IEA ECBCS Annex 49:

Low Exergy Systems for High-Performance Buildings and Communities

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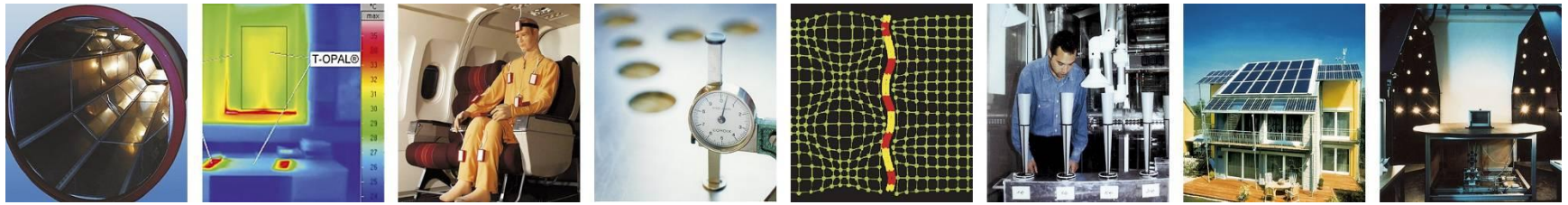

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Objectives

Energy savings and reduction of CO_2-emissions:

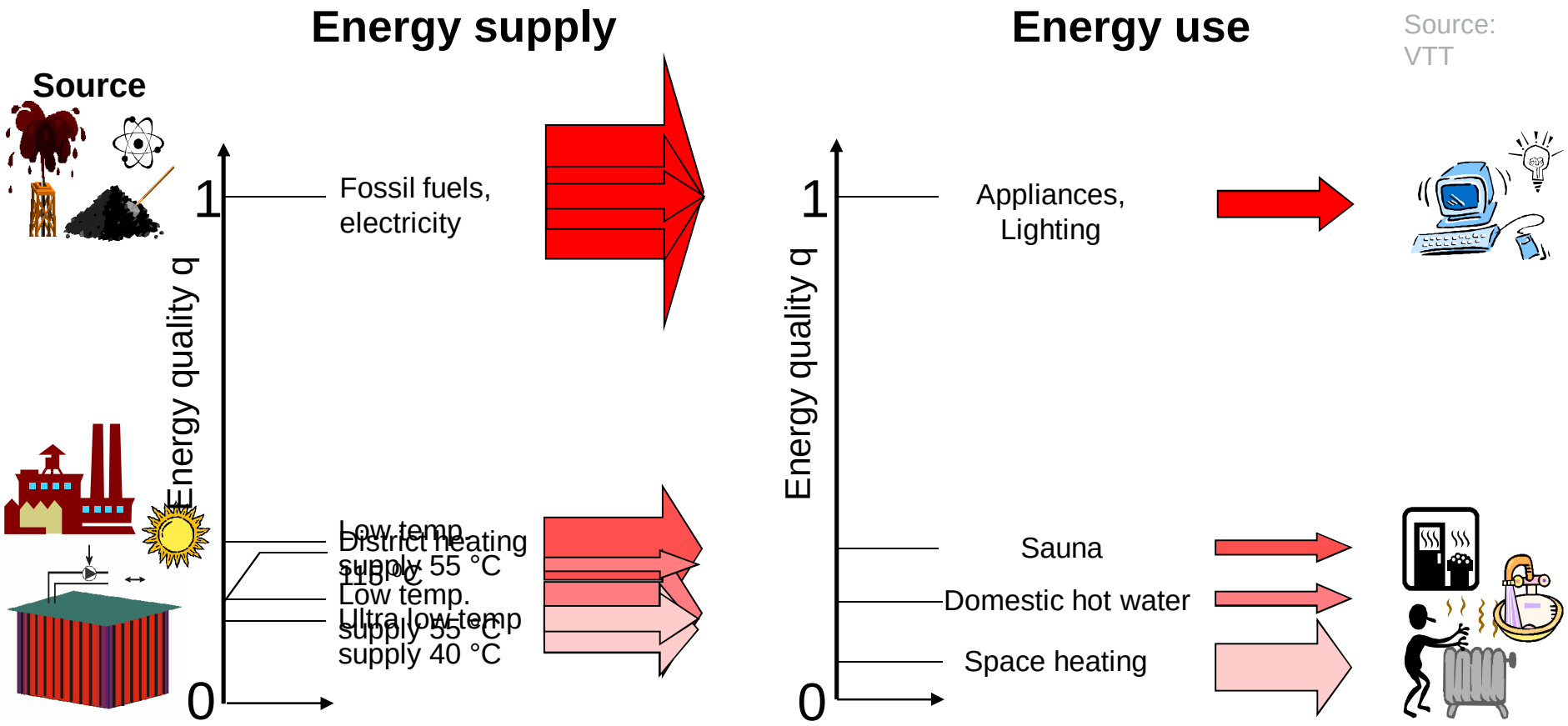
By the use of

low valued and **environmentally sustainable energy** sources

for heating and cooling of buildings.

Through utilization of the ***EXERGY*** concept

Matching of the energy quality of demand and supply



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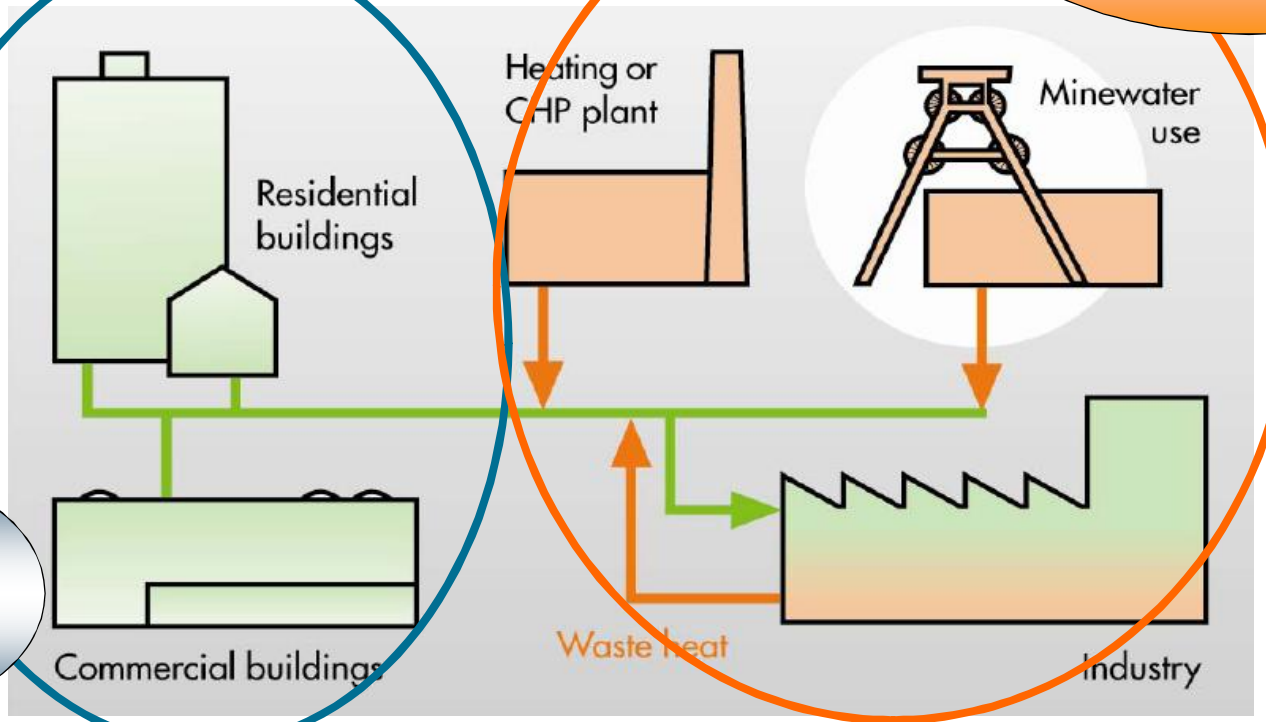
Scope annex 49 Activities

Sustainable community systems

Supply systems



Building systems

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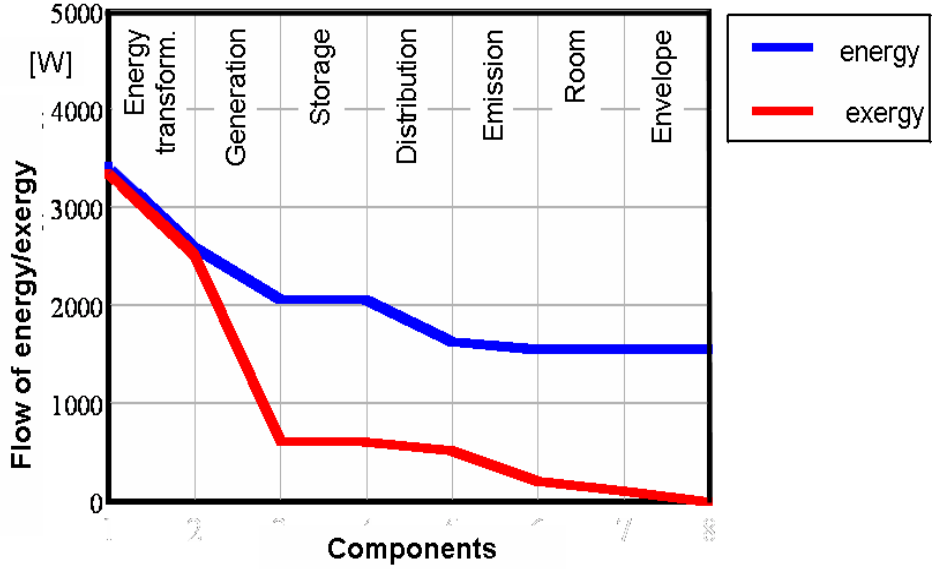
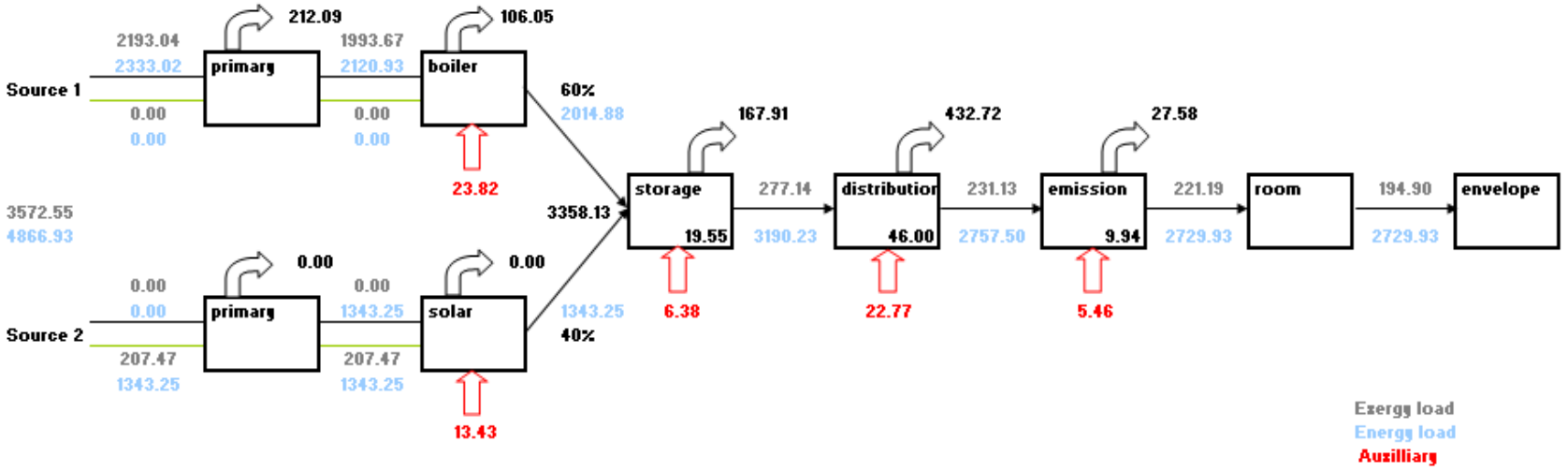
Analyses tools for LowEx systems

Software tools for an energy/exergy asssment





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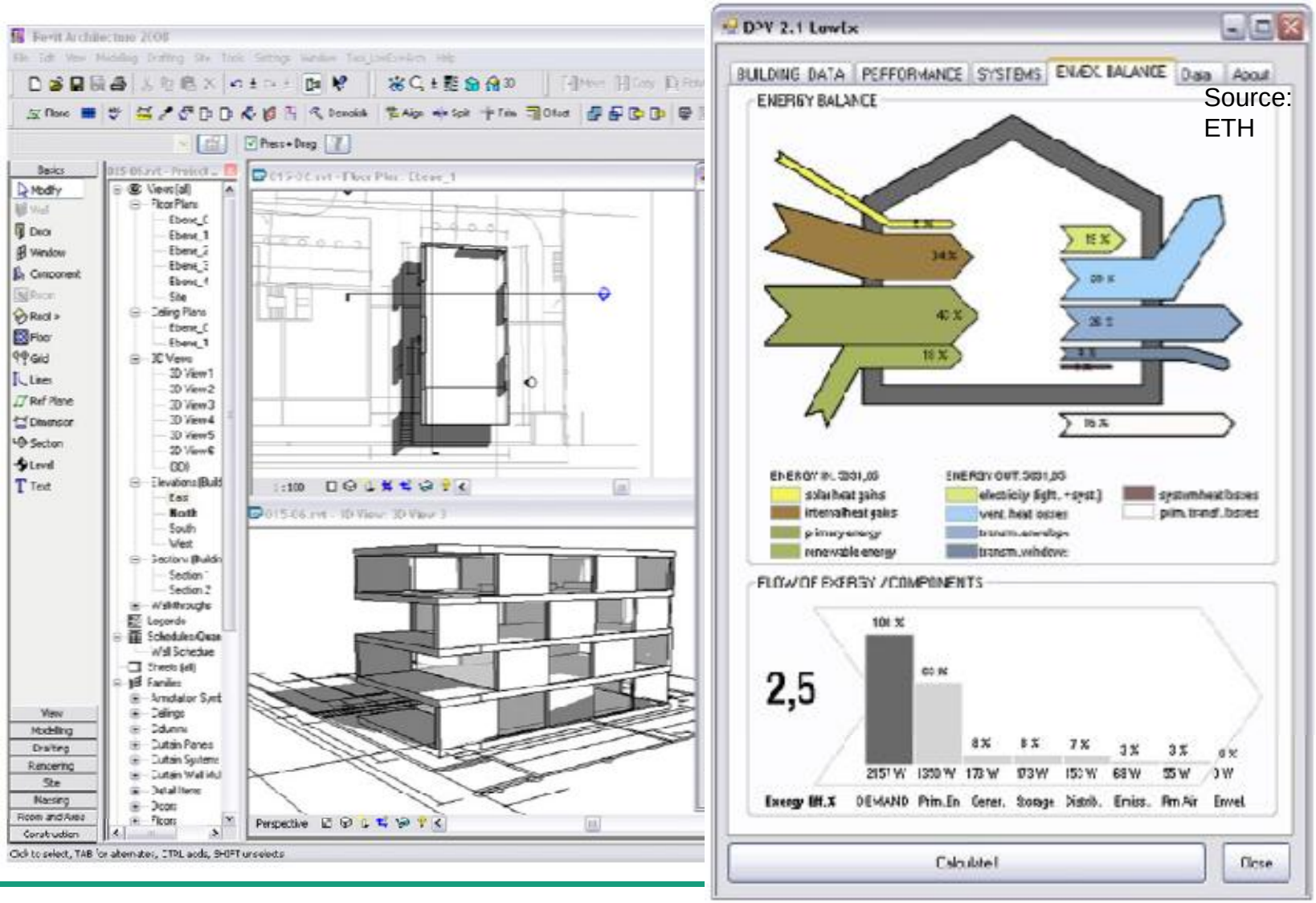
Analyses tools for LowEx systems (Example)



Source: ETH

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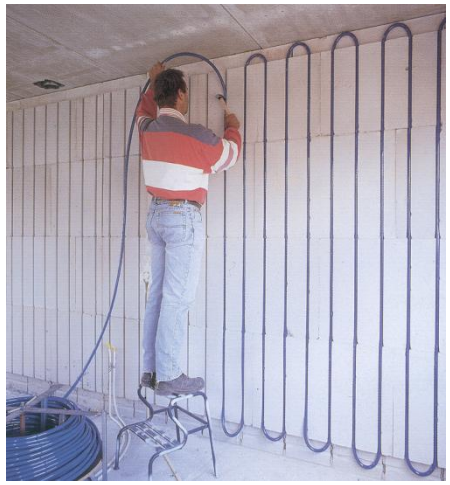
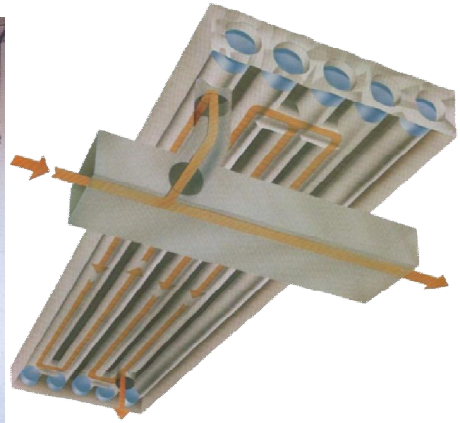
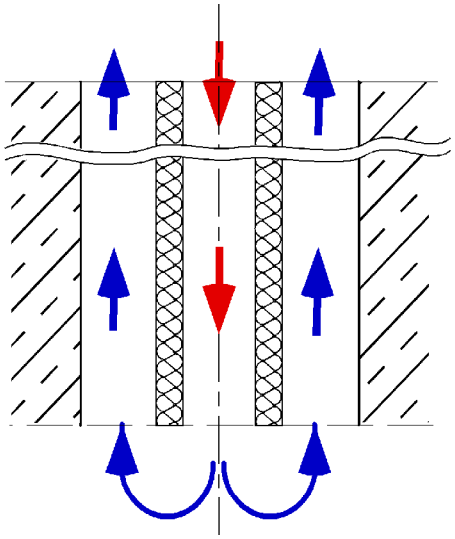
LowEx Building Systems



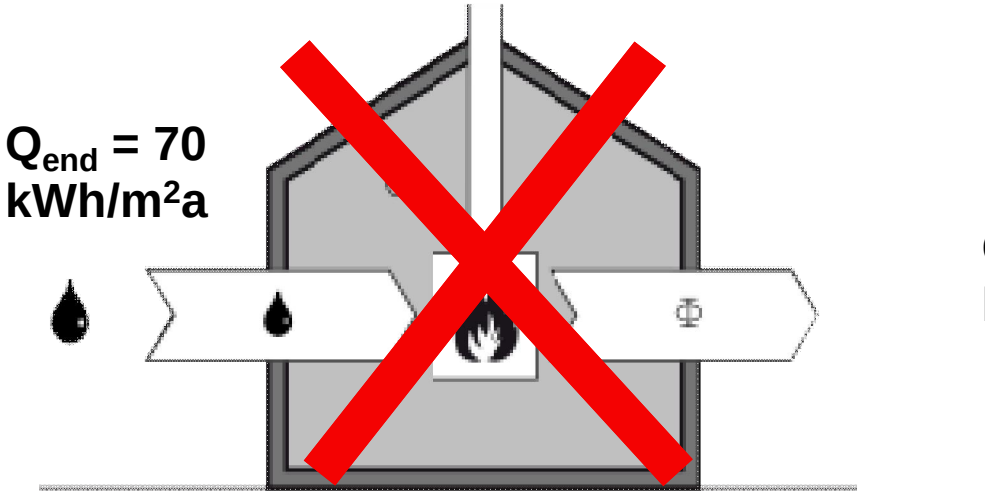


Heat/cold emissioning systems and storages



Low Exergy Buildings?

Match quality levels of supply and demand
by exploiting low quality, waste or environmental sources



...no combustion in buildings

...but LowEx buildings are not Passive Houses

Source: ETH

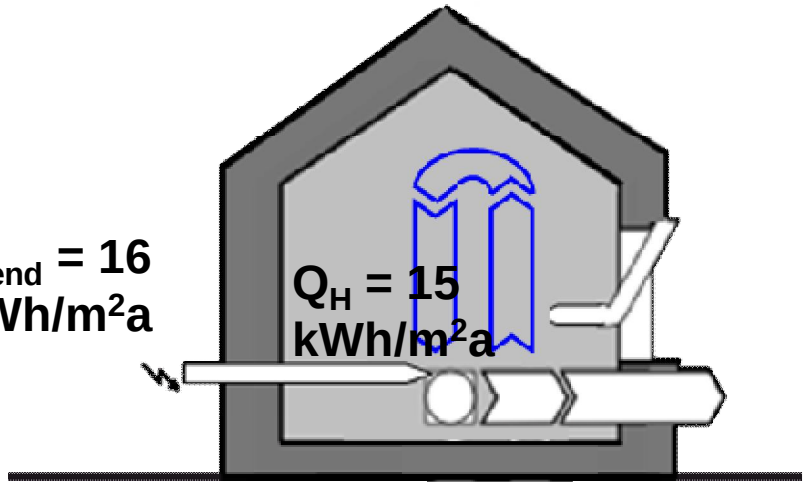
Low Exergy Buildings?

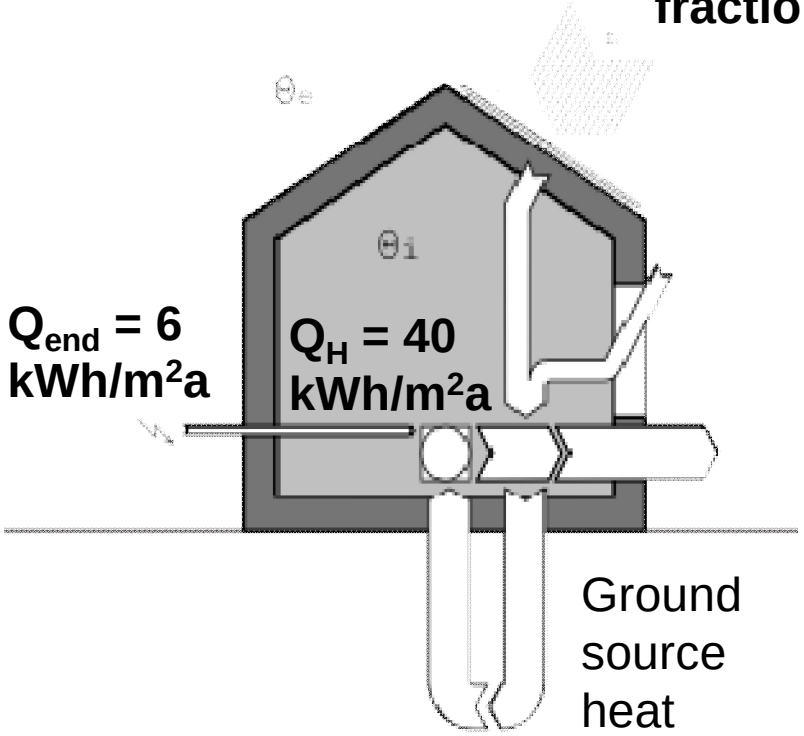
minimize primary energy:
by exploiting low quality, waste or environmental sources

Passive house

LowEx house

40% solar fraction





Air heat recovery unit

Ground source heat pump

…no combustion and minimum high exergy (primary energy) input

Source: ETH

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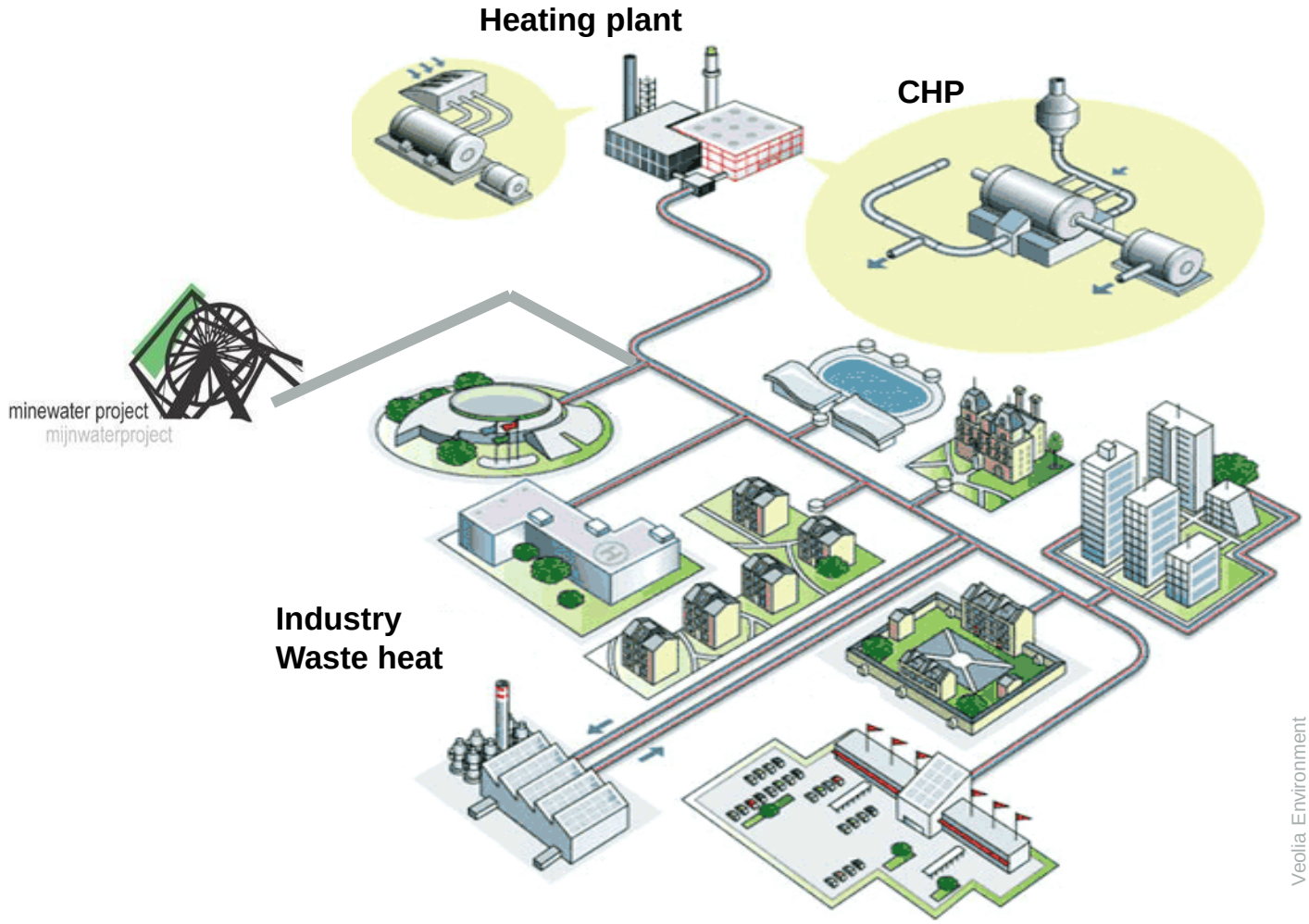
Seeking Low-Exergy Supply Structure for a Community



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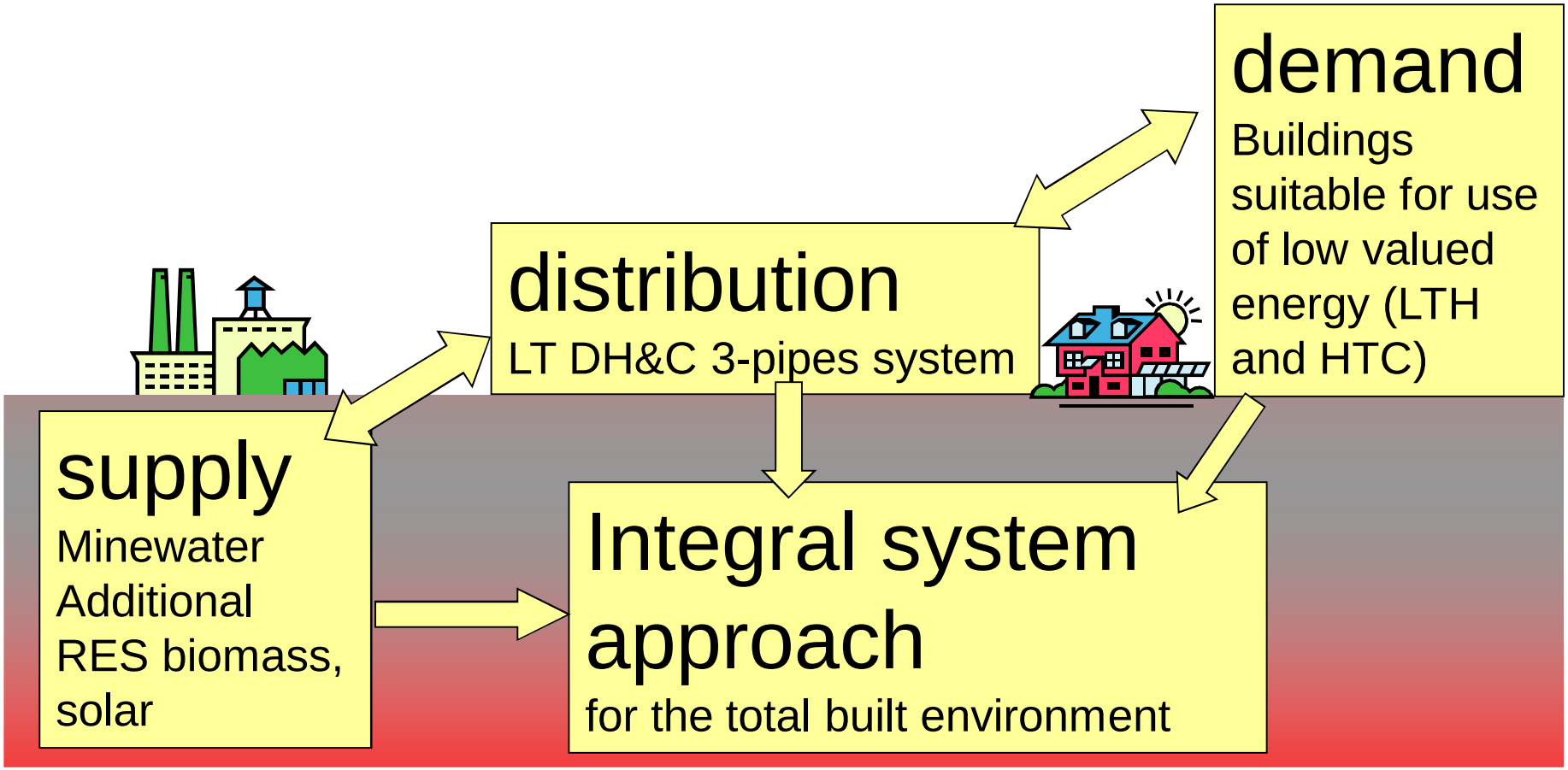
Community case study: Heerlen (The Netherlands)

- LowEx approach for the Mine Water Project



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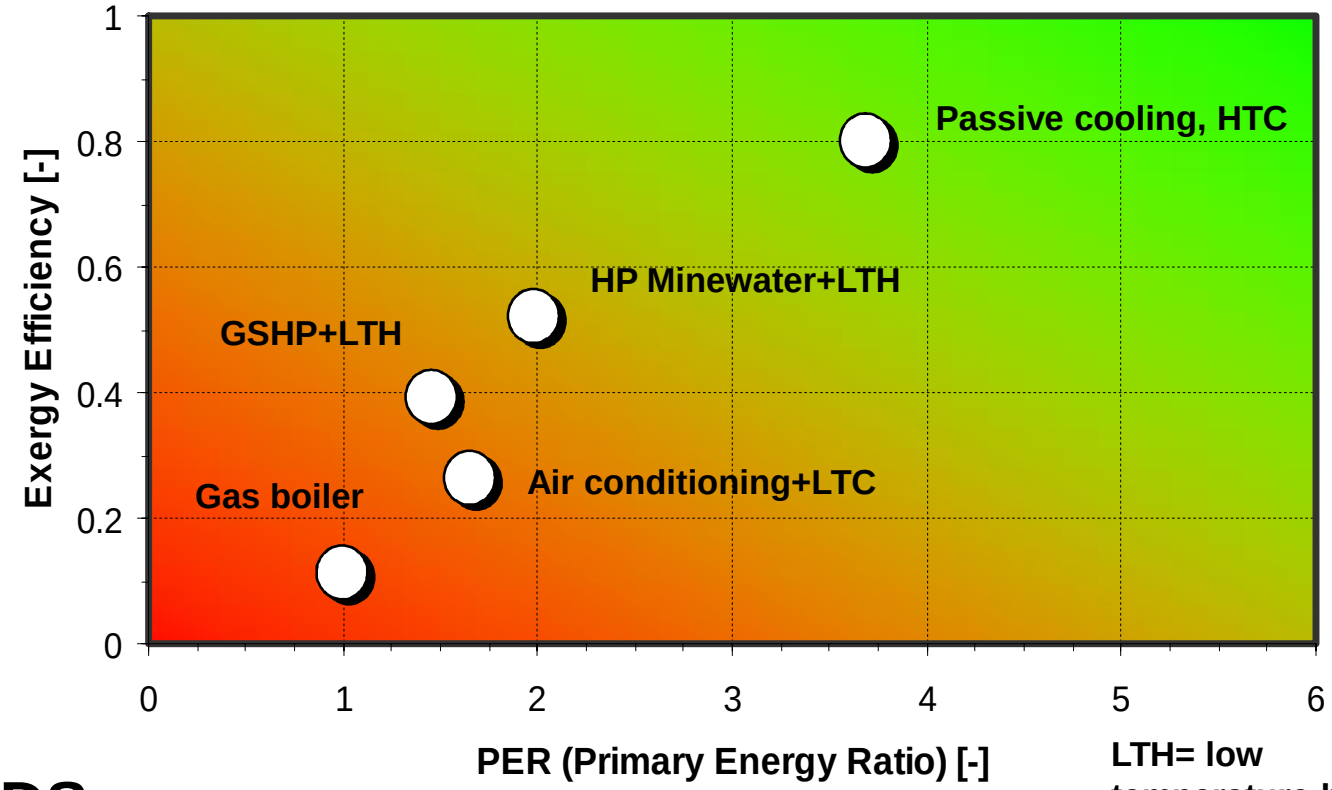
Community case study: Heerlen (The Netherlands)



LTH= low temperature heating

HTC= high temperature cooling

DEMANDS:

Space heating / cooling and DHW demands

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Concluding remarks

1. **Exergy demands for heating/cooling are very small - Energy demands are high.**
2. **Supply as low exergy as possible to the room space**
   - ➡ avoid combustion processes
   - ➡ and minimize electricity input
3. **Find suitable low-exergy sources in the immediate/local environment.**
4. **Development of system-components and their smart integration are necessary**

Annex 49

Low Exergy Systems for High-Performance Buildings and Communities

www.annex49.com

International Energy Agency
Energy Conservation in Buildings and Community Systems Programme