



THERMOS

Accelerating the development of
low-carbon heating & cooling networks

Affordable Smart City Heating – Dream or Reality?

THERMOS European Inspire Event

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Content

1. Key facts about THERMOS
2. How does THERMOS work?
3. Opportunities to engage



The aim of THERMOS is to develop and share tools and data for identifying and selecting low-carbon heating options in real geographies



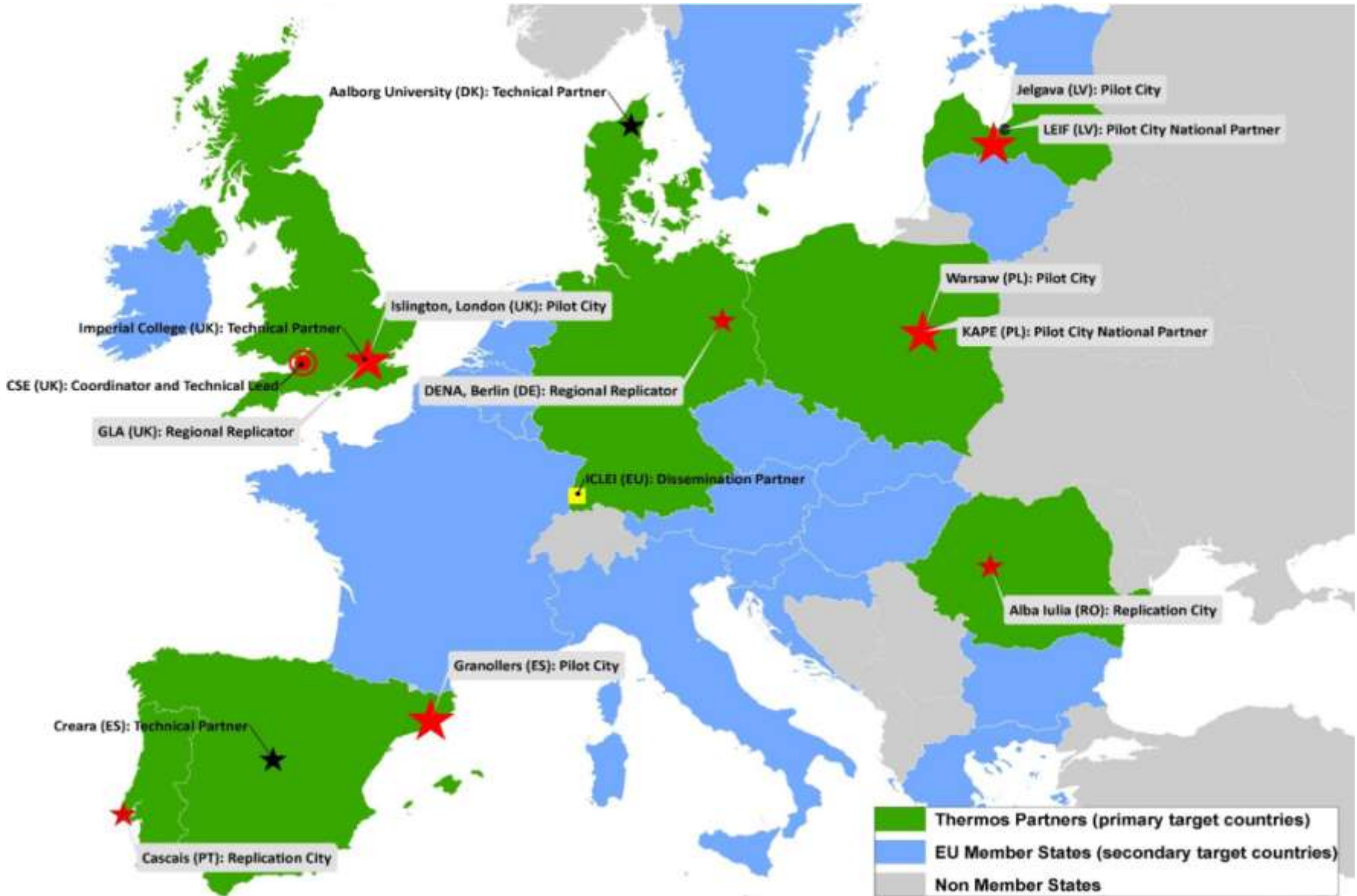
1. Generalise, implement and share and methods and data for **high-resolution energy system mapping**
2. Develop thermal **energy system models and optimisation** procedures which run on these maps
3. Integrate the maps and the models in an **open-source software** application developed in close collaboration with pilot local authority users
4. **Support the use** of the new tools with replication partners
5. **Promote and disseminate** our results to maximise post-project exploitation





1. **Building-level energy system mapping** – scalable to cities, regions and countries
2. **Energy system models** with direct representation of networks: **going beyond 2D heat mapping**
3. **Optimisation** to identify best solutions
4. **Free, open-source** product, aimed at local authorities: no requirement for expensive third-party software
5. Use of **open-data** for inputs whenever possible
6. Close collaboration with **Pilot local authority partners** to make sure we build tools with the most meaningful features
7. Supported rollout to **Replication partners** to ensure post-project sustainability







What kinds of question will THERMOS help with?

The purpose of THERMOS is to support the identification and development of low-carbon heating and cooling options.

The interests of the Pilot and Replication City users imply a need to support the following activities, and this is how we are designing the tool:

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



What's in an answer?

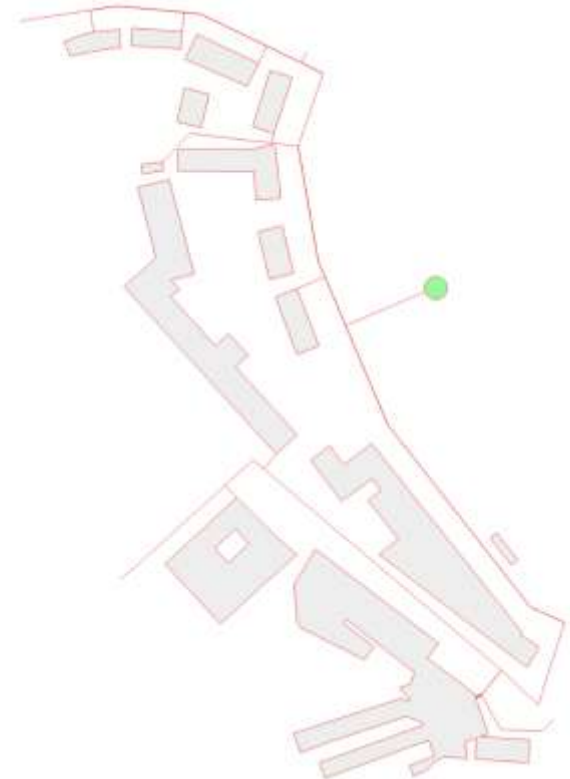
The Thermos application identifies the *best solution*, given a set of available energy supplies, demands, and distribution routes and the choice of certain decision-making parameters



What's in an answer?

The Thermos application identifies the *best solution*, given a set of available energy supplies, demands, and distribution routes and the choice of certain decision-making parameters

Here, a solution is a set of energy supplies connected to the set of demands they satisfy. The connections can be in the form of a distribution network, or as building-integrated heating technologies like individual gas boilers.





Asking a question

There are often lots of possibilities. The question is which supplies and demands to include, and how to join them up to get a viable system?

This is the set of decisions that the tool supports the user in making





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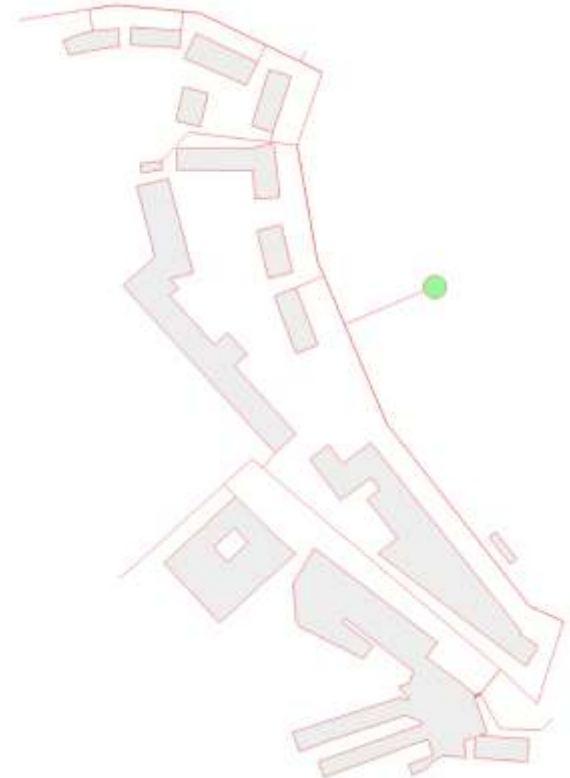




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Question structure

In THERMOS, a question comprises a set of elements which either could, or alternatively must, be in the resulting solution.

The elements are:



Energy demands - usually buildings

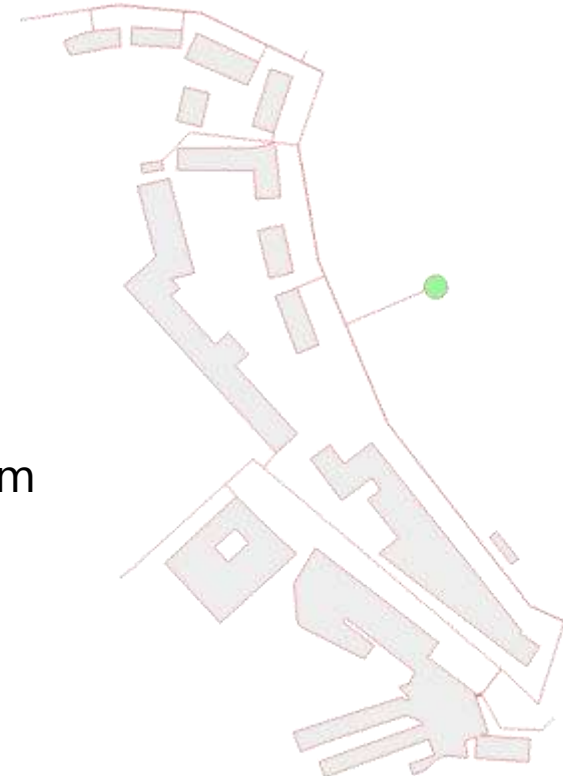


Energy supplies - e.g. CHP, boiler, heat pump



Connections – these combine to form a distribution network

And importantly: we also have to say what we mean by the “**best**” solution





Question structure

“Best” defines what quantity energy system model is trying to optimise. For example, we might want as our answer the solution with the:

- Highest net present value
- Lowest capital expenditure
- Lowest emissions
- Highest total demand met
- (other criteria are possible)



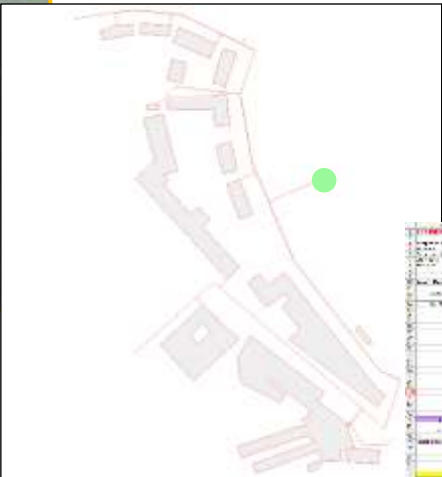

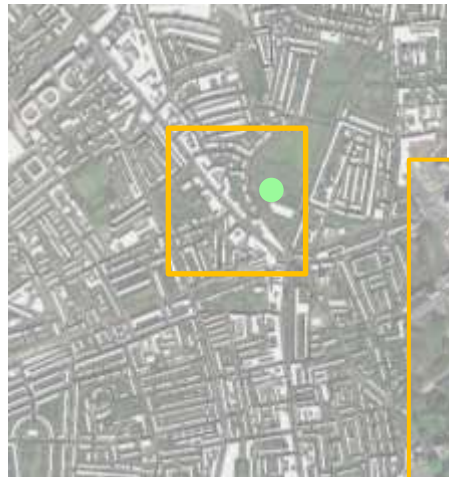
Getting an answer

When presented with a question in this way, the application will return a description of the solution. This will include things like

- Costs (capital, fuel, NPV)
- Fuel inputs and heat outputs
- Emissions
- A list and a map of the sites (supplies and demands) and connections
- Some detail on the properties of each of the sites and connections

The user will be able to export some or all of this data for use in other applications

Recap



THERMOS - Energy Performance of Buildings (EPB) - Detailed Data			
Room	Area (m²)	Volume (m³)	U-value (W/m²K)
Room 1	100	2000	0.15
Room 2	150	3000	0.15
Room 3	200	4000	0.15
Room 4	250	5000	0.15
Room 5	300	6000	0.15
Room 6	350	7000	0.15
Room 7	400	8000	0.15
Room 8	450	9000	0.15
Room 9	500	10000	0.15
Room 10	550	11000	0.15
Room 11	600	12000	0.15
Room 12	650	13000	0.15
Room 13	700	14000	0.15
Room 14	750	15000	0.15
Room 15	800	16000	0.15
Room 16	850	17000	0.15
Room 17	900	18000	0.15
Room 18	950	19000	0.15
Room 19	1000	20000	0.15
Room 20	1050	21000	0.15
Room 21	1100	22000	0.15
Room 22	1150	23000	0.15
Room 23	1200	24000	0.15
Room 24	1250	25000	0.15
Room 25	1300	26000	0.15
Room 26	1350	27000	0.15
Room 27	1400	28000	0.15
Room 28	1450	29000	0.15
Room 29	1500	30000	0.15
Room 30	1550	31000	0.15
Room 31	1600	32000	0.15
Room 32	1650	33000	0.15
Room 33	1700	34000	0.15
Room 34	1750	35000	0.15
Room 35	1800	36000	0.15
Room 36	1850	37000	0.15
Room 37	1900	38000	0.15
Room 38	1950	39000	0.15
Room 39	2000	40000	0.15
Room 40	2050	41000	0.15
Room 41	2100	42000	0.15
Room 42	2150	43000	0.15
Room 43	2200	44000	0.15
Room 44	2250	45000	0.15
Room 45	2300	46000	0.15
Room 46	2350	47000	0.15
Room 47	2400	48000	0.15
Room 48	2450	49000	0.15
Room 49	2500	50000	0.15
Room 50	2550	51000	0.15
Room 51	2600	52000	0.15
Room 52	2650	53000	0.15
Room 53	2700	54000	0.15
Room 54	2750	55000	0.15
Room 55	2800	56000	0.15
Room 56	2850	57000	0.15
Room 57	2900	58000	0.15
Room 58	2950	59000	0.15
Room 59	3000	60000	0.15
Room 60	3050	61000	0.15
Room 61	3100	62000	0.15
Room 62	3150	63000	0.15
Room 63	3200	64000	0.15
Room 64	3250	65000	0.15
Room 65	3300	66000	0.15
Room 66	3350	67000	0.15
Room 67	3400	68000	0.15
Room 68	3450	69000	0.15
Room 69	3500	70000	0.15
Room 70	3550	71000	0.15
Room 71	3600	72000	0.15
Room 72	3650	73000	0.15
Room 73	3700	74000	0.15
Room 74	3750	75000	0.15
Room 75	3800	76000	0.15
Room 76	3850	77000	0.15
Room 77	3900	78000	0.15
Room 78	3950	79000	0.15
Room 79	4000	80000	0.15
Room 80	4050	81000	0.15
Room 81	4100	82000	0.15
Room 82	4150	83000	0.15
Room 83	4200	84000	0.15
Room 84	4250	85000	0.15
Room 85	4300	86000	0.15
Room 86	4350	87000	0.15
Room 87	4400	88000	0.15
Room 88	4450	89000	0.15
Room 89	4500	90000	0.15
Room 90	4550	91000	0.15
Room 91	4600	92000	0.15
Room 92	4650	93000	0.15
Room 93	4700	94000	0.15
Room 94	4750	95000	0.15
Room 95	4800	96000	0.15
Room 96	4850	97000	0.15
Room 97	4900	98000	0.15
Room 98	4950	99000	0.15
Room 99	5000	100000	0.15
Room 100	5050	101000	0.15



To make the most of THERMOS, you will need:

- An understanding of thermal energy systems for buildings
- Good local knowledge of the study area
- Ideally this will include access to local data on:
 - building demands
 - supply locations
 - technology and fuel costs
- Specific questions which map to the THERMOS features
- GIS skills and software, for creating reports on the results



How to engage with us

- Learn about case studies developed by pilot and replication cities
 - Local stakeholder liaison groups
- Become a THERMOS trainer
 - In each participating country the project partners will train external stakeholders on the use of the THERMOS tools
 - EU and country specific **Train-the-Trainer** modules
- 5 European and 8 national workshops
- 4 webinars
- Stakeholders dialogues
- 3 European and 8 national inspire events



EU and country specific Train-the-Trainer modules

- Thermal energy supply and demand in Europe
- Energy system mapping and modelling with THERMOS
- Embedding THERMOS in your city
- Optimising thermal planning, resources and technologies
- Heating and cooling market and finance
- Local stakeholders involvement for adopting THERMOS
- Decarbonising the heating and cooling sector towards 2050

- Complementary material:
 - HEATING AND COOLING INNOVATION CATALOGUE
 - THERMOS USER MANUAL

THERMOS

thermos-project.eu

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