## Linking energy efficiency policies toward 4<sup>th</sup> generation district heating system

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#### Aim of the study:

 Investigate links between different elements of 4th generation district heating system in the long-term perspective

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#### Method:

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System dynamics modeling













## Analysis of selected policy scenarios

The system dynamics model analysed four different scenarios:

- Baseline scenario
- The fossil fuel tax scenario
- Renewable energy support scenario (subsidy scenario)
- Combined policy scenario



## The model used 6 different policy instruments:

- Increase of the Natural Resources Tax on the CO<sub>2</sub> emissions and excise duties on natural gas
- Financial support for energy efficiency measures in the consumption part
- Financial support for the integration of RES into DH and individual heating
- Financial support for the replacement of DH networks and the promotion of the transition to lowtemperature heating



### Amount of aid in different scenarios by sector



## Produced heat in national heat supply in Combined policy scenario



# Achieved share of RES in district, individual and national heat supply in Baseline and Combined policy scenarios



### Heat produced by CHP in different policy scenarios



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# The amount of CO<sub>2</sub> emissions emitted in the different scenarios in the total heat supply



## Conclusions

- By combining changes in tax policy and financial support in the form of subsidies, it is possible to achieve a significant reduction in fossil energy resource use in the national heat supply.
- In the Baseline scenario the use of RES in 2030 will be close to 60 %. However, in the Combined policy scenario it is possible to achieve the share of RES up to 80 % in DH and 62 % in individual heat supply.
- RES in the national heat supply in 2030 would be 66 %, which is 8 % more than planned in the decarbonisation dimension of national plan.
- In the Combined policy scenario, it is possible to reduce the amount of annual CO<sub>2</sub> emissions by circa 75% by the year 2050.
- The modeling results show that support in the form of subsidies has a greater impact on key targets than tax increases.



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