

Digitalisation and New Business Models in Energy Sector

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Digitalisation in the energy sector involves the creation and use of computerised information and processing of the vast amounts of data which is generated at all stages of the energy supply chain. It promises a lot for every segment of the energy ecosystem; homes, prosumers, distribution, transmission, generation and retail and is frequently stated as likely to lead to a transformation of the energy system. It is often associated with 'smart' energy, the Internet of Things (IoT) and Blockchain technology. The main aim of digitalisation is to improve efficiency. It enables better, cheaper and faster monitoring, recovery and maintenance of the assets and components through 'smarter' grids. Smart households facilitate households' own solar energy production. The Internet of Things (IoT) will integrate smart appliances for to facilitate efficiency savings and the provision of grid services. Blockchain which involves decentralised transaction verification will potentially empower individual customers to trade power and make payments in a seamless way. Digitalisation can help with better network and congestion management, assists in dealing with the renewable generation intermittency problem and allows more effective network monitoring and more efficient network operation. It also provides digital platforms for demand response, and Peer-to-Peer (P2P) energy and carbon credit trading.

This paper reviews and compiles numerous new business models in the energy sector by presenting 40 start-ups worldwide and gives special attention to Blockchain based solutions. The aim of the paper is to provide some insights which might be useful to energy regulators faced with many new companies seeking to profit from the digitalisation of the energy sector. Should these companies and their business models be encouraged is a key question for regulators with a statutory duty to protect energy

customers from monopoly pricing and to promote competition, at the same time as ensuring security of supply and advancing decarbonisation.

In the assessment of these companies we summarise their business models under four headings:

- Value Proposition (What are they offering?),
- Targeted Customers (Who are they targeting?),
- Value Creation/Value Delivery (How are they planning to create and deliver their service?),
- Value Capture/Revenue Model (What are the sources of their expected revenue and How are they planning to create this?).

We conclude that decentralised generation and increasing numbers of prosumers pose new challenges and as well as new business opportunities in the energy sector. Traditional centralised markets have their shortcomings in enabling the participation of small parties. Aggregators could be a way of integrating prosumers to the electricity markets. Nevertheless, aggregators require access to markets and market instruments, and they might need to acquire access rights via agreements with existing retail suppliers. This is why many of our start-ups collaborate actively with existing utilities.

The development of digital technologies promises to have significant impacts in the energy industry. Advanced algorithms such as artificial intelligence, machine learning and deep learning are frequently used in electricity trading projects to promote digitalisation in energy markets. Numerous P2P energy trading systems utilise Blockchain technology. P2P trading through smart contracts is one application of Blockchain technology that will impact all commodity market participants in the near future. However, we underline that the application of Blockchain technology in energy trading (promoted by many of our start-ups) is a supplementary practice and Blockchain will support, rather than replace the existing energy market.

We have tried to compile 40 business models from around the world which represent interesting cases. Even though these companies offer novel and exciting solutions and services, due to the weaknesses in value capture and revenue creation models, we believe many of these companies – as with all start-ups - will not survive in the long run.

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