



# THERMOS

Accelerating the development of low-carbon  
heating & cooling networks in Europe

THERMOS Train-the-Trainer Certification Programme  
Instructor Led - Webinar No. 1

**29th October 2020**





# Welcome to the THERMOS Capacity and Train-the-Trainer Certification Programme!

## Agenda for Today

**16:00 – 16:05** Welcome and introduction (*by Daniela Torres – ICLEI*)

**16:05 – 16:10** Train the Trainer Programme introduction (*by Julen Imana – ICLEI*)

**16:10 – 16:20** THERMOS tool features (*by Martin Holley – CSE*)

**16:20 – 16:35** Basic THERMOS tool demonstration (*by Julen Imana – ICLEI*)

**16:35 – 16:50** Q&A from participants (*Moderation by ICLEI*)



## Martin Holley

- Senior Technical Project Manager: [Centre for Sustainable Energy](#), UK
- Roles within THERMOS
  - Project Coordinator for THERMOS
  - THERMOS Trainer
  - Support for development and delivery of training materials
- Background
  - Senior Technical Project Manager, Centre for Sustainable Energy (2002-present)
  - Project Engineer, PV Systems Ltd./Energy Environmental Technical Services Ltd. (1999-2002)
  - Environmental Researcher, Corporación Oikos (1996-1997)
  - Test Measurement Engineer, Rolls Royce PLC. (1983-1990)



## Tom Hinton

- Software Developer: [Centre for Sustainable Energy](#), UK
- Roles within THERMOS
  - Tool designer and software developer
  - THERMOS Trainer
  - Support on technical deliverables
- Background
  - Software Developer, Centre for Sustainable Energy (2012-present)
  - Scientific Software Engineer, Minimax Labs (2010-12)
  - Contracting Software Engineer to CPFR Solutions (2002-03)



## **Alis Daniela Torres**

- Officer Sustainable Resources, Climate and Resilience. ICLEI Europe.
- Roles within THERMOS
  - THERMOS Train the Trainers programme manager.
  - Support to the development of THERMOS Sustainable Adoption Roadmap



## **Alexandra Pfohl**

- Officer, Communications and Member Relations. ICLEI Europe
- Roles within THERMOS
  - THERMOS communications and capacity building manager
  - Support on technical deliverables on communication, exploitation and stakeholder engagement.



## **Julen Imana**

- Jr. Officer Sustainable Resources, Climate and Resilience. ICLEI Europe.
- Roles within THERMOS
  - THERMOS Train the Trainers programme manager.



# THERMOS in a nutshell

- EU Horizon 2020 funded research project (2016 – 2021)
- provides advanced energy system data and models in a **user-friendly open-source software** to make heating and cooling network planning faster, more efficient, and more cost effective.



CASCAIS



MAYOR OF LONDON

Imperial College  
London

ISLINGTON

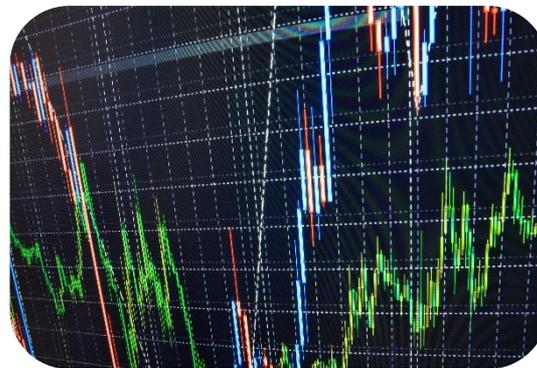


# THERMOS – Thermal Energy Resource Modelling and Optimisation System

An open-source software designed to:



optimise local district energy network planning processes



support sustainable energy master planning



identify and select low-carbon heating options in real geographies



# THERMOS Train-the-Trainer Programme



**Pathway D – Fall 2020**



## Become a THERMOS expert in less than 16 hours in three easy steps with the THERMOS online Training!

<p><b>3 Instructor-Led Webinars</b></p> <p><i>Dedication: 1 hour per webinar</i></p>	<ul style="list-style-type: none"> <li>• <b>Webinar 1:</b> Kick-off &amp; energy system mapping and modelling with THERMOS <b>Oct 29<sup>th</sup> 2020 16:00</b></li> <li>• <b>Webinar 2:</b> Embedding THERMOS in your city. Case Studies Presentations by THERMOS partners <b>November 12<sup>th</sup> 2020. 16:00</b></li> <li>• <b>Webinar 3:</b> Final Webinar THERMOS trainers in action – Presentation of Cases by New Trainers <b>December 10<sup>th</sup>, 2020 16:00</b></li> </ul>
<p><b>THERMOS practical exercises</b></p> <p><i>Study time: 4-6 hours + 3 Supporting Videos (20 min each)</i></p>	<p><b>Option A:</b> Completing all three exercises with supporting videos</p> <ul style="list-style-type: none"> <li>• Exercise 1: Planning &amp; evaluating a project with THERMOS.</li> <li>• Exercise 2: Optimising planning decisions</li> <li>• Exercise 3: Modifying demand and network paths</li> </ul> <p><i>Evaluation: Submission of exercise solutions. By <b>December 1st, 2020</b></i></p>
<p><b>THERMOS Pro Case Study</b></p> <p><i>Study time: 6 -8 hours</i></p>	<p><b>Option B:</b> Developing instructor-led real cases with THERMOS</p> <p><i>Evaluation: Advancing and presenting your case to THERMOS partners <b>December 1st, 2020</b></i></p>

Obtain a Training Certificate at the end!



- Find additional recorded webinars & reading material on the website
  - Recorded Webinars
  - THERMOS Innovation catalogue
  - Scientific Publications
- Download and submit your exercises on the website before **December 1st!**



# **Welcome to the THERMOS Capacity and Train-the-Trainer Certification Programme**

Lets Get Started!

Webinar 1

**Energy system mapping and modelling with THERMOS**





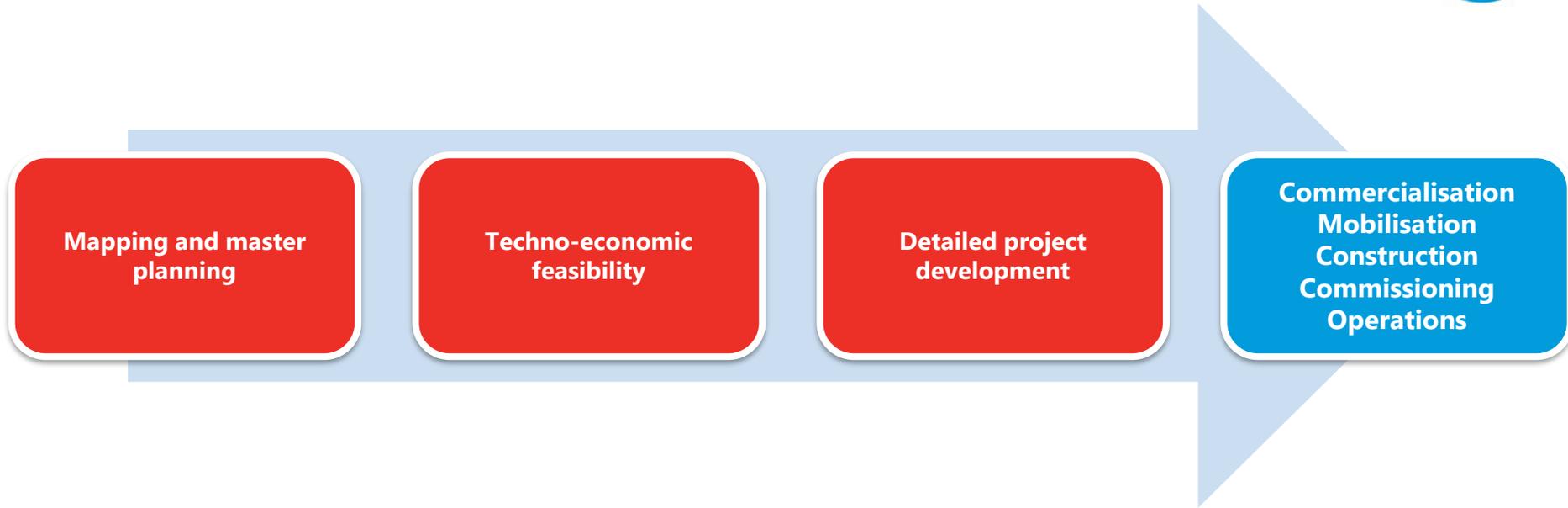
# THERMOS

## Overview and Key Features



# What is THERMOS used for?

thermos-project.eu



- Early-stage planning of district energy systems
- Considers four main use-cases:
  1. Expansion of existing district heating/cooling systems
  2. Identifying local energy demands for known energy sources
  3. Optimising networks between known energy sources and demands
  4. Providing optimised solutions when considering energy demand reduction, networked and non-networked system measures



# Who can use it?

- Anyone – it's open-source, but mainly designed for local authorities and other stakeholders involved in district energy system planning
- THERMOS training resources available along with comprehensive online manual and 'quick-start' guide
- Basic level of understanding of energy systems required plus some GIS experience (if uploading local datasets)



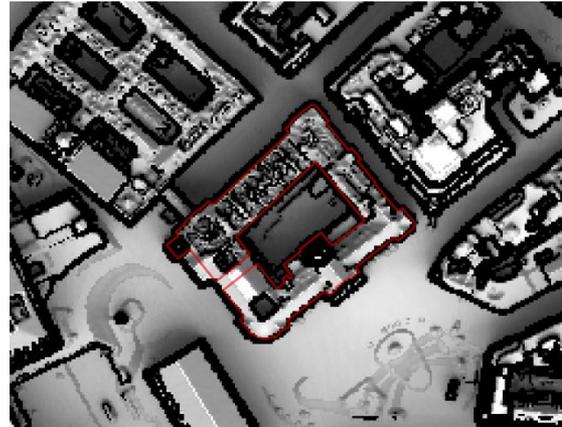
# Key features of THERMOS

thermos-project.eu



## 1. Mapping heat demand:

- Applies innovative demand model based on building shape and local heating degree days
- Uses 2-D building polygon data from OpenStreetMap (default), or 3-D shape data if height data available



- Cooling demand estimation via basic benchmarks
- Can also upload local data e.g. building polygons, energy demand benchmarks or actual known demands

# Key features of THERMOS

## 2. Optimising a network layout:

- Can consider two objectives:
  - Maximising network NPV
  - Maximising 'whole system' NPV
- Iterative method for network based on three decisions:
  - Location of heat source(s)
  - Which heat demands should connect to the network
  - Routes of heat distribution pipes
- Cooling treated in a similar way



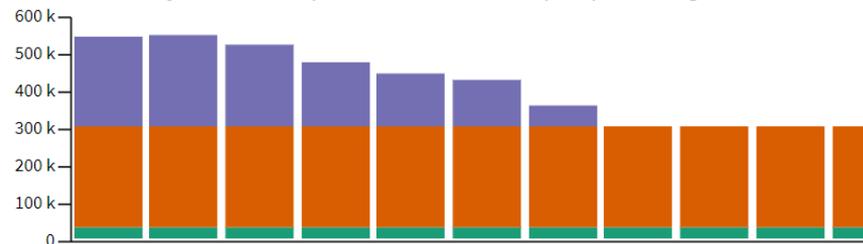
# Key features of THERMOS



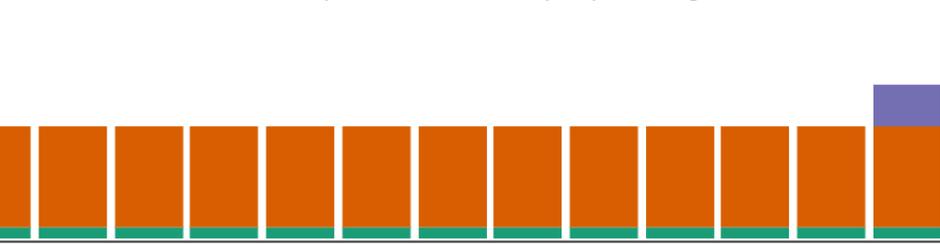
## 3. Optimising heat supply:

- Based on provision of given demand at minimum cost
- Considers:
  - Building demand profiles
  - Technology types and costs (incl. storage)
- Modelled separately to network but can iterate

Winter weekday — 462.78 kWp, 6.49 MWh — Heat pump Storage Curtailment



Winter weekend — 459.23 kWp, 6.5 MWh — Heat pump Storage Curtailment



Peak day — 526.86 kWp, 7.19 MWh — Gas boiler Heat pump Storage Curtailment

Peak day — 526.86 kWp, 7.19 MWh — Gas boiler Heat pump Storage Curtailment

# Why use THERMOS?

thermos-project.eu



- Developed with a range of local authorities – now being validated with industry experts
- Browser-based application with fast, easy mapping
- Rapid computing of optimised solutions, enabling repeat sensitivity analysis
- Enables substantial savings to be made in time and cost of pre-feasibility heat network studies
- Aims to encourage the right thermal networks in the right places, leading to cost-effective systems whilst helping to future-proof for emissions reduction.

# What's next with THERMOS?

thermos-project.eu



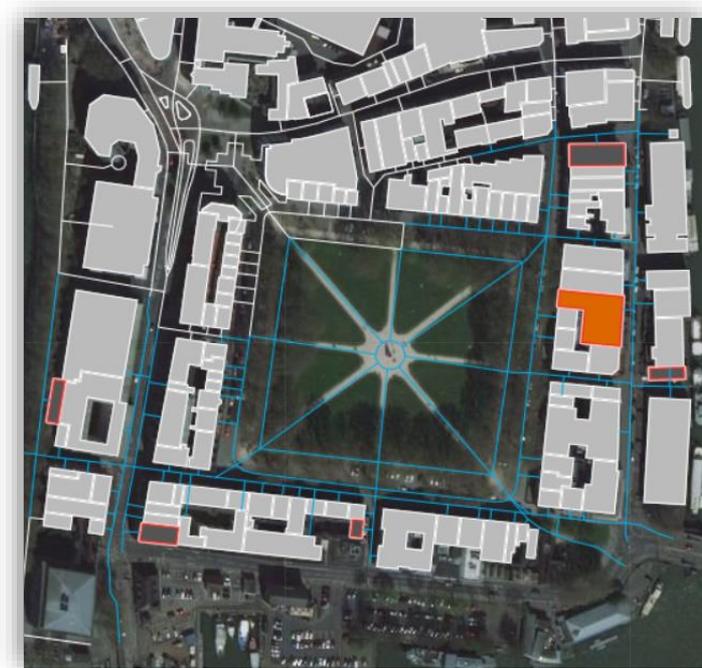
- Final phase of model validation and user-interface enhancements before H2020 project end in March 2021
- THERMOS Business Plan and Sustainable Adoption Roadmap now being developed
- This will include our arrangements for maintaining the availability of THERMOS beyond the project end.

<https://tool.thermos-project.eu/>





# Demo of the THERMOS Tool



- Heating network in Bristol
- Connect 5 restaurants to the network
- 1 supply building
- Optimise the solution



# **THERMOS**

## **Train-the-Trainer Certification Programme**

Webinar 1

**Energy system mapping and modelling with THERMOS**

Questions and Answers





# Explore THERMOS

1. Go to the THERMOS Training website: <https://www.thermos-project.eu/get-involved/training/>
2. Watch the demonstration video: [www.youtube.com/watch?v=r14L63Bf2t0](http://www.youtube.com/watch?v=r14L63Bf2t0)
3. Explore the THERMOS tool: <https://tool.thermos-project.eu/>
4. Exchange with THERMOS users: <https://forum.thermos-project.eu/>

*All you need is a standard web browser and an internet connection.*



# Next Steps

1. Think about if you would like to develop a case study or the exercises
2. See you in two weeks. Thursday November 12<sup>th</sup>, 2020 . 16:00 to 17:00
  - Practical case studies on different THERMOS Users
3. Stay at Home exploring THERMOS
4. Stay healthy



# Upcoming event



Renewing district heating

**Keeping our cities sustainably warm -  
Inspiring the Efficient Renewal of District  
Heating for the Just Transition**

KeepWarm's final conclusions:  
Thursday, 12. November 2020  
9:00 - 16:00 CET

<https://keepwarmeurope.eu/finalconclusions/>



# Become a THERMOS Trainer and use the tool for free!



Get Involved

Training

Events

THERMOS Voices

Share



## THERMOS Train-the-Trainer Certification Programme

Are you interested in supporting better heating and cooling planning and in implementing better projects and local sustainable energy and climate action plans in accordance with climate policy trends?

Work with and learn from THERMOS to enable a faster upgrade, refurbishment and the expansion of existing infrastructure and to accelerate the development of new low carbon heating and cooling systems across Europe.

Be amongst the first to test and apply the THERMOS software!

### What is the Train-the-Trainers (TtT) Certification Programme?

The TtT programme aims to train local and regional energy authorities, energy agencies or representatives from public or private utilities, as well as other stakeholders managing local energy networks in using and applying the THERMOS software and to train them to train others.

Participants will be awarded a testifying certificate stating the competences and knowledge acquired, after a successful completion of an online webinar based training course and the development of a practical

Explore THERMOS “hands on”  
developing your own case

*Participating in the THERMOS training has allowed me to learn from other enriching experiences in DHC networks. The Train the Trainers programme gives you a general approach, not only to the THERMOS tool but also to all the key issues for planning a thermal network. I would recommend the programme to anyone interested in improving energy efficiency in urban areas.*



**THERMOS Trainer**  
Carlos Dapena  
Parc de l'Alba



**THERMOS Trainer**  
Carme Nadal  
TubVerd

*I personally found the THERMOS software very intuitive and easy to use. Its use makes it easy to obtain economic results of investment, exploitation and calculation of emissions, which at the same time facilitates the choice of different network options. In short, it allows significant time savings in calculations.*

# THERMOS



web

[thermos-project.eu](https://thermos-project.eu)



email

[info@thermos-project.eu](mailto:info@thermos-project.eu)



twitter

[@THERMOS\\_eu](https://twitter.com/THERMOS_eu)



linkedin

[THERMOS project](https://www.linkedin.com/company/THERMOS-project)



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 723636. The sole responsibility for the content of this presentation lies with its author and in no way reflects the views of the European Union.