Evolving Business Models for Utilities: Key Principles and Emerging Tendencies

CONFERENCE ON THE FUTURE OF UTILITIES : FROM BANKRUPTCY RISK TO NEW BUSINESS MODELS

Conference of the Chaire European Electricity Markets (CEEM) at the Université Paris-Dauphine

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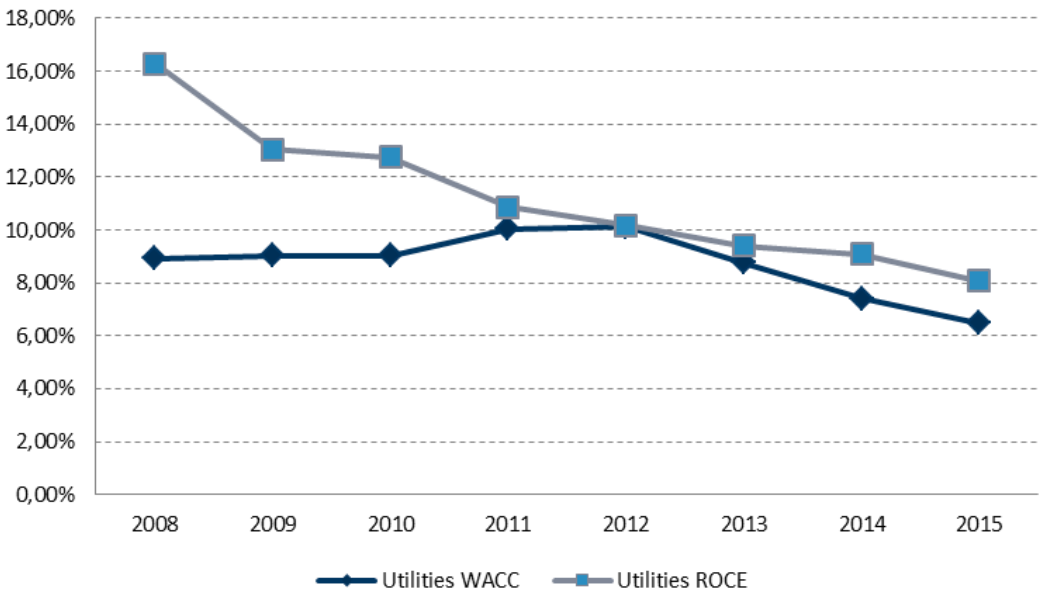
Outline

- Introduction: The death of the traditional business model of utilities in Europe
- New business models emerging upstream on the value chain
- New business models emerging downstream on the value chain
- Conclusions

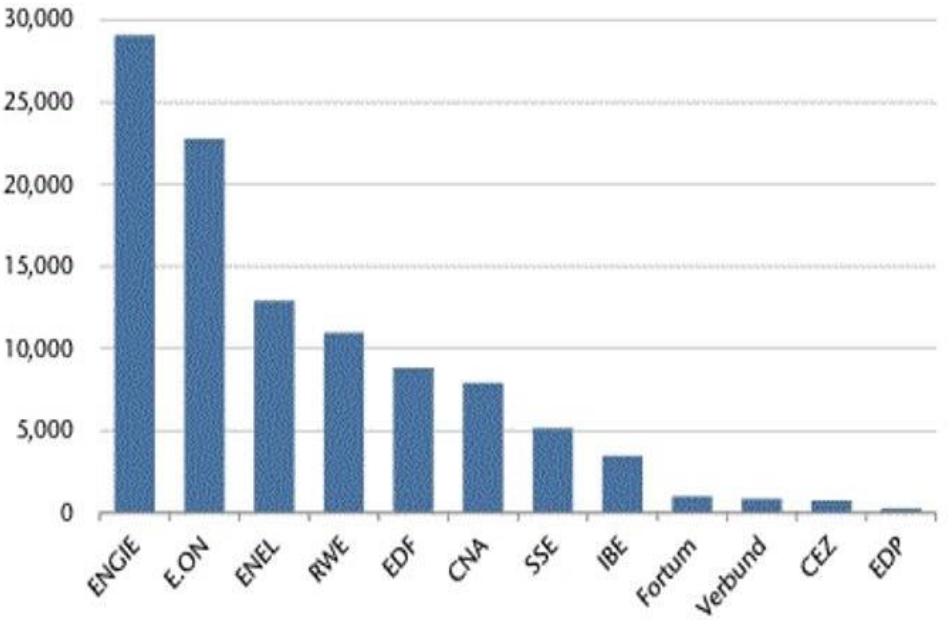
Introduction: The death of the traditional business model of utilities in Europe

ROCE and WACC for European utilities, 2008 to 2015



Source: FTI-CL Energy based on Exane data.

Utilities impairments since 2010 by company (€ m)



Source: Jefferies estimates, Company Data

- The profitability of the traditional business model of utilities has fallen in recent years, as margins upstream have collapsed following the drop in power prices.
- This led to > 100 Bn€ of impairments but it is not just a transitional trend as the market rebalances, but a structural issue that will undermine sustainably investment in generation.

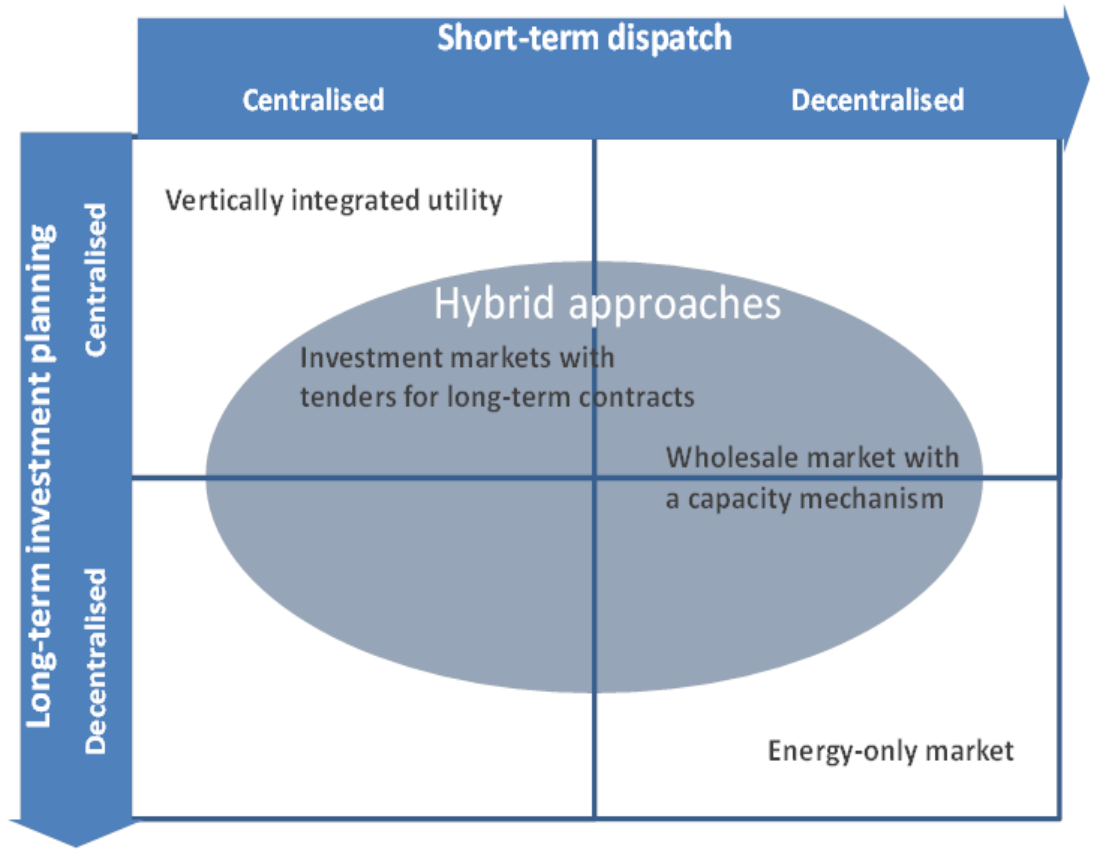
New business models emerging upstream on the value chain

Upstream (wholesale) market design: which signals / drivers of short-term dispatch and long-term investment coordination?

- **Power prices are a decentralised coordination mechanism:**
  - **Short term** – Efficient dispatch of all generation units based on variable costs
  - **Long term** – Signal retirement or new investment, trigger new entrants

- **In practice, price signals are distorted by a range of additional mechanisms:**
  - Most markets are hybrids with some form of regulatory interventions
  - Public intervention differs depending on objective, type of intervention and risk allocation

- **Key objective of sound market design is to limit distortions of price signals and establish sound coordination mechanisms for efficient system investment / operation**



New business models are emerging to monetize distributed generation, storage, and demand response

Business model application to the value chain

Segment:	Generation & Transmission	Trading	Data	End User

Business Models:

Asset Type:
- True DR[1]
- Generation[2]
- Storage
- Optimiser

1. Aggregator - I&C
Aggregates a portfolio of a few large (>100kW) DR participants

2. Aggregator - Residential
Aggregates a portfolio of many small participants

3. Aggregator - I&C
Aggregates a portfolio of a few large (>100kW) storage assets.

4. Aggregator - Residential
Aggregates a portfolio of many residential energy storage systems.

5. Aggregator - I&C
Aggregates small generation assets and runs in DR mechanisms

NB – Models can be combined

6. Aggregator – Virtual Power Plant
Aggregates small scale decentralised generation assets such as renewables, storage and conventional generation

7. Generator – Buy Operate Own
Purchase small scale generation assets and runs to obtain revenues from flexibility and capacity

8. Developer
Owns a storage technology and sells units to buyers through operate/service model without ongoing ownership

9. Generator - Build Operate Own
Owns / runs a storage technology using the units to provide revenues through flexibility, capacity and price arbitrage

10. Ancillary
Specialist trading function that optimises the use of flexibility to provide optimisation services to generators and aggregators to ensure maximum revenue potential

Notes: 1) True DR is an actual reduction / shifting in consumption; 2) Generation from small capacity units (<10MW) that are "behind the meter" on-site at I&Cs / owned
Source: FTI Consulting Analysis

An integrated decentralised approach: solar PV, electric vehicules, and batteries

Monetizing flexibility in electricity markets – 5 key sources of value

Capacity

- Load reduction & storage capacity is bid into capacity markets as a replacement for conventional generation
- Reducing the need for generation capacity requirements during peak demand hours

Energy

- Wholesale market price compensation (Arbitrage)
- Providing/avoiding energy use at peak times

Environmental

- Optimising energy mix to reduce CO2 intensive electricity generation at peak demand periods
- Ensuring maximal efficiency from new and existing conventional generating assets through consistent running

Reserves

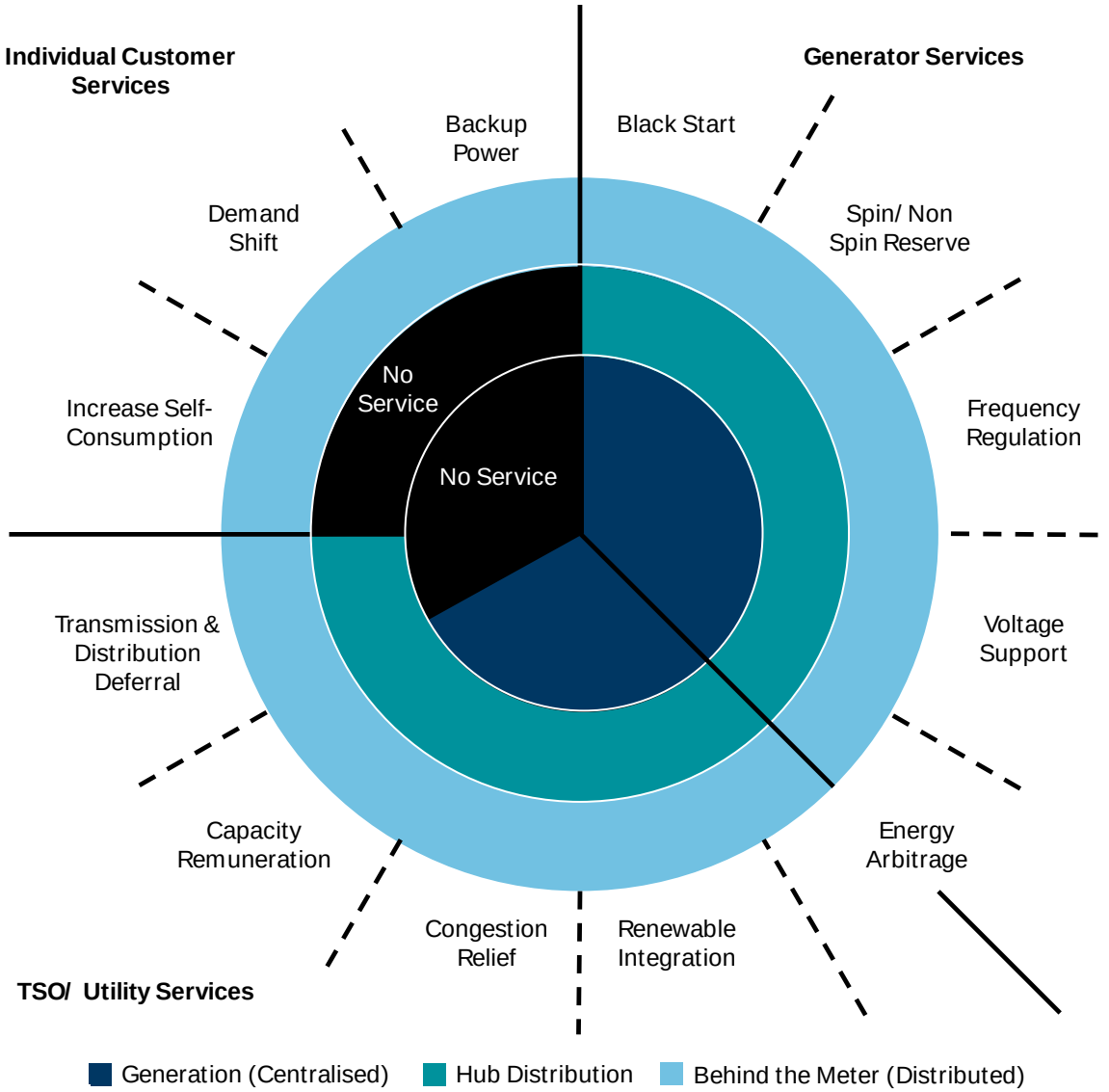
- Providing modifications in electricity demand or supply to a TSO or energy supplier to provide additional ancillary services (e.g. frequency, voltage etc.)

Network

- Active electricity management at the local level through demand adjustments or storage to
  - Limit capital investments in the network through peak avoidance
  - Reduced congestion and improve reliability

Source: FTI Consulting Analysis, Enernoc Investor Presentations

Revenue potential for storage and demand response: centralised and decentralised sources of value

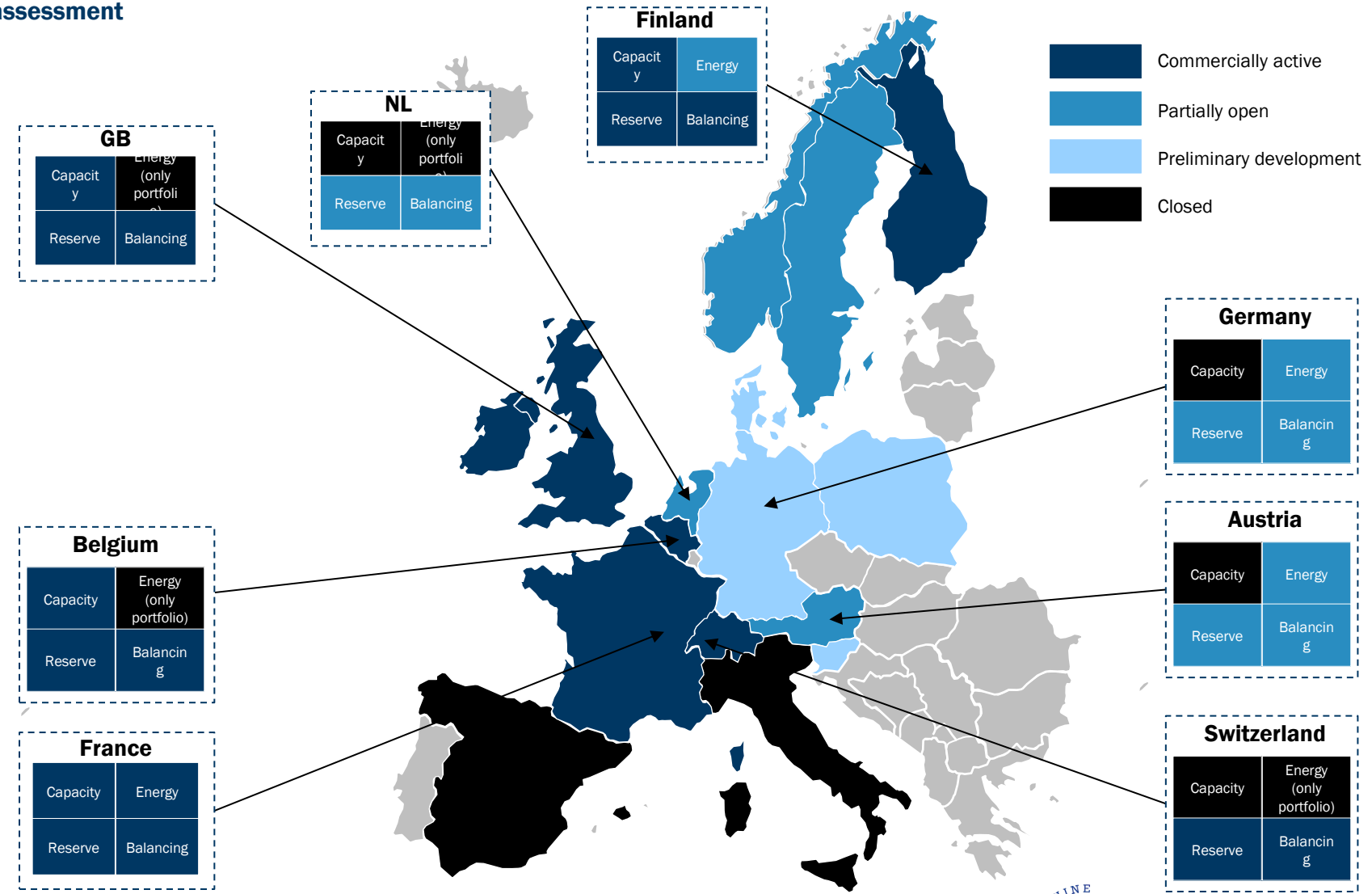


Demand response providers: which value for consumers and the electricity system?

In many countries in Europe still, aggregators do not have an adequate regulatory framework

Participation of independent DSR operator

EU country assessment



Source: SEDC, FTI-CL Energy

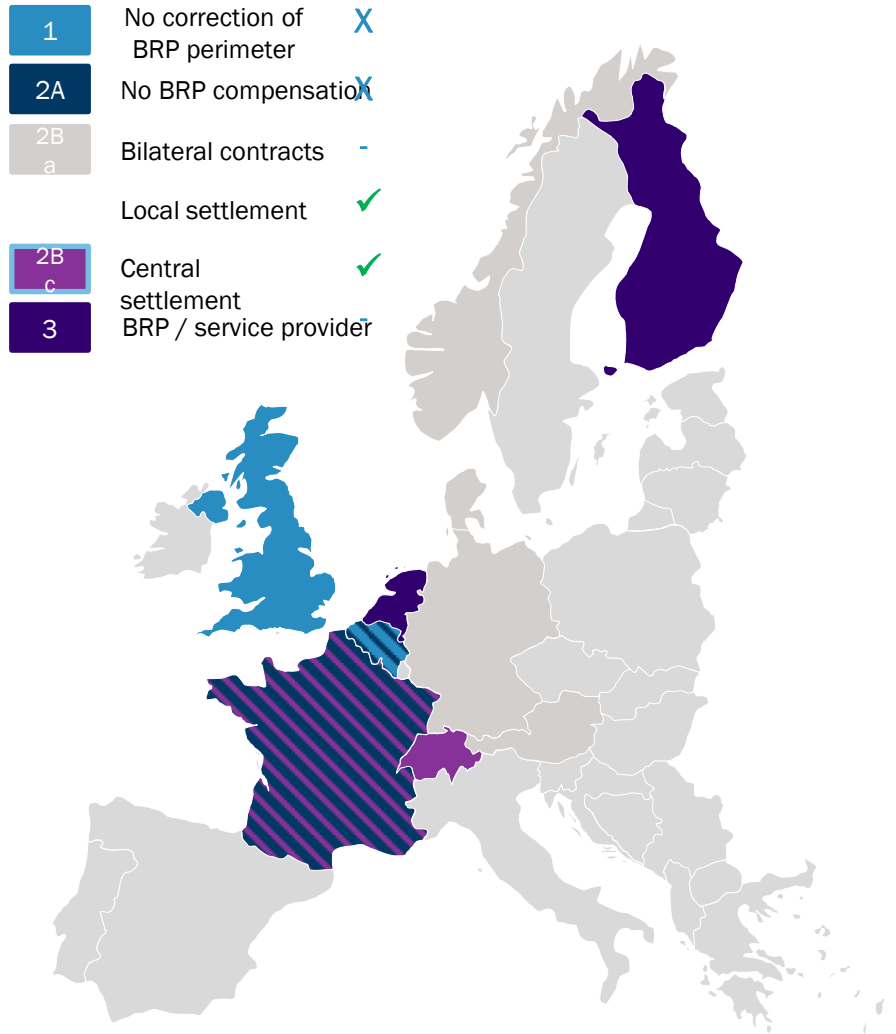
Demand-side response: Toward a sound regulatory framework?

- **EC CEP 2016's support to further development of DSR (Article 17 of Revised Electricity Directive)**
  - Requires systematic inclusion of DSR as a resource in all organised electricity markets (energy, capacity, reserve, ancillary services)
  - Supports market-based sourcing of DSR at the DSO level
  - Pushes for a regulatory framework encouraging DSR aggregators

- However **potential distortion** if DSR aggregators do not compensate suppliers for the energy sourcing costs
  - Exclusion of any compensation does not support level-playing field for competition:
  - EC CEP 2016 (Art. 15 of Revised Electricity Directive):

(…) aggregators shall not be required to pay compensation to suppliers or generators [only exceptionally if an aggregator induces imbalances to another market participant resulting in a financial cost, subject to NRA's approval]

Models for the transfer of energy in the European Union (2015)



Source: FTI-CL Energy based on SEDC

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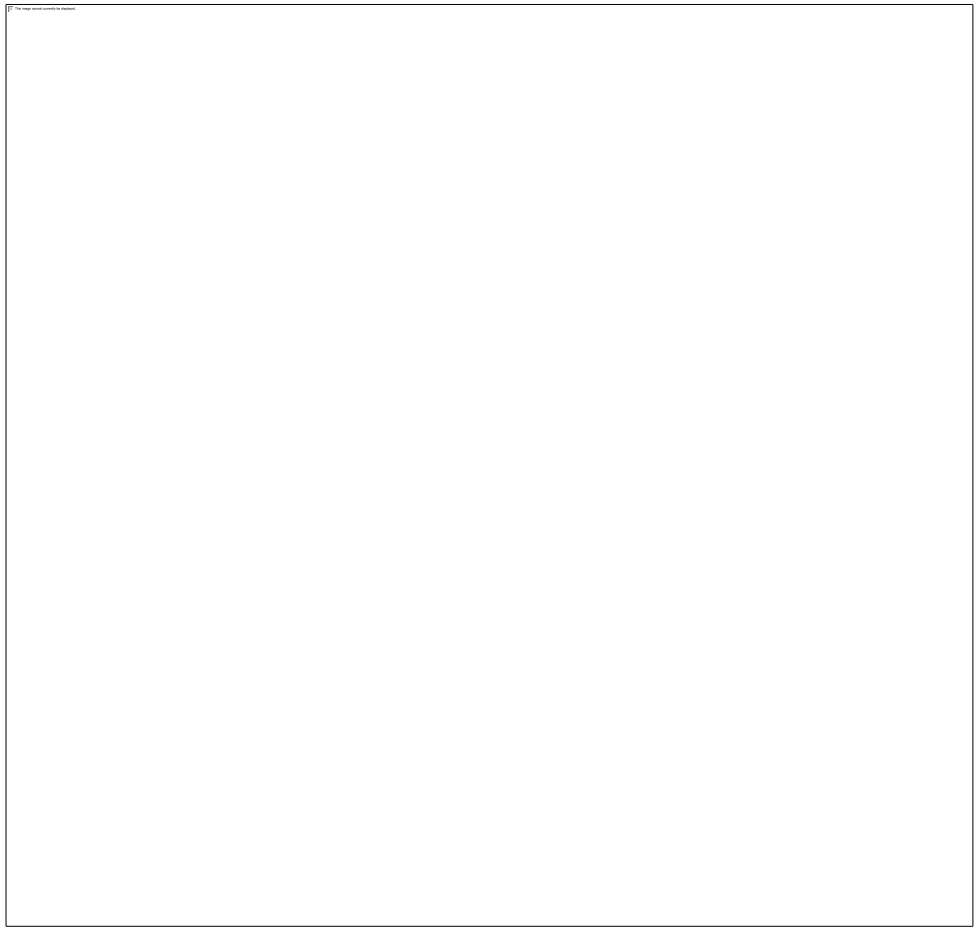
New business models emerging downstream on the value chain

Downstream (retail) market design: which price signals for prosumers / intermediaries?

- **The evolution of retail market design and the relevant price signals for consumers could be very different depending on the following drivers:**

- **Commodity vs. service pricing approach**
  - The energy transition could transform the retail energy supply into a service-oriented good, rather than a commodity

- **Prosumer attitude /engagement toward electricity**
  - status and life-style;
  - the gamification of energy supply;
  - an “early adopter” attitude towards energy technology; and
  - the positive image associated with auto-generation.



Knowing electricity consumers: what is in it for the big data companies?

nest

Alphabet

Google

works with nest

Downstream, utilities are moving toward the energy service company model

Energy service companies

Making demand management services as well as cleaner and more resilient power options available to all electricity consumers is core to all new energy business models.

Optimizing customer participation

- Understand behavior patterns
- Increase customer awareness through products
- Identify incentives and technologies to increase customers' ability to manage energy bills

Providing energy management products and services

- Provide bill management services
- Expand energy management services to small commercial and residential customers, e.g. building management systems, demand-response and energy efficiency programs, behind the meter distributed energy resources such as solar PV, micro-wind turbines and battery storage

Aggregating customers

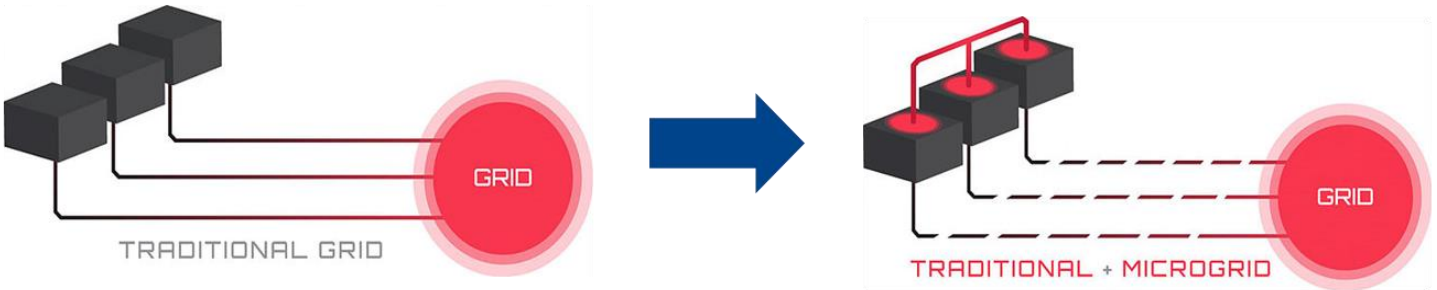
- Increase customers' participation and decrease transaction costs through aggregation, e.g in communities (municipal, community, commercial, non-profit)

Offering energy value-added services

- Support community and multi-family based renewal energy projects, e.g. sponsorship of micro-grid projects or community-based distributed energy generation projects
- Support "buy local" green power initiatives

The blockchain and collective self production: which business model?

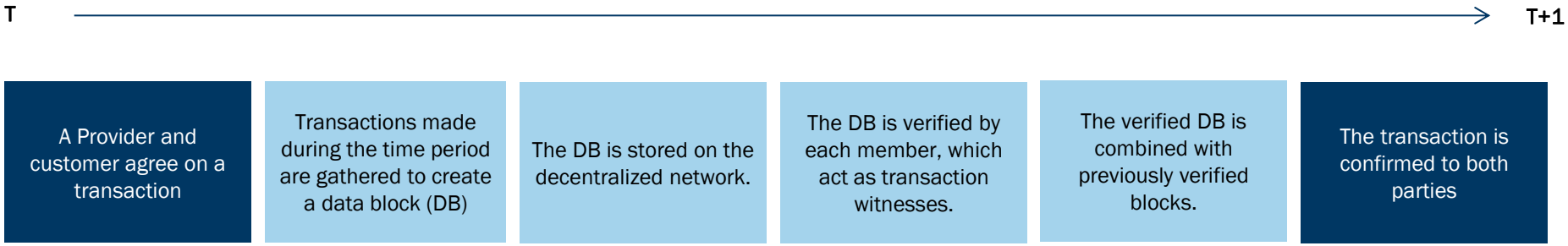
BROOKLYN MICROGRID



Source : Brooklyn Microgrid

Blockchain: Definition

- A blockchain is a digital contract which allows an individual party to conduct and bill a transaction directly with another party (peer-to-peer).



- **Decentralized storage of transactions ensures :**
  - Greater independence with respect to central authority
  - Tamper-proof recording of transactions

- **Decentralization of transaction system makes intermediaries unnecessary and allows :**
  - Speeding up of transactions
  - Reduction of transaction costs

- **Currently, one can make out two categories of blockchain applications :**
  - Use of cryptocurrencies as an alternative to real currency (Blockchain 1.0).
  - Use of smart contract, digital protocol that execute a transaction process by itself, without intervention from a third party (Blockchain 2.0).

Potential applications of the blockchain to the energy sector

- **The blockchain could allow to bypass traditional intermediaries, such as energy suppliers and banks**

- **A range of potential applications of the blockchain can be envisaged in the energy sector, such as:**
  - The automatization of transaction and supply systems using smart contracts
    - Based on predefined rules, they would mechanically control

    (i) that energy and storage flows are such that supply and demand are balanced and;

    (ii) cryptocurrency payments for energy supply.

  - **The documentation and securing of ownership**
    - Asset management
    - Guarantee of origin, certification of renewable energies and emission allowances.

  - **The recording of transactions**
    - Metering and billing of electricity consumption, heat use from smart meters
    - Billing of roaming

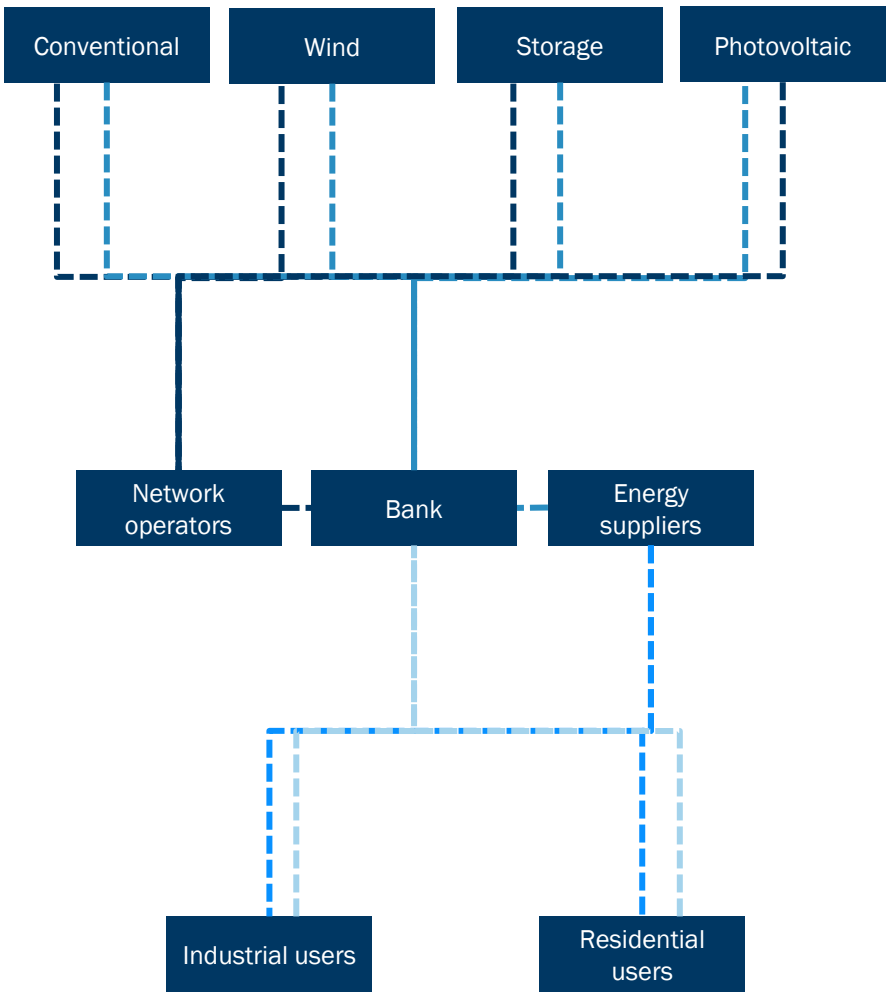


Figure 1: Traditional flows (physical and financial)

Electricity Payment

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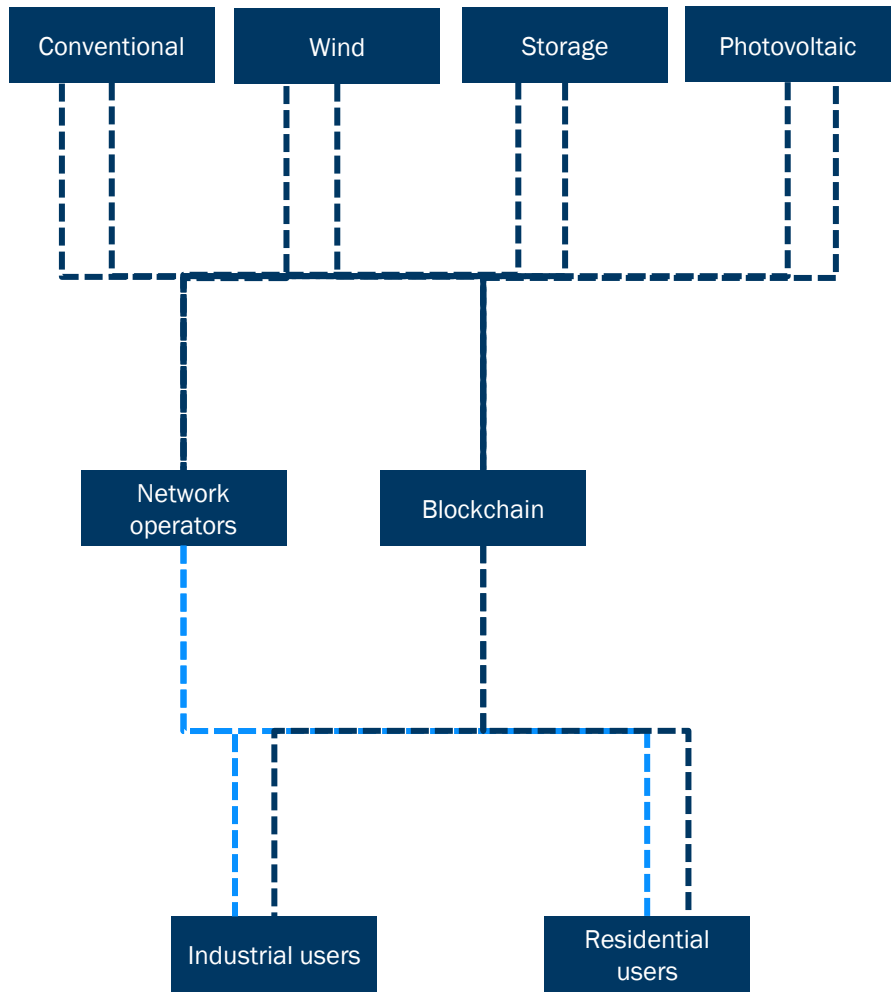
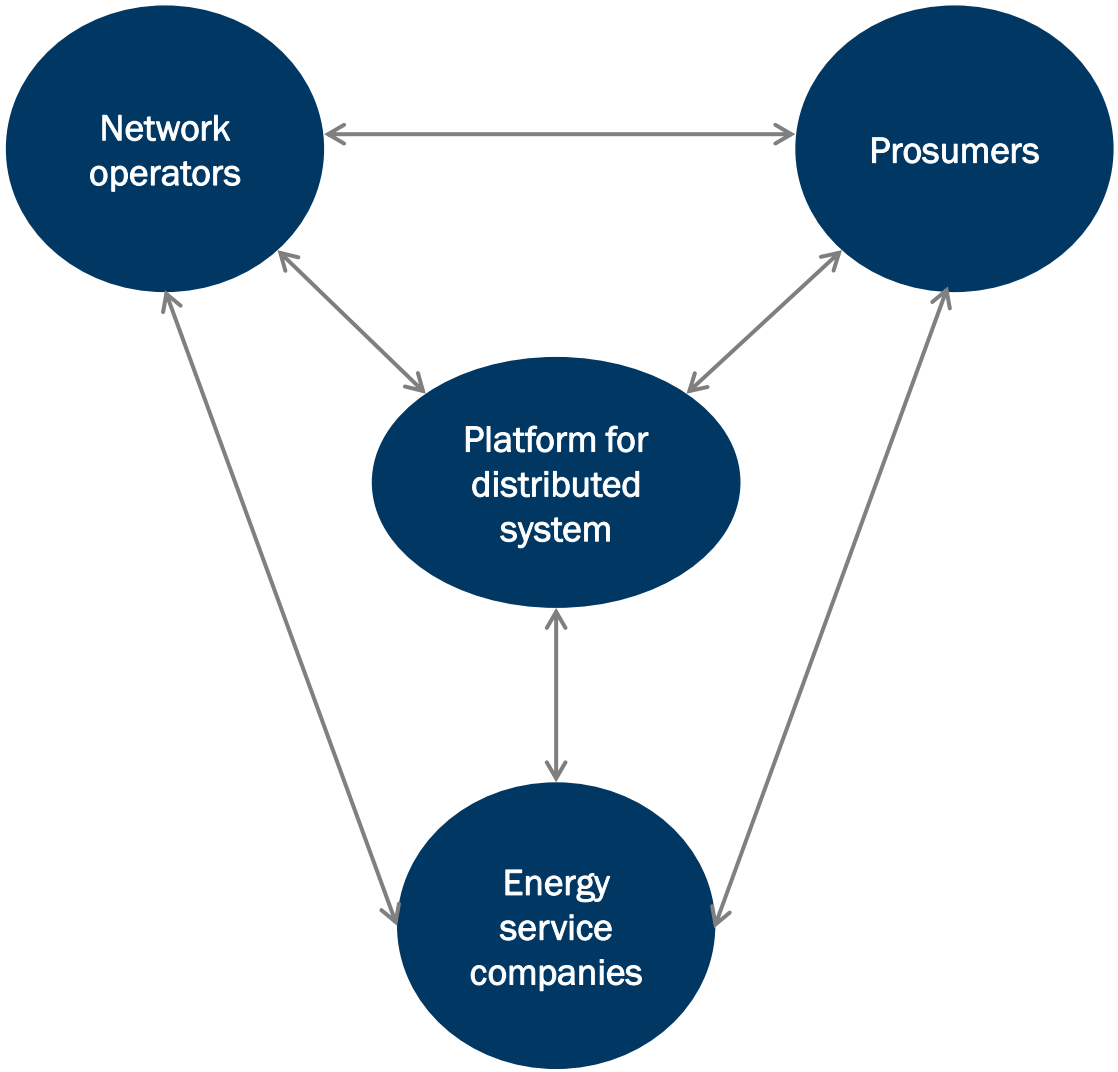


Figure 2: Process in a blockchain environment

New platforms are likely to emerge to coordinate distributed system operation, ESCOs, and prosumers



- Traditional role of network operators and utilities as system optimizers will need to be reconciled with emergence of new platforms
- Multiple platforms may co-exist / compete:
  - To capture value associated with system optimization of decentralized resources
  - To develop new services for active consumers (Prosumers)
  - To provide coordination signals for system planning and operations
- Key challenge is to limit “des-optimisation of energy system”

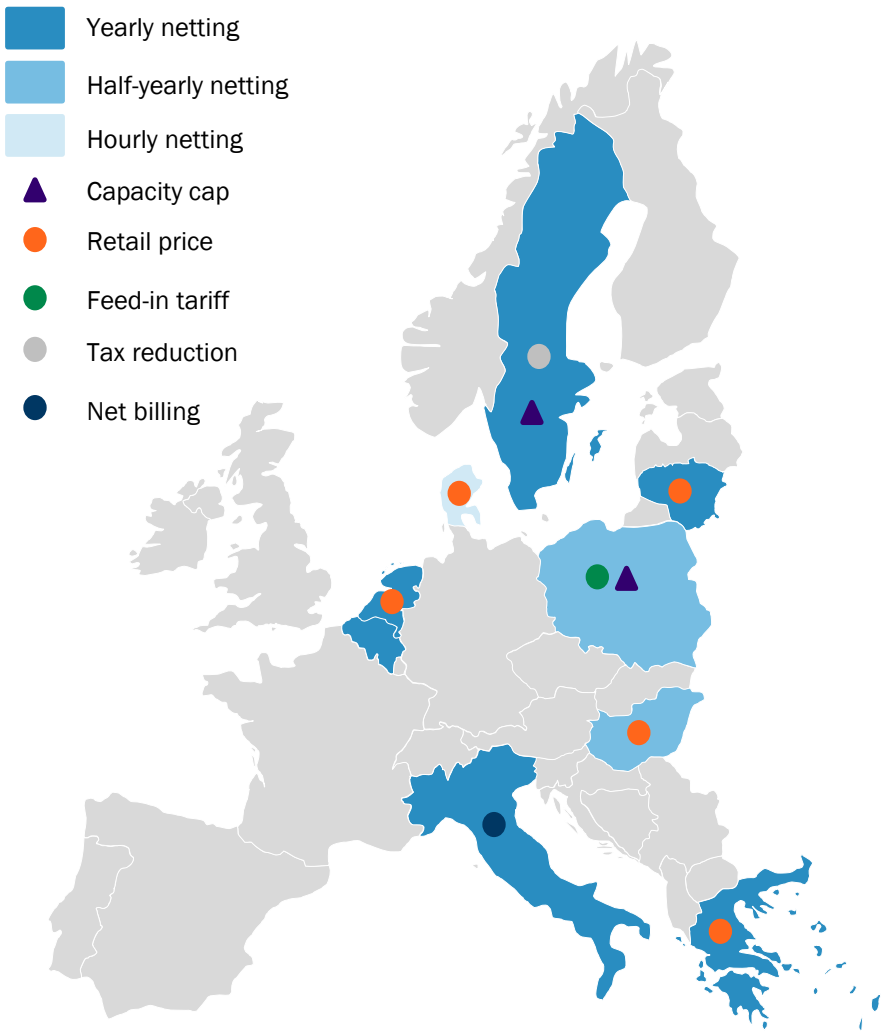
Self-generation: Unfair allocation of system costs?

- **Risk of inefficient and distortive cost allocation** in case of inappropriate regulatory framework
  - EC CEP 2016 (Art. 15 of Revised Electricity Directive)

(…) cost-reflective, transparent and non-discriminatory network charges, accounting separately for the electricity fed into the grid and (…) consumed from the grid

  - **Self Generation** sometimes exempted from network and system charges, but may still impact distribution system
  - **Net metering** raises issues from the system perspective:
    - Lower to no cost-reflectiveness undermining efforts to enhance customer flexibility
    - Unfair cross-subsidisation where more vulnerable customers pay more for the system than "prosumers"

Net metering schemes in the EU (2015)



Source: FTI-CL Energy based on EC's staff working document "Best practices on Renewable Energy Self-consumption"

Conclusions

Conclusion: consistency across retail and wholesale market price signals is key

- **Historically the EU internal electricity market focused on wholesale market integration to create a level playing field for large scale generators**
  - Market design being adapted to allow broader participation of smaller players / new products developed to reveal changing system needs (flexibility, etc.)
  - But policy interventions (support for RES, capacity mechanisms for security of supply, etc.) and lack of locational signals question the ability of wholesale power prices to act as coordination signal for operation / investment

- **Upstream on the value chain, new business models therefore emerge to aggregate small players and allow participation in wholesale markets, and capture value from missing markets for local flexibility value:**
  - Aggregators of virtual power plants / demand response act as intermediaries and raise question of allocation of value
  - Missing markets likely to lead to emergence of new local players, e.g. local balancing platforms

- **Downstream on the value chain, new business models are centered on provision of services to consumers and possibilities to generate value locally and / or by taking advantage of regulatory holes**
  - Commoditisation of electricity and move to services provision underway
  - Digitalization and blockchain will enable emergence of local platforms and bypassing of traditional suppliers
  - How sustainable are some of the business models leveraging regulatory holes / arbitrage opportunities?

- **Rise of prosumers and decentralized resources requires fundamental rethink of approach for market design:**
  - Auto producers / DSR use retail price as relevant benchmark for operation / investment
  - Key questions are therefore: 1/ which signal should retail consumers and intermediaries receive, and…
  - 2/ How to set a consistent and efficient system of prices, network charges, and taxes to avoid perverse incentives / opportunistic arbitrage (e.g. net metering, DSR compensation of suppliers, etc.)

  ⇒Best economic approach seems to 'clean up the bill': define cost reflective network charges, finance subsidies for clean technologies through general budget, etc.

Thank you for your attention

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