

Comparative Inventory Model of Conventional End-User Devices and Thin Clients

eceee Summer Study

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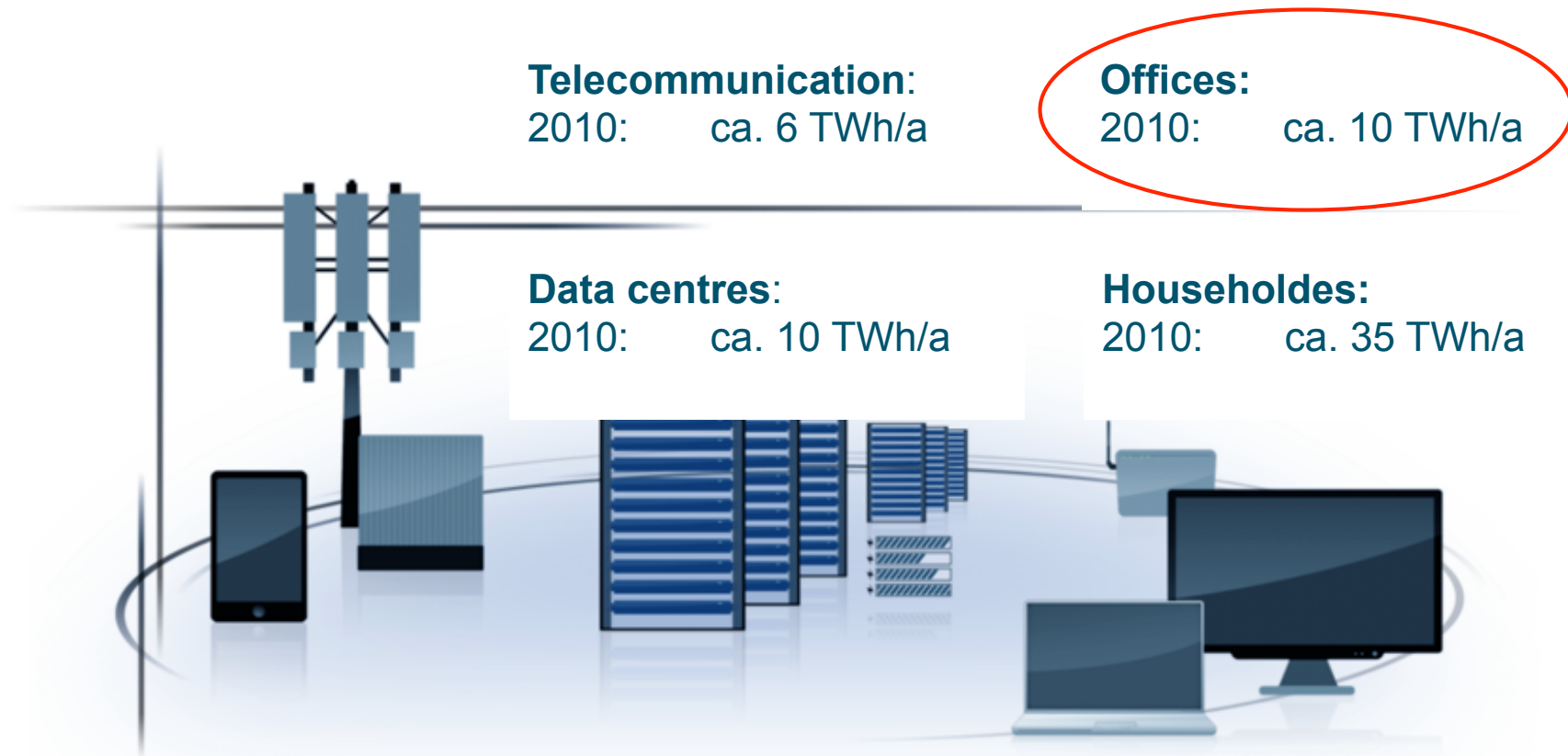
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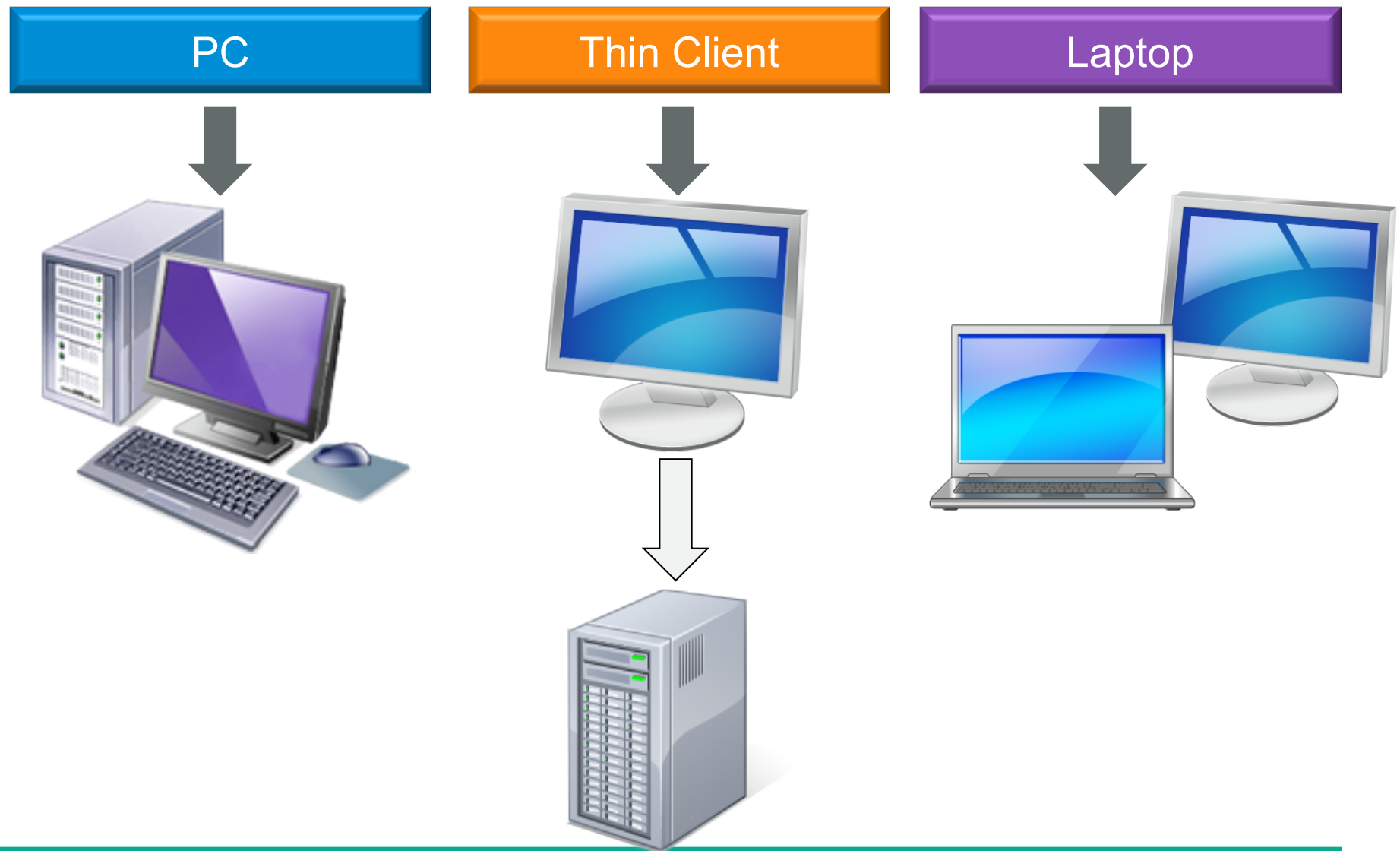
Electricity consumption of ICT

- Current ICT electricity consumption in Germany: ca. 60 TWh/a (about 10% of total electricity consumption)

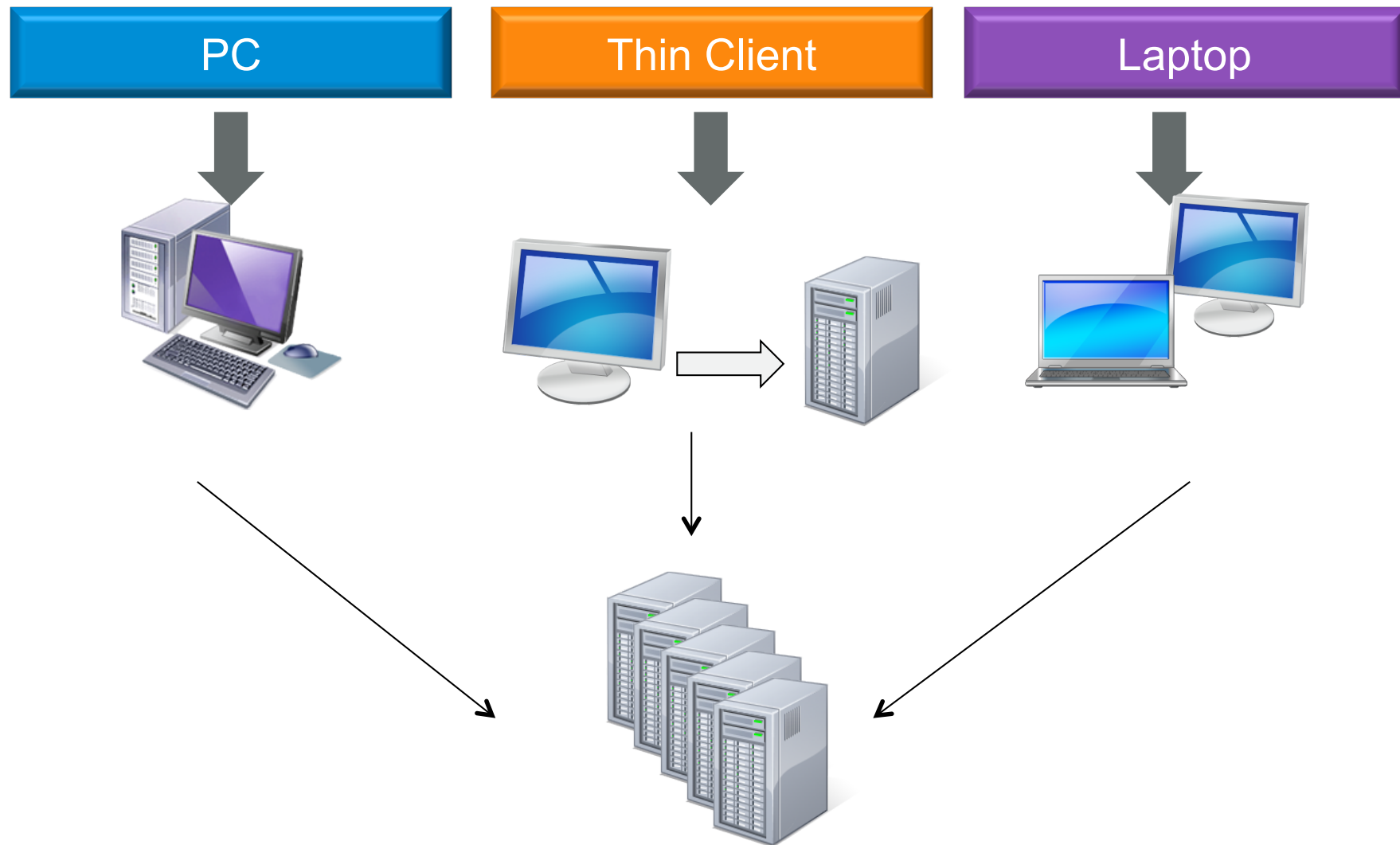


Source: Fraunhofer 2009: Abschätzung des Energiebedarfs der weiteren Entwicklung der Informationsgesellschaft, Fichter 2008: Energieverbrauch und Energiekosten von Servern und Rechenzentren in Deutschland

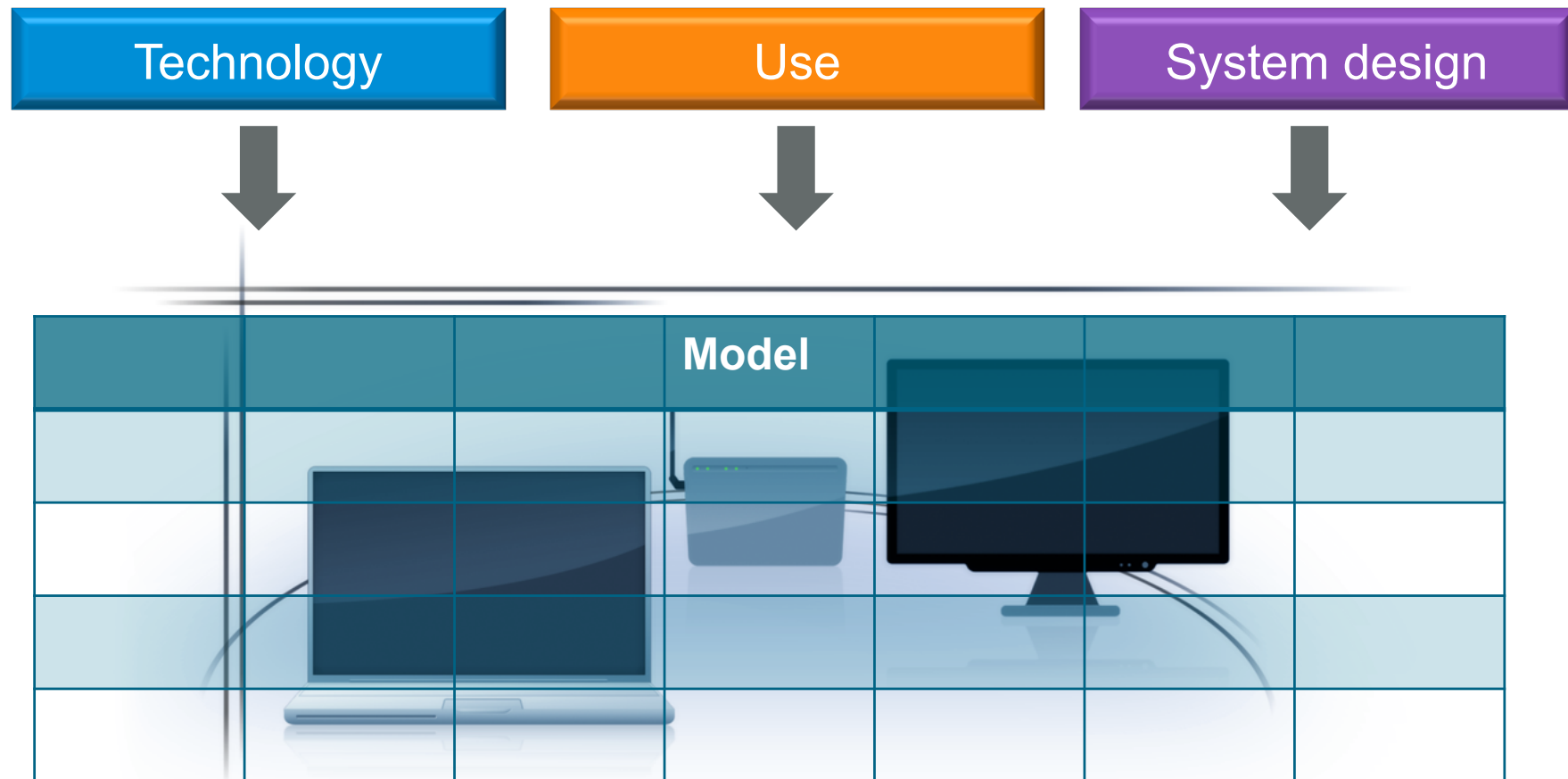
Idea of Thin Clients



Idea of Thin Clients



Model-based calculations of energy consumption



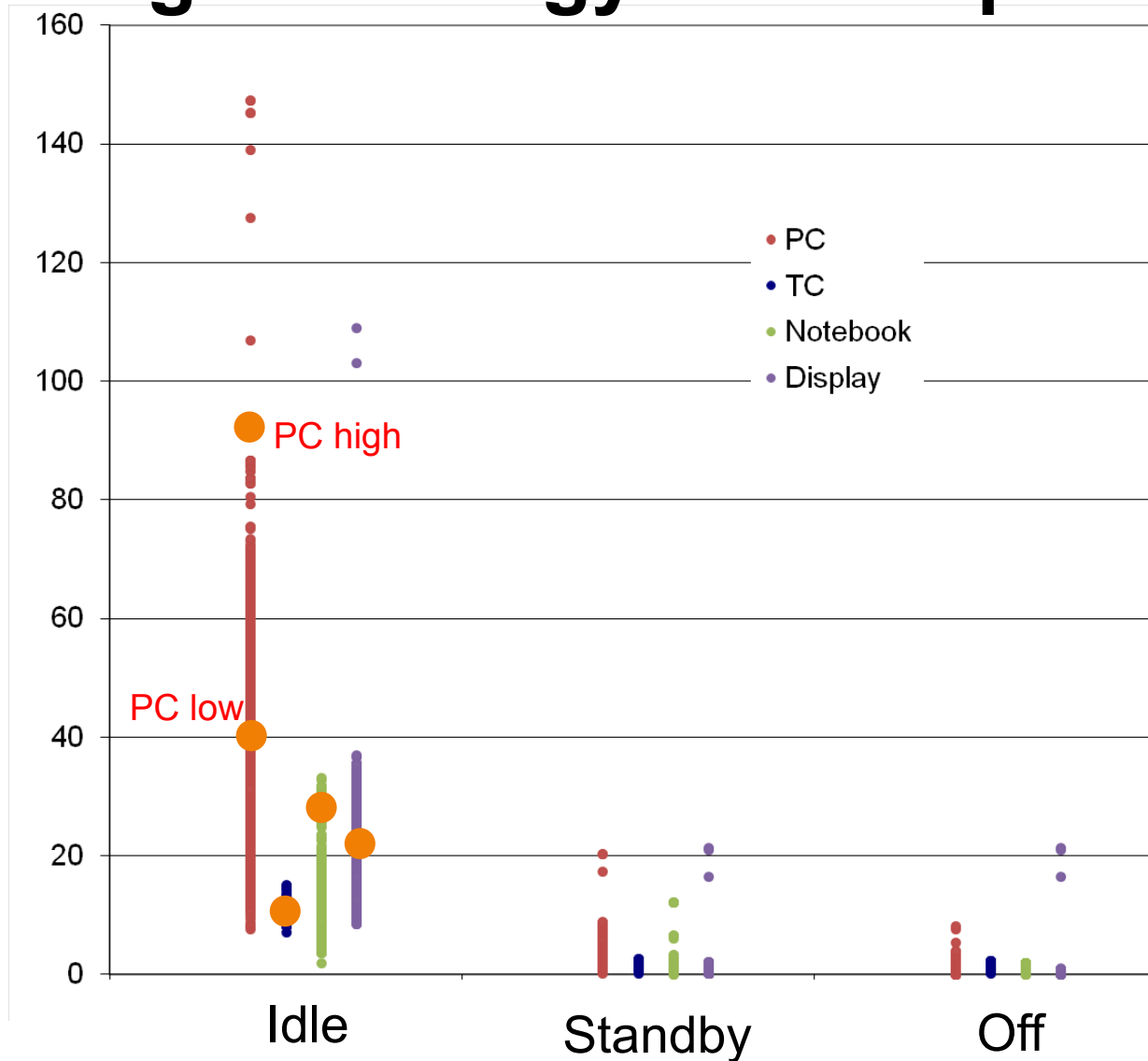
Model-based calculations

Parameters influencing the model

- Technology
 - power consumption, power management, technical features
- Use
 - home/office
 - light/heavy users
- System design
 - network architecture, product configuration, functionality

The parameterization of the model includes relevant data, technical and market trends.

Range of energy consumption



- Stock already in place?
- Best available technology?
- Average of the current market?

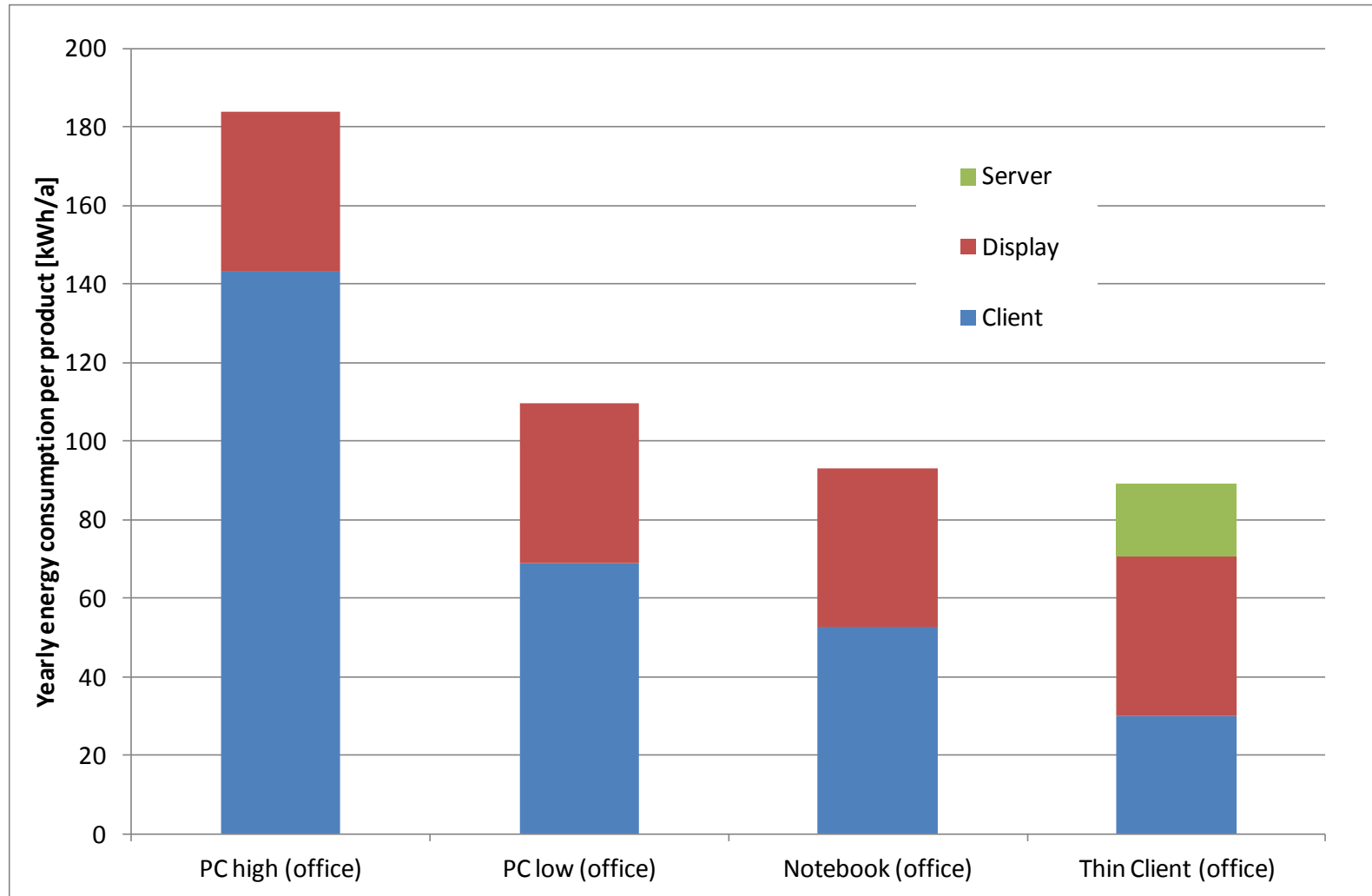
Source: Energy consumption values from the EU Energy Star register

Range of power consumption of the server

- No “off the shelf” solution with defined power consumption available
- Values depend on the actual implementation

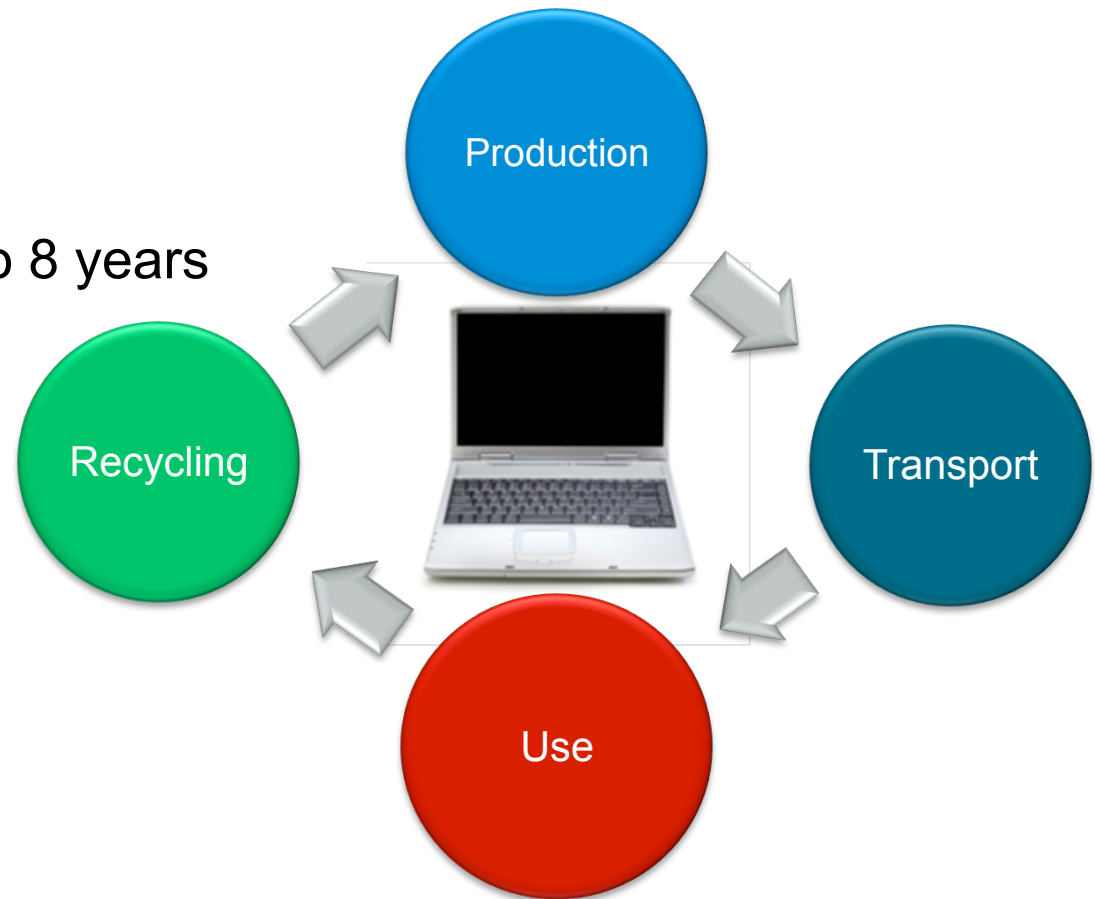
- How many clients per server?
 - Range from 50 to 130 clients per server (Knermann, Fichter, Kemper)
- Power consumption of the server?
- Overhead on the data center?
 - PUE: between 1.3 and 2

Yearly energy consumption

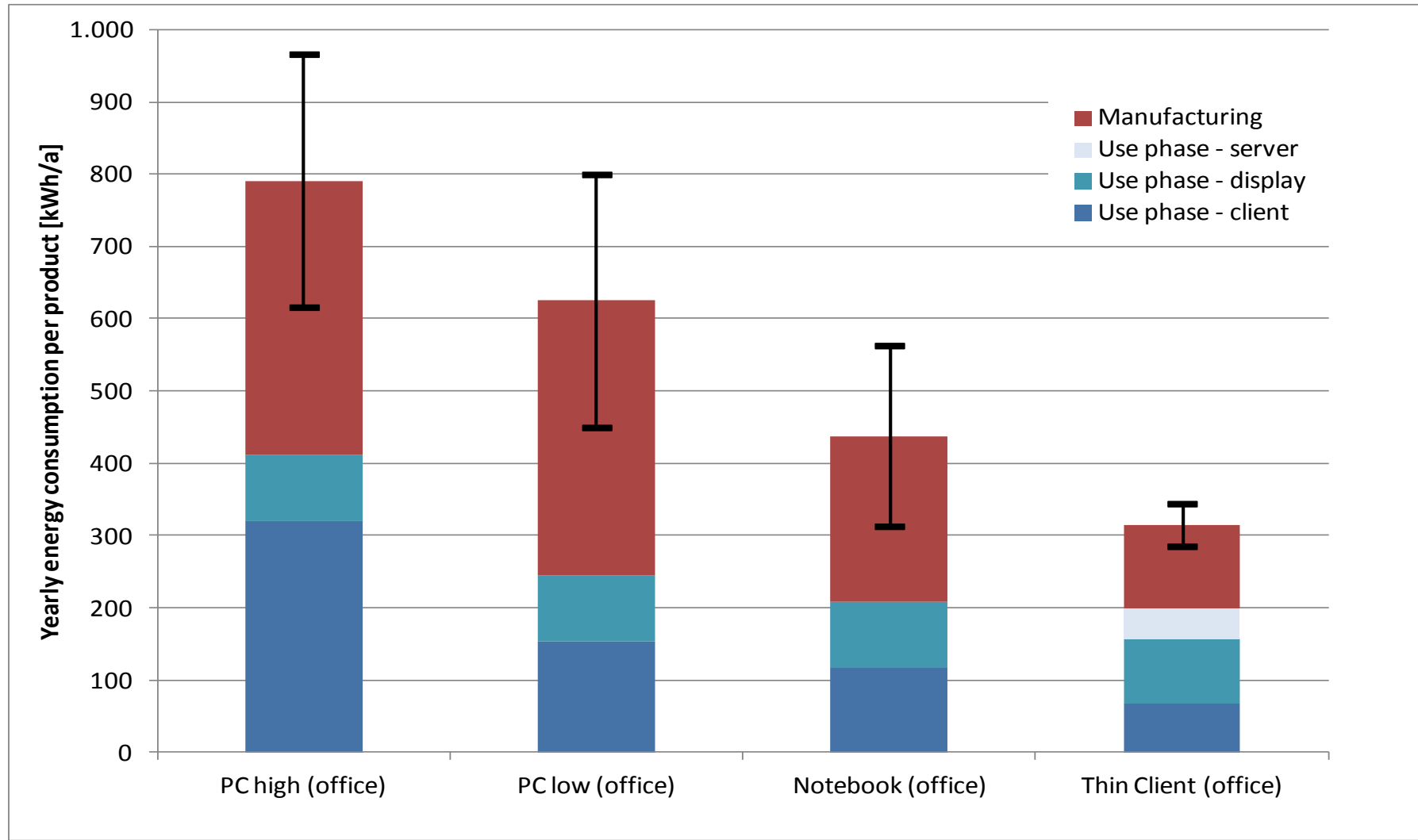


Life cycle

- Assumption:
 - 4 years use of PCs, notebooks, and servers
 - Use of Thin Clients and displays can be extended to 8 years



CO₂ emissions – 4 years

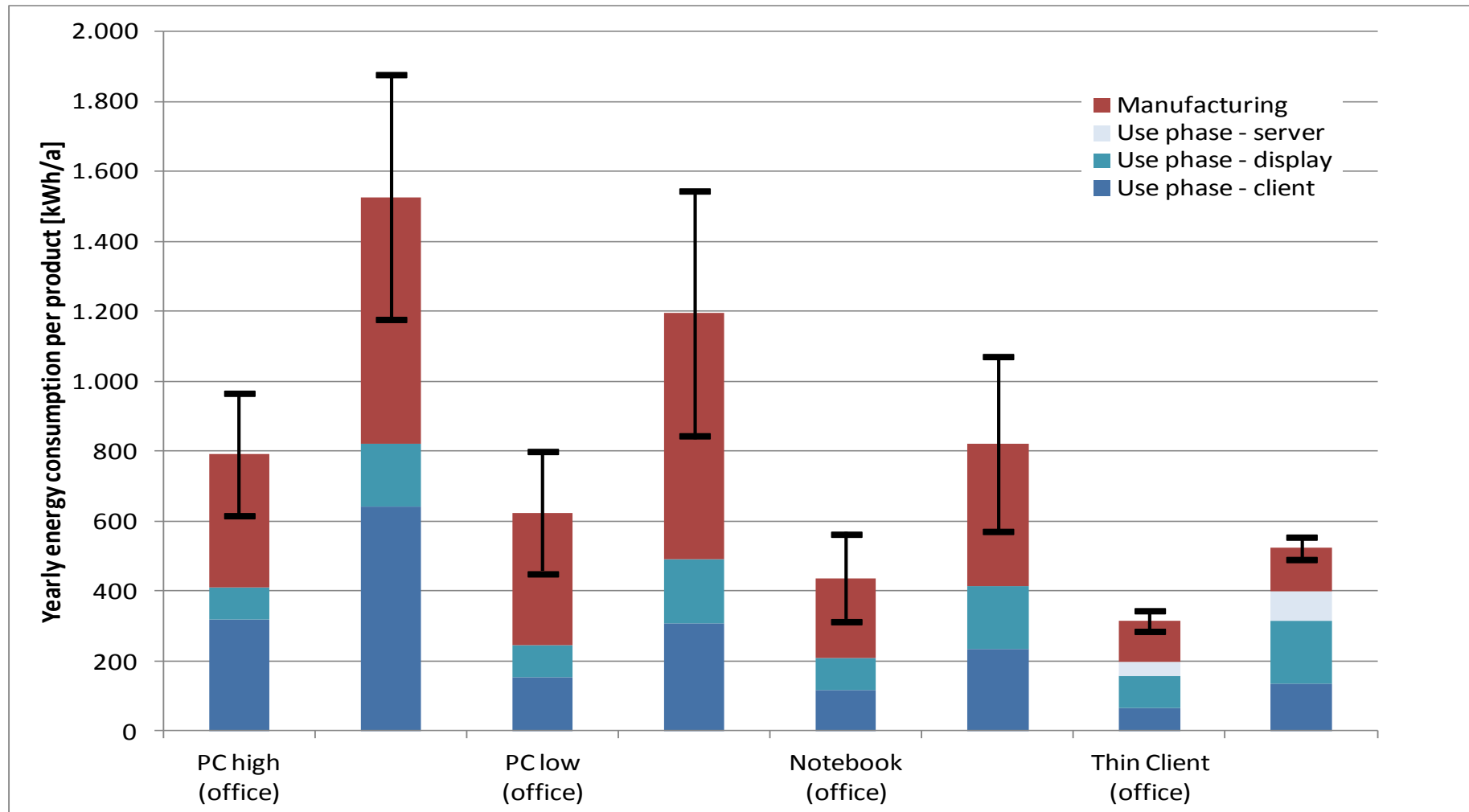


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CO₂ emissions – 4years / 8 years



Reasons to decide for Thin Clients

- Easier maintenance, easier back-up
- Computing capacity can be assigned individually per user and per task
 - Not all employees are at work at the same time
 - Not all users use computing-intensive applications at the same time
 - Less hardware (not a high-power workstation for each user)
- Less hardware due to longer life cycles of the Thin Clients

Different Use

- What are other forms of use which could influence the overall life cycle effect of the analyzed devices:
 - Thin Client: User profile can be assessed also from other places and devices
 - Notebooks: lower number of overall products
 - “Bring your own device”
 - Private use of “office” laptops

Conclusions

- Thin clients are not per se more energy efficient than PCs
- It depends on the specific implementation and application
- Real-life user behavior has to be taken into account
- Notebooks can (depending on the application) be an energy-efficient alternative

Thank you for your attention!

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