Einbindung von Grosswärmespeicherne in Dänemark
A FEW PICTURES.
• Flemming Ulbjerg. Senior Consultant.
  • Started working 1980. Buildings HVAC.
  • Medio 1990, gradually more and more district energy. Solar, heat pumps, CHP, storages etc.
  • Ramboll Energy, since 1989.

• Ramboll, a consultant with 14,000 employees.
TES IN DENMARK, UNTIL NOW.

• Integration of:
  • Solar.
  • CHP (Natural gas)
  • Heat from electric boiler.
  • Boiler / absorption heat pump. (natural gas and biomass)

• Replacing:
  • Heat-only from natural gas.
ADDITIONS AT EXISTING PLANTS.

- Surplus heat from industry / data. (When available)
- More electric heat pumps.

By implementing more heat from power, these plants are complete.
  - Preferable heat pumps.
  - Electric boilers makes a lot of sense.
IN THE PIPELINE FOR DISTRICT ENERGY.

Actually in predesign / detail design.

1. Larger PTES, where:
   1. No solar.
   2. Waste to energy, rejects heat in the summer.
   4. Surplus heat from industry.
   5. Surplus heat from data centres.
      1. Either building by building or district cooling.

2. Sizes: 0,5 up to 5 mio. m3 of water.
USE OF THE HEAT.

- Replace natural gas. (Denmark and f. ex. Baltic countries)
- Replace heat-only coal. (Germany)
- Replace CHP on coal etc. (Denmark)
OTHER PURPOSES.

- Diurnal cold storage in deserts regions. (Middle East etc.)
  - Cool at night instead of during the day.
    - Lower power prices, and lower ambient temperatures.
VIELEN DANKE