Best Practice Examples of Industrial Symbiosis in Lithuania

President of Lithuanian District Heating Association

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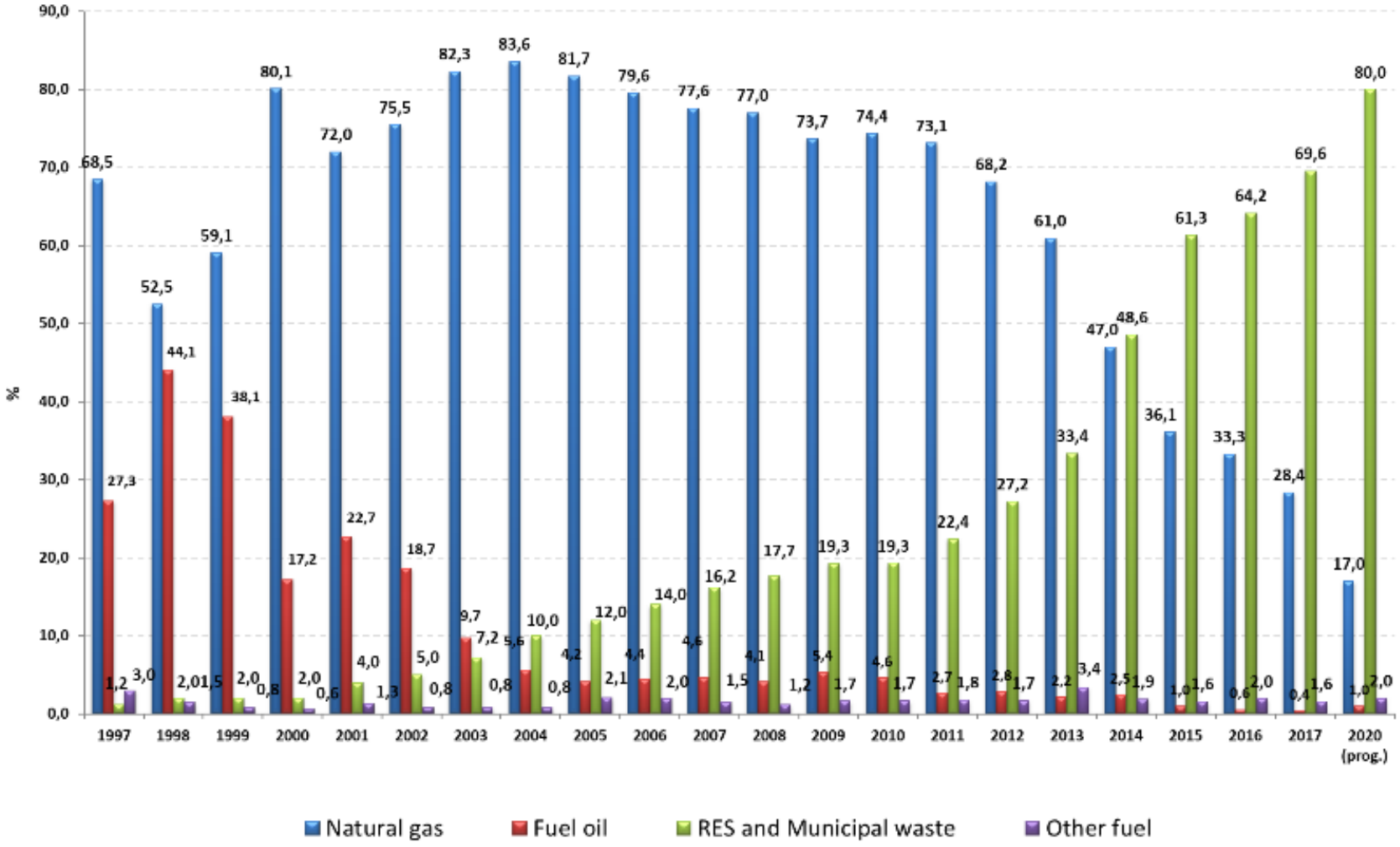
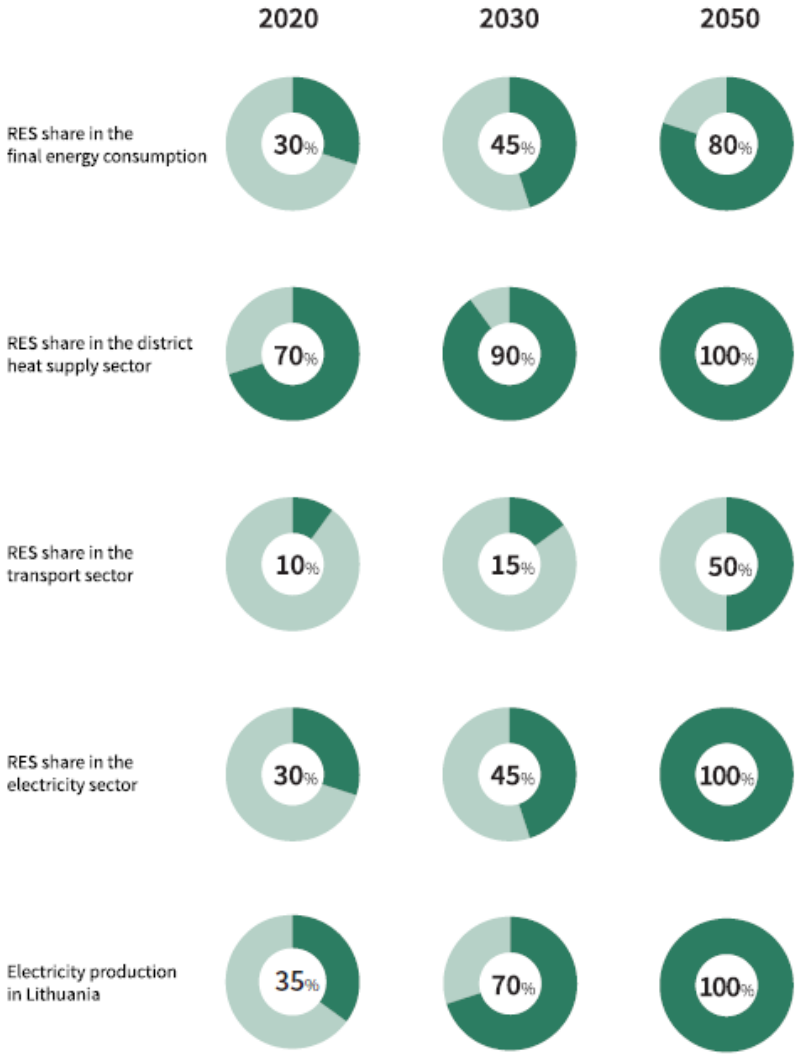
Fuel Structure in the District Heating Sector of Lithuania



Lithuanian plan in usage of RES (NATIONAL ENERGY STRATEGY 2018)



Overall RES share: *30 % 2020*

45 % 2030

80 % 2050

RES share in DH sector: *70% 2020*

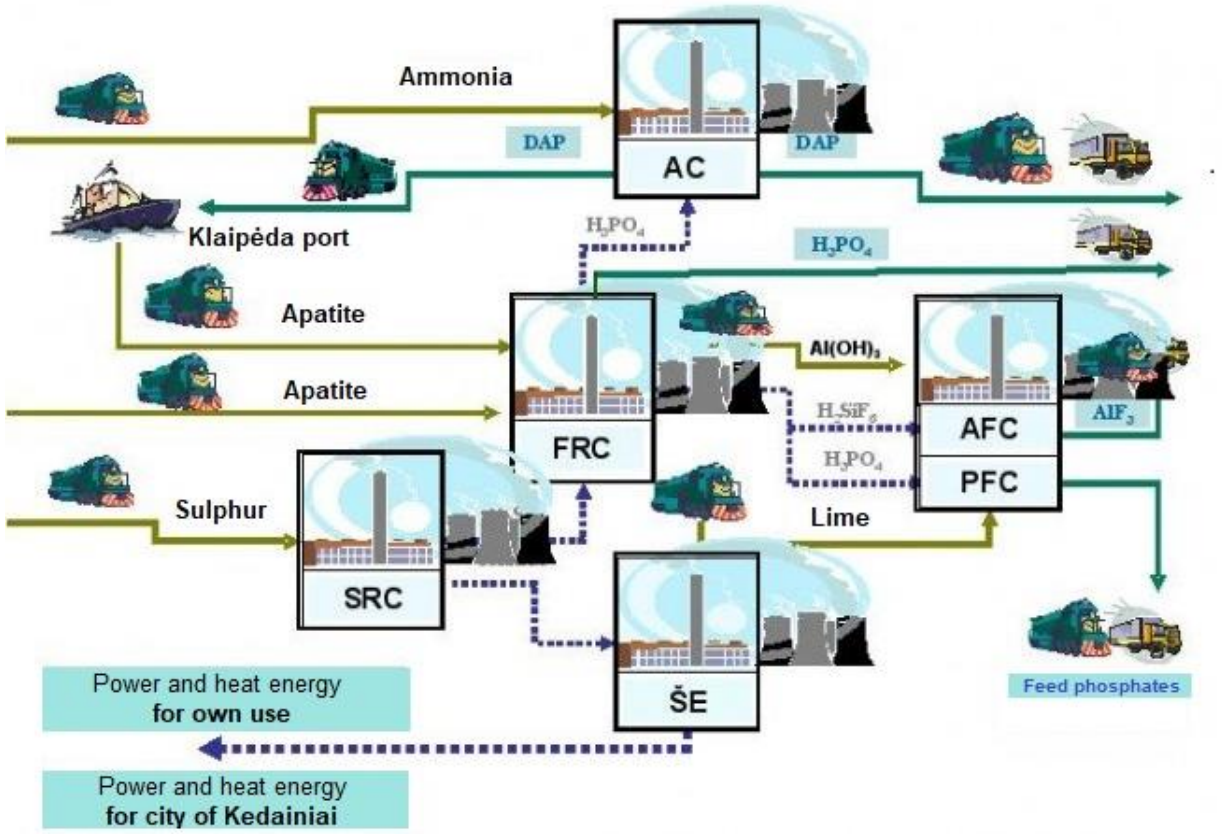
90 % 2030

100 % 2050

INDUSTRIAL SYMBIOSIS IN DISTRICT HEATING SYSTEMS

District heating network	Company name	2018	Type of production
Kaunas county	UAB „Ekoresursai“	6,741	Biogas CHP
Pasvalys	UAB „Kurana“	8,139	Biofuels
Kupiškis	AB „Simega“	34,834	Wood factory
Kėdainiai	AB „Lifosa“	103,941	Chemical factory
Klaipėda	UAB „Klaipėdos baldai“	14,961	Furniture factory
	UAB „Fortum Klaipėda“	390,799	MSW CHP
	UAB „Home Group“	2,313	Furniture factory
	AB „Klaipėdos mediena“	25,139	Wood factory
Vilnius	AB „Grigeo Grigiškės“	2,418	Pulp factory
	AB „Vilniaus baldai“	16,322	Furniture factory
Vievis	UAB „Autoidėja“	3,428	Biogas CHP
	UAB „Intergates“	3,665	Biogas CHP
Elektrėnai	UAB „Autoidėja“	1,144	Biogas CHP
	UAB „Intergates“	1,162	Biogas CHP
Kairiai	UAB „Energijos parkas“	321	Biogas CHP
Visaginas	UAB „Visagino linija“	26,255	Furniture factory
	Total MWh:	**641,582**	

Lifosa

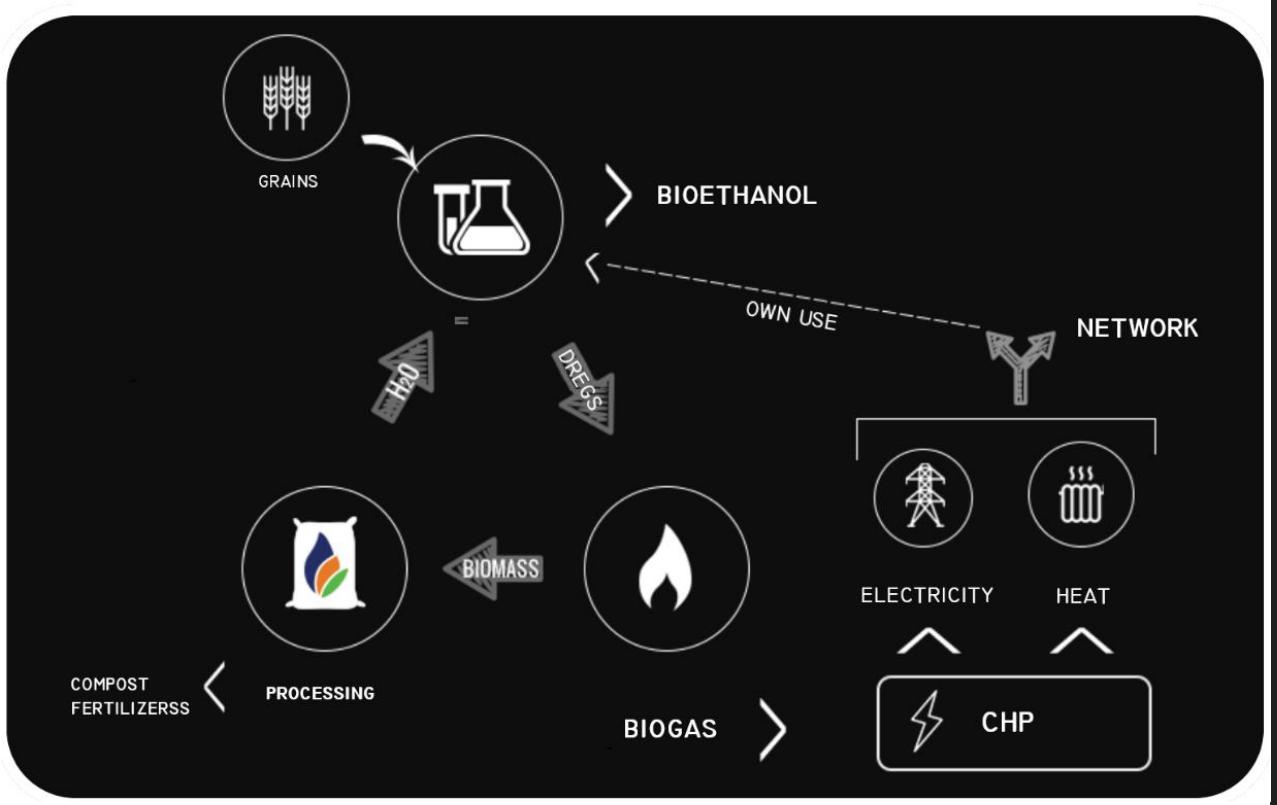


- Enterprise "Lifosa" is one of the largest chemical companies in Lithuania. The main production of the company is nitrogen - phosphorus fertilizer - diammonium phosphate (DAP), which is produced from phosphoric and sulfuric acids generated by the company itself

- Since 2000, **waste heat** from production process of sulfuric acid has been **used for heating of Kedainai city**

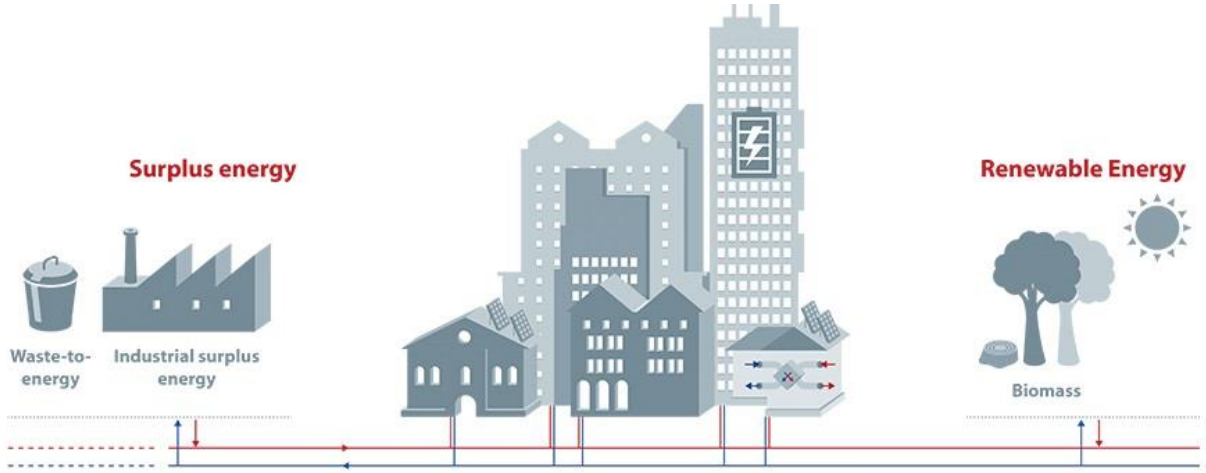
- In 2007, after additional equipments were installed, waste heat sources produce about **250 GWh** of electricity. About **50 GWh** of electricity supplied to the national electricity grid. The district heating **network receives about 100 GWh and fully cover city heat demand**

Kurana



- "Kurana" is one of the first companies inside EU which connected manufacturing of bioethanol, electricity and thermal energy from renewable energy sources into one uninterrupted technological loop. This **technological loop produces zero waste**
- The company produces biofuels that consists bioethanol with minimum concentration of 99.5 % per volume
- Dregs left after the production of bioethanol are being mixed and supplemented by organic materials and **placed into biogas reactors where 25 mln. m3 of biogas are being produced yearly**. A part of thermal energy and electricity is being used for technological process. Another part of electricity is being supplied to the national grid. **The company annually supplies about 9 GWh of heat to the district heating network of the city Pasvalys.**

Furniture manufacturers



- Multiple **furniture manufacturers** in various cities of Lithuania generate heat using productional waste (sawdust, etc.) and **supply the surplus heat** to the local **district heating networks**

- Example: ‘‘Vilniaus baldai’’ utilizes **sawdust** to generate heat for the district heating network of Vilnius. The **district heating network receives approximately 18 GWh of heat annually**

Construction of Municipal Solid Waste CHP Plants in the Largest Lithuanian Cities

Vilnius

- Population 542,664
- Share of district heating 90%
- Annual heat demand 2,5 TWh
- ***Utilization of municipal waste***

~145 000 t/a.

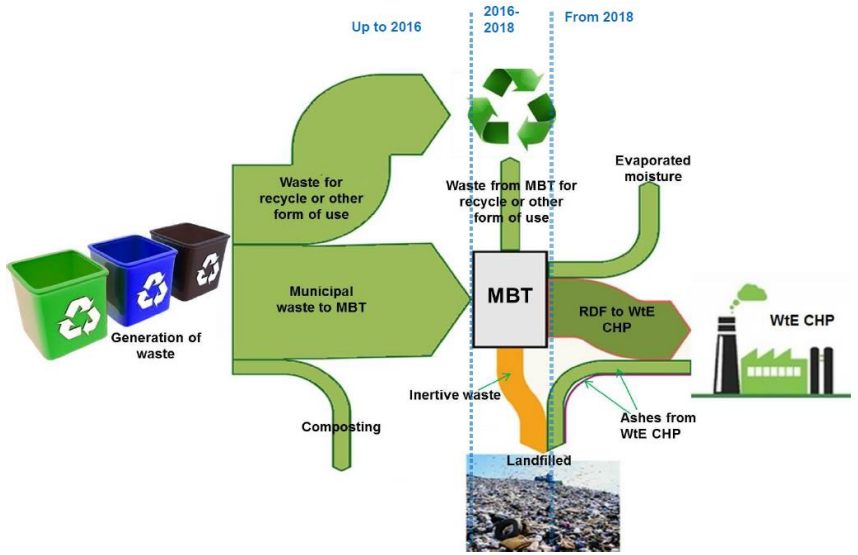
- Landfilling ~85%

Kaunas

- Population 301,296
- Share of district heating 90%
- Annual heat demand 1,2 TWh
- ***Utilization of municipal and industrial waste*** ~200 000 t/a.
- Landfilling ~95%

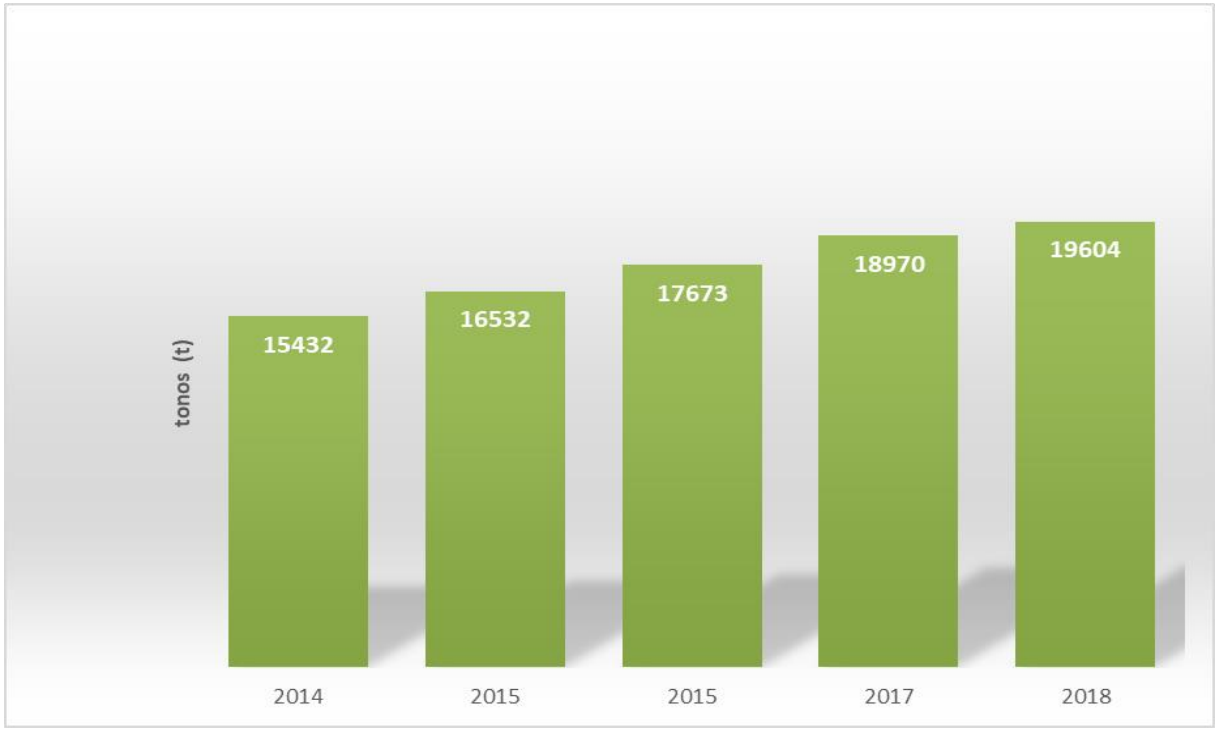
Waste Management

- **Ignitis group in Vilnius and Kaunas is carrying modern projects for high-efficiency cogeneration plants using solid wastes and biofuels**
- Results of the CHP plants implementation:
  - ✓ Circular economy targets for landfill **disposal up to 5%** of waste will be achieved (**in 2015, 54%** of municipal waste **landfilled** in Lithuania);
  - ✓ Annual **public savings** due to CHP plants will be around **23 mln. €**;
  - ✓ **Annual CO_2 emissions will be reduced by 436 000 tons;**
  - ✓ **Electricity** production from renewable energy sources **will be increased by 20%;**
  - ✓ Primary energy (fuel) savings will reach 40% compared to separate heat and power generation.



Potential for Energy-Industrial Symbiosis

Utilization of Biomass Ash



Ash usage for road construction

19 600 t/a. of bioash from DH companies in 2018:

23 % as a soil supplement for agriculture and forests

14 % for roads construction

6 % for construction materials

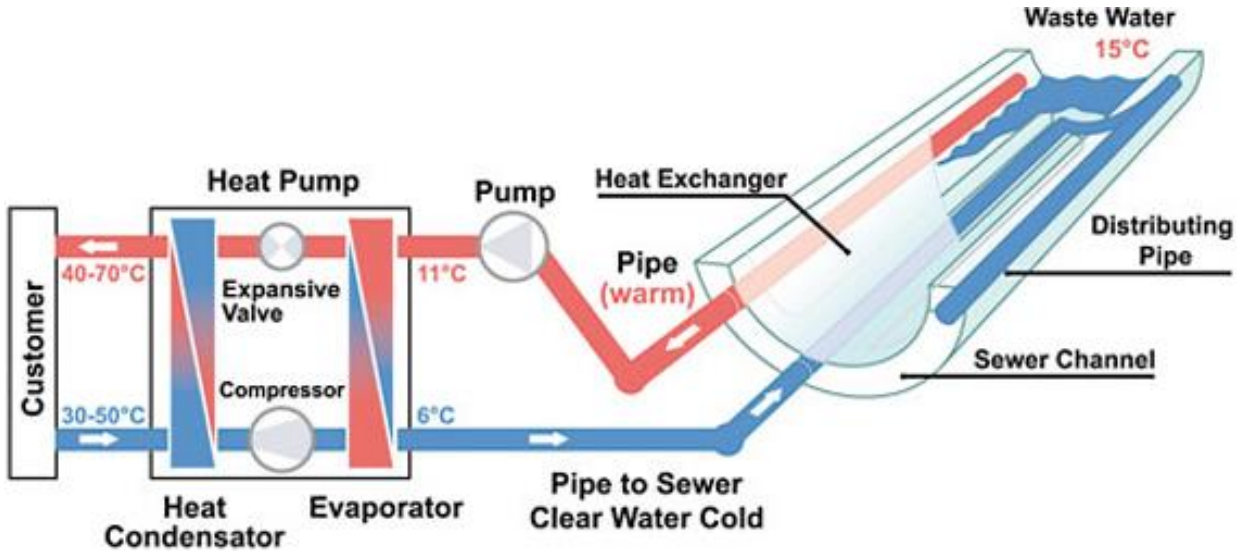
12 % landfilling

43 % for miscellaneous???

Potential for
Industrial-Energy Symbiosis

Waste Heat Recovery from Sewage Treatment Plants

Centralized sewage systems and waste water treatment plants available in the cities and towns of Lithuania



Currently: generation of biogas for small scale boilers or CHP plants. **Electricity and heat utilised for own needs**

Potential of wasted heat similar **to thermal energy required for domestic hot water in the city.** Available all year around...

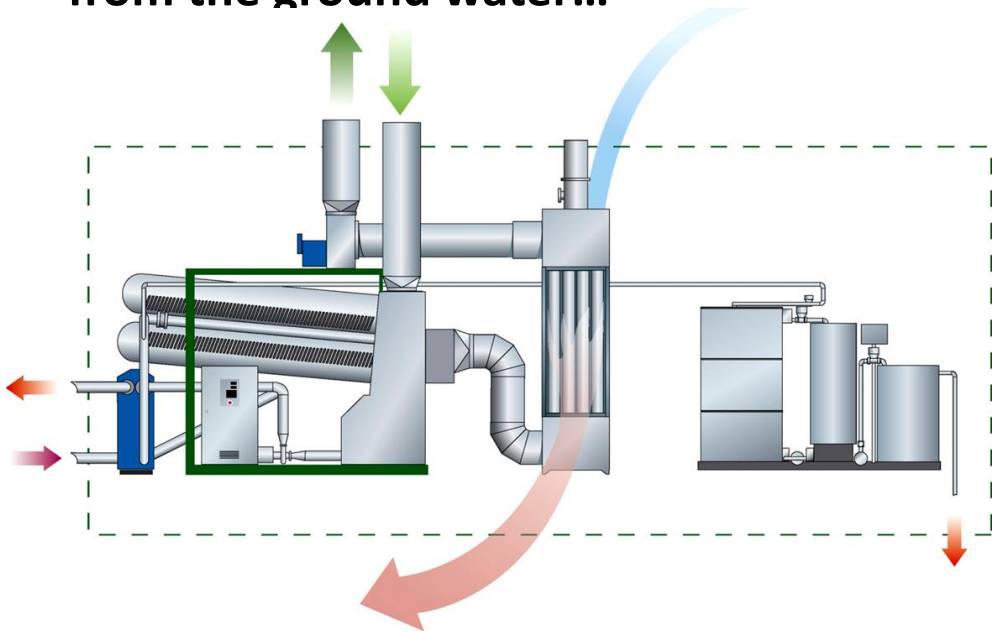
Wastewater is perceived as a source of material recovery and reuse. The main products that can be recovered from the wastewater include **water, wastewater sludge, methane gas, fertilizers and energy**.

Potential – waste heat recovery from cooling system of building

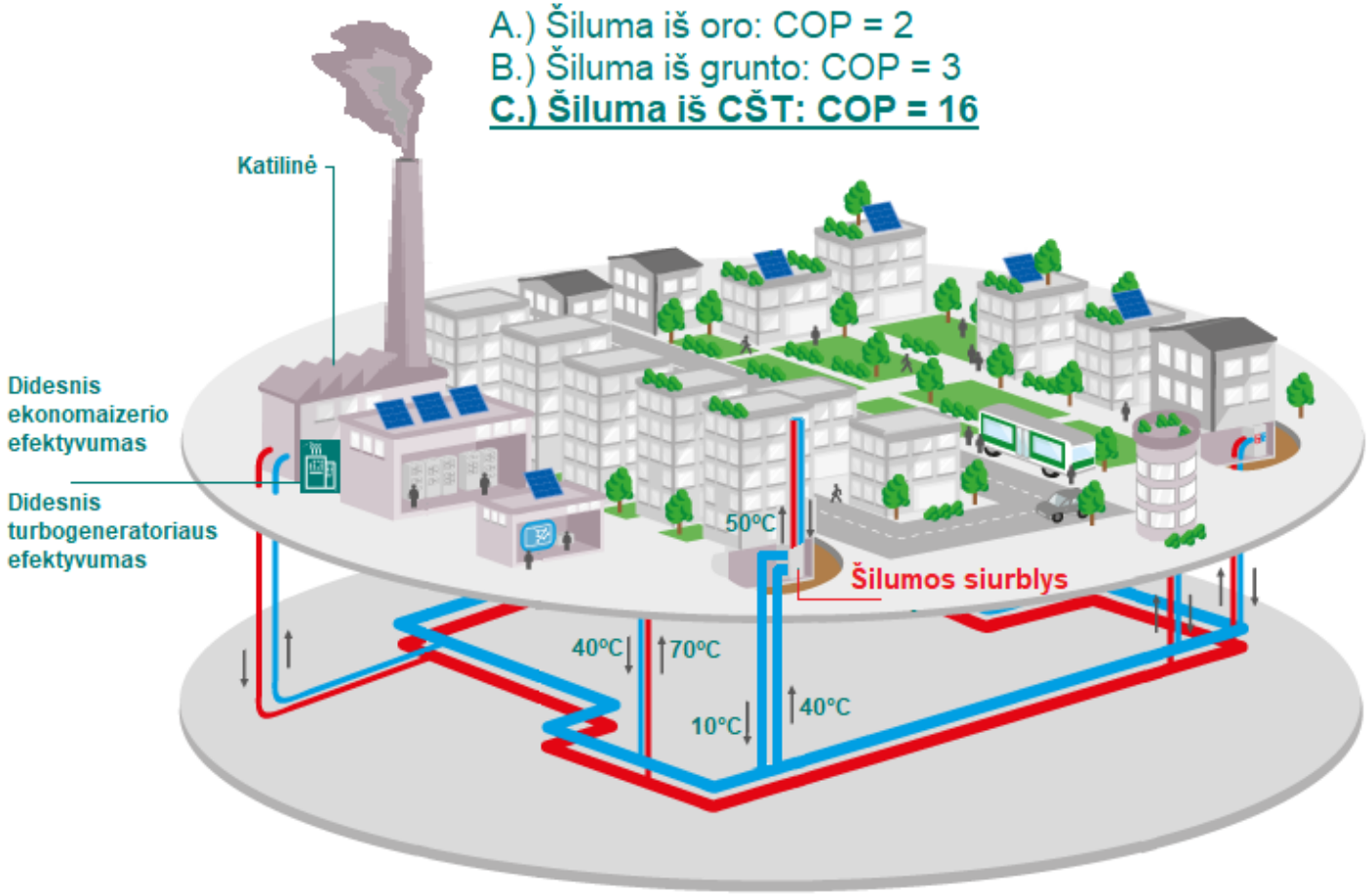
- Heating of tap hot water
- Heating of net water
- Seasonal storage of recovered heat

Symbiosis of heat pumps and biomass based DH systems

Extraction of thermal energy from DH return water much more effective than from the ground water…



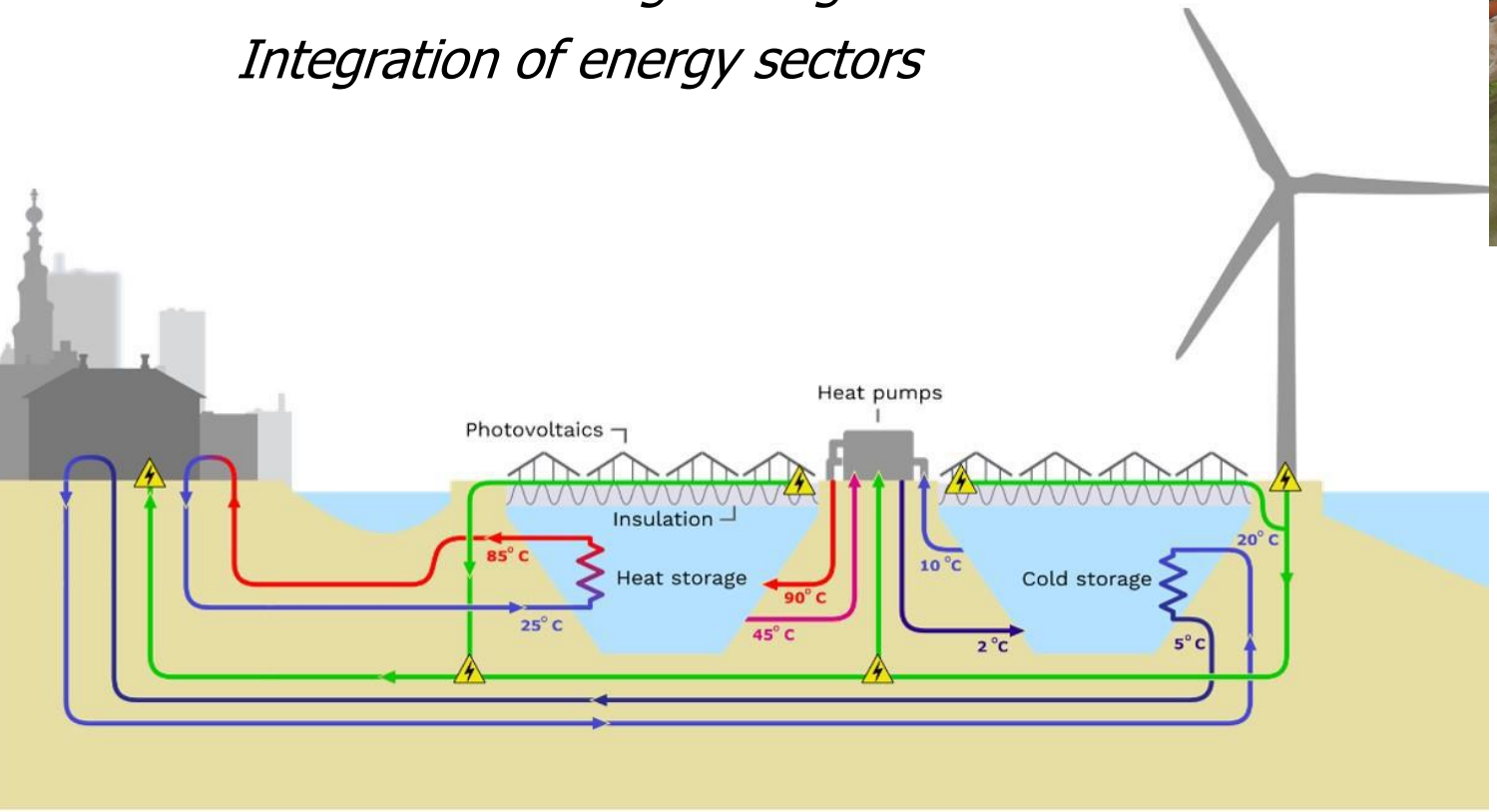
Condensing economiser



Collection of waste heat or electricity for seasonal storage

Function of EE Gigastorage

Integration of energy sectors



Potential – direct supply of cheap heat and electricity from CHP plants

- Production of liquid biofuels
- Industrial procceses based on heating, drying, melting etc.
- Greenhouses
- Swimming (public) pools – open type...

Copenhill

Summary

- Lithuanian DH sector switched from fosil fuels to renewable biomass in large scale
- High investment have been made and first must be returned
- State policy – diversification of primary energy sources
- Usage of new RES and waste heat will be suported in the financiale perspective 2021-2027 of EU Structural Funds
- **Symbiosis of heating, cooling, electricity sectors, industry and public services** **UNAVOIDABLE**

Without district energy systems the resources would be lost...

Thank you!

President of Lithuanian District Heating Association

Valdas Lukoševičius