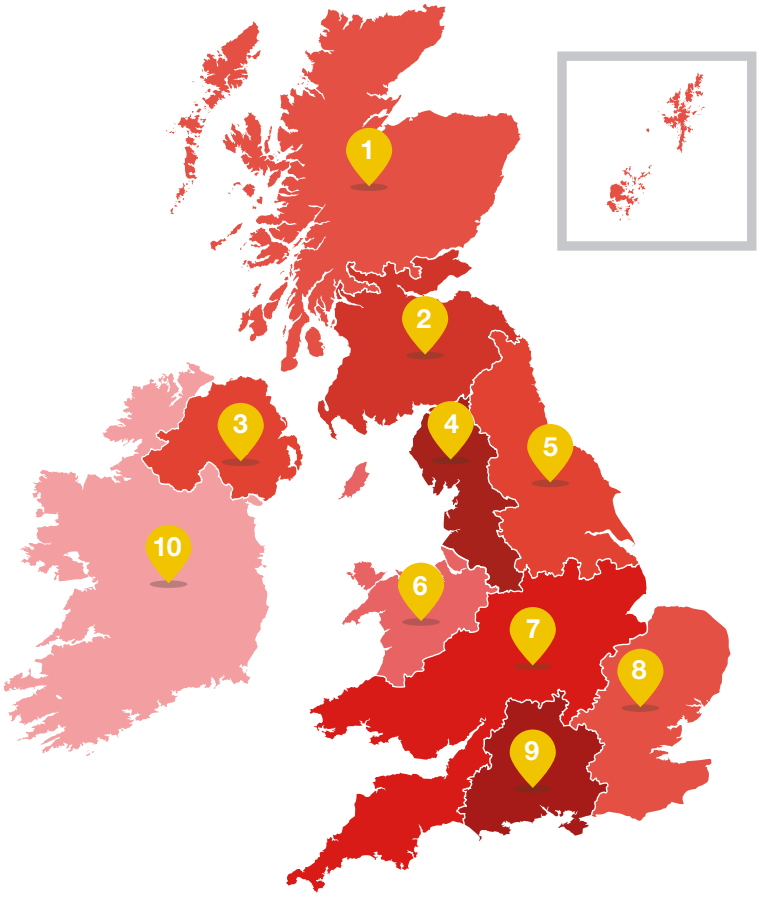
Electricity Network Innovation Guide For Communities 2018

energynetworks association

regen transforming energy

Electricity Distribution Network Operators



1 Scottish & Southern Electricity Networks

2 SP ENERGY NETWORKS

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Community Energy England

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Electricity Network Innovation for Communities

Welcome!

This guide is for communities and local energy stakeholders who are interested in electricity network innovation. It will help you learn more about how our energy system is changing, lessons from innovation trials, why these projects are important, and how you can get involved. This guide builds on The Rough Guide to Engaging Communities in Energy Network Innovation published in 2017.[1] It follows on from the 2017 Energy Networks Association (ENA) events in London and Newcastle, delivered by Regen with all the Distribution Network Operators (DNOs), and attended by 131 community and local energy stakeholders. This guide concentrates on innovation themes, including new content and case studies to help you participate in our changing energy system. We hope you find it useful.

Contents

1 https://www.regensw.co.uk/Handlers/Download.ashx?IDMF=79d7cd63-e67b-4454-9e3b-251ad172a992

What is electricity network innovation?

It's about making our energy system more reliable, cost-effective, and low carbon, by managing how we generate, distribute and use electricity in a smarter way. The connection of renewable energy, smart meters, battery storage and new low carbon technologies are driving innovation, and helping us balance the supply and demand for electricity. New ideas to make the system more efficient are tested in trials and many of these trials involve communities. Electricity network trials must focus on innovative and untested ideas that deliver network benefits to qualify for network innovation funding. There are lots of examples and case studies in this guide including projects that:

- use smart charging for electric vehicles to avoid peak demand periods
- help communities save energy and money, which may result in deferring expensive network upgrades
- use multiple household PV and battery storage systems to supply extra capacity at peak times of demand on the network.

Why do we need to innovate?

We need to innovate to help customers save money on energy bills, address climate change, and keep the lights on. Imperial College London and The Carbon Trust estimate that by managing the electricity system more flexibly, consumers could save between £17–40 billion by 2050[2].

We all use electricity every day to cook, connect and stay cosy, but the amount of electricity we use is changing, and how we use and generate it is changing too. Since the 1930's our grid has been operated centrally and was built to move electricity in one direction, from large power stations, out to homes and businesses across the UK. Since then more decentralised renewable energy has been connected to the electricity network, more battery storage is being connected to balance supply and demand, and electric vehicles and heat pumps are changing how, and how much electricity we are using at different times of day. Two-way flows of electricity, along with changing generation and demand patterns create opportunities and challenges for how the energy system is managed. Balancing supply and demand to make sure the lights stay on is becoming more dynamic. In some areas, for example, the network is constrained because it wasn't designed for two-way flows of electricity. If we manage the supply and demand in a smarter and more flexible way, we might be able to defer costly reinforcements, helping to make sure we continue connecting more low carbon generation.

2 https://www.ofgem.gov.uk/publications-and-updates/ofgem-and-government-pave-way-smarter-more-flexible-energy-system

Some of the issues being addressed by the community energy movement are aligned with the problems DNOs are tackling through innovation projects. The community energy movement is well established, with over 222 groups generating their own energy[3], and addressing environmental, social and local economic issues.

> “The bill payer pays for the network, so we need to optimise what we already have first.”
>
> **Ian Cameron,**
> UK Power Networks

However, changes in policy affecting the financing of projects mean that these organisations are looking at new and innovative business models. Many of these organisations are working to generate clean energy locally which increases security of supply and reduces carbon emissions. They are running projects to help people use less energy, help people in fuel poverty and help people save money on their bills. By working together with their DNO, communities can access knowledge and expertise, and potentially get involved in network innovation projects that benefit all customers.

> “We have a very fragmented energy system. Community energy, if done right, is an opportunity to start reintegrating the system at a local level.”
>
> **Felix Wight,**
> Repowering London

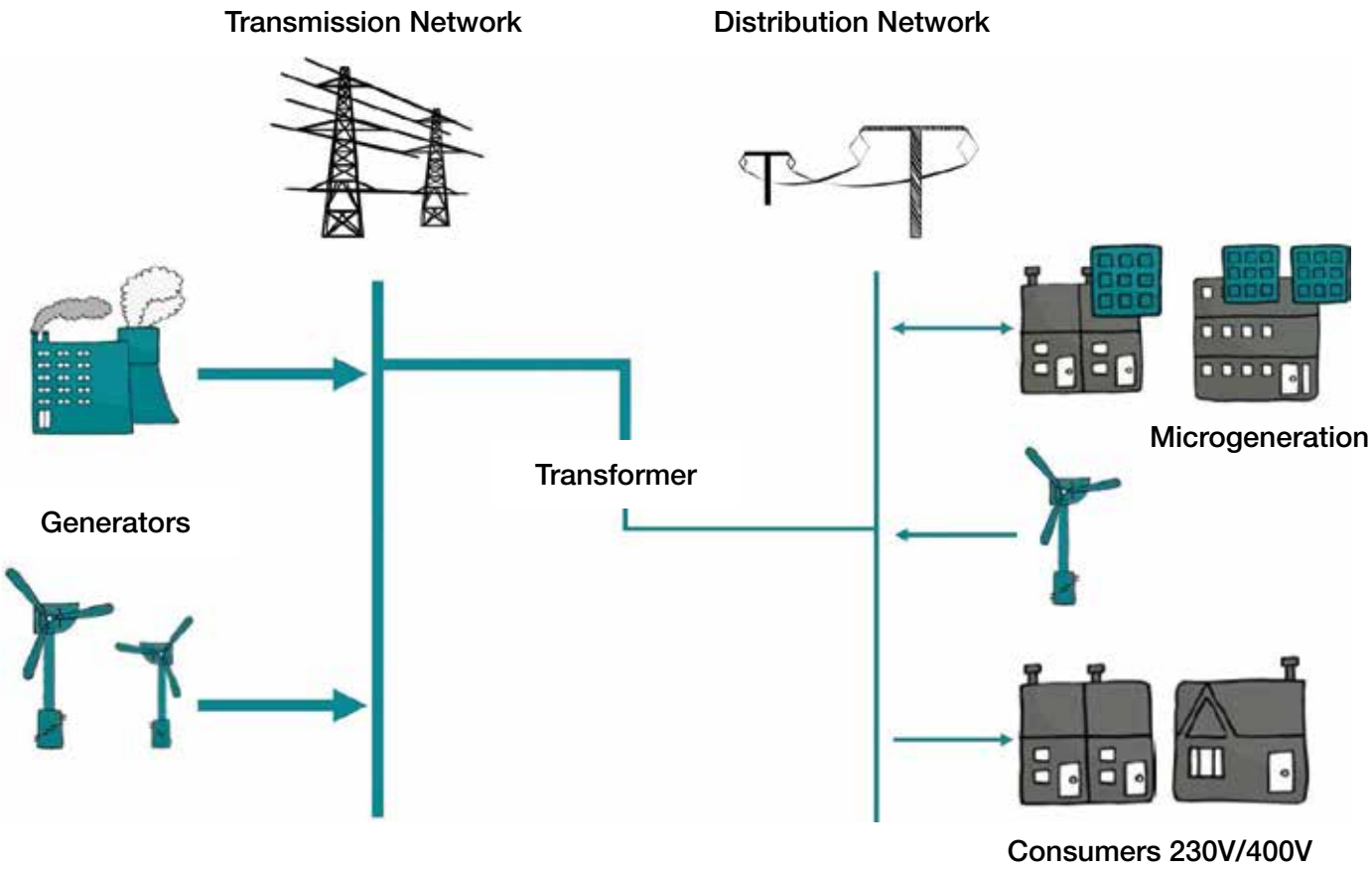
3 Community Energy England and Wales state of the sector report, 2017 p11, https://communityenergyengland.org/files/document/51/1499247266_CommunityEnergy-StateoftheSectorReport.pdf

Who operates the electricity network?

National Grid is the System Operator (SO) in the UK. They manage the high voltage transmission network that transmits centralised energy, from large power stations to where it is needed.

DNOs are licensed to operate the electricity network at a regional level, taking electricity from the transmission network and distributing it, at lower voltages to homes and businesses. They own and operate the pylons, transformers, poles and cables at distribution level. They fix the network if there is a power cut and they also connect new customers who want to generate energy (distributed generation), although some larger sites like wind farms are connected to the transmission network. They are different to your energy supplier, who is responsible for your electricity meter and sending you your energy bill. Around a quarter (27.6 per cent) of the average electricity bill covers the cost of using the transmission and distribution network[4]. There are six different DNOs in the UK and you can find yours on the map or by visiting the ENA website and entering your postcode.

www.energynetworks.org/info/faqs/who-is-my-network-operator



4 https://www.ofgem.gov.uk/publications-and-updates/infographic-bills-prices-and-profits

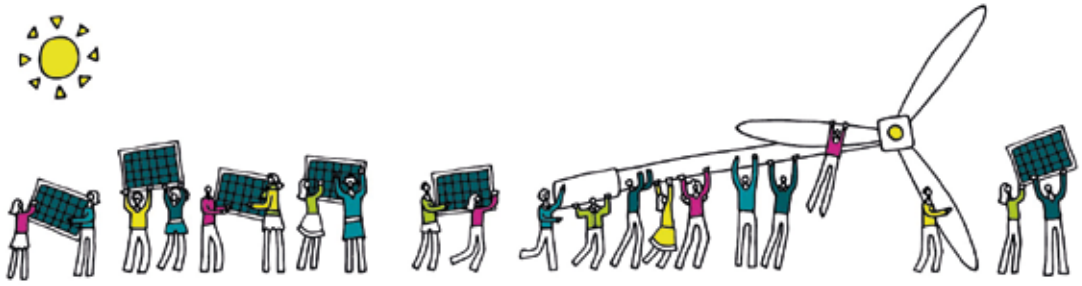
DNO to DSO

DNOs are transforming to become Distribution System Operators (DSOs). The ENA Open Networks Project[5] involving all the DNOs, has published this definition:

> “A Distribution System Operator (DSO) securely operates and develops an active distribution system comprising networks, demand, generation and other flexible distributed energy resources (DER). As a neutral facilitator of an open and accessible market it will enable competitive access to markets and the optimal use of DER on distribution networks to deliver security, sustainability and affordability in the support of whole system optimisation. A DSO enables customers to be both producers and consumers; enabling customer access to networks and markets, customer choice and great customer service.”

In the past, the DNOs worked behind the scenes running the network but are now much more involved in how the whole energy system works. They are increasingly interacting with customers and communities because of the need to connect more renewable energy and low carbon technologies like rooftop solar PV and electric vehicles. As our energy use changes, DNOs are looking at how they can manage electricity generation and demand on the network to avoid peaks, through behaviour change, education, incentives, battery storage and smart technologies. Their work includes supporting vulnerable customers to join the Priority Services Register (PSR), and delivering energy efficiency advice through trials, activities with vulnerable customers, and by working with trusted organisations. All DNOs have targets around engagement which they set out in their Incentive on Connections Engagement (ICE) and Stakeholder Engagement and Consumer Vulnerability (SECV) plans.

> “The rise of distributed generation, electric vehicles, energy storage and demand side response is transforming the way our customers engage with the energy system. Our transition to DSO is well underway as we adapt to our customers changing needs. I would encourage anyone interested in smart grids and what DSO means for them to get in touch with us or our community champions to discuss further.”
>
> **Richard Hartshorn,**
> Scottish and Southern Electricity Networks



5 http://www.energynetworks.org/assets/files/electricity/futures/Open_Networks/DSO%20Definition%20and%20RR_v7.0.pdf

DNOs innovate and collaborate

Innovation is a key consideration for DNOs as they transition to the smarter, more flexible energy system that can support the decarbonisation of heat and transport. It is also a crucial element of the regulatory framework for electricity networks, which includes funding and incentives that help them innovate for customer benefit, as well as deliver value for the network in the long term.

The ENA has developed the Electricity Network Innovation Strategy to set out a jointly-agreed approach from the energy networks on how innovation can best accommodate the future requirements of the energy system in its entirety, and can lead to the effective delivery of benefits in a collaborative and cost-effective way.

DNOs already undertake a range of collaborative activities, but they are looking to increase this collaboration across the energy industry to deliver more innovation and deliver better value to energy consumers and network customers. Energy networks welcome involvement in the initiatives described in the Electricity Network Innovation Strategy, and particularly want to engage further with community energy groups.

The Strategy is due to be published in March 2018, and more information can be found on the ENA website[6].

> “This Strategy sets out a jointly agreed roadmap for ongoing innovation that accommodates the future requirements of the whole energy system in a collaborative way that delivers more collective benefit for less cost.”
>
> **Geoff Murphy,**
> SP Energy Networks

The Open Networks Project is a key initiative for addressing the changes that need to be made to energy networks to create a more flexible energy system, as recently set out in Ofgem and the Department for Business, Energy & Industrial Strategy’s Smart Systems and Flexibility Plan.

The roles and responsibilities of network companies are changing as they respond to the deployment of new types of smart and renewable energy technology connected at a local rather than a national level. These changes mean that Distribution Network Operators are moving from their traditional role of simply distributing electricity to playing a more active role managing supply and demand locally. At the same time the role of National Grid as System Operator is also changing to facilitate the transition to a more decentralised, low carbon system. The Open Networks Project will describe the new roles and responsibilities required to support the transition to a smarter, more efficient electricity network.

These changes will help reduce the cost of running the network to customers and provide new opportunities for businesses and communities to offer flexibility services to local network operators. You can find more information about the Open Networks Project on the ENA website, and in the “Opening Markets for Network Flexibility” published in December 2018[7].

6 http://www.energynetworks.org/electricity/futures/network-innovation/electricity-networks-innovation-strategy.html

7 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/631724/upgrading-our-energy-system.pdf

How are electricity network innovation trials funded?

There are multiple funding options available including private and European money, but most trials are publicly funded by the government or Ofgem, the energy markets regulator. This section summarises some of the main funding sources.

Ofgem funding

The Network Innovation Allowance (NIA)[8] is a limited and set amount each year. The NIA can be used to fund smaller technical, commercial, or operational projects on the DNOs own network that could financially benefit the DNO and their customers.

The Electricity Network Innovation Competition (NIC)[9] is a £70 million a year fund. Each year DNOs and third parties can submit innovative ideas for projects. The innovative projects help all DNOs understand what they need to do to provide environmental benefits, cost reductions and security of supply as we move to a low carbon economy. Project ideas must meet strict criteria set by Ofgem, for example they must have the potential to demonstrate net financial benefits to existing and/or future electricity customers. If you wanted to submit a bid to the NIC you would usually need substantial time and resources and would need to partner with a DNO. Recently Ofgem has opened this funding up to third parties so that everyone has the opportunity to help shape project ideas from the start. For example, WPD were awarded funding for OpenLV, a £5.9 million project. This project was conceived and developed by consultants EA Technology, who pulled the partners together, and lead the project. OpenLV will trial and demonstrate an open, flexible platform that could ultimately be deployed to every low voltage substation in Great Britain.

UK Government funding

The Energy Systems Catapult[10] uses public money to independently drive innovation for future economic growth. They work with consumers, industry, academia and government to decarbonise our energy system at the lowest possible cost.

Innovate UK[11] is the UK governments innovation agency. They work with people, companies and partner organisations to find and drive the scientific and technical innovative solutions that will support the growth of the UK economy.

The Department for Business, Energy and Industrial Strategy (BEIS), through the Industrial Strategy Challenge Fund, recently funded the Faraday Challenge[12], a £246m government investment in battery technology for electric vehicles, which awarded funding to a community group, Energy Alton, amongst others.

8 https://www.ofgem.gov.uk/network-regulation-riio-model/network-innovation/electricity-network-innovation-allowance

9 https://www.ofgem.gov.uk/network-regulation-riio-model/network-innovation/electricity-network-innovation-competition

10 https://es.catapult.org.uk/

11 https://www.gov.uk/government/organisations/innovate-uk

12 https://innovateuk.blog.gov.uk/2017/07/24/the-faraday-challenge-part-of-the-industrial-strategy-challenge-fund/

EU funding

The European Union (EU) has funded projects through the Horizon 2020 research and innovation programme, for example:

- **Nobel Grid**

  A smart grid project, which included UK partners Carbon Co-op (a Manchester based community energy group) and the University of Manchester.

- **Project Sensible**

  A battery storage trial with UK partners including the community energy group Mozes and the University of Nottingham.

Communities have also accessed funding for energy network innovation trials through charitable funders and universities.

Eligibility criteria for electricity network innovation projects with a DNO

Most energy network innovation trials involve collaboration. Partnerships can include other DNOs, smart tech companies, renewable energy generators, businesses, communities, universities and research organisations. The most likely way communities could access funding with a DNO is through the NIA and NIC. This money comes from Ofgem who regulate and control how DNOs spend it. They set specific criteria so that public money is used for the benefit of all network customers. Ofgem are supportive of third party involvement and have launched a new Innovation Link'[13], so if you want more information or support understanding how your ideas could work then contact their team.

For a DNO to partner on an energy network innovation project, the project idea must:

Involve the research, development or demonstration of ideas that could change how the physical network is used or how the system is operated.

Be new and not have been done before – this could be new equipment, a new commercial arrangement, or a new way of operating, arranging or applying existing electricity equipment.

Be useful for the network – the potential learning should solve a problem relevant to the electricity network and deliver network benefits.

Have the potential to keep costs stable or save customers money by delivering net financial benefits to existing and/or future network customers. This means that the method being used must have the potential to deliver the solution at a lower cost than the most efficient method currently in use. Ultimately, this may result in lower Distribution Use of System charges (DUoS) which are paid for through energy bills.

Be innovative – not business as usual and an unproven business case.

Not duplicate other projects or innovation trials already conducted in the UK.

This is not an exhaustive list and full eligibility criteria for NIA and NIC projects are available on the Ofgem website[14].

13 https://www.ofgem.gov.uk/about-us/how-we-engage/innovation-link

14 https://www.ofgem.gov.uk/system/files/docs/2017/07/final_elec_nia_gov_doc_v3_0.pdf

https://www.ofgem.gov.uk/system/files/docs/2017/07/electricity_network_innovation_competition_governance_document_version_3.0.pdf

Areas of focus for Innovation

Demand side response (DSR)

Demand side response (DSR) is when consumers adjust the amount of electricity they use at particular times in response to a signal. This signal could be from an energy supplier or network operator and it is most likely to be a price incentive or penalty. For example, a cheaper energy tariff linked to local energy generation.

DSR is of interest to DNOs as it is one solution that can be used to balance the amount of generation and demand on their networks. For example, if there is too much generation on the network, consumers can be incentivised to use power (e.g. by charging their EV or heating up their water tank) through cheaper tariffs.

Community groups can play an important role in supporting DSR either by:

Starting new schemes with a supplier, DNO or aggregator in their local area, or by supporting the take-up of an existing DSR scheme by providing promotional support or advice to customers on behalf of the provider.

Example innovation trials:

ACCESS – Local Constraint Management (Mull)[15]

Sunshine Tariff[16]

Low Carbon London[17]

Energywise[18]

FUSION[19]

15 http://www.accessproject.org.uk

16 https://www.westernpower.co.uk/Innovation/Projects/Closed-Projects/Sunshine-Tariff.aspx#FAQLink208;javascript:void(0)

17 http://innovation.ukpowernetworks.co.uk/innovation/en/Projects/tier-2-projects/Low-Carbon-London-(LCL)/

18 http://innovation.ukpowernetworks.co.uk/innovation/en/Projects/tier-2-projects/Energywise/

19 https://www.spenergynetworks.co.uk/news/pages/innovation_funding.aspx
https://www.ofgem.gov.uk/publications-and-updates/electricity-nic-submission-sp-energy-networks-fusion

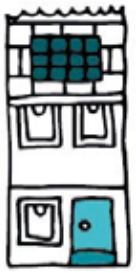
Key lessons learnt include:

- Problems with the smart meter roll-out have had an impact on the success of DSR projects
- Automation of energy consumption (e.g. using smart appliances or heat storage that could be controlled remotely) is more effective for shifting demand than relying on behaviour change alone
- Effective engagement with customers is key to encouraging people to sign up to the DSR scheme and to support them in maximising the benefits.
- No-lose DSR propositions, such as non-punitive time of use (ToUTs), are well received by low income households who may be struggling with their energy bills.

> "Community Energy is about more than just energy – it's an outreach activity that develops, strengthens and educates a local community. We welcome the opportunity to work with Community Energy groups and share best practice so more groups can benefit from previous projects we have supported."
>
> **Anne-Claire Leydier,**
> Policy & Markets Manager, Northern Powergrid

Energy efficiency

Energy efficiency is about reducing the amount of energy we use, for example:



- an LED lightbulb lasts longer and uses less energy than a traditional lightbulb
- energy efficient home appliances often use less energy to refrigerate food or wash clothes
- insulating our homes means we need less energy to heat them.

DNOs are interested in energy efficiency because it can reduce the overall peak demand for electricity from businesses and households. This is particularly relevant to DNOs in areas where they have constraints on the network due to increasing demand. If the demand can be lowered there is less of a need to pay for costly reinforcements to the infrastructure. Using less energy will not help if the constraint is due to too much electricity generation being connected to the network. You can see if there are constraints in your area by looking online at your DNOs 'heat maps'.

Community groups are often interested in energy efficiency because reducing energy use can reduce carbon emissions, and save people money on their energy bills. Improving the buildings we live in gives us a better quality of life, and can have a positive impact on our health.

Example innovation trials:

Energywise[20]

Power Saving Challenge[21]

Key lessons learnt include:

- Face to face engagement from trusted local organisations is effective in explaining the benefits of energy saving opportunities to hard to reach communities
- Engagement should be tailored to the local population
- Education and advice on energy efficiency can help customers save money
- Feedback and incentives for how much energy people save together encourages more energy saving

> “We worked with communities in Stockport to drive down energy consumption, this had cost, carbon and capacity benefits. The households have maintained the savings long after the trial ended.”
>
> **Michelle Lewis,**
> Electricity North West

20 http://innovation.ukpowernetworks.co.uk/innovation/en/Projects/tier-2-projects/Energywise/

21 https://www.enwl.co.uk/globalassets/innovation/power-saver-challenge/power-saver-challenge-closedown-report.pdf

Electric Vehicles (EVs)

Transport accounts for around a quarter of UK greenhouse gas emissions and affects air quality. At the end of 2017 the government announced that it will end the sale of all new conventional petrol and diesel cars and vans by 2040[22], with Scotland having a tighter target of phasing out petrol and diesel cars by 2032. Policy drivers and funding to support the growth of the EV market will have a significant effect on our energy system. National Grid estimate that peak demand from EVs could be around 5 GW, an 8 per cent increase on today's peak demand value[23].

DNOs are keen to manage EV charging to avoid peak demand periods, so they are running trials and testing smart charging. If everyone plugged their car in to charge when they got home from work there would be a need to upgrade the network to avoid power cuts. However, if we use smart chargers that monitor the cost of electricity throughout the day, they could charge the car at the cheapest points when there is least demand, and still make sure the car was fully charged for its next journey. This would require Time of Use Tariffs (ToUTs) to be more widely available.

Some community groups are interested in reducing carbon emissions from transport, improving air quality, helping people save money on their energy bills, and forming 'buying clubs' to get a discount on a bulk purchase of EVs. Owners of EVs are already forming their own communities of interest, and there are all sorts of forums online about charging points, when to charge, prolonging battery life and which EVs to buy.

Example innovation trials:

My Electric Avenue[24]

Electric Nation[25]

LV Engine[26]

22 https://www.gov.uk/government/news/government-gears-up-for-zero-emission-future-with-plans-for-uk-charging-infrastructure

23 http://fes.nationalgrid.com/media/1264/ev-myth-buster-v032.pdf

24 http://myelectricavenue.info/sites/default/files/documents/Summary%20report.pdf

25 http://www.electricnation.org.uk/

26 https://www.spenergynetworks.co.uk/news/pages/innovation_funding.aspx

Key lessons learnt include:

- Local champions are key to recruitment of groups of neighbours to take part in trials
- Some local electricity networks will require upgrades to help manage the increase in demand that comes with more people driving EVs, but smart charging could save billions in reinforcement costs
- Weekday charging is more likely to be before and after work (creating a morning and night peak), weekend charging is more likely to be between 10:00 and 18:00. Approximately 70 per cent of EVs are charged once a day, and more than 65 per cent of EVs are charged until the battery is full.

Local supply

There is a growing interest in local supply options that link local generators with local consumers. The drivers may be to enable a community-owned generator to sell its power directly to the local community, to enable greater control over energy bills, or to access new sources of value through providing local balancing and flexibility services.

Local supply is, therefore, of interest to community energy groups that have ambitions of maximising their use of local renewables, or helping to reduce energy bills in the community.

Local supply is of interest to DNOs when change in demand patterns has an impact on their networks. For instance, greater matching of local generation and demand results in less power being imported or exported out of the local area. This can be of benefit to the DNO when there is a constraint further along the network at a higher voltage level. The industry is exploring how local balancing could potentially be rewarded in the future for providing this service.

Example innovation trials:

Distributed Storage and Solar Study (DS3)[27]

ACCESS – Local Constraint Management (Mull)[28]

Sunshine Tariff[29]

SoLa Bristol[30]

Key lessons learnt include:

- There are currently very few models that are viable, due to regulatory barriers and immature markets
- DNOs only tend to be interested in local supply models if they can relieve pressure in constrained parts of their networks. If the network is not constrained, there is no incentive for the DNO to get involved.

27 https://www.northernpowergrid.com/innovation/projects/distributed-storage-solar-study-nia-npg-011

28 http://www.accessproject.org.uk/

29 https://www.westernpower.co.uk/Innovation/Projects/Closed-Projects/Sunshine-Tariff.aspx#FAQLink208;javascript:void(0);

30 https://www.westernpower.co.uk/Innovation/News-Events/News/SoLa-Bristol-Project-Conclusions.aspx

Electricity storage

Storage in the electricity system is the conversion of electrical energy into a form which can be stored (e.g. chemical, thermal, electrochemical and mechanical), and then converted back into electrical energy. There are lots of different types of electricity storage, from pumped hydro to batteries. Being able to store electricity enables us to use it at the times we need, rather than when it is generated. Storage alongside, or 'co-located', with renewable energy generation means you can store energy when it's cheap, when the sun shines or the wind blows, and use or supply that energy when demand and costs are high. This is known as price arbitrage or peak shaving. For this to be financially viable the cost of batteries will need to continue falling and ToUTs will need to be more widely available.

The System Operator (SO) uses storage to help keep the frequency on the electricity network stable (e.g. Enhanced Frequency Response, Firm Frequency Response), and for reserve or back up capacity (e.g. Short Term Operating Reserve and Capacity Markets). DNOs are interested in storage because it is a cheaper alternative to network reinforcement, and has the potential to enable additional generation to be connected to a network. These connections must often be managed more closely, for example through active network management (ANM), and the generator can be curtailed at times of peak load on the network. This means the connection would be limited or stopped during certain time periods. Rather than reinforcing the electricity network DNOs can use stored energy at times of peak demand. New flexibility markets are emerging as a result, with DNOs starting to procure these services. For further information see the **ENA Electricity storage guide for communities and independent developers**[31].

Community energy groups and people with microgeneration such as domestic solar PV, could use storage for:

price arbitrage

bypassing export constraints

maximising self-consumption of generation

and avoiding peak network charges

The government are reviewing the electricity network charging mechanisms to make sure they are fair for everyone, so this could change.

Communities are also interested in aggregating electricity storage, for example joining together multiple domestic or car batteries, to provide flexibility services to the DNO as a new revenue stream.

31 http://www.energynetworks.org/assets/files/news/publications/ENA%20Electricity%20Storage%20Guide.PDF

Example innovation trials:

SoLa Bristol

Distributed Solar Storage (DS3)

Domestic Energy Storage and Control (DESC)[32]

Key lessons learnt include:

- The income is uncertain, it is short term and not backed up by government subsidy (like the Feed-in Tariff). In many cases projects rely on "stacking" different income streams to be viable. This means more risk and less regulation
- Lithium-ion batteries are dominant. When we talk about energy storage we cover a broad range of technologies. Lithium-ion battery technology is currently the dominant technology in most applications, but this could change
- Costs are coming down rapidly. In 2017 we saw a 20 per cent reduction in battery costs. This trend is set to continue, which makes judging the right time to enter the electricity storage market very difficult.

32 http://innovation.ukpowernetworks.co.uk/innovation/en/Projects/tier-1-projects/domestic-energy-storage-and-control/

Renewable energy generation

Getting new renewable energy generation projects connected to the distribution network has become increasingly challenging. The cost of connecting in areas where the network is constrained has made many generation projects unviable.

This has implications for community energy groups with ambitions to generate power in their local community. The connections process is already technical and complex, which can create barriers for community groups without the expertise to navigate the process.
Also when there are network constraints, groups need extra support from the DNO to identify alternative options.

DNOs have obligations to continuously improve their engagement with customers wishing to connect to their networks. Many DNOs have actions specifically relating to engaging with community energy groups. They have also introduced alternative or flexible connections to help new generation projects get connected in constrained areas.

Example innovation trials:

Accelerating Renewable Connections (ARC)[33]

Northern Isles New Energy Solutions (NINES)[34]

Flexible Plug and Play (FPP)[35]

Integrated Network Constraint Management for Dumfries and Galloway[36]

LV Engine[37]

Key lessons learnt include:

- Early engagement with the DNO is essential
- Seek out support from the innovation/future networks team and investigate innovative connection ideas together. There may be funding available for projects
- Review your local DNOs Incentive on Connections Engagement (ICE) Plan and talk to them about their commitments.

33 https://www.spenergynetworks.co.uk/pages/arc_accelerating_renewable_connections.aspx

34 http://www.ninessmartgrid.co.uk/our-project/

35 http://innovation.ukpowernetworks.co.uk/innovation/en/Projects/tier-2-projects/Flexible-Plug-and-Play-(FPP)/

36 https://www.scottishpower.com/news/pages/sp_energy_networks_awarded_ofgem_innovation_funding_to_boost_dumfries_and_galloway_network.aspx

37 https://www.spenergynetworks.co.uk/news/pages/innovation_funding.aspx

Engaging your DNO

If you have an innovation project idea, or if you just want to learn more about the changes and new things happening in the energy market, there are many different ways you can get involved and your DNOs are here to help. The first rule of great engagement is to engage early, and energy network innovation is no exception. So if you have an idea, talk to your DNO! Every DNO has an innovation team and engineers with a huge amount of expertise and knowledge. Having a chat with them is free and could save you a lot of time and money when developing an idea. Each DNO has a different engagement strategy but they also work collectively to engage you.

Events – most DNOs run events for communities, other stakeholders and anyone that wants to connect to the network. They also hold collective events on this subject and so far have held events in Manchester, Oxford, Newcastle and London in 2016 and 2017.

2018 events: Autumn 2018, Edinburgh and Cardiff.

Online – there is a huge amount of information on the ENA and DNO websites and it's particularly useful to look at their innovation/future network pages. There are films, guides, toolkits, podcasts and case studies to help you. There is also:

- The Smarter Networks Portal which provides an overview of current smart grid projects across Britain. To find out more about these projects you can search by DNO, by funding mechanism or by type of technology: www.smarternetworks.org
- The Network Innovation Collaboration Portal which enables you to submit innovation project proposals directly to DNOs, and receive email alerts from DNOs looking for project partners: www.nicollaborationportal.org

Contact your DNO

People – you told DNOs at events that you want a named person you can contact about innovation projects and connections so here are the people to contact:

Western Power Distribution

Yiango Mavrocostanti

Innovation and Low Carbon Networks Engineer

T: 01332827445

M: 07787002618

E: ymavrocostanti@westernpower.co.uk

UK Power Networks

Community energy team within Innovation

E: innovation@ukpowernetworks.co.uk

Distributed Generation

E: DG-Q&A@ukpowernetworks.co.uk

Electricity North West

Helen Seagrave

Community Energy Manager

M: 07825 266524

E: Helen.seagrave@enwl.co.uk

Northern Powergrid

Anda Baumerte

T: 0197 760 5995

E: Anda.Baumerte@northernpowergrid.com

Scottish and Southern Electricity Networks

Andy Cumley (Scotland)

Commercial Contracts Manager

T: 01738 516886

M: 07810 858123

E: andy.crumley@sse.com

Claire Graham (England)

Commercial Contracts Manager

T: 02380817499

M: 07469 411748

E: claire.graham@sse.com

SP Energy Networks

Rachel Shorney

Stakeholder Engagement for North Wales, Merseyside, Cheshire and North Shropshire

E: Rachel.Shorney@spenergynetworks.co.uk

T: 0141 614 6252

Jillian Violaris

Stakeholder Engagement for Central and Southern Scotland

E: Jillian.Violaris.2@spenergynetworks.co.uk

T: 0141 614 4330

Energy Networks Association

Randolph Brazier

Head of Innovation & Development

T: +44 (0) 20 7706 5135

E: Randolph.Brazier@energynetworks.org

> “The electricity network is nothing without the people connected to it. In recent years we’ve seen a big increase in local community energy schemes connecting to the electricity network. It’s really important to Western Power Distribution that we engage with our customers.”
>
> **Alex Wilkes,**
> Western Power Distribution

Top tips for talking to your DNO:

- Talk to your DNO early
- Understand their role and what their aims are
- Use the Network Innovation Collaboration Portal
- Tell them about your experience and impact (for example, how big your community network is, how many members you have, how many people you have engaged through events and newsletters, how much electricity you have generated, and any behavioural change work you have done
- If you have an innovation project idea make sure it’s new; it will be useful to the whole network, and could save bill payers money
- Be clear about what you are asking for. For example, are you looking to partner and access funding together, or are you interested in their advice and experience from existing innovation trials.

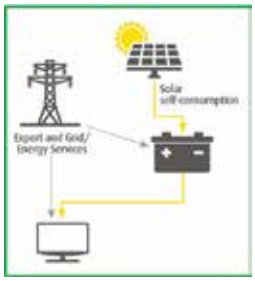
> “DNOs have a vital role to play in supporting community collaboration and working with local businesses, including the agricultural and land based sector, to enable the realization of their ambition to generate, source and consume energy locally that in turn can create prosperity and diversity of the local economy and development of long-term sustainable employment”
>
> **Euan Norris,**
> SP Energy Networks

Case studies of DNO-led innovation projects

We can learn from the research and trials that DNOs have already carried out. It's important to know what has already been tried and tested, as it's difficult to get funding for a project that is not new and innovative.

Project Name	What is the innovation project?	How does the project engage local communities?
OpenLV **Company Name** Western Power Distribution (WPD) **Project Partners** EA Technology Nortech Lucy Electric CSE Regen **Funding** NIC **What** Using LV substation data to build apps with communities **Where** WPD regions: South West, South Wales, West and East Midlands **When** 2017-2020	The OpenLV Project is an NIC Project, managed on behalf of Western Power Distribution by EA Technology. It is a relatively new trial, so results are not available yet. OpenLV aims to trial and demonstrate an open, flexible platform that could ultimately be deployed in every low voltage (LV) substation in Great Britain. This would replace a wide range of systems that deliver substation management solutions with a single piece of hardware that could run different software applications. The OpenLV project is split into three trial approaches: 1. Testing the ability for control signals to be sent to better manage the local LV network. 2. Community engagement 3. Third party user engagement	The OpenLV project is making electricity data from Western Power Distribution's low voltage network 'open access' for the first time ever. This presents a great opportunity for smart thinking and innovation within community groups. CSE invited community organisations to come up with novel ideas for using this data to develop software applications (apps) that will change the way their community uses electricity and relates to the local network. Selected community groups will receive support to develop web based apps, to consult their community and to develop communication materials. Hopefully apps developed through the OpenLV project will create benefits for all parties involved, and other communities will be able to replicate this success in future.
Website Links		
https://openlv.net/about/		

Project Name	What is the innovation project?	How does the project engage local communities?
Domestic Energy Storage and Control (DESC) **Company Name** UK Power Networks (UKPN) **Project Partners** Powervault Limited and Imperial College London **Funding** NIA **What** Co-located domestic PV and battery storage that could be aggregated to supply extra capacity at peak times of demand on the network **Where** Across UKPN's three licence areas in the East and South East of England and London **When** 2016-2018	UKPN is working with small-scale storage manufacturers and suppliers to install domestic storage units in 70 properties alongside existing solar generation. The project will monitor the performance of co-located domestic solar PV and battery units and the electricity consumed by the participating properties over time. It will also attempt to control the small-scale energy storage units to gain valuable insights into the benefits that DNOs can realise from responsive domestic customers. From the generation, storage and consumption data, UKPN aims to: • further understand the impacts of domestic energy storage on the network, particularly when combined with distributed generation • define a typical demand profile from a PV and storage-equipped household • understand how customers can benefit from generating their own energy, storing it and then either providing it to the network operator or consuming it for their own needs. The project will also inform the requirements for connections of PV and domestic batteries.	UK Power Networks are investigating whether this can be done in the future by creating 'virtual power plants,' grouping communities of batteries together to provide a short term boost to the electricity system at peak times. Early insights show that customers did not need to import any electricity from the network for 60 per cent of the days analysed in summer. Cheaper and faster connections of domestic storage and generation as well as potential additional revenue streams will benefit both individual customers in the community and local community schemes. Daniel Burges, from Richmond in London, is participating in the DESC project. He said: "We wanted to 'do our bit' for the environment, but also see if we could make a significant dent in both our electricity and gas consumption. The home battery storage was the logical next step really."
Website Links http://innovation.ukpowernetworks.co.uk/innovation/en/Projects/tier-1-projects/domestic-energy-storage-and-control/		



Case Studies of DNO-led innovation projects

Project Name	What is the innovation project?	How does the project engage local communities?
Northern Isles New Energy Solutions (NINES) **Company Name** Scottish and Southern Electricity Networks (SSEN) **Project Partners** Scottish Hydro Electric Power Distribution Hjaltland Housing Association **Funding** **What** Active Network Management – excess wind energy converted to domestic heat storage and used as needed **Where** The Shetland Isles **When** 2012-2017	The £18 million Northern Isles New Energy Solutions (NINES) project was the first time Active Network Management (ANM) was deployed at a large scale in the UK. The ANM monitors the local network and manages an appropriate response. As part of the wider NINES benefits, advanced storage and water heating systems were installed in 234 existing homes. These were specifically designed to use flexible charging based upon the predicted demand, weather forecasts, availability of renewables and any network constraints. The new heating system is designed to be more efficient, while giving the customer full control of both temperature and operating time and allowing for charging at times that best suit the network. By creating flexible demand on the islands progress has been made in exploiting and maximising Shetland's wind generation potential, trebling the volume of renewable generation on Shetland and in reducing the generated output from thermal generation, thus creating a positive impact on the CO^2 footprint of Shetland.	Electric heaters offered a more controllable and comfortable method of heating the homes. The NINES project benefit the local community by ensuring secure, affordable and sustainable energy provision. Stewart Reid, Head of Asset Management and Innovation at SSEN, said: "By creating flexible demand on the islands, through the use of smart technology and energy storage, we have made progress in exploiting and maximising Shetland's renewable generation potential and reducing the generated output from thermal power stations. The support for the project has been superb and we would like to thank the customers that participated in the trials. Their involvement was crucial to its overall success."
Website Links		
http://www.ninessmartgrid.co.uk/our-project/		

Project Name	What is the innovation project?	How does the project engage local communities?
FUSION **Company Name** SP Energy Networks (SPEN) **Project Partners** DNV-GL PassivSystems Origami Energy Imperial College SAC Consulting University of St Andrews Fife Council Bright Green Hydrogen **Funding** NIC **What** Implementing a local, open and structured energy flexibility market **Where** East Fife, Scotland **When** 2018-2023	FUSION is implementing a local, open and structured flexibility energy market in East Fife. The project is designed to create flexibility for the increasing number of 'prosumers' within the network. These prosumers are increasingly becoming engaged in the supply and generation of their own energy. The project aims to: • Test a European market model (Universal Smart Energy Framework, USEF) for the trading of flexible network services • Create the Information Technology (IT) infrastructure to facilitate the energy market • Release additional network capacity for Low Carbon Technology connections FUSION is working with communities with the aim to save customers over £236m and contribute to a 3.6m tonne reduction of CO^2 by 2050.	FUSION has undertaken significant and meaningful customer engagement during the submission development, including direct engagement with multiple trial area flexibility providers: • Fife Council – social housing and industrial & commercial • Bright Green Hydrogen • University of St Andrews • Kingdom Housing Association • The Agricultural community Throughout, feedback has been resoundingly positive, demonstrating an appetite to participate in a local energy flexibility market. During the bid phase, FUSION undertook a customer survey published through the Fife Chamber of Commerce, which received very positive feedback. Customers will have the opportunity to participate in the local flexibility market for provision of energy services by either engaging with the USEF platform directly or through aggregators or energy suppliers. In principle, there is no restriction on the types of service providers that can participate in FUSION.
Website Links		
www.spenergynetworks.co.uk/news/pages/innovation_funding.aspx www.ofgem.gov.uk/publications-and-updates/electricity-nic-submission-sp-energy-networks-fusion		

Case Studies of DNO-led innovation projects

Project Name	What is the innovation project?	How does the project engage local communities?
The Value of Lost Load (VoLL) **Company Name** Electricity North West (ENW) **Project Partners** Impact Research Limited **Funding** **What** Understanding the value of lost load (VoLL) to help determine network planning and investment **Where** Representative samples of customers from within Electricity North West's operating region and with consumers served by other DNOs **When** 2015-2018	Electricity supply interruptions have financial and social impacts on customers, which vary by season, time of day, customer load and customer type. At present a single uniform VoLL is used to evaluate what customers would be willing to pay to avoid a supply interruption. This innovative trial will produce improved valuations of VoLL by more fully understanding variations within customer groups and their specific needs and requirements. VoLL varies significantly among customer groups: residential, small to medium commercial and industrial enterprises (SMEs) and large commercial/industrial users. The value also varies considerably within each of these groups, for example, between rural and urban residential customers.	ENW consulted key stakeholders who support customers during a supply interruption such as hospitals, care homes, local authorities, educational establishments and charitable organisations. A customer panel was convened representing urban domestic, rural domestic, worst-served customers, and SMEs. This panel and further consultation was used to improve the accuracy of VoLL valuations and methodology. A comprehensive assessment of how VoLL should be defined across a range of customer segments will be published in February 2018. This should inform a potential revised model to help DNOs better plan their network investment and customer strategies. The findings are also likely to have an impact on ENW's social obligations, influence their Priority Services Register (PSR) and help them to develop solutions to address fuel poverty.
Website Links		
www.enwl.co.uk/innovation/smaller-projects/network-innovation-allowance-projects/enwl010---value-of-lost-load-to-customers/		

Project Name	What is the innovation project?	How does the project engage local communities?
Distributed Storage and Solar Study (DS3) **Company Name** Northern Powergrid (NPG) **Project Partners** Moixa, Energise Barnsley **Funding** **What** Aggregating domestic households with solar PV and batteries to form a virtual power plant and provide balancing services to DNO (NPG) **Where** Oxspring, Barnsley, South Yorkshire **When** 2016-2019	This project assesses the value of domestic energy storage alongside solar PV in reducing network constraints and saving customers money. Smart batteries have been installed in 40 homes in Oxspring connected to the same substation. The batteries will store the solar electricity generated from resident's PV at the sunniest times, which can then be used to reduce peak generation on the NPG's local electricity network. NPG wants to use the data to determine whether it would be possible to incorporate electricity storage in similar low voltage schemes when assessing future network applications. Simon Daniel, CEO of battery company Moixa, said: "Solar homes with batteries can halve their electricity bills, and this solution will become increasingly popular as costs of storage and PV fall."	Homeowners will be able to use more of their solar energy, export less and reduce peak solar generation output on the network. The participants, who are mainly pensioners living in bungalows, can see their battery usage on an online 'dashboard.' Energise Barnsley is holding regular feedback sessions throughout the project to get a better picture of the benefits for participants. Elaine Marsh, a pensioner in Oxspring said that she was "highly delighted" by the installation of the battery, which will enable her to use more of the solar generation: "I like eating my main meal in the evening and I shall be able to do that again [with the battery]. I will also be able to run the washing machine and cooker at the same time." She is motivated by the cost savings: "Even if you just save £1 it is better in your pocket than the energy companies."
Website Links		
www.northernpowergrid.com/innovation/news/home-battery-trial-aims-to-increase-electricity-network-capacity-to-enable-more-solar-homes-and-save-millions-for-customers		

Case studies of community-led innovation projects

Some advanced community energy groups in the UK are working on innovation projects to find new business models, and create resilient, empowered communities that generate, supply and use renewable energy locally.

Project Name	What is the community innovation project?	How does the project engage local communities?
Nobel Grid **Company Name** Carbon Co-op **Project Partners** 20 EU partners including Carbon Co-op and University of Manchester **Funding** EU Horizon 2020 research and innovation programme **What** Advancing ICT tools for smart grids to support stable grids and clean electricity **Where** Manchester **When** 2015-2018	Carbon Co-op has been installing batteries and trialling technology for smart grids as part of their EU funded Nobel Grid project, which has given them valuable data and helped them build their own capacity. The overall aim of the project is to develop smart grid solutions for community and publicly owned energy system actors. The NOBEL GRID project will produce results along three key themes: • Innovative solutions and tools for DSOs in order to provide secure, stable and robust Smart Grids • New services for all the actors of the distribution grid, including new actors, such as prosumers, aggregators and energy service companies (ESCOs) • Smart Low-cost Advanced Meter (SLAM), addressing the needs of all actors of a Smart Grid.	Carbon Co-op is a community energy group. One of their projects involves working on the Lancaster cohousing pilot site, which has its own microgrid, there are 40 domestic and 15 commercial properties. Carbon Co-op connected black boxes to each electricity meter to gather valuable data on how much energy customers are using and where they could save or shift their demand. Carbon Co-op have developed their own opensource advanced meter and are thinking about installing batteries, but the data has to come first, to size the battery properly and work out if and where they are economically viable in domestic households. Installing batteries in Manchester has given them real insight into the challenges of fitting sometimes noisy boxes the same size as a fridge into people's homes.
Website Links		
http://nobelgrid.eu/about-nobel-grid/		

Project Name	What is the community innovation project?	How does the project engage local communities?
Sensible Battery Project **Company Name** Mozes **Project Partners** Universities of Nottingham, Oporto, Nurnberg and a group of European Technology Companies **Funding** EU Horizon 2020 research and innovation programme **What** Testing different domestic batteries in social housing with solar PV and researching the selling/sharing of electricity produced by individual homes between members of the community **Where** Nottingham **When** 2014-2018	The MOZES community energy project has 65 households with PV, and an EU funded project has enabled them to install 22 batteries to test this new technology alongside PV on social housing. As the batteries were too big and heavy to fit in the loft space of small houses, they were installed outside and surrounded by protective boxes for security. The project was challenging because it brought together engineers, academics and householders in partnership, who all use different language and jargon. Partners learnt that projects like this should be tested and in a deliverable state before asking households to sign up. The technical/engineering issues should ideally be resolved before the project reaches people's living rooms, otherwise it creates anxiety and confusion. Delays lead to disillusionment and good community engagement requires clear expectation setting. Remembering it is real people who should be at the heart of these types of project is the key lesson.	MOZES is a community energy project which has provided energy advice to 308 households, installed solar panels on 65 houses, 22 batteries, energy efficiency measures in 26 houses and run workshops for local people to learn about energy efficiency and the environment. This all involves ongoing engagement with the wider local community.
Website Links		
http://www.mozes.co.uk/current_projects_sensible.html		

Case studies of community-led innovation projects

Project Name	What is the community innovation project?	How does the project engage local communities?
CARE **Company Name** Cwm Arian Renewable Energy **Project Partners** Arwain Sir Benfro - Rural Development Programme, and one of Wales' largest haulage companies **Funding** **What** A smart grid with a community owned wind turbine, local supply, and hydrogen storage for transport **Where** Pembrokeshire **When** 2006 onwards	CARE is innovating by working with a local business to find new revenue streams and reduce greenhouse gas emissions from energy generation, commercial and domestic rural transport. It took CARES 13 years to get planning permission for a 700 kW wind turbine. By the time planning permission was granted, the feed in tariff (FIT) had gone and the business model was no longer viable. CARES have been developing a new business model based on the wind turbine having a private wire to one of Wales' largest haulage companies, an electrolyser to generate hydrogen which will be used to run the trucks and a couple of community minibuses. This would enable the electricity from the wind turbine to be converted to hydrogen and stored for use when it's not windy. This system would be controlled by virtual smart grid software.	CARE is a community energy group committed to delivering the communities energy aspirations and ongoing engagement with local people. They secured funding to develop a network of community energy talks and initiatives and highlight opportunities for community energy generation and carbon footprint reduction within communities. The project also aims to identify community energy champions to establish discussion and working groups at a grass roots level.
Website Links		
www.renewwales.org.uk/community-groups/projects/cwm-arian-renewable-energy-188.asp		

Project Name	What is the community innovation project?	How does the project engage local communities?
Westmill **Company Name** Westmill Wind Farm Co-operative **Project Partners** **Funding** **What** The first UK community owned smart hybrid energy power station **Where** Westmill, Swindon **When** Coming soon	In 2008 Westmill wind farm was the first 100% community owned onshore wind farm to be built in the south-east of England. It has since been joined on the same site by the first 100% community owned solar farm in the UK in 2012. In keeping with its pioneering spirit for community energy, there is now a proposal to develop the first community owned smart hybrid energy power station integrating the wind and solar energy produced on site with smart storage to manage, store, and distribute renewable electricity for local community use. Integrating smart storage allows Westmill renewable energy to reduce its intermittency of electricity output to the local electricity grid. It also has the potential to offer smart demand and supply grid management services, as well as providing local on-demand grid supply and other emerging services such as EV charging to local vehicles, rather than when it is generated. The vision is ambitious and includes investigating a range of base-load capable technologies to help with the local area challenges and opportunities, and providing a 'living laboratory' facility R&D environment for the development, testing and assessment of a wide range of clean energy generating, storage and distribution technologies. This facility would all be managed as a hybrid clean energy power station on a local area smart grid.	As well as the vision of providing clean energy direct to the local community via this hybrid power station, the current Westmill Wind Farm Co-operative and Westmill Solar Co-operative together engage with the local community via the charity, Westmill Sustainable Energy Trust charity. The trust delivers educational work linked to clean energy, supports local energy conservation, renewable energy initiatives and arts projects.
Website Links		
http://www.westmill.coop/		

Case studies of community-led innovation projects

Project Name	What is the community innovation project?	How does the project engage local communities?
Brixton Solar Community Trading **Company Name** Repowering London **Project Partners** OFGEM, EDF Energy R&D UK, Brixton Solar, Electron, PassivSystems, University College London **Funding** **What** Peer to peer energy trading **Where** London **When** 2017-	Repowering London is looking at new community energy business models to deliver better value for community generation, and a more direct relationship between generator and user. They are looking to use new technologies such as smart devices and storage to access value from accessing flexibility markets. Their Brixton Solar Community Trading innovation trial is part of Ofgem's regulatory sandbox that enables new ideas to be tested outside of the current regulatory framework. The peer to peer energy trading platform aims to allow residents in urban areas to source their energy from local renewables and trade that energy with their neighbours reducing overall energy costs.	Repowering London is a community energy group that works collaboratively with other community energy groups and local authorities. They support communities to deliver, own and manage renewable energy projects that provide benefits to the citizens that surround them.
Website Links		
www.repowering.org.uk/projects/brixtonenergyprogramme		

Project Name	What is the community innovation project?	How does the project engage local communities?
Southill Solar Farm **Company Name** Southill Community Energy **Project Partners** Seeking project partners **Funding** Community share offer **What** Solar farm with aspirations for a co-located battery to provide flexibility to the DNO **Where** Charlbury, Oxfordshire **When** First generated - 2016	Southill Community Energy is a community benefit society aiming to help local people and groups to reduce their carbon emissions. Their 4.5 MW solar farm will generate enough green energy to power the equivalent of all the homes in the three nearest parishes – Charlbury, Finstock and Fawler – in West Oxfordshire. The site will also save around 2,372 tonnes of carbon a year, or approximately 60,000 tonnes over the lifetime of the project, helping in the fight against climate change. Southill are now exploring battery technology to be able to provide flexibility to the DNO and generate additional revenue. "Installing our solar farm was challenging because of the cost and a lack of technical expertise, we needed extra support from our DNO and it really helped having one point of contact. It was difficult getting an 11 kV connection rather than a 33 kV connection." Tim Crisp, director, Southill Community Energy	Profits from Southill solar farm will be used to fund local low-carbon projects, reducing energy use from buildings, food, transport and consumption, and ongoing education. The group are investing in the local community centre and the listed Corner House in Charlbury, as well as enhancing the local ecology and environment. They are developing the hedgerow boundaries, establishing a wildflower meadow, and allowing sheep to graze the site in the winter months. They also have a thermosolar beehive which uses solar power to kill parasitic Varroa mites.
Website Links		
www.southillcommunityenergy.co.uk/		

Summary

As our energy system shifts from centralised to decentralised, DNOs are changing to DSOs. This transition is part of the whole system change to a smart and flexible model. DNOs are becoming more proactive and more engaged with customers, and are incentivising and creating new markets. Innovation is playing a key role to inform the transition to a DSO model. At the same time communities are working hard to find new and viable community energy business models. They are innovating to achieve their goals of connecting more low carbon generation, creating greater energy efficiency and fairer local economies where prosumers can sell the power they generate to other people within their local community.

This guide demonstrates that DNOs and communities are sharing values and common ground, which is a great starting point. In every change there is an opportunity, and the massive shift in our energy system gives us the opportunity to make it fairer, smarter and more flexible. It is in everyone's interest for communities to participate to ensure that change happens with us, not to us. Making our energy system more efficient and fair will also help us achieve:


More low carbon generation


Savings on network reinforcement costs that we pay for via energy bills


Security of supply


New revenue streams for flexibility services

This requires greater participation and engagement. DNOs are working hard to ensure that this is an open process, and you can get involved in a way that suits you. They are hosting events, writing stakeholder newsletters, drafting innovation and stakeholder engagement strategies, and producing tools and guides like this one, to give you the opportunity to learn and participate. The case studies in this guide show how communities are working with DNOs on new and inspirational projects. They are not just as trusted intermediaries, they are finding new solutions to the complex technical and regulatory challenges that innovation projects seek to learn from. The energy system is complex, but there are plenty of ways to get involved as the system changes. We need more collaborative projects and partnerships between communities and DNOs to ensure this shift is democratic. To have the best ideas you need a rich pipeline, so don't be shy, get in touch and speak to your DNO representative. After all, conversations are free and might just help you achieve your ambitions and accelerate the move to a low carbon economy.

Glossary

Active Network Management (ANM): The use of distributed control systems to continually monitor all the limits on the network, along with systems that enable the correct level of generation to meet demand.

Aggregators: Aggregators combine and sell flexible load adjustments and on-site generation flows from multiple consumer sites.

Demand Side Response (DSR): When consumers adjust the amount of electricity they use at particular times in response to a signal (i.e. either a control signal or price signal) from a supplier, system operator or network operator provided either directly or via a third party such as a supplier or aggregator.

Distributed Generation (DG): A generating scheme that is connected to the distribution network.

Distribution Network Operator (DNO): The DNO owns, operates and maintains a distribution network and is responsible for confirming requirements for the connection of distributed generation to that network.

Distribution Network: A system of electricity lines and equipment that connects the transmission system and distributed generation to end users. In England and Wales the distribution systems are the lines with a voltage less than or equal to 132 kV. In Scotland this is 33 kV and below.

Distribution System Operator (DSO): An organisation that securely operates and develops an active distribution system comprising networks, demand, generation and other flexible distributed energy resources.

Distribution Use of System charges (DUoS): apply to every connection to the distribution network and collect the revenue the Distribution Licensee needs to build, operate, maintain, repair and invest in the network. They are one component of a customer's electricity bill.

Energy Service Company (ESCO): a commercial or non-profit business providing energy solutions including design and implementation of energy savings projects, retrofitting, energy conservation, energy infrastructure outsourcing, power generation and energy supply, and risk management.

Enhanced Frequency Response (EFR): A fast response (sub-second) service for electricity storage projects to supply to National Grid.

Electricity Storage: Storage in the electricity system is the conversion of electrical energy into a form which can be stored, and converted back into electrical energy.

Firm Frequency Response (FFR): Another fast (seconds) response service to maintain the frequency of the network for National Grid.

Flexibility: The ability to modify generation and/or consumption patterns in reaction to an external signal (such as a change in price, or a message)

Local supply: The supply of energy led by (or for the benefit of) a local group and for the benefit of local consumers. A local group is a collection of people and organisations with shared interests in local energy outcomes within a common geographical area.

Network Innovation Allowance (NIA): A set allowance each DNO receives as part of their price control allowance. It provides funding to explore technologies or commercial and operating arrangements that will deliver benefits for customers.

Network Innovation Competition (NIC): An annual opportunity for DNOs to compete for funding for the development and demonstration of new technologies, operating and commercial arrangements. Up to £70 million is available per year.

Network Reinforcement: Increasing the electrical capacity of those parts of the network that are affected by the introduction of new generation or demand.

Peak Demand: When demand is highest, usually around 17:30 on a winter weekday evening before workplaces have closed and people arrive home wanting heat and light. There must be enough electricity available to meet this demand.

Price Arbitrage or Peak Shaving: Storing energy when it's cheap, when the sun shines and the wind blows, and using or supplying that energy when demand and costs are high.

RIIO: Ofgem's framework for setting price controls for licenced DNOs. RIIO stands for Revenue = Incentives + Innovation + Outputs

Short Term Operating Reserve (STOR): A slow (minutes) storage reserve service, that requires output for a minimum 2 hour timeframe for National Grid.

Smart Appliances: Appliances that can support demand side flexibility because they can be set up to respond to signals, such as price information (e.g. received from the smart meter) or direct control signals.

Smart Energy System: A system that intelligently integrates the actions of all users connected to it, including new parties, in order to efficiently deliver secure, sustainable and economic electricity supplies.

Smart Tariffs: Energy tariffs that incentivise consumers to use, store and export electricity at times that are most beneficial or least costly to the system.

Smart: Something enabled by new technology or new uses of technology, in particular technology (often communications) that enables automatic control.

Supplier: The Grid Code definition:

(a) A person supplying electricity under an Electricity Supply Licence; or

(b) A person supplying electricity under exemption under the Act; in each case acting in its capacity as a supplier of electricity to Customers in Great Britain.

Time of Use Tariffs (ToUTs): Energy tariffs that charge different prices at different times of the day.

Transmission Network: A system of electricity lines and equipment that connects power stations and substations. In England and Wales the transmission system is rated above 132 kV. In Scotland the transmission system is rated 132 kV and above.

Value of Lost Load (VoLL): represents the value that electricity users attribute to security of electricity supply and the estimates could be used to provide a price signal about the adequate level of security of supply in GB.

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