DECARBONISATION OF THE HEATING SECTOR

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DECARBONISATION OF THE ENERGY SYSTEM

- Decarbonisation of the energy system
  - is a challenge due to limited resources.
    - Reduction of primary energy consumption essential (example Austria: For self-supply approx. 40%, the potential (hydro, biomass, wind, PV) is not big enough)
  - requires sector coupling
    - Industry-mobility-heating and cooling in buildings
    - Different energy carriers (electricity, gas, biomass, ambient/waste heat)
    - Distribution and storage
  - needs a deeper insight to Exergy vs. Anergy
    - Exergy (electricity, high temperature heat, chemically bonded energy) is the backbone of the energy system
    - Anergy (low temperature heat) has to be used as much as possible, due to conversion efficiencies in power generation (biomass, power to X to power)
    - Trend goes to electrification of industry and mobility
    - Cooling/air conditioning as big driver and challenge (see IEA Future of Cooling)

ASPECTS OF TECHNOLOGIES

- Building sector:
  - Increasing comfort requests
  - Retrofitting as a challenge
  - Should mainly use Anergy
  - Single family houses (SFH): PV, thermal (short term and seasonal(?)) and electrical (short term) storages, electro vehicles, heat pumps
  - Multifamily houses up to districts: the same as SFHs but in addition local thermal grids up to district heating systems (including waste heat, solar thermal heat, seasonal storages)
- Industry
  - Heterogenous processes, therefore different solutions on process level
  - Increasing on-site efficiency (e.g. high temperature heat pumps)
  - Distribution of waste heat (Anergy)

STORAGES (INCLUDING CONVERSION TECHNOLOGIES)

- Requirements:
  - MW- scale with capacities up to TWh, space requirements!
  - Scalable systems for decentralized solutions
  - Cost competition, “merit order” in between different technologies
  - Short term storages are the basis for seasonal storages for smoothing of fluctuations of PV and wind-power
- Short term storages (days up to weeks)
  - Hydro, pumped-storage power (large and small scale)
  - Compressed air
  - High temperature storages
  - Batteries
  - Flywheels
- Seasonal storages (>months)
  - Chemical storages
    - Biomass
    - P2X:
      - C-based, Synthetic fuels (requires seasonal CO2 storages)
      - N-based (Ammonia)
  - Thermal storages
    - High temperature storages
    - Thermo-chemical storages

CONCLUSIONS

- Conclusions from a technology point of view
  - Within the sector coupling energy storages and distribution are crucial
  - Most of the technologies available, missing links must be brought on technology readiness in the next 5-10 years
  - Demonstration and upscaling relevant in the next years