



Welcome to the second newsletter of the project FLEXYNETS. Please read on for updates from our partners and news of the latest breakthroughs.

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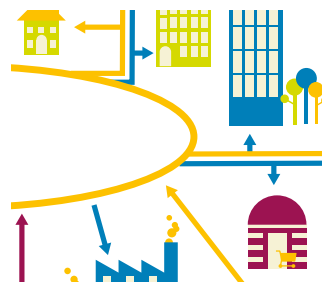
## EDITORIAL



### From a fossil fuel based economy to an energy efficiency founded one

FLEXYNETS moves along with the EU strategy which triggers the shift from a fossil fuel based economy to an energy efficiency founded one ... [read more](#)

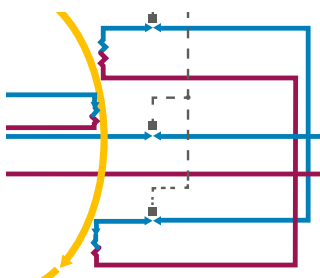
## 5<sup>th</sup> GENERATION DHC NETWORKS



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- **12th Heat Pump Conference** (15-18.05.2017, Rotterdam, Netherlands)
- **Euroheat & Power 38th Congress and Exhibition** (Glasgow 14-17.05.2017)

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### From a fossil fuel based economy to an energy efficiency founded one

FLEXYNETS moves along with the [EU strategy](#) which triggers the shift from a fossil fuel based economy to an energy efficiency founded one, by:

- bringing new technologies from research to market
- attracting investments
- adapting the workforce
- triggering sustainable finance for the clean economy
- empowering citizens and consumers
- achieving a recourse efficient low carbon economy.

FLEXYNETS is a Horizon 2020 project aiming to develop, demonstrate and deploy a new generation of intelligent DHC networks.

Traditionally, District Heating and Cooling (DHC) networks distribute high temperature thermal energy from a centralized generation plant to a number of remote customers. As such, current DHC systems are compromised by heat losses and an unexplored potential to integrate other available energy sources into the network.

Fourth generation networks move forward reducing carrier fluid temperature levels and integrating thermal energy delivery stations along the network, which exploit renewable and waste heat sources.

FLEXYNETS solutions step even farther as distribution temperatures are reduced down to ground level (15-20°C) and thermal energy harvest can be as dispersed as customers are. Since reversible heat pumps are used as an interface between DHC network and the customer, thermal energy can be drawn from the network covering heating needs, and/or waste heat from space cooling and refrigeration processes can be fed into the system.

Besides the environmental benefits related to the efficient re-use of energy, the savings correspond to lower expenses for energy bills for users. In addition, FLEXYNETS creates a broad range of profit opportunities for heat suppliers and for single customers, increasing their contractual strength: feed-in schemes are under elaboration similar to the electric market's, allowing private actors selling renewable and waste heat to the network manager.

Moreover, the scalability of FLEXYNETS solutions – from serving a small cluster of buildings up to an entire city – makes them suitable for single city quarters; thus, they do not require large infrastructural investments and complex political decisions involving the entire urban environment. On the contrary, they strongly facilitate the market entry of small private investors from the industry, retail and service sectors, who have the opportunity to improve their thermal systems efficiency and to integrate a revenue source in their balance sheet.

*Roberto Fedrizzi (Eurac Research, project coordinator)*

## FLEXYNETS planning at a glance

The peculiarity of FLEXYNETS is that its network can *simultaneously* provide both heating and cooling, regardless the season of the year. This feature opens a wide range of possibilities for the future implementation of smart networks, because energy consumption for space cooling and refrigeration purposes is expected to face a dramatic increase in Europe within the next 20 years (Fig. 1).

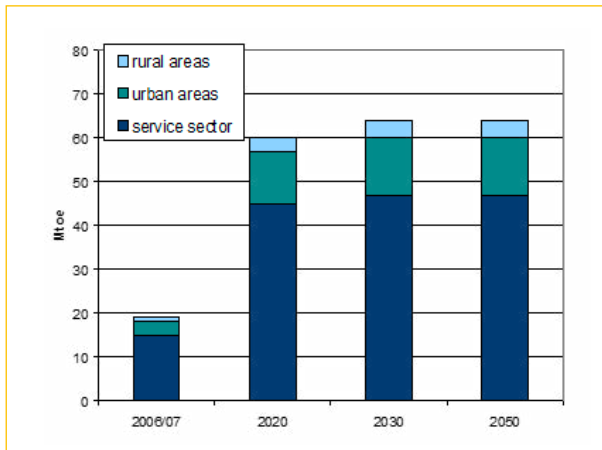


Fig. 1 Expected evolution of cooling demand. RHC-ETP 2011

One of the sectors with the fastest growth in cooling demand is the commercial: the technical equipment of shopping malls and supermarket requires more and more cooling for air conditioning and food conservation. Heating, air conditioning and food refrigeration are responsible of the majority of hypermarkets electric consumption (Fig. 2). As an example, one medium-size supermarket, with chillers installed for a total electric capacity of 150 kW only for refrigeration purposes, rejects into the environment as much

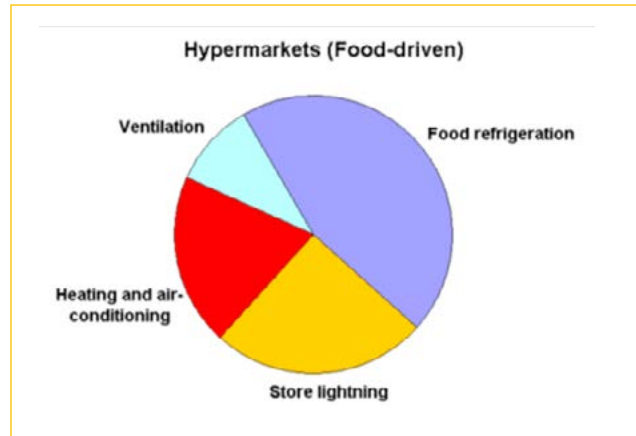


Fig. 2 Electricity consumption for cooling and food conservation in retails. EuroCommerce, 2009

as 1500 MWh per year of low-temperature thermal energy. Recovering such energy would allow to cover yearly heating needs of 150 to 200 dwellings<sup>1</sup>.

Data centres are another rapidly growing sector generating heat that could potentially be recovered and reused. These examples are reported on purpose, as these waste heat sources are normally located within the urban context, therefore in the vicinity of residential and tertiary buildings. FLEXYNETS is now engaged in assessing meaningful urban scenarios throughout Europe in terms of energy use (for space cooling, heating and DHW preparation) and urban waste heat availability. A number of towns have been selected as case studies to identify reference conditions. A practical example of a town studied is Århus, a mid-size

<sup>1</sup> Space heating demand 75-100 kWh/m<sup>2</sup>y and living area 100 m<sup>2</sup>.

## 5<sup>th</sup> GENERATION DISTRICT HEATING AND COOLING NETWORKS

Danish town with almost 320,000 inhabitants. The town has been divided into types of settlements: *Residential, Public, Commercial and Industrial* (Fig. 3).

Based on energy uses and availability different possible topologies of a DHC network are being analysed for specific settlements to identify what solution (ring, tree or backbone,

Fig. 4) suites best from the energy management and investment perspectives.

While first results are available and soon will be published, general rules are being elaborated in order to guide planners towards the optimal solution based on the local assessed conditions. As one of the final results of the project, a pre-design tool will be elaborated reporting on this information.

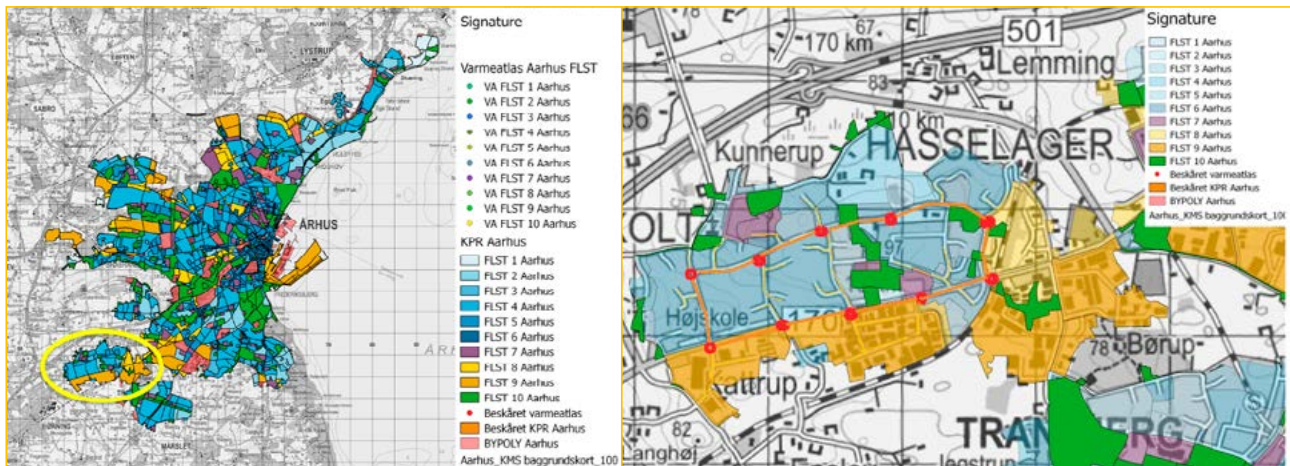


Fig. 3 The town of Århus divided into the 10 settlement typologies (left) and the detail of the highlighted neighborhood (right)

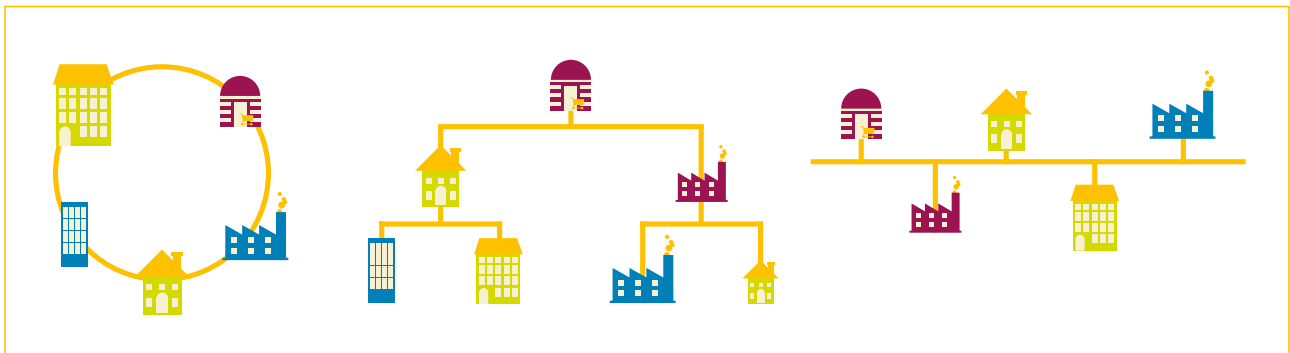


Fig. 4 Ring, tree and backbone DHC network structures

### ExCHangE: from numerical analysis to laboratory tests

A new laboratory infrastructure has been set up in the framework of the FLEXYNETS activities.

The Energy Exchange Lab for advanced district heating and cooling networks tests is installed over an area of about 800 m<sup>2</sup> and allows to emulate, in a small scale, a thermal network with distribution temperatures that can be varied between 5°C and 90°C.

The Energy Exchange Lab is characterized by a high level of hydraulic and control flexibility: the laboratory is able to reproduce a wide range of DHC systems, from the first generation up to the fifth generation FLEXYNETS ones. It is also able to integrate with thermal, gas, and electricity grids and simulate winter or summer conditions.

The pilot is complete and counts with three subsystems: *the producer substation, the prosumer substations and the thermal network.*

- The first includes a solar field with concentrating collectors, a gas boiler, a sorption chiller and an ORC unit. This allows to emulate and test a RES driven trigeneration system connected to the DHC network and to the electric grid.
- The second subsystem includes heat pumps emulating users drawing and feeding thermal energy into the network. This allows elaborating on design, sizing and management of the interfaces with the distribution system.
- The third is a double ring with a total length of 150 meters and a thermal storage capacity of more than 3000 litres.

Overall the laboratory infrastructure will permit to support the validation of FLEXYNETS' solutions, transferring the theory to a real in-scale system before the same results are used at real DHC networks.

We are ready for the next step!



The Energy Exchange Lab in Bolzano



### First Flexynets workshop in Bolzano

On the 31st of January the first workshop for experts in low temperatures district heating networks entitled “Cold water district heating and cooling systems as flexible exergy exchange systems – a promising concept for the future?” took place in Bolzano.



The target audience were experts in the field like engineers, energy managers and installers, as well as public authorities, utilities and energy service companies.

The focus of the workshop was to introduce and discuss the concepts and developments of the project with experts in the field. Invited external system planners and networks operators with hands-on experiences in district heating, provided practical expertise to a fruitful discussion during the workshop.

The panel presented topics, issues and results of the project and promoted discussions about FLEXYNETS main activities.

The workshop was attended by 20 experts from different fields: industry, public authorities, universities and research centres.

The outcome of the workshop showed encouraging future developments for the technology, as some examples of operational low-temperature DHC networks are already available throughout Europe.

A second workshop will be organized in 2018 reporting on the results of the project.

### Webinar

Do not miss the opportunity to attend the webinar “**Cold water district heating and cooling networks**” scheduled on **Wednesday 10th May at 10.00**.

The webinar will be led by Roberto Fedrizzi (Eurac Research, project coordinator), Dirk Pietruschka (Enisyst) and Daniel Trier (Planenergi) and will go through the concepts and discussions held during the first workshop.

Furthermore, Johan Desmedt (Vito) and Serena Danesi (ZHAW) will present aim and objectives of Storm and H-Disnet, two Horizon2020 projects, part of the DHC Community.

You can register to the Webinar [here](#)

### Three other EC funded projects focus on FLEXYNETS related solutions

Take a look at their websites!



The OPTi project aspires to create a long-lasting impact by rethinking the way DHC systems are architected and controlled. The overarching goal is to create business benefit for the industry as well as to ensure optimal end-consumer satisfaction.

OPTi delivers methodologies and tools that will enable accurate modelling, analysis and control of current and envisioned DHC systems.

OPTi treats the DHC system as a system subject to dynamic control, and will treat thermal energy as a resource to be controlled for DHC systems towards saving energy and reducing peak loads. This will lead to the most environmentally-friendly way of utilizing energy sources, thus reducing the reliance on additional boilers running on oil and/or electricity and overall providing a socio-economically sustainable environment.

OPTi helps energy companies to operate both today's and future DHC systems in an optimal way.

<http://www.opti2020.eu>



STORM project tackles energy efficiency at district level by developing an innovative DHC network controller. The project partners have developed a controller based on self-learning algorithms, which is currently experimented in the two STORM demo sites.

The developed controller will enable to maximize the use of waste heat and renewable energy sources in DHC networks.

The controller has been implemented in two demo sites, Mijwater BV in Heerlen (NL) and Växjö Energi in Rottne (SE), where the resulting energetic, economic and environmental gains are assessed. In the first demonstration site in Heerlen, flooded mine galleries act as a renewable heat source and provide a total of 500,000 m<sup>2</sup> floor area connected to a low temperature district heating and cooling network. The Växjö Energi district heating system in Rottne, Sweden, is the second largest high temperature distribution network in Rottne, Växjö. It makes up about 10,300 metres with a total volume of about 64 m<sup>3</sup>.

<http://storm-dhc.eu>



CELSIUS City has established an intelligent heating system covering virtually all the households and commercial buildings in the appropriate high density areas of the city and an energy efficient district cooling system for its commercial customers. These systems make use of a range of excess heat sources all created within the city during the course of an average operational day, for example from various industrial and datacentre activities, heat extracted from

sewage and bio-based heating. CELSIUS City not only consumes much less fossil fuel generated energy than a traditional European city; but it also plays a fundamental role in supporting the resilience and security of the electricity network by effectively utilising existing network capacity for connecting new distributed generation and for providing grid balancing. This becomes more relevant via thermal storage, when excess renewable electricity, generated for example by wind turbines, is being supplied into the grid.

<http://celsiuscity.eu>

### 12th Heat Pump Conference



FLEXYNETS' team will be present at the triennial 12th IEA Heat Pump Conference 2017 that will be held at the World Trade Centre in Rotterdam from 15th to 18th May.

The Conference theme is "Rethink Energy, Act NOW!" and it will be presented the article "**Pricing Strategies for Neutral-Temperature District Heating and Cooling Networks Based on Heat Pumps**".

With participants from over 30 countries, the event is a key event for policymakers, executives and representatives from industry, utilities and the public sector, R&D managers and technology supporters, energy managers, planners, consultants.

<http://hpc2017.org>

### Euroheat & Power 38th Congress and Exhibition



Euroheat & Power 38th Congress and Exhibition will take place in Glasgow from 14th to 17th May 2017.

Entitled "Experience Tomorrow Today", the event will provide a platform to discuss key issues for European and global district energy sectors across a range of technical and commercial issues, from resource assessment and innovative technological design, to market and policy developments.

[www.ehpcongress.org](http://www.ehpcongress.org)

### DecarbHeat 2017 Conference



The way we use energy in our society needs to change if we want to keep global warming well below 2°C, as stipulated at COP21 in Paris. This transition needs to include decision-makers on all levels and must above all include citizens.

The #DecarbHeat Forum will take place at BEL Bruxelles the 11th and 12th of May 2017 and it brings together high level policy makers, major players of the heating & cooling industry and influencers from related stakeholders.

The forum will discuss the decarbonisation of H&C and will focus on the following topics:

- *Policy.* Good policies to help decarbonising the H&C sector
- *Cities.* What cities (can) do to decarbonise the building stock and the thermal grids
- *Digitalisation.* How H&C can get smart and automated
- *Industry.* What options for high temperature processes

Enjoy inspiring panels with:

Dominique Ristori (invited), Director General for Energy, European Commission

Dolf Gielen, Director of Innovation & Technology, IRENA

Harry Verhaar, Global Affairs, Philips Lighting

Claude Turmes, MEP, Group of the Greens/European Free Alliance

Sean O'Driscoll, President, Glen Dimplex

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



### Clean Energy EU: European Commission sets energy targets for the next decade

The European Commission has released the long-awaited Energy package, gathering legal proposals on energy policies.

#### Towards an Energy Union based on former 2030 targets and Paris Agreement

The package intends to create an Energy Union based on the principles enounced in February 2015. It is grounded on the targets and commitment announced during the Energy Council in October 2014 ahead of the COP21 Paris Agreement.

The European Union had agreed on EU-wide 2030 targets and policy objectives, based on a 40% emissions reduction, 27% use of renewables and enhanced reliance on energy efficiency with at least 27% energy savings compared with the business-as-usual scenario.

#### Holistic approach of the Winter Package

The Clean Energy Package sets several legislative framework and proposed targets and measures on:

- Energy policy
- Use of renewable resources
- Energy efficiency measures and targets
- Market design initiative

#### Energy performance of buildings in the spotlight

As part of the energy efficiency package, and based on a consultation opened early 2016, the European Commission has proposed a review of the Energy Performance of Buildings Directive (EPBD) of relevant articles of the Energy Efficiency Directive (EED).

The proposal sets renovation targets, minimum performance requirements for existing and new buildings. It furthermore adds provisions on energy performance certificates on inspections.

The proposal is joined by a Staff Working Document showing best practices of improved energy performance in buildings.

#### Next steps

The legislative institutions, representing the citizens (the European Parliament) and the Member States (the Council of the European Union) shall discuss and agree on equal terms with the proposal.

Further information available on this [site](#).



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