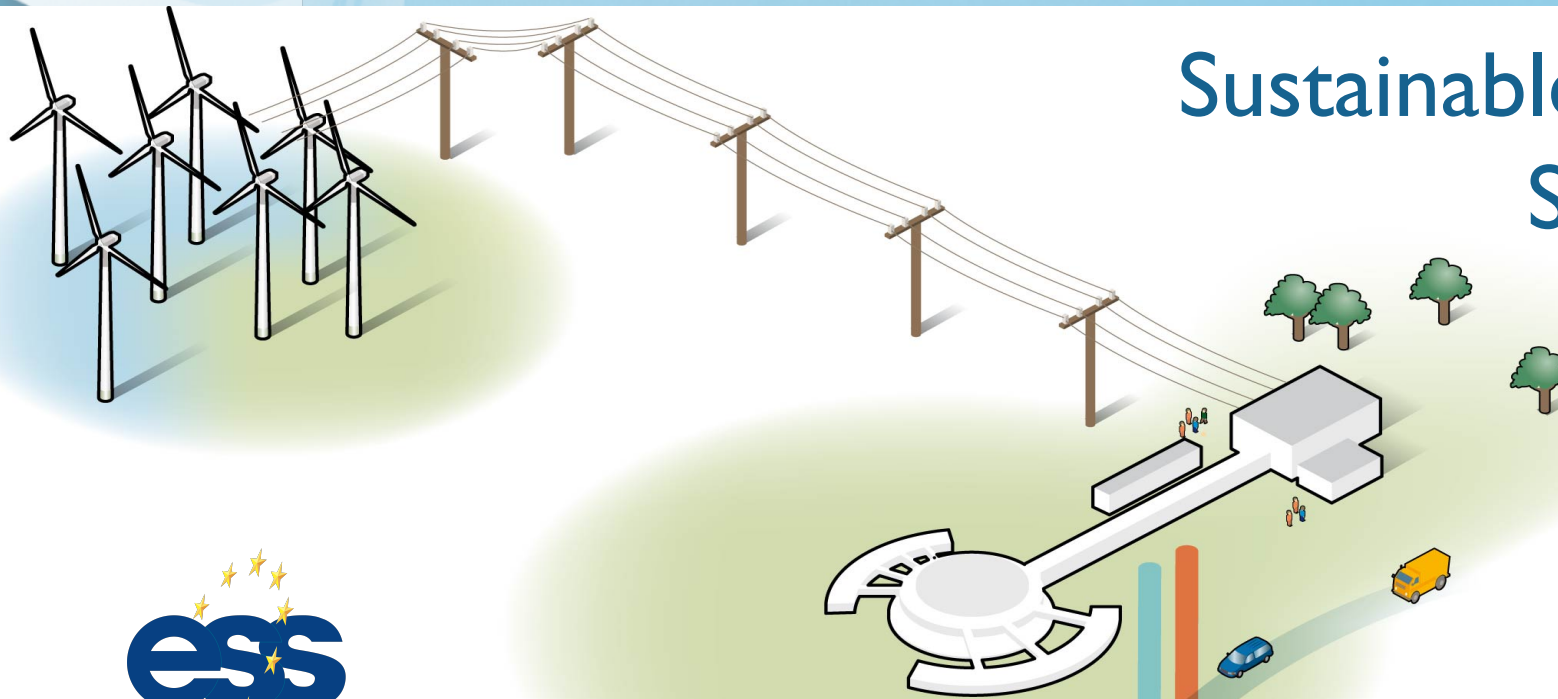


# Sustainable Energy Solutions



**RESPONSIBLE – RENEWABLE – RECYCLABLE**



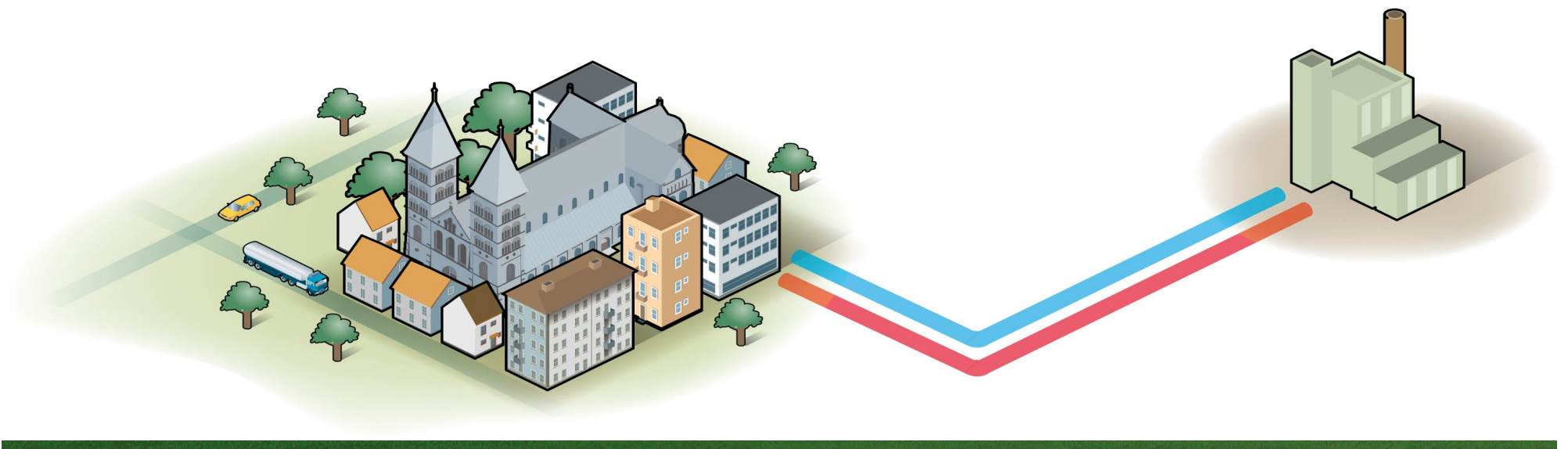
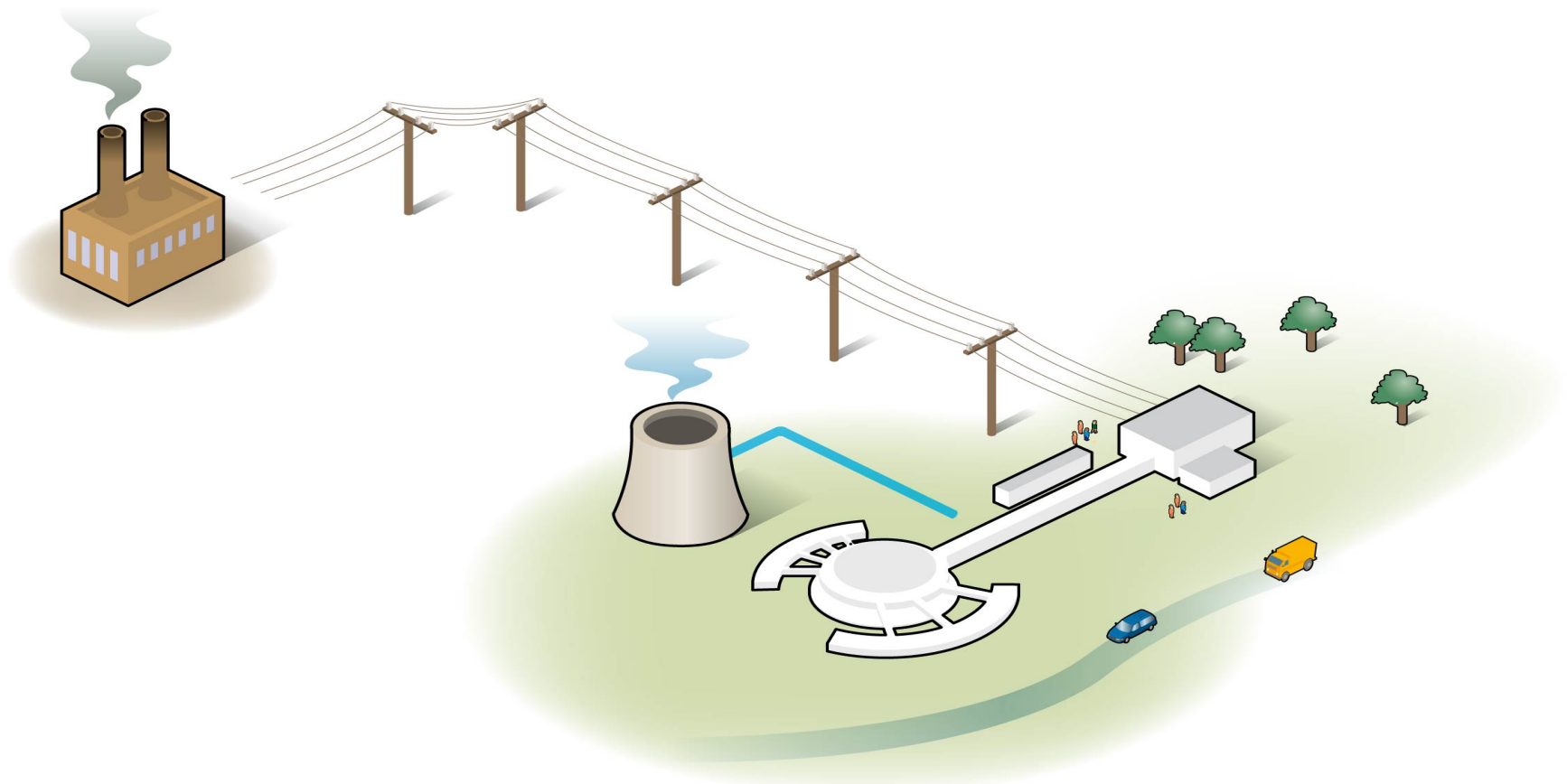
# RRRR for ESS

**Responsible:** Benefits of the research for society must be much greater than the costs, in money, in energy and in environmental impact. It is not sufficient to promise great research results and innovation in the distant future.

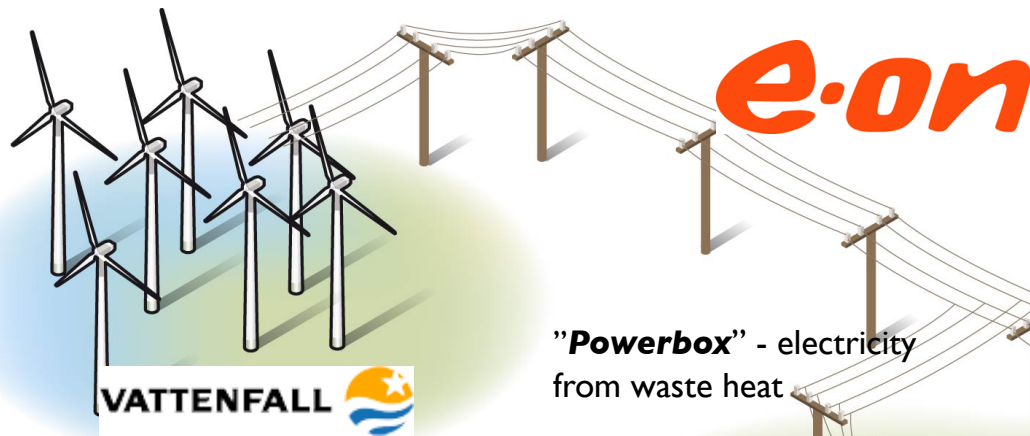
**Renewable:** All energy will be sourced from renewables.

**Recyclable:** The heat generated will be used for heating other buildings, both on site and, via the district heating system of the City of Lund, in the entire city and even in the City of Eslöv 20 km away.

**RELIABLE:** The availability of the cooling system must be near 100%, similar to cryogenics.







Continued development will strengthen the business case for the ESS Energy Solution.



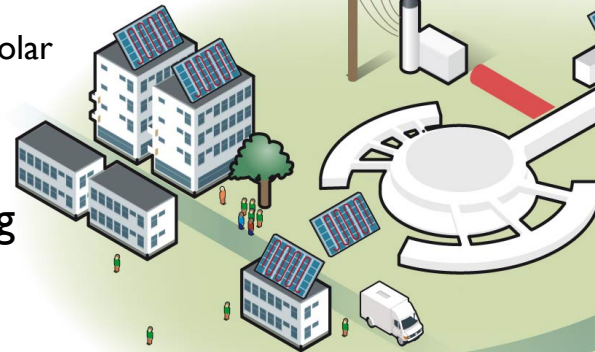
"Powerbox" - electricity from waste heat



EUROPEAN SPALLATION SOURCE

On Site Solar Systems

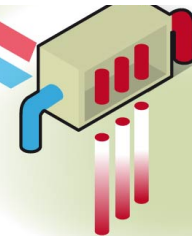
Demonstration of emerging energy technologies strengthen sustainability message and energy culture



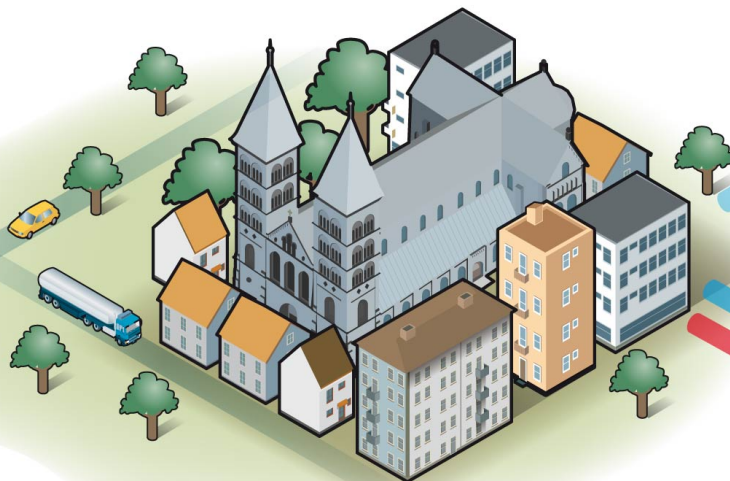
Energy Exhibition at Visitor Centre



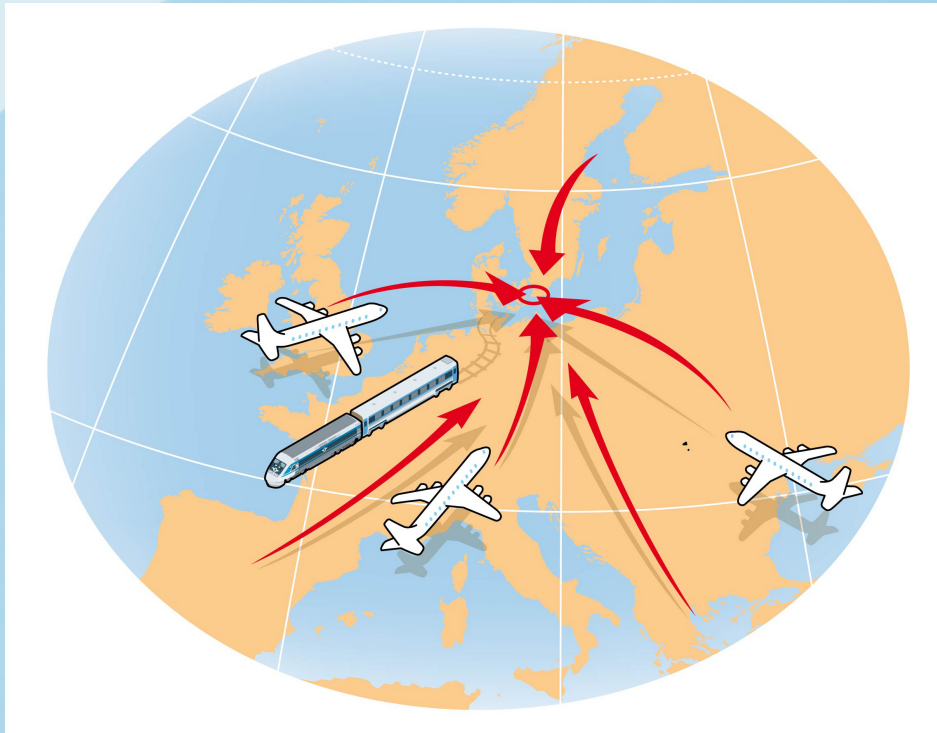
Seasonal storage Cooling and Heat



District Heating



## Total Footprint - Travel and Concrete



- 1000 researchers travel by train from average distance 700 km in Europe : 20 ton per year
- 2000 researchers travel by airplane average distance 1000 km in Europe : 620 ton per year
- Use of 55000 m<sup>3</sup> of concrete for building requires over 50 GWh.
- Steel?



# Why?

- Legal requirement
- Legitimacy
- Money
- Commitment: We have promised 20% reduction in electricity use.
- Best practice is required by law. Industry is far ahead of science in implementation.



## ESS Energy Solution: Opportunity for Sustainability and Economy

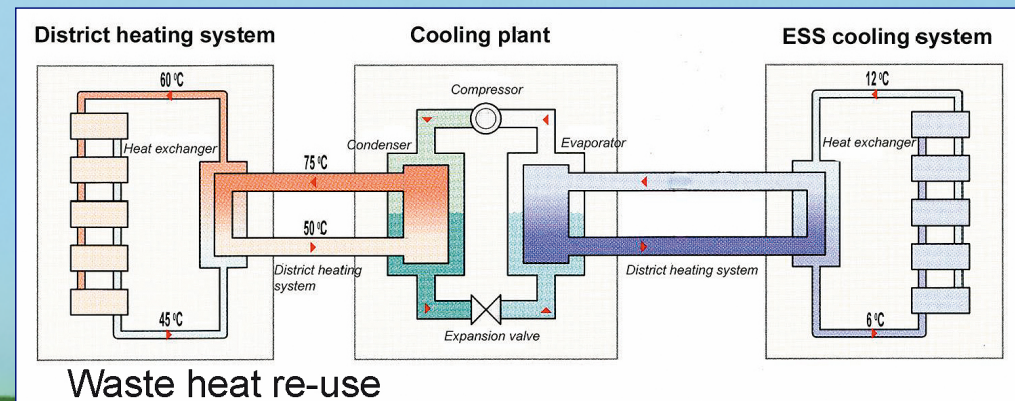
- 13 M€ revenue and cost reduction every year
  - 8 M€ from owning wind power
  - 5 M€ from improved energy efficiency and waste heat business
- 160 000 ton reduction of global carbon dioxide emission every year





# Recycling Challenges

- Because the heat generated in summer will be greater than the need, a seasonal storage system must be developed.
- The operating temperature of the district heating system is around 75°C, compared to 40°C which is a common design parameter for cooling. Careful attention from management will be required to ensure that appropriate redesign steps are taken when possible.
- $T > 75 \rightarrow +\text{€}$
- $T < 40 \rightarrow -\text{€}$
- $40 < T < 75 \rightarrow ??$





# Challenges

Heat  
recovery  
opportunities

Less buck for  
your bang

