LONDON ENERGY PLAN WORKSHOP

HEAT SUPPLY

25 September 2015

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WELCOME

LEAH DAVIS

Project Manager,
London Energy Plan,
Greater London Authority

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WELCOME

HAROLD GARNER

Energy and Sustainability Manager,
London Borough of Camden

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INTRODUCTION TO THE LONDON ENERGY PLAN

Leah Davis
Project Manager

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“The first spatial mapping of London’s energy demand, supply and infrastructure to 2050”

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WHY DO WE NEED THE PLAN?

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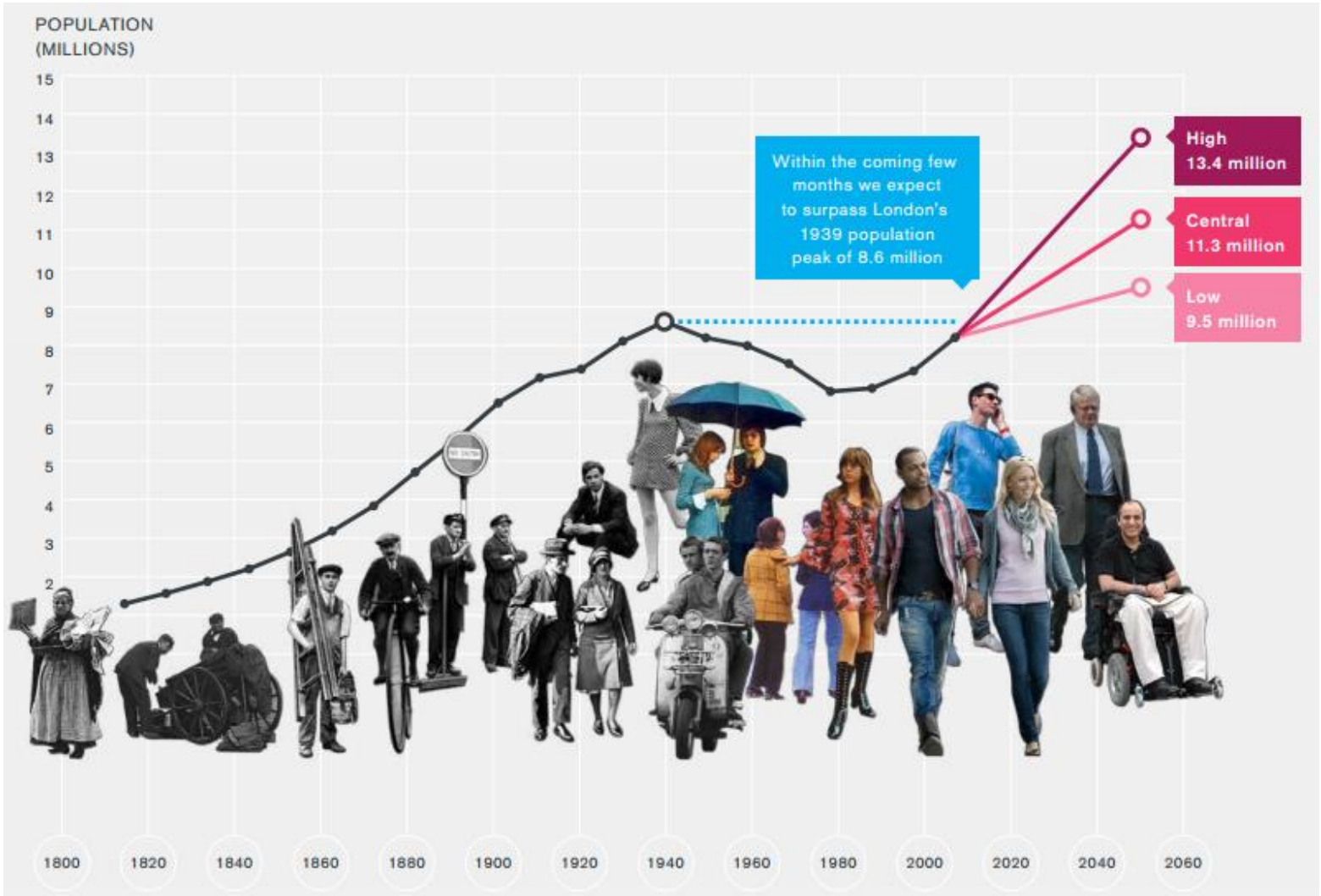
AN INCREASING POPULATION



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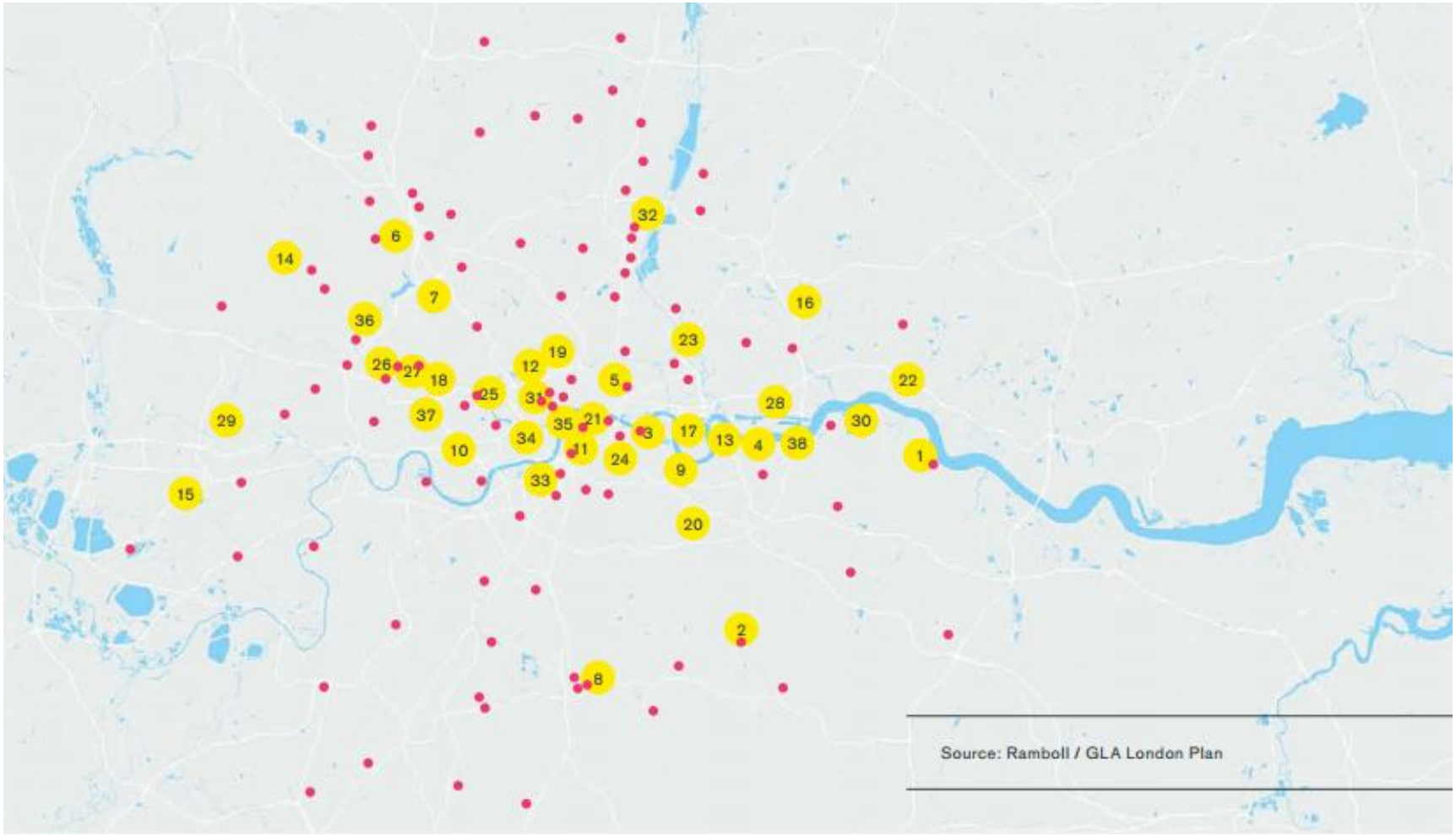
IMPACTING THE ELECTRICITY GRID



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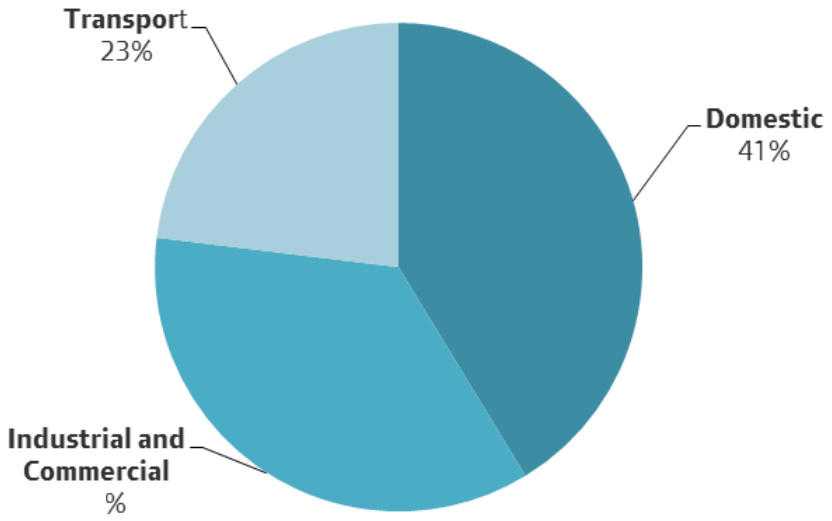
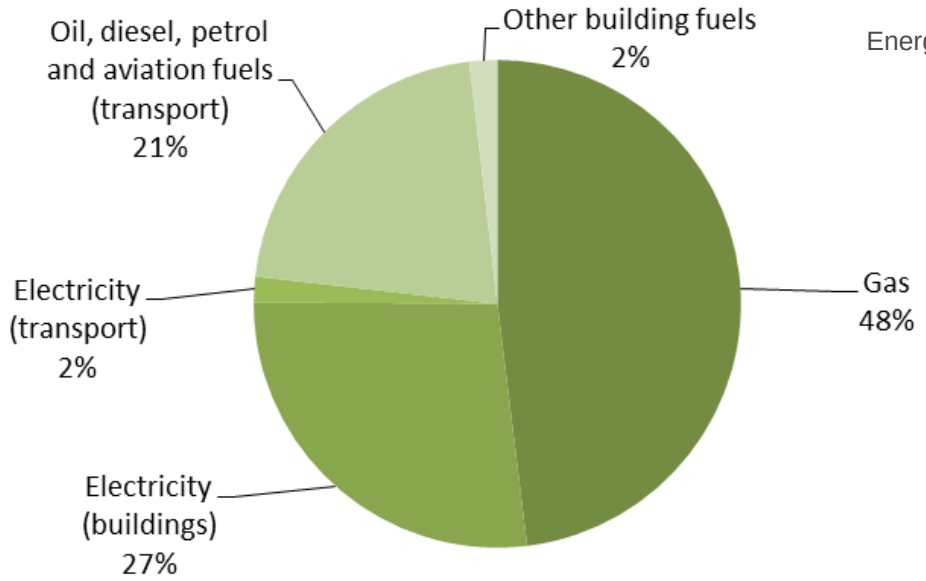
IMPACTING HEATING AND FUEL SUPPLY



Energy use by sector, London Energy and Greenhouse Gas Inventory, 2013



Energy use by fuel, London Energy and Greenhouse Gas Inventory, 2013

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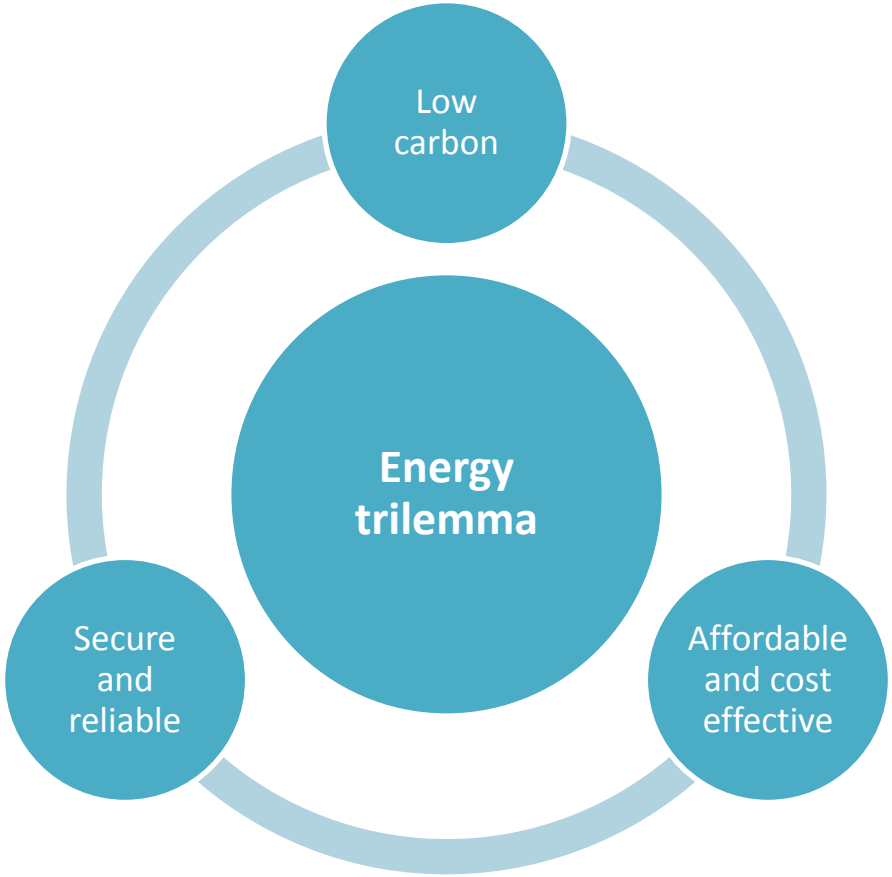
WHAT'S DIFFERENT?

Coordinated London approach

Interaction of demand, supply and infrastructure

Out to 2050

Electricity grid



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OUTCOMES AND OUTPUTS

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OUTCOMES	An evidence base capable of future iterations which sets out pathways to deliver the necessary infrastructure required AND meet the energy ‘trilemma’.
	Have agreement from those responsible for delivery that the evidence and approach is one that will inform their delivery.
OUTPUTS	Electricity infrastructure – how much, where and impact on sub stations.
	District heat and power networks – where and types and location of generation
	London specific scenarios and data

PROPOSED FORMAT AND DELIVERY

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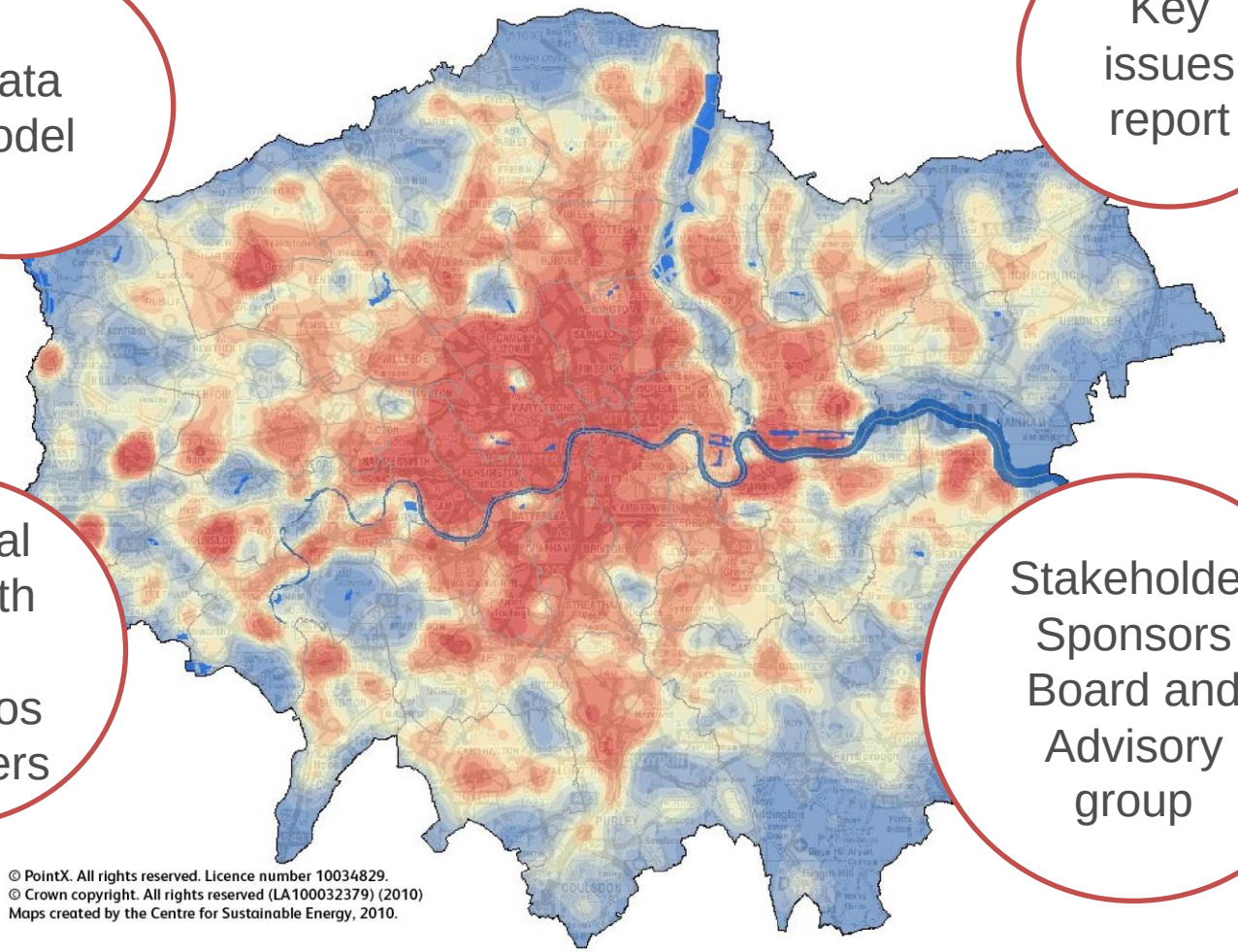
WHAT'S IN THE PLAN?

Data model

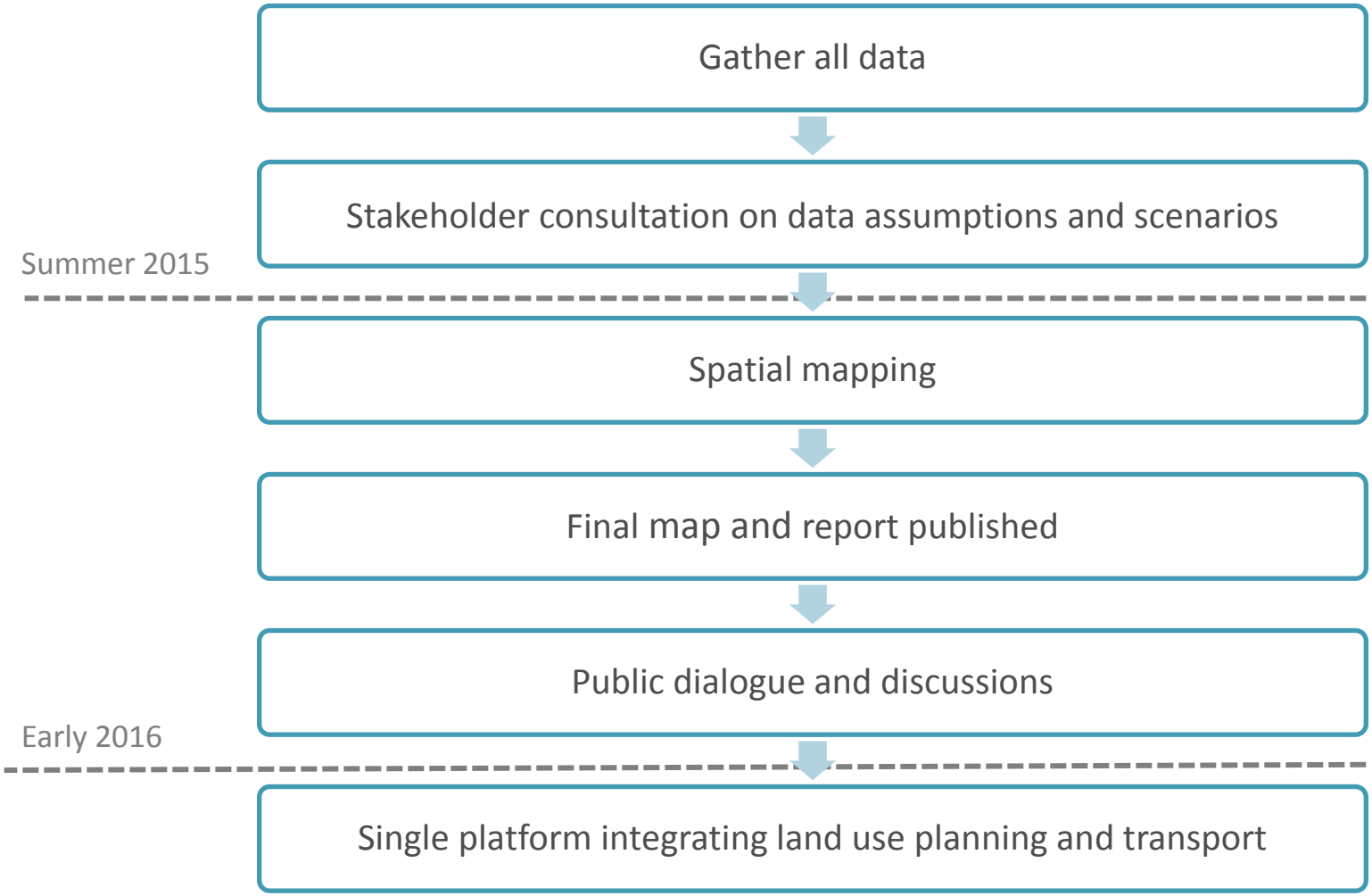
Key issues report



A spatial map with 3 scenarios and layers

Stakeholder Sponsors Board and Advisory group

DELIVERY TIMEFRAMES



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SCENARIOS AND THE MODEL

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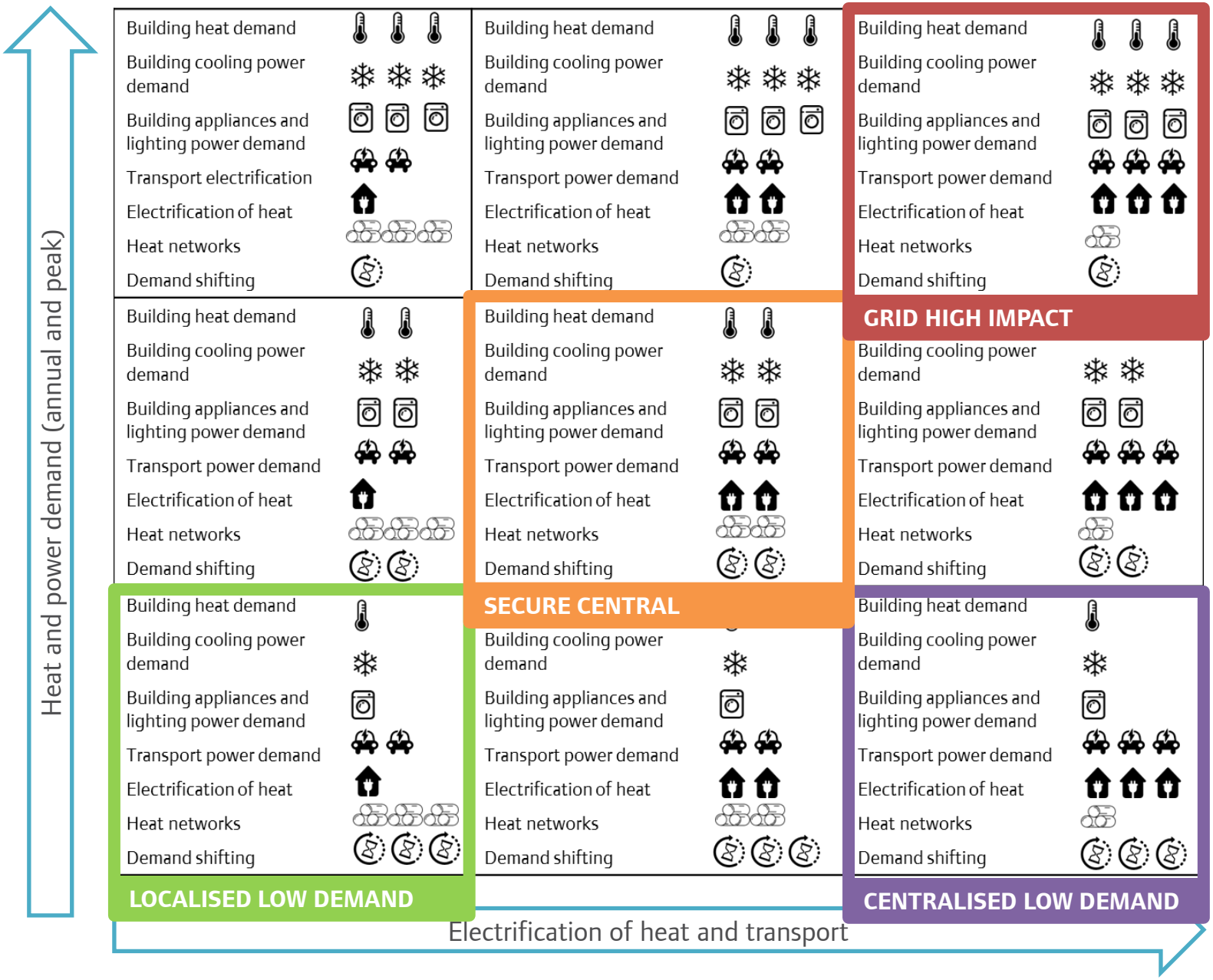
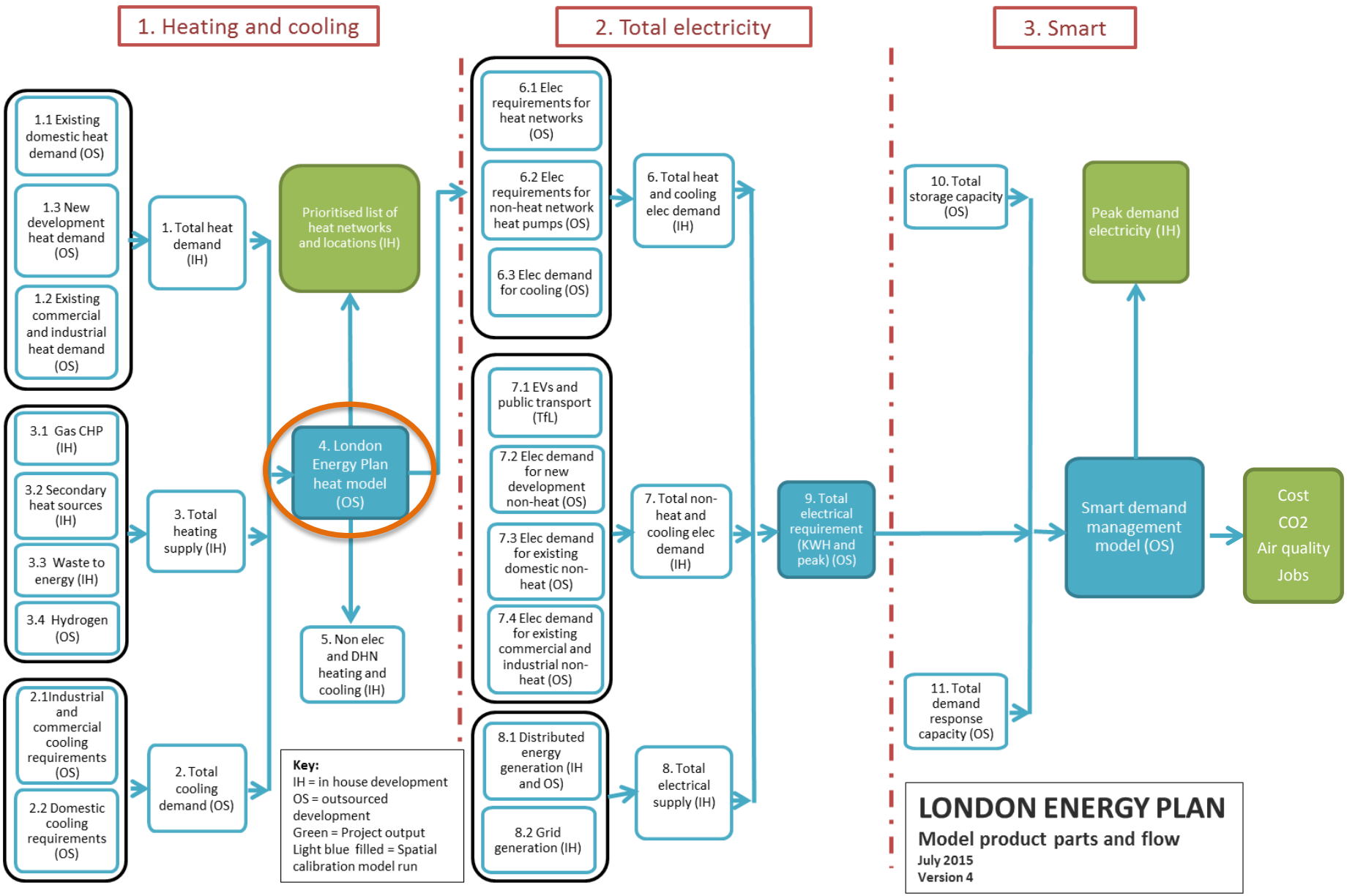
SCENARIOS


Heat and power demand (annual and peak)
Electrification of heat and transport
Building heat demand
Building cooling power demand
Building appliances and lighting power demand
Transport electrification
Electrification of heat
Heat networks
Demand shifting
GRID HIGH IMPACT
Transport power demand
SECURE CENTRAL
LOCALISED LOW DEMAND
CENTRALISED LOW DEMAND

FIXED FACTORS

- Climate scenarios
- Development/ new build rates
- CO_2 emissions performance of measures over time
- Underground, tram and bus power demand
- 2025 and 2050 roll out scenarios are linked
- We meet at least the 80% reduction in CO_2 emissions by 2050 in all scenarios
- Internal temperature requirements in buildings

LONDON ENERGY PLAN MODEL



INTRODUCTION TO THE HEAT MODEL

Agnieszka Griffin

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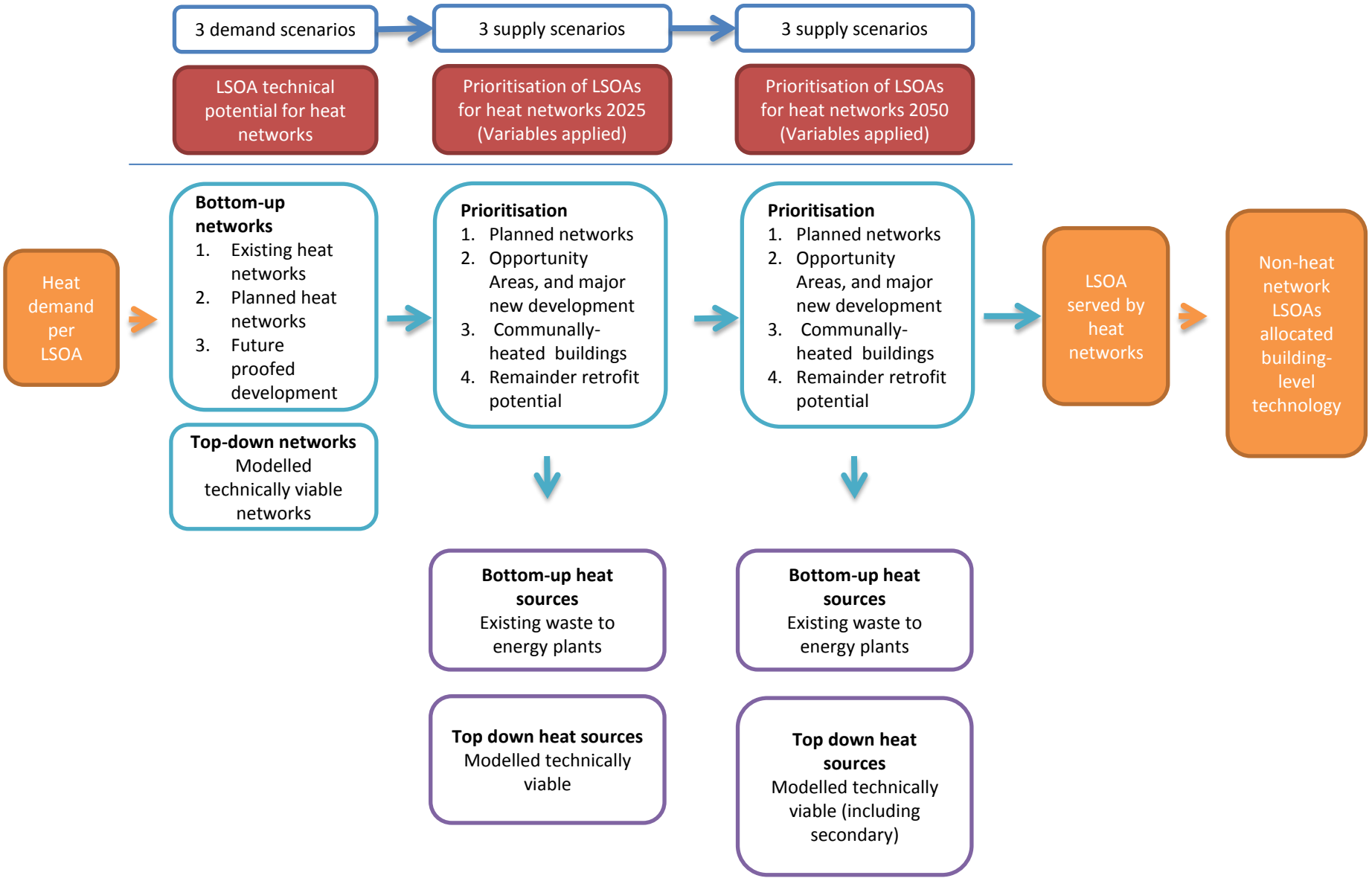
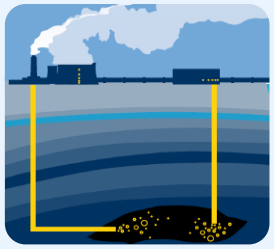
THE HEAT MODEL









London Energy Plan Heat Model

Greater London Authority

25th September 2015

Element Energy Ltd
Ian Walker
ian.walker@element-energy.co.uk
Foaad Tahir
foaad.tahir@element-energy.co.uk

Introduction

London Energy Plan heat model – background and objectives

- The heat model assesses the heating technology mix required to meet London's heat demand to 2050.
- Includes analysis of building level technologies, heat networks and hydrogen networks (high-level)
- The decentralised energy system model was initially developed as part of a comprehensive assessment of low carbon energy potential in London (Buro Happold and Camco, 2011) – Main focus of today's session.
- Main functions of the DE modelling are:
  - Evaluate the economically viable potential for district heating deployment in London
  - Identify areas best suited to heat network deployment, i.e. lowest cost of heat delivered
  - Assess economic and environmental performance of heat networks and preferred heat supply technologies in viable areas

Purpose of today's session

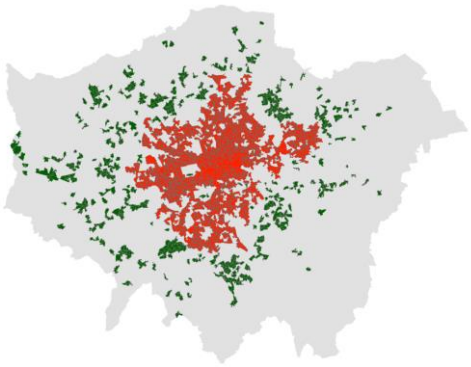
- To gather feedback on the methodology and sense-check the key input assumptions
- To present the type of outputs that the heat model will produce and identify further insights that can be drawn from the analysis

The original decentralised energy model has been amended and updated for integration into the London Energy Plan

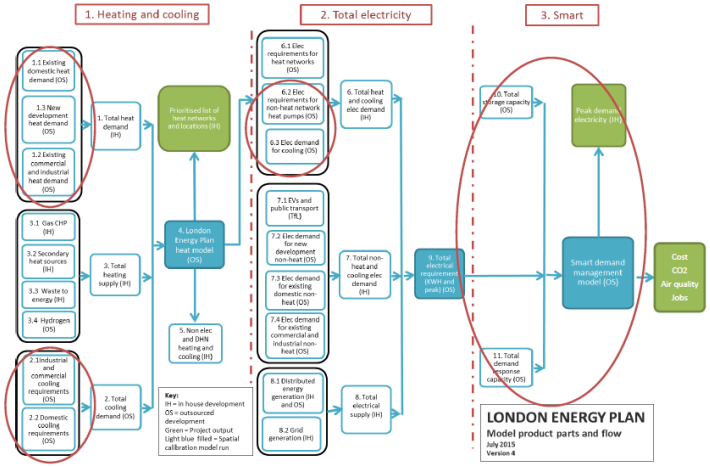
Revisions to the existing decentralised energy potential spreadsheets

- Increased geographic resolution – increased from MSOA to LSOA
- Integration with other London Energy Plan models, particularly the heat demand model
- Integration of secondary heat sources
- Update of cost and performance data with most recent sources

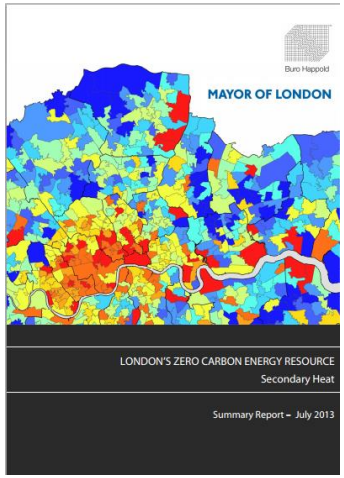
Increased spatial resolution



Integration into the Energy Plan

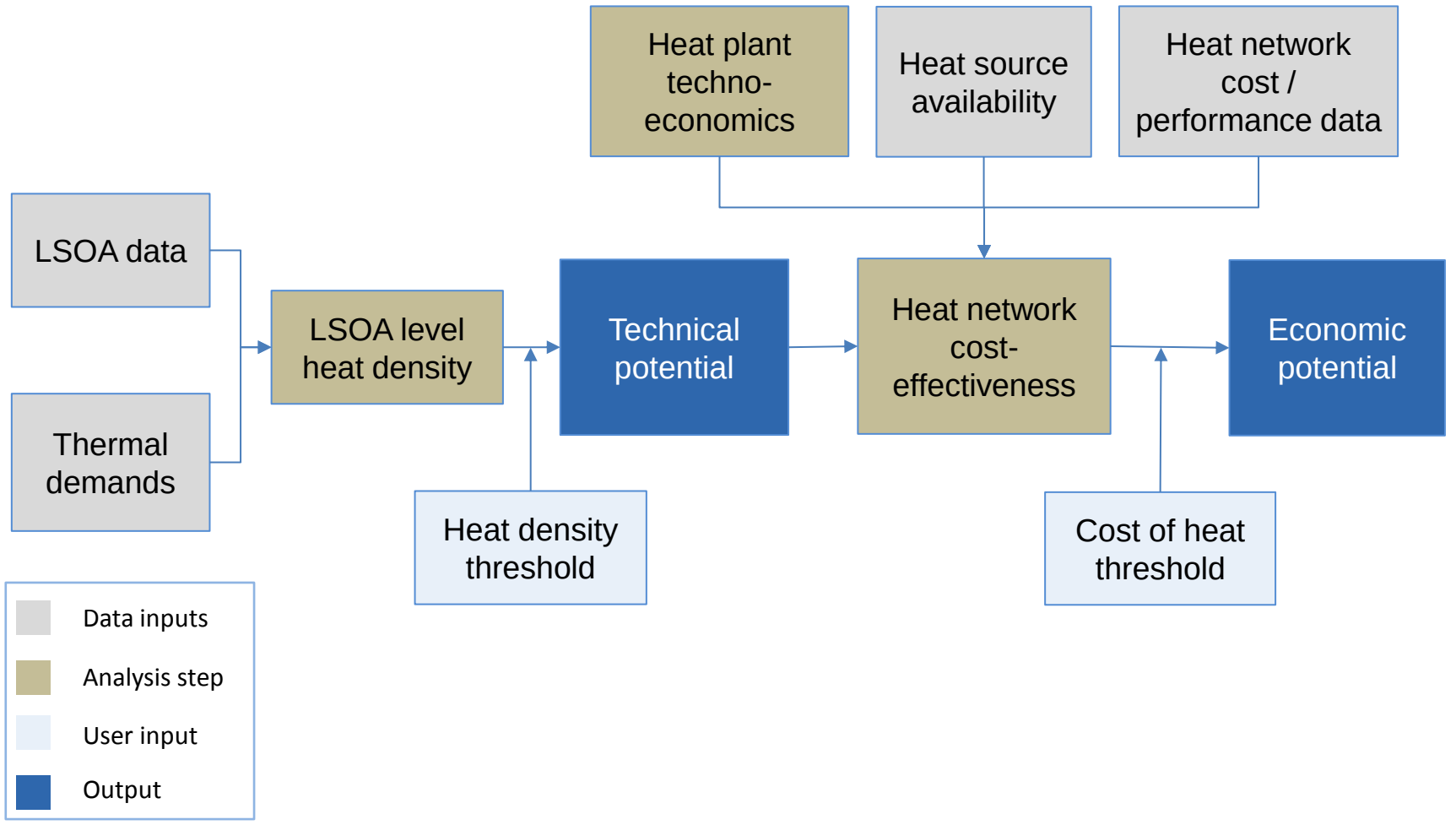


Secondary heat sources



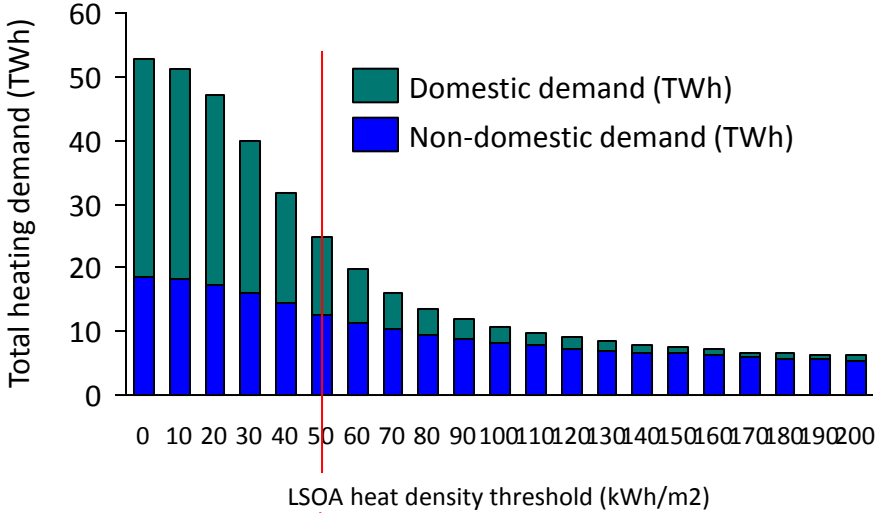
The heat network modelling identifies the technical potential before applying techno-economic analysis to prioritise areas and heat sources

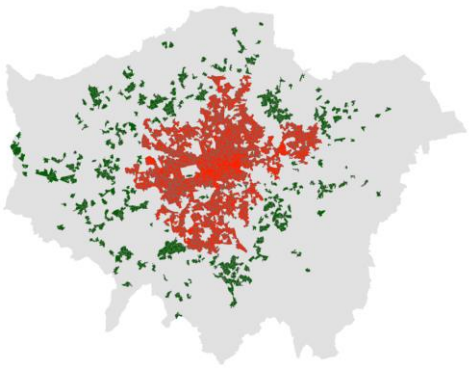
Overview of the heat network assessment model



Assessment of the economics of heat generation and distribution within areas of technical potential underpins the economic deployment

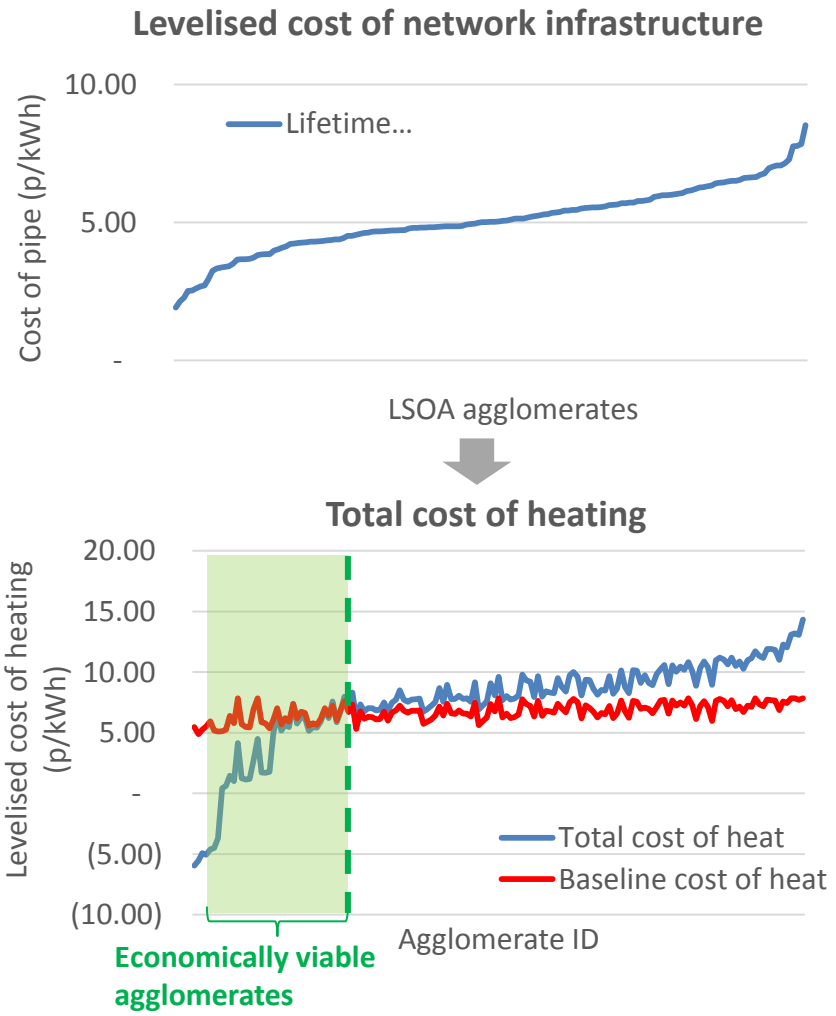
Technical potential





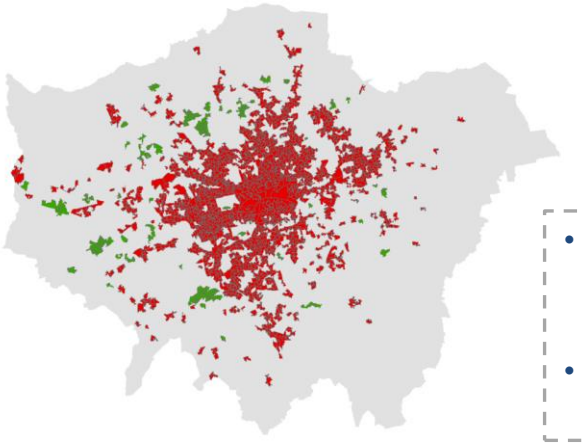
Agglomerates with >50 kWh/m² heat density

Economic potential

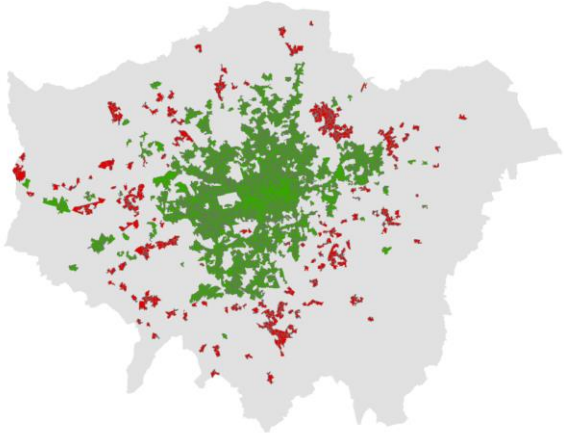


Example outputs – Areas with economic potential and heat sources deployed

2015

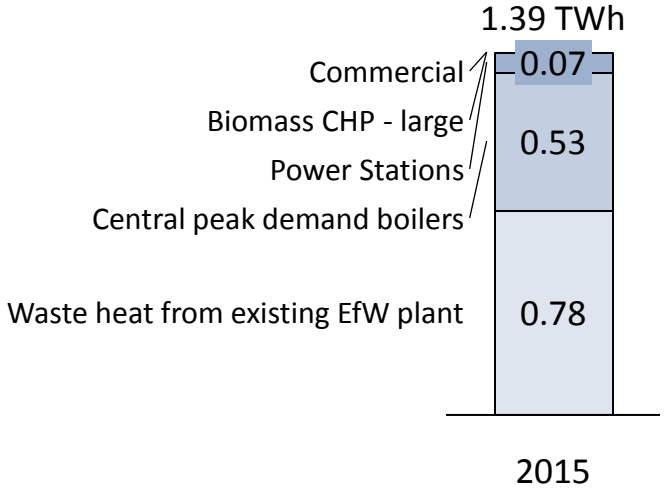


2025

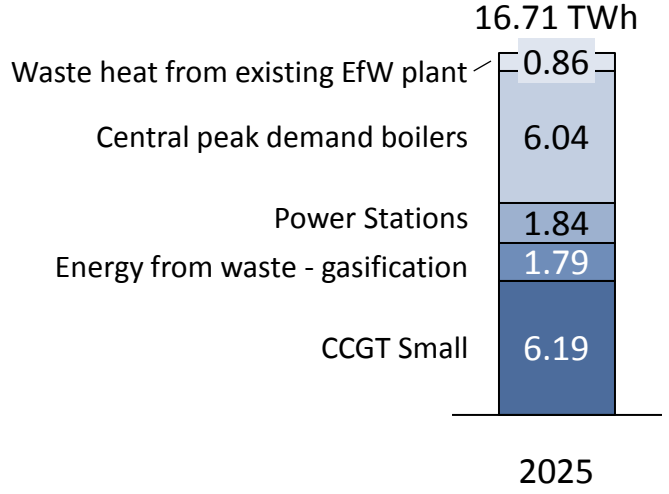


- Green areas have economic potential for heat networks
- Red areas are not viable

Heat delivered by source (TWh)



Heat delivered by source (TWh)



The workshop will now break into groups for two roundtable discussion sessions

Format of the break-out sessions

- The room will be divided into four groups
- There will be two break-out sessions, each:
  1. Approach & assumptions
  2. Heat sources and economic potential
- Further information is provided on the A3 hand-outs
- Your facilitator will take notes during the discussion and feed the input back to the GLA / Element team

Break-out 1: Approach & assumptions

- London Energy Plan scenarios
- Building level technologies
- Identifying the technical potential
- Heat network sizing, technical and economic parameters
- Secondary heat sources

Break-out 2: Heat sources and economics

- Heat generation technology techno-economics
- Area prioritisation and heat source deployment
- Outputs of the heat model

Breakout Session 1 – Approach and key assumptions

Key points we want to cover in the session

- **London Energy Plan scenarios** – Are the three proposed scenarios realistic and useful? If not, what changes would you want to make?

- **Building level technologies** - do we have a full list of technologies? Do you agree with our rationale for including and excluding technologies and how we are applying them?

- **Technical potential for DHN in London** – is the heat density threshold approach sensible? What is an appropriate heat density threshold level?

- **Heat network analysis** – Do you have any feedback on the network analysis methodology? Do you agree with the approach to sizing the network pipe lengths and diameters?

- **Secondary heat source potential** – Do we have a complete list of potential sources? Do you have any comments on the scale of the potential and spatial constraints on availability

Breakout Session 2 – Heat sources and economic potential

Key questions for the session

- **Heating technologies** – Do you have any comments on the range of heat sources considered and the available potential within London? Do you have any comments on the heat plant economics?

- **Area prioritisation and heat source deployment** – Are there any comments on the approach to prioritising areas for heat networks and selecting heat sources? Do you have any comments on the appropriate choice of cost-effectiveness threshold for DHN viability?

- **Economic potential** – Do you have ant feedback on the approach to determining economic viability? What is an appropriate counterfactual cost of heat?

- **Outputs and future network prioritisation** – Are the outputs provided by the heat model useful? Are there any other outputs that should be produced?

KEY ENERGY ISSUES AND OPPORTUNITIES FOR LONDON

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ISSUES AND OPPORTUNITIES

Domestic buildings demand and demand shifting	• Increasing use of batteries for power storage • Need for incentives to help consumers switch use of energy during the day
Non-domestic buildings demand and demand shifting	• Incentives for SMEs • Gaining developer views of new technologies and rateable values
Transport	• Home working • Electric vehicles and vehicle-to-grid technologies
Electricity grid	• Interaction and balancing of heat, gas and electricity grids in the future • Increasing use of microgrids and local management of grids • Use of renewables and challenges and opportunities around load balancing
Heat supply	• Use of thermal and other storage on heat networks • Transitioning from gas-fired CHP to other heat sources from now to 2050 • Ownership of heat networks • Interaction of building energy efficiency with heat network efficiency
Other	• Air quality impacts of different energy infrastructure and technologies • Addressing fuel poverty • How costs are spread • Include behavioural factors in uptake of technologies

ROUND UP AND NEXT STEPS

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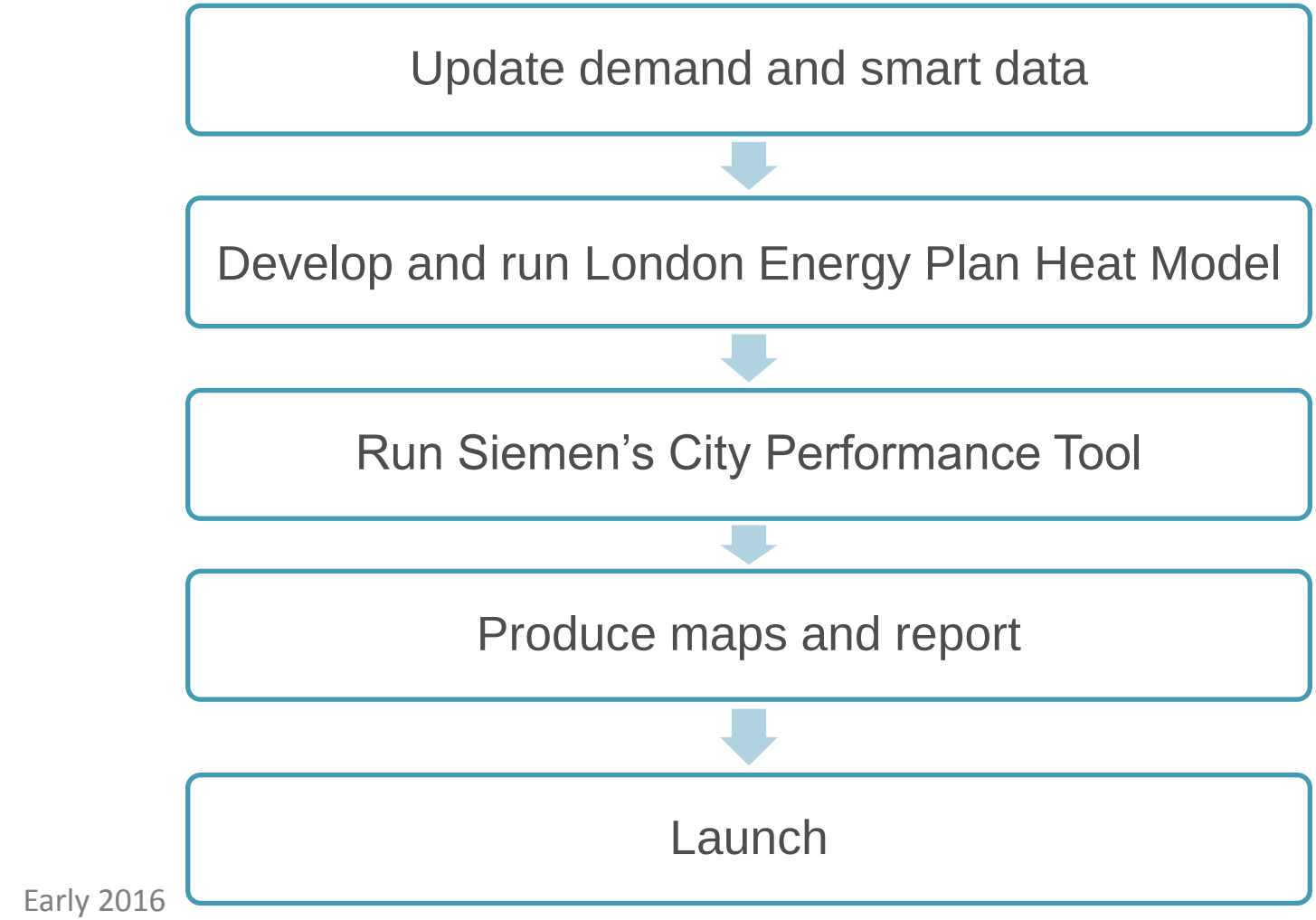
NEXT STEPS


Update demand and smart data
Develop and run London Energy Plan Heat Model
Run Siemen's City Performance Tool
Produce maps and report
Launch
Early 2016

THANK YOU

CONTACT US

Leah.Davis@london.gov.uk
020 7983 4615

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