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The Road from 2018 to 2035: Business Models

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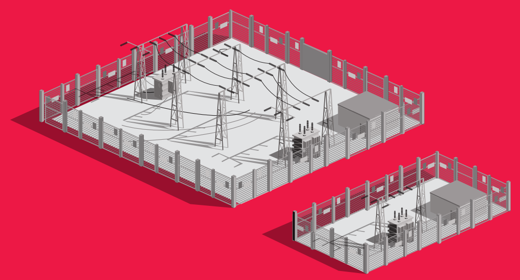
THE ROAD FROM 2018 TO 2035

Business Models

A number of new models could emerge across the energy industry partly displacing the old corporate, national utility model.

THE EXISTING ELECTRICITY SUPPLY MODEL

Built up over the years, this model provides a relatively cheap and reliable source of power. Customers purchase energy from licensed suppliers, who produce their own energy and purchase it from other generators in a national market. Energy is then transported to customers by regulated monopoly transmission and distribution companies.

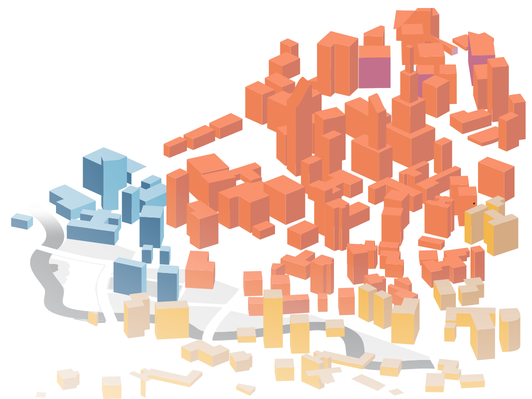


Electricity Supply Model

ALTERNATIVE MODELS:

Energy service companies (ESCOs)

Under this model, companies offer an integrated package meeting all their customers' energy needs: heat, power and transport. This can include installing and maintaining appliances, and financing, as well as supply. The customer pays a fee for all of these services and the ESCO is incentivised to maximise the energy efficiency of each of its customers.



Customers could allow the ESCO to act as an aggregator or virtual power plant, controlling energy devices such as a heating unit or fridge, and managing demand to maximise efficiency. The energy service provider could also manage behind-the-meter energy generation – such as PV or storage.

Energy services contracts would be time-based across all energy types. For example, it would be more expensive for a customer to travel in their hydrogen or electric vehicle during peak times. Smart phone apps would show customers the cost of using different devices at any particular time of day such as how much it will cost to boil the kettle.

Becoming a full ESCO (rather than just an energy supplier) may require large upfront investment but should provide good long-term revenues; a similar model to mobile telephony over last 20 years.

Data-driven and with a high degree of control over customers' energy use, the ESCO could maximise energy efficiency and its own revenues.

The ESCO could sub-contract many of the services it provides – such as maintenance and energy supply. It would also rent capacity on the electricity and distribution grid (see virtual power networks below).

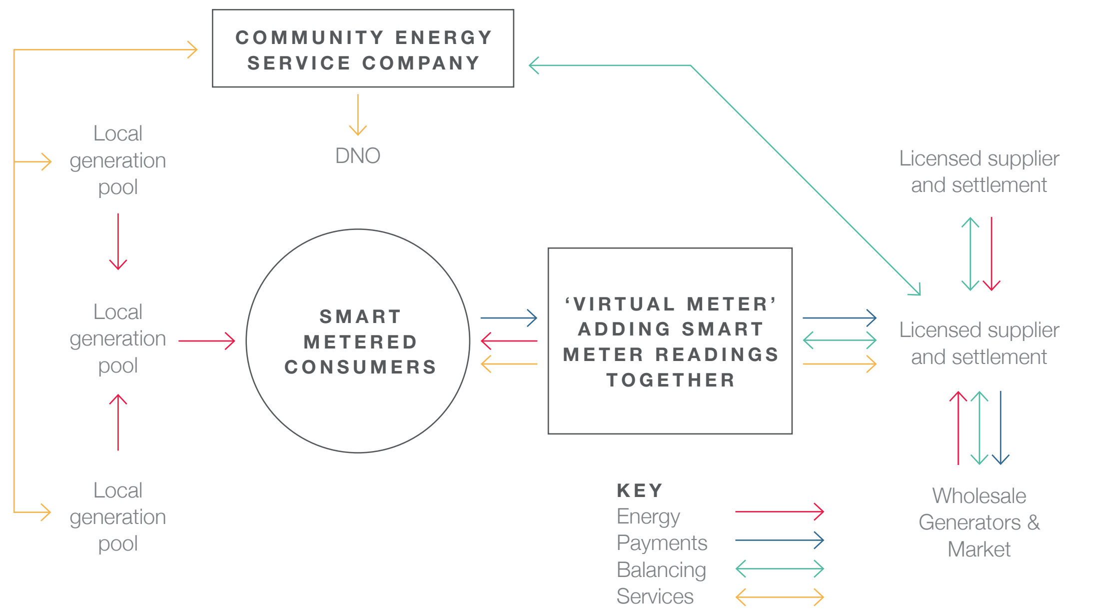
Local energy communities

In this model, local generation is pooled together and local demand is aggregated and managed by a community ESCO. All customers connected to this community will have smart energy systems to enable this.

Local generation is netted-off at a virtual meter point. Excess energy is sold back to the main grid and any shortfall is bought from the main grid.

Local energy communities would be virtual. Groups of consumers in a location would sign up and the distribution company would continue to run the network.

Suitable primarily for electricity, this model would also enable local sources of gas (bio-methane or hydrogen) to be managed by the community ESCO in a similar way.



Community Energy Supply Model

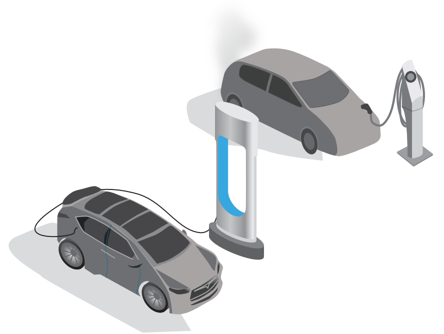
Peer to peer

A peer-to-peer trading model would allow customers to procure energy directly from generators.

Enabled devices would bid into a digital marketplace and individually generate or consume energy depending on market signals. Such a market would be underpinned by a blockchain transaction model with decentralised transaction data storage and a smart contract. With data on quality, price, quantity and other factors written in the form of code, these smart contracts are stored and validated by the underlying blockchain technology.

With peer-to-peer energy markets, office buildings would be able to monitor thousands of electric devices and engage in energy supply and demand transactions to optimise load flexibility and minimise their energy costs.

Similarly, car parks would be able to provide grid ancillary services by using idle EVs parked on site.



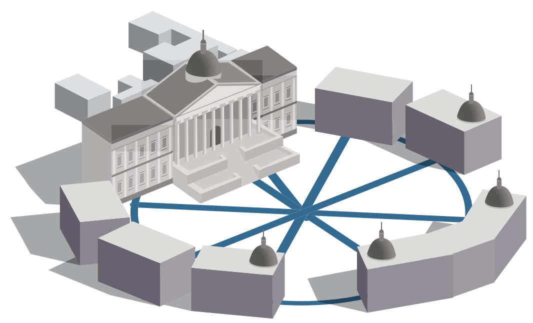
Municipal energy

Municipal energy involves a local authority buying locally generated energy and selling to customers in its own area through its own fully licensed supply company. It would either buy energy from local generators or run its own generation facilities. Municipal energy companies would likely be not-for-profit, or any profits would be invested back into the local community.

Municipal systems are quite common in other European countries but are rare in the UK (Robin Hood Energy is one example). For a municipal energy system to work in the UK, companies would need to be allowed to provide energy only to customers within their boundaries (currently suppliers have to offer tariffs to all customers).

Municipal ESCOs could also emerge. A local authority could offer an ESCO service along with the other council services it provides, included in council tax. Controlling a number of properties would have significant advantages for demand-side response and balancing services.

Customers (or simply council tax payers) may be more likely to trust a local authority. However, the drive for cost efficiency may not be as strong as for a 'market ESCO'.



HYDROGEN PRODUCTION

Producing hydrogen on a large scale to feed the distribution networks will require new business models.

Hydrogen conversion

Under this model, gas retail suppliers would continue putting natural gas into the grid but this would be converted to hydrogen by the 'hydrogen convertors' (operators of the SMRs).

Suppliers would pay a conversion fee to these convertors, which would include the costs of storing the CO_2 produced. As SMRs are likely to be concentrated around port facilities, there will need to be price regulation of the conversion fee.

This model will only work for natural-gas-to-hydrogen conversion and so will need to operate alongside other models of hydrogen production such as electrolysis.

Hydrogen auctions

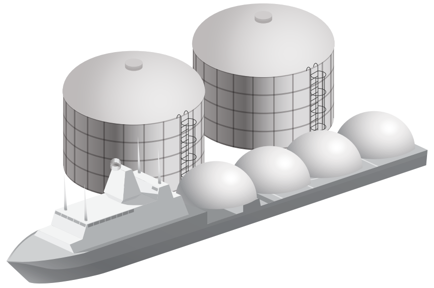
Under this model, suppliers would enter an auction run by the local gas distribution network (GDN) operator – with regulatory oversight.

Gas shippers would bid into an auction, dropping out when price is too low until there is enough hydrogen in the system to meet demand. Shippers would sell gas to customers directly and/or sell to retail suppliers. Each regional network would have its own auction process.

Full integrated regulated gas utility

Hydrogen would be produced (either by SMR conversion or electrolysis), distributed and supplied by the local GDN. Each GDN would be a monopoly, giving customers no choice of supplier and being subject to full price regulation.

This could act as a transitory model in the short term while hydrogen is established. As hydrogen networks expand and are connected, supply and retail will be opened up to competition.



NETWORKS

Distribution system operators (DSOs)

Currently, system balancing is carried out by the national system operator National Grid – though operated at arm's length from the transmission owner.

Supply patterns are changing due to the growth of renewables. Demand patterns are also beginning to change with the introduction of new technologies – such as smart meters and grids, home batteries and storage – and new approaches to transport and heating. As generation and demand become increasingly flexible, the distribution system needs to evolve. To reduce the cost of updating the system, flexible solutions provided by local balancing at the distribution level can be used to mitigate peak demand and reduce network strain.

One way to increase system efficiency is balancing at the local level by creating distribution system operators (DSOs). They would be responsible for much of the same activities that the national system operator currently undertakes, but at a distribution network level. A DSO's activities would include:

- Enhanced monitoring and planning using smart metering data
- Real-time configuration of the network
- Permanent active network management in specific areas of the network
- Distribution system balancing.

A DSO could be the existing distribution network operator (DNO) but a separate organisation would provide a degree of separation between investment decisions and the asset owner.

Virtual power networks

Customers (or a group of customers) would pay 'rent' to use the gas and electricity networks.

They would purchase gas or electricity directly and pay a fee to the gas and electricity DNOs to use the parts of the network they need.

DNOs and GDNs would move from charging for distribution to having a more direct relationship with customers. Charges would reflect capacity (or constraints on capacity) – network rent would be higher during peak times.

TRANSPORT

Vehicle to grid

In this model, EVs would communicate with the power grid to engage in demand-side responses.

An EV supply company – the vehicle supplier itself, a related company or an entirely separate entity – would control the charging of individual customers' EV batteries.

When at home, a customer's EV would be connected to a smart charger controlled via the internet that knows electricity costs by the hour. The charging company would decide when to charge (at times of low demand and low prices) and when to export energy back into the grid (at peak demand and high prices). The customer would set a minimum charge level for the battery to ensure they are not left short of range.

The revenue streams for the EV supply company would include:

- Wholesale arbitrage opportunities (the difference between peak and off-peak charging)
- Providing balancing services to the system operator and asset services for DNOs and Transmission Networks (allowing network operators to avoid network reinforcement)

The customer will receive very low or free charging in return for providing the vehicle-to-grid service.

For this to be commercially viable, battery degradation, replacement costs and the costs of establishing connections to the grid must be considered.

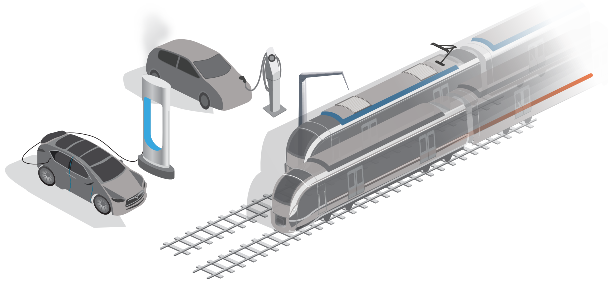
Transport as a service (TaaS)

TaaS companies would run a network of mostly electric, autonomous vehicles for customers to use. When not in use these vehicles would drive themselves to an EV charging point to recharge or to export into the grid during peak time – effectively acting as a form of intra-day storage.

So instead of owning vehicles, customers will hail them using a smartphone app. Along well-used routes, customers could share rides in larger vehicles for cheaper fares (collected via a subscription or pay-as-they go). This model would reduce the total number of vehicles, as TaaS vehicles would be on the road for a far greater proportion of the time than self-owned ones are today (40% rather than 4%).

TaaS companies could be existing vehicle manufactures, existing ride-hailing services such as Uber or new entrants. They would set up a network in each city, starting with the largest cities and eventually rolling out into the towns and the suburbs.

Competition is likely to be most intense, and profit margins lowest, in larger cities. Revenue other than fares or subscriptions is likely to be important and could come from providing storage and balancing services to the electricity grid and selling advertising space on and in the TaaS vehicles.



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