



## Holistic simulation & optimisation of energy systems in Smart Cities

**CITYOPT's** mission is to optimise energy systems in smart cities. Applications and guidelines will support efficient planning, detailed design and operation of energy systems in urban districts



CITYOPT is supported by the European Commission through the Seventh Framework Programme (FP7)

Grant agreement no: 608830

## OUR APPROACH

The project addresses energy system optimisation in different lifecycle phases, supported by a user-centred design approach. Stakeholders, including city decision makers, facility managers, and citizens, are involved in all project phases.

## OBJECTIVES

**CITYOPT** will create a set of applications and guidelines supporting efficient planning, detailed design and operation of energy systems in urban districts. It will consider appropriate service business models, privacy and trust and will involve users in all project phases.

**CITYOPT** addresses energy system optimisation in different lifecycle phases, considering potential end user and stakeholder characteristics.

① **Planning tools** - support analysing, simulating, optimising and communicating city planning alternatives. A holistic approach integrates energy dynamics of local grids and buildings, consumption behaviours, energy storage, and local energy production using renewables.

② **Design tools** - optimise design for energy efficiency of supplementary construction and renewable integration ensuring grid stability. Stakeholder and user research on design requirements specifies how new or retrofitted energy efficient buildings interact with nearby buildings through local energy networks, e.g. exchanging surplus renewable heating/cooling energy.

③ **Operational tools** - increase optimisation opportunities related to user behaviour, like residential demand response schemes for inhabitants to participate in online-optimisation, and visualisations to engage users.

## OUR TEAM

Our group gathers 7 project partners from 4 European countries, including research institutes, cities, energy utilities and a design studio.



VTT - Technical Research Centre of Finland [www.vtt.fi](http://www.vtt.fi)



AIT - Austrian Institute of Technology [www.ait.ac.at](http://www.ait.ac.at)



CSTB - Scientific and Technical Center for Building [www.cstb.fr](http://www.cstb.fr)



Experientia [www.experientia.com](http://www.experientia.com)



EDF [www.edf.com](http://www.edf.com)



City of Helsinki & Helsingin Energia [en.uuttahelsinki.fi](http://en.uuttahelsinki.fi), [www.helen.fi](http://www.helen.fi)



Nice Côte d'Azur Métropole [www.nicecotedazur.org](http://www.nicecotedazur.org)

**Project coordinator: Åsa Hedman**

Senior Scientist at VTT -  
Technical Research Centre of Finland

✉ [asa.hedman@vtt.fi](mailto:asa.hedman@vtt.fi)

☎ +358 40 570 3798



[www.cityopt.eu](http://www.cityopt.eu)

## Helsinki, Finland

The Helsinki case study evaluates electricity storage solutions and business models in the new residential districts of Kalasatama and Östersundom. In the planning phase of the new districts, **CITYOPT** applications will examine technologies, sizing, placement and steering of electric and heat storage to find optimal solutions. The expected impact will be a higher utilisation rate of renewable energy sources and a higher degree of grid-independency.

## Vienna, Austria

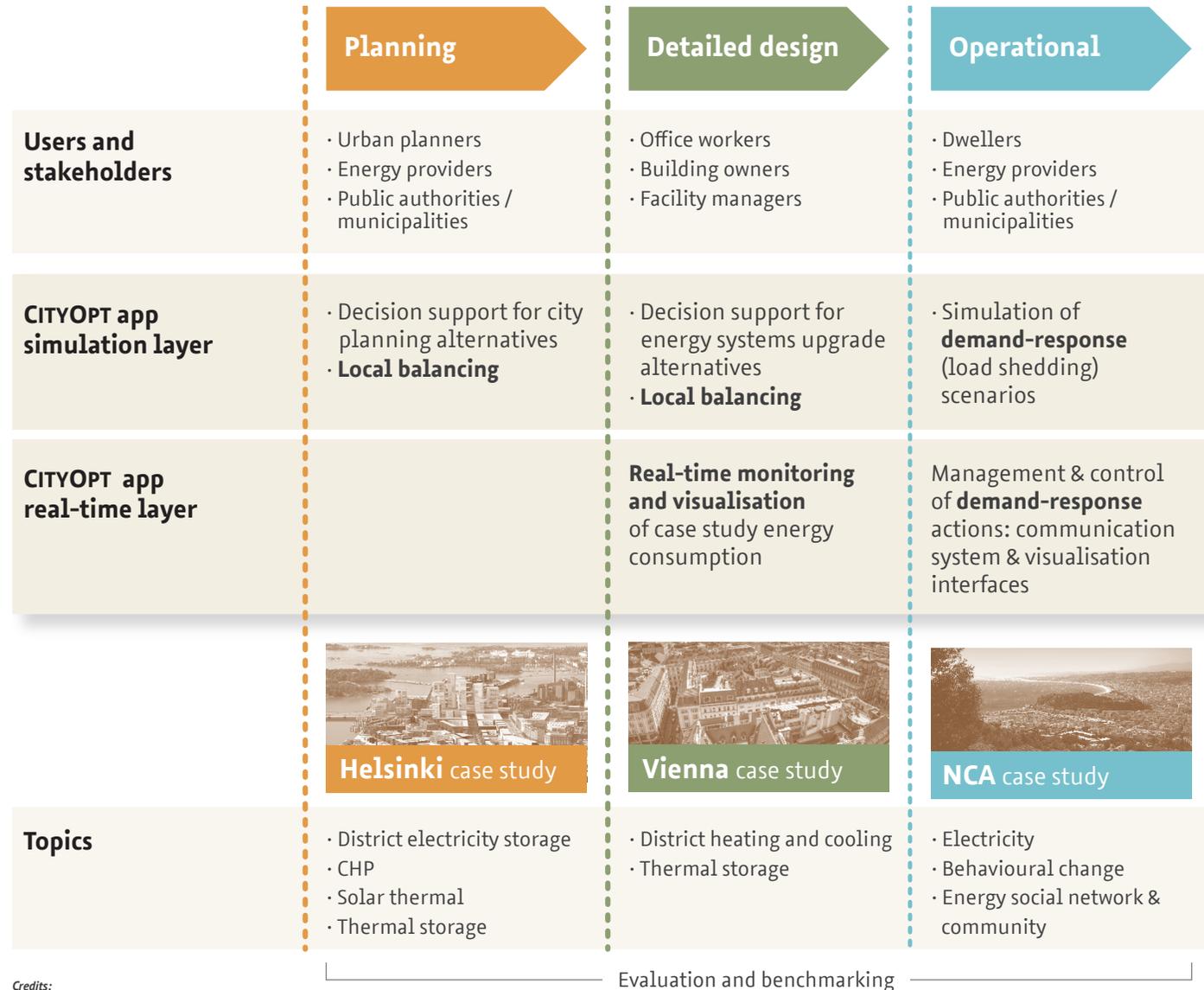
**CITYOPT** will investigate the optimal design and implementation (including cost assessment and business model development) of integrating existing buildings, their energy supply and storage systems, and the cooling system of RTA's climatic tunnel into a site-wide energy system that uses waste heat to warm office buildings. The expected impact is maximisation of waste heat use to increase energy performance and reduce CO<sub>2</sub> emissions of the urban area modelled in the case study.

## Nice Côte d'Azur, France

PACA – Provence Alpes Côte d'Azur - is one of France's most fragile regions for electricity supply. **CITYOPT** will analyse which conditions will motivate customers to modify their behaviours, within a **CITYOPT** energy community. Families will be recruited to participate in the experiment. **CITYOPT** will explore existing demand response schemes, as well as new customer engagement schemes such as social networks or community driven actions. Expected impact is optimised energy management for the supplier, and extra customer service, leading to increased energy literacy, empowerment and incentivisation.

## PILOTS

3 case studies in different climate zones demonstrate solutions: **Helsinki, Finland; Vienna, Austria; Nice Côte d'Azur, France.**



**Credits:**

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 Nice - Vue Générale Aérienne / photo by A. Issock