

SUPPORTING THE DEVELOPMENT OF SUSTAINABLE HEATING & COOLING SYSTEMS TO DECARBONISE THE BUILDING STOCK

INTRODUCTION

In 2021, Energy Cities gathered three cities from Italy and Croatia, who discussed barriers and levers they experienced to develop sustainable heating and cooling systems.

PROFILE OF PARTICIPATING CITIES	
SAN LUCIDO (IT)	<ul style="list-style-type: none"> ⊕ First energy plan drafted in 2006, with a plan of reducing energy consumption by 20% until 2020 ⊕ Desires to be energetically independent and use renewable energy in all municipal buildings ⊕ Plans to reduce costs to consumers; currently introducing the concept of energy community to this regard ⊕ Active in the fight against energy poverty ⊕ Winner of Euro-China Green & Smart City Awards in Governance Exemplarity Category in 2016
KARLOVAC (HR)	<ul style="list-style-type: none"> ⊕ Active in researching the possibilities for use of geothermal energy through the city-owned company GeotermiKA Ltd. ⊕ Local politicians committed to decarbonise heating ⊕ Heating companies that currently use natural gas also want to switch to RES due to carbon tax and rising costs ⊕ Lacks professional capacity and funding to implement decarbonisation projects ⊕ Plan to have a chapter dedicated to heat in the “Development strategy of Karlovac for 2021-2027”
VARAZDIN (HR)	<ul style="list-style-type: none"> ⊕ Committed to climate neutrality until 2050, with an overall goal of CO₂ reduction of 56 % until 2030 ⊕ Focused in large part on housing stock renovation, creating a one-stop shop to this regard ⊕ 97% of energy for district heating is produced with natural gas as fuel, it’s price increase might inhibit further development of district heating ⊕ Desires to implement circular economy principles ⊕ In the process of creating a one-stop-shop for residential building renovation

PLANNING

Heating plans and strategies are essential and must be based on data

To achieve decarbonisation of any sector requires consequent action and, thus, plans for the future. This is especially relevant for district heating, due to the large investments and long timelines involved. Additionally, heat plans may become ever more relevant, should the current goal of the European Commission to implement mandatory heat planning for cities above a certain size come to fruition.

Tools for heat planning can improve heating plans and ease the process of their creation, leading to a more coherent end-result. However, such tools are not yet widespread across Europe for cities. The city of San Lucido shared its experience with two of them: the Hotmaps toolbox and the THERMOS tool. Thanks to these tools, the city has identified the possibility to develop a district heating system and has carried out a first feasibility study, with the hopes of implementing district heating by 2025. Other tools were presented and discussed for analysis at city-, district- or building-level¹.

Watch out! It is also agreed that some data is always hard to acquire (e.g., diversity of actors possessing a certain set of data). Thus, planners must always stay flexible and retain their own judgement when determining which costs reflect reality the best in their own contingencies.

Best practice from San Sebastian (ES):

The municipality of San Sebastian performed an exhaustive energy demand calculation and mapping for the city, using a bottom-up approach based on building data. Various scenarios were designed, with differing renovation strategies and sources of heat. They can now be used as a basis for pre-feasibility studies and to find out the optimal order of energy-efficient building renovation etc. It will allow the city to implement a comprehensive, coherent, and efficient roadmap of activities for years to come. Furthermore, meetings with stakeholders were organised, to assess the scenarios together and to agree on a heating strategy together.

Low-carbon heat sources for district heating

To be able to decarbonise district heating, cities obviously need sources of heat. These are not always self-evident and are location specific. The cities from Italy and Croatia, for example, are in a geographically favourable place to use solar heating, as is already done in San Lucido. Collaboration and knowledge sharing between other cities is still important, so as not to “reinvent the wheel” needlessly. This can be done across similarities of geography, size, or *status quo* of current heating systems, depending on the goals.

Waste heat from industry, geothermal, large-scale solar thermal plants, large heat pumps, waste incineration plants and sustainable biomass are the technologies that seem to be at the forefront of centralised heat production and, thus, are ones to be explored further.

Watch out! The optimal solution is always tailor made and there is no “silver bullet” that can solve the needs of each and every city. Therefore, several avenues of action should be explored, and potential scenarios analysed before taking action.

¹ For a presentation on the topic, please contact Energy Cities

Best practice from Karlovac:

Karlovac has a history of geothermal exploration, even though it has not been fully implemented. To save resources and learn about best practices, as well as due to a deficit of local proficiency and knowledge, Karlovac is actively looking for partners from Iceland, due to their advanced use of geothermal energy, whilst also preparing for probing drills to determine the feasibility of such projects in the city. It is believed that around 50% of Karlovac's heating needs might be satisfied with geothermal. In Karlovac, political support is the main driver of realisation of projects regarding the use of geothermal potential, financial backing is still a problem that remains to be solved.

ENGAGING CITIZENS AND STAKEHOLDERS

Municipalities should pave the way with good examples for renewable heating

In areas with low population density district heating may not be economically viable and thus other solutions should be explored, whilst maintaining an ambitious level of use of renewables. Heat pumps combined with solar thermal appliances seem to be viable technical solutions in the eyes of the participating cities. Unfortunately, gas boilers often remain the cheapest heating solution for most households. Recent increases of gas prices in October and November 2021 are carefully watched by Varazdin, San Lucido and Karlovac, but this instability also calls for the use of local and renewable energies having stable prices. To fight this, the cities underlined the importance of subsidies schemes for renewable heat. Inequalities still remain high between EU Member States, as shown in a [study](#) by the European Environmental Bureau published in October 2021, in terms of payback time for a standardised middle-income family when switching from gas boilers to heat pumps.

Municipalities can also play a role to support energy-efficient renovation of buildings to favour the use of renewables. One-stop-shops where inhabitants can get answers to questions and legal help can be good assets to overcome difficulties (financing options, legislative questions, common agreement in multiple family dwellings etc.), which is why Varazdin is in the process of implementing a one-stop-shop that will permit an easily accessible point of consultation.

Watch out! Decentralised renewable heating (primarily in the form of heat pumps) usually presents a large up-front investment on the part of the consumer. A potential solution is aid by the (local) government and alternative business models, such as [Heat as a Service](#)² and long-term leases on the equipment.

² Presentation available

Best practice from San Lucido:

San Lucido has implemented several renewable energy projects in combination with energy-efficient renovation in municipal buildings with the help of funding by the Ministry of Development – a solar thermal plant and PV-panel powered heat-pumps have been installed on a municipal building to supply it with renewable heat, being the first building in San Lucido to obtain an A4 rating – the best energetic class in Italy.

Energy communities

Involvement of citizens helps with trust in the long term, which, in turn, aids in accomplishing de-carbonisation goals. A strong manifestation of a proactive citizen base is the existence of energy communities, which permit citizens to organise, take care and an active interest in the management of their own energy production and, therefore, also see the benefits that it brings. Municipalities still play a large part in establishing energy communities, from being a simple informer about the possibility, to elaborating on the legal frameworks to holding shares in the communities.

San Lucido, for example, is considering implementing energy communities with a 50% municipal, 50% citizen ownership split. National Italian legislation, however, forces there to be a maximum of one energy community per one medium voltage electrical cabin, thus limiting the amount of potential energy communities. Additionally, they cannot exceed 200kW of production. Support schemes include a 20-year-long subsidy of 100 €/MWh for renewable energy communities, which can also be cumulated with the “Superbonus 110%” tax relief scheme.

Watch out! Energy communities are still a fairly new concept across the EU and the legal framework isn't always clear and established. Members States are currently transposing the EU Directives in their national laws. To know about the assessment of the European Federation of citizens energy cooperatives, you can consult their [Transposition Tracker](#).

Best practice from GECCO (Bologna, IT)³:

GECCO or Green Energy Community is a community management project based in Bologna, which aims to involve inhabitants and local businesses in increasing local energy production, using the concept of energy communities as one of their tools. Being one of the fore-runners of this idea, they are actively researching the best options and developing their business model, by engaging the local stakeholders through activities such as a climathon, lecture series for both kids and adults and educational walks in nature.

³ Presentation available