ITRC-MISTRAL Infrastructure Analysis: OxCam Arc

Wed, 20 November 2019

Institution of Civil Engineering, London

#OxCamITRC #OxCamArc @UKITRC

ITRC mistral
multi-scale infrastructure systems analytics

UKRI Engineering and Physical Sciences Research Council

UK Infrastructure Transitions Research Consortium (ITRC)

UK Infrastructure Transitions Research Consortium (ITRC) is a consortium of seven UK universities:

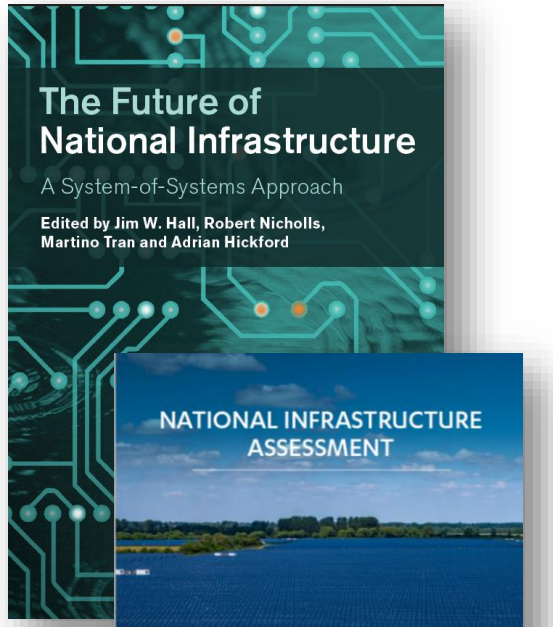
- University of Oxford
- Newcastle University
- University of Southampton
- Cardiff University
- University of Cambridge
- University of Leeds
- University of Sussex

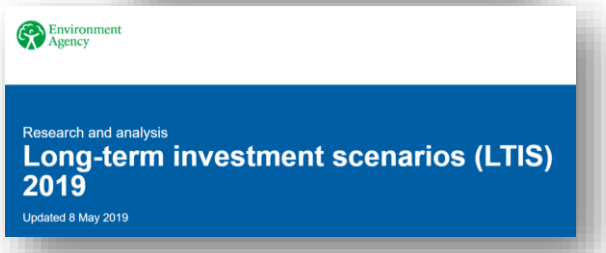
ITRC has been supported by more than £10 million of funding from the Engineering and Physical Sciences Research Council, along with other partners in government and industry

UK Infrastructure Transitions Research Consortium (ITRC)

From 2011 the UK Infrastructure Transitions Research Consortium (ITRC) has developed:

- The NISMOD national system-of-systems model (energy-transport-digital-water-waste) for infrastructure planning in Britain
  - NISMOD was used in the UK's first National Infrastructure Assessment
- National modelling of climate risks to infrastructure networks
  - Used to inform the Environment Agency's long term investment strategy for flood defences
  - Analysis for the National Infrastructure Commission's resilience study
- NISMOD is being migrated to a new £8million facility DAFNI: the Data and Analytics Facility for National infrastructure





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PARTNERING FOR PROSPERITY:
A new deal for the Cambridge-Milton Keynes-Oxford Arc
NATIONAL INFRASTRUCTURE COMMISSION

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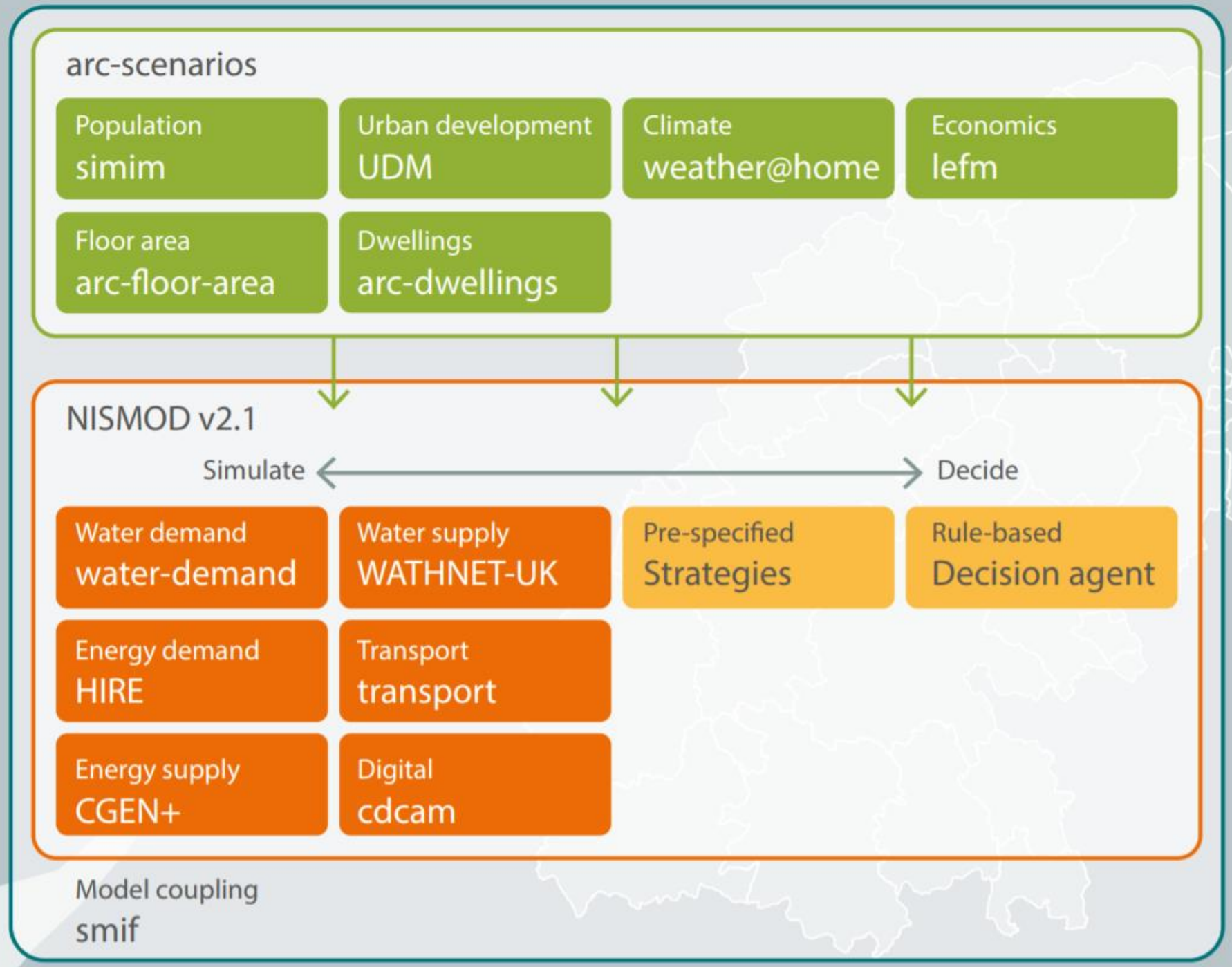

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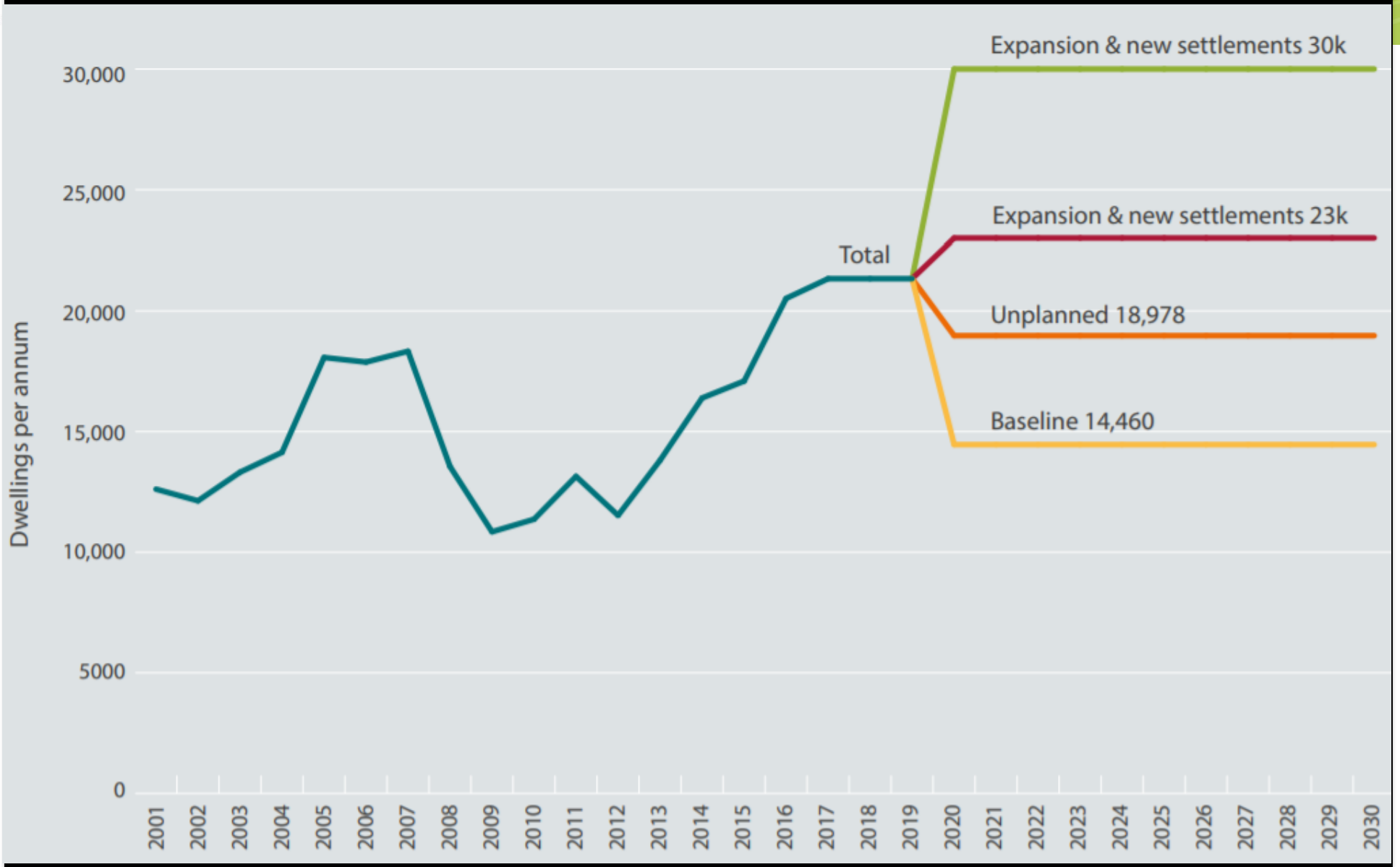
Expansion & new settlements 30k
Expansion & new settlements 23k
Total
Unplanned 18,978
Baseline 14,460
Dwellings per annum
30,000
25,000
20,000
15,000
10,000
5000
0
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
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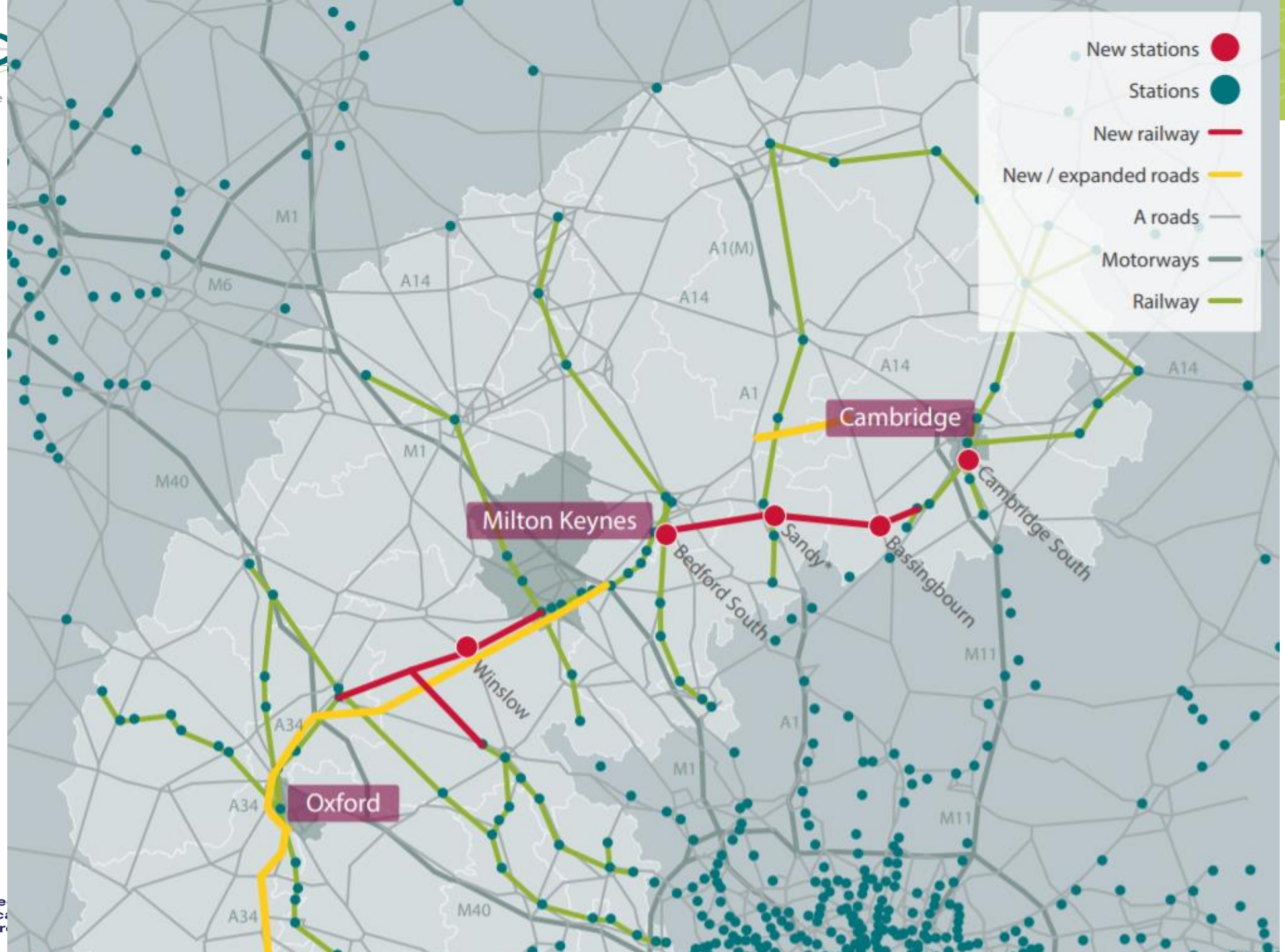
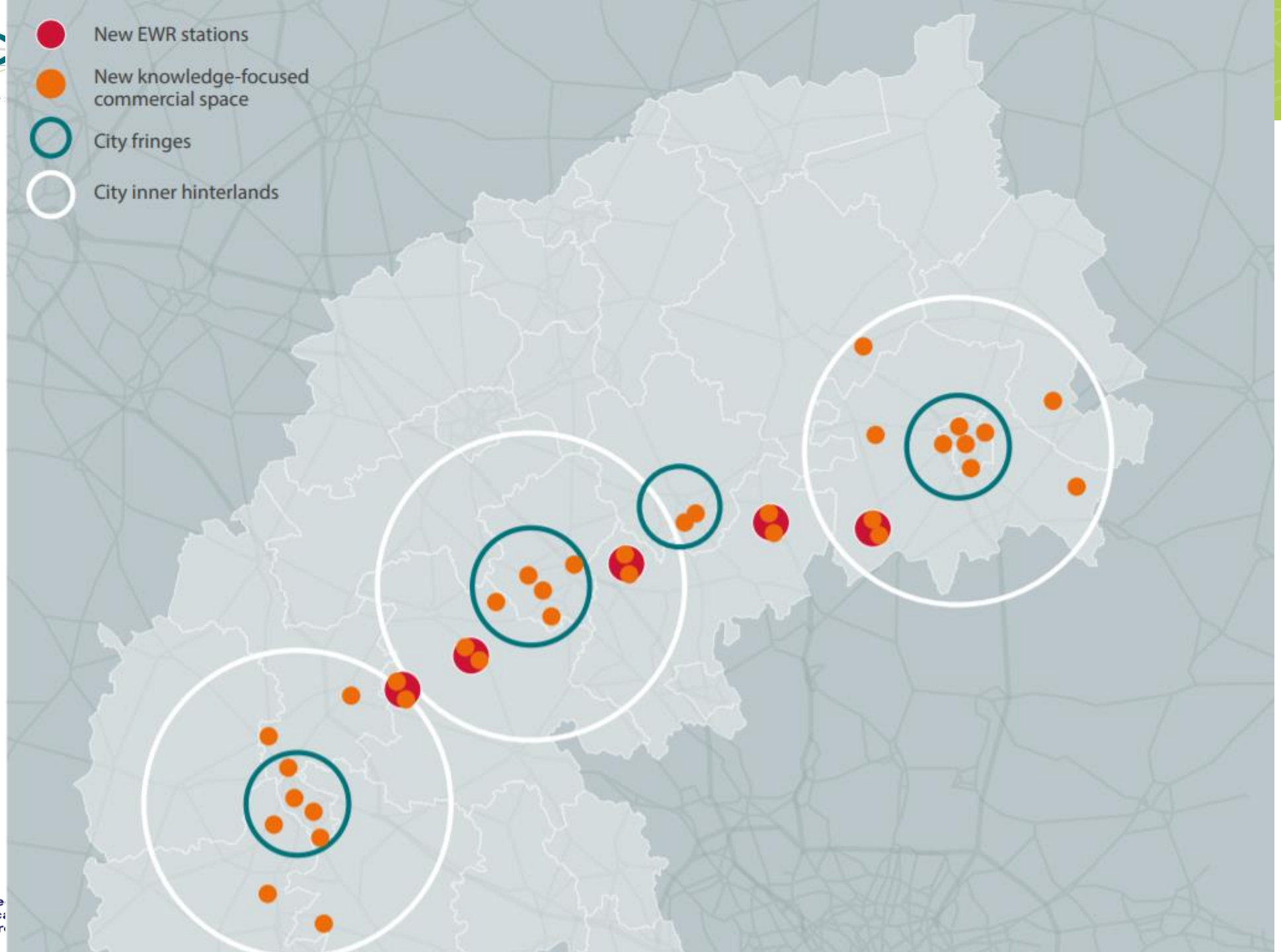
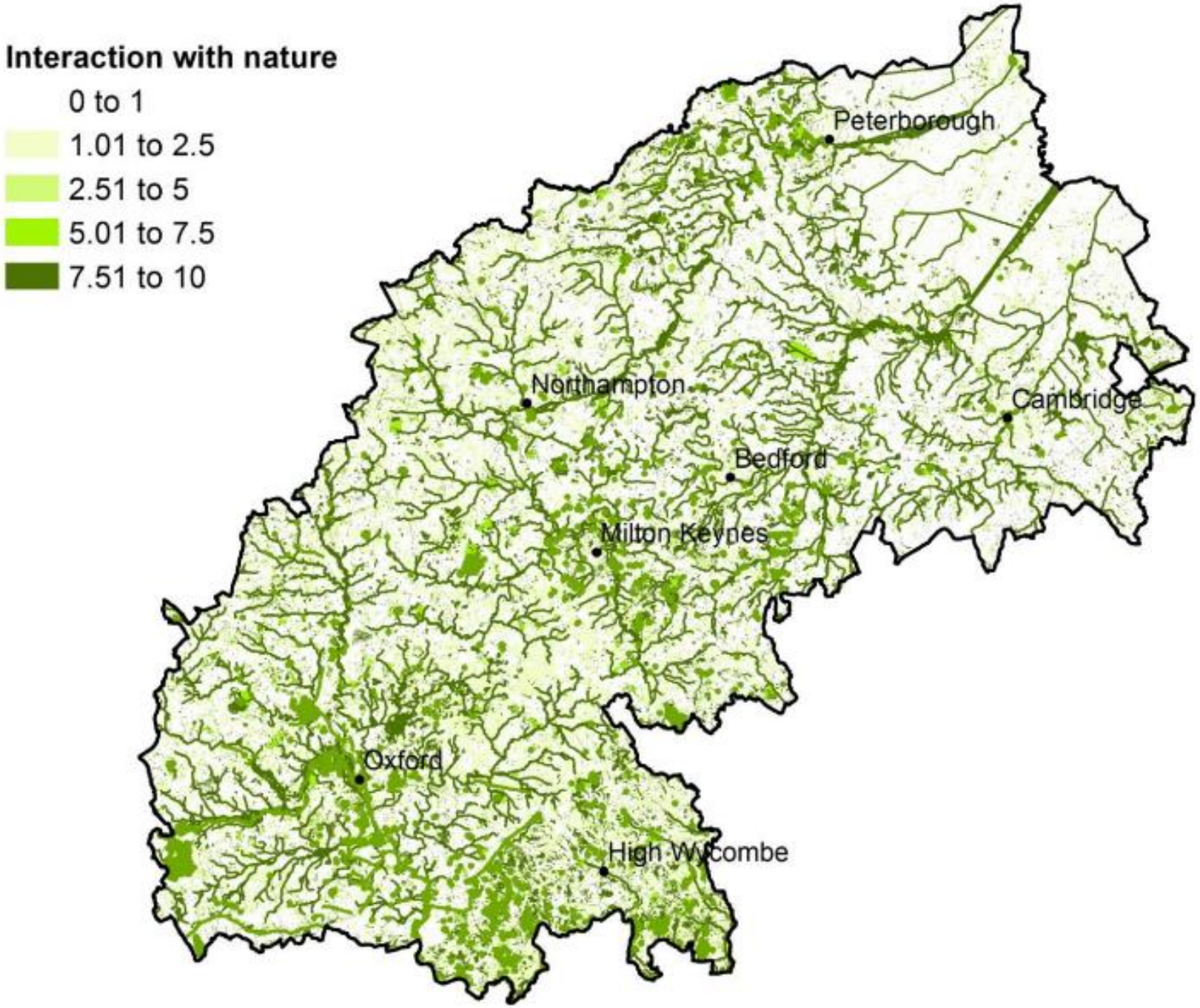
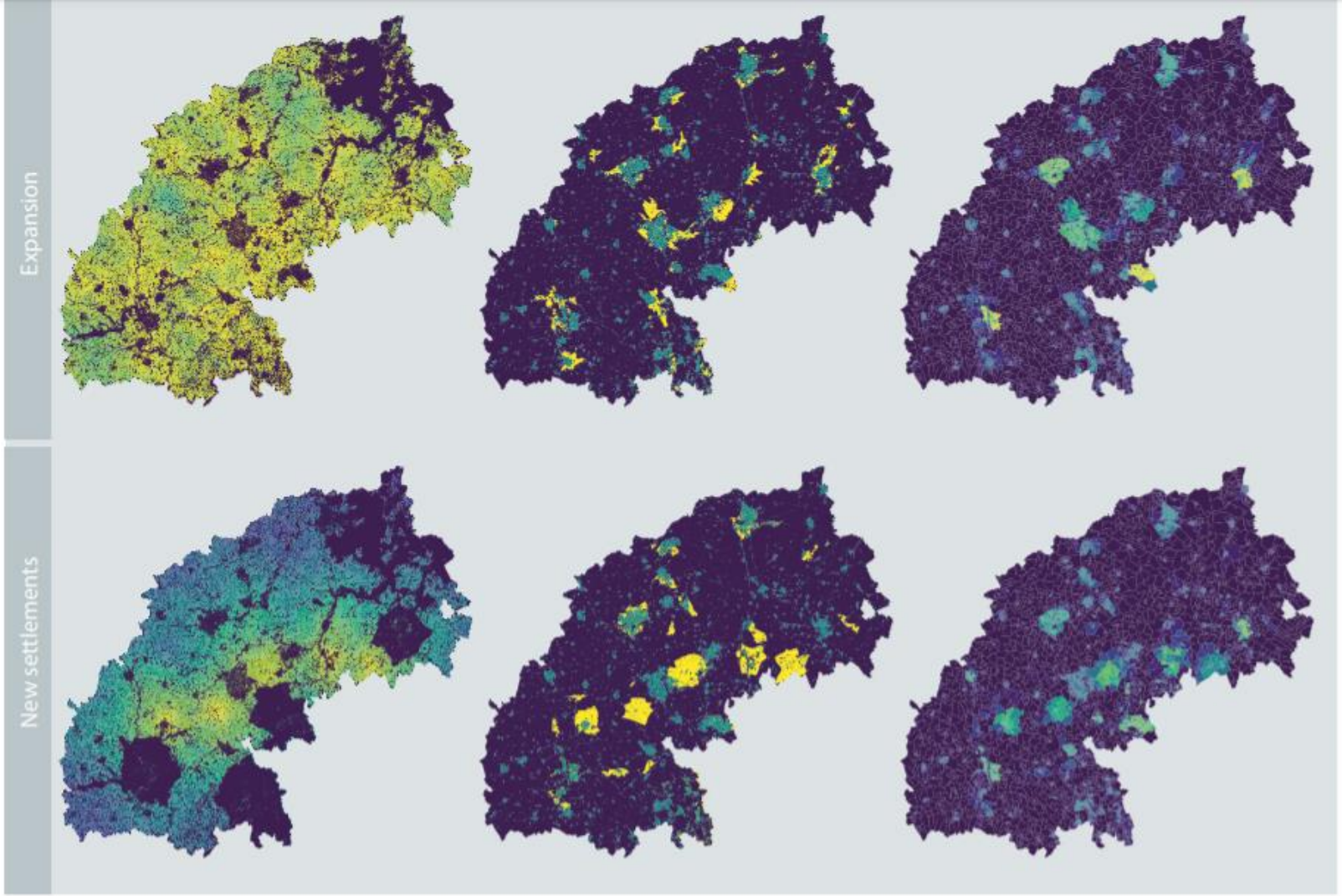
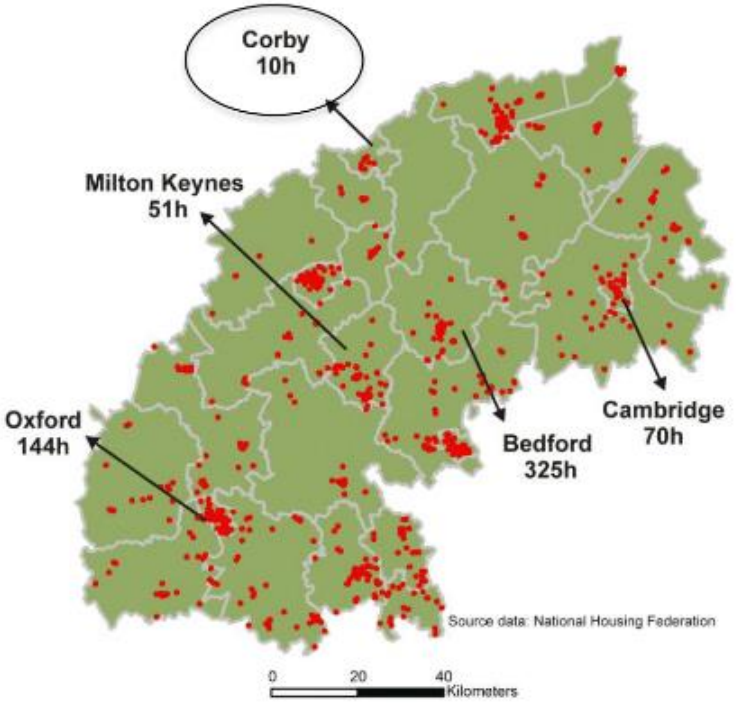
2030


New stations
Stations
New railway
New / expanded roads
A roads
Motorways
Railway
Cambridge
Milton Keynes
Oxford
Winslow
Bedford South
Sandy
Bassingbourn
Cambridge South
M1
M6
M40
A14
A1(M)
A1
M11
A34

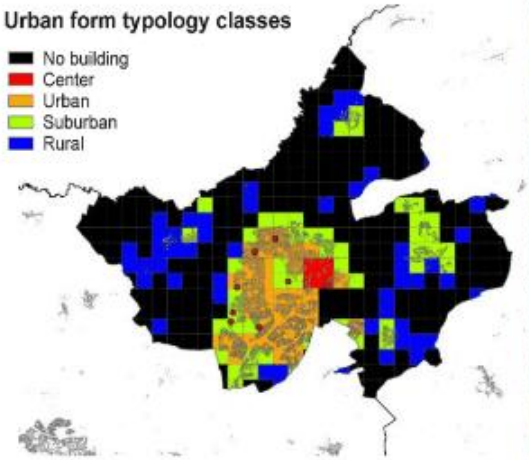

New EWR stations
New knowledge-focused commercial space
City fringes
City inner hinterlands


Interaction with nature
0 to 1
1.01 to 2.5
2.51 to 5
5.01 to 7.5
7.51 to 10
Peterborough
Northampton
Cambridge
Bedford
Milton Keynes
Oxford
High Wycombe


Expansion
New settlements
Key
Suitability
0
0.25
0.5
0.75
1
Development
Undeveloped
Developed
Future development
Density
(dwellings / ha by output area)
0–6
6–9
9–16
16–27
27–40
> 40



Examples of brownfield land sites and their size in hectares

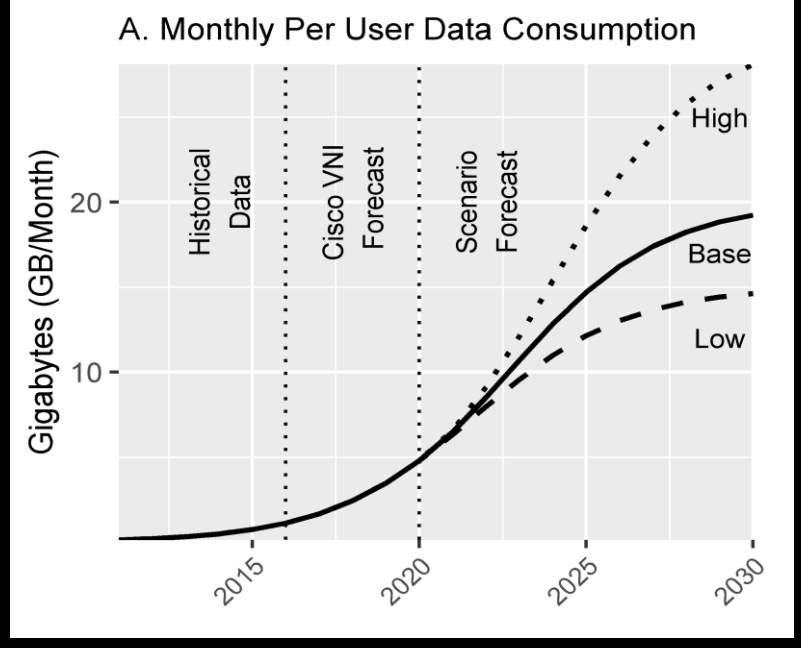


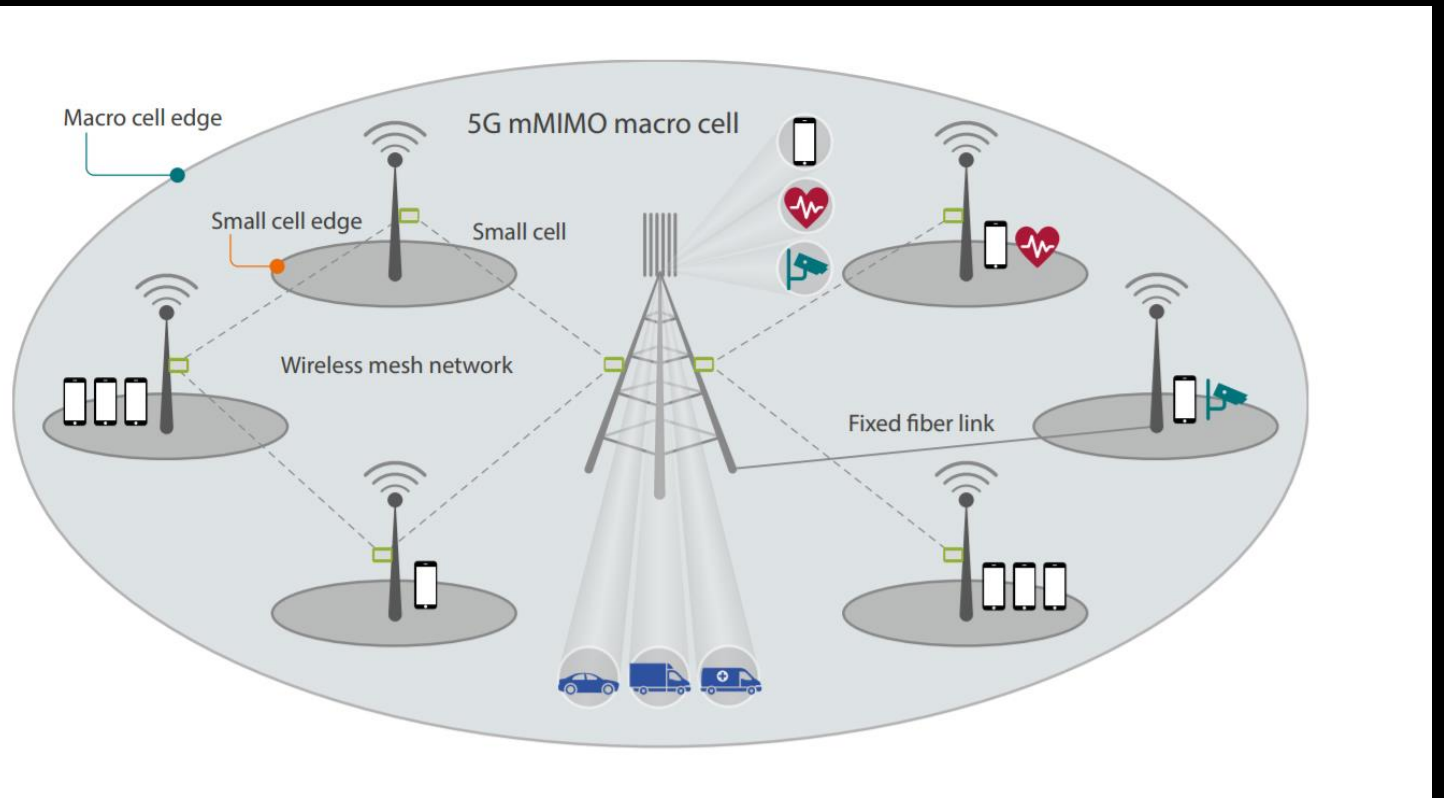
Urban form classes (Corby)

Corby (Google)

Brownfield land location

	Energy strategy			
	Electric	Heat networks	Green gas	Unconstrained
Heat supply	Heat supply driven completely by electricity: Heat pumps, resistive heating and electric boilers.	Heat supply is mainly from CHP units utilising natural gas, biomass and solid waste. Availability of biomass and solid waste is restricted. Gas boilers are used to back-up CHP units during peak periods.	Use of dedicated hydrogen boilers for heating. Gas boilers remain to produce heat (as green gas is injected into the gas mix). Biomass/Biogas CHP units are installed.	Full availability of technologies. Availability of resources such as biomass and waste.
Electricity supply	Distributed wind and solar (PV). CHP units are installed as they produce heat (Heat driven CHP operation) and power.			
Gas supply	Transmission grid supplies are available with limited gas storage facilities within the region.		Hydrogen and biogas injection into the gas grid limited to 20% by volume. Large scale hydrogen production via SMR, CCS, and small-scale electrolysis deployments. Hydrogen is supplied via new hydrogen pipelines and re-purposed gas distribution pipes.	Transmission grid supplies are available with limited gas storage facilities within the region.


A. Monthly Per User Data Consumption
Gigabytes (GB/Month)
20
10
Historical Data
Cisco VNI Forecast
Scenario Forecast
High
Base
Low
2015
2020
2025
2030


Macro cell edge
5G mMIMO macro cell
Small cell edge
Small cell
Wireless mesh network
Fixed fiber link

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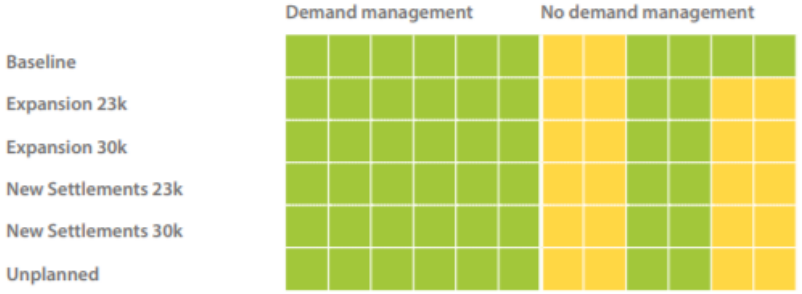
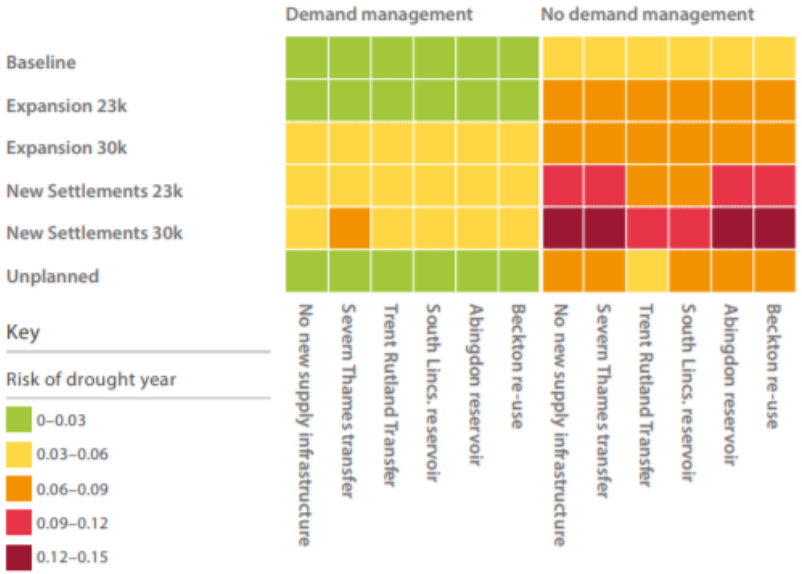
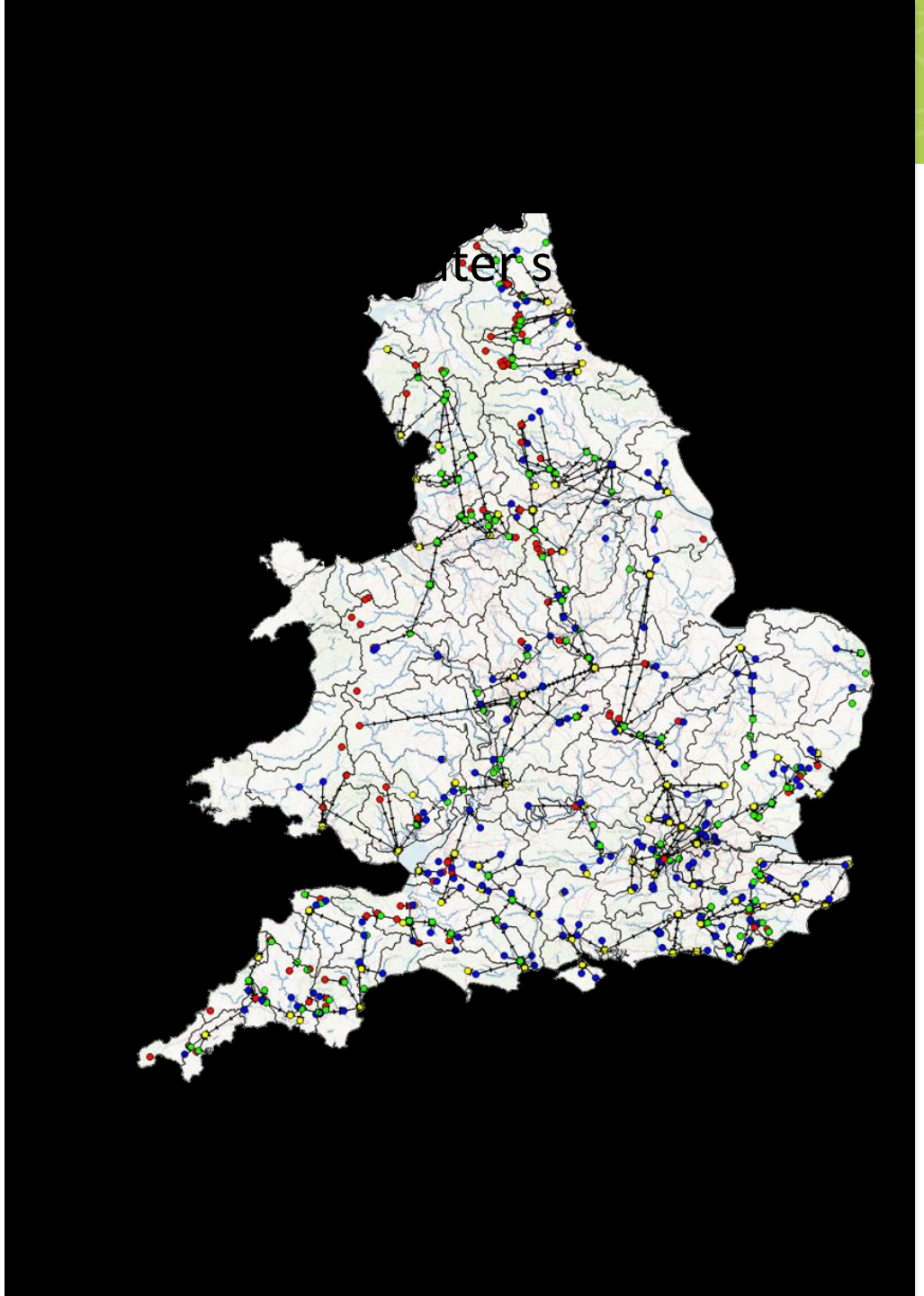
SWOX (Oxford, Bicester, Banbury)

Ruthamford North



Ruthamford South





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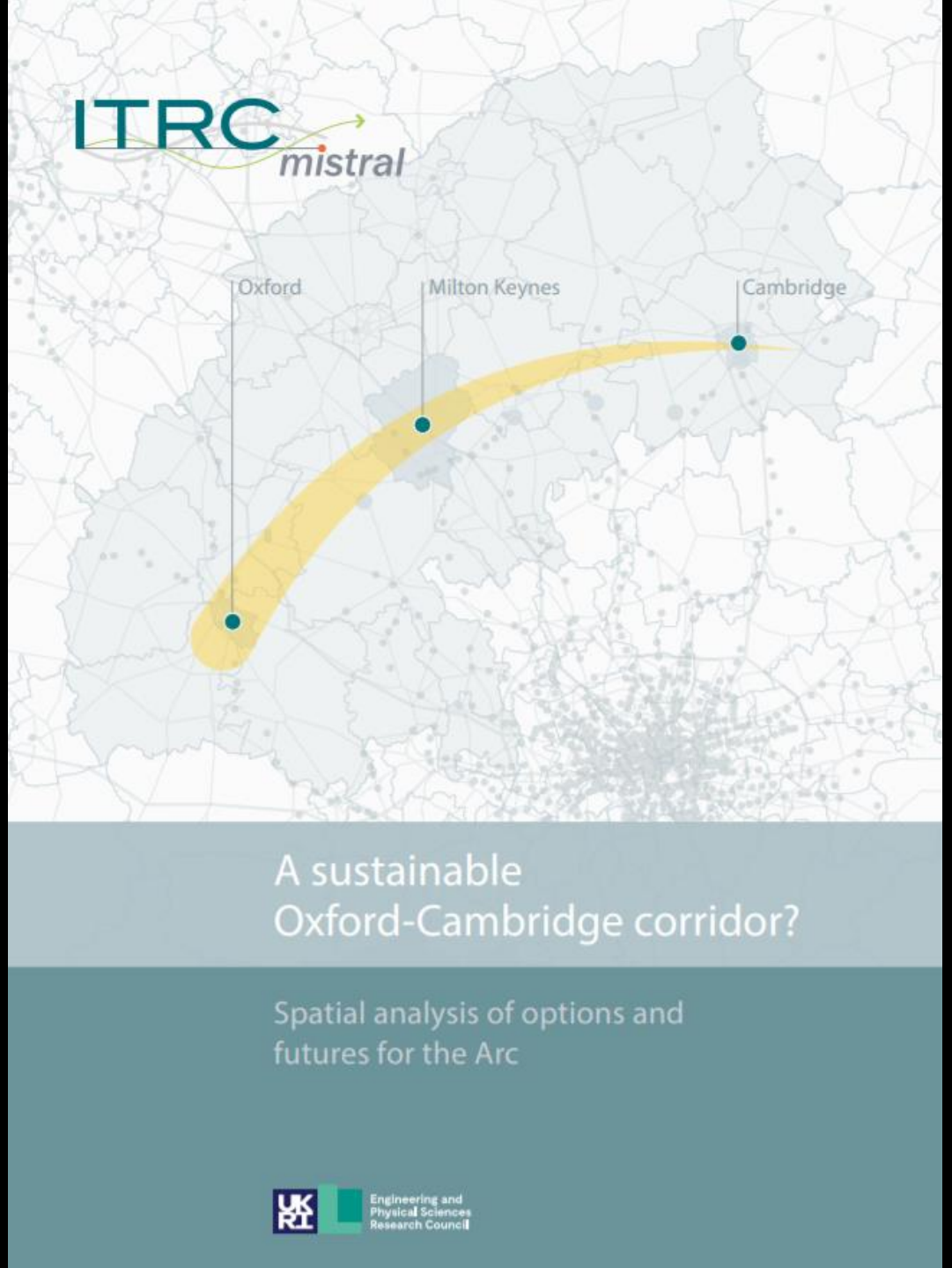

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