

# Resource Library for District Heating with Renewable Energy. (DHRL)

**Webinar: Renewable Energy for District Heating in Ukraine**

**Resource Library, Planning Tools, Feasibility Studies, Analysis**

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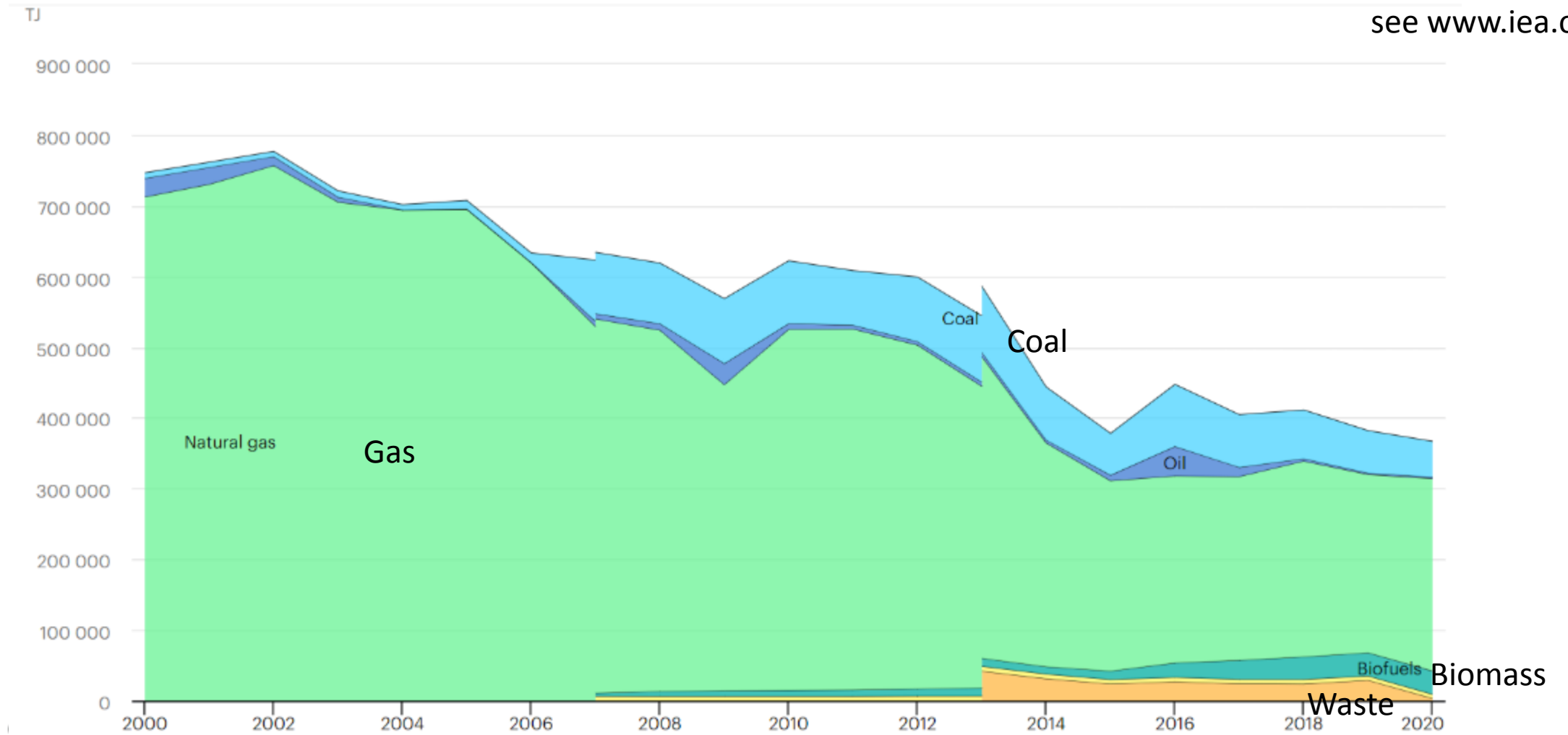


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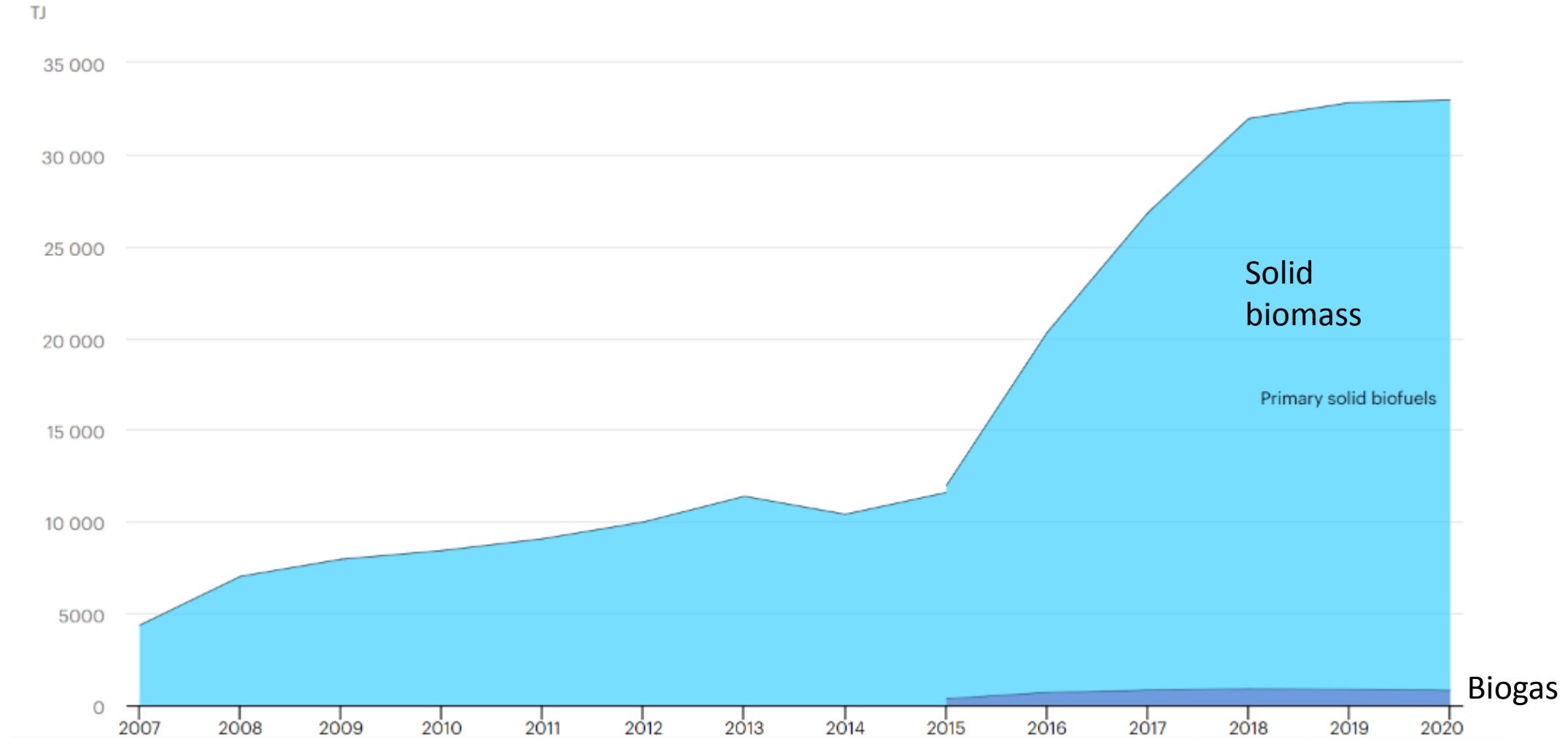
# Energy Sources for District Heating in Ukraine

Data from IEA,  
see [www.iea.org](http://www.iea.org)



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# More Biomass for District Heating in Ukraine



# Renewable Energy for District Heating – Large Potentials in Ukraine

- Solar Heating
- Heat Pumps
- Geothermal Heating
- Straw for Power and District Heating
- Biogas for Power and District Heating
- Waste Heat Usage
- Energy Savings and Optimisation of District Heating

# Solar Heating for District Heating

- In some countries, as Denmark & Austria, solar heating is popular for smaller and medium-sized district heating systems, using large solar heating modules, 2\*6 m
- It can supply 5-10% of the heat demand without heat storages and 15-30% with heat storages in Ukraine.
- A few plants have large seasonal heat storages that can store the heat from summer to winter and then the solar heating can cover 50% or more of the heat demand. The seasonal storage tanks are usually insulated artificial ponds with heat resistant plastic liners and with insulation at the top and sides.
- For district heating, the solar collectors are usually placed in solar fields.



# Heat Pumps

- Heat pumps use electricity or fuel to drive a process, where heat at a lower temperature is “moved” to a higher temperature. The higher the temperature difference, the more input energy is needed per unit of heat delivered. The cold reservoir can be air, soil or water. Air-source heat pumps are cheaper than ground source heat pumps, but their efficiency is low with low outdoor temperatures.
- Heat pumps for district heating typically have an efficiency, also called coefficient of performance (COP), around 3, meaning that 1 unit of electricity produces three units of heat by absorbing two units of heat from the ambient or from another cold heat source.
- Heat pumps are mostly used in district heating systems with low temperatures: 60-70°C forward temperature and 30-40°C return temperature.



# Geothermal Heat

- Heat from the deep underground is an important source for district heating in many countries, including Iceland and France.
- Currently there is a high interest in geothermal energy in Europe.
- The use of geothermal heat depends completely on the geological formations and in particular the underground temperatures. Normally geothermal energy use requires deep drillings to get water from 500-3000 m underground and to return the cooled water.
- Depending on the underground temperatures, geothermal energy can be used in the following ways:
  - With high temperatures, steamed is formed that can be used for power
  - With 75-100°C, geothermal heat can be used directly for district heating
  - With 50-75°C, geothermal heat can be used with heat pumps

# Straw and Agricultural Residues for District Heating

- Straw and corn stalks is the cheapest fuel for boilers and CHP in Ukraine. It is also abundant.
- It is, however, also one of the more difficult fuels with higher ash content than wood.
- Straw is widely used for district heating in Denmark, where 9% (12 PJ) of district heating comes from straw firing and a small additional contribution is from straw used in biogas plants.
- Straw can be used in CHP plants and in heat only boilers, from smaller domestic boilers to large-scale CHP plants.





# Biogas

- Biogas plants work with a biological process with a combination of natural bacteria in an anaerobic (oxygen free) environment.
- Biogas plants can supply gas with 60% methane, well suited for boilers and smaller CHP plants with gas motors
- Biogas can be made from animal manure, plants, sorted organic waste, sewage sludge
- Biogas is popular in Denmark, Germany and other countries, will in 2030 provide all gas needed in Denmark



# Waste Heat

- Waste heat from industries have a long history in district heating supply.
- In recent years, the introduction of heat pumps and cheaper power have enlarged the potential for waste heat in district heating with the many heat streams that are too cold to feed directly into district heating.
- Careful analysis of smaller sources are leading to an increased use of waste heat in district heating.
- In certain cases, new technologies have increased the potential. For instance, new cooling systems in supermarkets with CO<sub>2</sub> as refrigerant have enabled the use of waste heat from refrigerators and freezers to be fed directly into local district heating networks.

# Energy Savings and Optimisation of District Heating

- In many district heating systems as well as in district heat usage, there are large potentials for energy savings.
- Optimisation of district heating networks and use can both save energy and make district heating better fit to the future.
- The network optimisation typically includes reductions of the temperatures in the network, both forward and return temperatures.
- Reduction of losses and lower temperatures are important to make district heating a viable future energy carrier, using renewable energy

- Technologies**
- Solar heating for district heating
  - Heat pumps for district heating
  - Geothermal heating
  - Straw heating and CHP for district heating
  - Biogas for district heating
  - Waste heat Usage
  - Energy Saving and Optimisation of District Heating



**District Heating with Renewable Energy. Resource Library (DHRL)**

This resource library for renewable energy in district heating is developed in 2022 as part of the project: Change Agents for a Green Society with Focus on Renewable Energy for District Heating, Ukraine.

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<https://dhrl.rea.org.ua/en/>

- Технології**
- Сонячне опалення
  - Теплові насоси
  - Геотермальне тепло
  - Опалення Соломою
  - Опалення Дервиною
  - Біогаз
  - Вторинне тепло
  - Енергозбереження та оптимізація централізованого тепlopостачання



**Централізоване тепlopостачання на відновлюваній енергії. Бібліотека технологій (DHRL)**

Цю бібліотеку ресурсів для відновлюваної енергії в централізованому опаленні було розроблено в 2022 році в рамках проекту «Агенти змін для зеленого суспільства з акцентом на відновлювані джерела енергії для централізованого тепlopостачання, Україна».

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Thank  
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