THERMOS

Accelerating the development of low-carbon heating & cooling networks

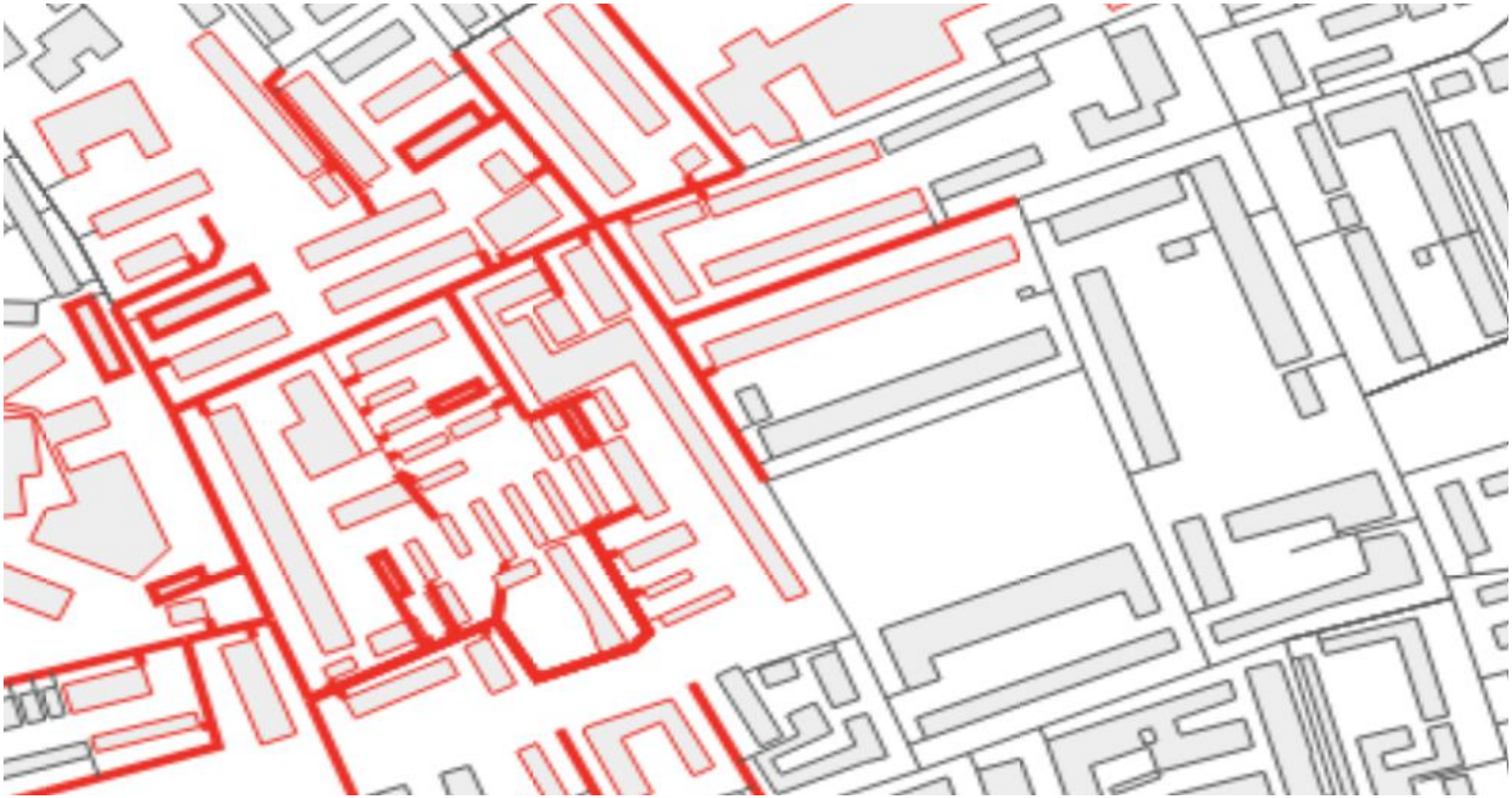
Capacity Building and Train-the-trainer programme
Module 3: Embedding THERMOS in your City

Module 3 of the THERMOS Capacity and Training programme

This Module consists of five parts as follows:

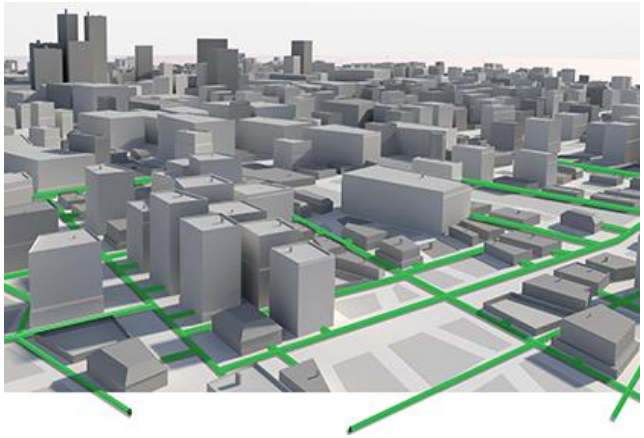
3.1 Planning a city's thermal system using THERMOS
3.2 Dataset requirements, sources and proxies (*upcoming*)
3.3 Political and technical decision-makers' involvement
3.4 Impact of THERMOS and cross-departmental potential
3.5 THERMOS used by different stakeholders.

3.1 Planning a city’s thermal system using THERMOS



Q: How effectively are cities planning their energy supply and distribution networks?

- Robust methods to identify, analyse and compare specific thermal energy system options at local authority scale are essential to develop strategic local sustainable energy solutions.
- Most of this work in Europe is currently being done more or less manually by a limited number of consultants using their own bespoke, private and often crude tools.
- This creates a number of problems…



Answer: in many cases, ineffectively…

- Studies are expensive, with little or no cost reduction over time.
- There is limited capacity in the consultancy sector to undertake the work and limited capacity in public authorities to manage it effectively.
- There is a lack of transparency and consistency in the methods used, so meta-analyses are not feasible.
- There is little or no capacity-building in the public authorities who pay for the work, because this is not in the short-term interests of private sector consultants.

A solution...?

- **THERMOS** – a decision support tool for energy planners.
- Combines state-of-the-art energy system data and models in a user-friendly map-driven open-source web-based application.
- Tailored to the real-world requirements of energy planners to make heat network planning faster, more efficient and more cost effective.

A solution...?

- Considers a wide range of energy sources (including waste heat from transport infrastructure).
- Incorporates state-of-the-art demand modelling to produce address-level energy system maps (considers heating, cooling and electricity demand).
- Applies advanced modelling algorithms to analyse energy supply and distribution options.
- Tested in eight THERMOS Pilot and Replication Cities.

Preparation for adopting THERMOS

THERMOS can be easily embedded within local authority energy planning systems but will need a supportive 'environment' to ensure successful adoption.

The first steps are therefore to:

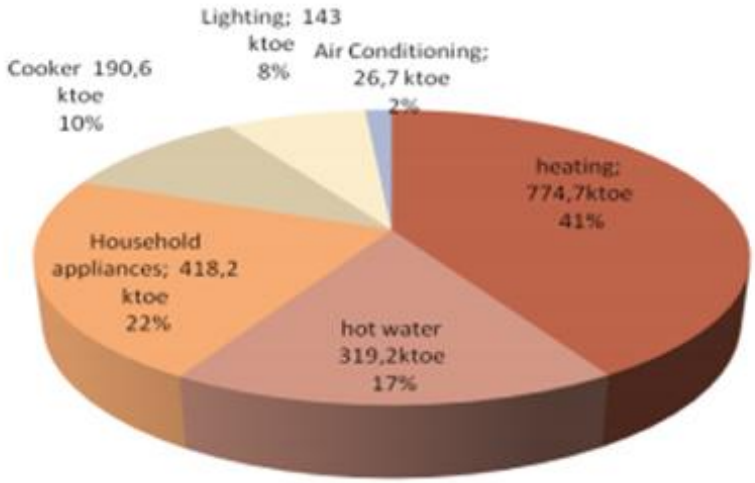
- Undertake a **Baseline Replication Assessment**
- Establish a **Local Stakeholder Liaison Group**
- Engage **THERMOS trainers** and prepare for roll-out of training
- Selection of **initial case study**.

Baseline Replication Assessment

…needed to assess the national/local framework conditions needed for the successful adoption of THERMOS. This will define:

- Heating and cooling in the local context
- Stakeholder identification and engagement
- Towards THERMOS uptake (i.e. barriers and solutions)
- THERMOS case study (example of where THERMOS could be used)

Figure 3: Domestic energy consumption distribution by uses (2007)



Local Stakeholder Liaison Group

…needed to establish or strengthen engagement in cities to ensure bottom-up support and a needs-based application of the THERMOS tool. This will:

- Establish a group of relevant local and regional stakeholders to support the city in energy system planning with THERMOS.
- Facilitate data collation for the Baseline Replication Assessment and subsequent THERMOS analyses…

Local Stakeholder Liaison Group

…needed to establish or strengthen engagement in cities to ensure bottom-up support and a needs-based application of the THERMOS tool. This will:

- …promote capacity building through new skills and expertise within the group.
- Communicate and promote THERMOS energy system planning initiatives amongst wider city stakeholders.

(See **Module 6** for further information)

Engage trainers and prepare for roll-out of training

- The THERMOS Train-the-Trainer programme will have resulted in one or more trainers in each Pilot/Replication City.
- Further training should be scheduled for other stakeholders e.g. Stakeholder Liaison Group.
- Trainers should draw on the accompanying suite of THERMOS materials to raise awareness e.g. Replication Guide, Innovation Catalogue, Service-pitch book etc.

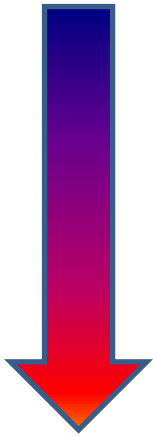
Selecting an initial case study

THERMOS is designed to consider four main use-cases which should cover the needs of most cities:

1. Adding new sites and connections to an existing network
2. Designing a new network based on an existing energy source
3. Designing a new network to supply a given set of buildings, with one or more potential energy sources
4. Assessing / comparing the performance of specific networks and non-networked solutions

Where does THERMOS fit?

Typical processes in developing heat networks:



1. Heat mapping
2. Energy master planning
3. Feasibility
4. Detailed project development
5. Commercialisation

Where does THERMOS fit?

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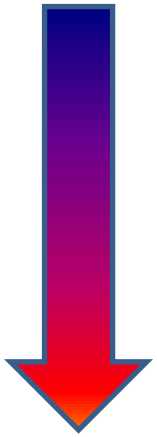

1. **Heat mapping**
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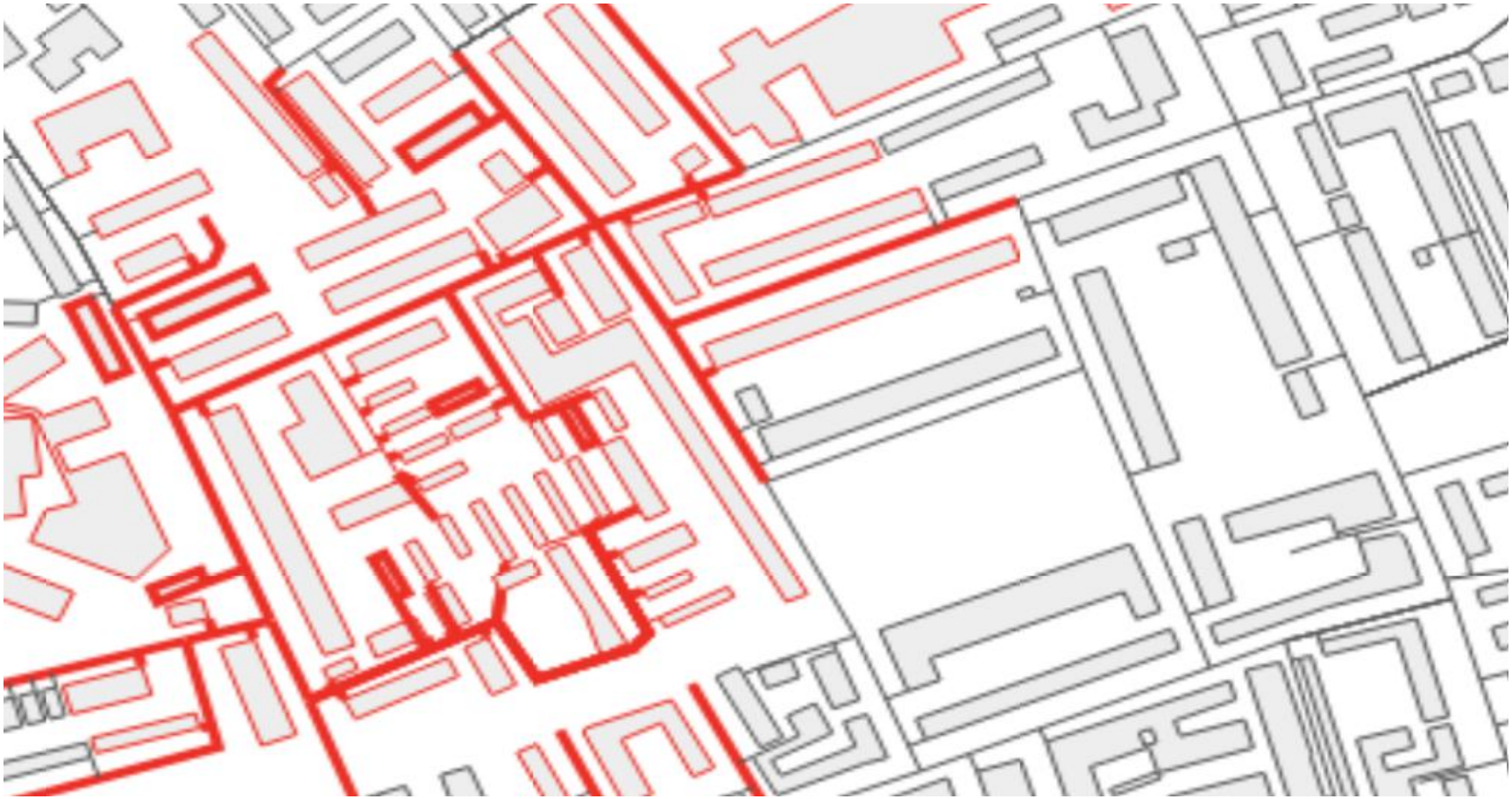
THERMOS can help with these

3.3 Political and technical decision-makers' involvement



Getting corporate commitment

Getting 'buy-in' from decision-makers by recognising THERMOS as a tool which can help enact local strategies and achieve local targets e.g.

- **Sustainable Energy Action Plans (SEAPs)** – 20% emissions reduction by 2020
- **Sustainable Energy and Climate Action Plans (SECAPs)** – 40% emissions reduction by 2030
- **Other regional/local area plans** containing policies on climate change mitigation and adaption, security of energy supply, fuel poverty, economic development etc.

Covenant of Mayors
Committed to urban sustainable energy

Getting corporate commitment

Ensuring adequate allocation of resources with regard to:

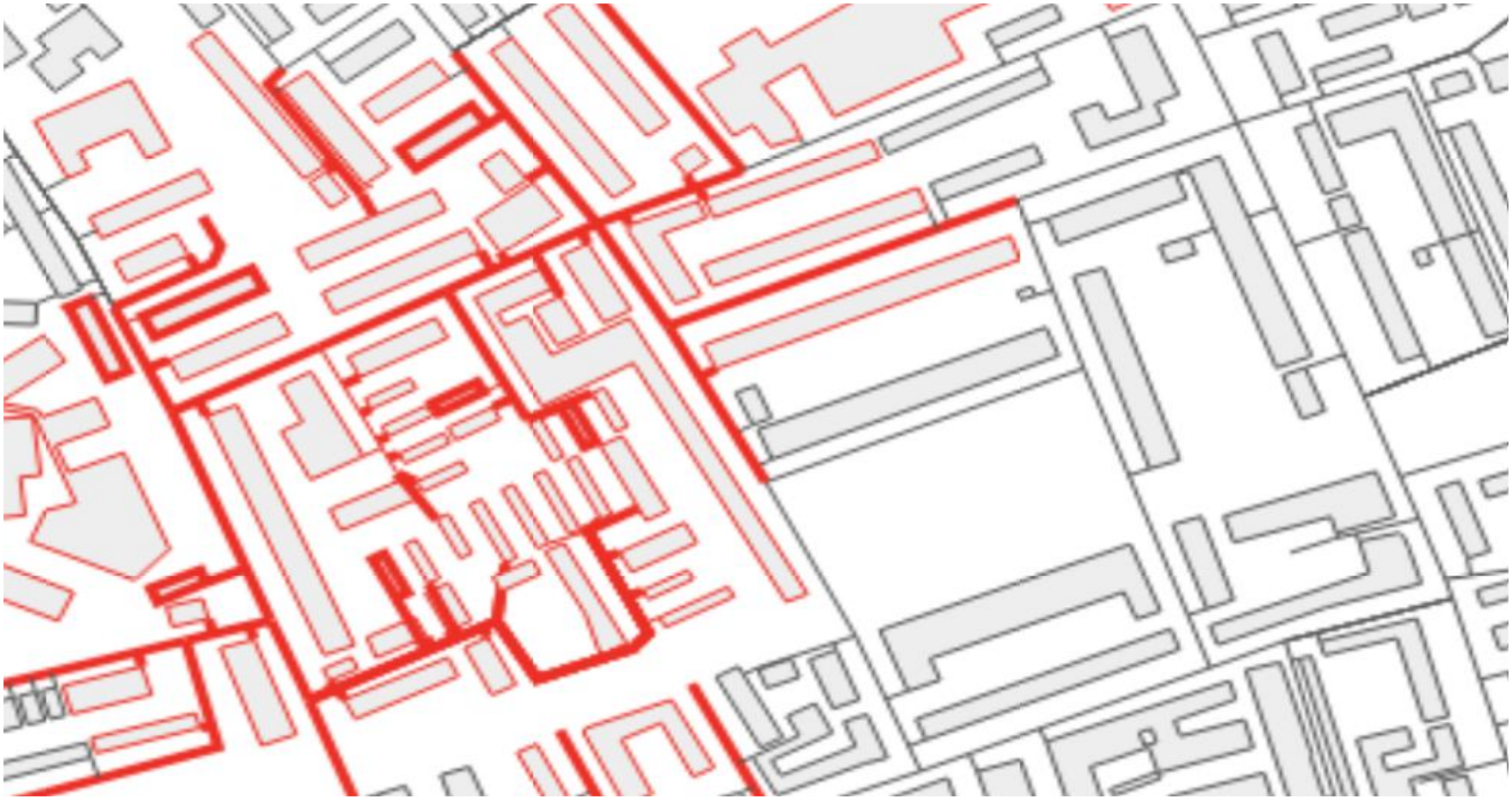
- **Formal adoption** – ensuring THERMOS is suitably communicated and publicised internally and fully embedded within energy planning procedures
- **IT services** – embedding and maintaining the THERMOS application
- **THERMOS tool 'owner'** – nominated individual(s) to manage/operate the tool and be responsible for training, updates, communicating outputs etc…

Getting corporate commitment

Ensuring adequate allocation of resources with regard to:

- **Skills required** – e.g. in building energy systems, collation/formatting of energy data, interpreting THERMOS outputs etc.
- **THERMOS training** – initial training, on-going internal training (Train-the-Trainer)
- **Acknowledging and enabling cross-departmental cooperation** in energy system planning with THERMOS.

3.4 Impacts of THERMOS and cross-departmental potential



Impacts of THERMOS in energy system planning

Using THERMOS to facilitate energy system planning can result in a range of benefits both external and internal to the local authority.

External: Well-designed systems, appropriately scaled and located to:

- Help reduce local CO_2 emissions or other pollutants
- Provide increased security of energy supply from decentralised local energy systems
- Facilitate a range of local socio-economic benefits
- Maximise synergy between local energy sources and demands.

Impacts of THERMOS in energy system planning

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Internal:

- Cheaper than using external consultants and builds capacity for future
- Potentially a faster, more efficient process
- Increased flexibility to explore difference scenarios and make changes…

Impacts of THERMOS in energy system planning

Using THERMOS to facilitate energy system planning can result in a range of benefits both external and internal to the local authority.

Internal:

- …better in-house understanding of design principles, sensitivity of variables and options available
- Improved integration between local authority departments or teams
- Demonstrating leadership and innovation in energy system planning.

Cross-departmental potential

- Energy system planning with THERMOS may require collaboration between a number of local authority departments or teams.
- Need to avoid the 'silo' approach where departments have a tradition of working independently…

Cross-departmental potential

Examples of departmental roles in using THERMOS and/or interpretation of results:

- **Spatial planning** – initial overview of existing/new developments and citywide strategic energy infrastructure planning.
- **Housing/building management** – liaison with occupants, views on joining heat networks.
- **Sustainability or environmental protection** – assessment of emissions/noise from energy plant, sustainability of fuels, evaluation of environmental benefits…

Cross-departmental potential

Examples of departmental roles in using THERMOS and/or interpretation of results:

- **Engineering** – feasibility of proposed pipe routes, suitability of energy plant location, costings for engineering works and plant operation.
- **Energy management** – identification of low/zero carbon energy supplies, collation of local empirical data on energy demands, impact of energy efficiency refurbishment on demand, options for energy system ownership/operation, financial viability of energy system and costs to end-users…

Cross-departmental potential

Examples of departmental roles in using THERMOS and/or interpretation of results:

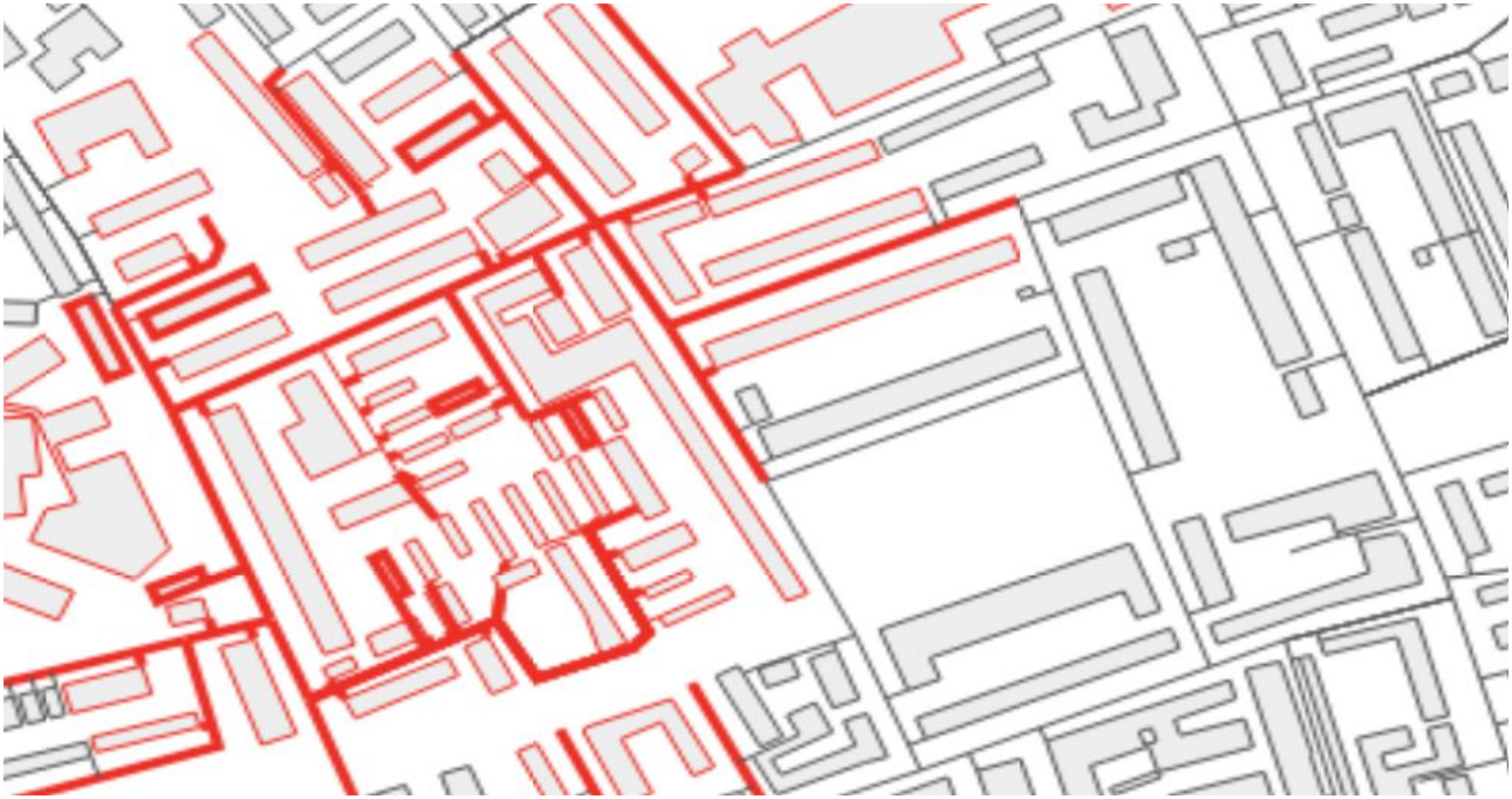
- **Water and waste management** – use of water/waste treatment plants as energy generation sources (Anaerobic digestion, biogas, energy-from-waste, etc)
- **Economic development** – evaluation of wider socio-economic benefits and subsequent identification of areas which could benefit the most.
- **Energy Procurement** – comparison of existing energy costs with those modelled by THERMOS…

Cross-departmental potential

Examples of departmental roles in using THERMOS and/or interpretation of results:

- **Social services** – liaison with householders and social housing tenants on participation in a local energy network.
- **Transport/Mobility** – joint coordination of infrastructure installation (done concurrently to minimise disruption), co-location of electric vehicle charging points with private-wire CHP system.
- **IT services** – installation and maintenance of THERMOS, advice on GIS formats and outputs.

3.5 THERMOS used by different stakeholders



THERMOS is open-source…

THERMOS facilitates multi-stakeholder use by:

- Use of open-source software and datasets wherever possible, making sharing and comparison of outputs easier
- Enabling strategic citywide meta-analysis of opportunities for potential future integration
- Free comprehensive support through THERMOS project outputs including Application Manual, Replication Guide, Sustainable Adoption Roadmap and Trainers' Network.

Not just for local authorities…

THERMOS is most likely to be used by local authority planners and energy management staff, but is also available to other stakeholders such as:

- Civil servants
- Consultants
- Utilities & energy providers
- Community groups
- Other public sector bodies with large urban estates
- Housing associations

Summary

- THERMOS offers a way to help city planners strategically plan their networked energy systems more effectively and efficiently.
- The THERMOS tool combines state-of-the-art energy system data and models in a user-friendly map-driven open-source web-based application.
- Cities can prepare for THERMOS by undertaking a Baseline Replication Assessment, establishing a Local Stakeholder Liaison Group, planning training and selecting an initial case study.

Summary

- THERMOS uses open-source data where possible and aims to be flexible regarding data input sources/formats to allow for use of proxies where necessary.
- Formal corporate ‘buy-in’ and adequate resource allocation are prerequisites for the successful adoption of THERMOS.
- The potential internal and external benefits of THERMOS should be recognised from the start.
- Cross-departmental collaboration in the adoption and use of THERMOS should be planned and encouraged – maybe new processes needed?
- THERMOS is open-source and available to other stakeholders alongside local authorities

THERMOS

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