

EBOOK

# DNO to DSO: The new network effect

New research explores the three forces  
driving the UK's smart grid strategy

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Neos Networks worked with London-based agency Octopus Group to carry out interviews with 100 businesses and 205 consumers who generate their own electricity from renewable sources. As well as in-depth interviews with eight leaders in the UK energy industry, all of whom are responsible for DNO to DSO transition strategies and/or network innovation. The findings in this report are based on these interviews.

# Introduction

The UK's energy sector is at the apex of an era of change and transformation. With new pricing controls that put the consumer at the centre of decision making, the advancement of the smart grid and the ongoing need for sustainability, the list of challenges facing providers is long and growing by the day.

At the centre of these challenges sits a shift in the energy business model, as providers transition to become Distribution System Operators (DSOs), and away from Distribution Network Operators (DNOs).

Naturally, the drivers of change in energy are centred on wider shifts in how gas and electricity are generated, used and purchased. And transforming will almost certainly benefit providers in the long term.

But that doesn't mean DNOs will cope any better with the immediate pressures created by this change. Becoming a DSO means new roles and responsibilities within energy businesses, as well as the need to reshape the supply chains and legal frameworks within which they work. This is driven by the 'prosumer' approach of businesses and consumers generating their own energy, gathering pace and further transforming how energy is created, used and, in many cases, sold back into the grid.

It also means a greater onus on data intelligence and network connectivity to enable the innovative, technology-focused and security conscious way of working, towards which the industry is moving.

It will position IT and telecommunications leaders in the energy sector as genuine changemakers, possessing the power to influence the future direction and success of their businesses.

To understand more about the transition from DNO to DSO, what industry leaders see as the real challenges and how to make the most of it, Neos Networks has commissioned new research into the forces driving the UK's smart grid strategy. The research explores:

- The role of prosumers, their motivations for energy generation and how they use energy
- The immediate changes required for energy providers and their long-term objectives
- How connectivity can better enable and empower energy providers in the coming years

## SECTION 01

# The energy behind the change

While the transition to a DSO model for energy providers can be seen as a positive point of modernisation for the industry, it's also a required change. Ofgem's 'Smart Systems and Flexibility' endorses the move, as part of a stated aim to create an energy network ecosystem that's efficient, flexible, better equipped to meet demand and able to take advantage of technological innovation as it happens.

In part, the driver of the shift is that the DNO model is not able to adequately support things like distributed energy, renewables and different storage models. This means proactive evolution in the UK's energy sector is essential if providers are to support the UK's long-term needs.

But another, perhaps more powerful, driver is a series of 'on the ground' trends in how businesses

and consumers are using, creating and selling or storing energy as prosumers.

It's crucial that providers understand these trends if they're going to successfully pivot to a model that prioritises interdependence between companies, prosumers and the public sector, in the pursuit of a truly distributed energy model.

### Leadership intentions

Leading energy groups across the sector have their own priorities and plans around the DNO to DSO transition. Ofgem describes theirs in a list of organisational views and priorities:

- Facilitating network access for flexibility and low carbon generation
- Optimising network capacity usage through smart charging signals
- Investing in smart enabling technology
- Promoting competition for capacity in networks
- Developing flexibility markets and platforms
- Big data – enabling flexibility platforms, smart technology and behavioural change
- Smart engineering standards for traditional network investment
- Promoting resilience
- Local energy (enabling energy transactions at local level)



## Prosumer priorities

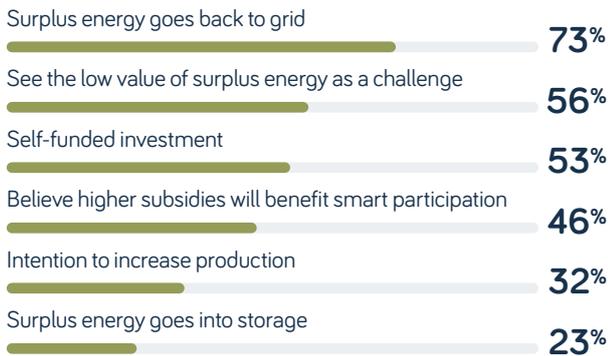
At present around 35% of businesses in the UK are producing electricity through on-site generation, with 72% having factored self-generation into their long-term strategic plans. While there is less certainty around the figures associated with individual producers of electricity, some studies predict that the country is on a growth journey from one million residential prosumers in 2015 to 24 million in 2050.

What's interesting are the motivations behind these residential and business prosumers, their future intentions and the barriers they perceive could harm or hamper energy generation in the coming years.

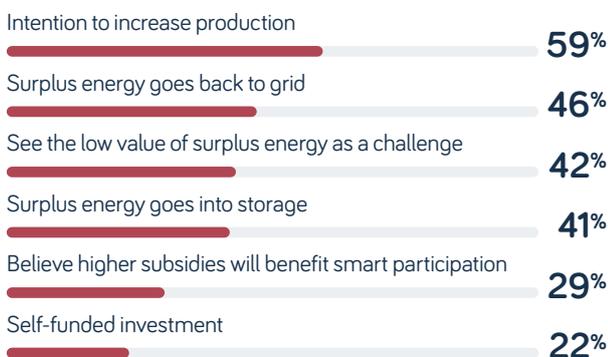
For both businesses and consumers, environmental concerns are the primary driver for investing in renewables.

However, businesses also cite carbon offsetting as an equally influential driver – perhaps for corporate reputation purposes, or to take advantage of lucrative and beneficial carbon offsetting schemes. Rising energy costs were also highlighted as a reason to generate off-grid energy, a factor which is pertinent to the industry as it works through specific changes around pricing and fairness.

### Consumer

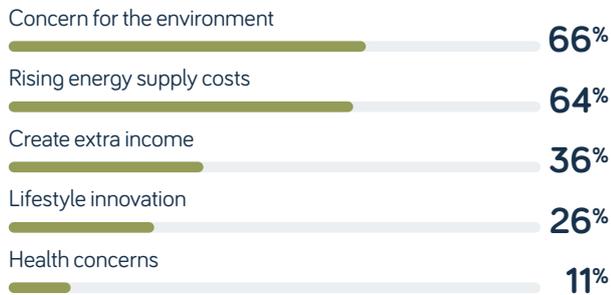


### Business

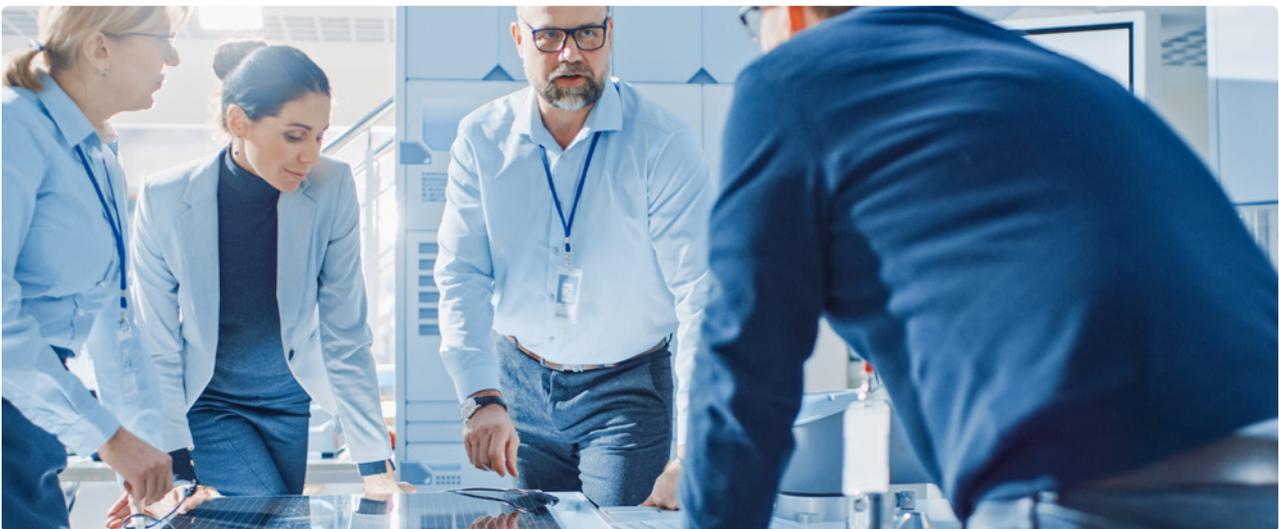


## Why do you invest in off-grid, renewable energy?

### Consumer



### Business



It's also important to note that incentivisation is an influential driver of energy generation. 82% of those asked state that it plays a significant role in renewable installation – while 77% believe that these incentives need to be increased in order to continue the positive trend of prosumer generation.

This is where the energy industry as a whole should be watchful. Although prosumer trends are broadly positive, there are warning signs of issues further down the line. For example, just 32% of consumers intend to increase the amount of renewable energy they produce, despite the benefits and lifestyle advantages it creates. While businesses are slightly higher at 59%, most would hope for that number to be greater.

The risk of de-incentivising or demotivating the people and businesses that are driving the prosumer element of the DSO transition is huge. Particularly as 76% of businesses produce an energy surplus every month, with 46% putting that surplus back into the grid – a figure that's even higher for consumers (73%).

Prosumers play a pivotal role in the future state of energy provision. Fortunately for the sector, as well as identifying risks and pain points, our research also finds clear direction from prosumers on what would encourage them to increase generation, and what might see others do the same. Together, they say that if numbers are going to rise they need greater network flexibility, lower hardware costs and smarter infrastructure monitoring.

**“Prosumers have got a huge part to play (in the smart grid). Individual prosumers can make decisions to install on their site – embedded exports allow us to maximise the value of the local benefit – there will be way less losses, so lower overall cost of supply.”**

Operations Director, Electricity Platform Operator

**“The consumer market is very exciting, potentially. However, the numbers aren't there yet because the payoff for consumers is 10-12 years out. They need a feed-in tariff to overpay, or bigger government subsidy to take it from niche to mainstream.”**

UK energy provider

## PROPORTION OF BUSINESSES

Stating that feed-in-tariff (FIT) incentives played a significant role in renewable installation



That no longer participate in incentive schemes



SECTION 02

# The DSO framework

With prosumer priorities and administrative requirements in mind, the role and purpose of the DSO is relatively clear. However, adapting and adhering to the new world order in energy is a complex task, full of technical, legal and regulatory requirements. In addition, there is board-level uncertainty within energy firms with regards to what does and does not constitute the specific role and remit of the DSO; would it manage energy balancing in this new environment, for example?

Essentially, there are two elements to consider. The first is adjusting to a new landscape for energy, including legal frameworks and a reshaping of the energy supply change.

The second is about data intelligence and usage, and the technology and connectivity capabilities providers will need going forward. Getting this right could not be more important.

Administration overload is cited by more than a quarter of prosumers as one of the key reasons that prosumers give up on schemes, along with inaccurate monitoring. Energy companies are being challenged with the need to address both of these concerns as they create their new business models.

## Top three reasons for no longer participating in FIT scheme



Returns were too small



Too much administration



Monitoring was inaccurate



## New landscape, new ecosystem

Some of the key concerns arising from our research with energy leaders was around the new roles energy providers would have to take when moving to a DSO model. There is also widespread apprehension about how well equipped the industry is to cater for a super-connected ecosystem of energy partners. It was clear from the interviews that while a greater need for collaboration in UK energy is required, concerns still exist in regards to the capacity for current systems and processes to cope with what's required of them.

Finding a way through this is heavily dependent on inter-industry collaboration and the reshaping of some long-standing ways of working and business relationships; particularly when a subset of our research sample expressed a belief that the legal frameworks that govern energy companies needs to change.

However, of equal concern is the tools and technologies that will support that collaboration and provide the capacity for monitoring and measurement that the DSO model and the smart grid requires.

**“The system needs to be wholly flexible – you need DNOs to be incentivised or penalised if they don’t make the systems flexible across the board. Not just in the bits where they think they have a problem.”**

DNO/DSO Change Management Leader,  
UK energy provider

**“Cross-industry collaboration is needed: that is likely to deliver the best value – different parts of the jigsaw puzzle. Companies need to collaborate to get the best value for the whole system.”**

Head of Operations,  
electricity platform operator

**“We need to enable smart trading, between people, between businesses, in communities. There is a 20%/80% chance that they will get there – but if they get it, it’s an absolute game changer.”**

Commercial Director, DNO

**“Without collaboration, we’re not going to make this work in a number of areas where we’re delivering stuff to consumers.”**

DNO/DSO Change Management Leader,  
UK energy provider

## Connections for collaboration

The DSO model and smart grids are both heavily data and connectivity reliant. Energy providers, prosumers, regulators, the National Grid and more will have to be constantly connected, with devices and systems 'talking' to each other all the time in order to understand usage, supply, trends and performance as things change. And with energy consumption having become unpredictable over the past few years, there's a real need to harvest and process more data from energy suppliers to get a better handle on how energy is used in the current market.

Naturally, this leads to drastically increased demand on existing network infrastructure and connectivity solutions. In the first instance because there will simply be more traffic to cope with at all hours of the day. And secondly because data will need to be transferred, processed and understood in real-time, if the promise of a smart energy model is going to be met.

Prosumers suggest that improvements in energy connectivity are needed urgently if a distributed, smart approach to energy is going to become a reality in the UK.

**“Renewables are intermittent so we need to know what they're doing to be able to predict and forecast generation levels, to have some flexibility over what's going to be happening.”**

Change Project Leader, DNO

**“As we move to this more distributed, decentralised system, clearly devices are going to be talking to one-another more... We are going to need more and more comms in order to make these levers work.”**

DNO/DSO Change Management Leader,  
UK energy provider

**“We need more monitoring equipment at different levels and different sites – it's got to be bi-directional so we know how much power is going through those lines.”**

Head of Engineering, electricity provider



**Effective communications infrastructure is critical to creating a more intelligent smart-grid approach to energy distribution and management.**



These statements and statistics show that despite the good intentions and positive steps around energy transformation, there's a missing piece of the puzzle that could compromise things. Without robust, reliable connectivity and real-time data provision, clearer monitoring and communications can't be achieved. And there are other connectivity issues at hand, such as the security concerns that come with a more digitalised, smart system as well as the cost of managing vast volumes of data to inform the smart grid.

Western Power Distribution (via Ofgem) agrees, stating that: "It is considered that unresolved telecoms issues could delay a smart grid project by a year or more, with an even greater impact on the eventual roll-out."

If energy companies are going to avoid this sort of roadblock and successfully transform their industry for the better, they need to think about the challenges of the next five years in terms of technology, connectivity and collaboration – with a plan of how they're going to face them.

**"Hopefully at some point we will be able to connect all that data to our network... the one problem we tend to have is, particularly in old sites, we don't have bi-directional data."**

Head of Engineering, electricity provider



SECTION 03

# Five years in energy

The next few years in the UK energy sector will be pivotal for its capacity to thrive over the coming decades (perhaps up to 2035, when some believe the optimal DSO model will be in place). The prosumer area of the sector has made their intentions, needs and priorities clear, as they seek to be an integral part of a more efficient, sustainable and smart way of powering the UK. Now, it's down to the energy companies themselves to make the changes that will meet this demand and realise the potential that goes alongside distributed energy.

This challenge to the sector can be viewed in three ways, which together should form a plan of action that will put in place the technological foundations for future success. These are:



Collaboration



Customer strategy



Connectivity





## Collaboration

The DNO to DSO transition and future operating model depends almost entirely on collaboration between providers, regulators, the grid and prosumers. Energy companies are effectively switching from a way of doing business based on their interests and priorities to a network eco-system, where each part has an impact on the whole.

The challenge, as demonstrated by our findings, is that just 24% of prosumer businesses see collaboration between providers as an important step towards smart energy infrastructure; and that system integration is not where it needs to be today.

Providers have a dual role here. Firstly, to foster that culture of collaboration between themselves, prosumers and beyond. And secondly to make it possible with reliable, robust technological partnerships alongside expert businesses that understand the value of collaboration in major infrastructure projects.

**“Without collaboration, we’re not going to make this work.”**

DNO/DSO Change Management Leader,  
UK energy provider





## Customer strategy

The number of stakeholders each energy company deals with is set to grow exponentially. With many new interested parties looking to get involved in how they contribute to something much wider than energy provision to customers.

A new DSO customer strategy has to include all these groups, with a clear overview of how they will be served. That includes the 30% of prosumers who require smarter infrastructure monitoring to increase production, the 35% who want more network flexibility and the 77% of businesses who suggest that incentives should be increased to drive take up of renewable energy generation.

It also includes the end user, who will expect greater levels of service, transparency and visibility as energy transforms.

To keep to the requirements they're setting themselves, energy companies need the right tools and technologies to fulfill various requirements. That means working with open-minded, problem solving partners with experience of managing demanding stakeholder groups.

**“The regulators have to open up the network and access to the end customer. Until we get clear direction on that, there will be inertia in our approach, and everyone else who isn't the energy supplier.”**

Director, regional distributor

## TOP 3 REQUIREMENTS FROM ENERGY PROVIDERS TO IMPROVE ENERGY METERING AND MANAGEMENT





## Connectivity

As has been explored, connectivity is a huge focal point for the DNO to DSO transition. Without reliable, robust systems that enable real-time data transfer and system monitoring, the DSO model will inevitably falter.

Again, improvements and transformation are essential. Fortunately, energy companies are not at a standing start. Most have modernised their telecommunications infrastructure to some extent and understand the roadmap they're on.

The vital next steps energy firms will soon take depend heavily on working with the right people. Top of the agenda should be partners that understand mission critical services and have demonstrable experience in providing the infrastructure for them to work.

If energy companies can tick that box, and create meaningful long-term technical infrastructure partnerships, they will be well-placed to ensure that they can operate successfully as a DSO and contribute to a smart energy future.

**“Going forward telecoms is a very important aspect of the transition towards smart grids. We’ve seen in several projects happening around the country that communications and data transfers are usually the weak spot.”**

Head of Innovation, energy services provider





### About Neos Networks

Neos Networks provides class-leading connectivity and data centre services that deliver very high performance, cost efficiency and a competitive edge.

The company operates a 20,000+km private telecoms network and an estate of 90 commercial data centres that span the UK. With its extensive telecoms and data centre operational expertise it offers commercial security with unrivalled in-house engineering resource.

[enquiries@neosnetworks.com](mailto:enquiries@neosnetworks.com)  
+44 (0)345 070 1997

[neosnetworks.com](https://neosnetworks.com)