



# Improving the performance of District Heating Systems in Central and Eastern Europe



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This project receives co-funding from the German Federal Ministry of Economic Cooperation and Development.



# Keeping our cities renewably warm



8. October 2020 e-seminar  
*George Stiff, ICLEI Europe*

# ABOUT KEEPWARM

KeepWarm supports **forward-looking district heating systems** (DHS) in seven countries of Central and Eastern Europe (CEE) to develop and implement pilot projects which **retrofit** their systems in a more **sustainable** manner.

To **overcome barriers** to DH deployment across the region, KeepWarm facilitates DHSs via a multi-stage approach:



Increased **capacities** of specialists working in DHS companies by offering training workshops

DHSs supported in the development of viable **business plans**



DHSs advised on how to **mobilise funding** for bankable pilot projects

Exhibit of replicable DHS **demo cases**



Facilitating the multi-level integration of DHS retrofits into key **strategies and plans**

# International project partners

**ASSOCIATION FOR DISTRICT HEATING  
of the Czech Republic**

*Czech Republic*

**ik** Landwirtschaftskammer  
Steiermark

*Austria*

**Jožef Stefan Institute, Ljubljana, Slovenia  
Energy Efficiency Centre**

**KSSENA**

*Slovenia*

**REGA** REGIONALNA ENERGETSKA AGENCIJA  
NORTH-WEST CROATIA  
SJEVEROZAPADNE HRVATSKE  
REGIONAL ENERGY AGENCY

*Croatia*

**I.C.L.E.I**  
Local  
Governments  
for Sustainability

*(Germany)*

**giz** Deutsche Gesellschaft  
für Internationale  
Zusammenarbeit (GIZ) GmbH

*Latvia*

**ZREA**  
ZEMGALES REĢIONĀLĀ  
ENERĢETIKAS AĢENTŪRA

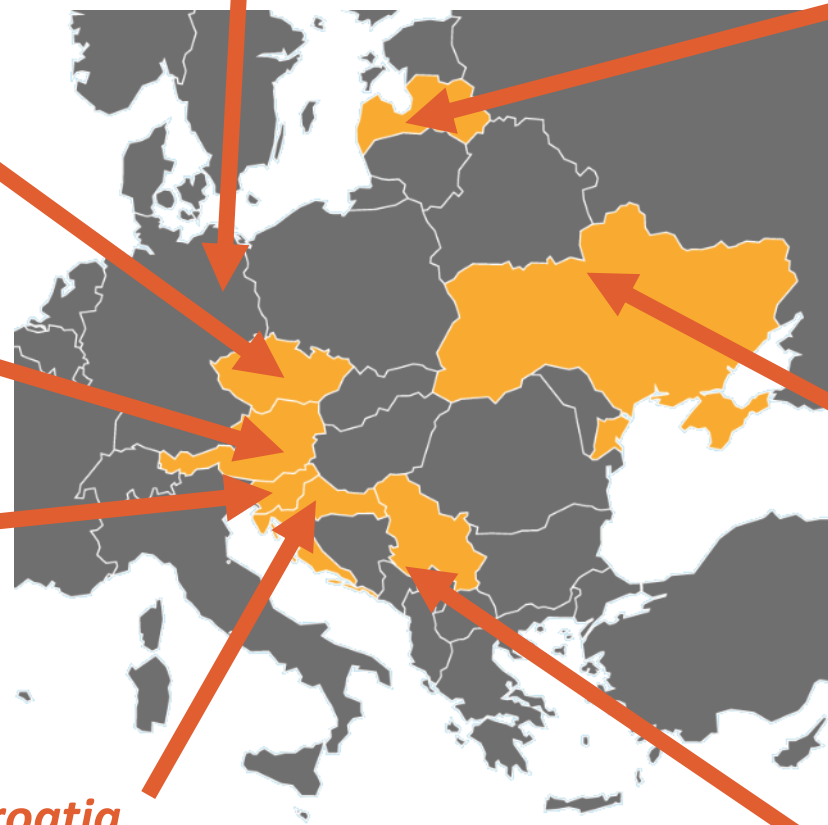
**KT-ENERGY**

*Ukraine*

**VINČA**  
INSTITUTE OF NUCLEAR SCIENCES  
University of Belgrade  
NATIONAL INSTITUTE OF THE REPUBLIC OF SERBIA

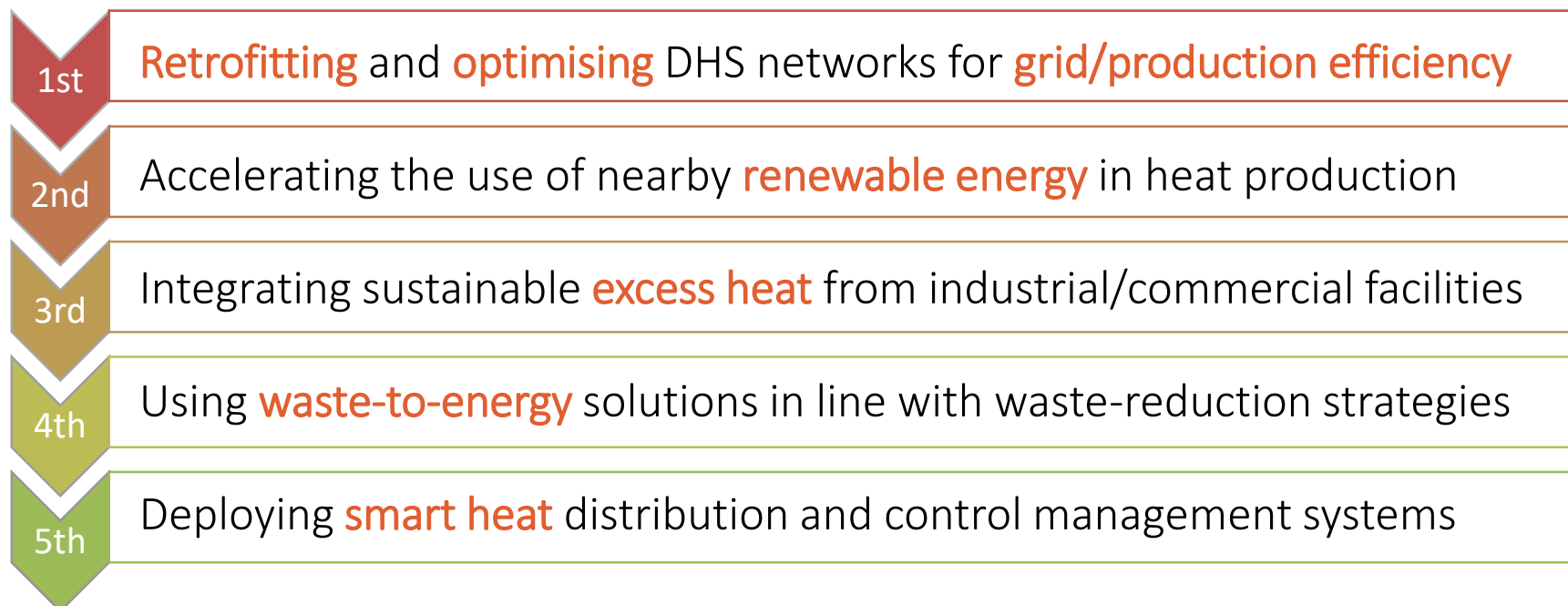
*Serbia*

**FSB** University of Zagreb  
Faculty of Mechanical Engineering  
and Naval Architecture




## KEEPWARM RETROFITS

KeepWarm partners and DHSs are essentially following a suggested action-hierarchy to achieve more **efficient operations** from **cost-effective investments**, which provide even more **reliable services** to DH customers while still contributing greatly to **climate-related goals**.



- Portfolio of **23 DHS** pilots
  - Operations
  - Investment plans and drivers
  - Key stakeholders
  - Resource requirements
  - Results...
- Trends and **national contexts**
  - Challenges and trends
  - Policy/investment framework
  - Recommended actions...
- All 7 **translated** versions now on our country pages




KeepWarm  
Sustavski odgoj za budućnost

# CTS u RH

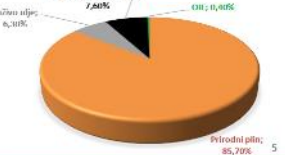
# Legislativni okvir i mjere

Daljnisko grijanje pokriva **15%** ukupnog toplinskog konzuma u Hrvatskoj s **različitim** veličinama i vrstama CTS. Oko 110 CTS **regulirano** je putem Hrvatske regulatorne energetske agencije (HERA). Većina sustava u vlasništvu je javnih kompanija.



Source: [www.energetika.hr](https://www.energetika.hr)

### ENERGETSKA BILANCA U CTS U RH



Energy Source	Percentage
Prirodni plin	86.74%
CH <sub>4</sub>	11.40%
Izloženo ulje	6.31%
Ekstra lako tečno ulje	7.66%

### Izazovi

- Distributivna mreža je zastarjela i **neučinkovita**
- CTS zahtijevaju značajne investicije u **obnovu** i modernizaciju
- Nedostatak **energetskog planiranja** koje bi omogućilo suradnju
- Nedostatak **legislativnog okvira** za dekarbonizaciju

### Trendovi

- **Kogeneracijska postrojenja** ostaju jezgra CTS-a u RH
- Potrošnja topline se **smanjuje** uslijed povećanja energetske učinkovitosti (obnova zgrada i mreže)
- Postupna integracija **OIE**
- Povećanje energetske učinkovitosti u proizvodnji i distribuciji topline

### Zakonodavni okvir

- Cilj: **1% povećanje OIE** u CTS u razdoblju 2021-2025
- Mjere za povećanje **učinkovitosti u CTS**
- Potpora **visokoučinkovitoj kogeneraciji i OIE**

### Investment subsidies covering:

Novi CTS / proširenje CTS	<input checked="" type="checkbox"/>
Obnova CTS (EnU / OIE)	<input checked="" type="checkbox"/>
Potrošači / broj priključaka	<input checked="" type="checkbox"/>
Kreditiranje i drugi oblici financiranja	<input checked="" type="checkbox"/>
Porezne inicijative	<input type="checkbox"/>

### Preporučene mjere

- **Integracija solarne energije** u CTS
- **Analiza potencijala** otpadne topline, solarne i geotermalne energije
- **Povezivanje individualnih kotlovnica** (manji CTS) u jednu distribucijsku mrežu
- **Revitalizacija distribucijske mreže**

<https://keepwarmneurope.eu/countries/hr-tocul/countries/eng/hr/>

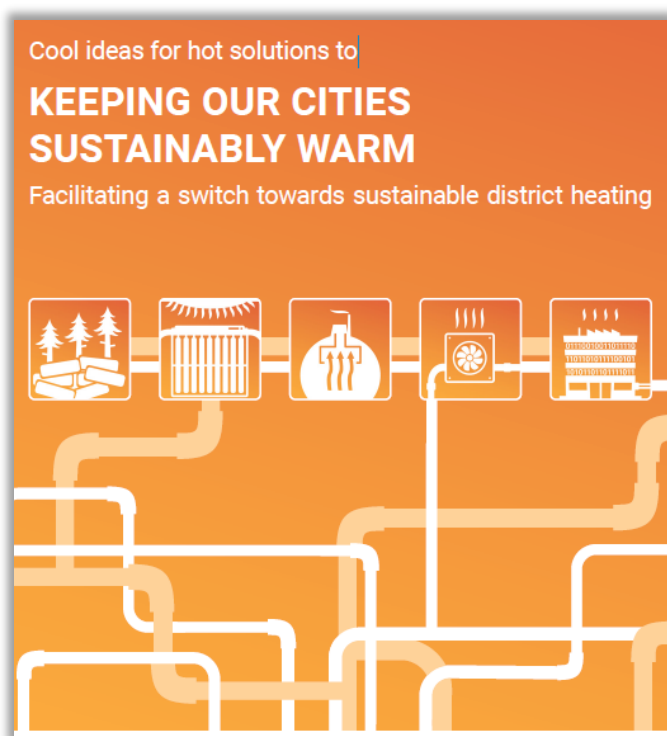
<https://www.energetika.hr/en/countries/hr-tocul/countries/eng/hr/>



# GUIDANCE ON DH FUELED BY SUSTAINABLE ENERGY

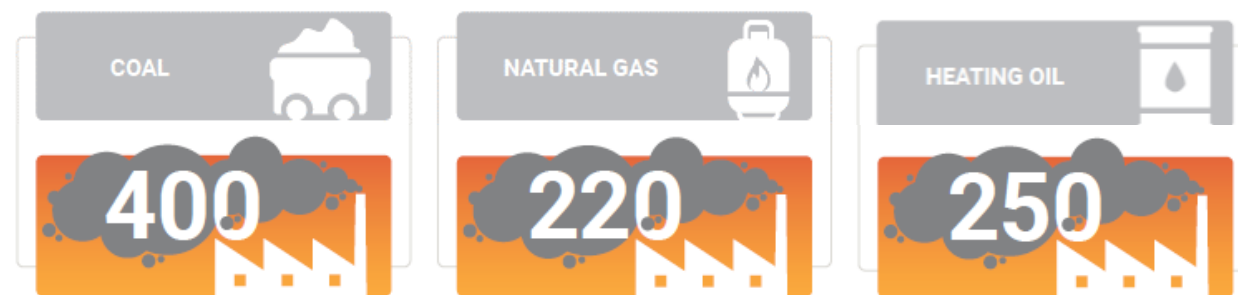
KeepWarm has more recently produced a comprehensive booklet “Keeping our cities sustainably warm” to guide **sustainably-sourced DH** (RE and excess heat)

- Inspire DH companies with **technical** and **financial** indicators
- Emphasise **funding** trends to European investors/institutions
- Showcase **environmental** and **socio-economic** advantages of RE and excess heat for policy-makers and public authorities
- Point out **emerging (business) roles** for other companies/stakeholders



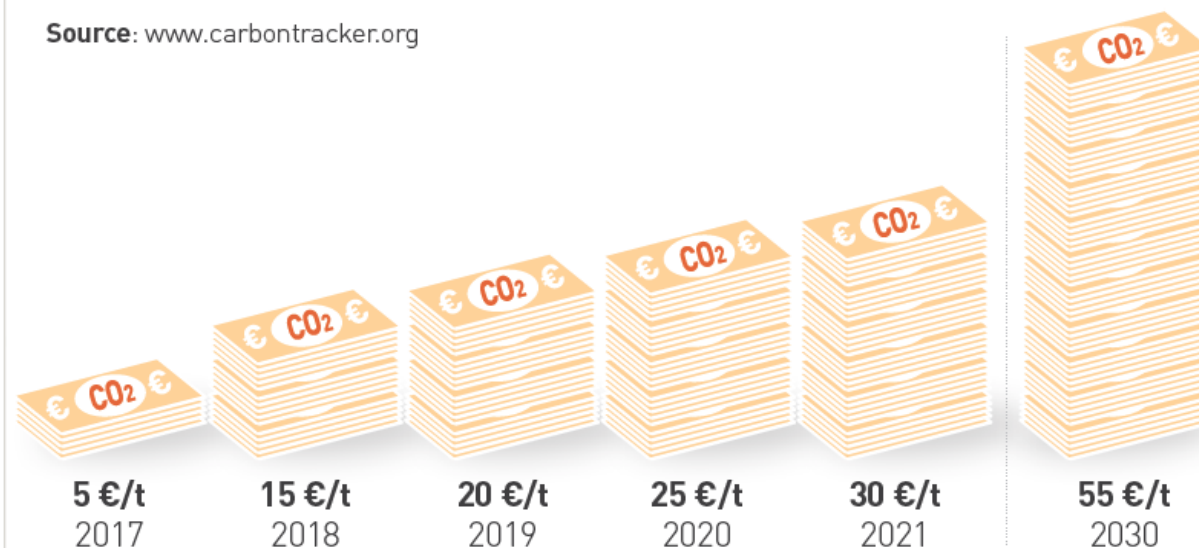
# WHY DECARBONISE DISTRICT HEATING?

- **Socio-economic** benefits:
  - GHG emissions
  - Local/regional employment
  - Boost to circular economy and innovation
- It just makes **business sense!**
  - Reasonable payback and O&M costs
  - Low- or no-cost resources
  - Rising fossil fuel prices
  - Public and private investment favoring RE/ExH more and more



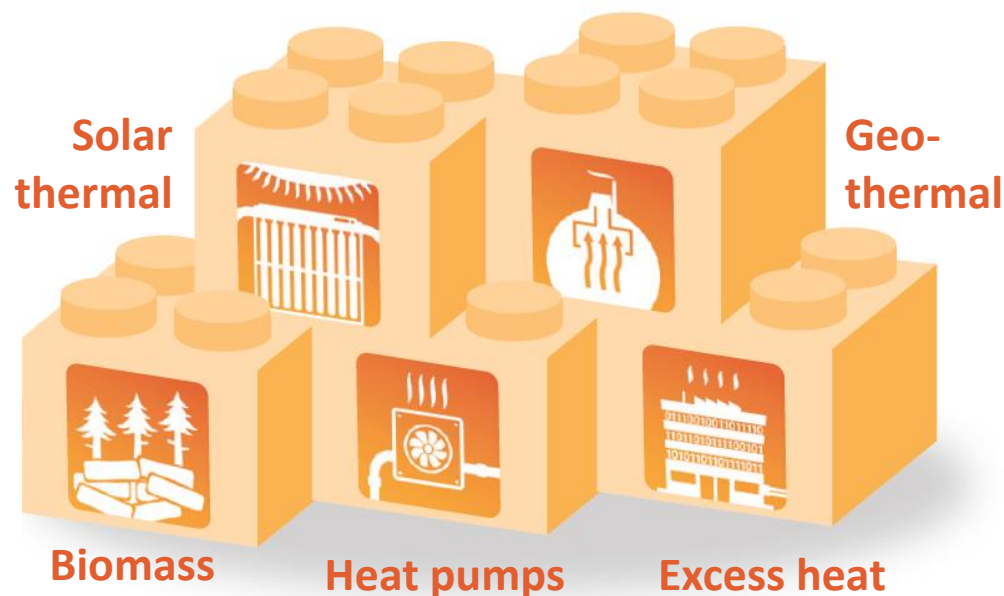
## EU carbon allowance price acceleration

Source: [www.carbontracker.org](http://www.carbontracker.org)





# HOW DO SUSTAINABLE ENERGY SOURCES STACK UP?



## Technical characteristics:

- **Plant capacities:** 1-50 MW, 65-95% thermal efficiency
- **Supply temperature:** 80-140°C
- **Resource needs:** 270 kg/MWh pellets or 380 kg/MWh chips, assuming 75% DHS efficiency
- **Technical prerequisites:** Fuel storage space (roughly double or more than for coal); Rebuilt plant from fossil fuel to accommodate biomass
- **DHS suitability:** best with modern (prefabricated) or low-temp DHS, not really suitable for steam or older hot-water DH
- **Operations:** up to 100% biomass share of DH can be very effective, but also works well in combination with any other sustainable energy source, usually to supply the base-load



## Financial data:

- **Upfront costs:** 0.3-0.7 M€/MW
- **O&M costs:** 1.8-3% of investment
- **Payback period:** 3-13 years
- **Jobs:** 0.78-2.84/MW



## Stakeholder engagement:

Beyond the general stakeholders and their roles mentioned near the end of this document, and providers of needed technologies, biomass requires special involvement with:

- **Local/regional/national public authorities** - should ensure suitable infrastructure network (e.g. forest roads) is in place and provide oversight on the sustainability of forestry/agriculture practices, as well as ensure compliance with air emission standards and pollution limits
- **Pellet/chip suppliers** - key partner guarantee fuel supply and quality
- **Forestry/agriculture experts** - used for understanding fuel availability and sustainability



## Greenhouse gas emissions: 0 kg/MWh

Even if including the transport of biomass fuel as well, though this usually counts as transport instead of energy generation, the entire biomass cycle still only releases 30 kg/MWh.



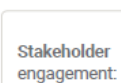
## Technical characteristics:

- **Plant capacities:** 1-50 MW
- **Supply temperature:** around 80-100°C
- **Resource needs:** >50°C enthalpy at 1-3 km deep, ideally >90 mW/m<sup>2</sup> heat-flow density
- **Technical prerequisites:** for DH purposes, only moderate drilling depths should suffice
- **DH suitability:** best with modern (prefabricated) or low-temp DH, not as much for older hot-water DH, and not really suitable for steam DH
- **Operations:** works well in combination with any other sustainable energy source to supply the base-load



## Financial data:

- **Upfront costs:** 0.7-1.9 M€/MW, most of which is usually for drilling costs and completion of wells
- **O&M costs:** 2.5% of investment
- **Payback period:** 5-10 years
- **Jobs:** 1.7/MW



## Stakeholder engagement:

- Beyond the general stakeholders and their roles mentioned near the end of this document, and providers of needed technologies, geothermal requires special involvement with:
- **Local/regional/national public authorities** - necessary for issuing drilling permits and facilitating land-rights issues
  - **Land owners/developers** - key for making (private) land available for geothermal exploitation
  - **Geology/drilling experts** - for ensuring ideal geothermal conditions (e.g. rock types, thermoclines, water flow...)



## Greenhouse gas emissions: 0-10 kg/MWh

The upper value takes into account the entire geothermal process, but otherwise geothermal frequently is just considered to be emission-free.

In KeepWarm's **Learning Centre** > Resources > Technical solutions and cases



Renewing district heating

[Home](#)
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[News & Events](#)
[Learning Centre](#)
[Countries in focus](#)
[Contact](#)

[Resources](#)

- Policy Spotlights
- Project materials
- Related projects

## TECHNICAL SOLUTIONS AND CASES



The resources listed here are covering various district heating concepts and technologies, including:

- Geothermal
- Solar
- Waste-to-energy
- Industrial waste heat
- Biogas
- Heat pumps
- Waste-to-energy
- Industrial waste heat
- Biogas
- Heat pumps



**KeepWarm**  
Improving the performance of District Heating Systems in Central and Eastern Europe  
Showroom of DHS pilot projects

KeepWarm [Showroom of replicable and bankable](#)

The purpose of this Service Pitch Book is to **reduce energy efficiency (EE) and integrating more sustainable** providing information about national contexts, **and pilot DHSs which have been actively participating in** networking opportunities to reach out to them

## CSA Latvija



Renewing district heating

CSA tiek nodrošināta **80%** Latvijas ēkām, galvenokārt mājaimniecībām. Pārsvārā **CSA** uzņēmumi pieder pašvaldībām, ir arī **privātie īpašnieki**. Trešdaļa no kopējiem Latvijas siltumtīkliem atrodas **galvaspilsētā Rīgā**.

### Izaicinājumi

- Siltumtīklos joprojām ir **lieli zudumi**, līdz pat 16%.
- Patērētāju iesaiste** un CSA pievilcīguma palielināšana
- Veco CSAS** uzlabošana, **siltumtīklu** atjaunošana
- Neefektīva un nepietiekama **AER izmantošana CSA**
- Neesošas **centralizētās aukstumapgādes** sistēmas



*Avots: Būvniecības Centrs*

**SILTUMENERGIJAS AVOTI – LATVIJA**

CSA kopā: **70%**

Indivīdu: **15%**

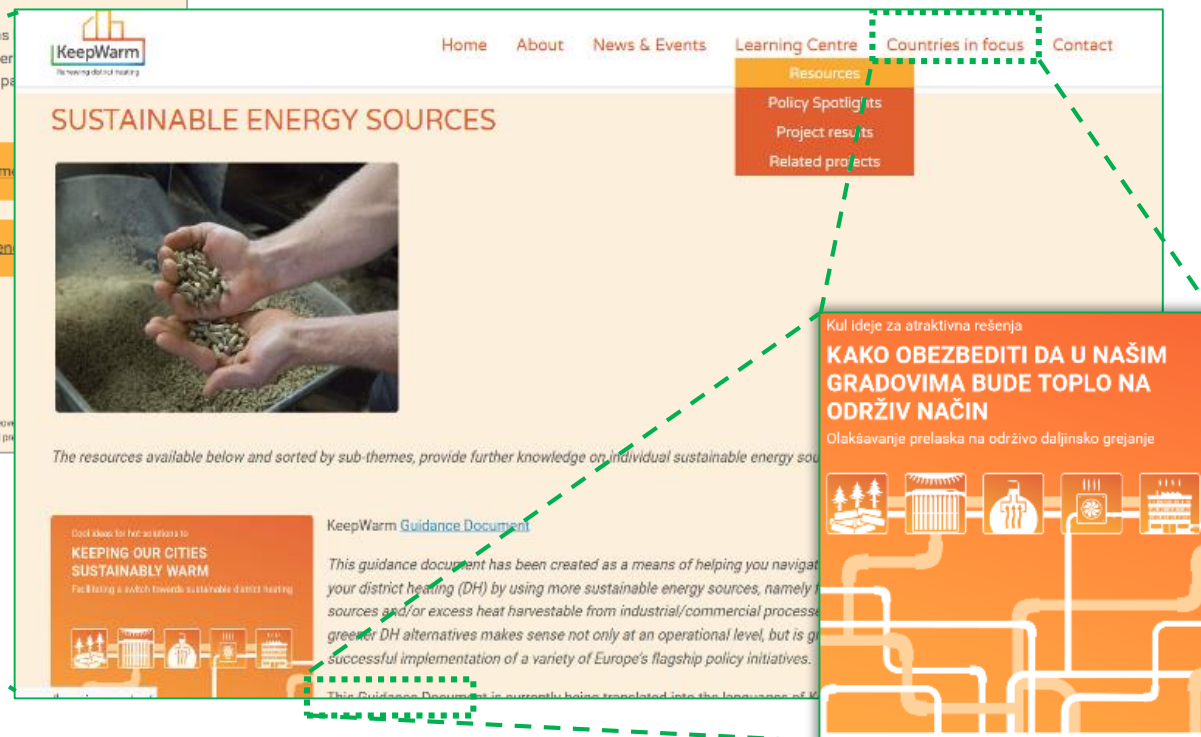
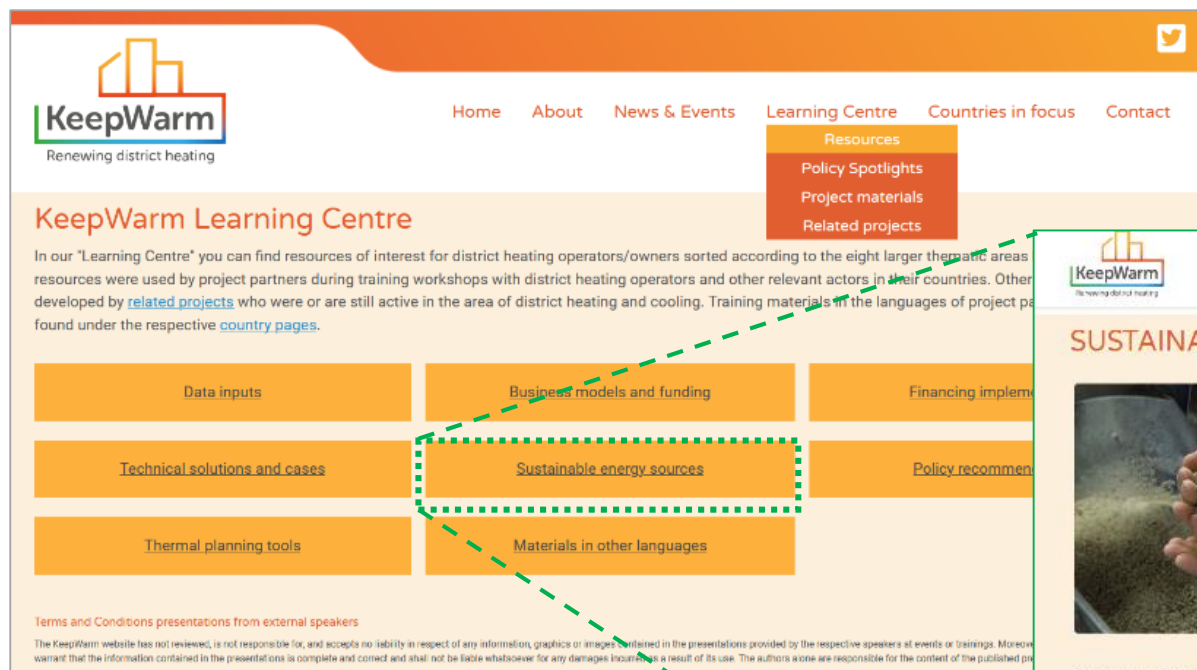
Koplieto: **15%**



[info@keepwarm.eu](mailto:info@keepwarm.eu)  
[www.keepwarm.eu](http://www.keepwarm.eu)

# ACCESSIBILITY OF THE KEEPWARM GUIDANCE BOOKLET

In KeepWarm's **Learning Centre** > Resources > Sustainable energy sources



## KEEP ON LEARNING WITH KEEPWARM

In order to help you on your way, you are highly recommended to explore further the KeepWarm website, including its Learning Centre with numerous resources from KeepWarm and many other related projects and EU-led initiatives, not to mention our latest news.

In particular, you can discover numerous **guidebooks, tools and other useful materials** to help you on your way to modernising DHSs:

- case studies of DH retrofits and sustainable-energy upgrades
- spatial mapping about heat supply and demand across Europe
- free-to use thermal planning software
- policy recommendations
- insights into finance and technical assistance
- training materials in multiple languages – ask us about **trainings we can offer you!**
- (online) Inspire Events, including **final e-conference on 12. Nov...**

... and much more!

## KEEP DH GOING WITH KEEPWARM

Finally, it is worth highlighting that the KeepWarm consortium is especially well-suited to use its **competence to help you achieve your DH goals!** Our diverse group of experts can apply our great **experience all across Europe**, especially in countries of the CEE region.

Contact us (centrally or via links on the next pages) so we can know how **our expertise can benefit your work towards making your DH more efficient and sustainable:**

- Technical consultancy
  - Feasibility studies
  - Financial guidance
  - Strategic action-planning
  - Policy/market integration
  - Staff/stakeholder trainings
  - General advice
- ... and much more!





# KEEP CALM

&

# KEEPWARM

with

# DISTRICT HEATING

## Thank you! Questions?

For **more information**, and to discover how **we can facilitate you in your DH transition**:

*visit* our website:

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

*contact* us at:

[info@keepwarmeurope.eu](mailto:info@keepwarmeurope.eu)

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ASSOCIATION FOR DISTRICT HEATING  
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