Quantifying the impact of district heating, heat pumps and electric vehicles in Italy, Romania and the UK

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Choosing the countries

Same measures for all countries
Methods and scenarios

- **Scenario 1 – Business-as-usual 2050**
  - Heat savings are added (30% Italy; 50% Romania; 40% UK)

- **Scenario 2 – District heating**
  - Stratego recommendations (60% Italy; 40% Romania; 70% UK)
  - Large-scale heat pumps

- **Scenario 3 – Individual heat pumps**
  - Cover remaining heat demands

- **Scenario 4 – Electric vehicles**
  - 50% of the transport demand

- Wind and solar integrated separately in steps of 10% of EU-CPI electricity demand until lowest PES, CO2 emissions and costs are achieved

3rd international conference on
SMART ENERGY SYSTEMS AND 4TH GENERATION DISTRICT HEATING
Copenhagen, 12-13 September 2017

www.4dh.eu       www.reinvestproject.eu       www.heatroadmap.eu
Changes in the energy system

Resources
- Wind etc.
- Fuels
- Solar etc.

Conversion
- Engines & Motors
- Fluctuating Electricity
- Electrofuels
- CHP
- Fluctuating Heat

Exchange and Storage
- Fuel Storage
- Power Exchange
- Electricity Storage
- Thermal Storage

Demand
- Mobility (Vehicles)
- Flexible Electricity
- Cooling
- Heating

Energy PLAN
Advanced energy system analysis computer model
Main results – gains on all metrics

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www.4dh.eu  www.reinvestproject.eu  www.heatroadmap.eu
UK – wind integration based on lowest costs

Wind integration (% of EU CPI el. demand)

BAU – 30%
DH – 30%
HP – 30%
EV – 40%
Italy - wind integration based on lowest costs

Wind integration (% of EU CPI el. demand)

BAU – 30%
DH – 30%
HP – 30%
EV – 40%
New heat production
Part conclusions

• All measures bring improvements in all countries
• In general, for all countries:
  – DH and HP improve efficiency
  – EVs reduce the costs
  – All measures reduce CO2 emissions

BUT

The measures do not (or slightly) integrate more RES compared to BAU

Minimum grid regulation share has huge impact on results
Italy

• With CHP – PP stabilisation of 30%

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• With RES stabilisation share of 50%

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Conclusions so far...

• Current grid regulation measures limit the amount of wind and solar in energy system

• Heat sector improvements do not or slightly increase the RES amount, but considerably improve efficiency

• More RES requires changing how we manage our electricity grids (?)
Thank you!

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