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

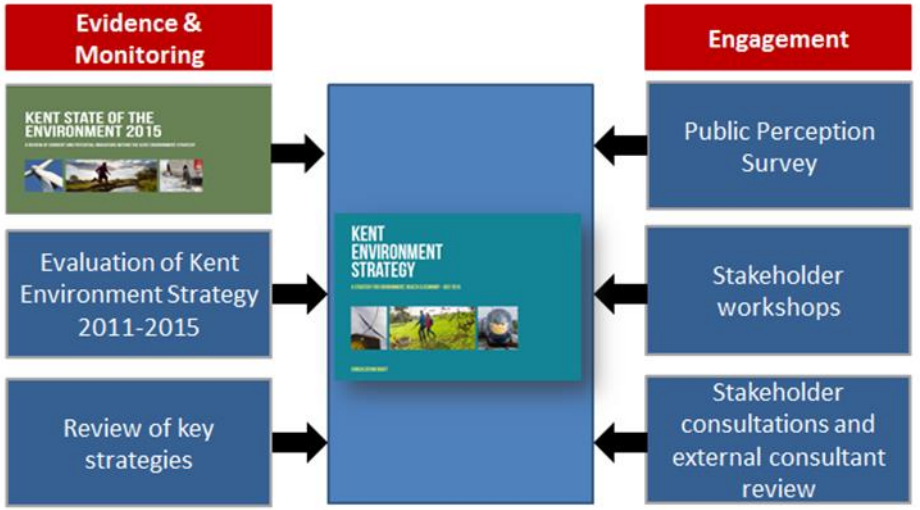
…Already embedded in KES…

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



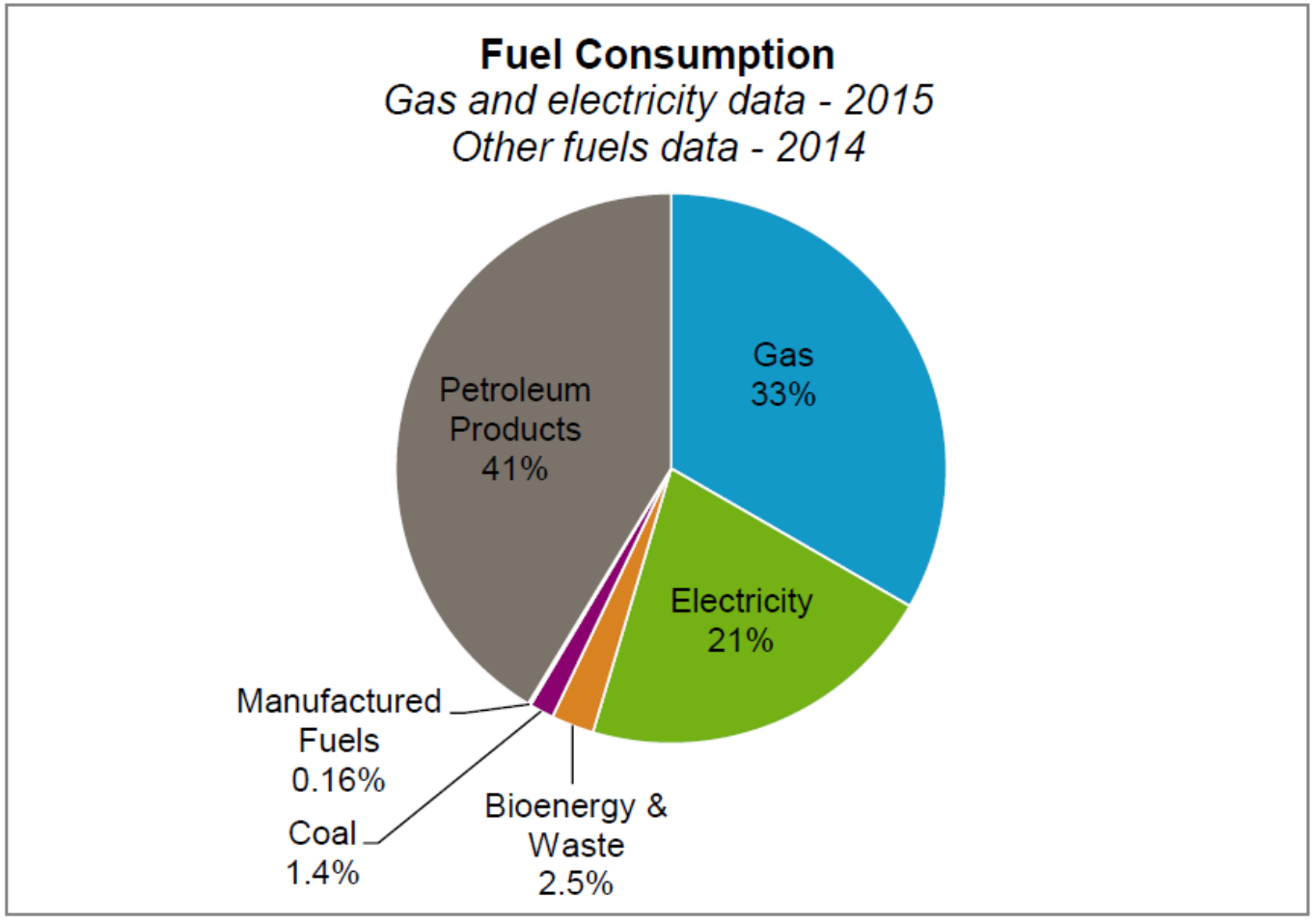
… Significant issue for growth…

… current consumption for Kent and Medway is

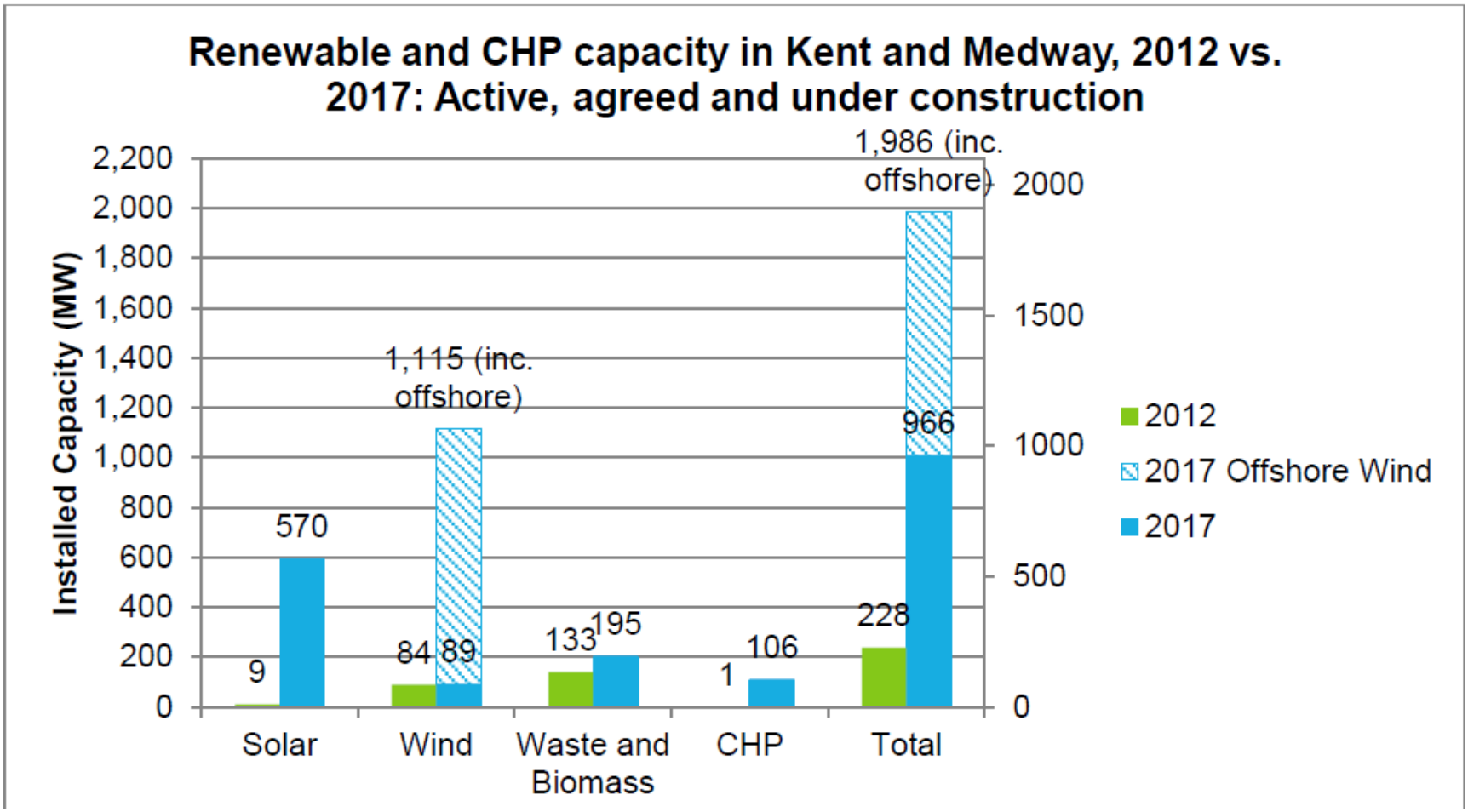
Fuel consumption (GWh)	Non-Domestic	Domestic	Road Transport	Rail	Bioenergy & Waste *(sector not specified)*	Total by fuel type
Gas*	3,380	8,565	-	-	-	**11,945**
Electricity*	4,501	3,099	-	-	-	**7,600**
Bioenergy & Waste	-	-	-	-	897	**897**
Coal	455	53	-	9	-	**516**
Manufactured fuels	41	16	-	-	0	**56**
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.*

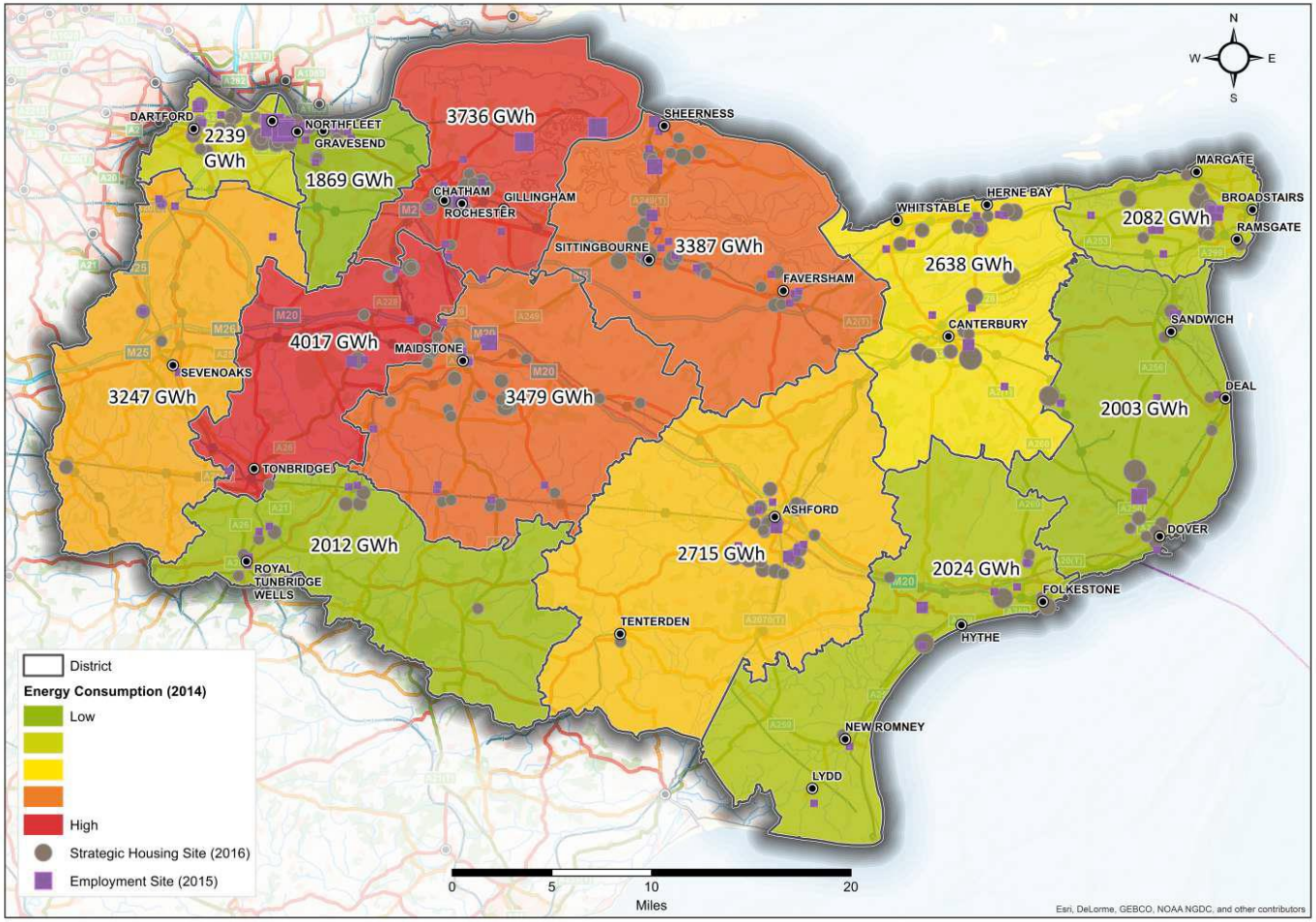
… predominantly fossil fuels…



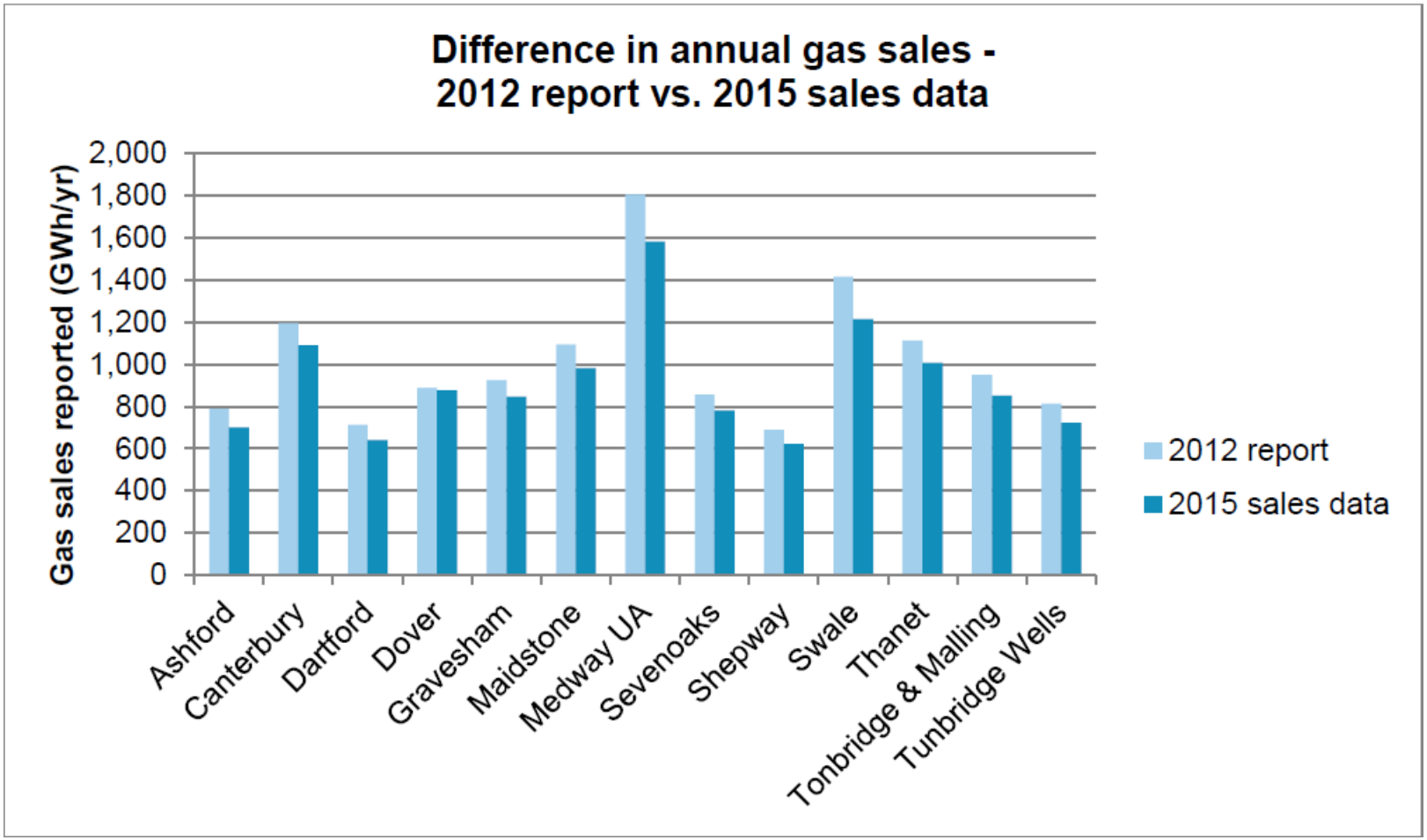
…though renewables are increasing…



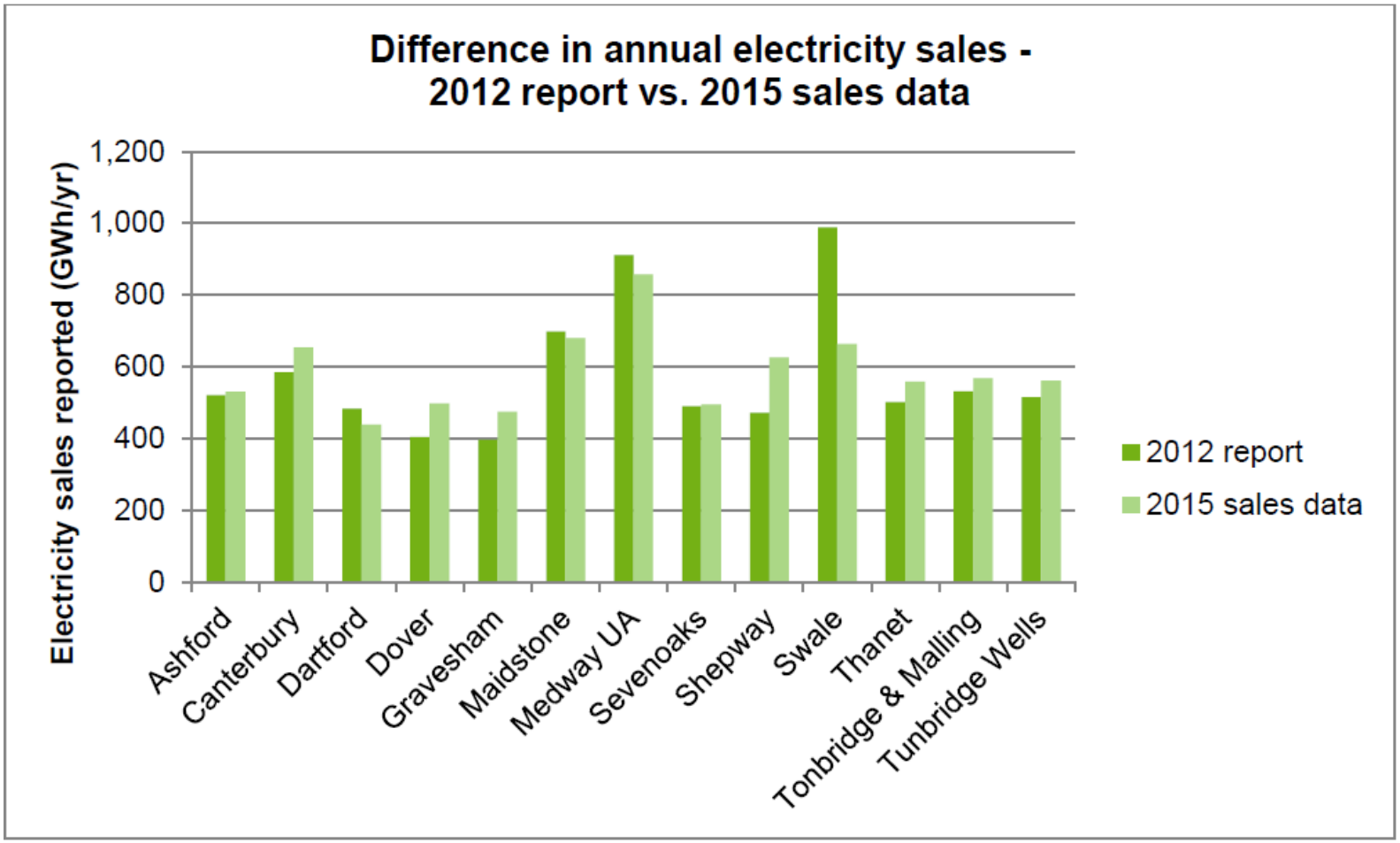
…energy use is not uniform…



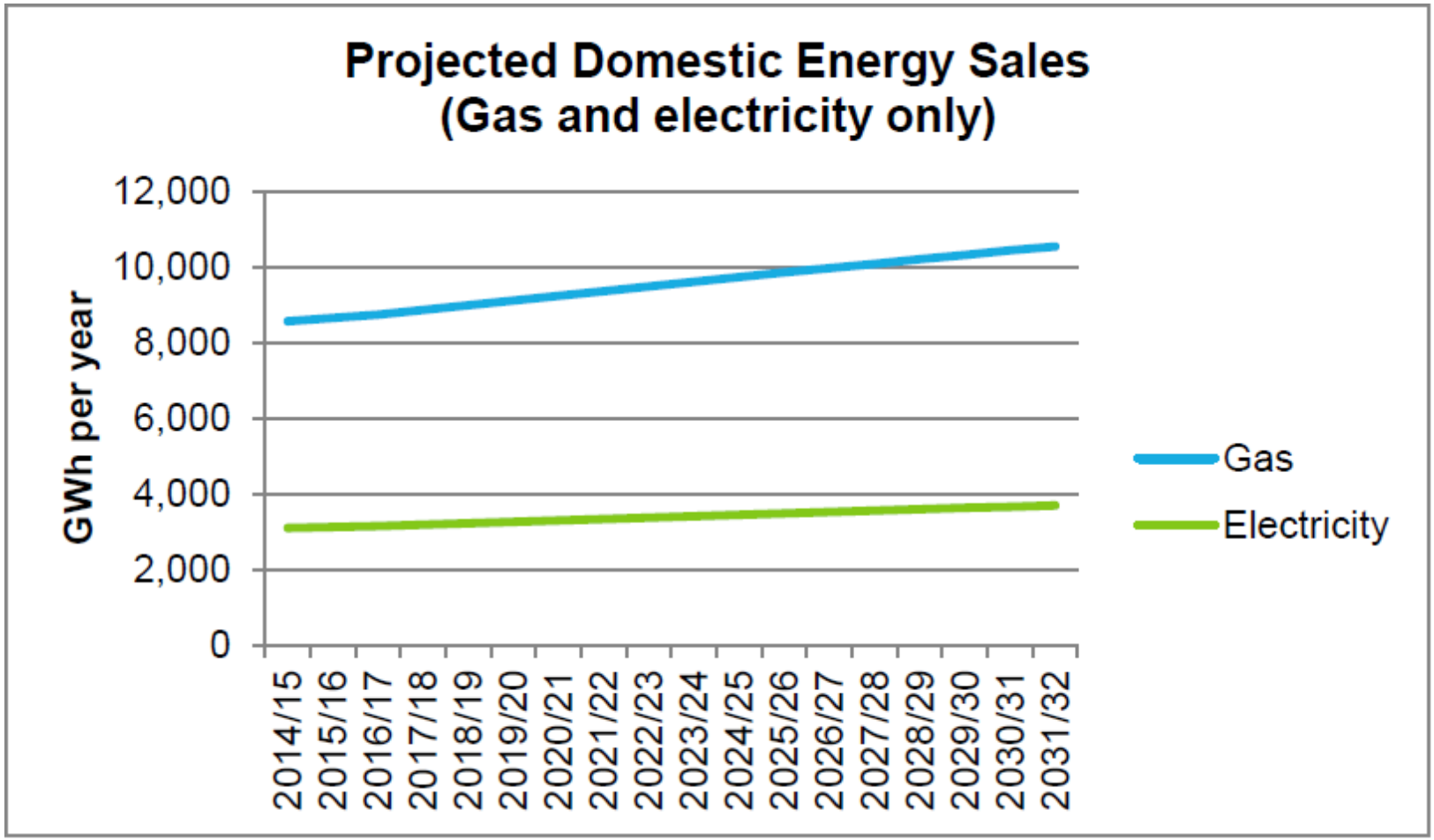
…gas use has decreased since 2012 …



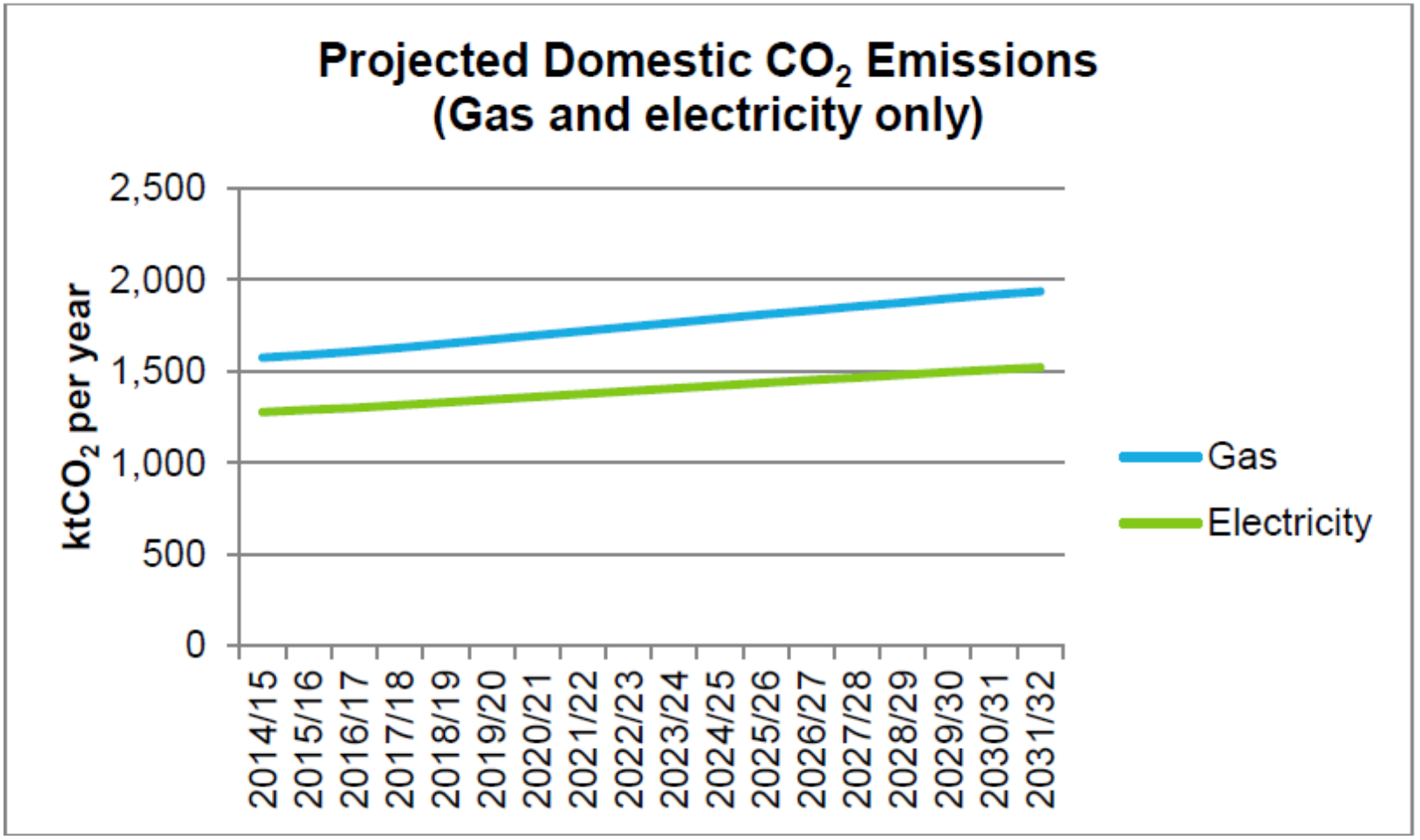
… as has electricity…

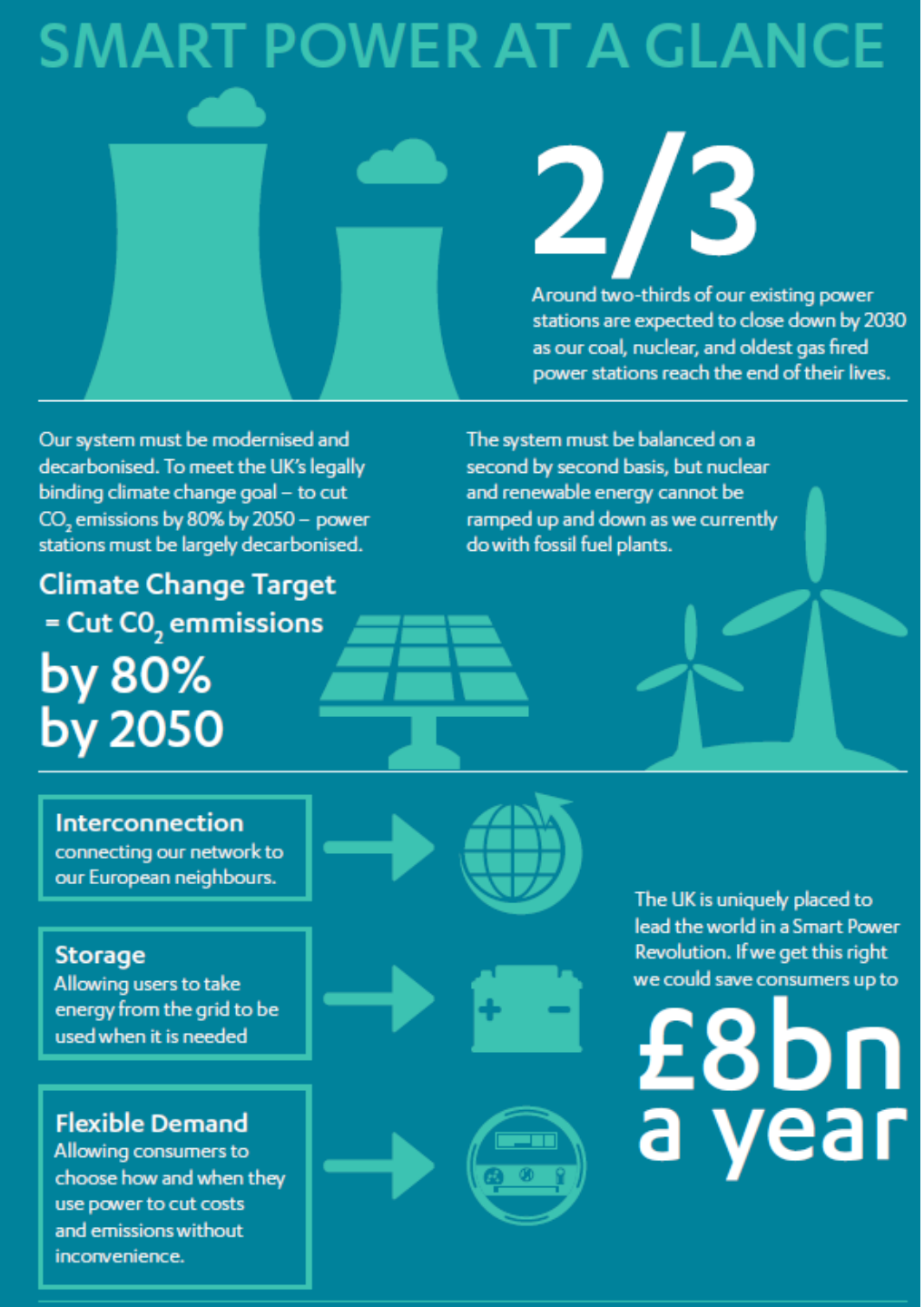


…however, the trajectory is up…



…increasing carbon emissions…





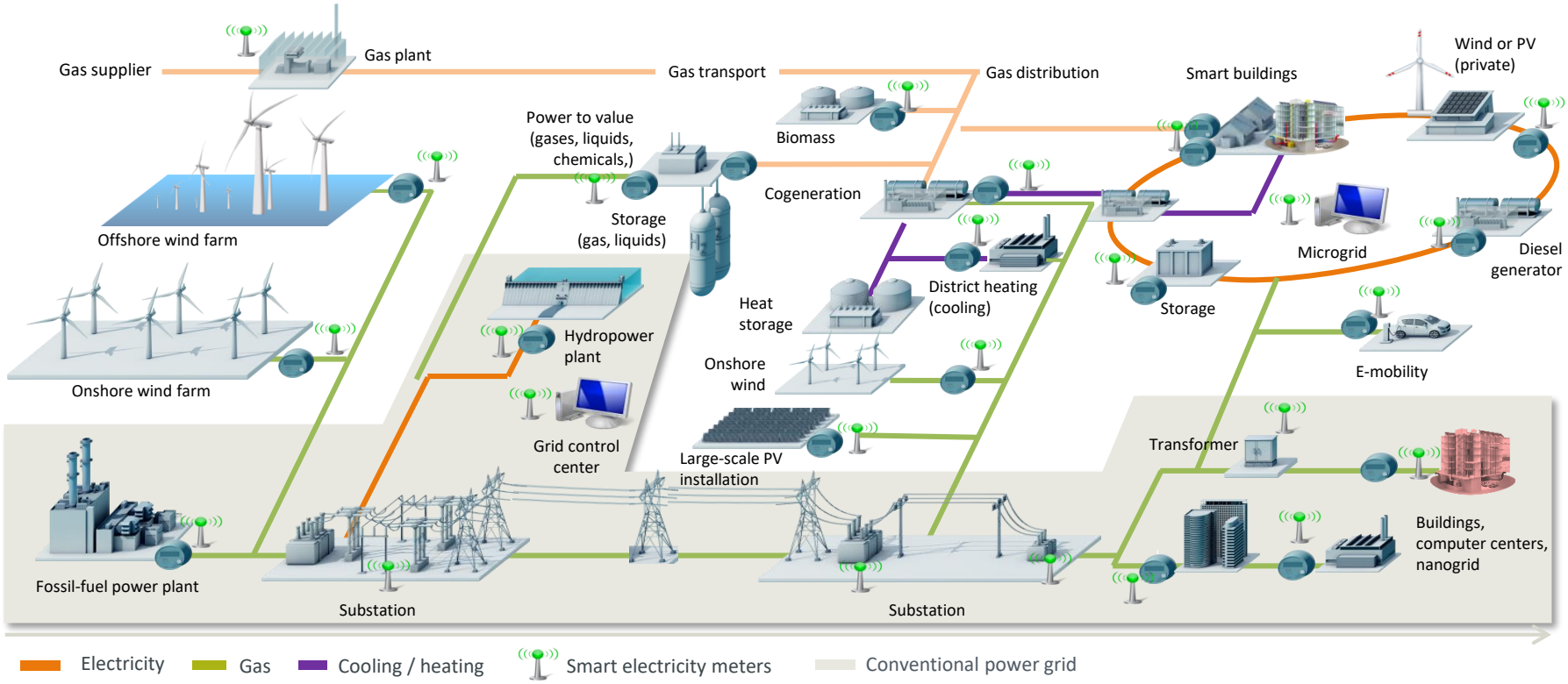
THE SMART POWER REVOLUTION

'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

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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

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LOW CARBON ACROSS THE SOUTH EAST

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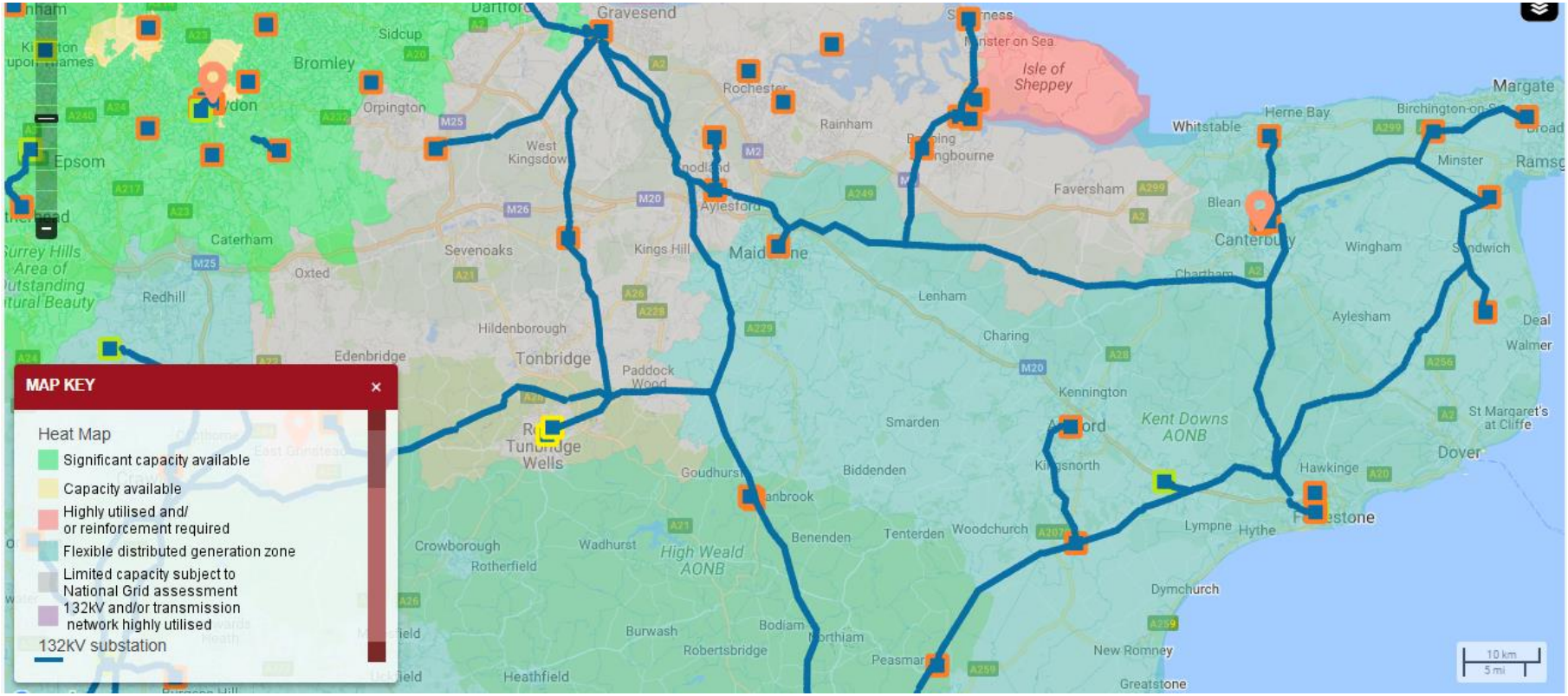
… but the grid is constrained..



…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

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Maidstone Heat Network Feasibility Update Workshop

Background

Previous studies

Heat Networks in Kent and Medway: pre-feasibility study

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MAIDSTONE HEAT NETWORK FEASIBILITY STUDY

Final Report

Prepared for: Kent County Council

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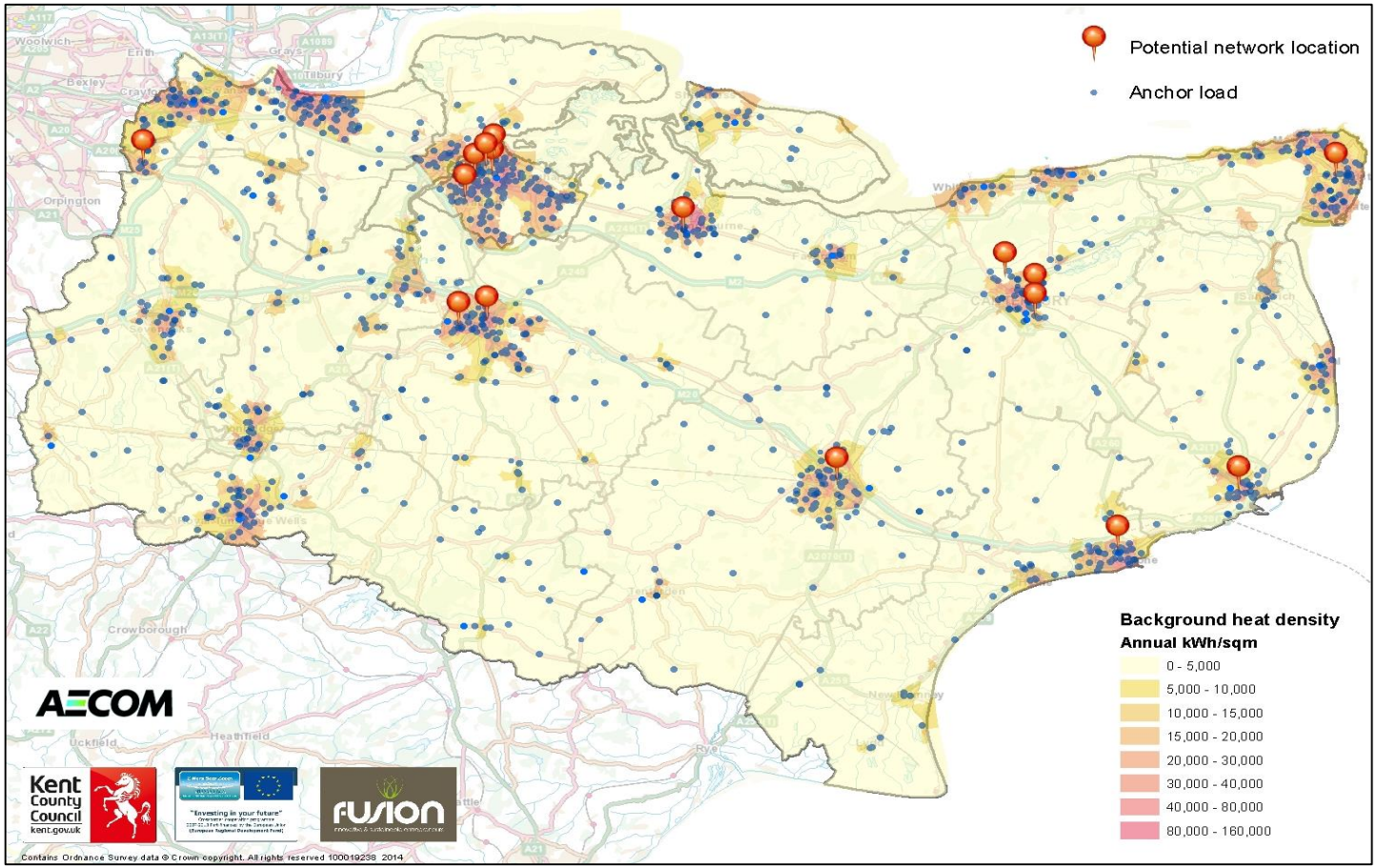
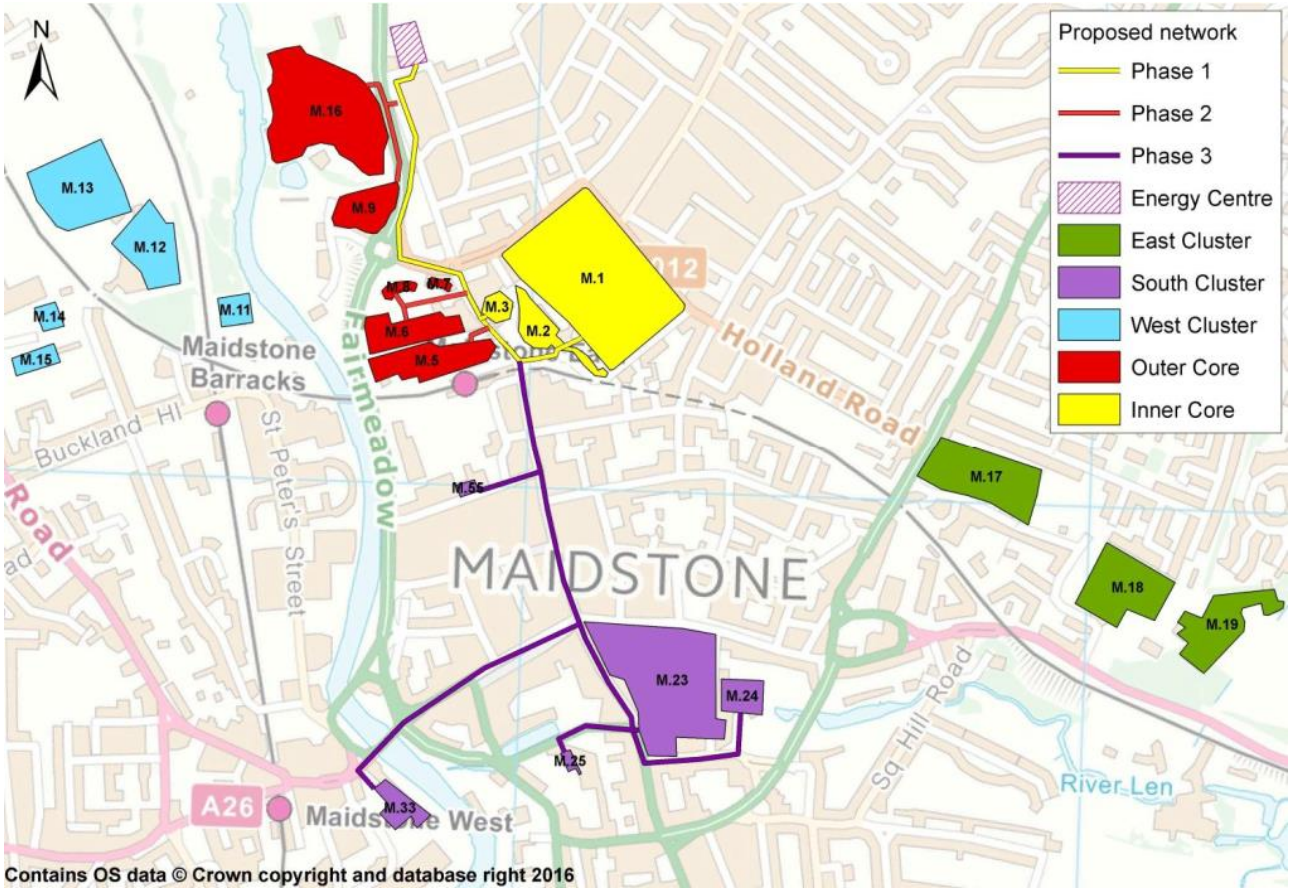
Kent and Medway Heat Network Masterplanning Study



Maidstone Heat Network Feasibility Study



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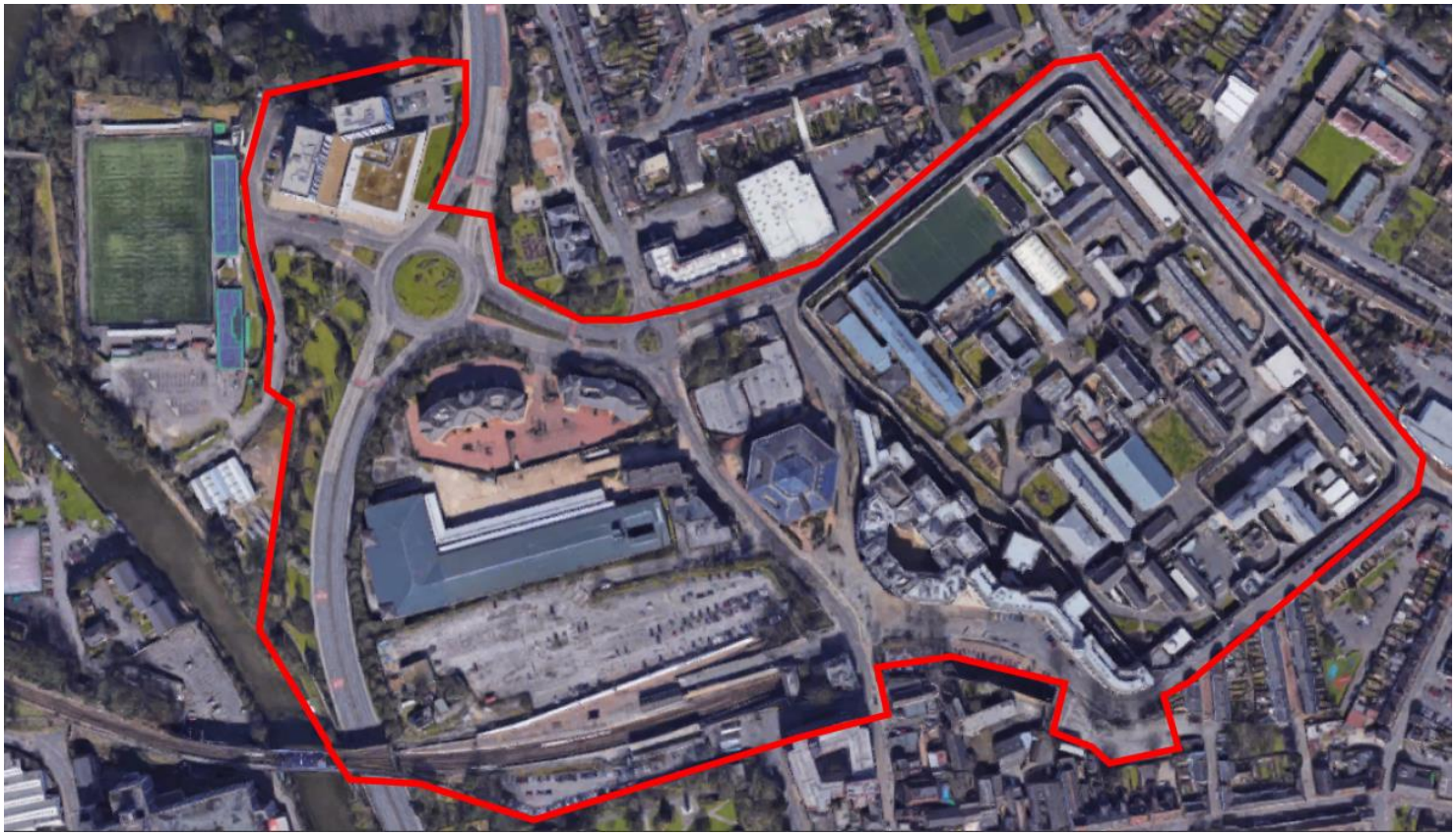
Imagine it.
Delivered.
New study

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



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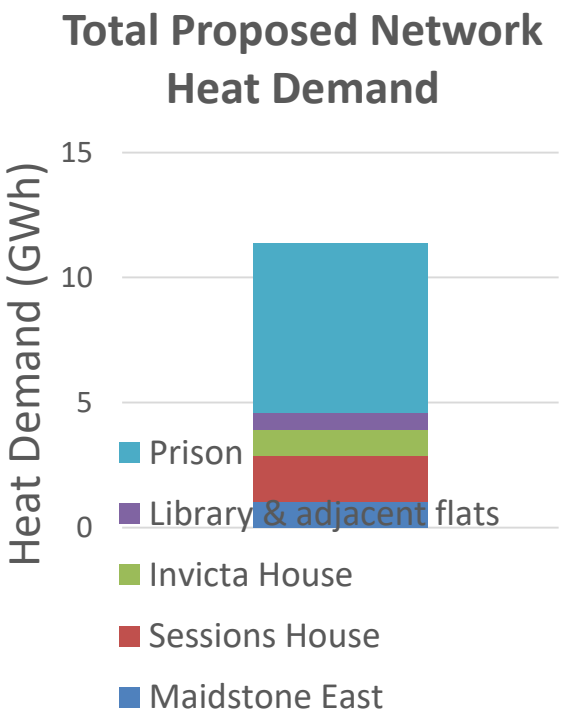
Energy demand assessments

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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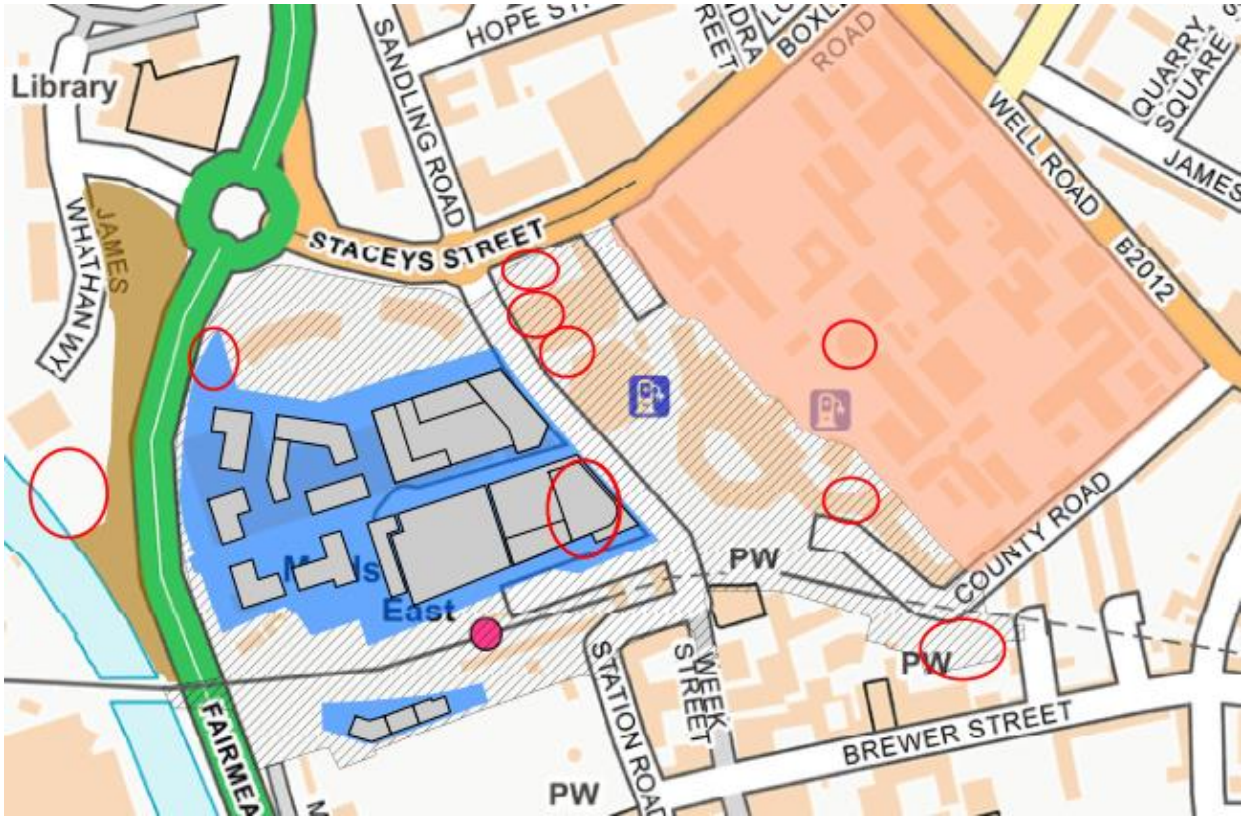
Updated energy centre assessment



Legend
Land Ownership

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

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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

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

Albert Street, Maidstone, ME14 2RL

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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

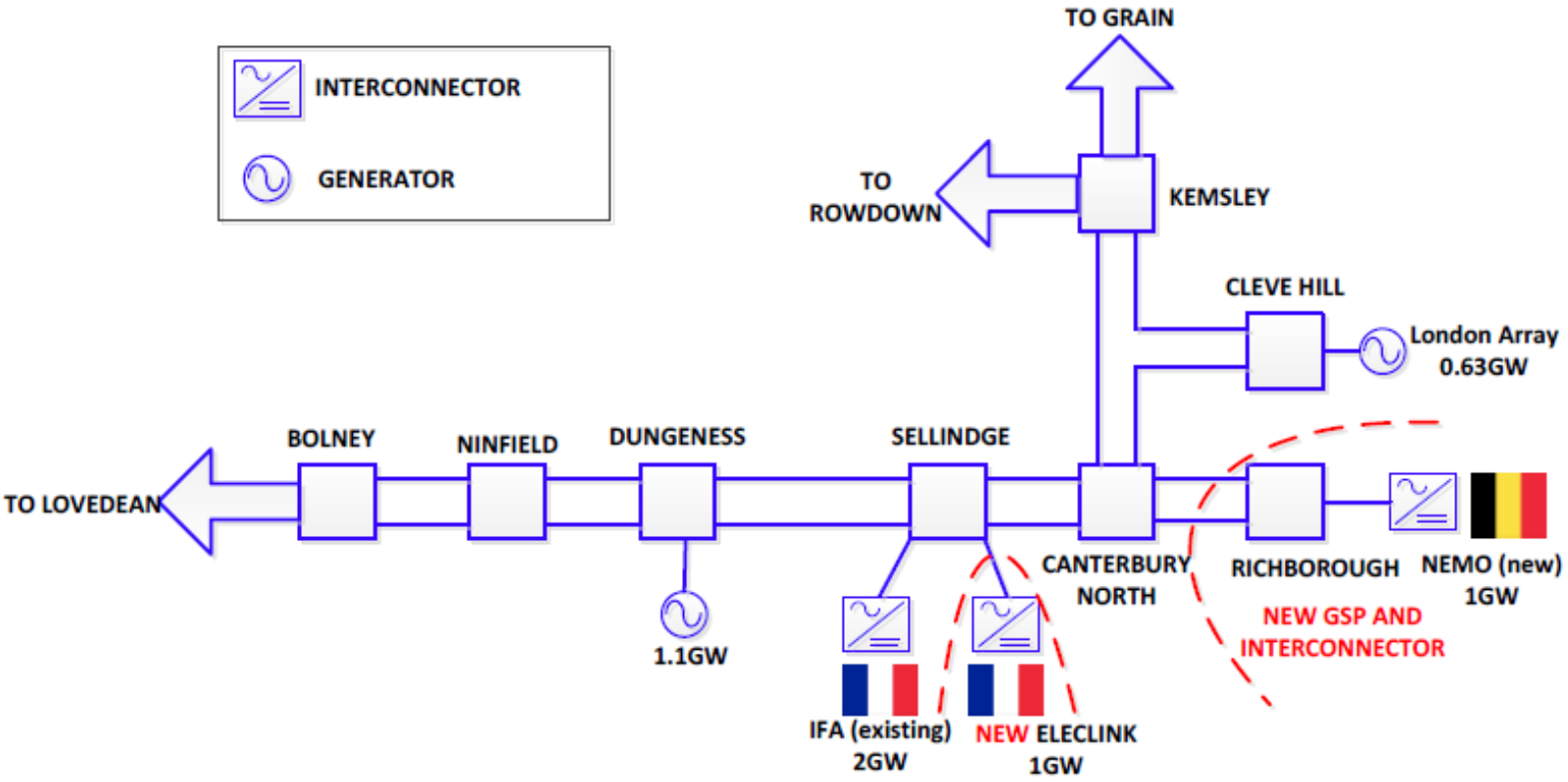
- At Kemsley considering connecting a third SGT
- New GSP, Richborough, for NEMO interconnector ~2021
- Works may release capacity in the area

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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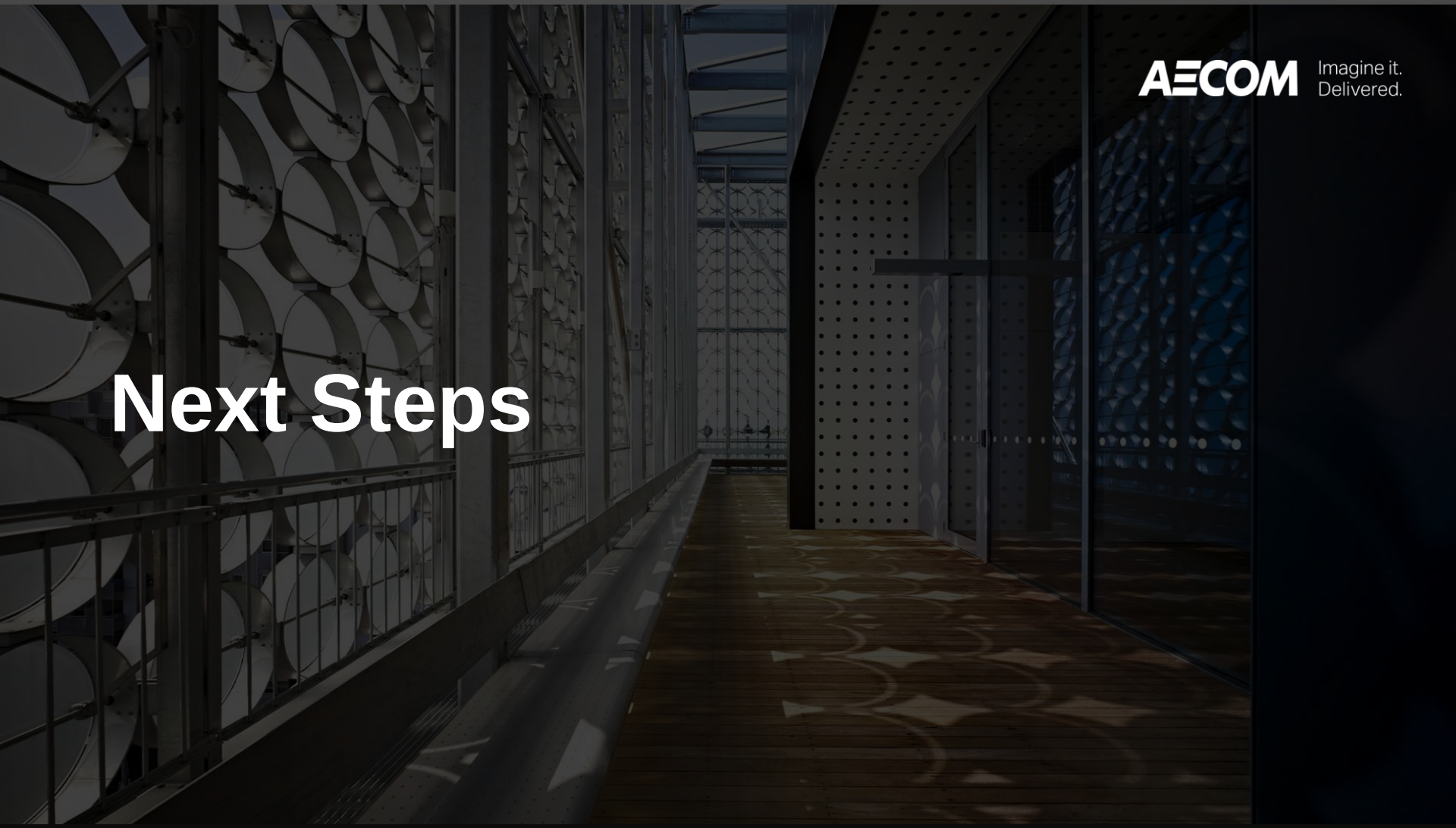

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Next Steps

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?

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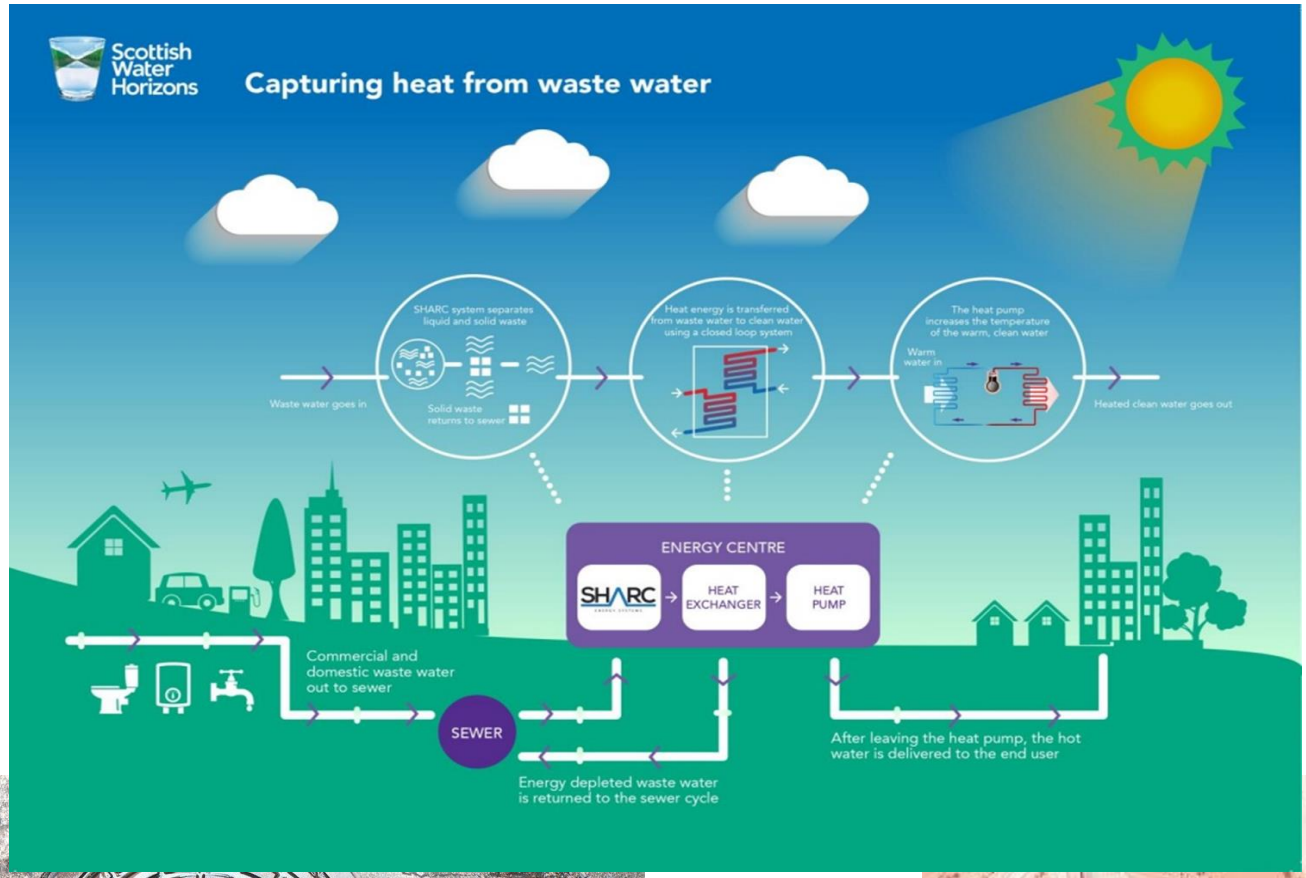
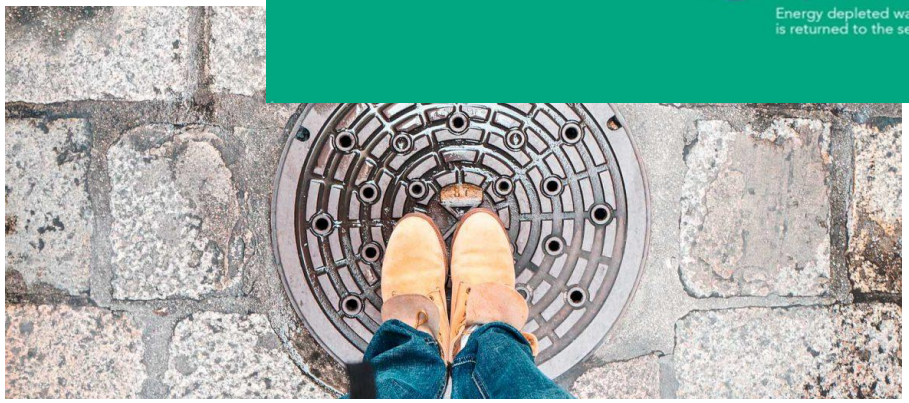
Sewer Source Heat Pump!!!





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