Future Utility Business Models: An Economic Perspective

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ACCC/AER Annual Conference
7-8 August 2015, Brisbane

Overview

- Theories of the firm and DNOs
- Consumer behaviour
- From a DNO to DSO Business Model
- Conclusions

Theories of the Firm

Why firms exist:

- ***The Capabilities Approach*** - Firm exists because of capabilities and core competencies

- ***The Property Rights View –*** A particular set of assets (firms) under joint ownership

What determines firm size:

- ***Neoclassical view*** - Technology, market size, entry barriers

- ***Transaction cost view -*** Market vs. hierarchy - cost of discovering prices

Scale, Scope, and Growth

❖ Economies of Scale

- **Technical economies**: Size of *production*
- **Non-technical economies**: Size of *the firm as a whole*

❖ Economies of Scope

- Products complement/substitute in service/quality and reduce average costs.

❖ Firms tend to want to grow

- Important for lumpy investments and R&D

Griffiths and Wall, *Applied Economics* 2012

Consumer Behaviour
and
Social Acceptance

Customer vs. Citizen

- Need to recognize the dual end-user role
  - ‘Customer’ vs. ‘Citizen’
- Need to know when we talk to which
- Consumers are expected to behave in a certain way, so may not respond well
- How policies are framed and communicated matters

Place the focus on ‘empowering’ the consumer in the market place

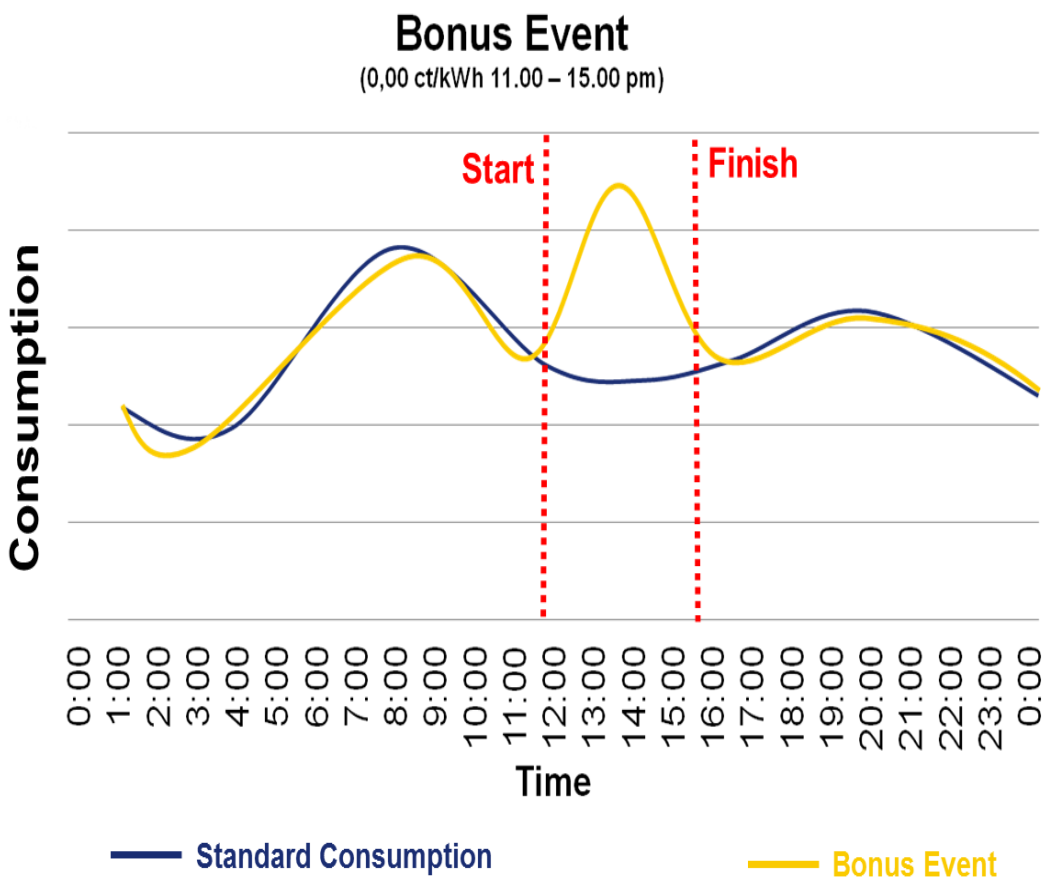
Behavioural Economics

- Need to better understand consumer behaviour in energy demand and markets.
- Consumers may behave with a budget.
- We value things that we own more highly than equivalent things we could buy.
- They value a windfall gain less than a regular expenditure
- So, how options/choices are designed/communicated matters for consumer decisions.

The Economist

Consumer - Cost Minimizer or Utility Maximizer

Figure 2: Example: Effect of tariff model within eTellingence



Source: EWE AG.

http://www.e-energy.de/de/etelligence.php

Network Business Model
From DNO to DSO

New Business Models - Context

- Low demand growth (e.g., 0.8% in US)
- Low short-term price elasticity
  - Competition in price can be unprofitable
- *What can a slow growing market offer to DNOs or other actors?*
- Demand for energy services, and its value to consumers, is increasing

DSOs in Europe

2,400 electricity distribution companies

260 million connected customers, of which **99%** residential customers and small businesses

240,000 people employed[1]

2,700 TWh a year[1]

Unbundling applies to the more than **190 DSOs** with **100,000** and more end users

Source: Eurelectric (2013)

No. of DNOs in Europe - Declining

Country	Number of DSOs 1997	Number of DSOs 2003	Number of DSOs 2010	Number of DSOs 2011	Number of DSOs with ≥ 100.000 customers	Total Number of Connected Customers	< 1 kV Customers (LV)	1- 100 kV Customers	> 100 kV Customers	Total distributed power (TWh)
AT	137	137	138	138	13	5,870,000	5,700,000	150,000	100	61
BE	36	29	26	24	15	5,243,796	5,178,890	64,906	0	55
BG		8	4	4	3	4,915,497	4,909,374	6,123	0	26
CY			1	1	1	535,050	512,972	646	0	5
CZ	8	8	3	3	3	5,837,119	5,812,727	24,258	134	65
DE	1000	900	896	880	75	49,294,962	n.a.	n.a.	n.a.	511
DK	211	119	76	72	6	3,277,000	n.a.	n.a.	n.a.	33
EE			36		1	652,000	651,000	1,000	0	8
ES	540		349		5	27,786,798	27,682,771	103,630	397	278
FI	115	93	85		7	3,309,146	3,305,268	3,761	117	60
FR			158		5	33,999,393	33,903,690	95,703	0	384
GR			2	2	1	8,195,725	8,184,378	11,347	0	45
HU	6	6	6	6	6	5,527,463	5,520,991	6,334	138	37
IE	1	1	1	1	1	2,237,232	2,235,681	1,545	6	23
IT	200	195	135	144	2	31,423,623	31,331,656	90,949	1,018	264
LT	1	2	2	1	1	1,571,789	1,570,584	1,205	0	9
LU	12	11	8	6	1	n.a.	n.a.	n.a.	n.a.	5
LV			11	11	1	873,856	872,930	926	0	7
NL		10	8	11	8	8,110,000	n.a.	n.a.	n.a.	109
PL	33	27	188	184	5	16,478,000	16,456,000	31,000	300	133
PT	4	1	13	13	3	6,137,611	6,113,839	23,772	0	52
RO	1	8	8		8	2,639,318	2,633,625	5,602	91	54
SE	230	190	170	173	6	5,309,000	5,300,000	9,000	n.a.	n.a.
SI	2	5	1		1	925,275	820,000	105,275	2	11
SK	4	4	3	3	3	2,392,418	2,379,672	12,664	82	20
UK	12	8	7	7	7	30,828,266	n.a.	n.a.	n.a.	326
NO	200	157	150	155	7	n.a.	n.a.	n.a.	n.a.	118

Source: Eurelectric (2013)

From DNO to DSO - 1

Distributed resources:

- ❖ DG
- ❖ Storage
- ❖ Energy efficiency
- ❖ Demand response
- ❖ Network investments

❖ Distributed resources - complementary or substitutes

Well-placed to aggregate the benefits (and costs) of 'distributed resources' at low transaction costs

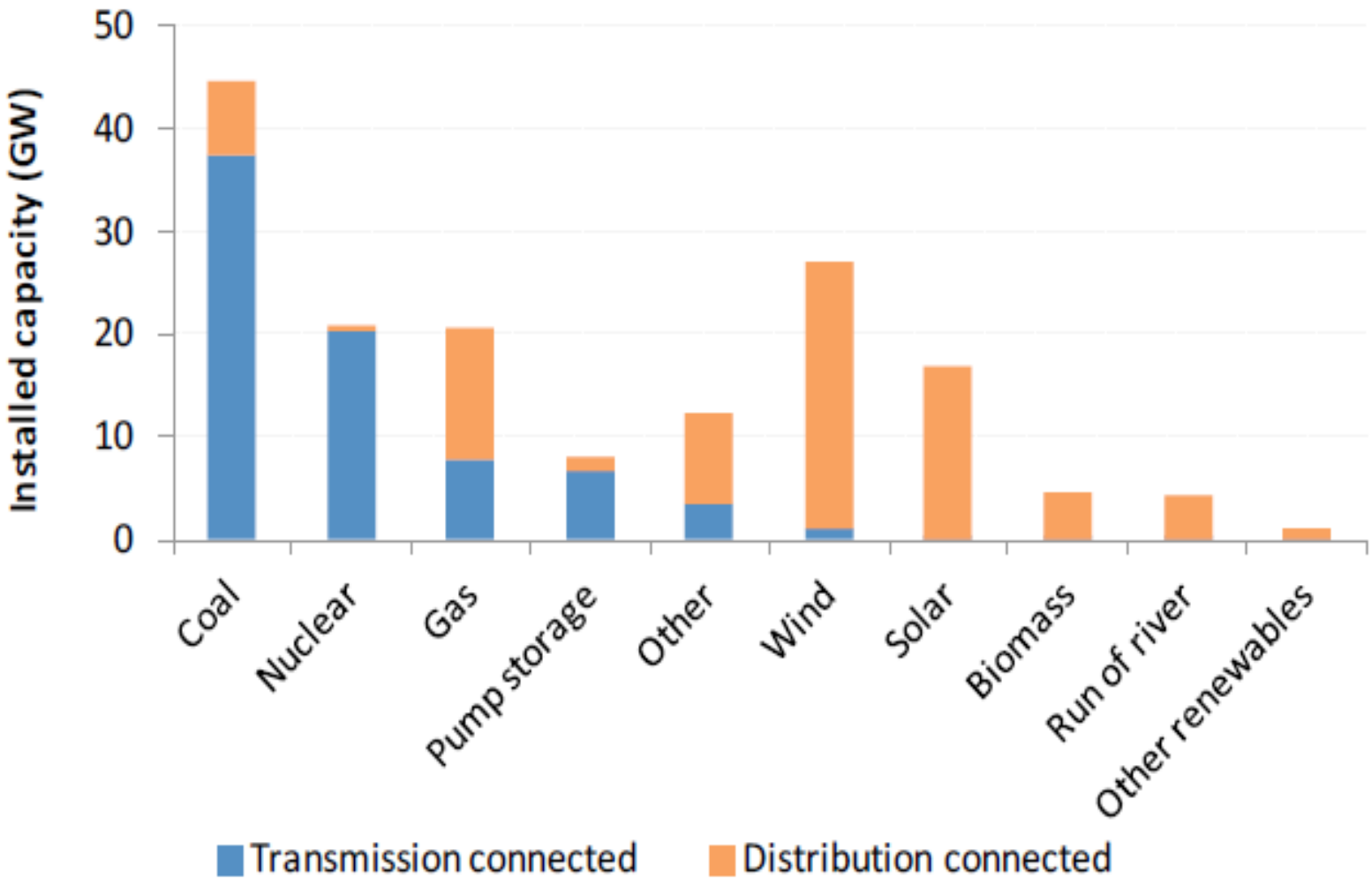
From DNO to DSO - 2

- Can contribute to national load balancing through dispatchable DG and DSM

- Can improve network investment efficiency

- Integration of distributed supply/demand resources
  - Technical integration: Bidirectional power flows
  - Economic integration: Connection or UoS charges
    - **“Competition for the market”**,
    - Periodic contracts with existing/new bidders, on non-discriminatory basis
    - Small actors can enter through aggregators
    - **Auctions**

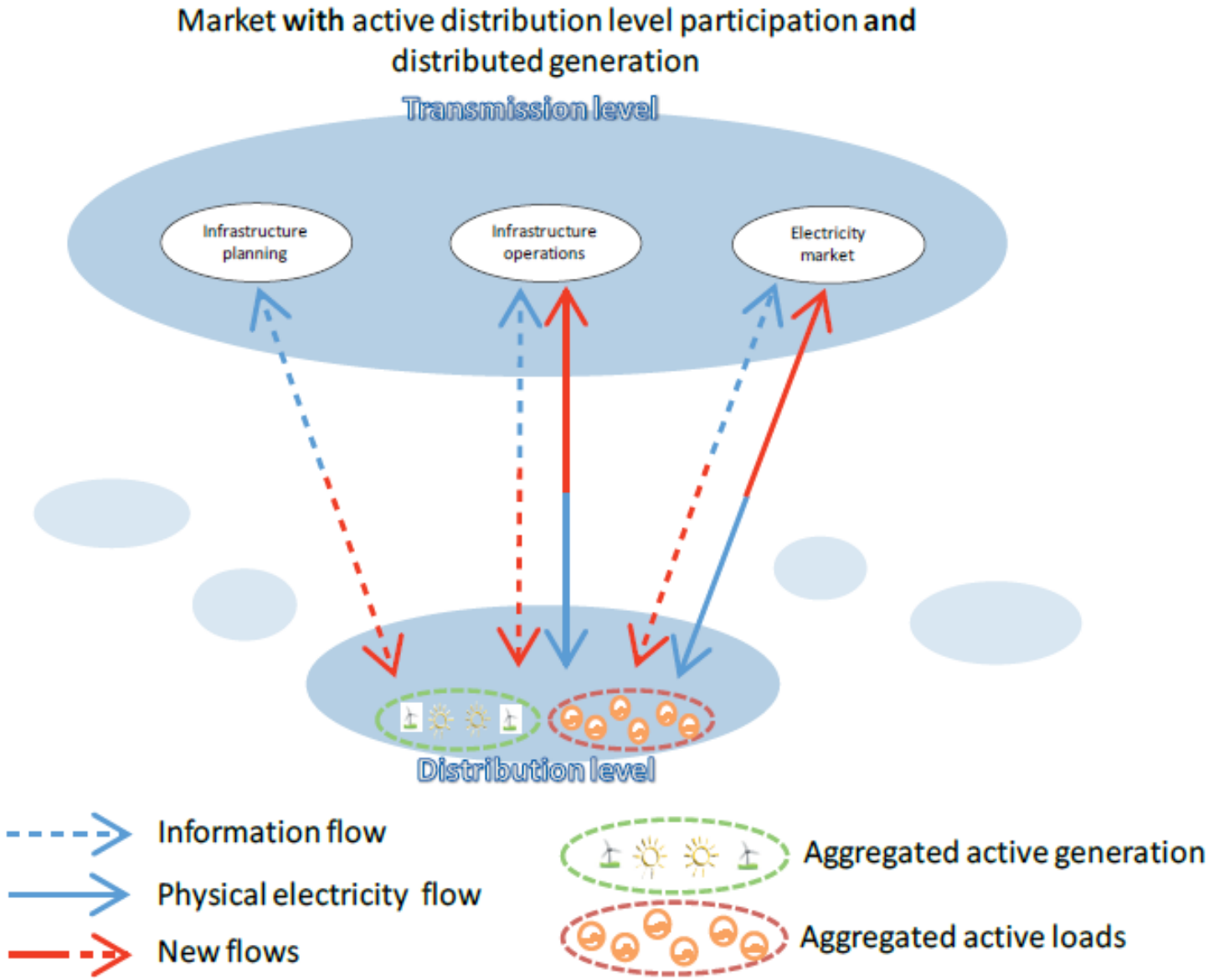
Figure 20 • Generation capacities by grid-level connection in Germany in 2010



Source: data from BNetzA, 2011a.

Source: IEA (2013)

Figure 24 • Potential outlines of enhanced interfaces between the transmission and distribution level

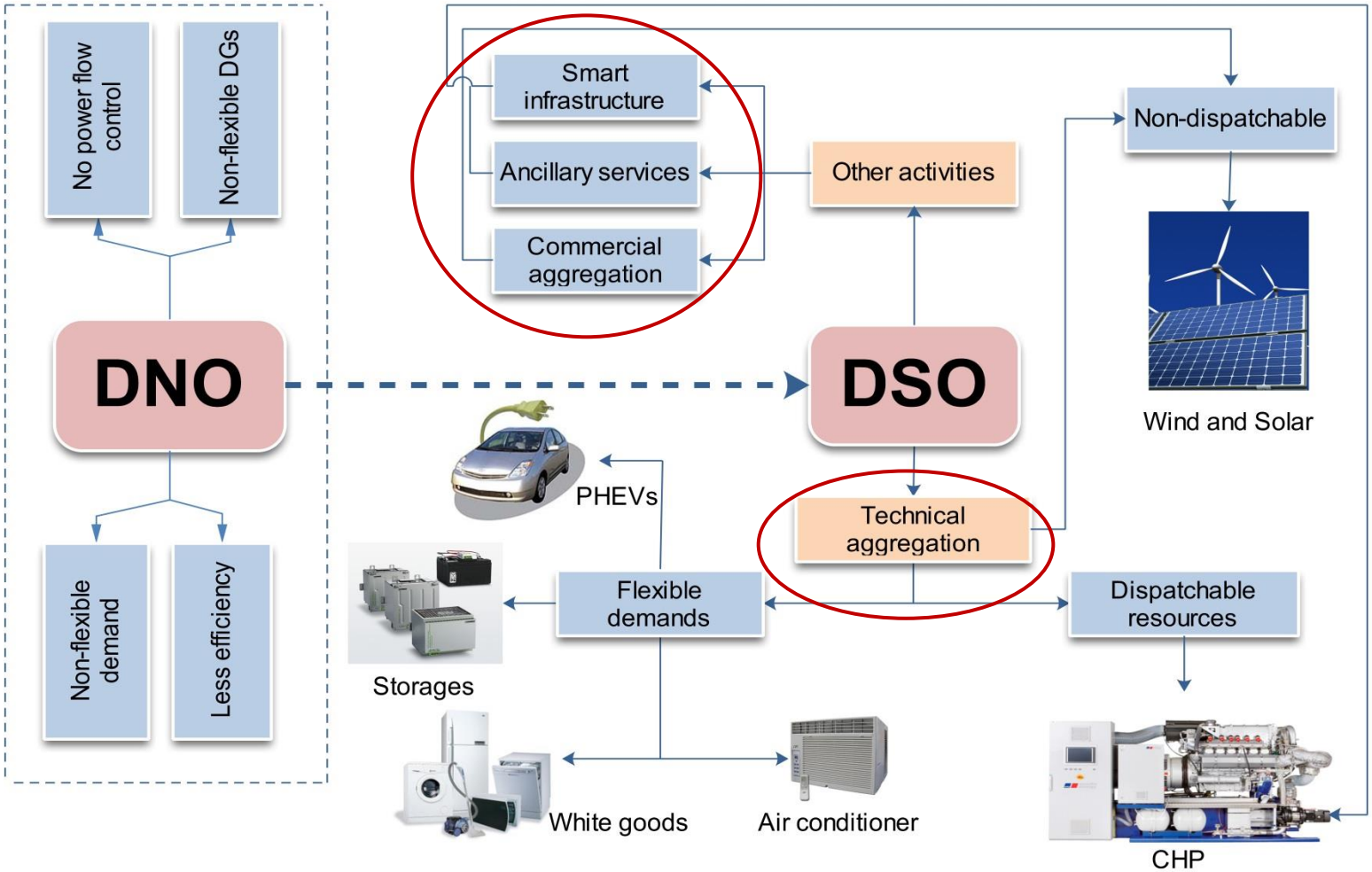


Source: IEA (2013)

Features of a DSO Model - Summary

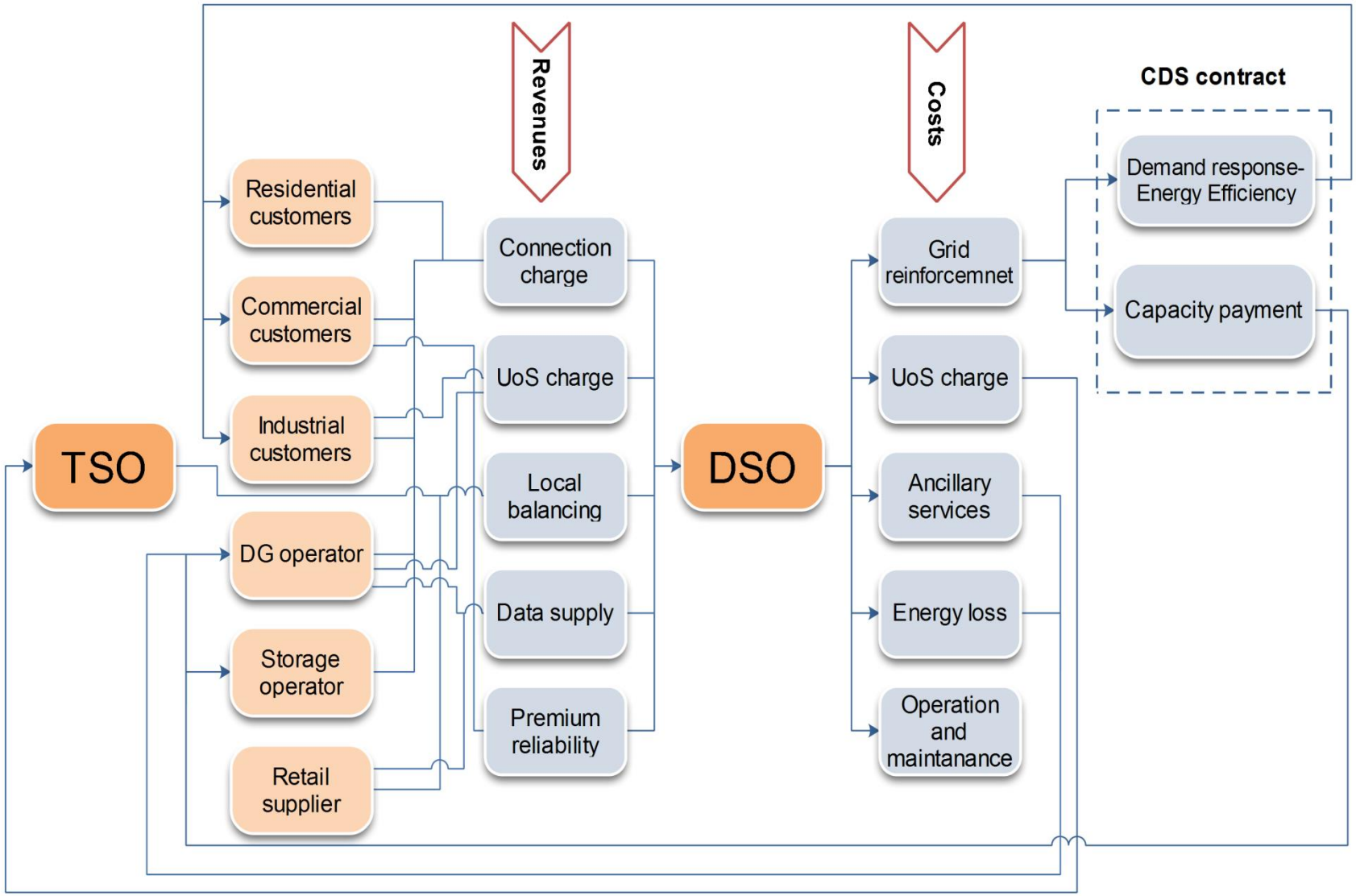
- Aggregates complementary/substitute distributed resources
- Market based
  - **‘Competition for the market’ instead of ‘competition in the market’**
  - Periodic auctions
- Low transaction costs
- Benefits from scale and scope
- Utilizes synergies with network investments
- Reduces information asymmetry and uses local network knowledge

From DNO to DSO



Source: Poudineh and Jamasb (2014)

DSO - Revenues and Costs



R&D and Innovation

- Market failure
  - Social discount rate > Private discount rate
- Energy sector among least R&D intensive industries
  - Why? Slow growth.
- Generation - the fastest growing segment is the renewables, which receive support
- Networks - nothing happens unless an allowable cost!
- Allow experiments
  - Ofgem's Innovation Zones and LCNF schemes

Conclusions

- Theory can guide us to some properties of business models

- Scale and scope matter for distributed ‘resource integration’ - demand/supply/storage
- ‘System integration’ benefits – e.g. grid

- Need for a unifying measure of energy services
- Promote innovation, R&D, experiments

- Technology, regulator, transaction costs define the boundaries between firm (DNO), market, sector

Need for a regulatory model and framework for DSOs

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Thank you

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