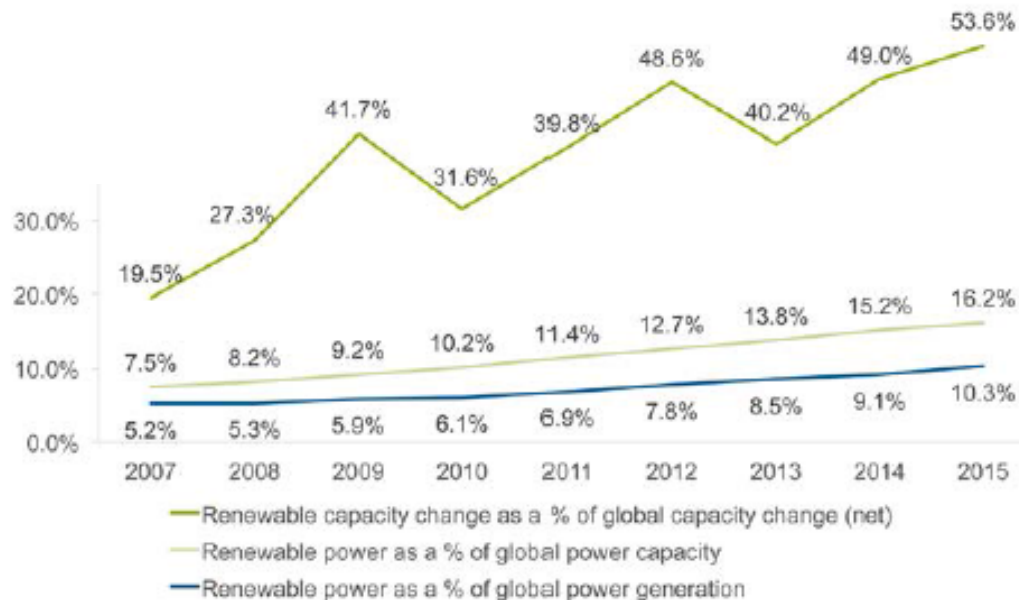


FIGURE 25. NET POWER GENERATING CAPACITY ADDED IN 2015 BY MAIN TECHNOLOGY, GW



Source: Bloomberg New Energy Finance

FIGURE 24. RENEWABLE POWER GENERATION AND CAPACITY AS A PERCENTAGE OF GLOBAL POWER, 2007-2015



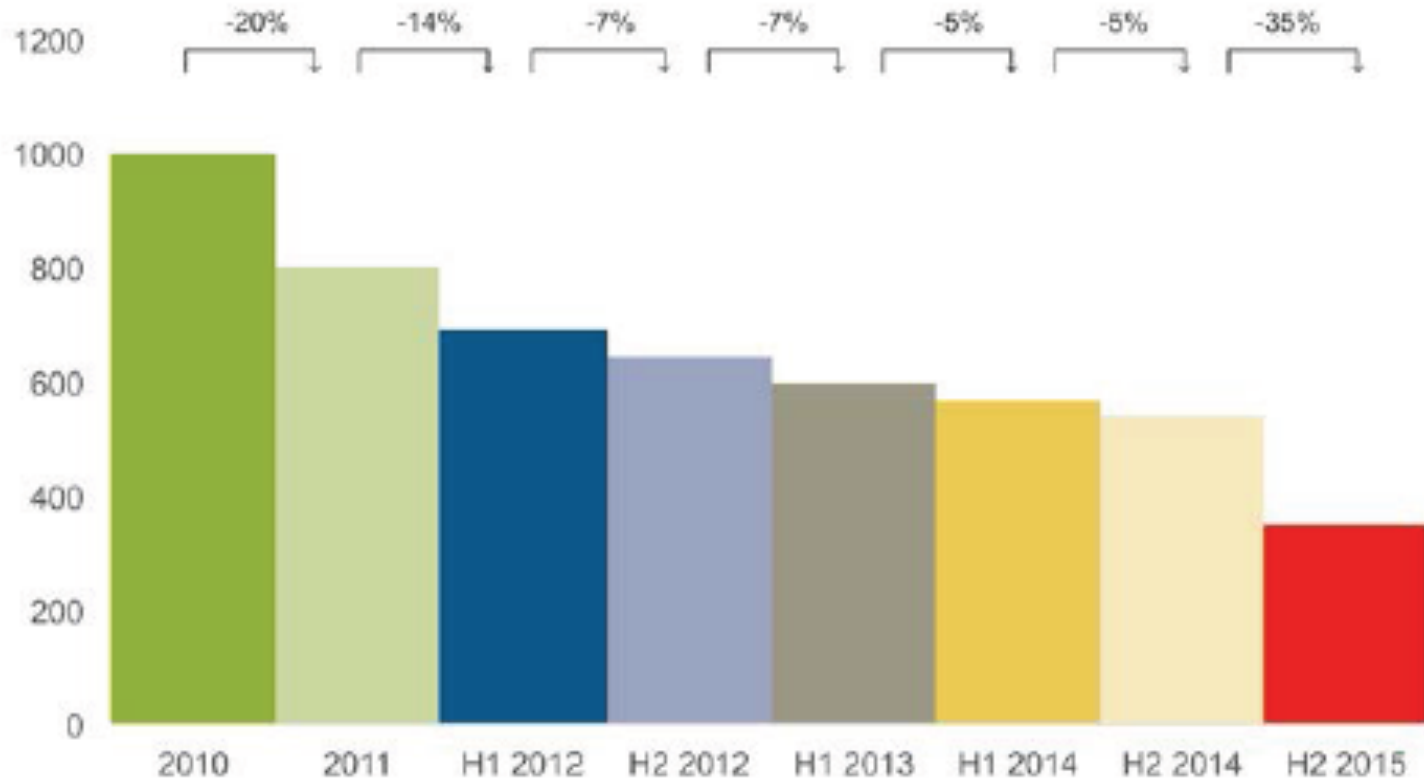
Renewables figure excludes large hydro. Capacity and generation based on Bloomberg New Energy Finance totals.

Source: Bloomberg New Energy Finance

A Game-Changer?

ht
gl

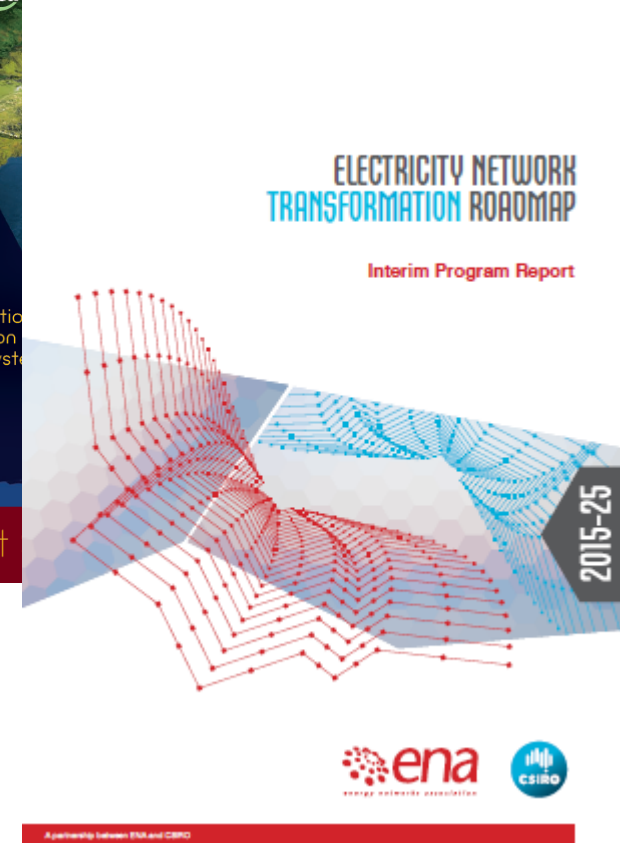
FIGURE 28. AVERAGE EV BATTERY COSTS, \$ PER KWH AND PERCENTAGE CHANGE BETWEEN PERIODS, 2010 TO H2 2015



Source: Bloomberg New Energy Finance

Despite all these opportunities, governance in most countries is lagging energy system challenges and changes

- energy system challenges and opportunities won't be solved and captured with BAU 'economic' regulation; and
- transformative governance will not 'emerge' – it needs to be put in place as part of long-term, directed strategic framework
 - NB note difference of requiring 'designed' governance and enabling evolving services and actors



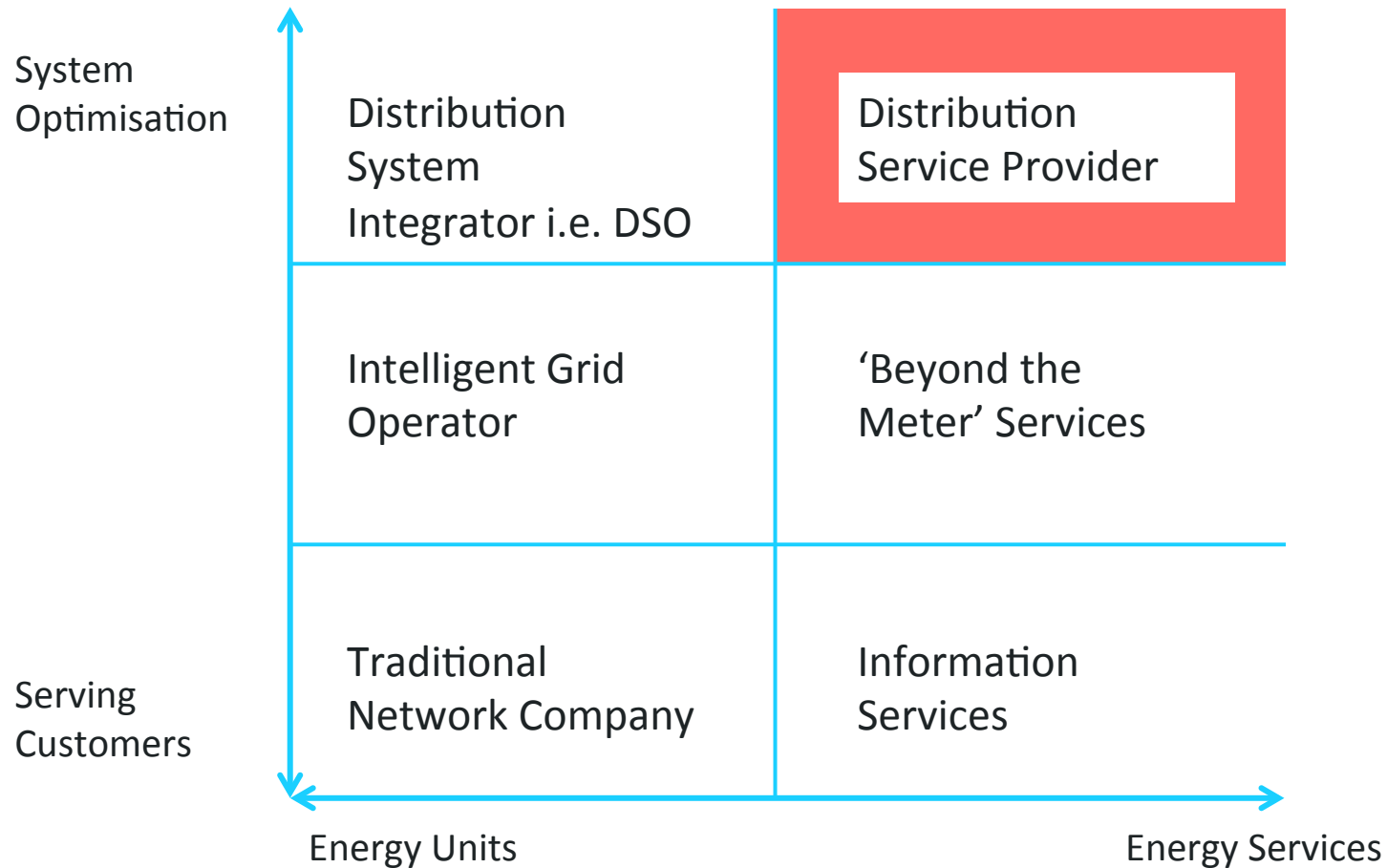
Its not just governance change we need, but transformative governance change

- There has (arguably) been very few transformative energy policies / governance since 1970's:
 - RE and CHP policies in Denmark in response to oil crises in 1970s
 - PURPA Act in CA in 1970's
 - FITs in Germany in 1990/1
 - NEM in some US States
 - ICT in energy?
- Others?
 - Biofuels in Brazil?
 - DSR in some US States
 - Current energy-independence in SE Australia?
 - Interconnectors in Europe?

What are the common qualities of transformative governance?

- The decision-makers understood the energy system challenges they were dealing with at the time, then
 - Dealt with the current challenges
 - Enabled the means to capture the new opportunities
 - Enabled more choice for customers (all types) / new entrants as wanted, and thereby gave them more influence
 - Kept up with technological and social change and preferences
- Leads to a structural, dynamic change

What do I think is the next transformative governance step?: distribution service providers (market facilitators at the distribution level)

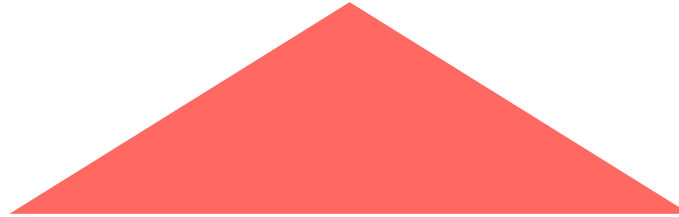


Source: Adapted from CSIRO and Energy Networks Association 2015, Electricity Network Transformation Roadmap: Interim Program Report

What is a traditional network utility?

Distribution Network Operator

- Supplying energy units to customers
- Maintaining certain operational standards
- Making a rate of return on capital assets, so incentive to add capital assets



Maintaining
a safe grid

Maximising
asset
infrastructure

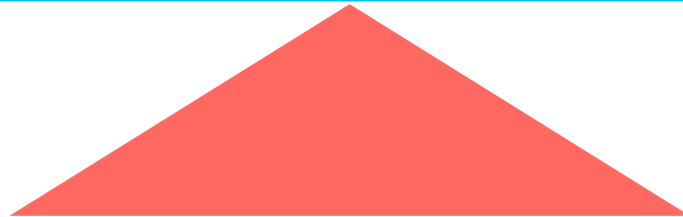
Rate of Return Regulation

Source: Adapted from CSIRO and Energy Networks Association 2015, Electricity Network Transformation Roadmap: Interim Program Report

What is a Distribution Service Provider?

Distribution Service Provider

- Integrating all types of DER via increased system and energy efficiency
- Enabling customers to provide and be paid for services to D-grid
- Facilitating services between 3rd party providers and customers
- Reveal value



Maintaining a safe & resilient grid

Increasing system efficiency

Optimising infrastructure

Support/enable public policies

Enabling highly reliable & resilient energy services

Bring forward cost-effective ways of achieving outcomes

Provide transparent data

Performance Based Regulation

Source: Adapted from CSIRO and Energy Networks Association 2015, Electricity Network Transformation Roadmap: Interim Program Report

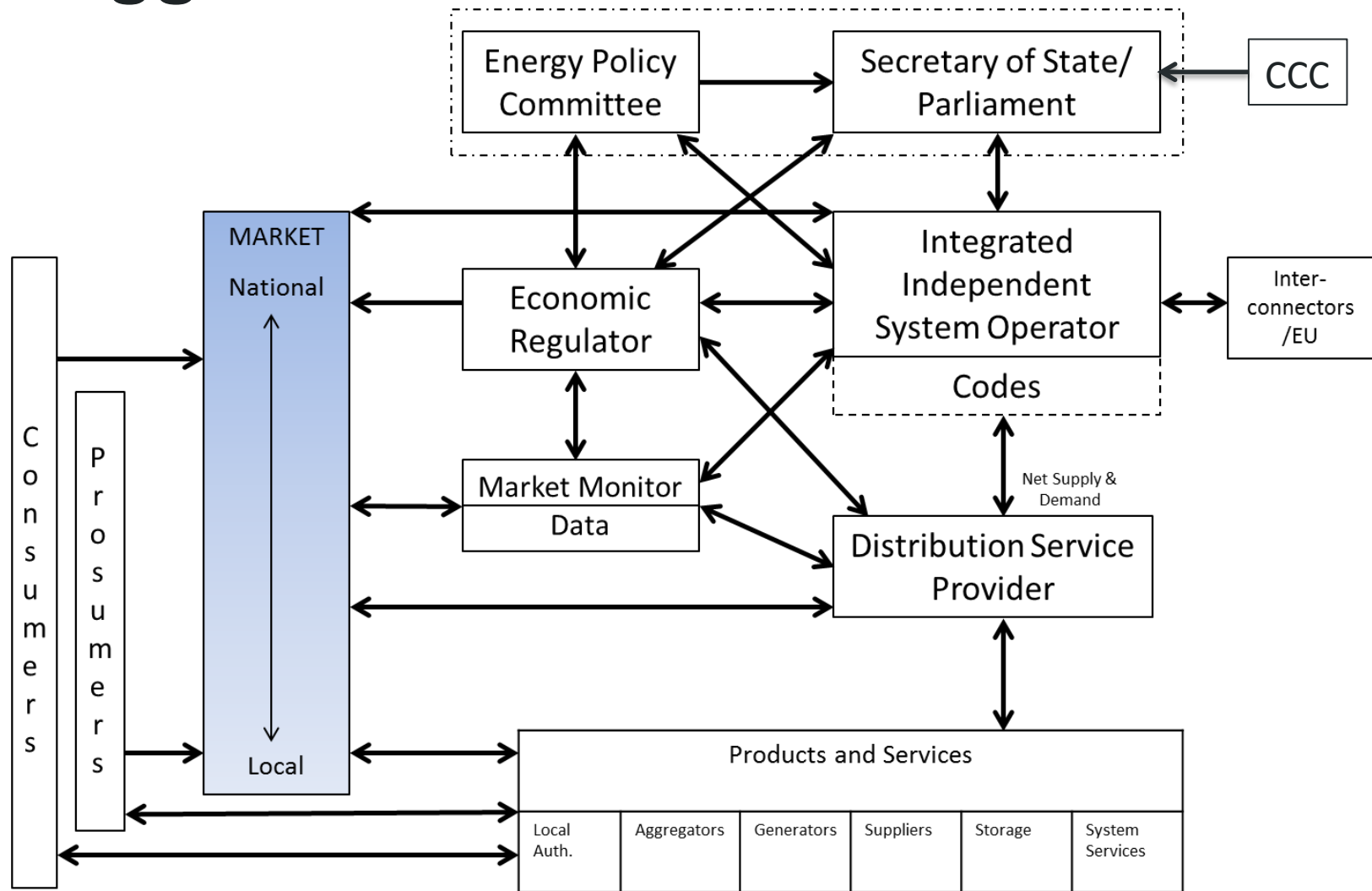
Past NY State Governance

Past Regulation	Incentivises	Suited to challenges / opportunities? NO
Rate of Return on Capital Assets	Passive Management and Operation	Customer prices will have to go up to pay for upgrades because of inefficient system operation
Small % related to PBR	Adding capital assets	Not sufficiently resilient to change
Payment per unit transferred across network	Supply orientated system operation	Lags technological change and social preferences
		Does not meet policy goals of sustainable, resilient and affordable ES

NY Reforming the Energy Vision

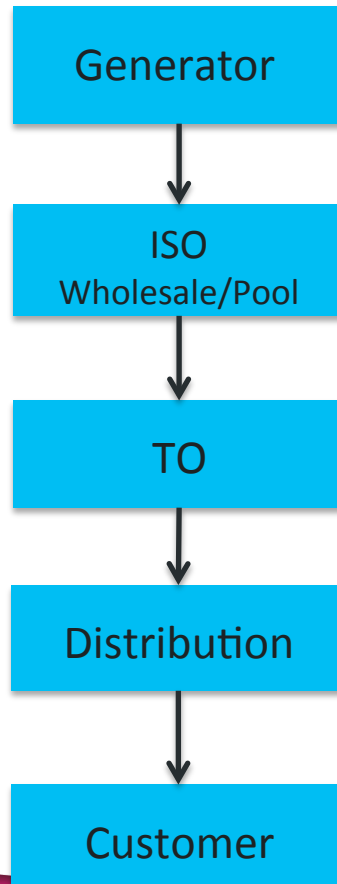
Governance	Incentivises	Suited to challenges / opportunities? YES
Performance based regulation for ?majority? of revenue	Active Management and Operation	Reveals value for new services
	Efficient system operation, including the demand side	Customer focus central to Vision
	Meeting policy goals	Attracts new entrants and new ideas
	Increased customer choice and involvement	Allows markets and operation to evolve
	Keeps system costs down, including infrastructure spend	It is a way to access demand reduction and flexibility
	Keeps customer prices down	New ICT key enabler
	Keeps up with technological change and social preference	

The 'whole' system has to be transformative eg suggested GB framework

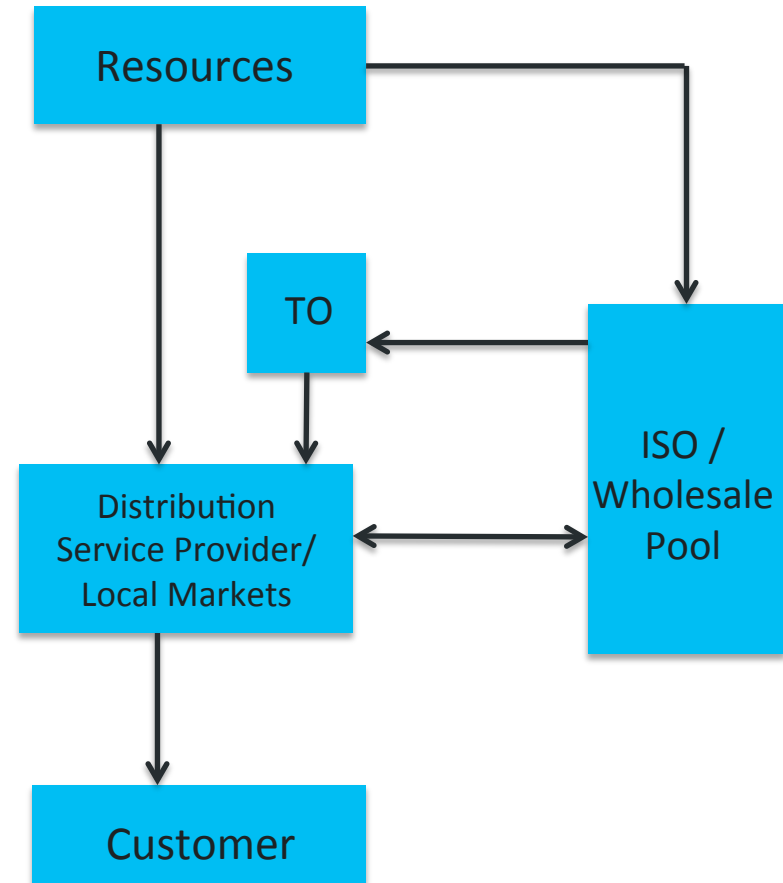


NY State as an Example of Transformative Governance?

Traditional



NY REV



Thoughts / Questions

- NY State has created a new value proposition at the distribution level which meets challenges of NYS and provides payments / incentives for new opportunities / innovation
 - Suits NY
 - Is the basic idea of a DSP a transformational governance mechanism which will spread around the globe?
 - Different countries at different stages; need different mechanisms?
- Learning about the value of flexible ES operation is spreading around Europe, US, Australia, ? elsewhere?
- Some countries / companies seem to be ‘pausing’
- Raises questions about whole energy systems
 - Is there a global whole energy system?

THANKYOU

[http://
projects.exeter.ac.uk/
igov/](http://projects.exeter.ac.uk/igov/)

Additional Slides

Is there a global 'whole' energy system?

- Whole energy systems are complex, broadly this ppt takes WES to mean:
 - if one part of a WES is changed, then there will be an impact somewhere else; AND therefore
 - it is not possible to change only one dimension of an energy system – decision makers have to work with the whole system whether technologies, economics, politics, social concerns and preferences etc
 - An enabling environment of all WES dimensions is required
- There are multiple levels and scales of WES
 - Local, regional, national, global

References

- See IGov: <http://projects.exeter.ac.uk/igov/>
- Catherine Mitchell <http://projects.exeter.ac.uk/igov/new-thinking-fit-for-purpose-gb-energy-governance/>
- Matthew Lockwood
<http://projects.exeter.ac.uk/igov/new-thinking-not-just-independent-but-also-integrated/>
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- Catherine Mitchell <http://projects.exeter.ac.uk/igov/working-paper-change-and-inertia-in-the-uk-energy-system/>
- Mitchell et al
<http://projects.exeter.ac.uk/igov/wp-content/uploads/2015/03/Public-value-energy-governance.pdf>
- Matthew Lockwood
<http://projects.exeter.ac.uk/igov/working-paper-energy-networks-and-distributed-energy-resources-in-great-britain/>

Power Sector Transformation – the case of the NY REV, Rich Sedano, RAP

<https://www.raponline.org/search/site/?q=NY%20REV>



Is a return on performance the icing?

An addition to ROE of a few % or basis points or cents per share?



Is return on performance a significant % of total earnings?

Is this sufficient to induce action motivate utilities to improve performance?