



# Balancing centralised and decentralised powergen and storage to enable secure decarbonisation

Sotiris Georgiopoulos – Head of Smart Grid Development



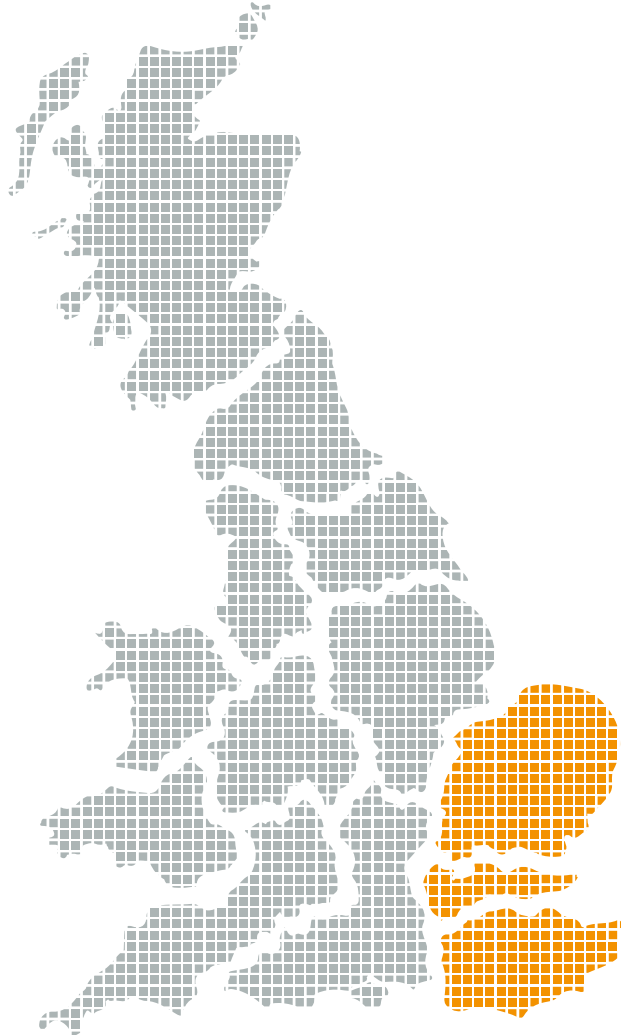
November 2021

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We invest in people Platinum



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# About UK Power Networks



**8.3M homes and businesses**

28% of UK total

**180,000 connected EVs**

36% of UK total

**14GW Peak Demand**

28% of UK total

**9.8GW of Embedded Generation**

# Key forces influencing our society and the future of our industry



- Distributed/Renewable Generation
- Energy Storage
- Local Energy



- Smart Meters and the connected home
- Micro generation / storage
- Electrification of heat and transport



## Net Zero

- Legally binding targets by 2050
- Ban on the sale of petrol, diesel and hybrid cars by 2035
- 2025 New homes: low carbon heating
- Energy efficiency



## Changing regulatory environment

- Market reflective returns
- Greater efficiency
- Managing uncertainty
- Greater focus on supporting customers in vulnerable circumstances
- The gas crisis



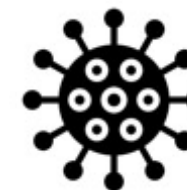
## Digital revolution

- Digitalisation
- Internet of Things
- Connected homes
- Data : presumed open, standardised and visible



## Evolving consumer expectations

- Affordability
- Vulnerability definition broadening
- Trust and purpose
- “Producers and consumers”



## Covid-19

- Lives
- Livelihoods
- Re-imagining the “next normal” at work and in the home

# Decarbonisation Journey

## Growth in DG

- **9.8GW** of DG connected, doubled since 2011
- Over **170,000** distribution connected generators
- **8.8GW** of DG accepted to connect

## Energy Storage

- 2.5GW accepted offers
- 320MW connected storage

## Heat Electrification

- Heat counts for a third of total UK CO2 emissions
- 27,000 heat pumps across UKPN in 2021

## EV Growth

- 180,000 electric vehicles on our networks

# We are preparing for any possible scenario

Parameter	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Net-Zero by 2050?	No	Yes	Yes	Yes
Low-carbon gas grid?	No	Yes	No	Yes
Electric cars and vans in 2030	2.6 million	4.5 million	4.5 million	4 million <sup>2</sup>
Homes with heat pumps in 2030	320,000	445,000	712,000	1,245,000
Homes with solar panels in 2030	195,000	248,000	397,000	248,000
Battery capacity in 2030	1.3 GW	2.7 GW	4.8 GW	4.1 GW
Total renewable generation in 2030	6.1 GW	7.2 GW	8.1 GW	8.6 GW

# Adapting for the next phase of decarbonisation

$$\text{Totex Expenditure} = [\text{Background load growth}] + [\text{Low carbon load growth}] - [\text{Energy efficiency \& Flexibility}] - [\text{Existing network capacity}]$$

①                      ②                      ③                      ④

We need to manage this uncertainty, whilst not losing sight of what is important:

Avoid bring a  
barrier to low  
carbon  
connections

Avoid  
unnecessary  
bill increases

Maximise  
energy  
efficiency and  
flexibility  
potential

Maintain public  
support with a  
just and fair  
transition

# Transitioning our business to enable a smart, flexible energy system

Efficient deployment of capital – lowest cost to Net Zero

Undertake robust customer engagement

- Strategic
- Robust
- Locally focused



Example:  
Co-designing a local area framework

Collaborate beyond traditional silos to deliver joined up services for customers

- Whole electricity
- Transport
- Heat



Example:  
Unlocking capacity in the South Coast collaborating with the ESO

Develop new markets and learn by doing

- Co-design
- MVP approach
- Scale to value



Example:  
Developing LV flex products

Embrace innovation, technology and data

- Faster
- Cheaper
- Greener



Example:  
Advanced analytics to infer network utilisation

# Thank you



**Visit:**

**<https://smartgrid.ukpowernetworks.co.uk/>**

**Email:**

**[sotiris.georgiopoulos@ukpowernetworks.co.uk](mailto:sotiris.georgiopoulos@ukpowernetworks.co.uk)**

**WEF: Annual UK  
Power &  
Networks review  
– Strategic System  
transition Challenges**

**#EnergyTransition  
#ETRI2021**

**23<sup>rd</sup> November 2021**

**Dr Nina  
Skorupska CBE  
@NinaSkorupska**



**THE ASSOCIATION  
FOR RENEWABLE ENERGY  
& CLEAN TECHNOLOGY**

# ***Renewable & Clean Tech Sector: value chain perspectives and opportunities***



# About the REA

@reassociation



UK Gov said  
back in  
Dec 2020  
**Build Back  
Better**

&

Nov 2021  
Net Zero  
Strategy:  
**Build Back  
Greener**

# Net Zero Strategy

- *building on the Energy White Paper & the 10 point plan (2020)*

- 40GW of Offshore Wind (1GW of floating offshore) by 2030
- 5 GW of low carbon hydrogen by 2030
- Changes to how the Low Carbon power markets are supported (CfD)
- UK Emission Trading Scheme (UK ETS), started Jan 2021. Commitment to explore expansion to other areas of the economy.
- Governments 'Industrial Clusters Mission' - four low-carbon clusters by 2030 - Including carbon capture sector.
- Jet Zero and greener maritime: research for zero-emission planes and ships. As well as support to drive EVs.
- 600,000 heat pumps/year by 2028.
- 30,000 hectares of trees/ year.

## Net Zero Strategy - UK Electricity

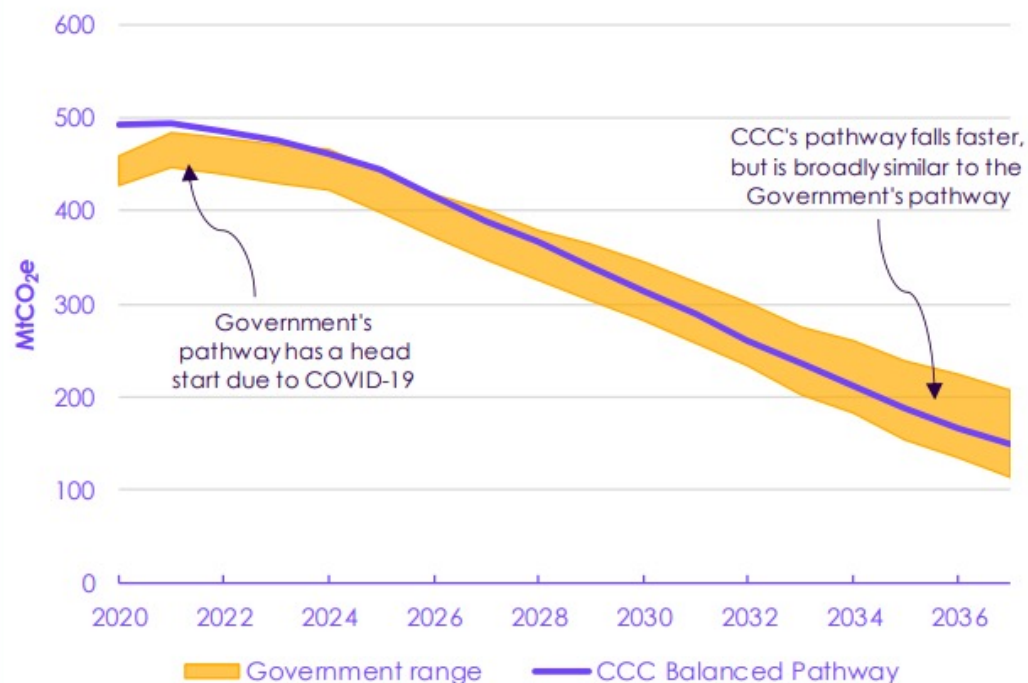
*By 2035, all our electricity will need to come from low carbon sources, subject to security of supply, bringing forward the government's commitment to a **fully decarbonised power system** by 15 years, whilst meeting a 40-60% increase in demand.*



@reassociation



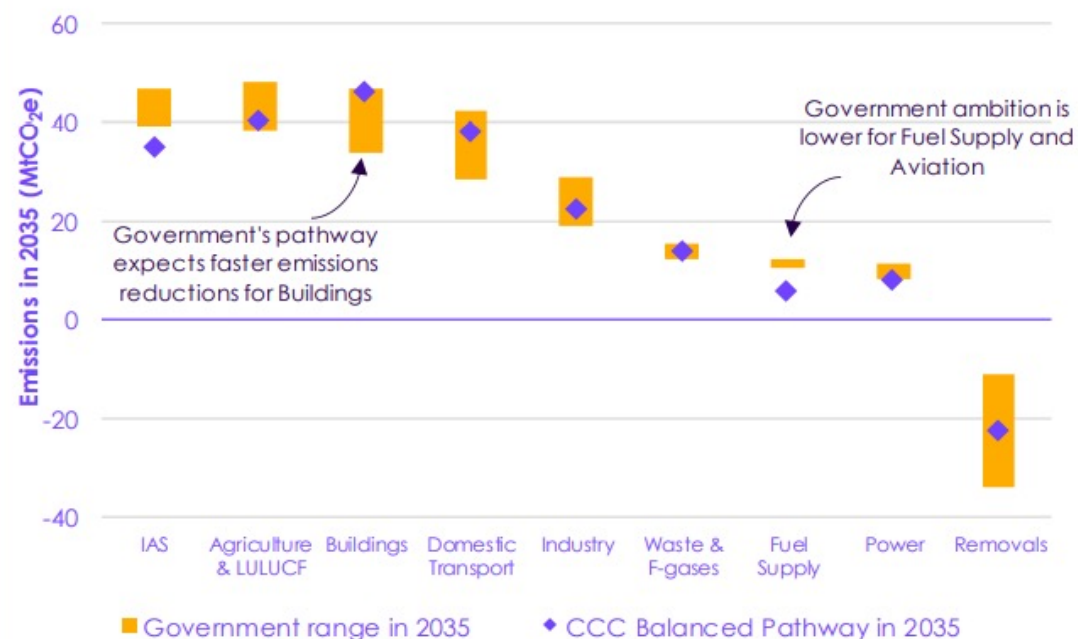
**Figure 1 Overall ambition compared to the CCC Balanced Pathway (2020-2037)**



Source: Net Zero Strategy (NZS); CCC analysis.

Note: The Balanced Pathway was the CCC scenario on which the Sixth Carbon Budget and the UK's NDC were based. 'Government range' refers to the Net Zero Strategy's Delivery Pathway.

**Figure 2 Sectoral ambition compared to the CCC Balanced Pathway (2035)**



Source: Net Zero Strategy (NZS); CCC analysis.

Note: IAS = international aviation and shipping. CCC's sectoral pathways are translated to be comparable with the NZS's sector classification. 'Government range' refers to the Net Zero Strategy's Delivery Pathway. Fuel supply covers oil and gas production and processing, coal mining, leakage from the gas grid, and hydrogen production.



# Transitioning to a Net-Zero Future

## REA Strategy

@reassociation

### INTERIM GOALS ALONG THE PATHWAY

#### CIRCULAR BIORESOURCES

By the end of 2023 all bio-waste is either separated and recycled at source or is collected separately and is not mixed with other types of waste.

Organics recycling is recognised in the reformed Packaging Producer Responsibility System.

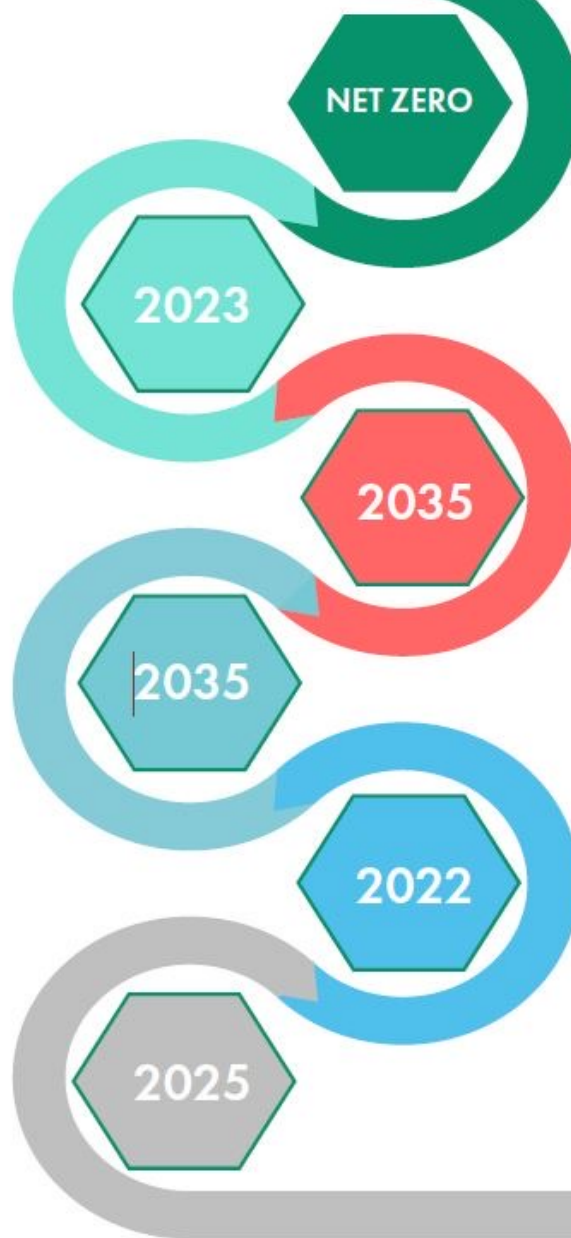
#### TRANSPORT

By 2035, renewable fuels and electricity are the majority source of energy used in the transport sector.

#### FINANCE

Finance and investment groups invest more in Net Zero agenda and drive corporate Environmental, Sustainability Governance (ESG).

Tipping the balance away from a fossil fuel-based economy by 2025.



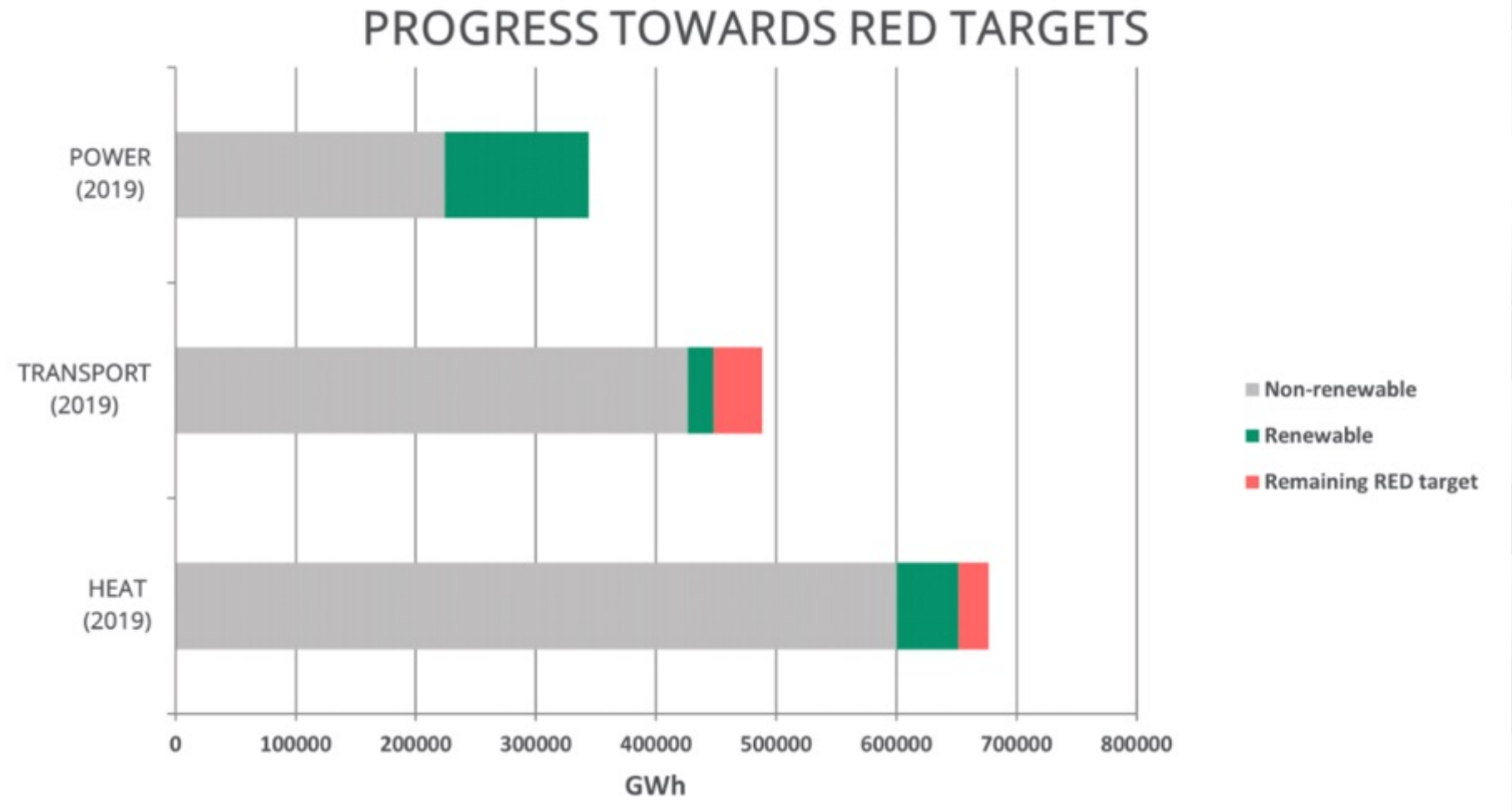
#### HEAT & COOLING

Renewables and clean technology solutions are the dominant form of heat by 2035.

#### POWER & FLEXIBILITY

Renewable power generation is the largest producer of TWhs by end of 2022, facilitated by clean technologies which operate in a deep and transparent flexibility markets.





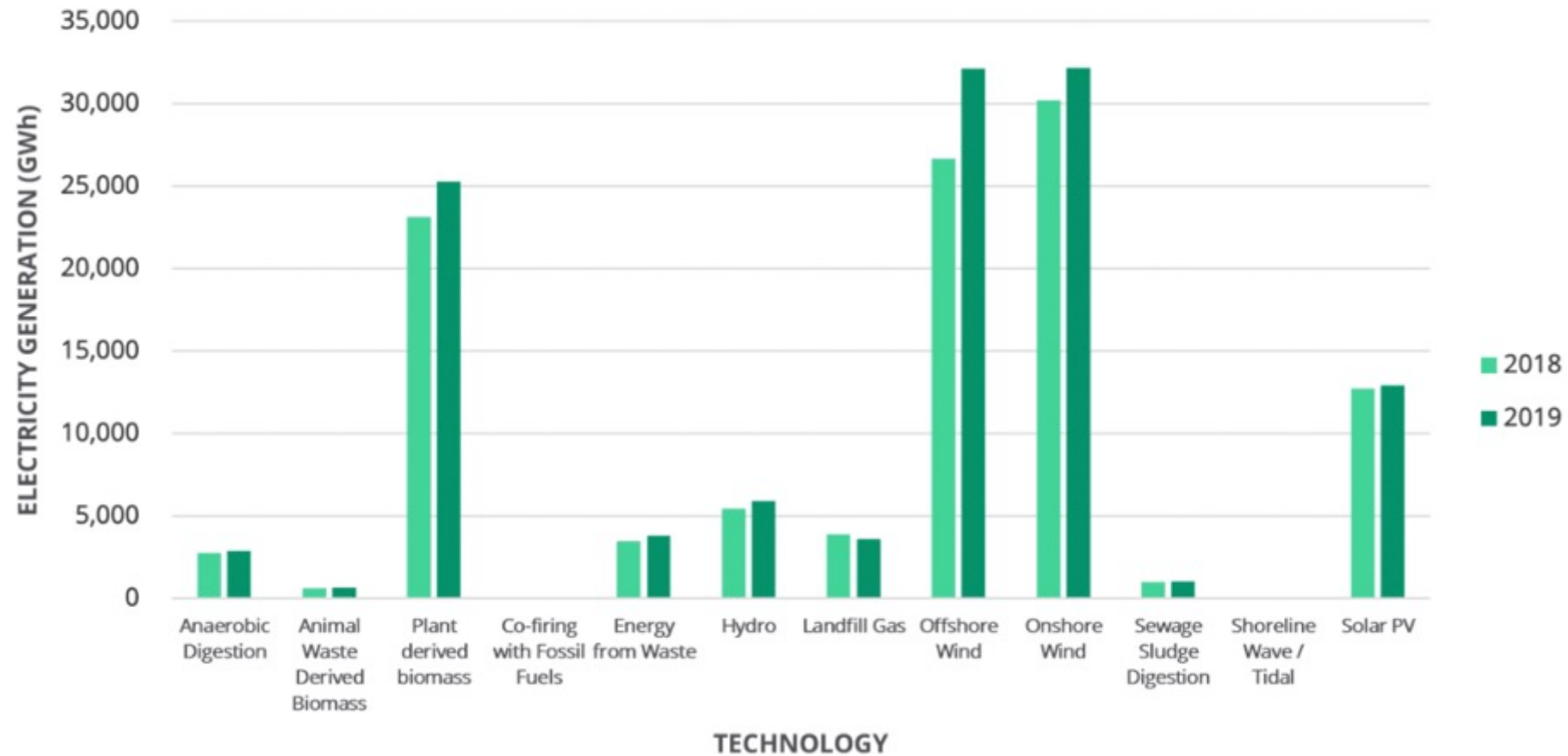
[REview-2021-.pdf \(r-e-a.net\)](https://www.r-e-a.net/REview-2021-.pdf)

# Power & Flexibility

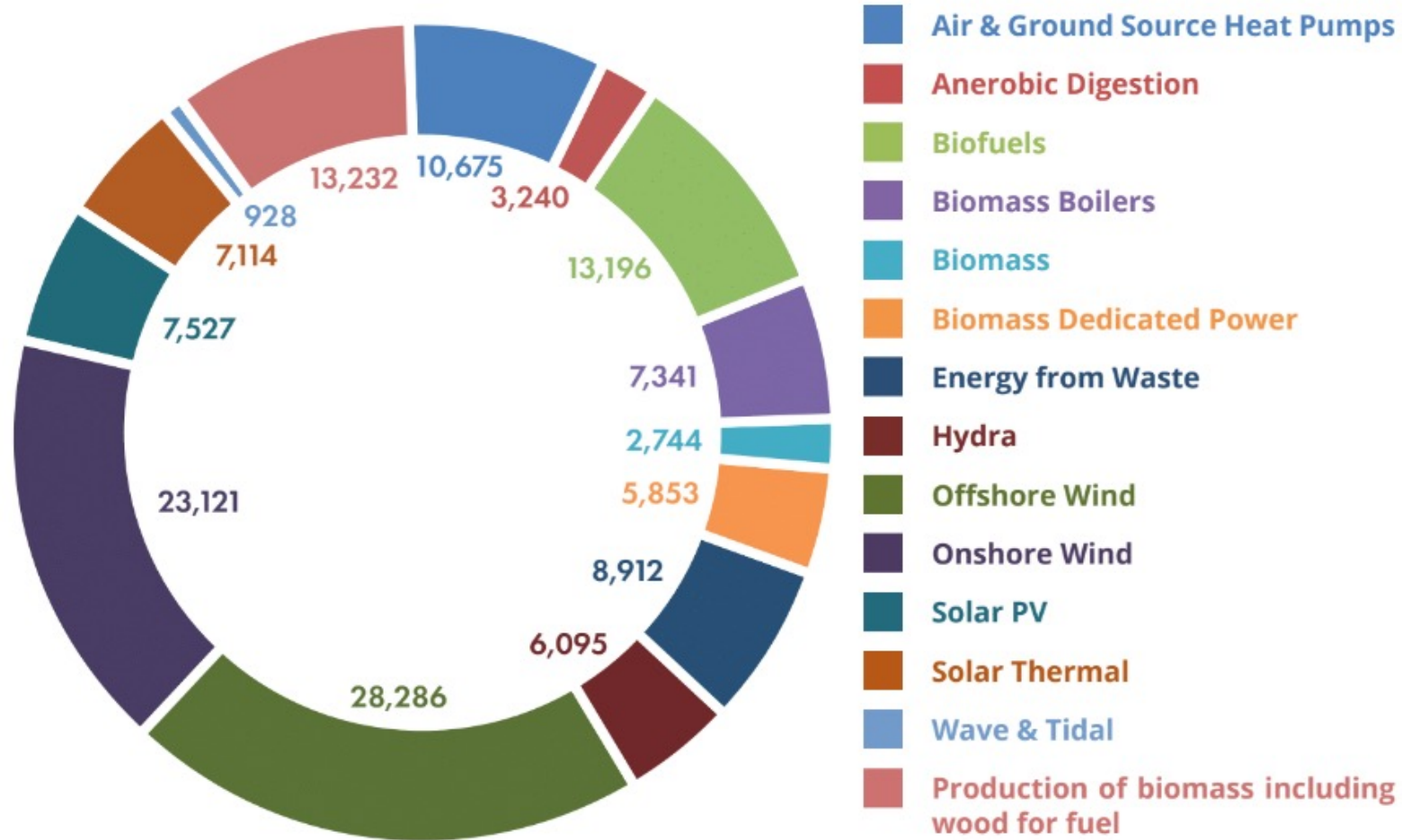
## Power & Flexibility - key findings:

- Progress of decarbonisation of energy in the UK continues to be driven by the power sector. In 2019, the power sector saw 34.85% of its energy come from renewable sources, up from 31.07% in 2018;
- Wind energy accounts for 53% of generation within the renewable power sector;
- A range of other technologies are making significant contributions, such as energy from waste and biomass power;
- Solar PV produces more than 10% - however, growth is slowing and, along with solar thermal, was the only technology which saw a dip in employment.

## POWER GENERATION BY TECHNOLOGY, 2018 VS 2019



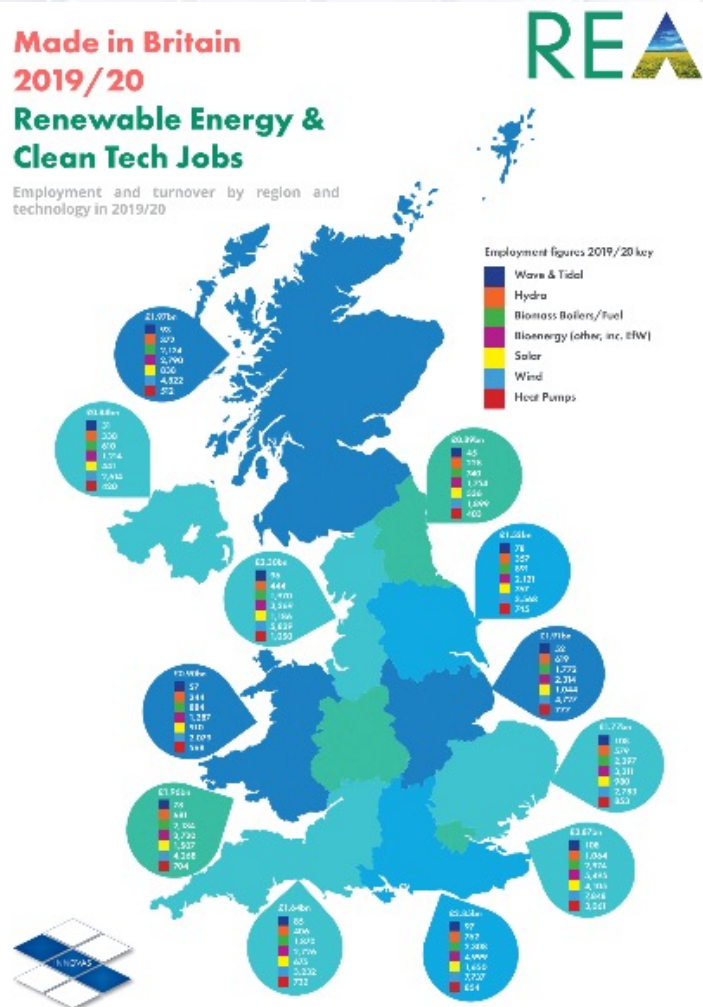
## EMPLOYMENT IN 2019/20 BY SECTOR



## Made in Britain 2019/20

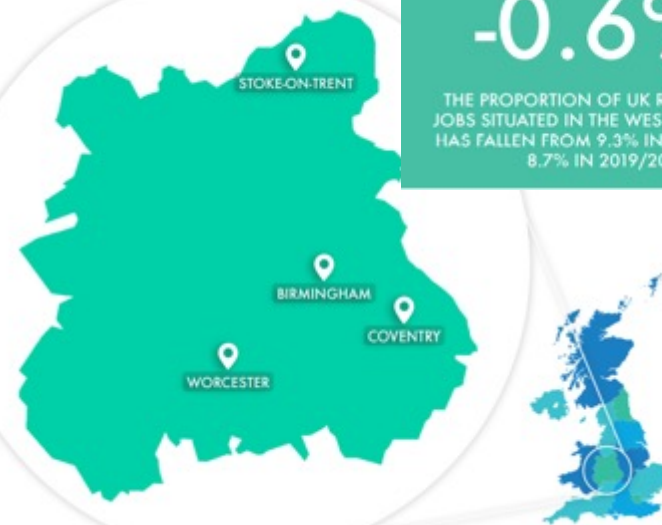
### Renewable Energy & Clean Tech Jobs

Employment and turnover by region and technology in 2019/20



# -0.6%

THE PROPORTION OF UK RENEWABLE  
JOBS SITUATED IN THE WEST MIDLANDS  
HAS FALLEN FROM 9.3% IN 2014/15 TO  
8.7% IN 2019/20.



In 2019, the West Midlands renewable energy sector employed 12,092 FTEs. The REA projects that this could rise to 29,110 FTEs by 2035, an increase of 17,018.

## WEST MIDLANDS 2035

## EAST MIDLANDS 2035

In 2019, the East Midlands renewable energy sector employed 11,306 FTEs. The REA projects that this could rise to 27,217 FTEs by 2035, an increase of 15,912.

# 41.8%

OF EMPLOYMENT IN THE EAST MIDLANDS  
RENEWABLE ENERGY SECTOR COMES  
FROM WIND ENERGY, COMPARED TO  
37.2% IN THE UK AS A WHOLE.



# REVIEW21

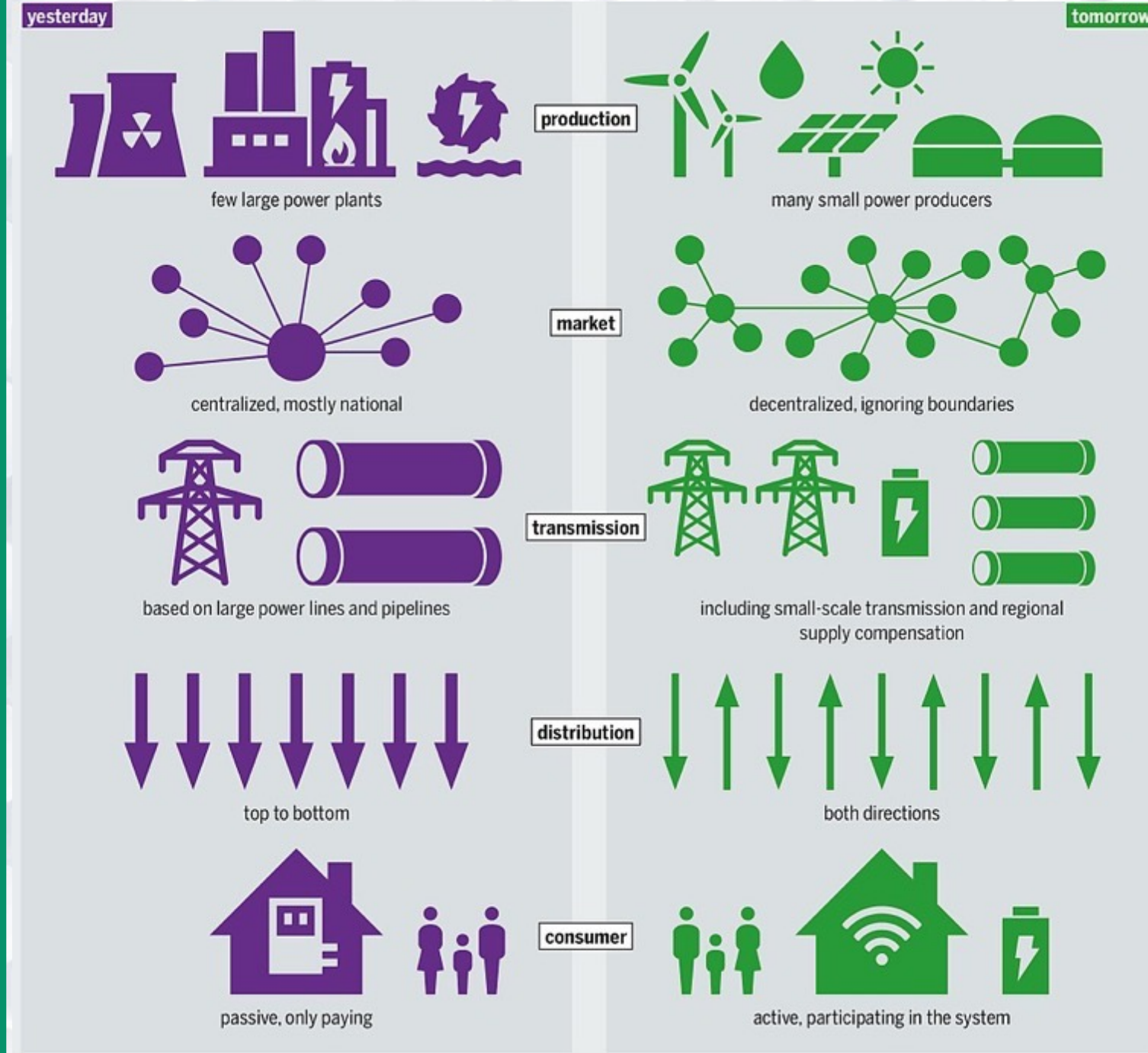
RENEWABLE ENERGY VIEW



# octopusenergy



We have a *different view* today of how our power system must work in the future



- Enabling net-zero
- Reduce energy waste and electricity cost
- Promote energy security

“Flexibility is the key to stability”

- John Wooden

[Energy Atlas: Graphics and license terms | Heinrich Böll Stiftung \(boell.de\)](#)



## REA's work on flexibility



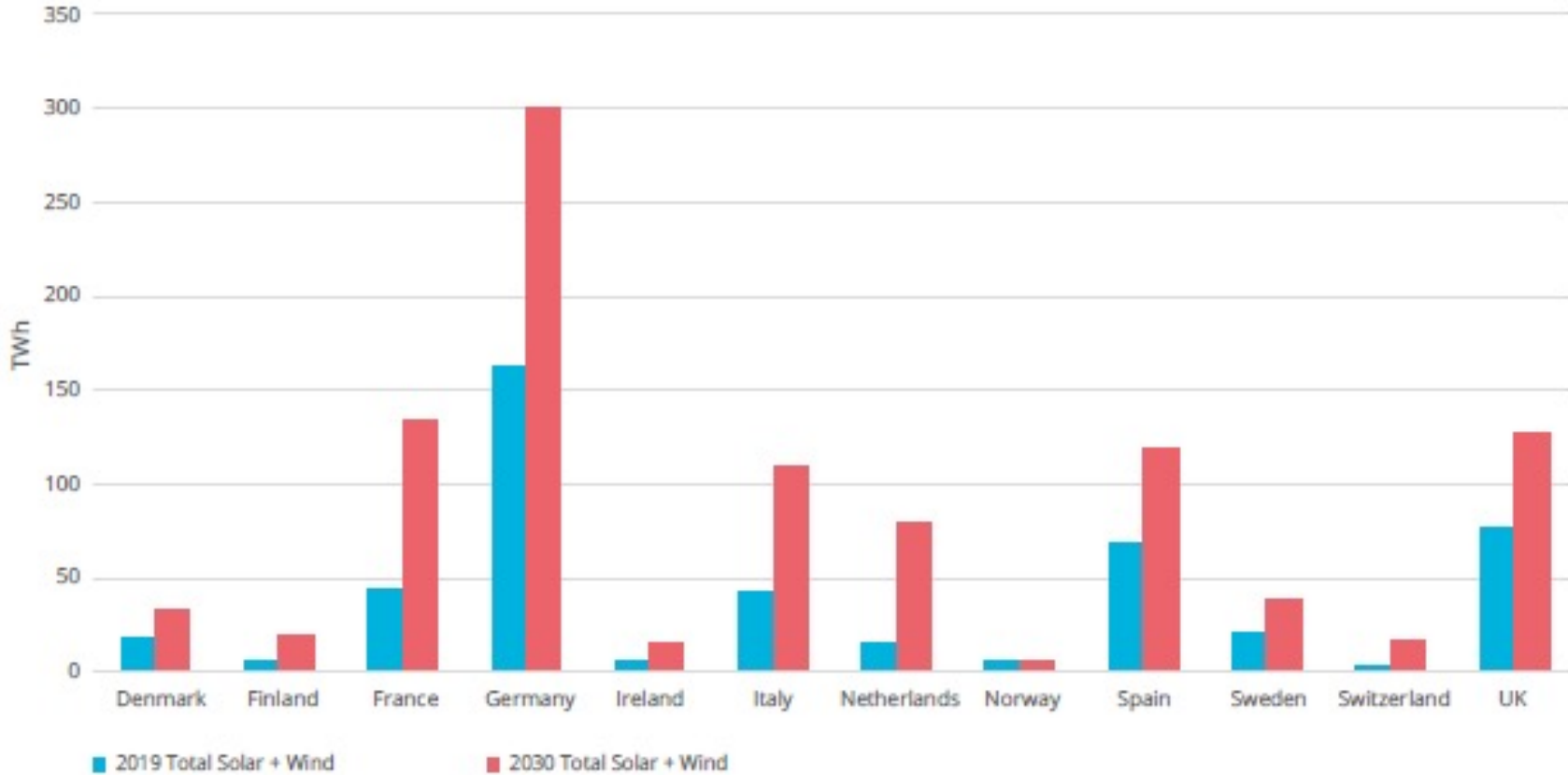
Each of the countries in our report has set emission reductions targets for 2030, together with associated targets for renewable electricity.

It is widely acknowledged that most of the new renewable resources will be *variable* wind and solar, which in turn will drive an increased need for flexible and dispatchable electricity resources to enable decarbonisation and security of supply.



# The 2030 decarbonisation challenge

## POTENTIAL FORECAST FOR 2030 WIND AND SOLAR ELECTRICITY PRODUCTION



If emission reductions targets for 2030 are met in the main by variable wind and solar *then* this will drive increased need for additional flexible electricity resources.



### Transition factors

#### Socio-political support

- Flexibility needs are recognised
- Supportive political and public consensus
- Public policy and regulation aligned

#### Technology potential

- Grid accessibility
- EV infrastructure deployment enabled
- Digitalisation enabled
- Innovation enabled

#### Market access

- Regulation enables fair access for all providers
- Trading - markets are open and effective
- Transaction costs are fair for flexibility

### Key questions asked were:

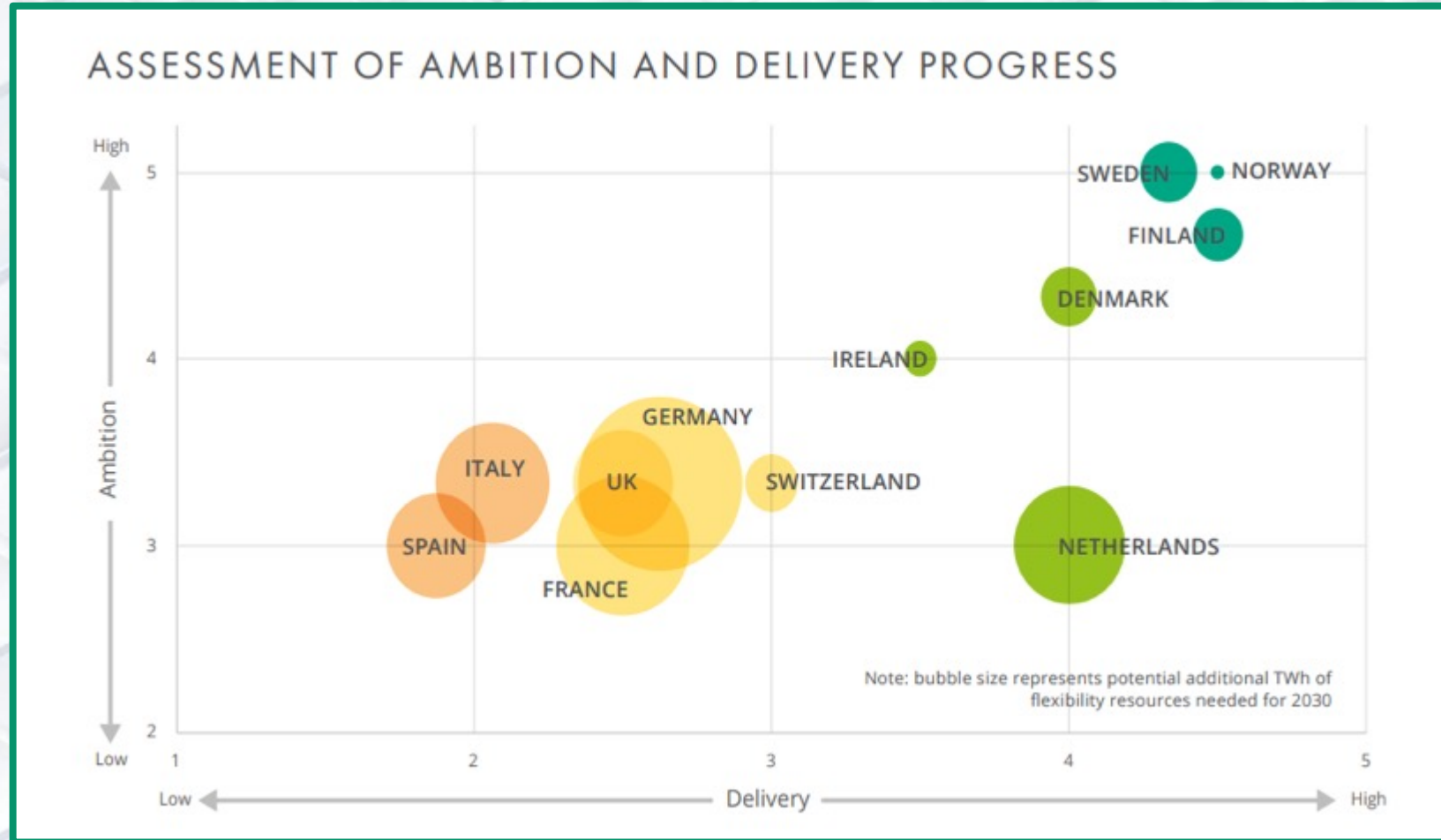
- *Is the socio-political background supportive or an impediment to investment?*
- *Are measures in place to help develop and deploy flexibility technologies?*
- *Do the regulatory and market arrangements enable or restrict new investment in flexibility services?*



## Transitioning to a Net-Zero Carbon Future

The evaluation data also allows us to assess the overall level of energy transition ambition for each country against the progress in delivering against this ambition.

The scale of the flexibility challenge



Dr Nina  
Skorupska CBE

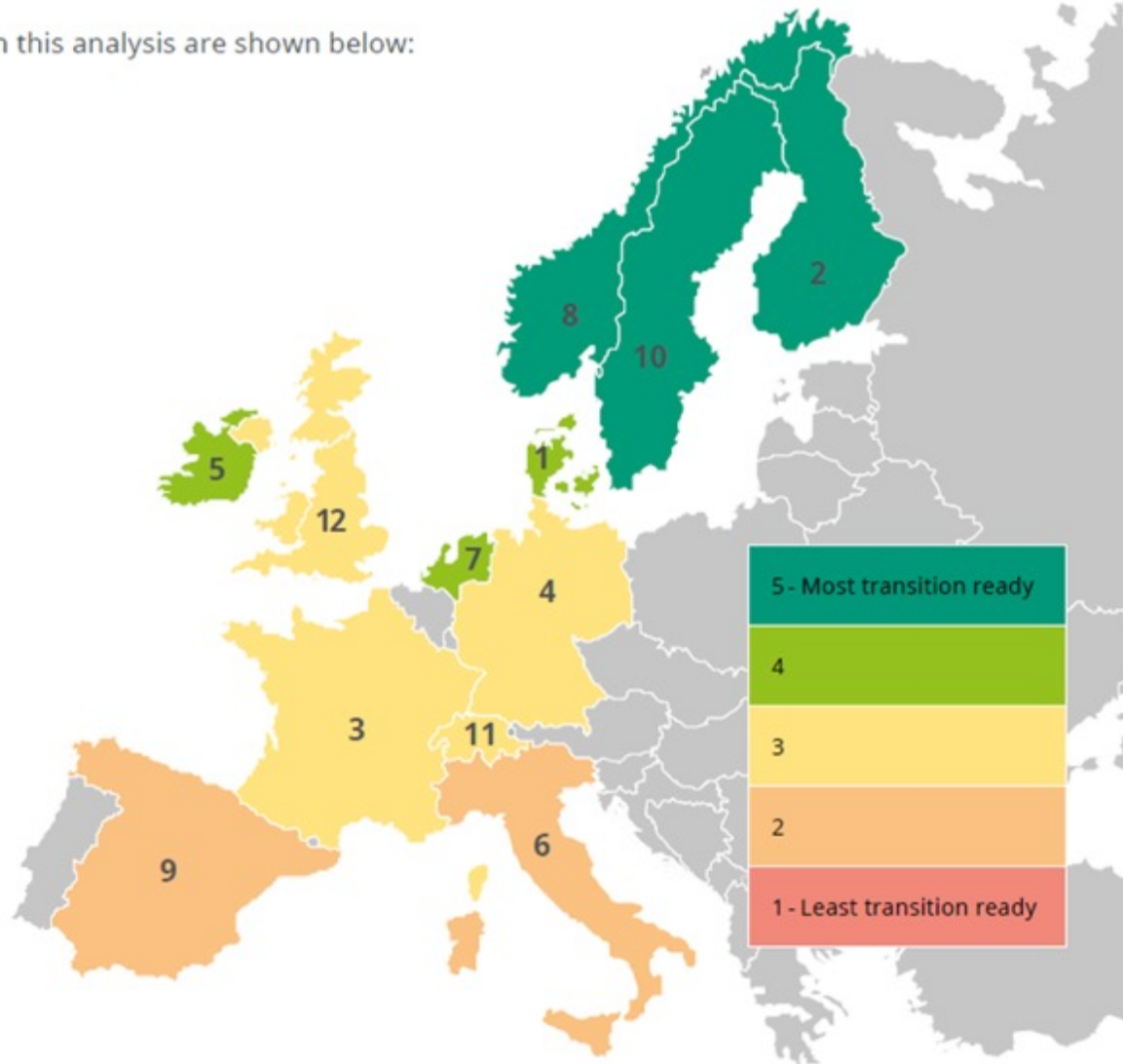


## ETRI 2021 Overall Rankings

Dr Nina  
Skorupska CBE

Overall country rankings from this analysis are shown below:

- 1) Denmark
- 2) Finland
- 3) France
- 4) Germany
- 5) Ireland
- 6) Italy
- 7) Netherlands
- 8) Norway
- 9) Spain
- 10) Sweden
- 11) Switzerland
- 12) UK



Each country  
has different  
market  
characteristics  
and  
decarbonisation  
challenges

The ranking is  
based on the  
comparative  
attractiveness to  
investors in  
flexibility  
resources



# ETRI 2021: UK REPORT

Dr Nina  
Skorupska CBE

UK



**Markets** - In 2019, UK annual renewable electricity production represented 35% of annual consumption, with solar and wind representing 22% of annual electricity consumption. The UK Government's advisors have targeted 50% renewable energy output for 2030, which could increase wind and solar output by around 52TWh.

**DER** - The UK has less than 1% penetration of electric vehicles in 2020, and electric vehicles represent around 7% of all new vehicle registrations. Over 11GW of rooftop solar is installed. Smart meter rollout is 46% complete.

**Survey** - The individual survey scores and comments for the UK are shown right.

Electricity markets	2019 actual	2030 estimate
Annual consumption (TWh)	342	342
Annual renewable production (TWh)	119	171
Renewable % of annual consumption	35%	50%
Annual solar and wind production (TWh)	76	128
Solar and wind % of annual consumption (TWh)	22%	37%

## SOCIO-POLITICAL FACTORS

Transparency on system needs and policy direction	Socio-economic impact	Political and regulatory alignment
3	4	3

## TECHNOLOGY FACTORS

Grid Reliability	EV Infrastructure and EV charging	Digital technology Enablers	Innovation
3	3	2	4

## MARKET FACTORS

Regulations	Compensation structures	Transaction costs
2	2	2

Distributed energy products and applications	2020 actual
Homes with electricity supply (million)	27.80
BTM rooftop solar (MW)	11,680
Domestic heat pumps ('000's)	260
Total Battery EV's ('000's)	206
% BEV penetration	0.5%
Physical and IT infrastructure (MW)	557

Enabling technologies	2020 actual
Smart meter penetration	46%

## In summary:

- + Strong public and political support for energy transition
- Extensive consultation on policy decisions often leads to delays or changes
- Weak alignment across Gov. bodies leads to uncertainty of policy goals ..especially in the short term...making them complex and slow
- Grid visibility is low and connections slow and costly to realise
- + Positive environment for innovation but with many different trials and slow deployment of change
- Flexibility "markets" are nascent but stacked towards legacy fossil generators and grid scale batteries



## Smart Systems and Flexibility Plan 2021

Indicated the need for :

- around 30 GW of new low carbon flexibility resources (a 20 GW increase) will be needed by 2030,
- and 60 GW (a 50 GW increase) by 2050 .

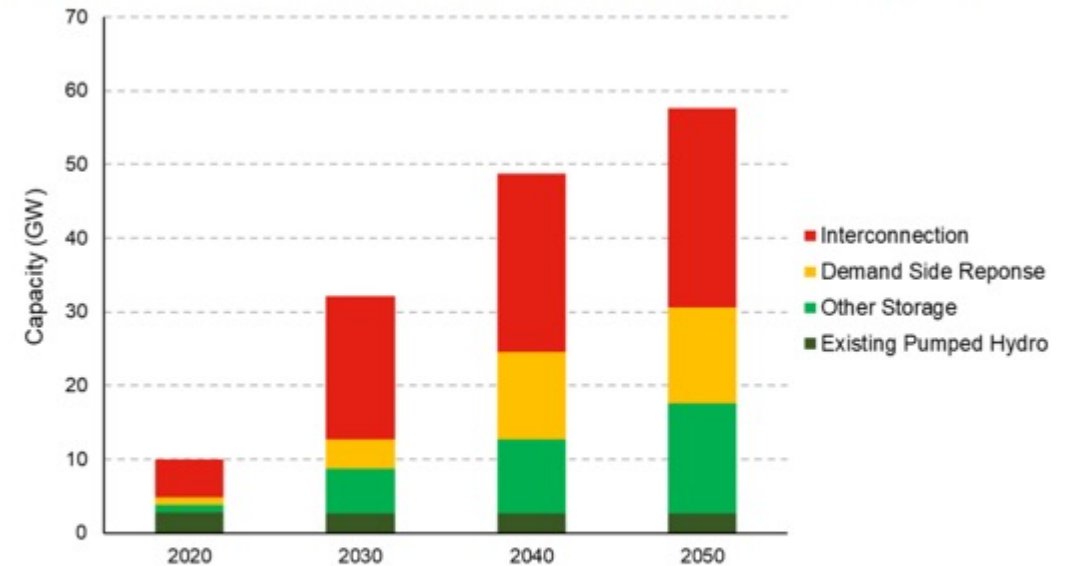
Delivered by storage, flexible demand and generation, and interconnectors.

NOTE:

Does not yet consider Longer Duration Energy Storage, nor Vehicle to grid (with increasing EV deployment)

*Nor the revised 2035 Net Zero Power ambition*

Figure 8: Illustrative deployment of flexible technologies, high flexibility scenario<sup>25</sup>



<sup>25</sup> 'Other storage' includes existing battery projects and new deployments. All new storage assets are assumed to be 4-hour duration and could be a range of technologies including new battery and pumped hydro projects.





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Thank you  
&  
Questions?



Dr Nina  
Skorupska CBE

**REA Restricted:** This contains information that is confidential to the REA and its members and should be not be shared without permission



**ElectraLink**

WEF forum

# Where is ElectraLink in 2021



232k Change of Supplier Events last month



Transfer 6.5 Millions Messages last month

170 GB of data last month

## Customers

DTS 297 Market Participant  
Connections  
Customer NPS 8.2

71 EMI Customers  
78 NS Customers

## Code Administration

DCUSA  
SPAA  
SMICOP  
TRAS

## Other Services

NRPS  
Advisory support

## Centre of competency

Data infrastructure  
Data services  
Data governance / data stewardship  
Industry process knowledge  
Customer engagement management

## Stakeholders

Innovation projects for SSEN  
Data delivery for Ofgem and BEIS  
Digitisation for DCUSA  
PAF data for RECCo  
Cost control for DTS users

# Data transformation drivers in the GB data landscape

## Smart Metering

- Increased data
- **Half-hourly Settlement**
- Security
- Data privacy
- Dual fuel processes

## Third Party Access to Data

- **Third party access to data**
- Increased requirements for speed and resilience
- High availability

## Flexible Energy Market

- Industry process change
- Time of Use tariffs
- Domestic Demand Side Response

## Smart Energy System

- DNO to DSO
- **Real time access to smart home**
- Electric vehicles
- Heat pumps
- De-carbonisation of heat.

Transformation of the data landscape

# Key questions to answer



What LCT is connected to the networks?

How will technologies drive behaviour change?

Where can I connect DER to maximise carbon reduction?

How fast are LCT proliferating?

What are the energy implications of de-carbonising heating and transport on a geography?

How can network companies efficiently plan ahead to connect LCTs?

How can I access granular LV data?

Where/when can I connect LCT?

# Improving visibility of data publicly...

## OPEN DATA

Home ▶ Open Data

< BACK TO ALL

### OPEN DATA

#### What is Open Data?

The Energy Market Data Hub (EMDH), managed by ElectraLink, transfers the data required to support the retail energy market (including electricity smart metering install and smart consumption data). Under the governance of the Data Transfer Service Agreement (DTSA), we are able to make this dataset available to market participants and regulators.

Since 2012, ElectraLink has had an established approach to data sharing – outlined in the DTSA, a well-defined data governance approach that enables us to manage a variety of data access requests from a wide range of utility industry parties.

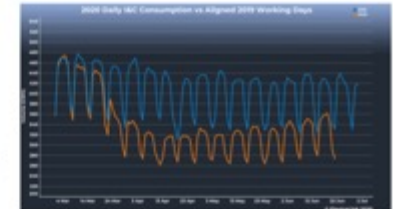


#### Half hourly I&C electricity consumption during COVID-19

Industrial and commercial (I&C) energy consumption patterns have changed since the government mandated working from home in a bid to slow the spread of COVID-19. Our insights team has produced a visualisation of trends in half hourly I&C consumption data to show how the largest consumption sites compare now to the same time last year.

Consumption volume is steadily increasing as lockdown measures are eased further and the economy reopens. The increase in pre-lockdown levels is slower than the drop that occurred in March, but the difference in consumption last week was less than 20 percent under the same time last year.

[VIEW CHART](#)



#### Half hourly embedded generation exports during COVID-19

ElectraLink has visibility of all the embedded generation that is not connected to the main transmission grid. Using data for the last three months, there appears to be no significant indication of impact on embedded generation as a result of COVID-19 to date. We will continue to monitor and update this as we continue to explore how embedded generation and decreased demand factor into our journey towards net zero.

[VIEW RANGE](#)

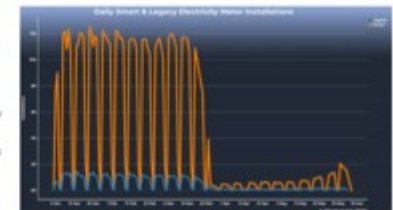


#### Daily meter installations

ElectraLink data shows that from the start of 2020, smart meter installations were occurring at the usual rate, but then dropped rapidly as the lockdown came into effect. This followed the announcement that all non-essential metering visits were suspended during this national emergency.

As lockdown measures are eased and the energy industry gears up to hit the 2024 smart meter programme target, the end of May shows a spike in smart and legacy meter installations compared to previous weeks. This is due to more non-essential site visits being carried out as consumers are more comfortable with engineers visiting their homes. We will continue to track the increasing rate of smart meter installations here as well as in our monthly smart meter installation stories.

[VIEW CHART](#)



#### Daily meter readings during COVID-19

In the section above, ElectraLink highlighted the cessation of non-essential meter installations following the outbreak of COVID-19. Following Ofgas Energy's announcement that they are furloughing over 3,000 members of staff responsible for meter readings, ElectraLink can confirm that meter reads taken by all Data Collectors across the industry have significantly reduced over the past week. We are currently processing around 1,000 reads per day, down 98.9% from meter reading activity prior to the nation's lockdown.

At their peak, the market's field force collected meter reads only accounted for approximately 10% of meter reads submitted on a daily basis, so the impact on the energy industry's underlying processes and performance is not anticipated to be detrimental.

The remaining 90% of meter reads submitted for settlement is split between customer reads, smart reads and pre-payment. Our data also indicates a decline in all three of these over the last month which we will explore in the coming weeks.

[VIEW CHART](#)



SSN and UK Power Networks scan the skyline to prepare for electric vehicles' arrival

Community Innovations, Keeping your power flowing / 22 October 2019

Skyline, a new innovative partnership, has launched to support the cost-effective transition to electric vehicles (EVs). In a cross-industry first, data from car dealerships, charge point operators and electricity networks is being shared and utilised to target investment and pave the way for the net zero carbon transport revolution.

The UK is seeing a significant growth in electric vehicles, which will also mean a considerable increase in electricity demand. Recent research commissioned by SSN showed in 2019. Data analysts at UK Power Networks, which that the 95,000 EVs currently in its areas are due to

Electricity network operators Scottish and Southern partnership with the Energy Innovation Centre (EIC) them to pinpoint when and where new electricity capacity

The group will work with third parties to share electricity networks plan for the projected increase

The Skyline project brings together car dealership time. While charger installers routinely update the not previously involved in the data-sharing process

project will develop a new digital platform over multiple data sources to feed in crucial data these.

EMDH data shows increase in solar and battery exports to distribution networks

October 11, 2019


Home > News > EMDH data shows increase in solar and battery exports to distribution networks



ElectraLink and the Renewable Energy Association (REA) have identified a significant increase in energy exported to GB distribution networks from battery storage and solar PV sources.

Data from the Energy Market Data Hub (EMDH) indicates solar PV exports to distribution networks reached 87GWh in 2018, up from 194GWh in 2017. From 2014 to 2018, battery storage exports increased from 50MWh to 40GWh.

**Solar PV and Solar PV (Mixed) Exports 2012-2018 (GWh)**



**Related Posts**

ElectraLink and Renewable Energy Association launch partnership to champion a decentralised electricity system

LCT Detection project uses advanced analytics and machine learning to indicate presence of 15,000 low carbon

LCT Detection project uses advanced analytics and machine learning to indicate presence of 15,000 low carbon technologies on Western Power Distribution's local electricity network

March 20, 2019

Home > News > LCT Detection project uses advanced analytics and machine learning to indicate presence of 15,000 low carbon technologies on Western Power Distribution's local electricity network

ElectraLink Provides Innovative New API Platform to British Gas

October 25, 2018

Home > News > ElectraLink Provides Innovative New API Platform to British Gas

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October 25, 2018

Home > News > ElectraLink Provides Innovative New API Platform to British Gas

ElectraLink, the UK's Energy Market Data Hub (EMDH), has created a new Application Programming Interface (API) on top of the existing EMDH platform which will provide instantaneous access to data. An API is a mechanism for secure, real-time access to the data within the EMDH operating system, either through manual queries made within the API portal or automated machine to machine data look ups.

British Gas is the first supplier in the GB energy market to utilise this API technology to access Estimated Annual Consumption (EAC) information held on the EMDH allowing for more accurate billing, details of Erroneous Transfers (ETs) and address details. This customer specific data will streamline the switching process and improve the experience for customers wishing to change suppliers. The BIG API enables customers to obtain precise quotes, set Direct Debits and have confidence in the accuracy of their switch using the most up to date energy market data available.

**Recent News**

Switching requests plummet in October following supplier market exits

Market disruption drives customers to find switching security with large suppliers

Dan Hopkinson's role as ElectraLink CEO made permanent

Dataset Will Help National Grid 'Join the Dots'

April 21, 2018

Home > News > Dataset Will Help National Grid 'Join the Dots'

ElectraLink, the UK's Energy Market Data Hub, is pleased to confirm it can now provide much needed data to National Grid following the signature of a long-awaited contract between the system operator and the central body.

This follows a change implemented by ElectraLink to the data access rules in its agreement with the users of the data transfer service in response to National Grid's concerns over its ability to accurately gauge electricity demand during peak periods. These concerns are caused by the volatility of renewable sources and a lack of visibility as to how much power smaller plants connected to local power networks are generating.

Rising energy demand and greater penetration of renewable energy have contributed to this growing issue. National Grid has previously warned of operability challenges caused by unpredictable renewable growth which has surged in recent years, and which is not connected to the main grid. Discussions on the

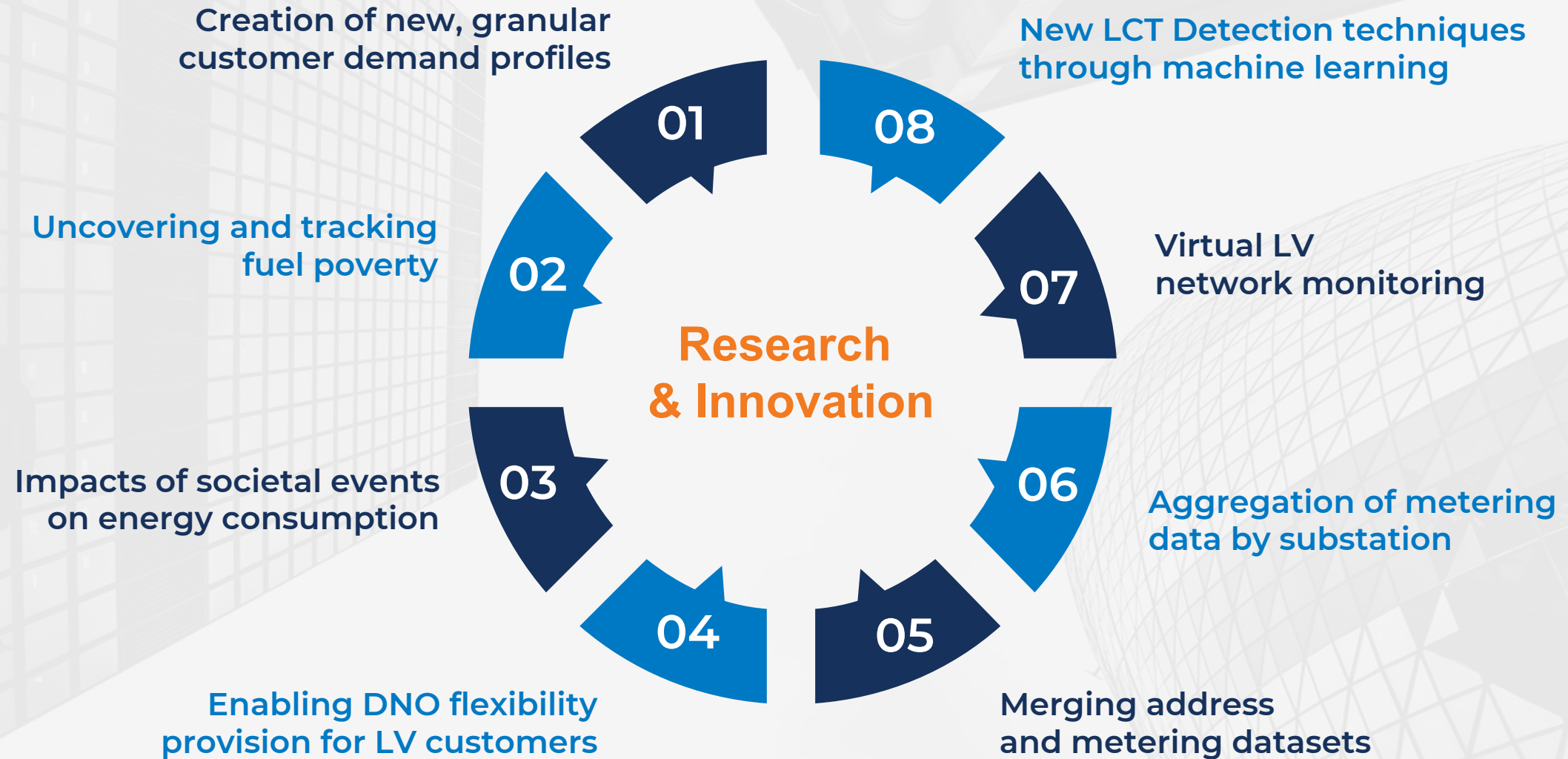
**Recent News**

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# Data can unlock barriers to Net Zero



# Lessons learnt



Through 20 years of experience  
ElectraLink has learnt:

Access to data is constantly evolving

Engagement is key to prioritising  
user needs


Diverse technology options are needed  
for a diverse market

Data governance is a challenge and  
needs tackling up front

Data quality and standards should not  
be a barrier to getting started

# Takeaways from today...

- 
- ElectraLink has been focused on data and digitalisation for 20 years
  - Managing data transfer for 290+ participants and **sharing billions of data points to third parties**

- 
- The provision of data is evolving and central datahub providers must evolve with industry. Our key learnings have been:
    - No one-size fits all approach to data access
    - Access to data needs to be flexible and transform with industry needs

- 
- We are all facing the same challenges so collaboration and coordination across states and industries is key

# Contacts



➔ [electralink.co.uk](https://electralink.co.uk)



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An aerial night-time photograph of Europe, showing the continent's outline and major cities illuminated by yellow and white lights against the dark blue of the surrounding oceans. The lighting highlights the density of urban areas and the geographical features of the continent.

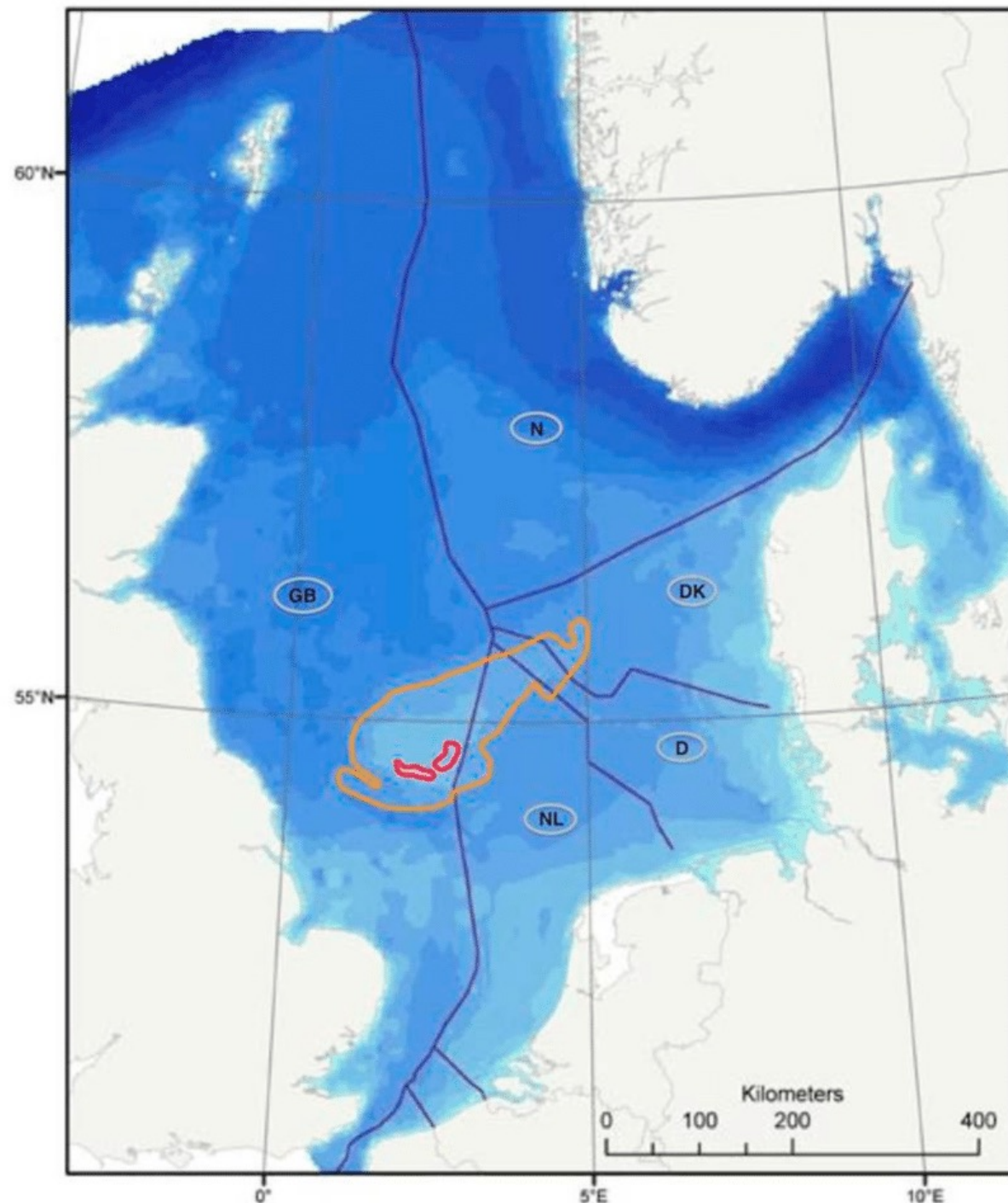
# Integrated Infrastructure Deployment

Jon Davies

**nationalgrid**  
Interconnectors

## Resourceful North Sea

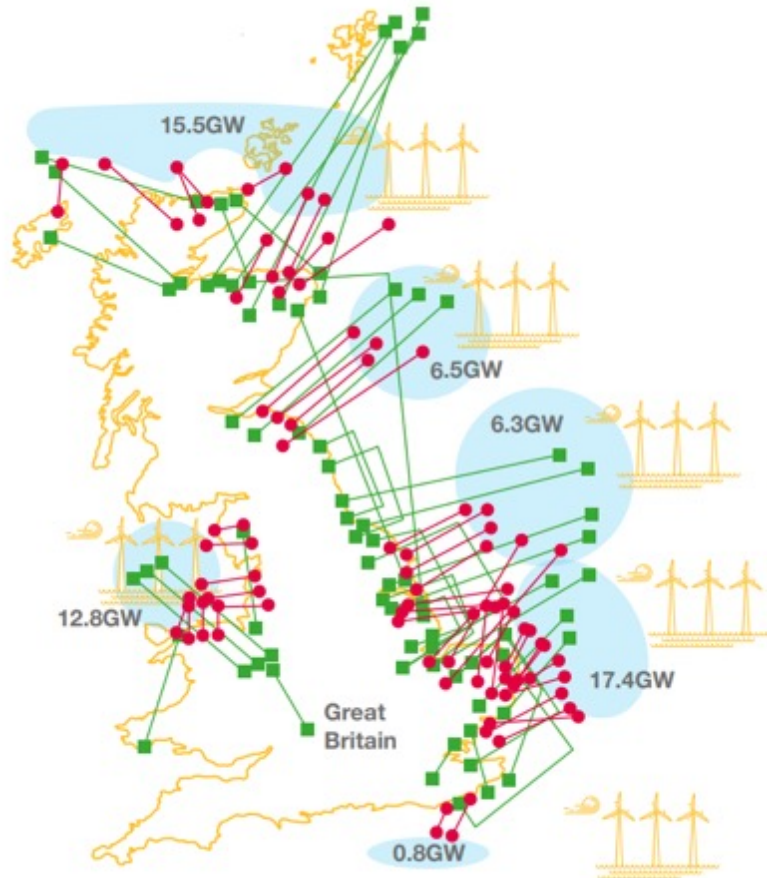
- The North Sea is 2.7 times the area of Great Britain
- Shallow, enclosed waters enable resource exploitation
- Nearly 90% of the UK & EU's offshore wind targets for 2030 (100GW) could come from the Dogger Bank area alone <sup>1</sup>
- **All** of UK & EU's offshore wind targets for 2050 (440GW) could come from ~16% of the North Sea



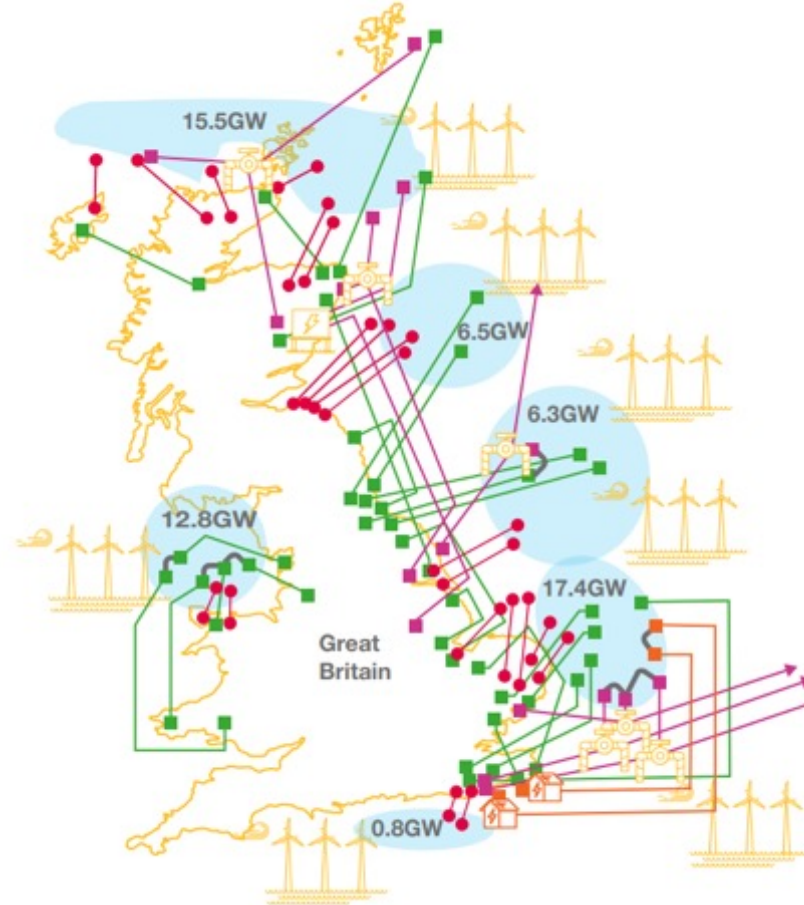
<sup>1</sup> Assumes offshore wind power density ~ 5MW/km<sup>2</sup> Dogger Bank area ~ 17600km<sup>2</sup>

# Challenge 1 – coordination in design

## CURRENT APPROACH



## INTEGRATED APPROACH



## BENEFITS\*

**Landing points**  
105 to 30

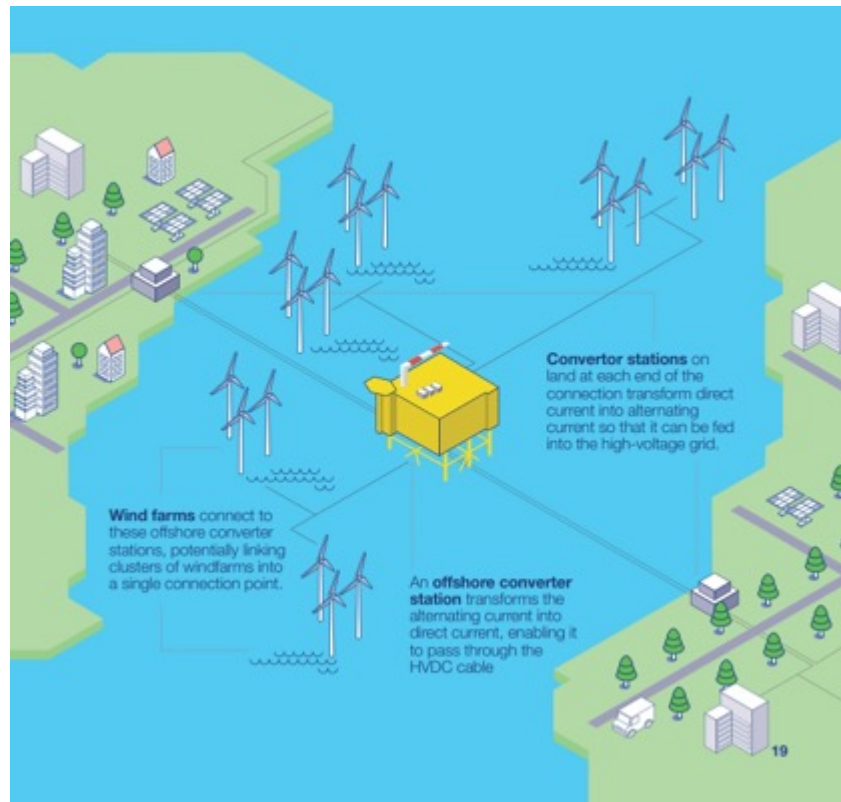
**Onshore & offshore cable**  
11,585km to 6735km

**HVDC substations**  
57 to 20

\* National Grid ESO Offshore Coordination Project Report, December 2020

## Challenge 2 – cooperation across the industry and across borders

Cooperation developing solutions...



... and cooperation across borders



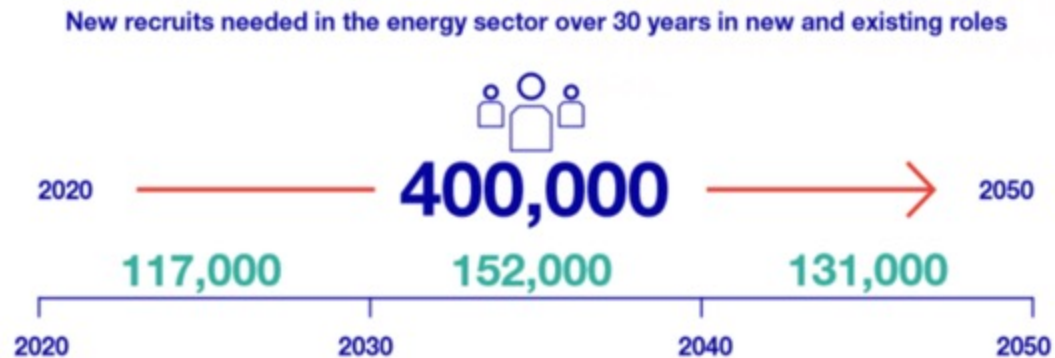
## Challenge 3 – Policy will set the pace

- Legislation, policy and regulation are needed to encourage development and investment
  - **UK:** OTNR will shape this for offshore wind and transmission
  - **EU:** ORES is already clear and will shape the EU market that we need to interface with
- Regulation balances risks and benefits for investors & consumers
  - £ billions of benefits to be shared appropriately
  - Commercial arrangements between MPI investors will be crucial

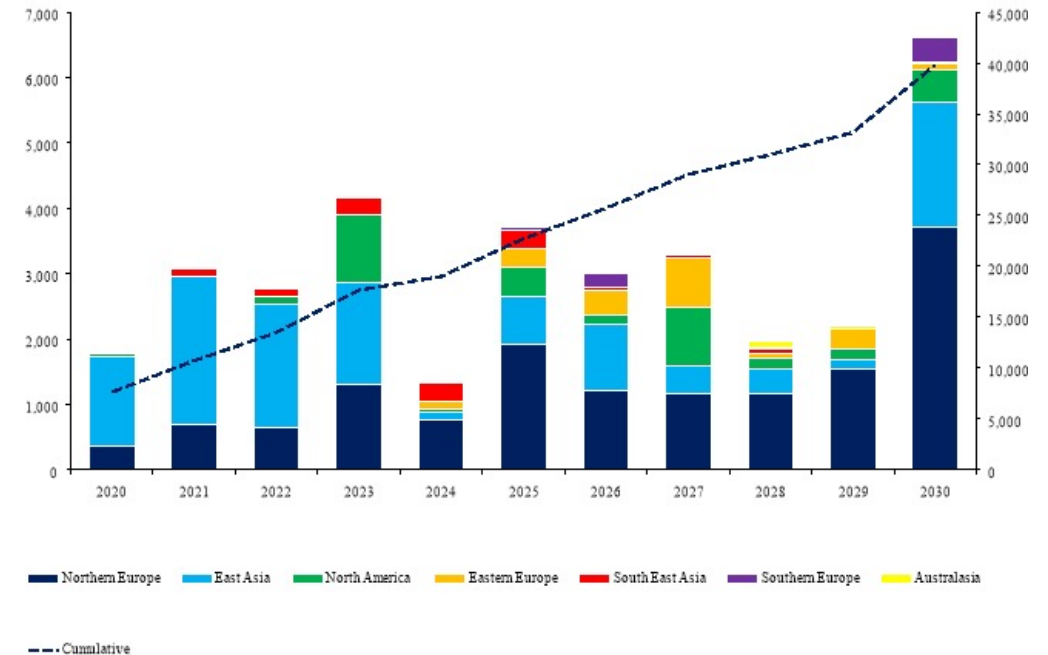


# Challenge 4 – identifying and addressing supply chain constraints

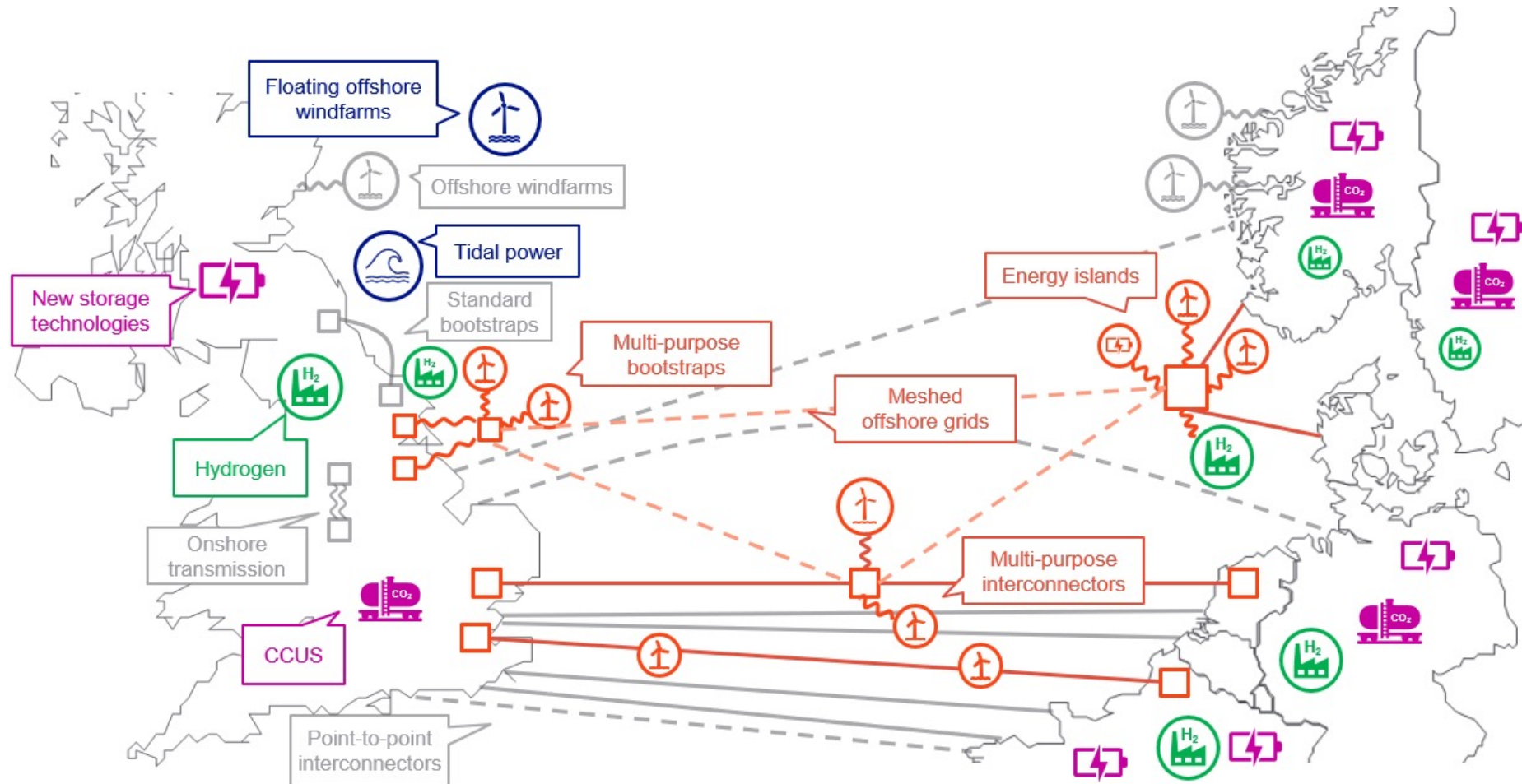
Over 100,000 green energy jobs...



... and a cable market set to grow six-fold



# Challenge 5 – breaking the problem down to make progress



To close...

We **have the technology and the ambition** to meet our targets.

Addressing these challenges is **critical for unlocking the renewable resources** in the North Sea. **2030 starts today.**

# Integrated Infrastructure Deployment

Planning challenges across generation, transmission, microgrid deployment, storage and interconnection



Chris Leach 23/11/21

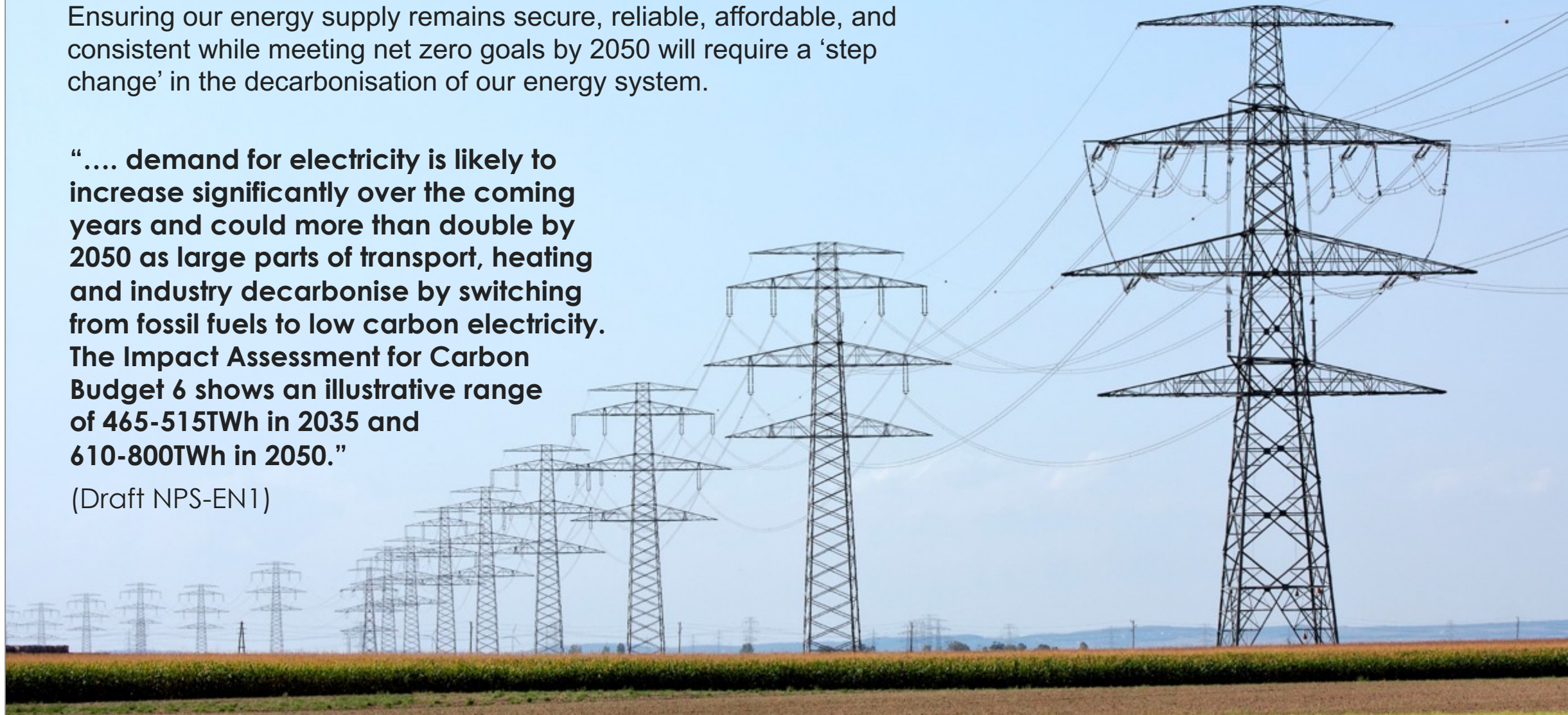


# Current Situation

Ensuring our energy supply remains secure, reliable, affordable, and consistent while meeting net zero goals by 2050 will require a 'step change' in the decarbonisation of our energy system.

**“.... demand for electricity is likely to increase significantly over the coming years and could more than double by 2050 as large parts of transport, heating and industry decarbonise by switching from fossil fuels to low carbon electricity. The Impact Assessment for Carbon Budget 6 shows an illustrative range of 465-515TWh in 2035 and 610-800TWh in 2050.”**

(Draft NPS-EN1)





# Planning Framework

Number of different, and often competing planning frameworks for developing energy infrastructure in the UK.

Two main planning regimes (in England) for developing energy infrastructure are DCO and TCPA – depending on size of project. Each have their own advantages and disadvantages.



Delivering aims of the NPS and Net Zero will require a mix of different technologies, across different scales, different planning regimes, and will all need to tie together





# Main Challenges to delivery through planning

- Timescales
- Public perception – e.g. Delivering SMR
- Additional land and Biodiversity net Gain
- Competing land uses
- Changing Policy
- Resources of LPA / Statutory bodies / competing planning policies





# How to overcome these challenges

- Planning ahead – incorporating energy infrastructure into Net Zero Plans, Local Plans and Land Use Strategy
- Recognising that energy infrastructure can't be developed in isolation – Developers working closely with e.g. Utilities
- Planning energy infrastructure with housing / industrial
- Co-locating energy projects
- Increasing powers of LDOs / PD rights?
- Another tier of 'Major Infrastructure Projects'?
- Where electricity, gas, petroleum, hydrogen, and road infrastructure have been conceived independently, it is likely that these will increasingly merge into one system with critical interdependencies.



Design with  
community in mind

# The Growing Strategic role and Delivery of the Microgrid

Westminster Energy Forum Panel Discussion

Andy McKenzie

Microgrid Commercial Lead UK&I

[se/microgrids](#)

# The **most local** of global companies

Key figures for 2020

**5%** of revenues devoted to R&D

**€25.2 billion**

2020 revenues

**41%**  
of revenues in new economies

**128,500+**  
Employees in over 100 countries

We **partner** in  
everything  
we do

**Deep Domain  
Expertise**

Taking Sustainability  
to the next level

**650k** service providers  
& partners

**45k+** system integrators  
& developers

**3k** electricity companies

Home  
Building  
Industry  
Data Centre  
Infrastructure  
Cities



Over **300 microgrid** projects delivered globally

Over **900 electrification** projects delivered globally

**#1** Corporate Knights - 2021's most sustainable company on the Global 100 index

**#2** in Microgrid control technology by Navigant Research (2018)

Pioneer in innovative digital and IoT solutions for MV equipment and SF6 free switchgear.

# Sustainability is no longer a nice-to-have. It's business critical

Boards face **increasing pressure** to become ESG competent and prepare for climate change challenges

*2021 S&P Corporate Governance TreGlobalNds*

Companies are increasingly using digital to build **resilience** and take on **innovation**

*2020 Corporate Energy & Sustainability Progress Report*

Government and business **net zero commitments doubled** in less than a year in 2020

*2020 United Nations Press Release*

# COVID-19 has updated the definition of critical infrastructure

Now more than ever, we have to re-think who requires energy resilience.

Large electro-intensive Infrastructure

- Hospitals
- Water and Wastewater Facilities
- Data Centers
- Military Bases

Critical to local well-being

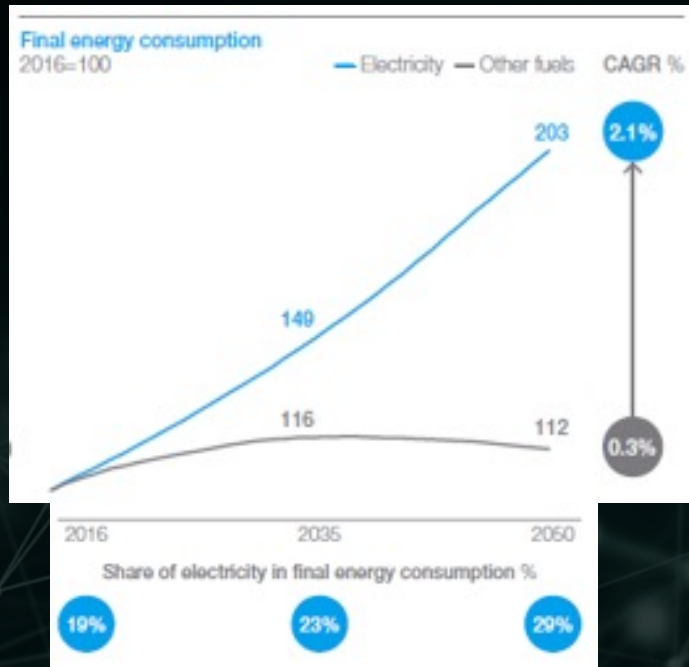
- Grocery Stores
- Distribution Centers
- Gas Stations
- Cell Phone Towers
- Banks/Co-ops

Life Is On

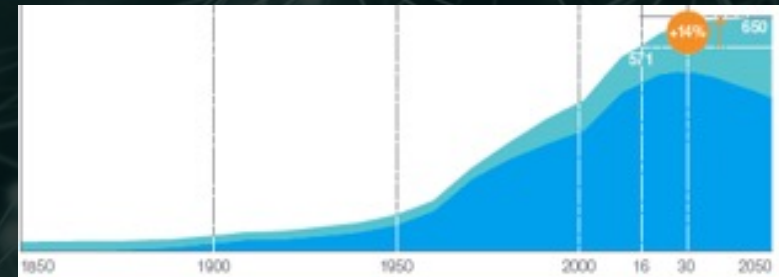
**Schneider**  
Electric

# A New Energy Landscape


**Electrification** across key end uses, particularly in buildings and road transport, drives a doubling of electricity demand by 2050



**Decarbonization** of generation while global primary energy plateaus around 2030, and **distributed renewable** energy sources get highest share



# On the brink of disruption



**“The electricity system that has served us well for 100 years is facing a fundamental threat to its existence.”**

Navigant Research, Liberating Microgrids (and all DER)

# From simple and linear



Centralized  
generation



Transmission &  
distribution



End-use  
consumption

# Added distributed energy resources



Centralized  
generation



Transmission &  
distribution

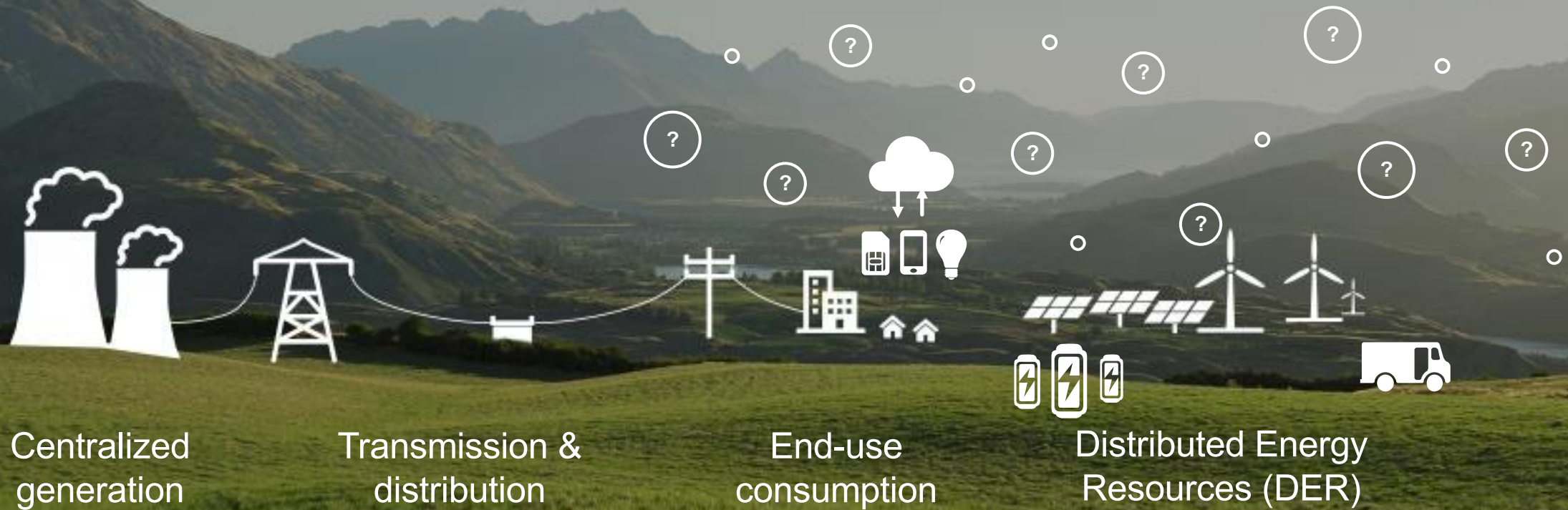


End-use  
consumption



Distributed Energy  
Resources (DER)

# To increasingly complex and multidirectional



# Technologies... Art of the possible



# Microgrid end-customers

A **Grid of Grid(s)**  
interconnecting new usage and  
generation with **Decentralized**  
**control** enabled by **Digital**  
technologies

**Large & XL MG**  
2MW to 20MW – and above  
Custom & Engineered solutions



**Large sites**

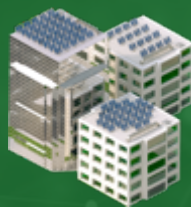
- Hospitals
- Consumer Goods
- MMM
- Oil & gas
- Data Centers



**Infrastructures**

- Eco-District
- Electrical companies (grid operators)
- Green Ports
- Airports

**Small & Medium MG**  
50kW to 1MW  
Standard & Repetitive solutions



**Buildings**

- Hotels
- Retail
- Real estate



- Rural electrification

**Access to Energy**

## **Prosumers**

Local energy resources  
implemented at end-user site  
require local or virtual “orchestrator”

## **Communities**

Local energy resources shared  
among different users  
require local or virtual “operator”

# Case study – SAPM Microgrid in Sydney, Australia

**SYDNEY, Australia – November, 2019**

Schneider Electric has been chosen by The South Australian Produce Market Limited (SAPML) as a major supplier to achieve Australia's first energy **microgrid connected to the spot market**, that will not only supply the site's entire energy demand but also export power to the National Electricity Market (NEM).

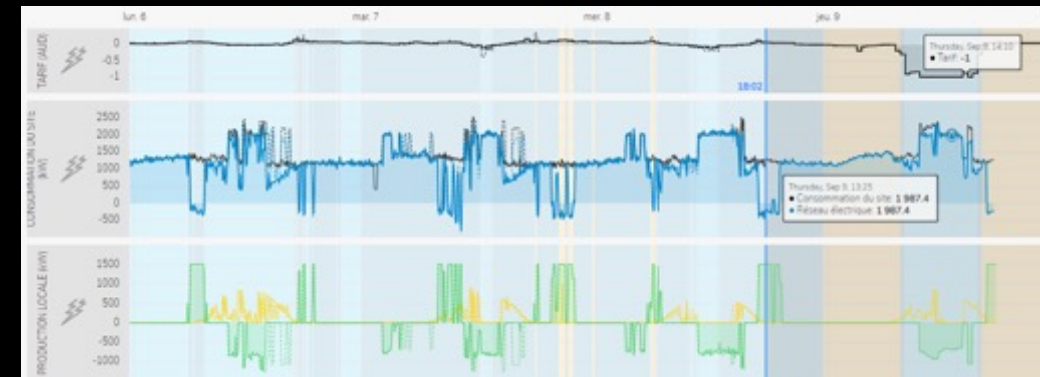
The **\$10.5M Microgrid** which includes more than 6,400 solar panels and 25 Tesla power pack batteries energy storage systems, uses Schneider Electric's **EcoStruxure Microgrid Advisor** technology in its control system, which allows them to forecast demand and electricity spot market pricing 24 hours ahead of time.

Using data analytics from the software, South Australia Produce Market can determine the most economically beneficial times to charge or discharge the battery.

The microgrid will **have notable environmental benefits** by:

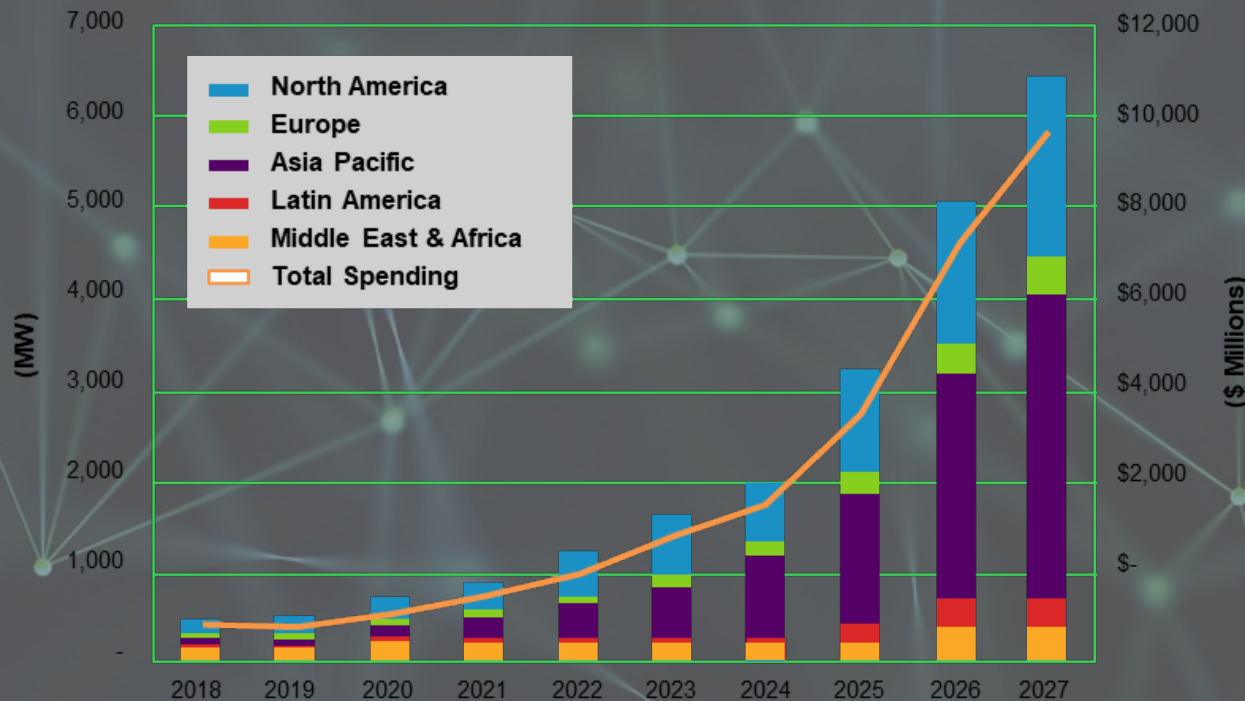
- cutting annual greenhouse gas emissions by 32%
- reducing the maximum demand on grid by 3.8MWh per annum
- having a net savings of \$4.3M over 10 years.

At full capacity, the system is capable of powering approximately 4,500 homes..



# Drivers for Growth & Adoption

Grid-Tied C&I Microgrids by Region,  
World Markets: 2018-2027



(Source: Navigant Research)

## Maximize Value creation across ecosystem

- Capability to combine use cases

## Ensure Value sharing for all stakeholders

- Monetization (Implicit & Explicit)
- Value of resilience
- Investment models (CAPEX, EAAS, ...)

## Ease of adoption

- No impact on comfort / production
- Friendly regulation (Relationship with utility, grid code)

## Local skills & support

- Upskill of Electrical channel (contractor, system integrator)
- Integration of new usages (EV)



**Good for  
the earth  
+  
Good for  
business**

**Limit** global warming  
**Appeal** to investors  
**Attract** employees  
**Appease** customers  
**Gain** a competitive advantage

Life Is On

**Schneider**  
Electric

Life Is On

**Schneider**  
Electric