

Report from our *Innovation and Disruption* event – Chris Friedler

Nigel Cornwall and Pixie Energy hosted an event in London on 19 June, exploring innovation and disruption at the grid's edge due to the radical reshaping of the energy system to meet decarbonisation objectives. The event considered how large changes at the customer interface is already driving this transition. It was held to profile a recent book of the same title edited by our collaborator Perry Sioshansi.

Below, we distil some key points made by the broad range of speakers.

Sioshansi of Menlo Energy Economics opened the guest lectures with a talk on the transition from traditional electricity consumers to the concept of “**nonsumers**” – self-reliant energy producers with no need to connect to the grid. He used multiple examples of this transition, such as the high number of solar roofs providing profitable energy in California.

The presentation highlighted how future consumers will have options to produce and sell their own energy, including through more complex aggregated arrangements such as peer-to-peer trading. He concluded by examining the future relationships in this new supply system, such as traditional consumers, prosumers selling energy back to the grid through solar PV and similar technology, and prosumagers who do the same but on a greater scale and with battery storage potential.

Finally, more exotic relationships with nonsumers were explored, such as getting energy from self-contained microgrids with integrated energy services and peer-to-peer trading.

Centrica's Edmund Reid followed with an example of **distributed energy**, and how Centrica is aiming to satisfy the new needs of customers.

Key trends in falling usage from consumers of grid services, falling costs of battery storage and increased usage of renewables show the growing market for distributed energy. This is leading to increased retail competition in distributed energy, and Centrica wishes to get into this market share, with the ambition for its Distributed Energy and Power (DE&P) division being to deliver £1bn in revenue by 2022. Centrica's view is that the transition from consumers to nonsumers is already happening. This presents many challenges but great rewards to companies that can successfully manage the transition.

Cornwall Insight Retail Team Lead Anna Moss introduced possibilities for **disruptive innovation in the retail market**. There is a wide choice of tariffs available for consumers, with 192 tariffs available from over 90 suppliers, with bundled tariffs increasingly available to the consumer.

Moss predicted that fundamental changes to tariffs may occur with the advent of EVs, and there is already increasing proliferation of local energy suppliers with other new suppliers and markets emerging.

There is no shortage of supply innovation ideas, but suppliers may be limited in application. However, regulatory sandboxes will also allow new ideas, and the supplier hub consultation if it is actively progressed would be a further catalyst of change.

James Moore of Redburn Consulting highlighted two areas of change for equipment manufacturers – energy efficiency and renewable energy. Big gains have been made in increasing energy efficiency in motor engines and lighting, with plenty of room for greater upgrades.

Renewable power has also increased as levelised costs have reduced, and wind alongside the combination of solar and battery storage will be optimal. This has impacted the grid infrastructure, with infrastructure growing but with usage patterns changing as energy efficiency take hold.

Moore concluded that EVs have future potential to change this rapidly post-2023, when they become cost-competitive. He concluded that fossil fuel power generation faces challenges from energy efficiency and rising renewables. Low and medium voltage networks is also a better positioned segment, with low-voltage set to capitalise on the EV roll-out.

Peer-to-peer trading, taking consumers off the grid via solar PV and batteries, was the focus of **David Shipworth of the UCL Energy Institute**.

Regulatory changes are increasingly allowing for peer-to-peer trading, with the UK being seen in Europe as a regulatory innovator in this area. The CommUNITY network project in London is trialling regulatory and governance issues, with key outcomes including issues with households with multiple suppliers and difficulties predicting customer bills based on variable solar. Shipworth highlighted how peer-to-peer can deliver benefits to the grid, such as demand-side response as well

as maximising consumer engagement and minimising social cost.

Blockchain and its relations to energy were introduced by **ESMT's Christoph Burger**. He gave background to **blockchain technologies**, and how using financial transactions across multiple computers aims to be more secure than the banking system.

A clear majority of experts believe we will see blockchain business models between now and 2020, with 85% estimating cost cutting potential for utilities of 20-60%. For regulators, blockchain possibly via use of a smart contract can reduce the need for regulation in the utilities system. The Enerchain peer-to-peer network example shows how blockchain can save costs in energy systems.

Cornwall Insight's CEO Gareth Miller then gave a keynote address on how decarbonisation pathways for transport and heat are diverging, with transport following an electrified route and heating following the potential route of hydrogen. This is due to the need for decarbonisation between now and 2030, with the power sector unable to make up this difference and electric vehicles being a readily deployable solution to fill target gaps in the carbon budgets. Without this target, there may be the more optimal and cost-effective model of hydrogen across both the transport and heat systems.

Miller added heat decarbonisation in general presents "enormous problems", especially when compared to the power and transport sectors, with costs estimated to be hundreds of billions for heat decarbonisation, and huge social problems regarding electrification of heat via heat pumps. The power sector, both through direct decarbonisation and indirect decarbonisation via transport and heat, is therefore going to play a continuing important role in decarbonisation more broadly. Miller also introduced a new Cornwall Insight paper *Driven to Disruption?* (see [ES622](#)).

Malcolm Keay, of the Oxford Institute for Energy Studies, then presented on current energy prices and increasingly dysfunctional price signals.

This is moving wholesale prices away from consumers, not giving them an accurate view of what they are paying for. A new system where customers are billed separately for variable renewables when they are producing power and when they are not being proposed, creating two separate markets. This would allow a fundamental change, putting more power in the hands of consumers.

Nigel Cornwall delivered the last talk, focusing on **community energy in a post-subsidy world**. He introduced Pixie Energy, which is aiming to support innovation in local markets, and he outlined some of the work that Pixie Energy is completing, such as the Norwich Virtual Energy Community project, as well as a comprehensive energy mapping project his team were carrying out covering East Anglia. Pixie Energy is looking to kick start more local supply models and case studies to stimulate innovation.

With the removal of renewable subsidies (except for offshore wind), there is a changing market for renewables that local markets could fill in part. Over time rising retail prices passing through higher policy costs would strengthen incentives for self-consumption, and levelised costs of renewables technologies would continue to fall.

But to support orderly deployment in the short term, the government should ensure there was still a guaranteed market for renewables exports from April 2019, maintaining a minimum price but reflecting wholesale prices. Time of export pricing should also be developed to incentivise energy storage technologies.

Moderated by Cornwall, a **panel discussion** concluded proceedings, with Gareth Miller, Edmund Reid, Fereidoon Sioshansi, Maxine Frerk and Malcolm Keay examining some of the themes.

Frerk, Director of Grid Edge Policy, talked about the **Smart Fintry community project** in Sterlingshire, which associated renewables assets (PV, wind and AD, including heat storage, with local consumption and balancing them). Wireless communications and smart meters were also incorporated. The project had highlighted that many changes were needed for the regulatory agenda if such projects were to be viable in their own right.

Sioshansi spoke about fairness vs. efficiency in distributed schemes, noting that private wire or off-grid solutions raised complex issues for regulators. Keay and Miller discussed the merits of a revenue stabilisation CfD for renewables. Edmund Reid spoke of his experiences of the Local Energy Market in Cornwall, and how it has showcased the need for letting the market come up with more solutions away from large policy interventions.

We thank all attendees and speakers.

Download conference slides [here](#).

Download our EV paper [here](#).

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