

# Data centre as driver for industrial carbon reduction

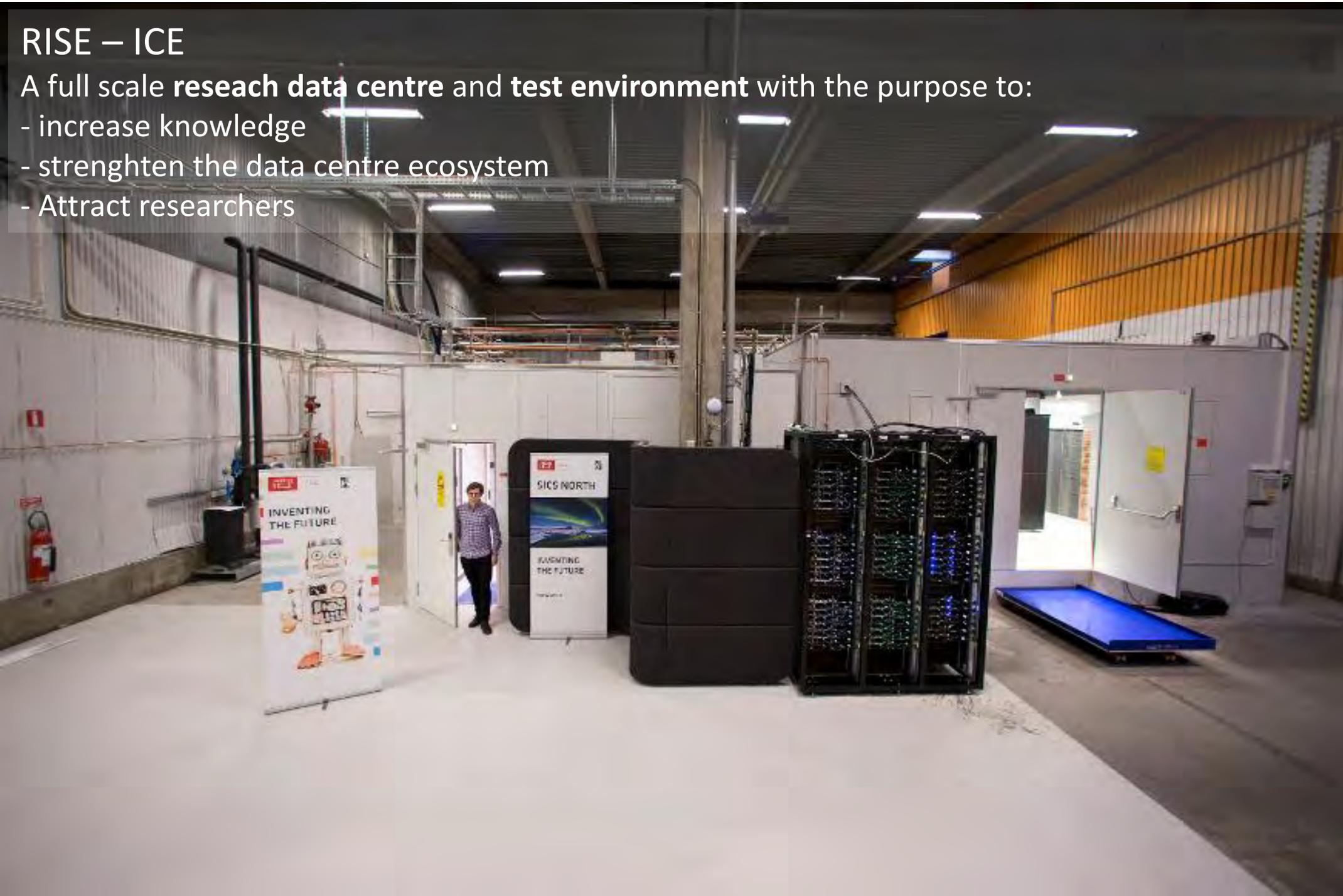
RISE - Research institutes of Sweden

Louise Mattsson  
louise.mattsson@ri.se

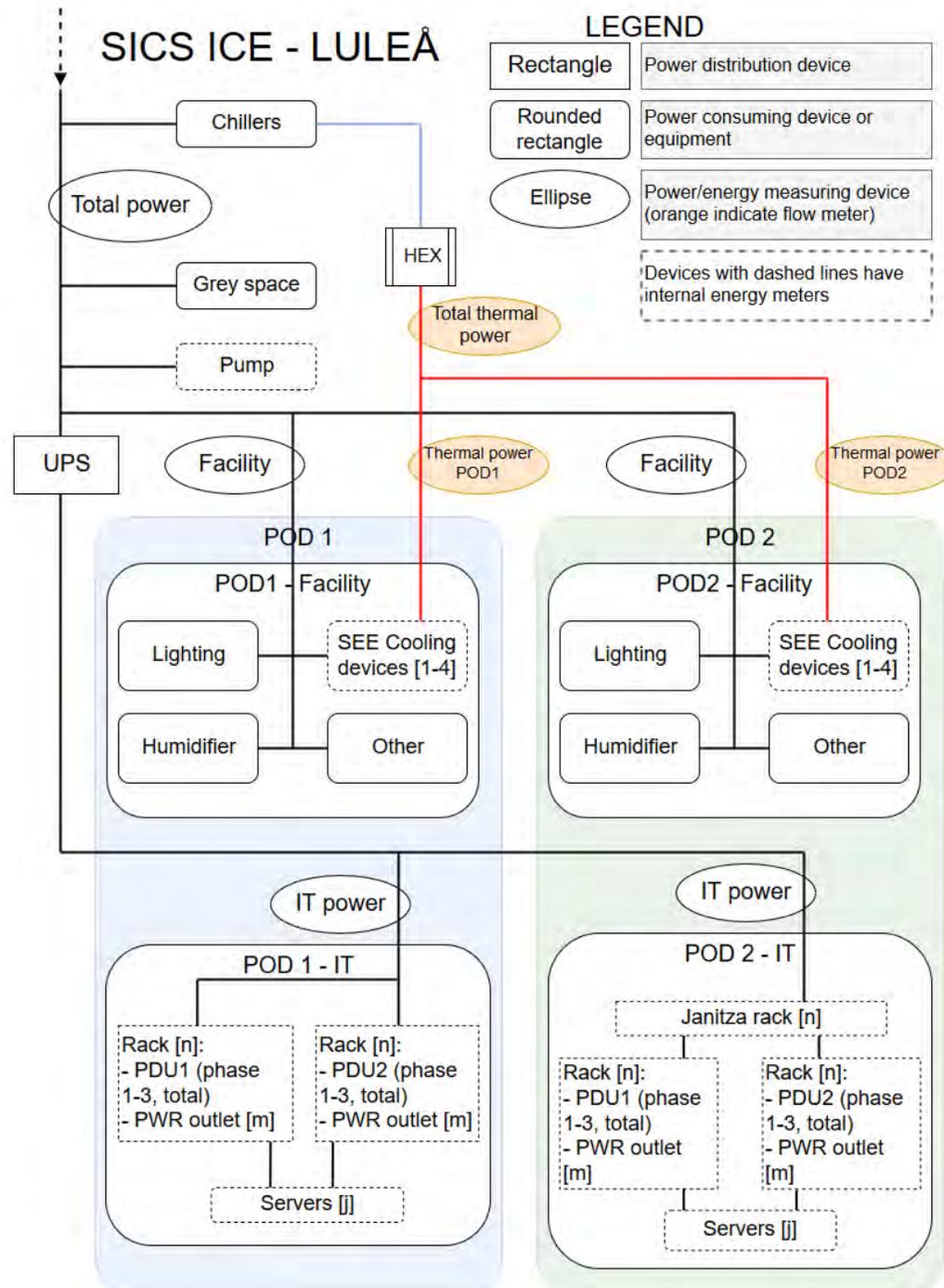
# RISE – ICE

A full scale **research data centre and test environment** with the purpose to:

- increase knowledge
- strengthen the data centre ecosystem
- Attract researchers



# System of measuring



# Reducing carbon footprint



Free air cooling



Optimized server fan control

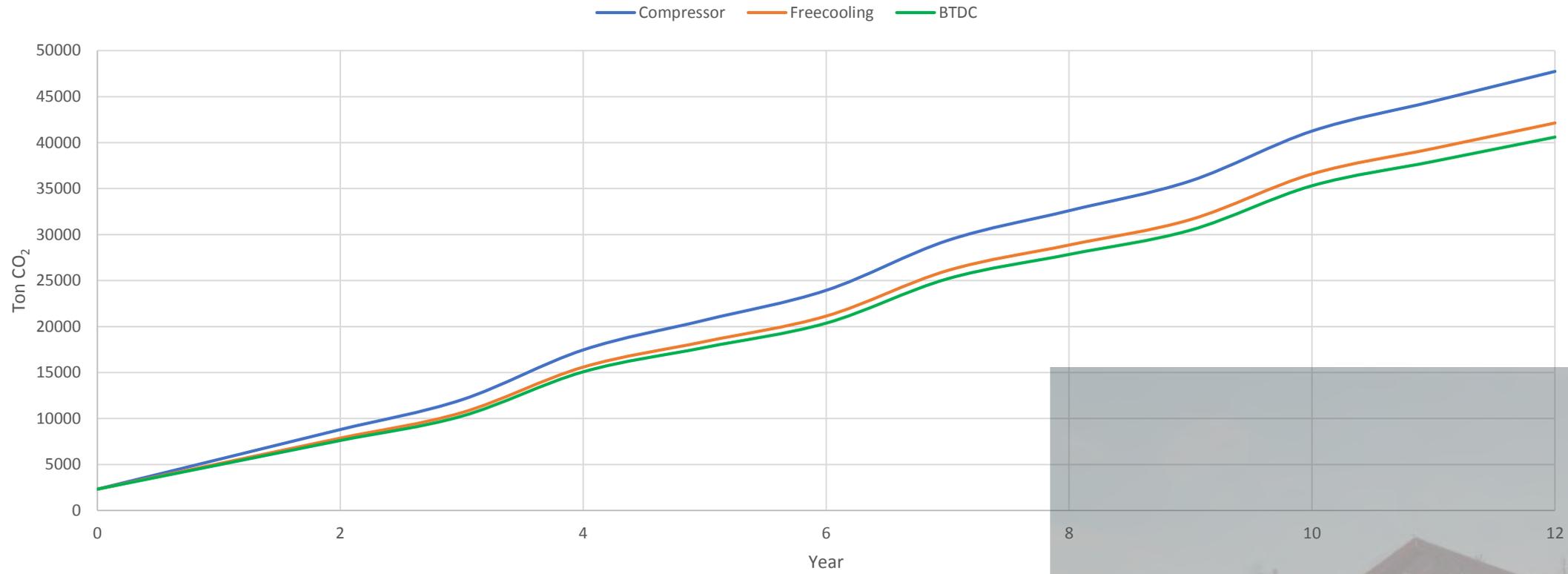


Renewable power source  
(hydro, wind, solar)



Hot air containment

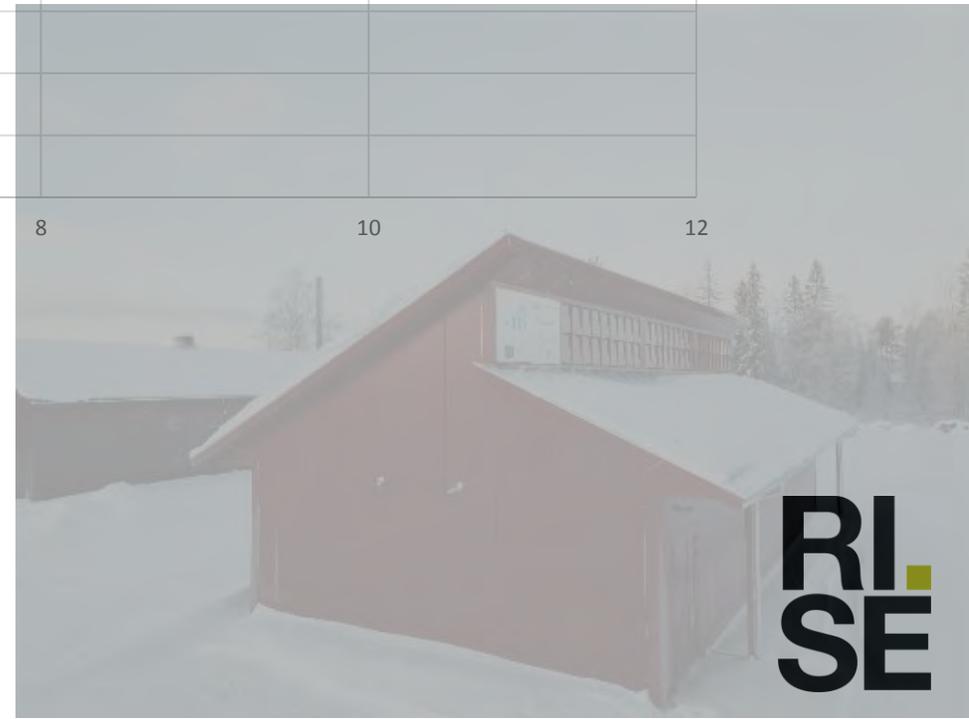
# EU-average el-mix for different cooling techniques



Free air cooling



Renewable power source  
(hydro, wind, solar)



**RI**  
**SE**



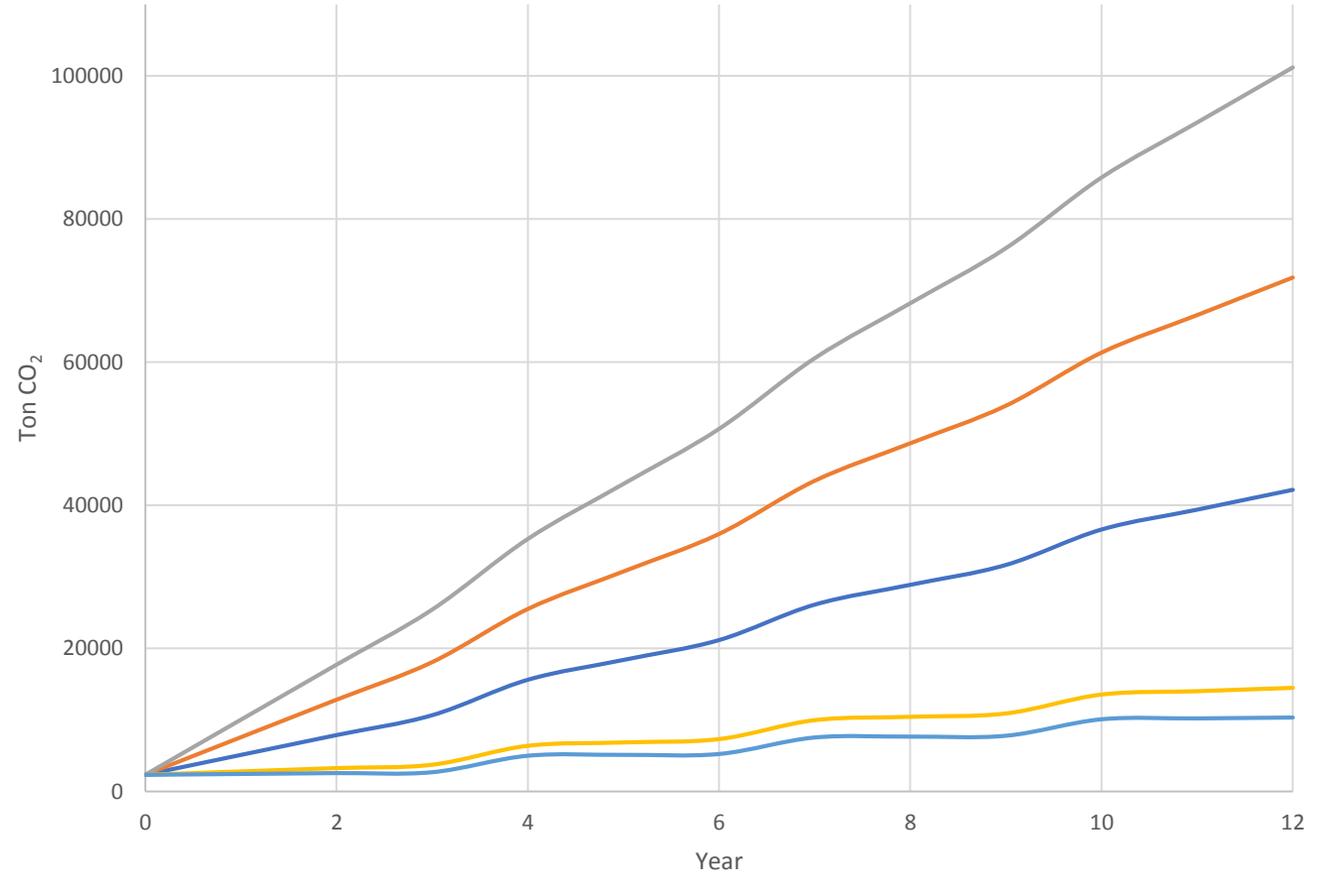
Free air cooling



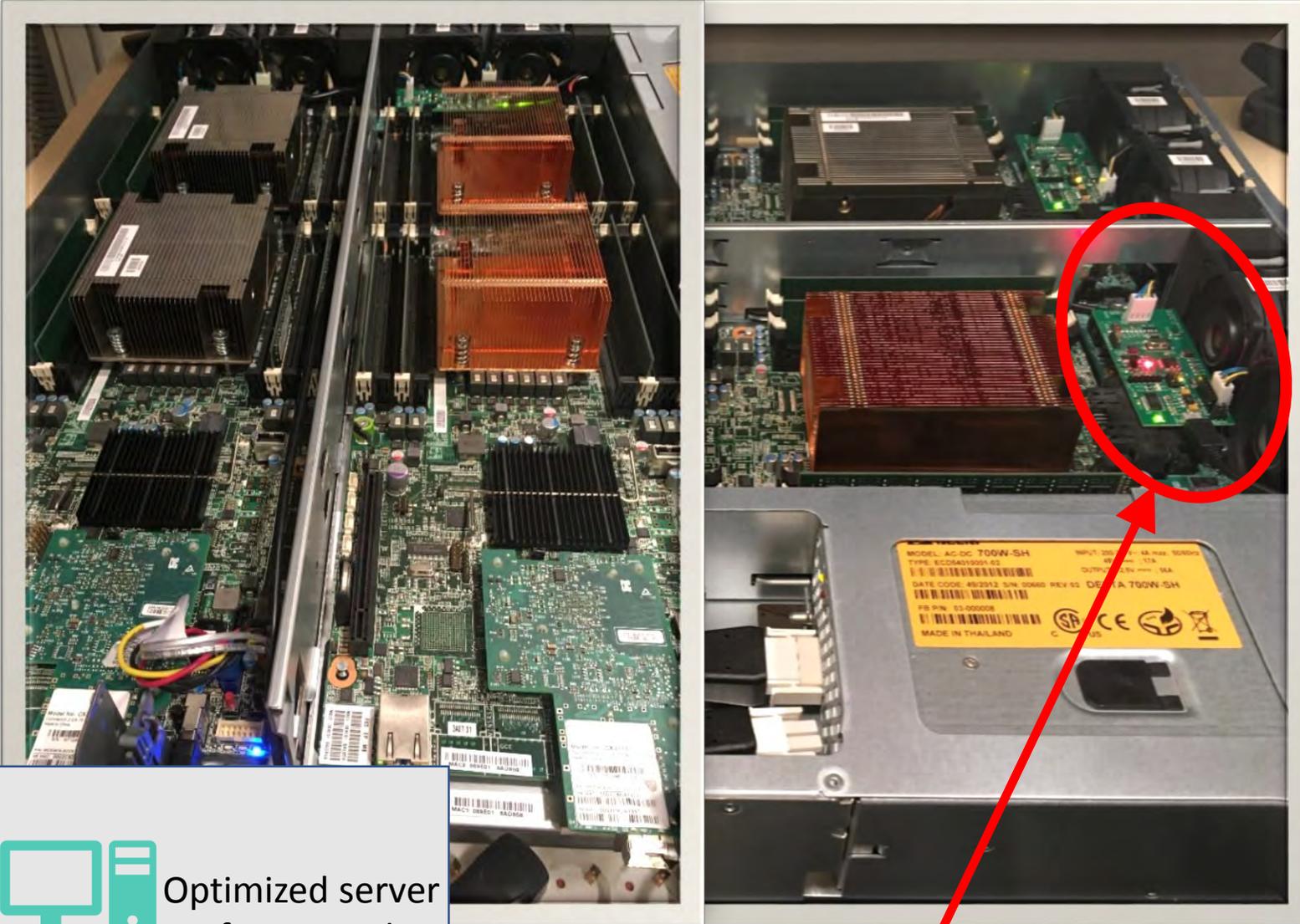
Renewable power source  
(hydro, wind, solar)

Free air cooling for different el-mix

EU-average el-mix Germany Estonia Nordics Sweden



# Heat sinks in OCP Servers



- Aim to achieve lower flow rates and higher delta temperature across the Windmill servers.
- Flowrate control is also achieved by the use of some locally developed fan controller cards.
- Run to a fixed delta temperature across all servers or calculate flowrate through each server and provide this information to the fresh air cooling system.
- Replaced aluminium heat sinks containing embedded heat pipes with copper heat sinks.



Optimized server  
fan control

LOCALLY DEVELOPED FAN CONTROLLER

# Data centre as driver for carbon reduction



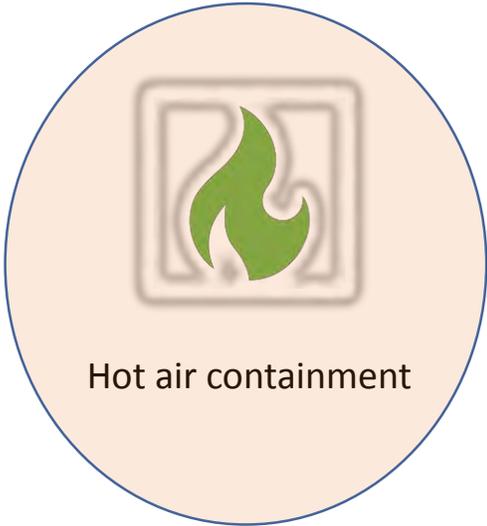
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Optimized server fan control



Renewable power source  
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Hot air containment



Hot air containment

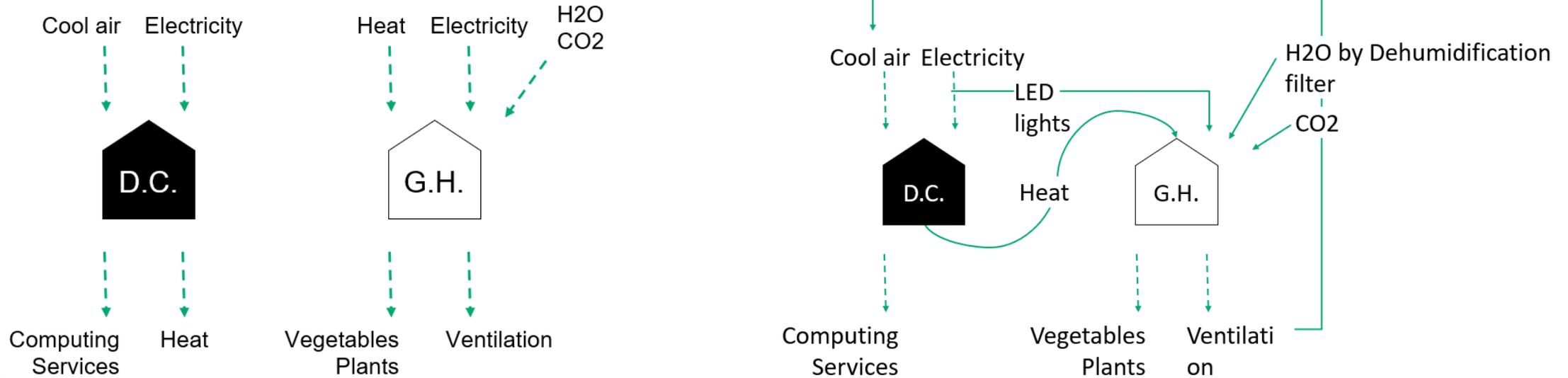


# Hot air containment

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- - more practical to collect the hot air and make use for it in industries that creates products that are linked to the carbon cycle (greenhouses, fish farm, insect farm, bring up trees from seed, preservation of food in e.g drying process (apple dryer).

# Data centres and greenhouses are complementary



Hot air containment



### Container/GH



(300 m<sup>2</sup>)  
6 containers (48m<sup>2</sup>)  
Even heat dist.

DC 0,1 MW



173 ton **CO<sub>2</sub>**eq/year

319 Tons Peat



229 ton **CO<sub>2</sub>**eq/year

Data storage/processing



DC, 1 MW

### Greenhouse



(3000 m<sup>2</sup>)  
Even or  
Uneven heat dist.

DC 1 MW



1734 ton **CO<sub>2</sub>**eq/year

3185 Tons Peat

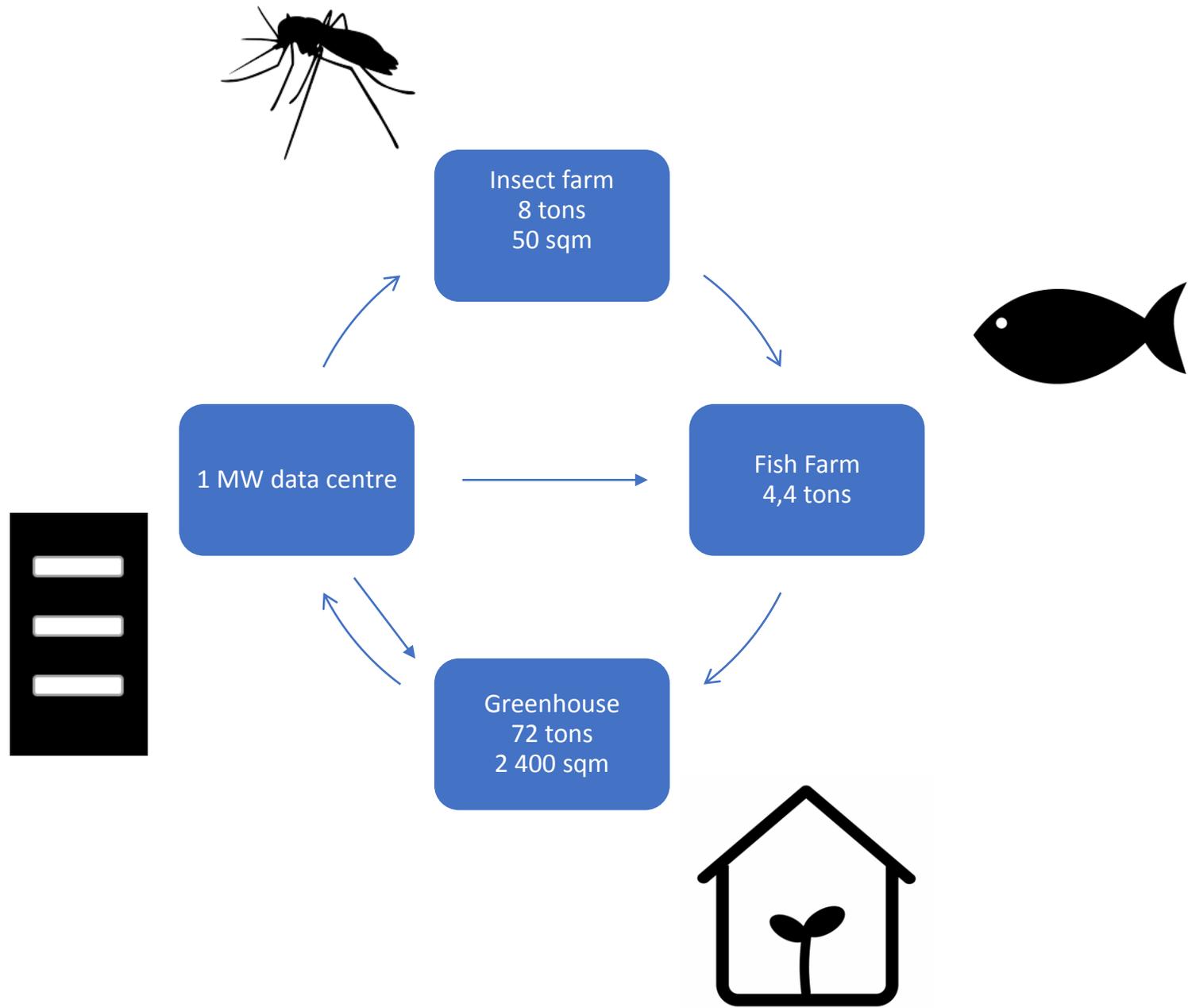


2293 ton **CO<sub>2</sub>**eq/year

Data storage/processing



Hot air containment



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Thank you for your attention!

Louise Mattsson  
[Louise.mattsson@ri.se](mailto:Louise.mattsson@ri.se)