

DISTRICT HEATING POTENTIAL IN A HYDROGEN-BASED ENERGY SYSTEM – AN EXPLORATORY FOCUS ON ITALY

Mezzera F., Fattori F., Tagliabue L., Dénarié A., Motta M., Energy Department Politecnico di Milano

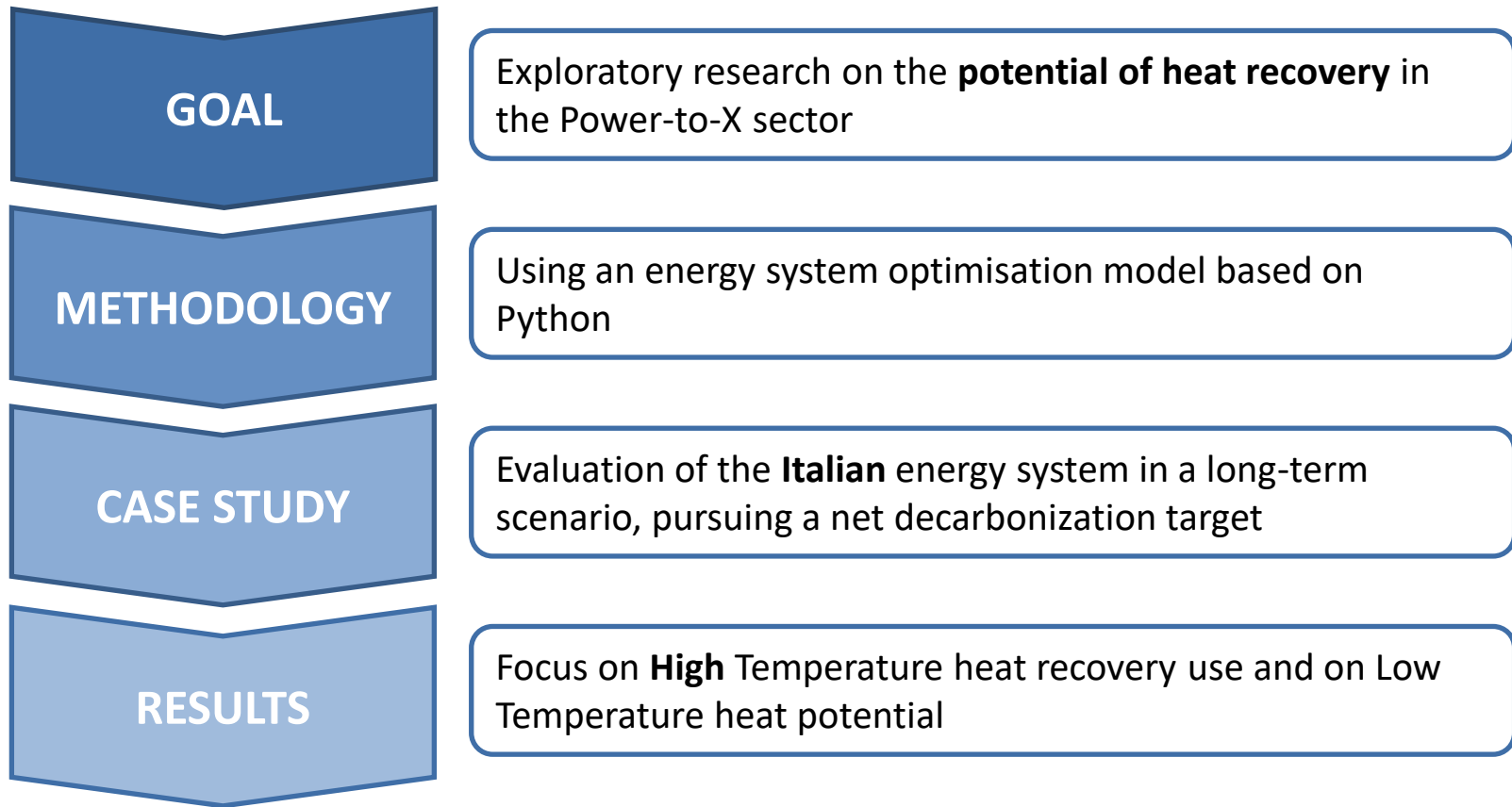


POLITECNICO
MILANO 1863



Powered by

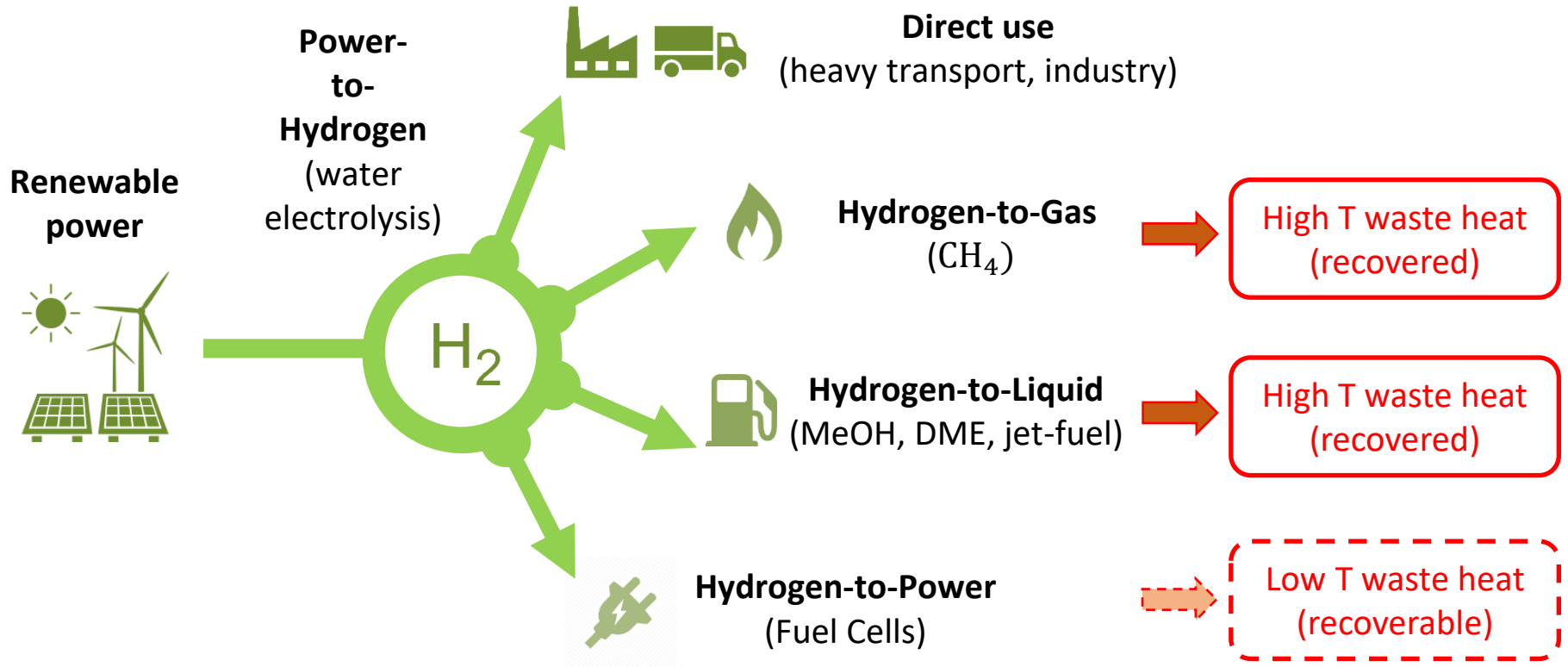




Powered by

2

Technology background: implemented P2X processes






Powered by

3

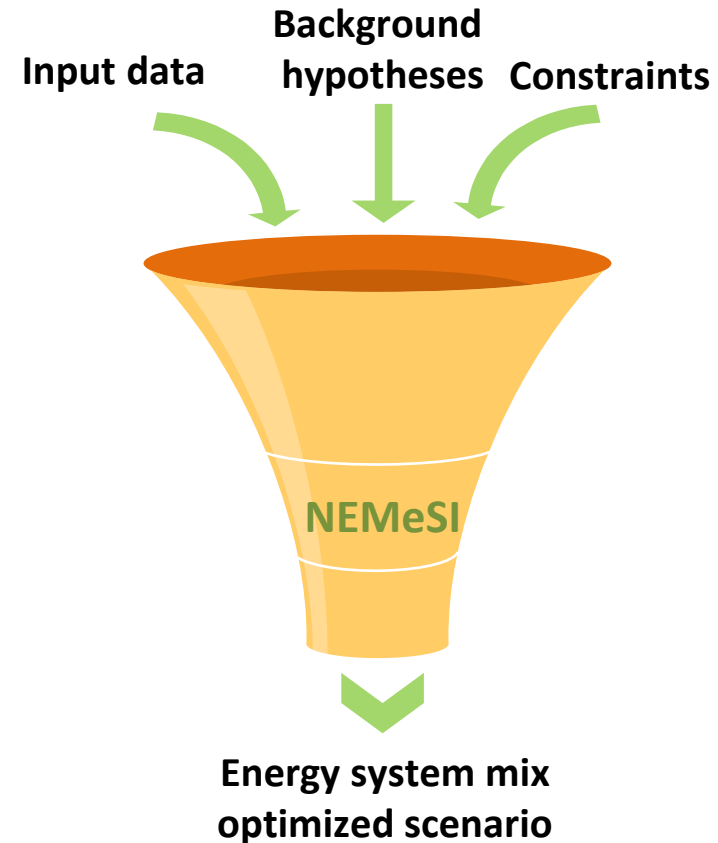
Model description: NEMESI

NEMeSI (National Energy Model for a Sustainable Italy) is an energy system optimisation model based on the open-source framework Oemof.

-  • high temporal resolution; single year simulation with an **hourly time-step**
-  • Customizable technological level
-  • **Single node** spatial resolution
- **Linear Programming** problem; cost optimization



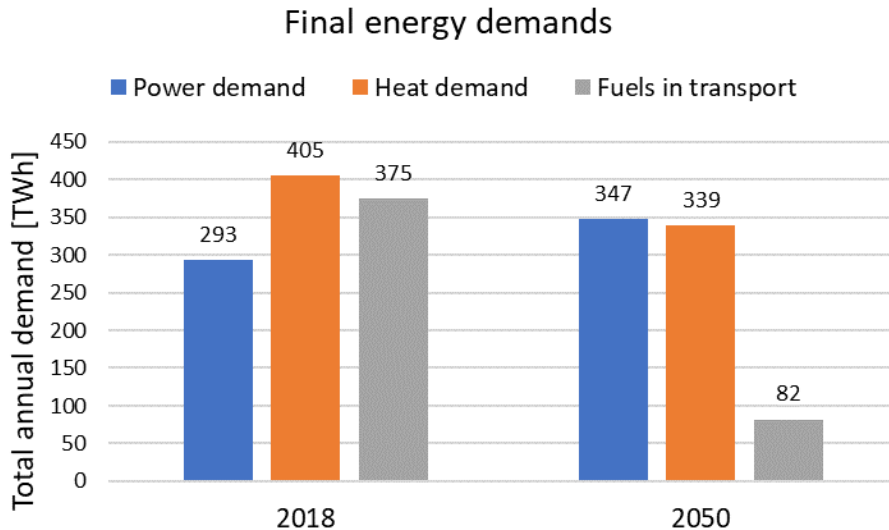
Hourly system operation **with min annual cost for primary fuels** is returned



Powered by

Case study: decarbonised Italian energy system

- **Net decarbonisation** for the Italian energy system in a long-term time horizon (e.g. 2050).
- High RES penetration

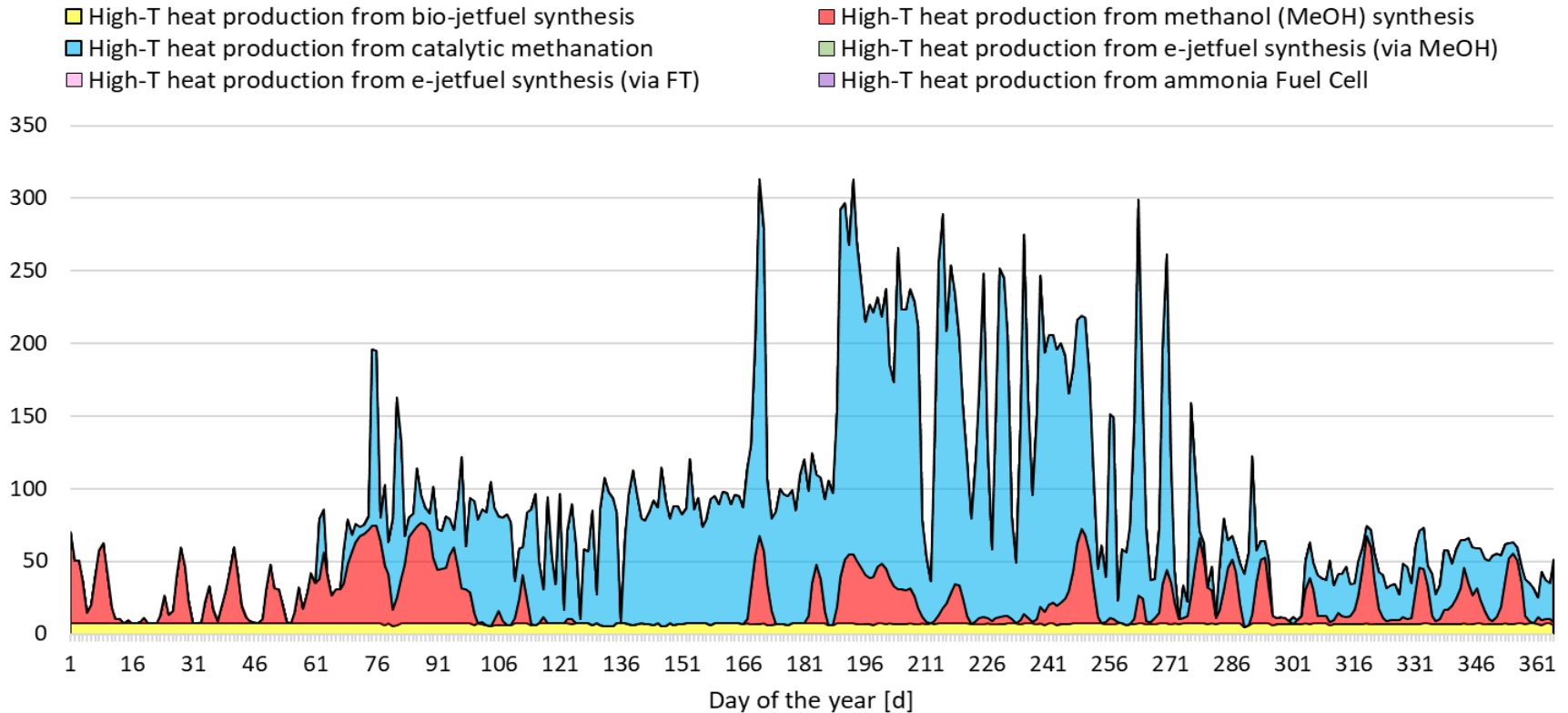


Powered by

5

Results: yearly profile of High-T heat production processes

Recovered High T heat production [GWh]

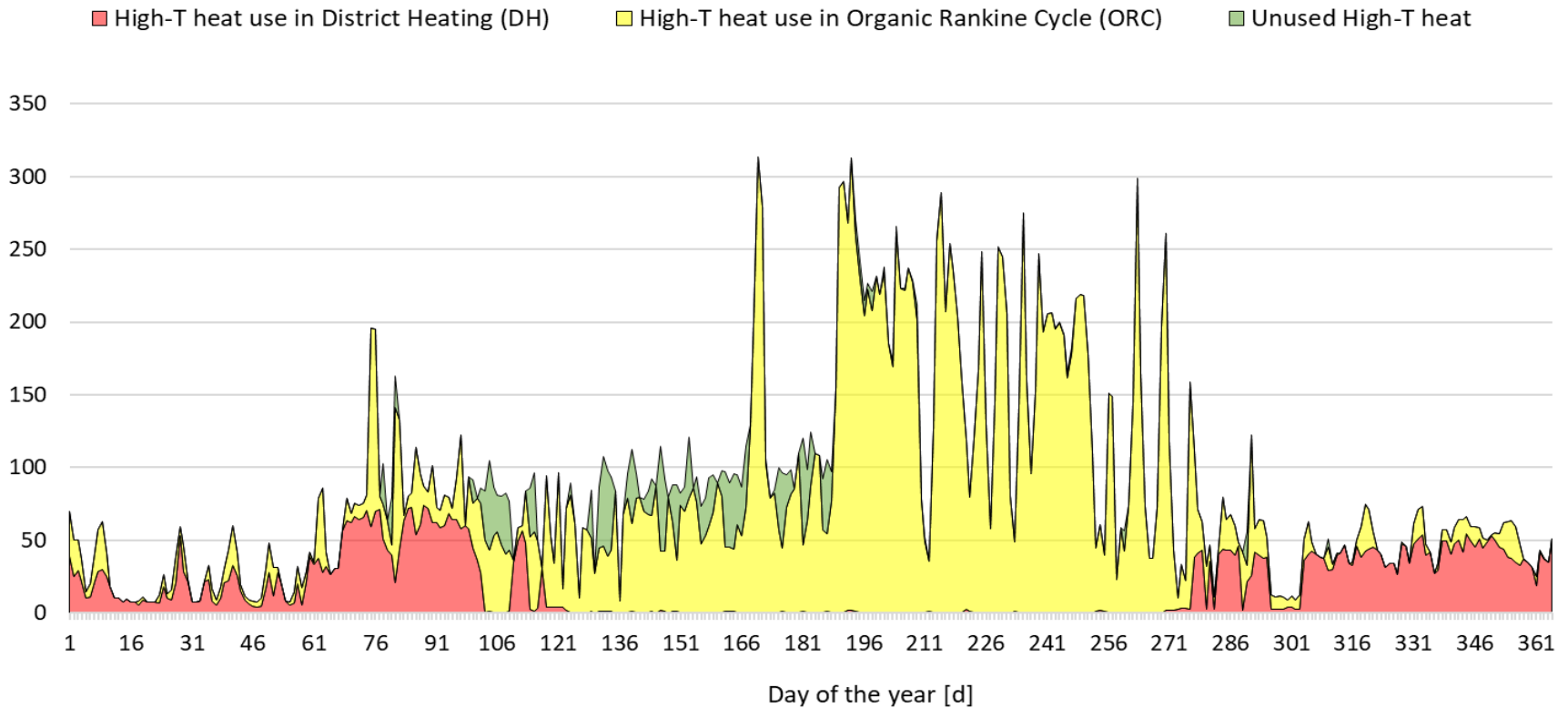


Powered by

6

Results: yearly profile for recovered High-T heat utilization

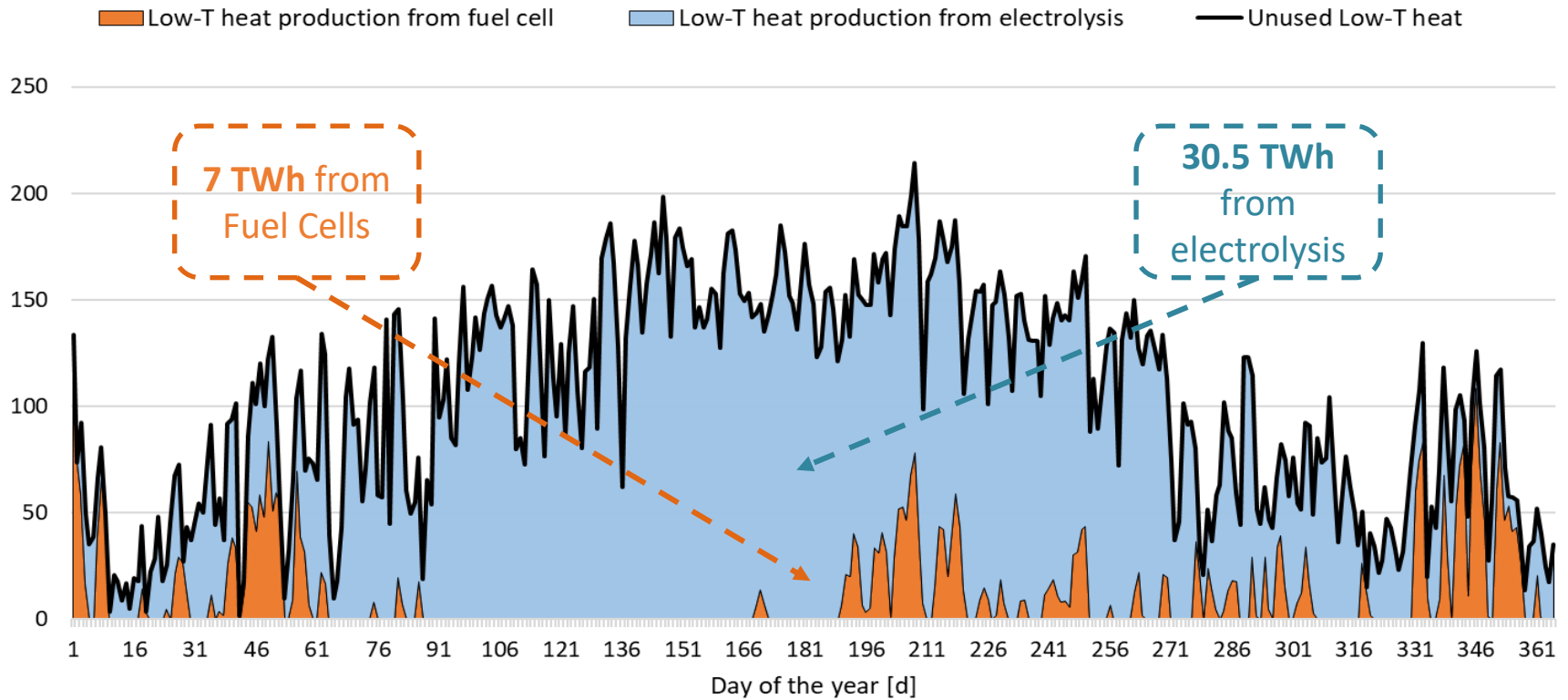
Recovered High T heat utilization [GWh]



Powered by

Results: yearly profile for recoverable Low-T heat

Recoverable Low T heat production [GWh]

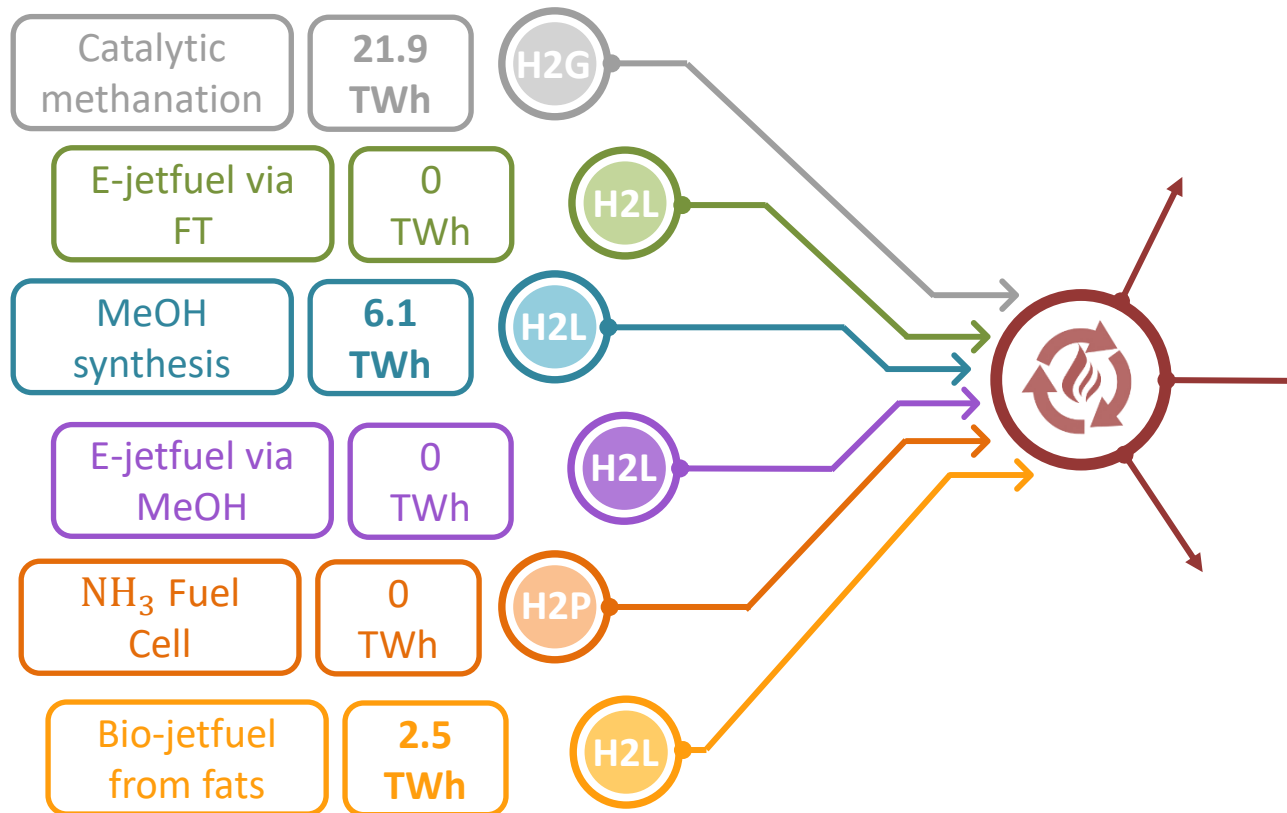


Powered by

8



Results: focus on High T heat recovery



Power generation via ORC

The **majority** (22 TWh, 72%) of High T waste heat is used to power generation via Organic Rankine Cycle

Heat recovery destined to District Heating

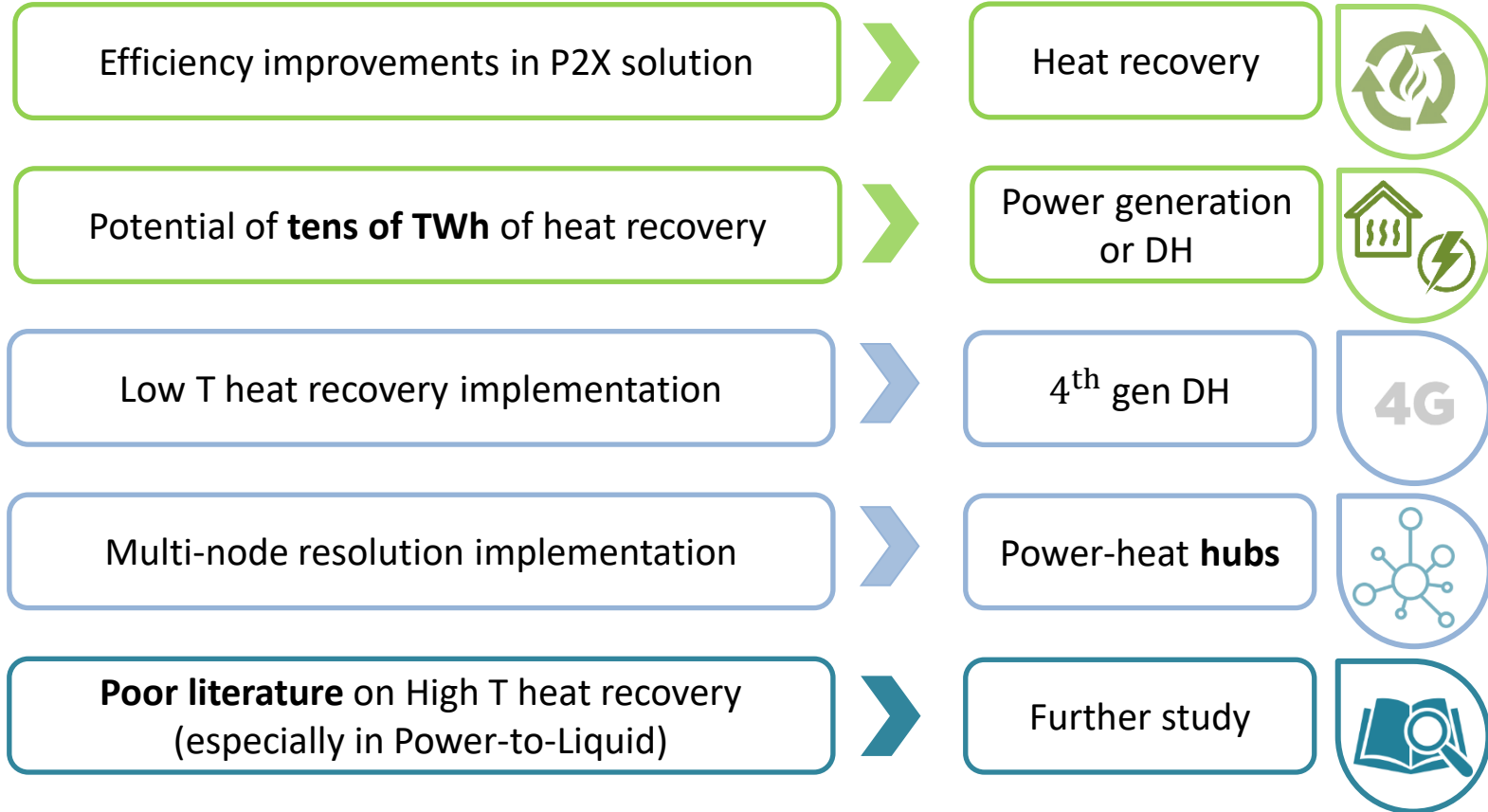
Minor part destined to DH
 ~ 6 TWh (21%)

Heat loss

Unused part (7%)

Powered by

Conclusions



Powered by

10

6th International Conference on Smart Energy Systems
6-7 October 2020
#SESAAU2020

Thank you for your attention

Francesco Mezzera,
Energy Dept. Politecnico di Milano
francesco.mezzera@polimi.it

