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Date: 26 November 2018

KENT UTILITIES ENGAGEMENT SUB-COMMITTEE - THURSDAY, 1 NOVEMBER 2018

The attached presentations are from the meeting held on the 1 November 2018. They relate to agenda items 7, 8, 9, 10.

7 **Kent and Medway Strategic Energy Overview - A Local Authority Perspective (KCC) - Presentation (Pages 3 - 42)**

8 **Future Energy Provision - A Utility Provider Perspective - Presentation (Pages 43 - 66)**

9 **Enabling Growth - A Developer Perspective - Presentation (Pages 67 - 80)**

10 **Outcomes from the Previous Iteration of the Kent Utilities Engagement Sub-Committee - verbal update (Pages 81 - 88)**

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Future Energy Systems
A Local Authority Perspective

Energy has become a strategic issue…

SOUTH EAST
LOCAL ENTERPRISE
PARTNERSHIP

The future of energy: South East England

LOCASE
LOW CARBON ACROSS THE SOUTH EAST

Interreg North Sea Region
FRAMES

PASSAGE
Interreg Europe
European Union
European Regional Development Fund

Interreg 2 Seas Mers Zeeën
Triple-A

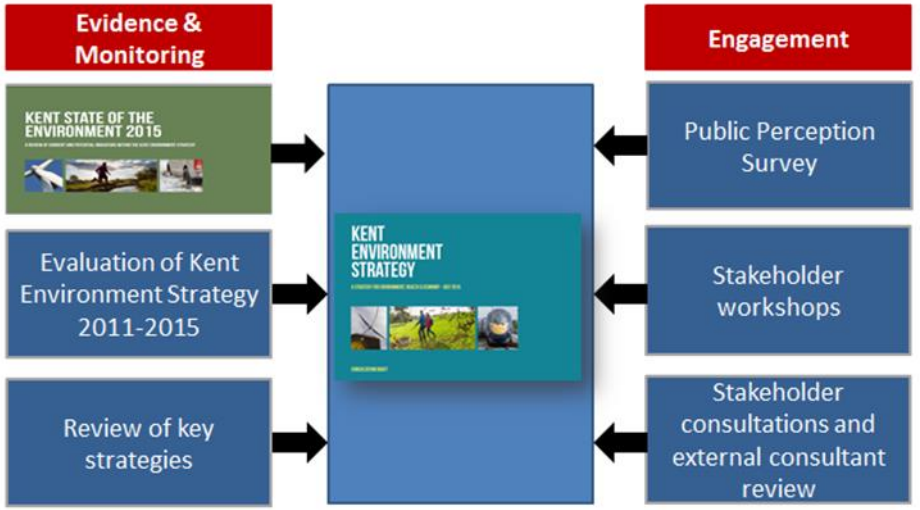
…Already embedded in KES…

Setting the direction for the county

- Strategic Context and Framework
- High level priorities
- Partnership
- Significant opportunity or challenge

Why work in partnership?

- Cross boundary issues
- Resources/expertise
- Funding
- Greater impact and better outcomes



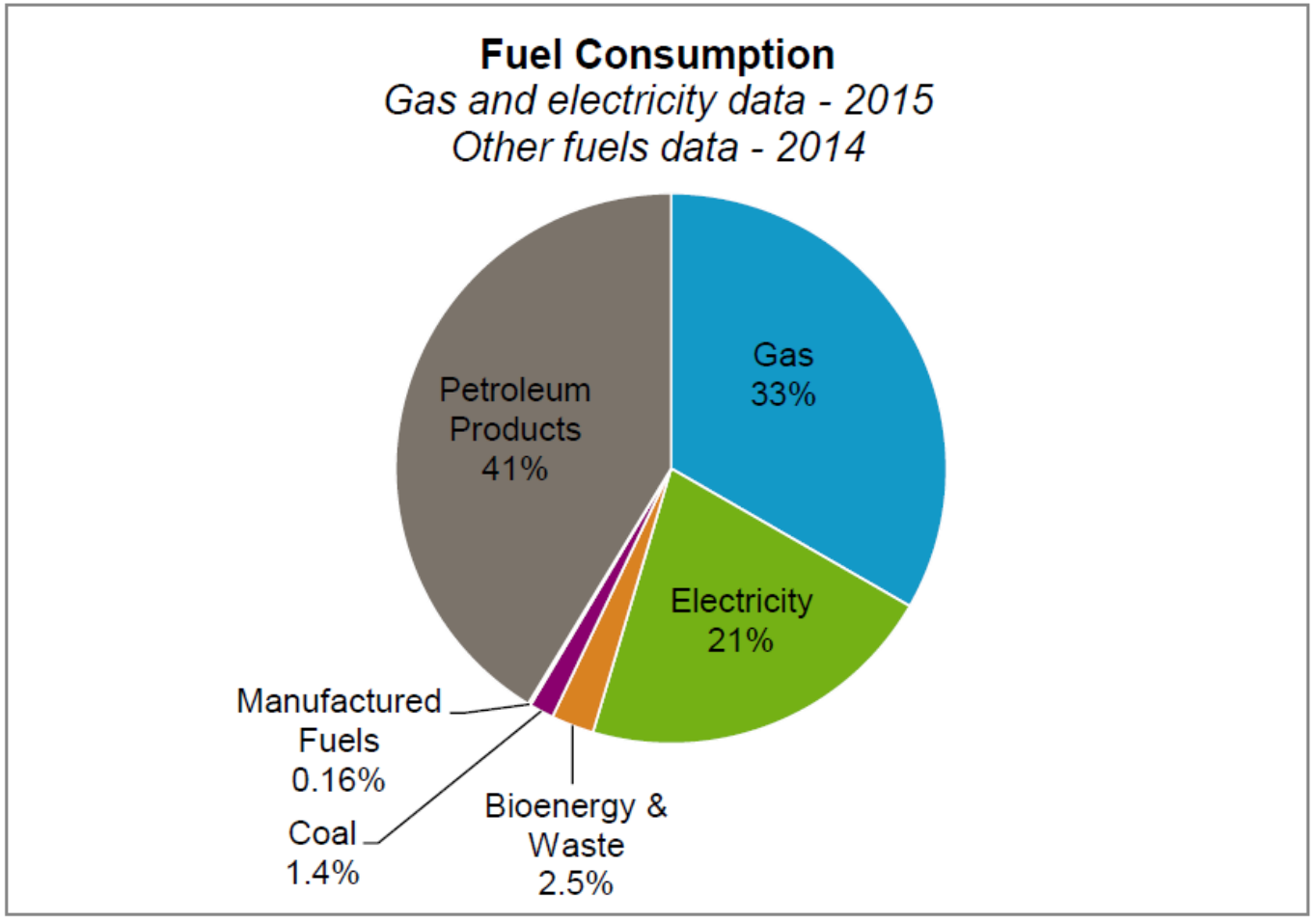
… Significant issue for growth…

… current consumption for Kent and Medway is

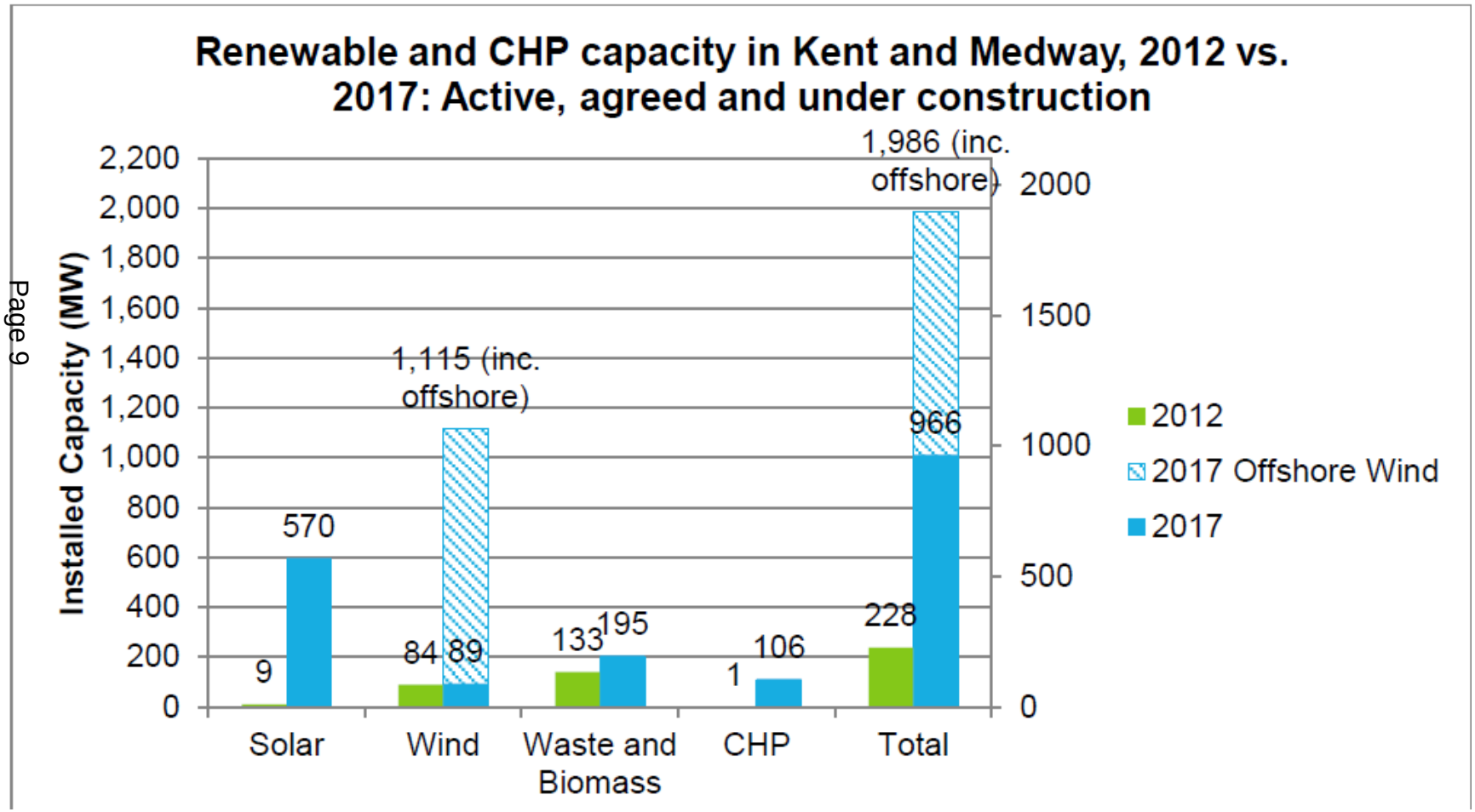
Fuel consumption (GWh)	Non-Domestic	Domestic	Road Transport	Rail	Bioenergy & Waste *(sector not specified)*	Total by fuel type
Gas*	3,380	8,565	-	-	-	**11,945**
Electricity*	4,501	3,099	-	-	-	**7,600**
Bioenergy & Waste	-	-	-	-	897	**897**
Coal	455	53	-	9	-	**516**
Manufactured fuels	41	16	-	-	0	**56**
Petroleum products	1,102	609	13,034	43	0	**14,788**
Total by sector	**9,478**	**12,342**	**13,034**	**51**	**897**	**35,801**

** indicates 2015 data. All other figures use 2014 data.*

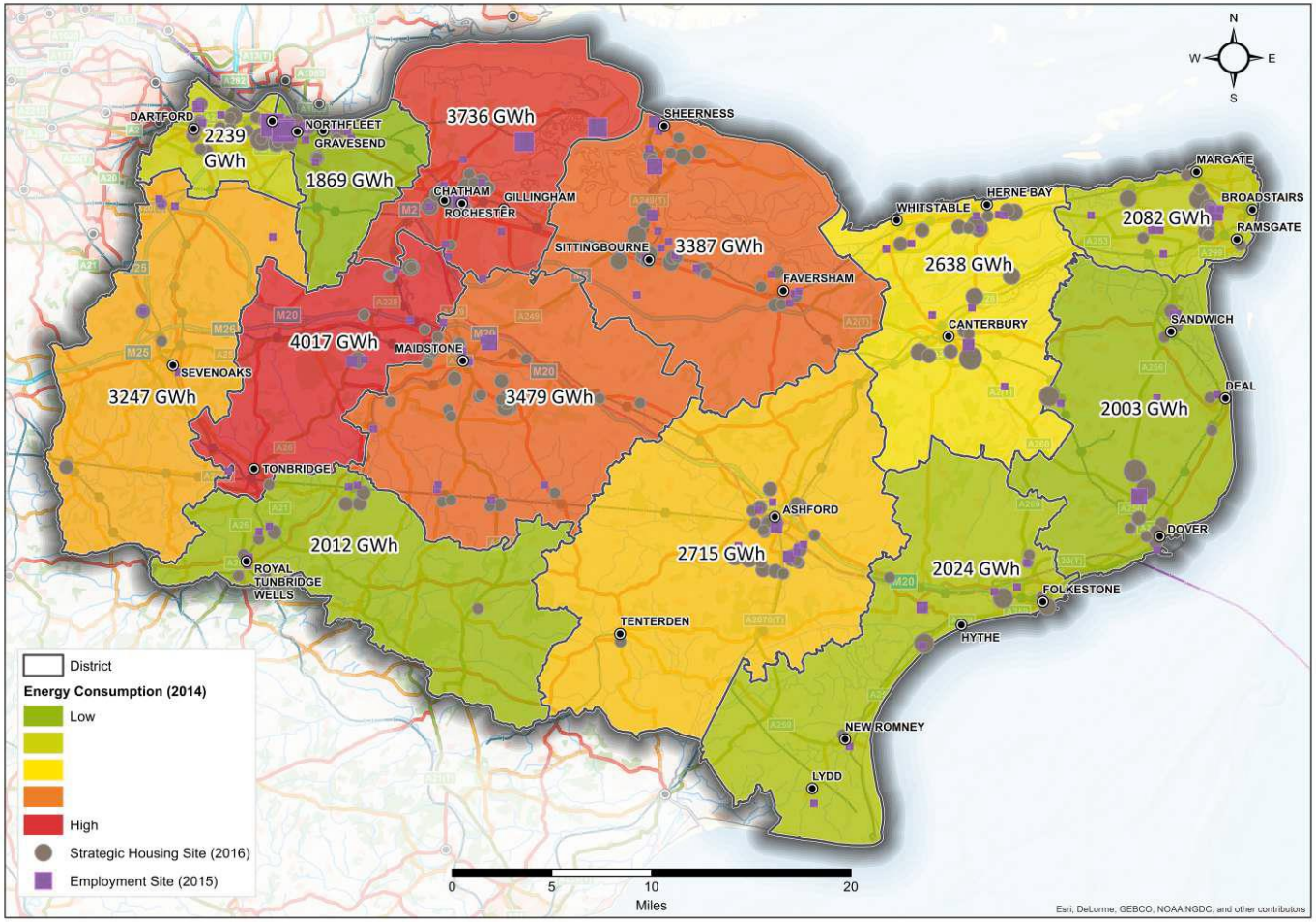
… predominantly fossil fuels…



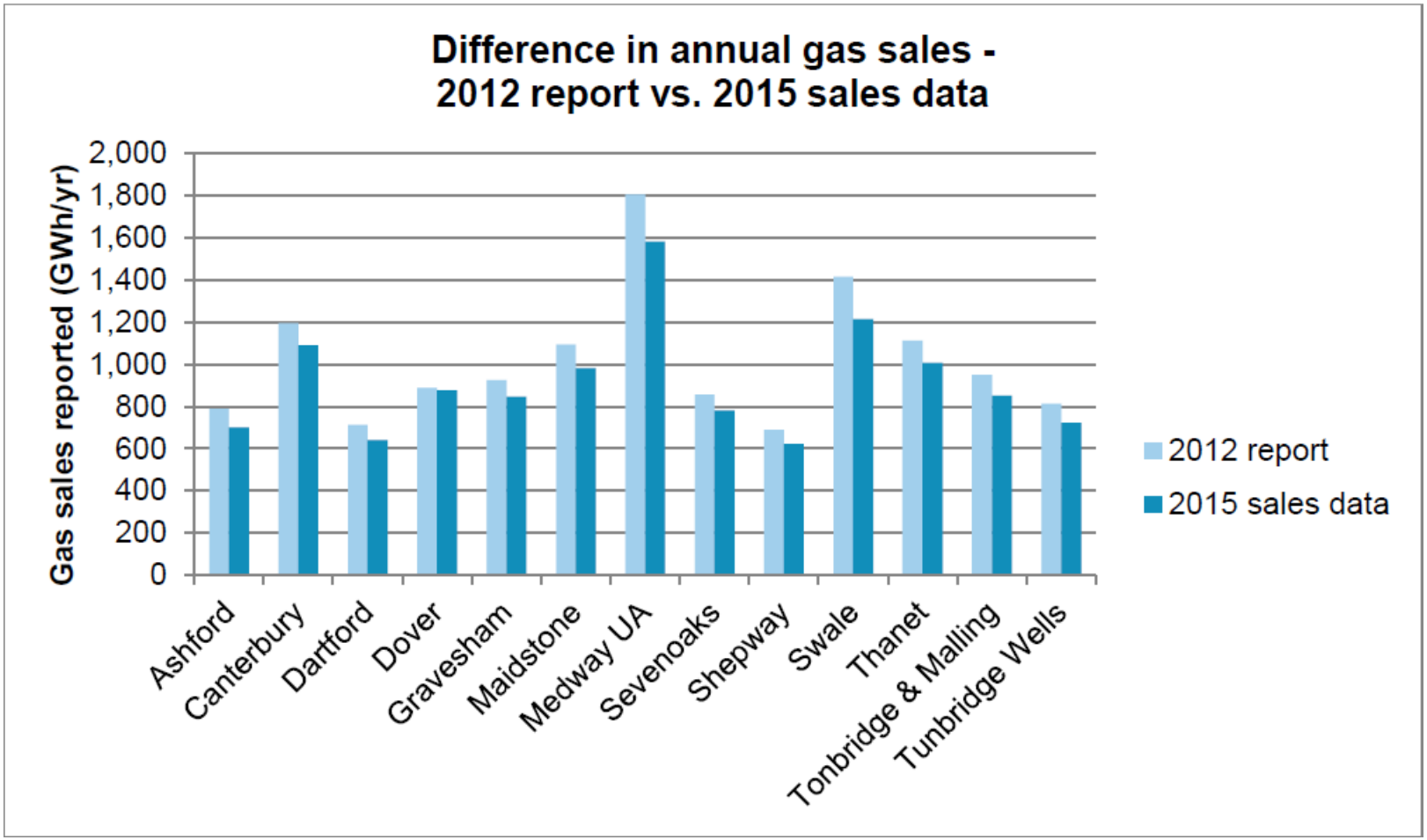
…though renewables are increasing…



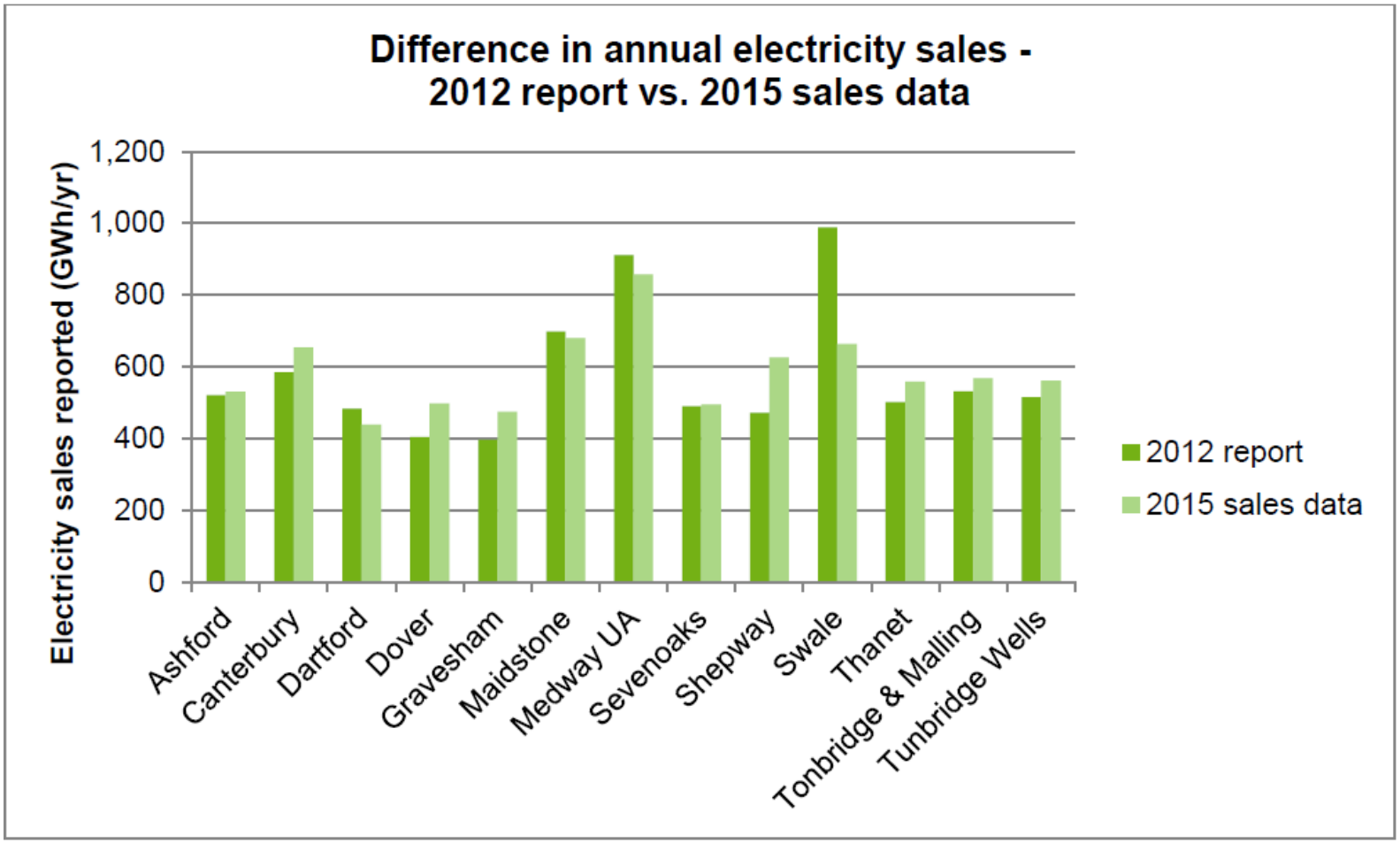
…energy use is not uniform…



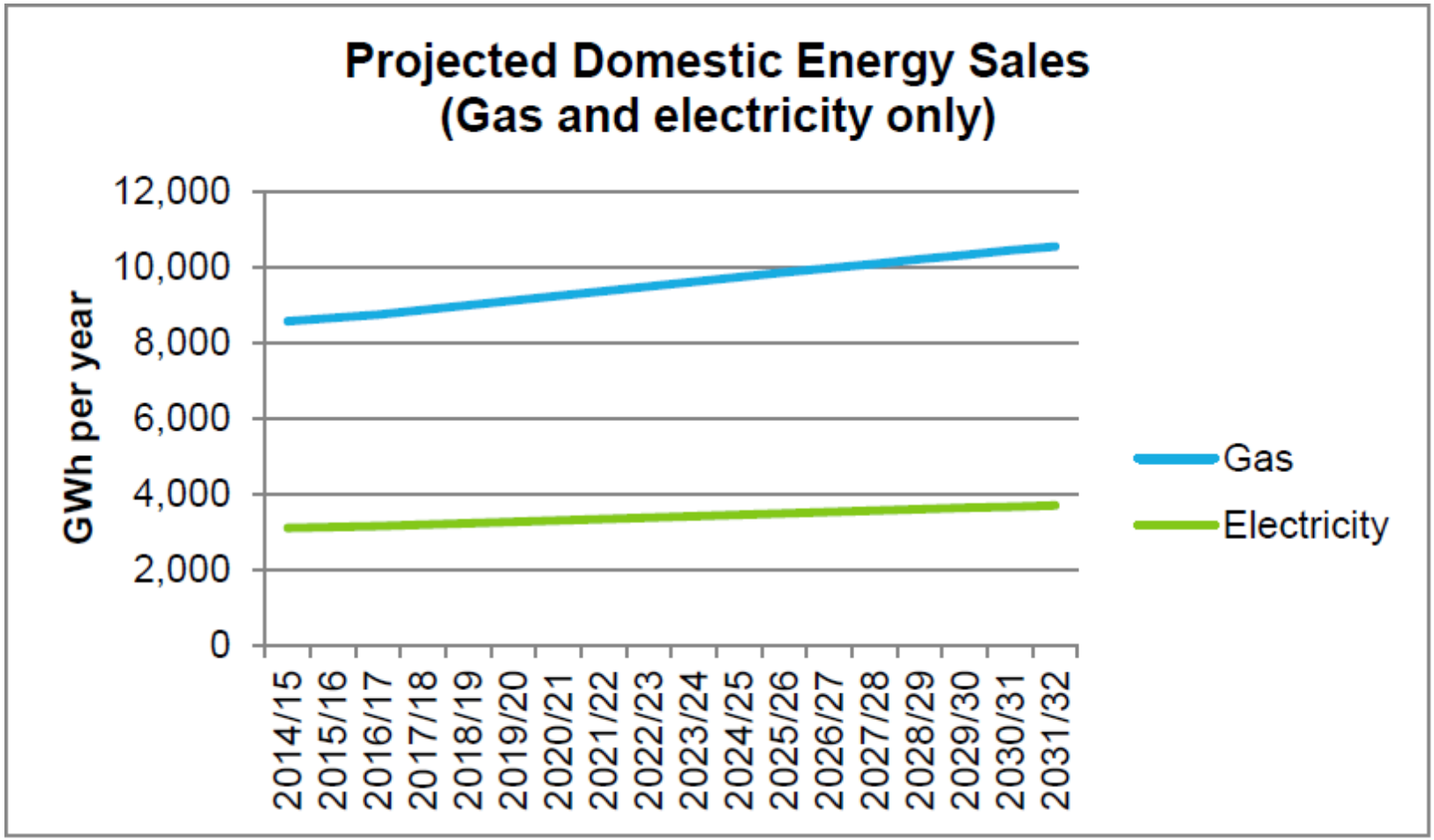
…gas use has decreased since 2012 …



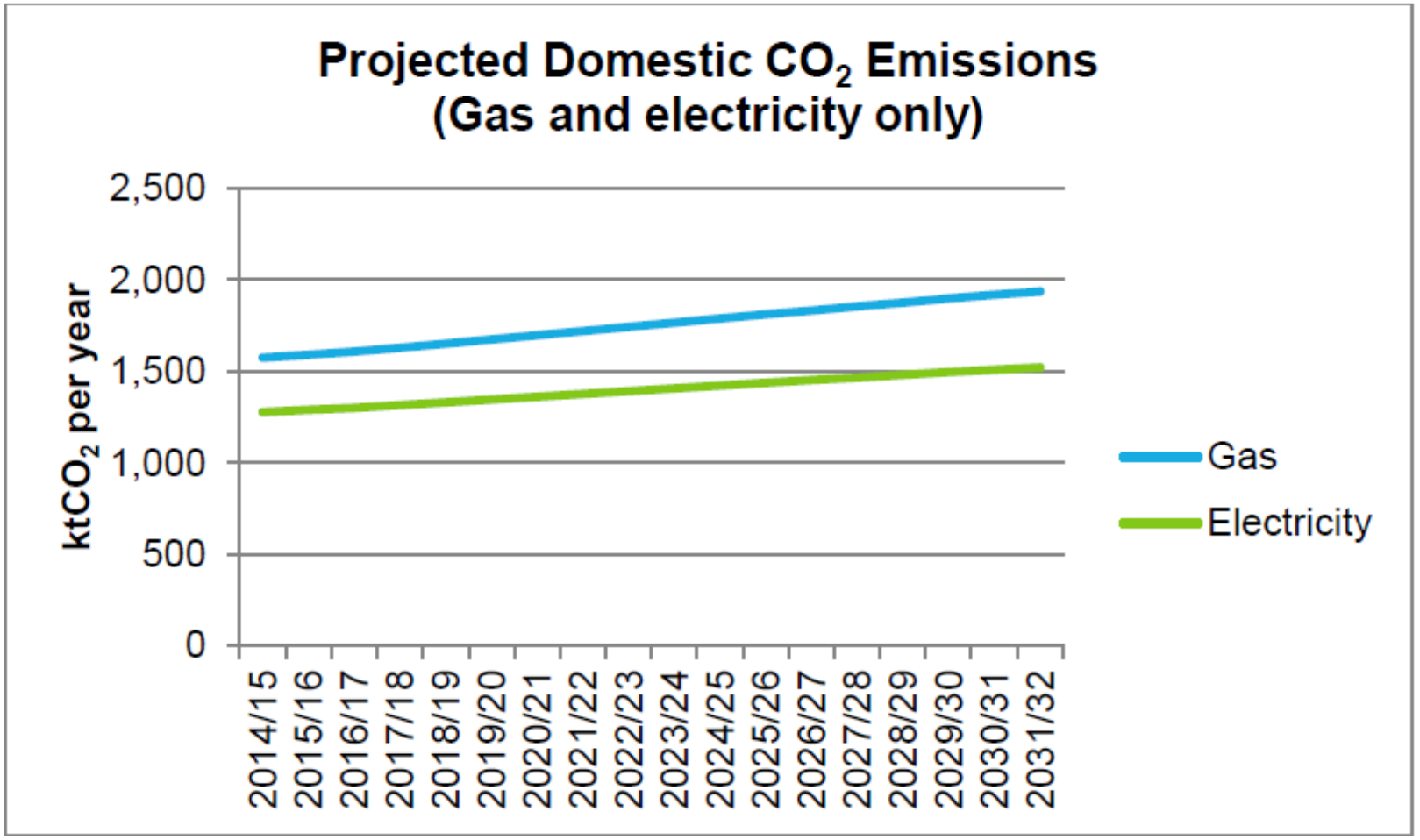
… as has electricity…

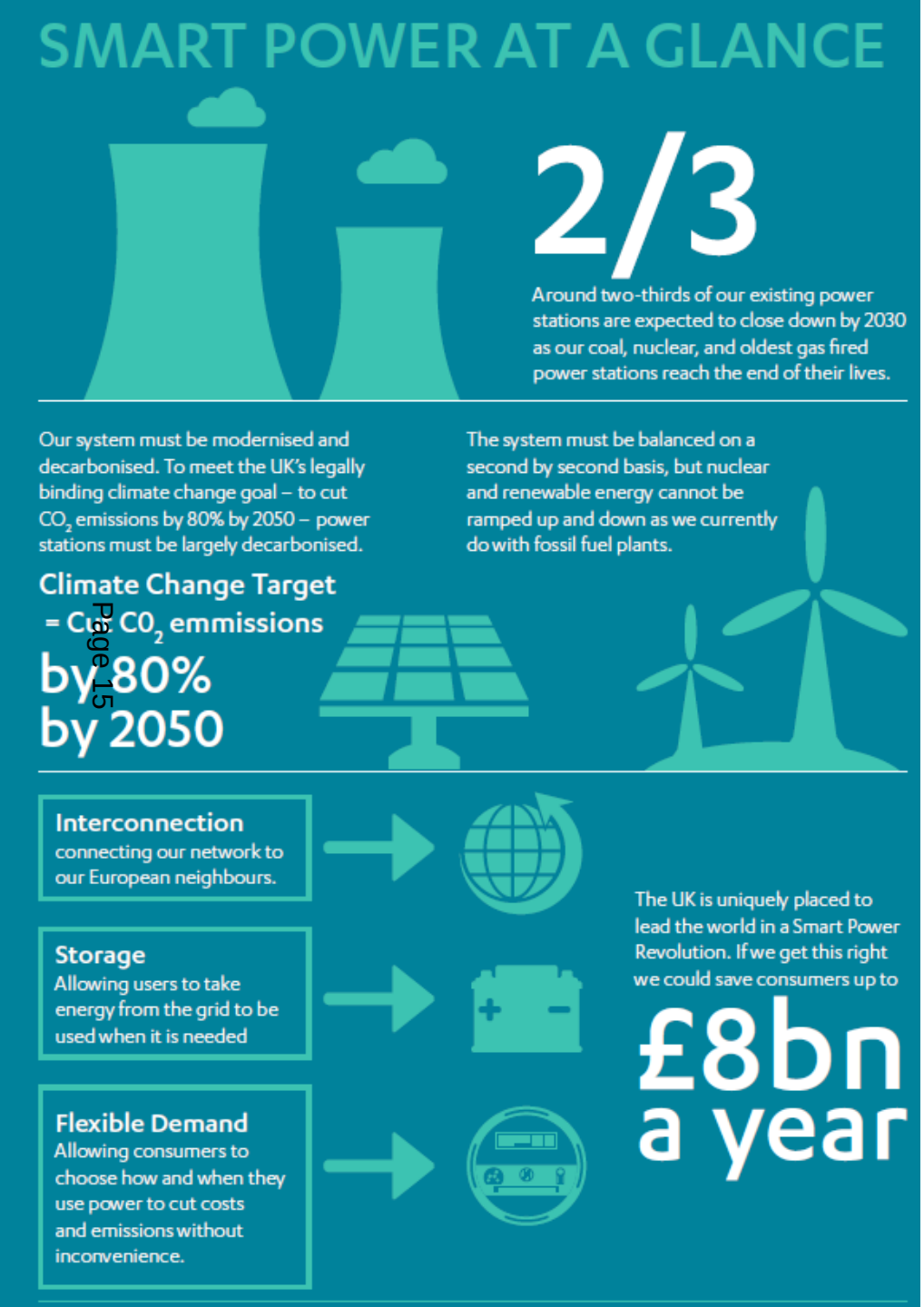


…however, the trajectory is up…



…increasing carbon emissions…





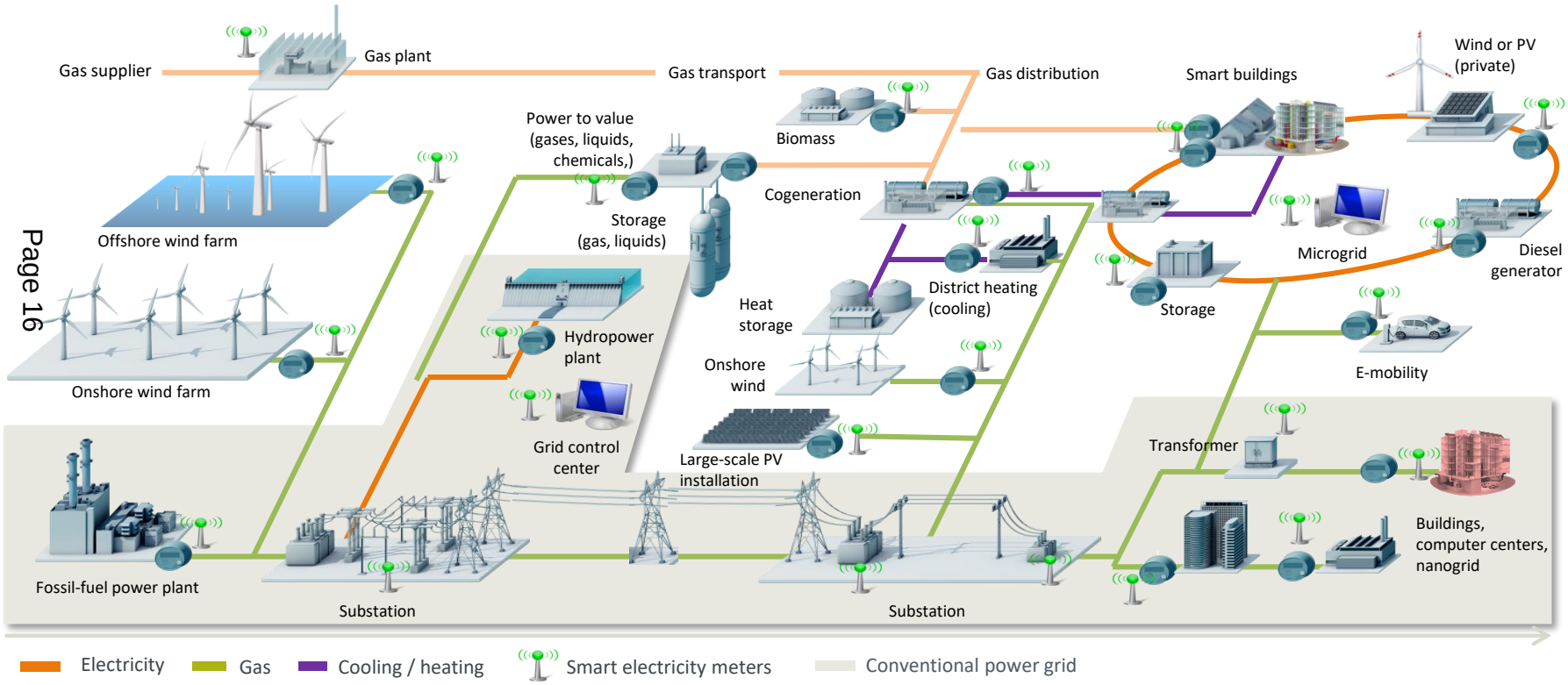
THE SMART POWER REVOLUTION

'The UK is uniquely placed to lead the world in a Smart Power Revolution. Failing to take advantage would be an expensive mistake' ***National Infrastructure Commission***

Local Government is a large energy user and land owner and could play a crucial role in bringing forward **energy storage** and **flexible demand**…….

…a modern, low carbon energy system…

SOUTH EAST
LOCAL ENTERPRISE
PARTNERSHIP



LOCASE
LOW CARBON ACROSS THE SOUTH EAST

Interreg North Sea Region FRAMES

PASSAGE Interreg Europe
European Union European Regional Development Fund

Interreg 2 Seas Mers Zeeën Triple-A

…the future is already here…

Growth in Electric Vehicles

- Over 300 electric buses in London by 2020
- 100k Plug-in vehicles sold in the UK (56%YoY growth)
- 12k charge points

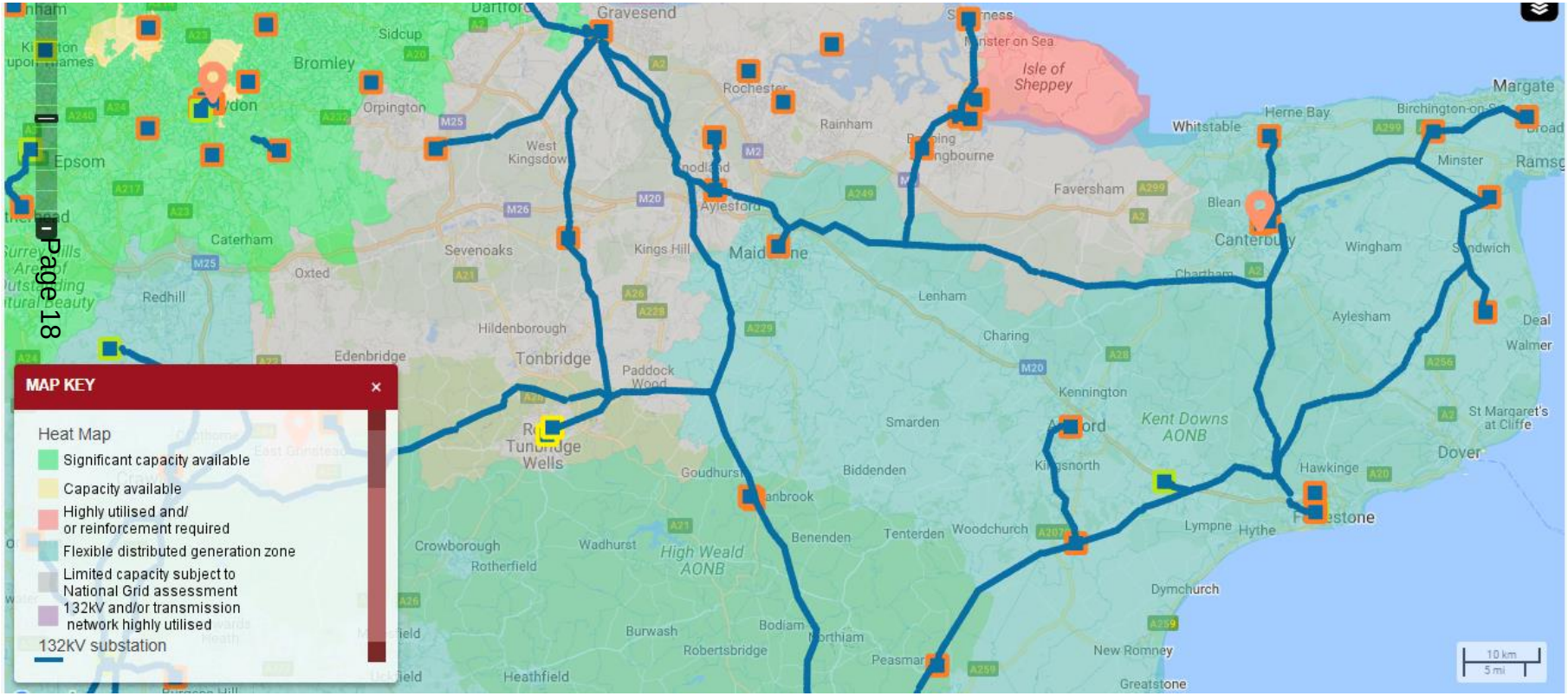
Storage Market Boom

- Almost 1GW of accepted storage offers
- Nearly 16GW of enquiries

Growth in DG

- 8.5GW of DG connected, doubled in the last 5 years
- First Solar / Storage schemes with no subsidy support

… but the grid is constrained..



…Need to work closer with key partners

- Developers
- UKPN
- SGN
- National Grid
- Energy generators

…to achieve …

- Security of supply
- More decentralised energy
- Decarbonisation
- Digitalisation

… with a focus on

- Data and strategic planning (DIGIGIF) – LA's, Developers, Utilities
- Identification of potential hot spots, or connection problems
- Developing innovative solutions to overcome barriers and keep connection costs down

UK Power Networks/National Grid Power Potential Scheme Scheme

- https://bcove.video/2z2q0U5

Maidstone Heat Network Feasibility Update Workshop

Background

Previous studies

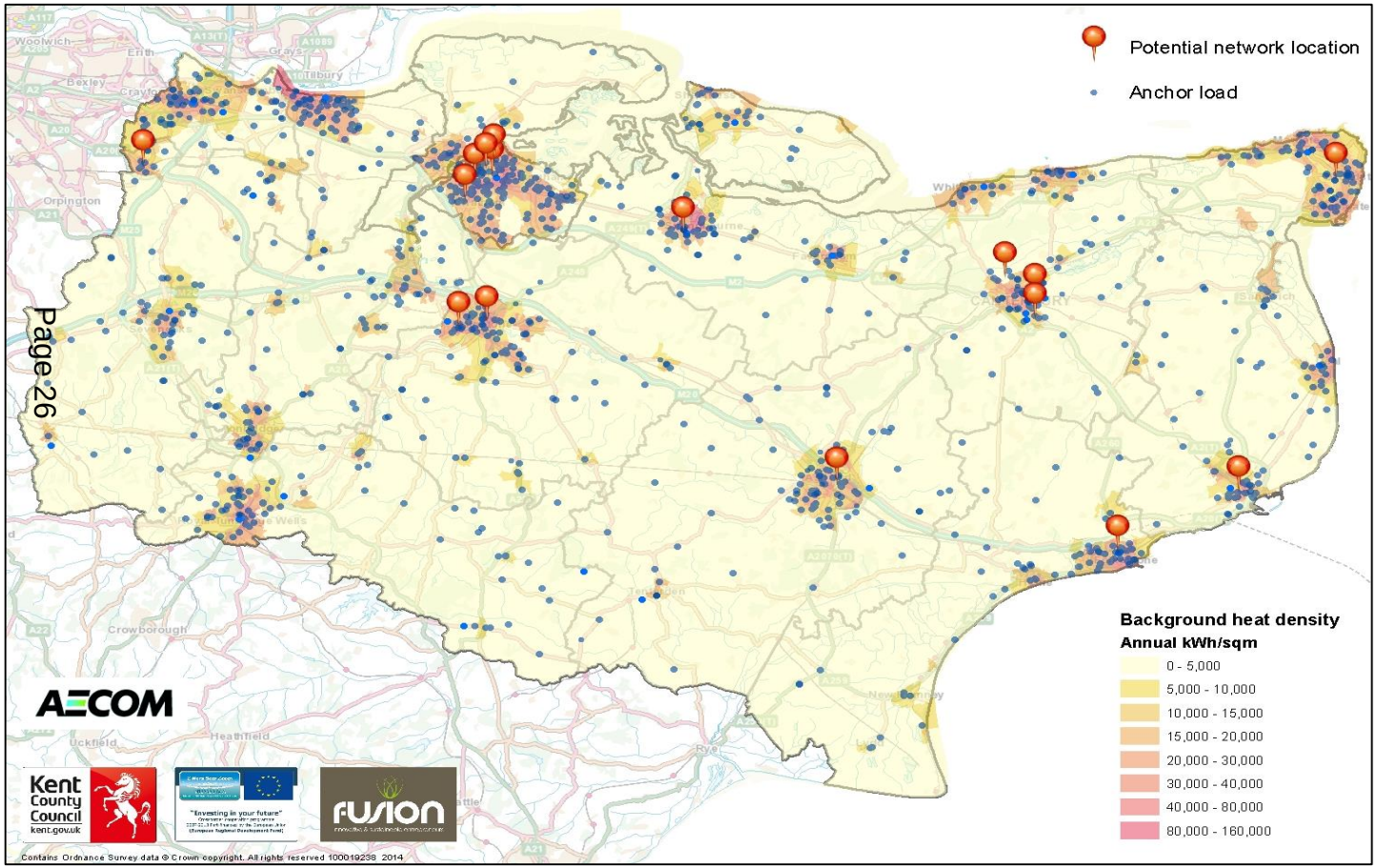
Heat Networks in Kent and Medway: pre-feasibility study

MAIDSTONE HEAT NETWORK FEASIBILITY STUDY

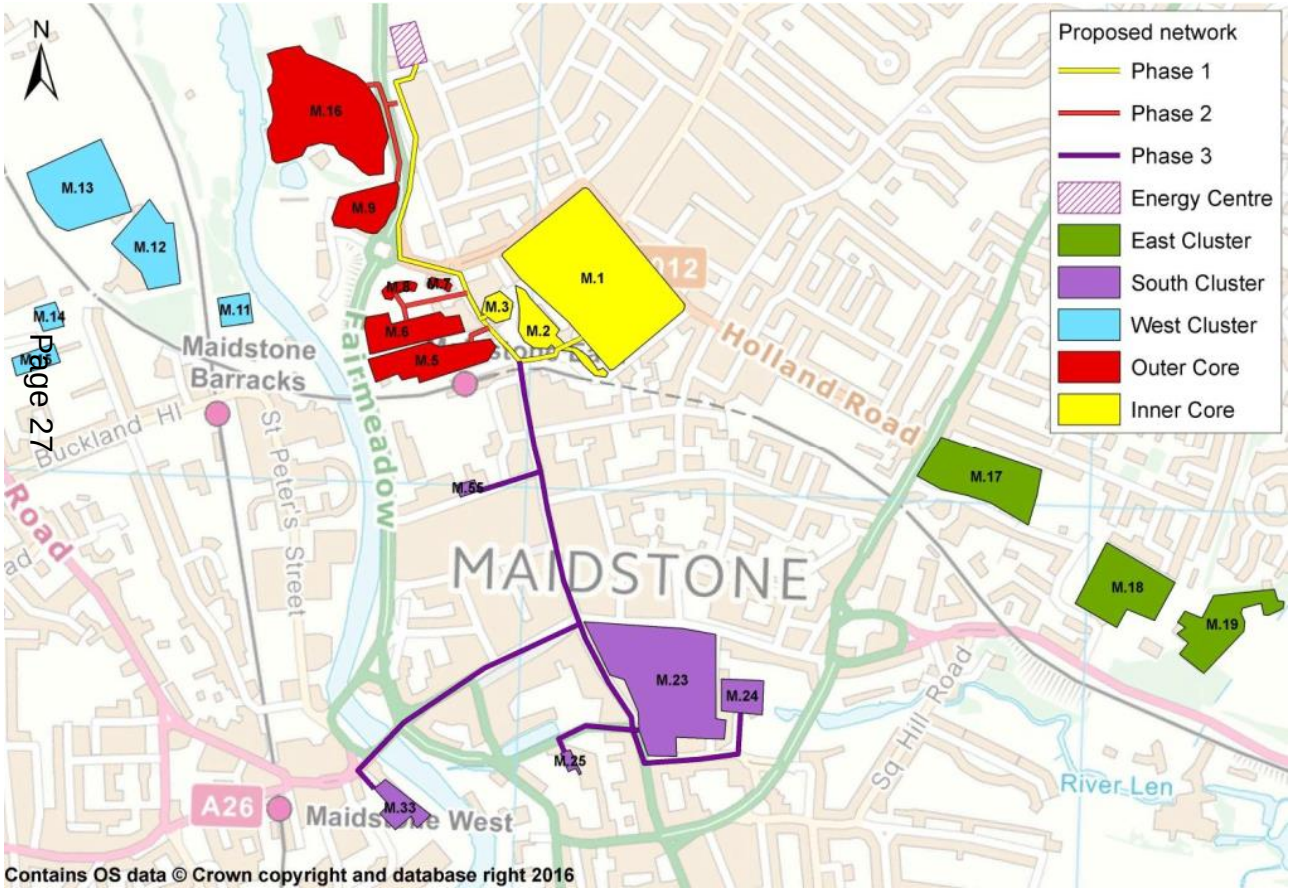
Final Report

Prepared for: Kent County Council

Kent and Medway Heat Network Masterplanning Study



Maidstone Heat Network Feasibility Study



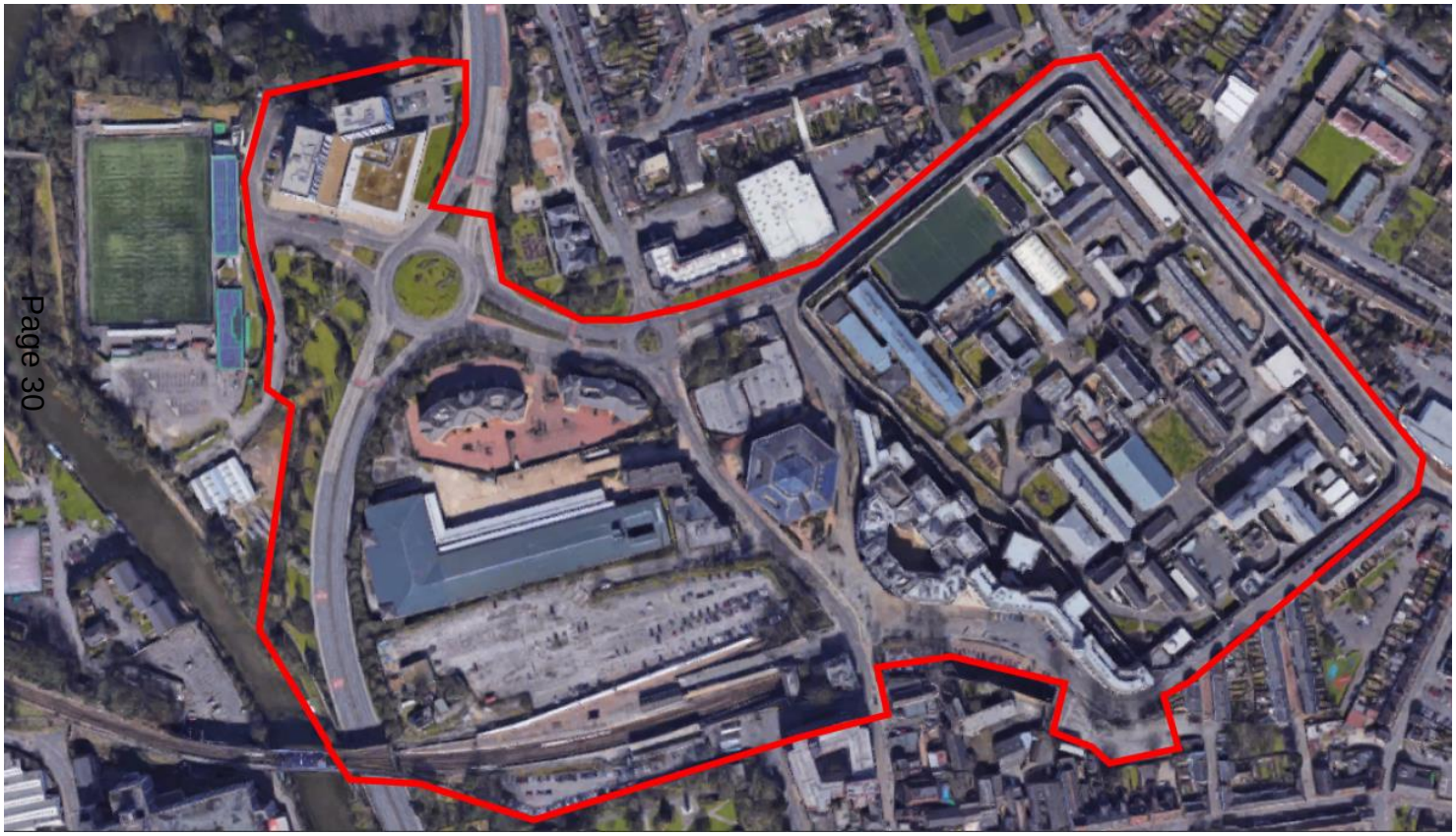
AECOM

New study

Aims and objectives

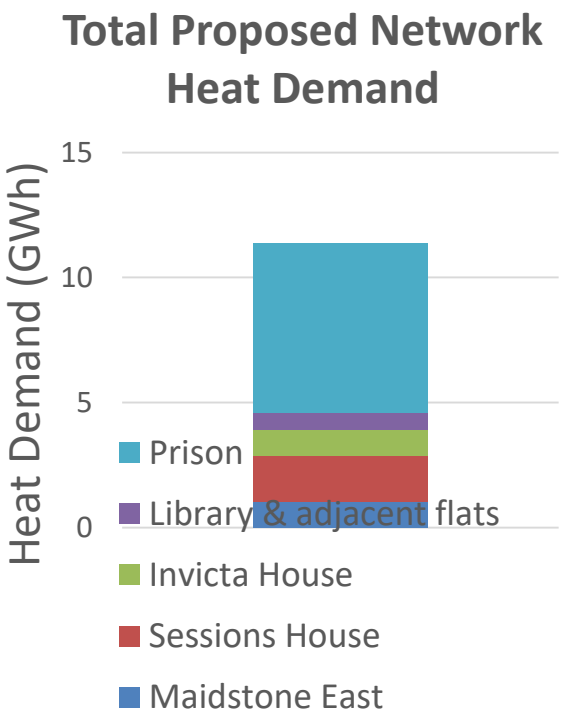
- Define a optimised and deliverable scheme
- Resolve issues raised at the end of the last study
  - Power export limits
  - High capex and
  - Need for 3rd party buy-in
- Address any changes in the study area, particularly Maidstone East development and HMP Maidstone
- Address changes to policy and technology development
- Update feasibility work to new HNDU standards

Establishing study area



Energy demand assessments

Load	GIA (m2)	Thermal Consumption (kWh)	Energy Data Source
Maidstone East	29,020	1,053,505	Preferred scheme accommodation schedule, AECOM modelling database
Sessions House	23,162	1,814,835	Annual metered data, AECOM modelling database
Invicta House	10,638	1,027,644	Annual metered data, AECOM modelling database
Library & adjacent flats	10,638	683,458	Area schedules and AECOM modelling profiles (metered data supplied of insufficient quality for determining heat demand)
Prison	28,758	6,783,798	Annual metered data & area schedules (received during previous project), AECOM modelling database
Total	**102,216**	**11,363,241**	



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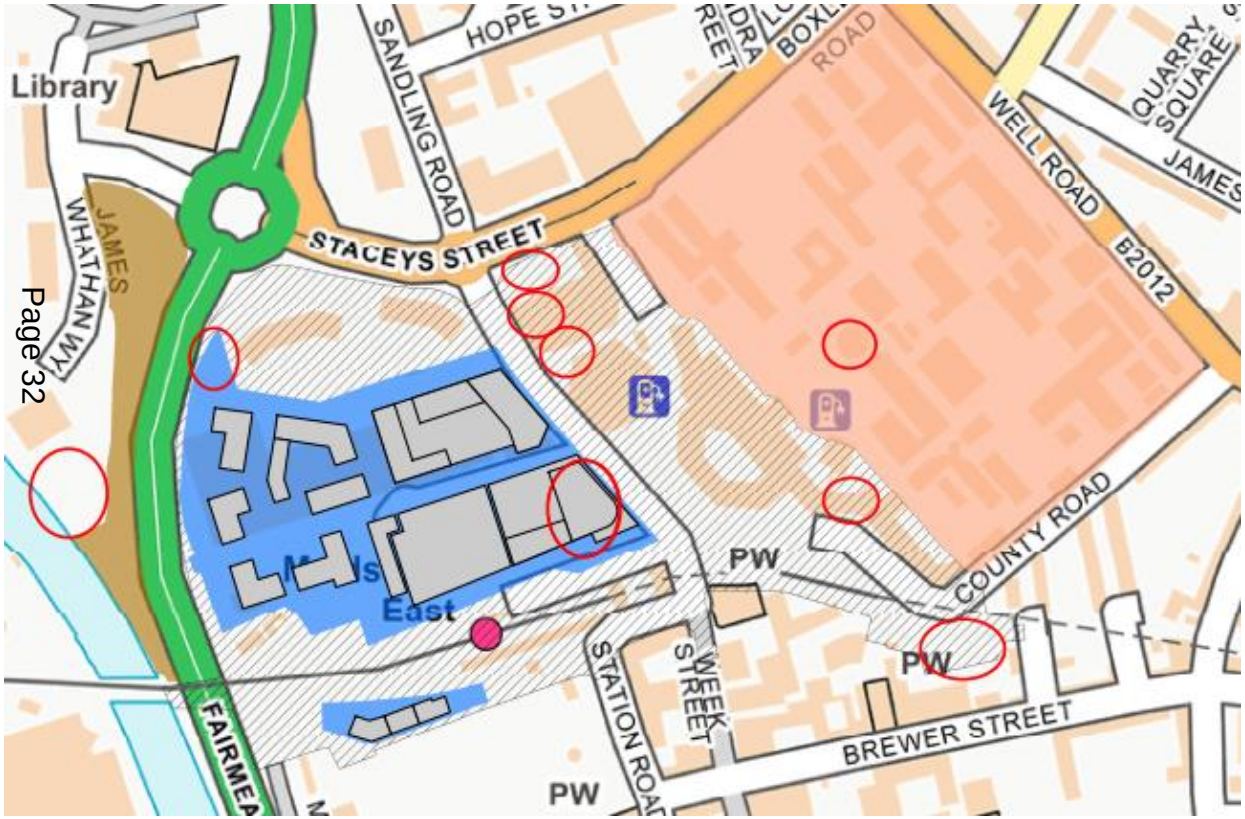
Updated energy centre assessment



Legend
Land Ownership

- EC Location Option
- Highways
- KCC Opportunity Area
- New Development
- Prison
- New Build Blocks

AECOM

Shortlisted heat sources

Five potential heat generation options identified:

1. Gas CHP and gas boilers

2. WSHP and gas boilers

3. WSHP only

4. WSHP, CHP and gas boilers
   [version 1 - lower temperature network within Maidstone East and higher temperature network everywhere else]

5. WSHP, CHP and gas boilers
   [version 2 – higher temperature network]

Shortlisted heat sources – initial TEM assessments

ID	Technology overview	Initial high-level CAPEX estimate	Initial high-level gross IRR (40 year) estimate
1	Gas CHP and gas boilers	Up to £9.7m	Up to 3%
2	WSHP and gas boilers	Up to £8.4m	Needs RHI or grant
3	WSHP only	Up to £11.5m	Needs RHI or grant
4	WSHP, CHP and gas boilers [version 1]	Up to £8.2m	Up to 3%
5	WSHP, CHP and gas boilers [version 2]	Up to £7.7m	Up to 4%

*CAPEX estimates do not include costs of networks within Maidstone East or Maidstone Prison.

Power supply optioneering and UKPN discussions

Previous Study:

In March 2016 an application was made for 2.58MW, consisting of the following:

- 3 x 851kW CHPs
- 20kW PV power
- Previously no import power requested

Albert Street, Maidstone, ME14 2RL

Budget estimate received for works was **£11,120,000**

Proposed works

- Significant network reconfigurations and network reinforcement work which includes the installation of a Super Grid Transformer
- Completion of National Grid Statement of Works
- Installation of reverse power transducers at Waterside Primary Substation
- Review and replace the AVC scheme at Waterside Primary Substation
- Installation of 11kV underground cable from the point of connection to the customer site (approximately 100m)
- Installation of HV metered substation at the customer site including the installation of:
  - 11kV metered RMU
  - RTU
- Witness the testing and the commissioning of the G59 relay
- Carry out the associated shutdowns

Power supply optioneering and UKPN discussions

Discussions at meeting with UKPN – 12th September 2018:

UKPN have advised that the area now falls under flexible DG area

- Certain times of the year generation will be curtailed
- An estimate of expected curtailment will be provided upon completion of study from UKPN

Maidstone is supplied by Kemsley and Canterbury North GSPs

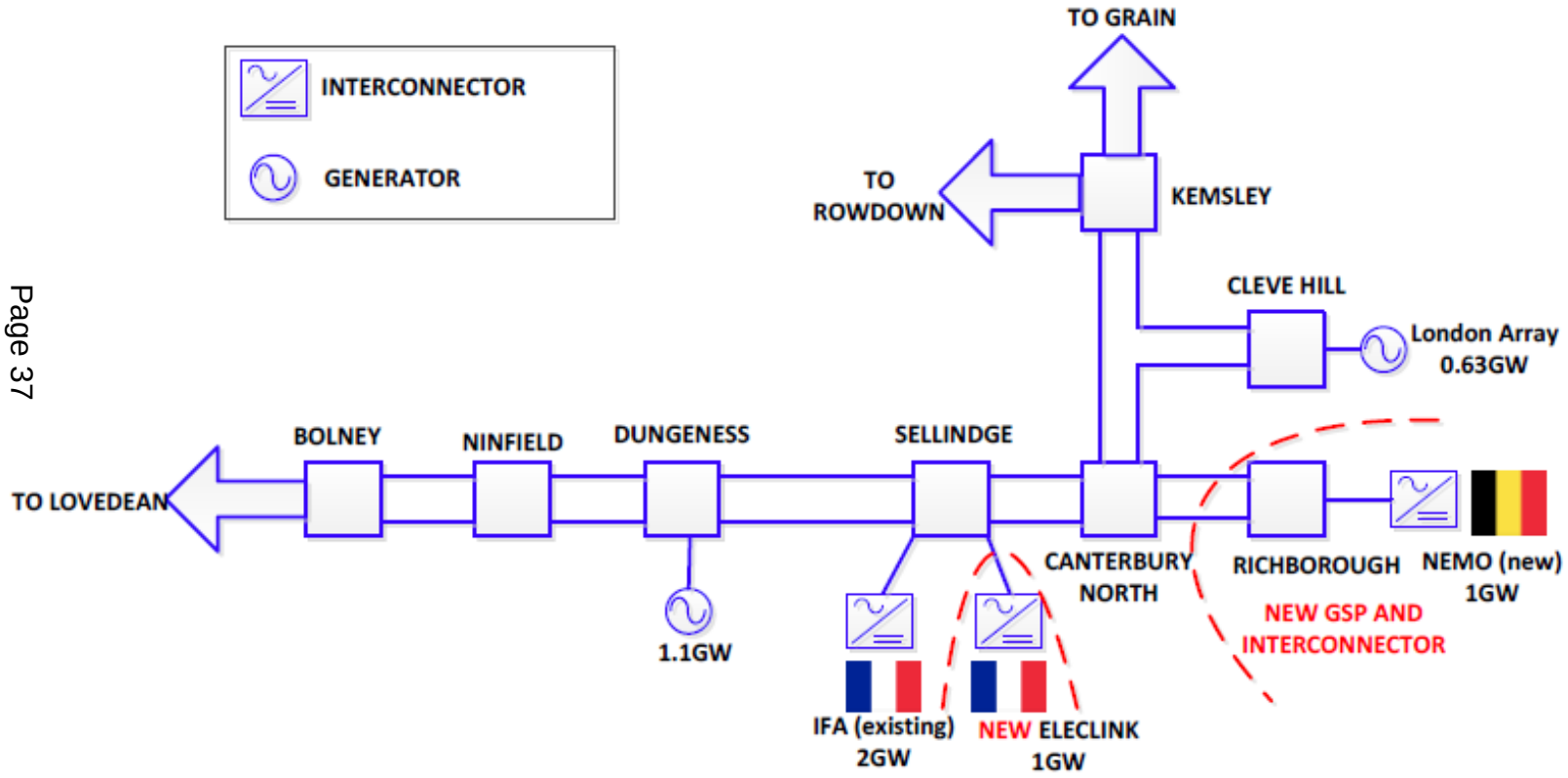
- At Kemsley considering connecting a third SGT
- New GSP, Richborough, for NEMO interconnector ~2021
- Works may release capacity in the area

Maidstone may be served by a new exit point

- Decision is still at UKPN's "Gate A" so cannot reply on this

Other issues present – reverse power, TF windings…

Power supply optioneering and UKPN discussions



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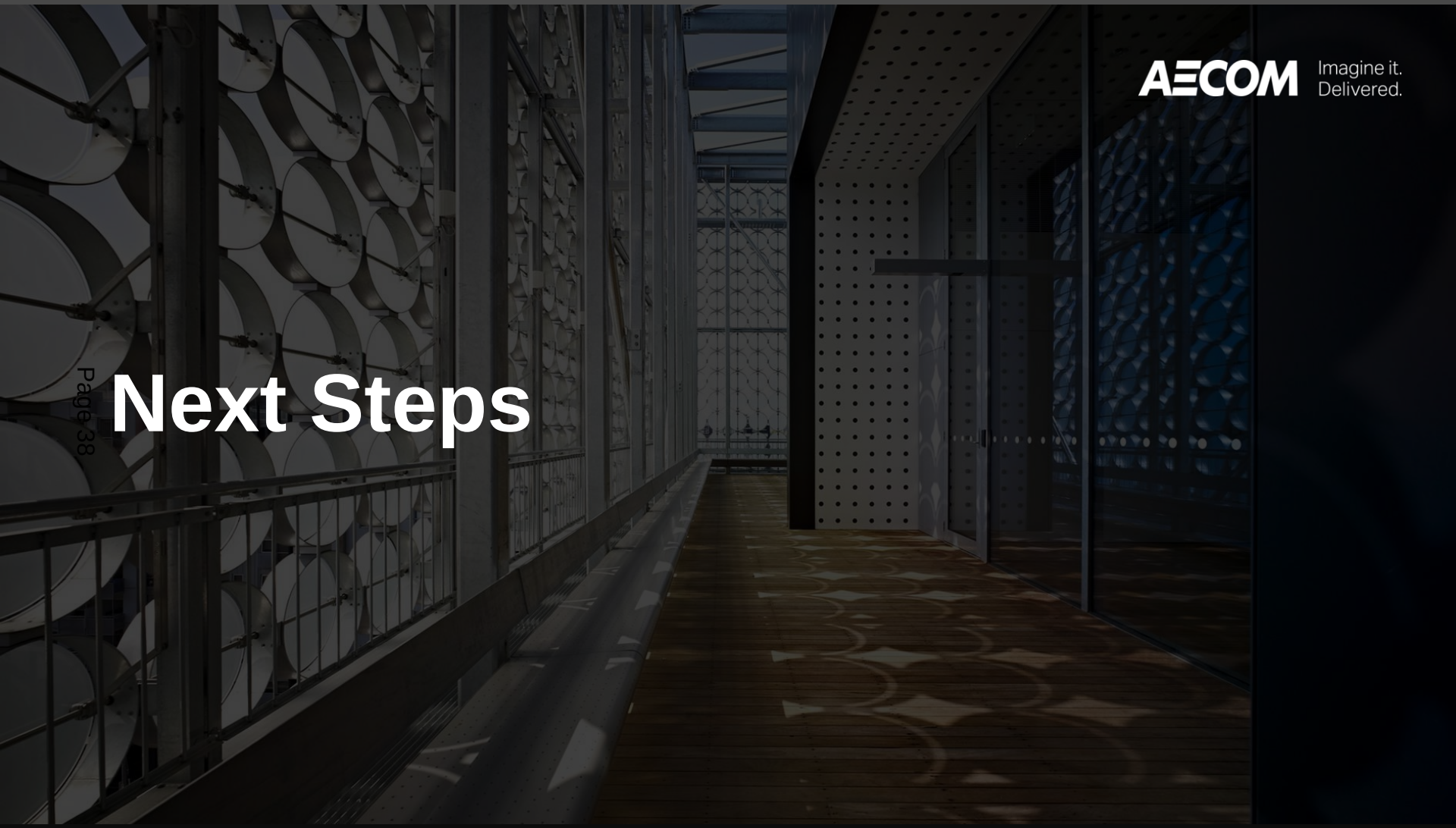


AECOM Imagine it. Delivered.

Next Steps

Next steps

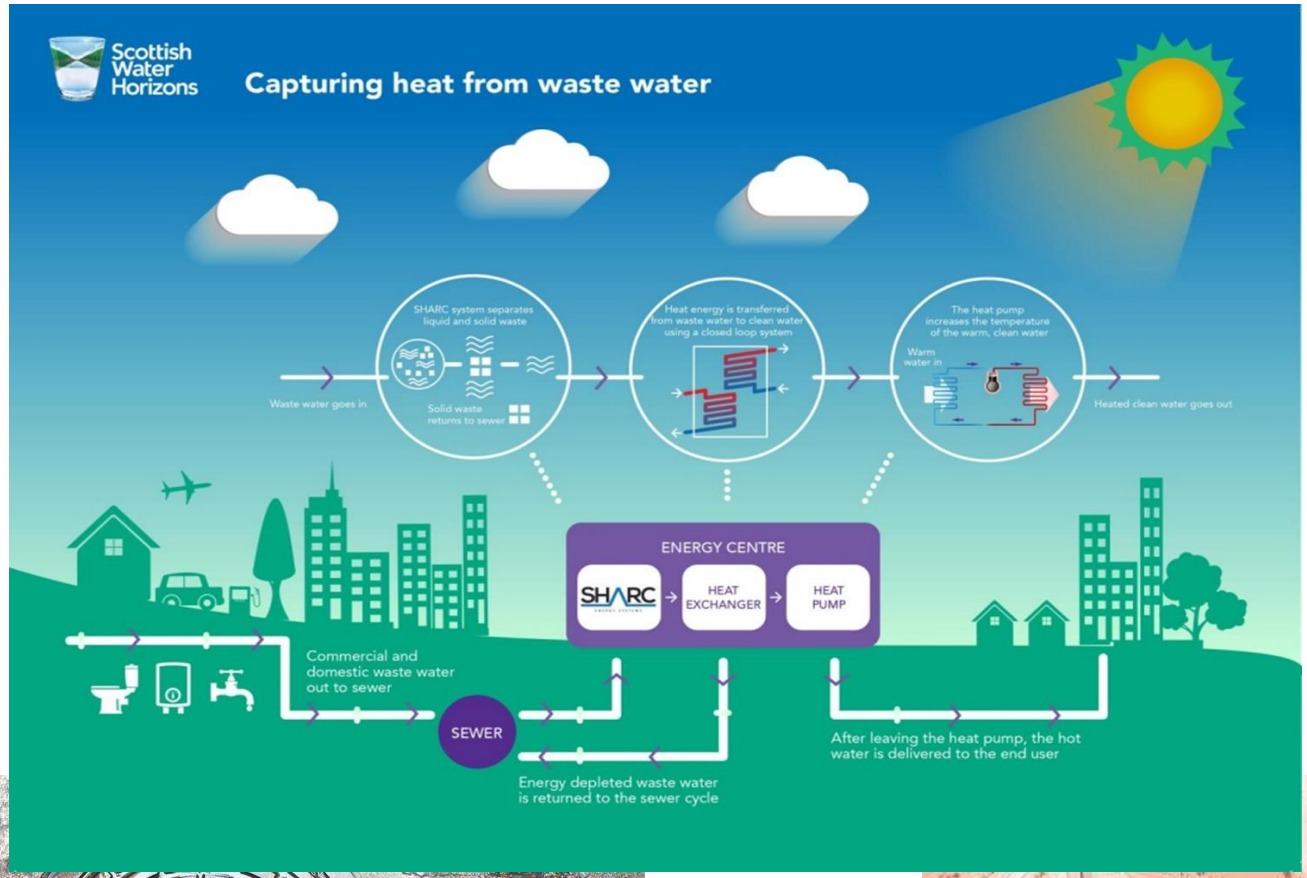
- Confirmation of options to take forward to Stage 2
- Planned work for Stage 2:
  - Scheme optimisation
  - Finalisation of energy demands and profiling
  - Plant sizing
  - Energy centre design
  - Network sizing and routing
  - Final TEM modelling
- Programme
  - Stage 2 works start next week
  - Further meetings planned mid Oct and mid Nov
  - Draft report end Nov, Final report mid Dec

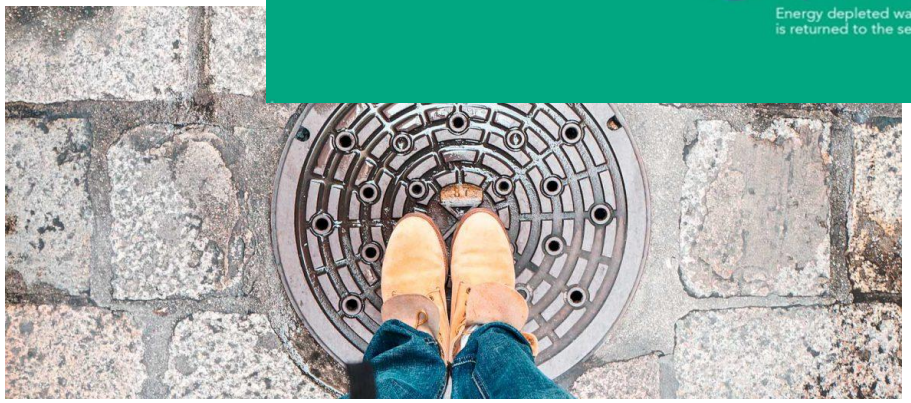
-Government/Commercial engagement

- Work with Government to attract funding from Heat Network Investment Programme
- Soft market testing leading to commercialisation

What's this?

Sewer Source Heat Pump!!!





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Presentation on UK Power Networks for Kent County Council

1st November 2018

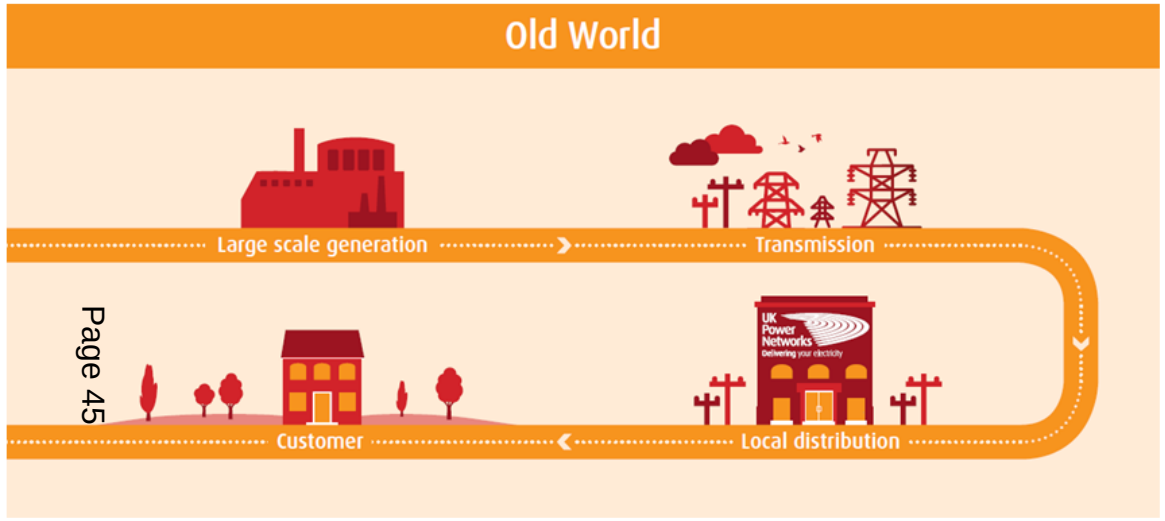
UK Power Networks
Delivering your electricity

Who we are

- **187,992km –** total cable length
- **120,000+** substations
- **8.3 million** homes and businesses
- **18 million +** people rely on our service every day

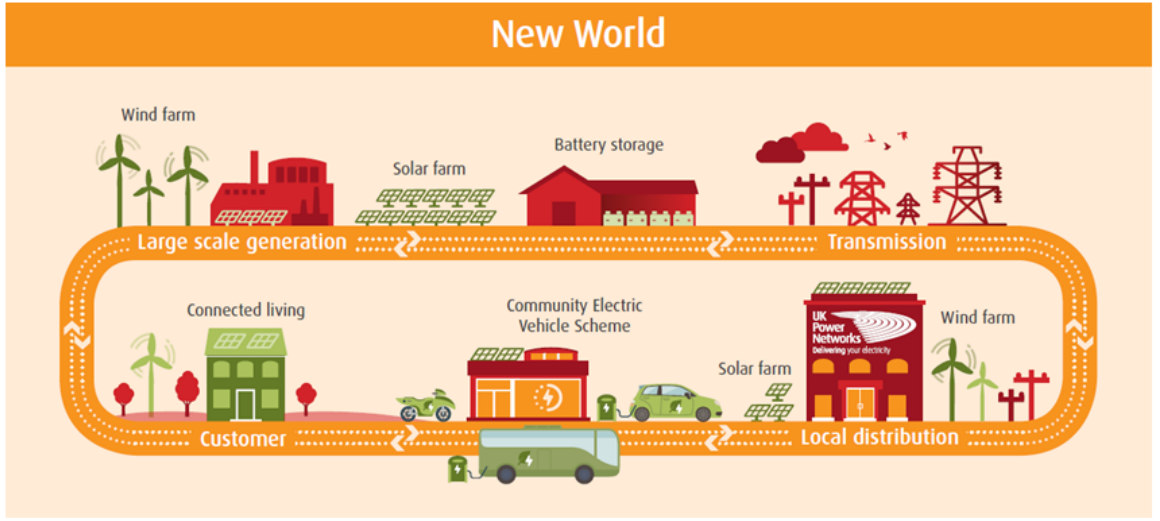
How your residents experience energy is changing

"Traditional"



Centralised- few large Generators
Predominantly fossil fuel based
One way power flows
Predictable - Planned
Customers consume only
Flexibility from large generators

"Emerging"



Decentralised (Thousands of distributed generators)
Hybrid – Vast volumes of renewables
Bi-directional power and information flows
Intermittent – Actively Managed
Customers self-produce, consume and trade
Flexibility from Demand, Storage and generation

The future is already happening

Distributed Generation

Connecting energy: we have connected 9GW of Distributed Generation, of which 4.5GW is renewable distributed generation, the equivalent of 1.5 x Hinkley Point Cs.

Storage

Battery storage: in October 2017 we connected our largest battery yet – a 40MW connection near Tunbridge Wells.

Electric Vehicles

- **Growth of electric vehicles:**
- **149,000** Plug-in vehicles sold in the UK, **31%** on our networks.
- Over **16,000** public charge points – and an increase of 33% in the past 12 months!

Investing for the future

- Last year we invested over £600 million back into the network.
- We are the most innovative network and this enables us to avoid traditional costly grid reinforcements and keep costs as low as possible for constituents.
- We are the lowest cost DNO in the UK, charging just £78.41 on the average energy bill per year to maintain all the cables and substations across our entire distribution network.
- We have committed to invest over £30 million over the next 5 years in monitoring electric vehicle uptake.

Over

£4.5bn

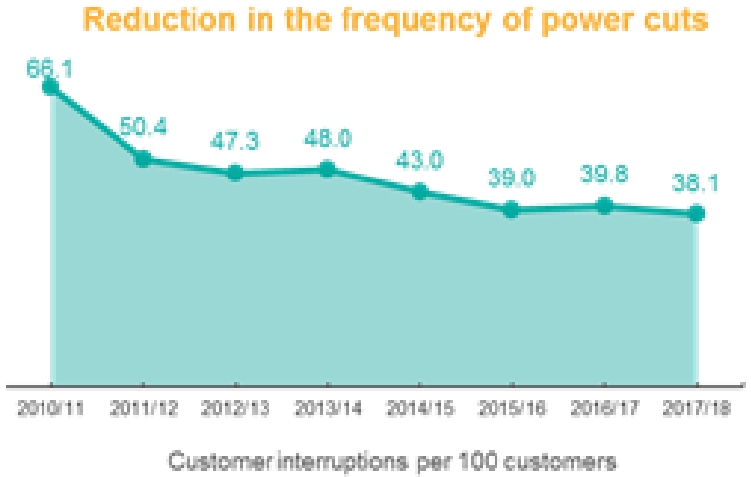
to be invested in the network between 2015 and 2023.

£615m

invested in the network in 2017.

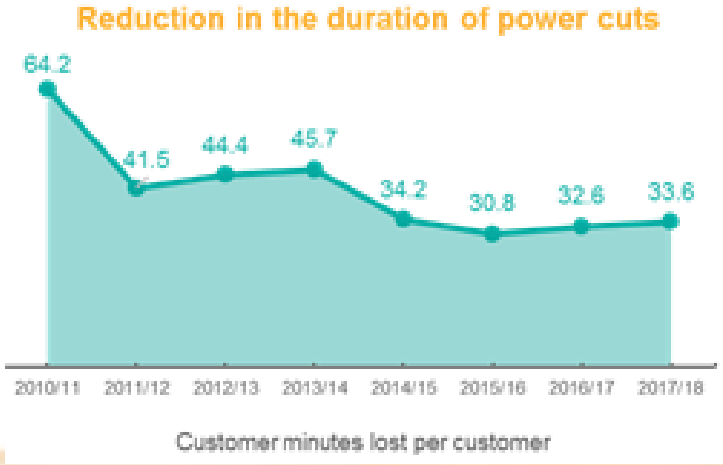
How we serve customers across all of our network

- Our power cut performance has improved by 42% since 2010/11

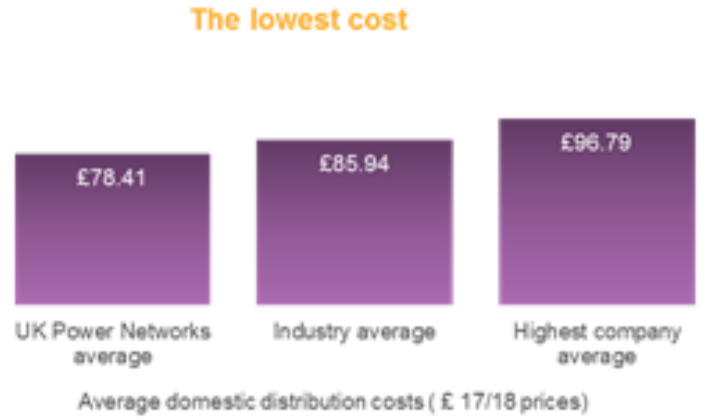


- 87% customer satisfaction score for 2017/18

- The length of the average power cut has nearly halved since 2010/11.



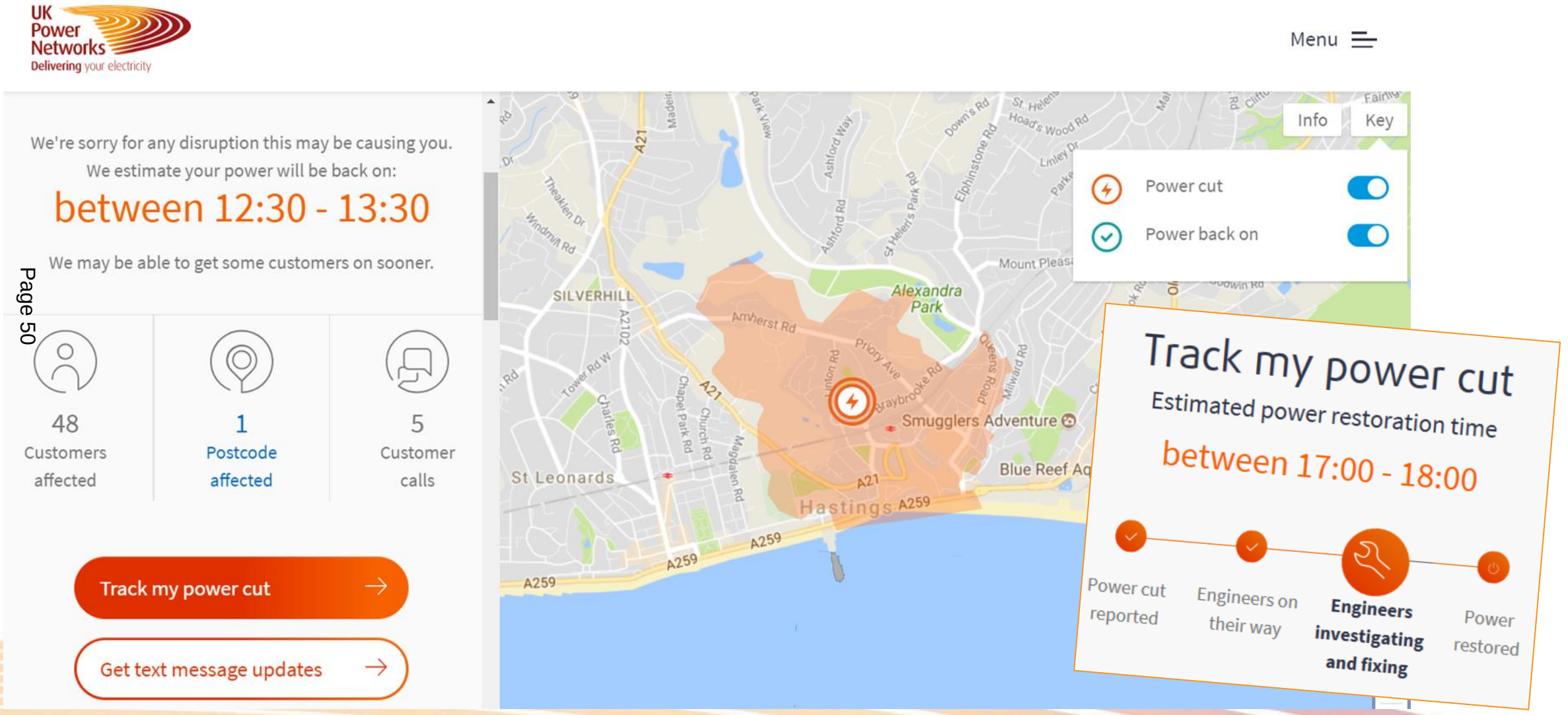
- UKPN continues to be the lowest cost Distribution Network Operator in the UK.



How we can help if your residents experience a power cut

- **Call 105** free of charge from a corded landline phone or ring from a mobile phone.
- They can request updates on existing power cuts or make us aware of any immediate issues that you or your residents face.
- They can also tweet us @**ukpowernetworks**

Residents can track live power cuts online as well



Supporting your residents in a power cut

- **Our Priority Service Register: free to register!**
- **There is no cost to the individual or to the council.**
- **There is a 24 hours a day telephone number.**
- **Tailored support if needed such as home visits, hot meals, advice and keeping your friends and relatives updated.**
- **In certain scenarios we may also offer a free hotel overnight and transport to the hotel.**
- **How to register? Go on our website, e-mail psr@ukpowernetworks.co.uk or telephone 0800 169 9970.**

Delivering new growth and meeting demand on the electricity network

UK Power Networks
Delivering your electricity

Key drivers for investment

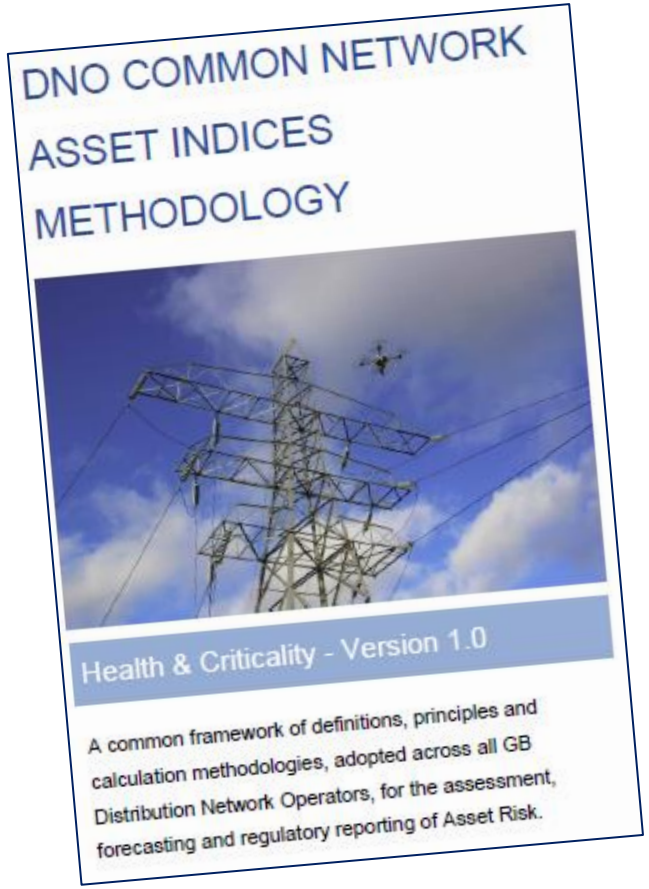
Our aim is to deliver the best network performance in the UK while maintaining the overall health of the network.

We make an ongoing assessment of:

- The condition of our assets (health indices)
- The utilisation of those assets (load indices)

The way in which we assess our assets is common to all DNOs and drives our investment programme. We are funded to maintain health and utilisation at stable levels through the eight year RIIO period.

Replacing ageing assets can also create spare capacity to support future development.



How new developments are funded

The UK has a common methodology setting out the structure of connection charges

- A ‘shallowish’ model aimed at protecting connected customers funding reinforcement for commercial developments
- New connecting customers fund the cost of any new assets solely provided for their development and a proportionate share of any reinforcement
- Where reinforcement costs are shared the balance not funded by the customer will be ‘socialised’ across existing customers and recovered via the networks element of the electricity bill
- The common methodology only applies where a development meets certain criteria

Investing ‘ahead of need’

The current regulatory framework does not provide an adequate framework to enable DNOs to speculatively invest in anticipation of future development.

Ofgem requires investment to be efficient and if not deemed efficient they could disallow it. There are a number of risks:

- Development planning is by its nature an optimistic process
- DNOs are not funded to make speculative decision on where development may occur
- Development risk should be borne by those driving development and making the commensurate returns

How we are facilitating the new decentralised, decarbonised and digitalised world of electricity

UK Power Networks
Delivering your electricity

Our Distribution System Operator Strategy

1. Facilitate cheaper and quicker connections using proven innovation

Continue rollout of Flexible DG that uses Active Network Management

2. Use customer flexibility as an alternative to network upgrades

Run market tenders for flexibility services such as Demand Side Response

3. Develop enhanced System Operator capabilities

Develop TSO – DSO Commercial Framework, DER Dispatch capability and readiness for smart meters

4. Collaborate with industry to enable GB wide benefits

Actively participate in industry forums to make this transition a reality

5. Prepare and facilitate the uptake of Electric Vehicles

Enable connections using smart solutions and ensure business readiness

Role of a DSO

Keeping the lights on

Secure and reliable supplies taking into account two way flows and greater intermittency.

Providing great customer service

Facilitating cheaper and quicker connections using proven innovation.

Lowering our costs

Optimising network investment decisions using alternative flexible solutions.

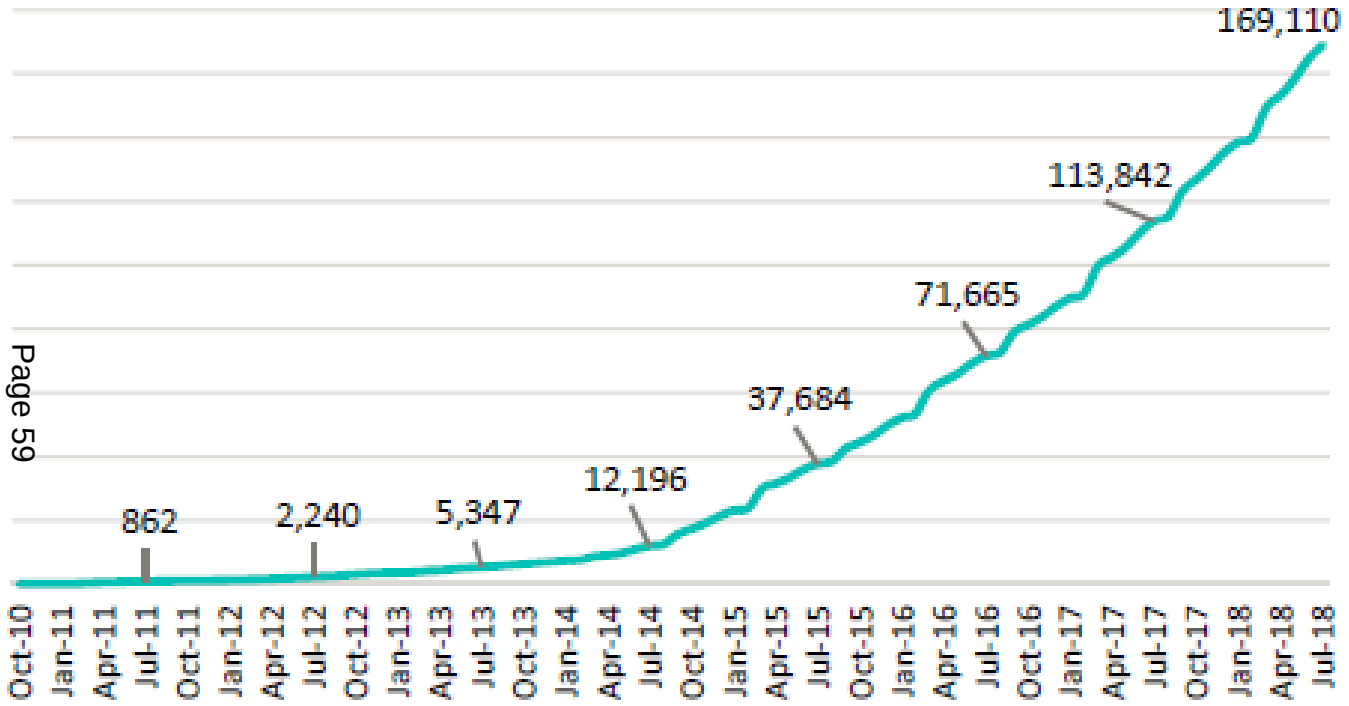
Support whole system optimisation

Collaborating with the ETSO to deliver 'whole system' outcomes that are best for customers.

Enabling markets

Enabling market solutions for DER to provide flexibility to the local and wider system.

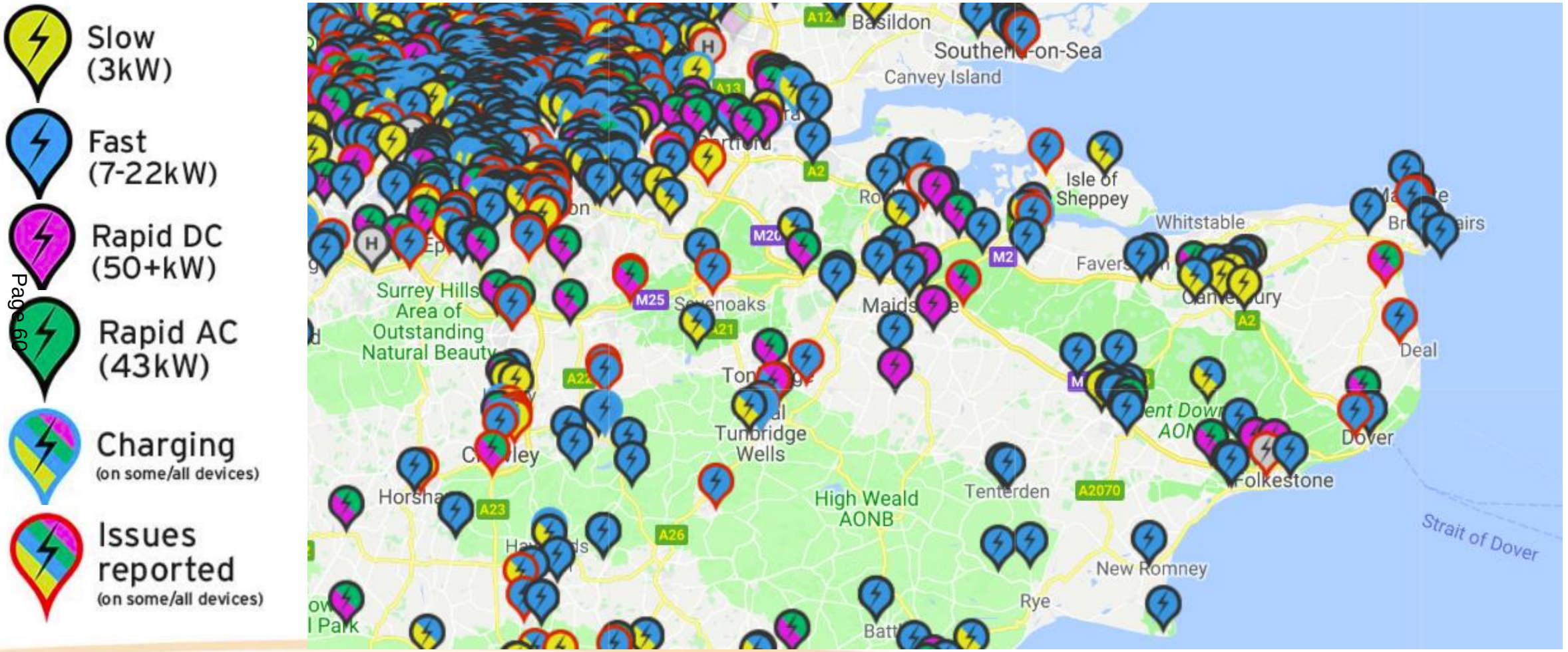
Facilitating the future of electric vehicles



Source: Society of Motor Manufacturers and Traders, Driver and Vehicle Licensing Agency

- By 2040 there will be a ban in the sale of diesel and petrol cars.
- Pure electric vehicles reduce local air pollution. They have zero emissions – no direct CO2 or NO2. They also reduce noise pollution due to quieter engines.
- Some electric vehicles run as little as 2.85p per mile, but have higher initial purchase costs.
- Around 50,000 electric vehicles connected to our network.

Zap-Map.com – Electric Vehicle Charging Points



Helping our customers with innovative and lower cost solutions for delivering electric vehicle charging infrastructure

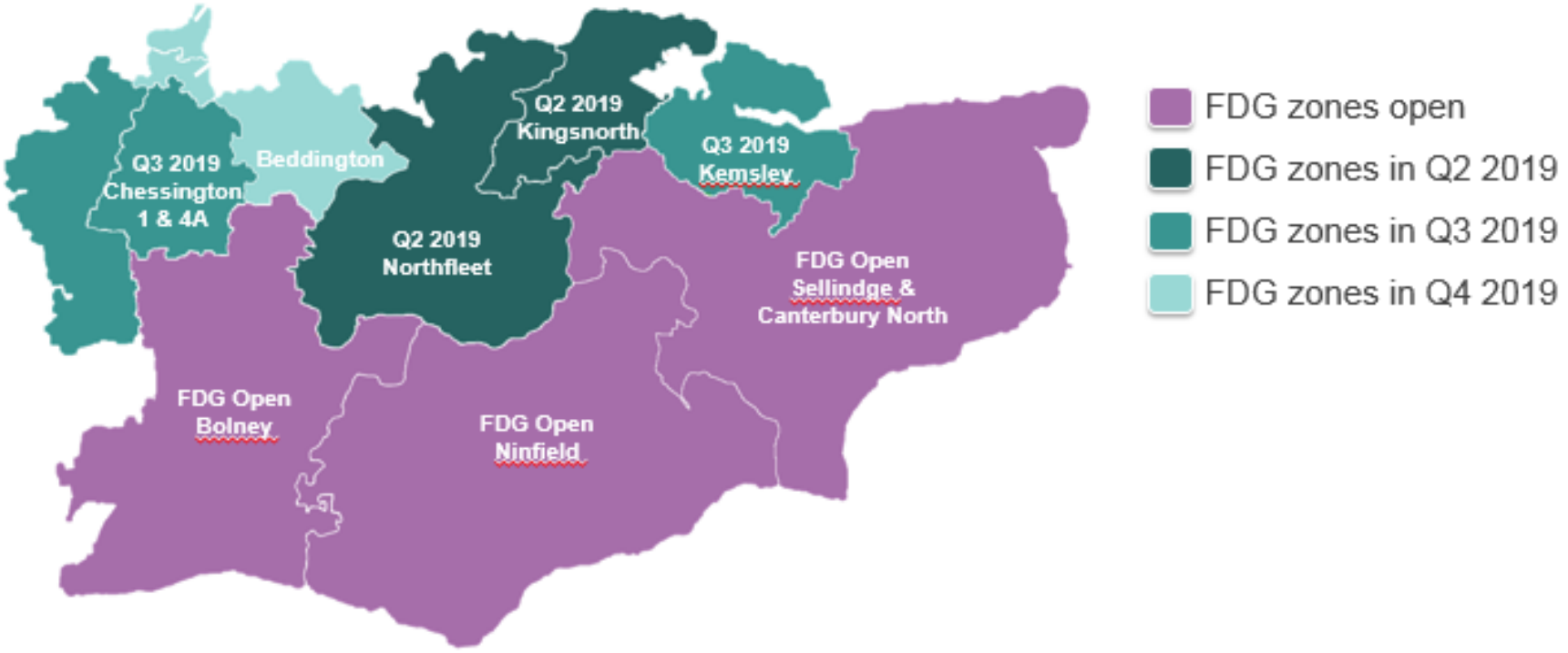
- Waterloo bus garage – timed demand connections where most charging occurred in the non-peak hours overnight help avoid costly electricity network reinforcement costs for TfL.

- We run free ‘ask the expert’ surgeries to help our customers understand how they could potentially save money on delivering charge point infrastructure.

- We ran a trial with Kensington and Chelsea to retrofit streetlight lampposts to enable on street charging for terraced homes without off street parking or a garage.

Enabling more generation connections

Our plan to roll-out flexible connections across the South East of England



There are parts of the UK Power Networks distribution network where the cost of connection is very likely to be higher than expected due to additional reinforcement works being required. A flexible connection will provide a connection within the existing network without the need for reinforcement.

Community Energy

- Community energy refers to community projects or initiatives focused on one or more of the following strands:
  - Reducing energy use
  - Managing energy better
  - Generating energy
  - Purchasing energy
- Community energy organisations help to deliver a smarter, cleaner energy system whilst generating social benefits.
- UK Power Networks has recently become a Principal Supporter of Community Energy England and is the first electricity network operator to run a consultation in partnership with Community Energy England so that it can understand more about the regional needs and aspirations of community groups.

Local authority energy projects

- Cambridgeshire County Council is planning its own renewable energy park and ride site. It will generate electricity, charge electric vehicles and selling electricity back to the electricity network.
- Forest Heath District Council purchased a 12.4MW solar farm in Lakenheath in 2016, which over a twelve month period, after operating and loan costs, generated over £370,000.
- Nottingham City Council set up the first not-for-profit energy company owned by a local authority, called Robin Hood Energy.

Cambridgeshire County Council's proposed park and ride site at St Ives

How we can help Kent County Council with its energy and low emission strategy

1. We can help advise on the overall strategy to help ensure it is achievable, practical and sustainable. We are working with other County Councils to discuss their county energy plans.

2. If the County Council is intending to develop its own energy generation or community energy scheme, we can advise from an early stage to ensure we can help deliver it at the lowest cost using innovative solutions.

3. If the County Council wishes to connect its own electrical vehicle charging points, early engagement can potentially save a lot of money.

Thank you for listening – any questions?

Kent County Council and Kent Developers Group

Utilities Workshop - Electricity

Future – Short to medium term

- A Monopoly
- Insets available but site related, do not include off-site infrastructure improvement.
- No incentive for these companies to reduce these cost – carry though costs – not competition.
- Significant lack of investment over many years.
- Do they engage with Districts to understand the growth agenda?

District engagement.

- Different utilities are required to engage with the districts in different ways and invest in their growth agenda, not universal.
- Do the electricity companies engage?
- Do they know where to invest?
- 5 year investment cycle.
- They need to be able to recover costs.
- They will argue it changes.
- They need cost certainty.

Long term.

- 20 years plus.
- Where will electricity come from, how will it be delivered?
- Gas and petrol may not be available – how do we heat our homes
- More reliant upon home charging for cars and vans
- Sustainability – we need to respond
- Battery and solar farms and futures investment.

Now

Sympathy ends, no more tears

So, today – Land purchase.

- Developer looks at a development opportunity.
- Engages a consultant
- Capacity available, all good.
- But further investigation required at a cost.
- Developer does not have planning, too many potential abortive costs already, holds back.
- Put on hold pending planning

Planning process

Planning granted – hopefully

Planning granted – Brakes - enforcement

Pre-start – before we can begin to deliver houses, even start to invest

- Now part of the districts delivery plan, their growth agenda - commitment.
- Pre planning conditions to be resolved, some relating to utilities – too many.
- Developer can now invest in housing deliver – want to.
- SME and larger developments alike – related issues.

Pre-start – before we can begin to deliver houses

- Approach utility companies for capacity checks.
- Now taken seriously.
- Capacity gone or yes, we have capacity but reinforcement required, £1 million please.
- Capacity only secured upon payment, developers upon usage.
- Need upfront investment.
- Remember they are a monopoly

Improvement?

- Developers play the game – need to
- Do electricity providers invest in the future?
- They are proactive but could they do more?
- Consider Ebbsfleet and Otterpool, Second comer recover over 10 years max.
- Ever changing needs – car charging points, one per property?

Action on the growth agenda.

- Needs Electricity company to be part of the delivery team.
- Where are OFGEM in the agenda?
- County responding to sustainable delivery – wind and battery farms.
- Understanding of the future.
- Be part of the future.

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Utilities Engagement Sub-Committee

The Sub-Committee's work with the Water Sector (2016-2017) – Outputs and Follow-up Activities

Alan Turner
Water Resources Manager
01 November 2018

Kent County Council
kent.gov.uk

Set of Objectives:

1. Improved relationship between stakeholders.
2. Improved information on growth, development and water infrastructure.
3. Better delivery of strategic wastewater infrastructure.
4. Making the most of charging regime changes.
5. Lobbying Government for better strategic planning.
6. Encourage lobbying by developers.

Follow-up Activities

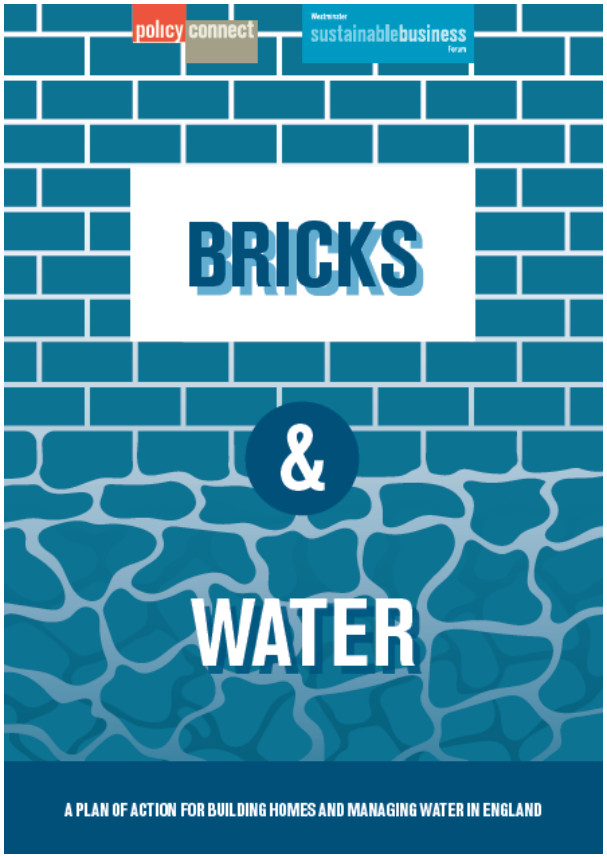
- **New charging regime** – developers now know the water infrastructure costs before land purchase.
- Growth and Infrastructure Framework is providing **better information** on growth and development.
- Ofwat - new **water company performance** metric to assess developer satisfaction
- KCC **liaison** with water companies puts pressure on Developer Services **performance.**

Follow-up Activities

- SW Workshop to improve **performance** and **relationship** with developers and local authorities (Gatwick, 2017) and current review of internal processes.
- Kent Developers Group discussions with SW around **performance** and **improved infrastructure delivery**.

Follow-up Activities

- KCC and KDG were on the Steering Group and provided evidence for **Water and Housing Inquiry,** chaired by MP.



Follow-up Activities

Aligning Wastewater Infrastructure Planning with Development Planning

- Pilot project by KCC, Dover DC and Southern Water

YEAR	1				2			
DELVEOPMENT PLANNING ACTIVITIES								
Prepare and consult on SA Scoping Reoprt								
Evidence gathering including preparation of HELAA								
Identify issues and options and select preferred options								
Infrastructure Meeting **SHARED MILESTONE**								
Prepare draft Local Plan								
WASTEWATER PLANNING ACTIVITIES								
Provide strategic overview of the network and capacity information								
Prepare draft Interim Strategic Options and Maps								
Infrastructure Meeting **SHARED MILESTONE**								
Finalise Interim Strategic Options and Maps								

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Follow-up Activities

Aligning Wastewater Infrastructure Planning with Development Planning

Next steps

- Presentation to Kent Planning Officers Group
- Potential roll-out to other Kent LPAs
- Engagement with water supply companies
- Exploring wider relevance to other utility infrastructure providers (energy?)

Is there a need for on-going training for LA planners, water company staff and developers?

Questions?

Alan Turner
Water Resources Manager
01 November 2018

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