

EcoBalance 2016, Kyoto, Japan

Environmental burdens of data centres – not only the use stage matters

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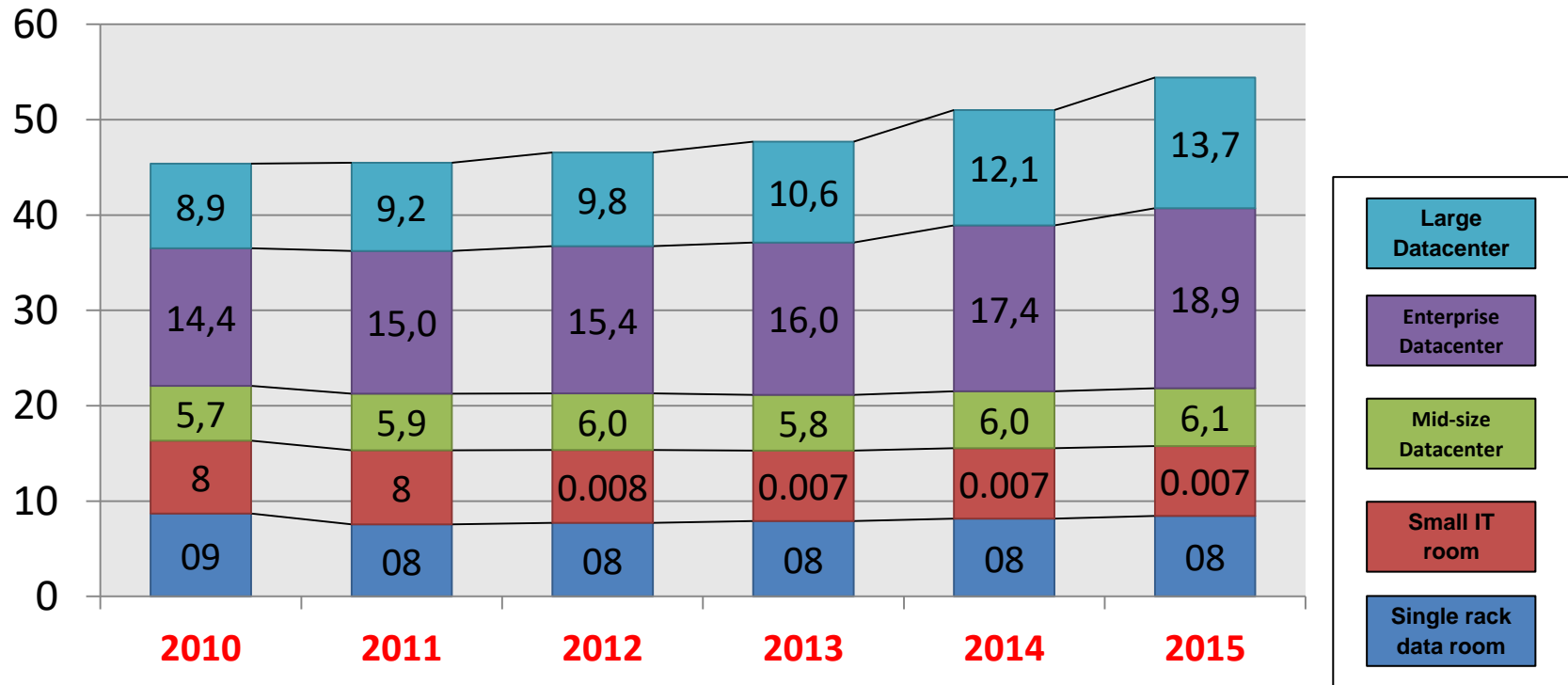


Data centres have become major contributors to the global rise in energy consumption and emissions

- About 2% of overall electricity consumption
- Rising faster than any other industry (while recently some – temporary? – slowdown)
- IT equipment accounts for only about half of the total consumed use phase power
- But what about hardware, M&E and building production?



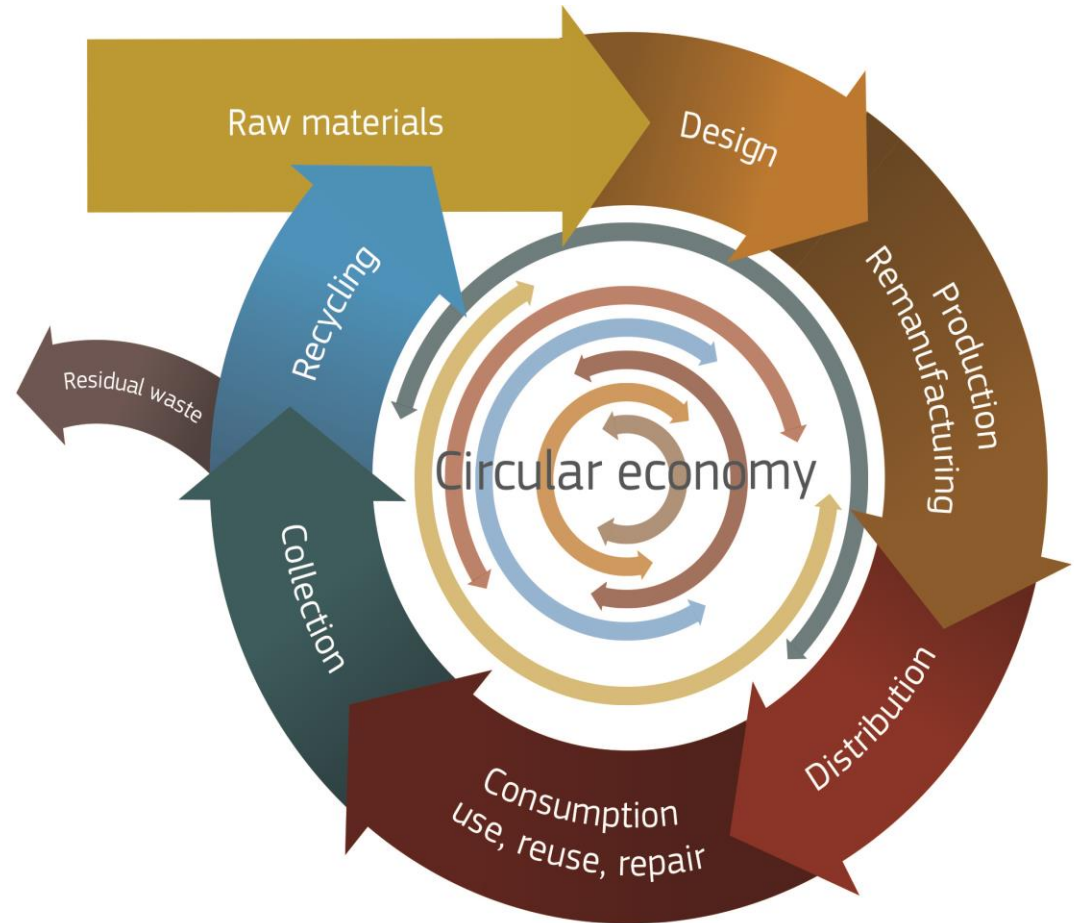
Introduction- Data Centre Challenges



Despite higher growth in the large DC space, Small-to-Midsize data centers will continue to represent 40% of the installed base

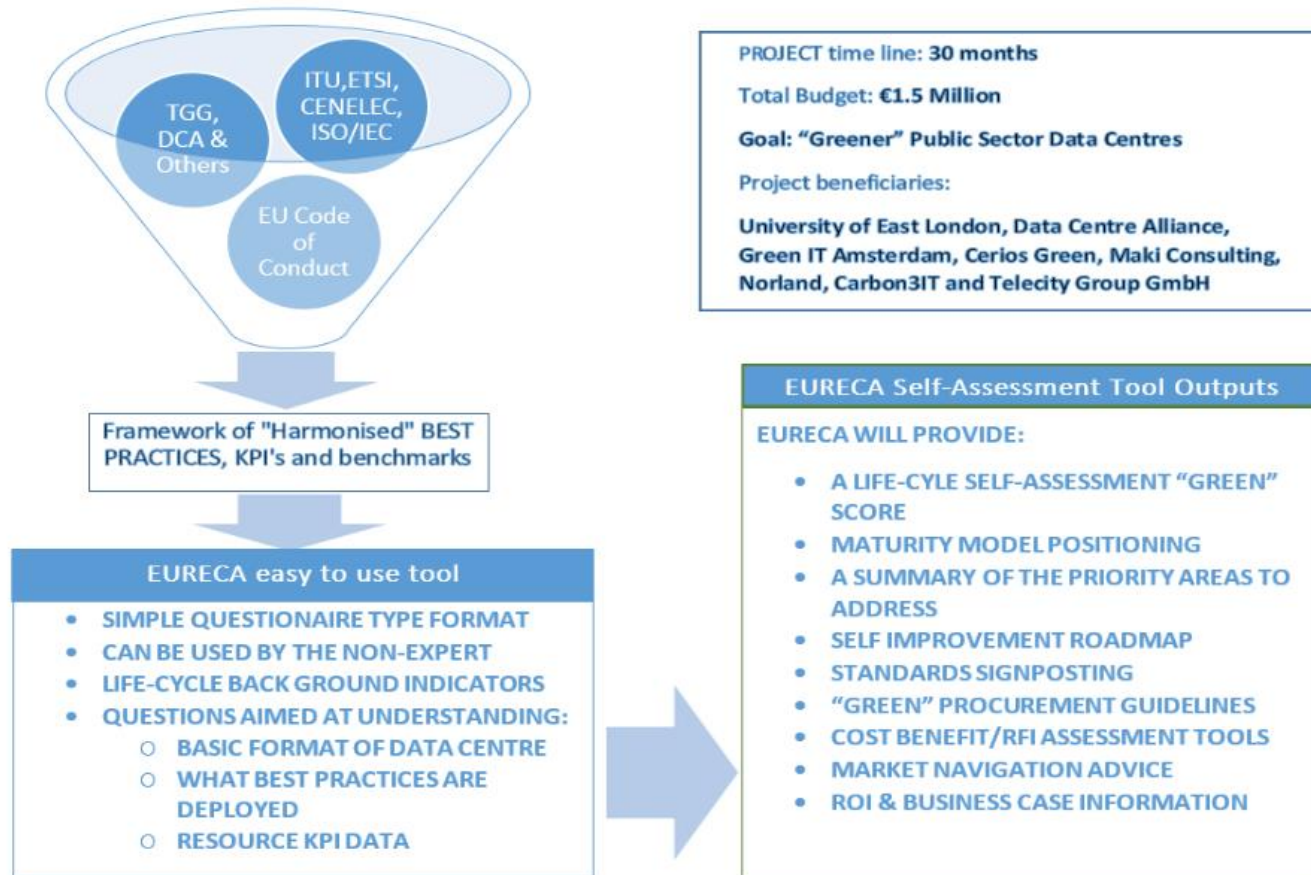
Source: Gartner "Forecast: Data Centers, Worldwide, 2010-2015", October 2011

... to a
circular
economy





The concept

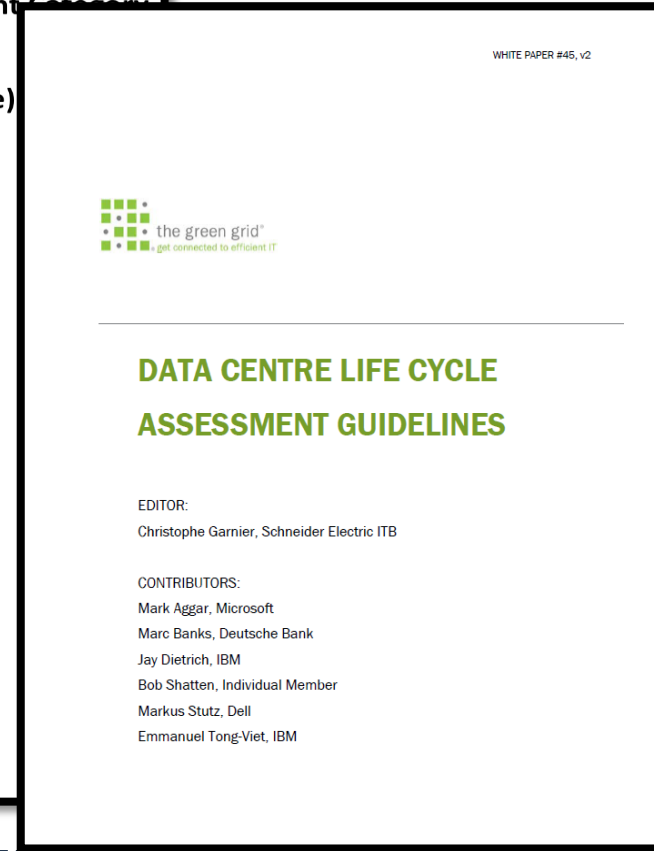
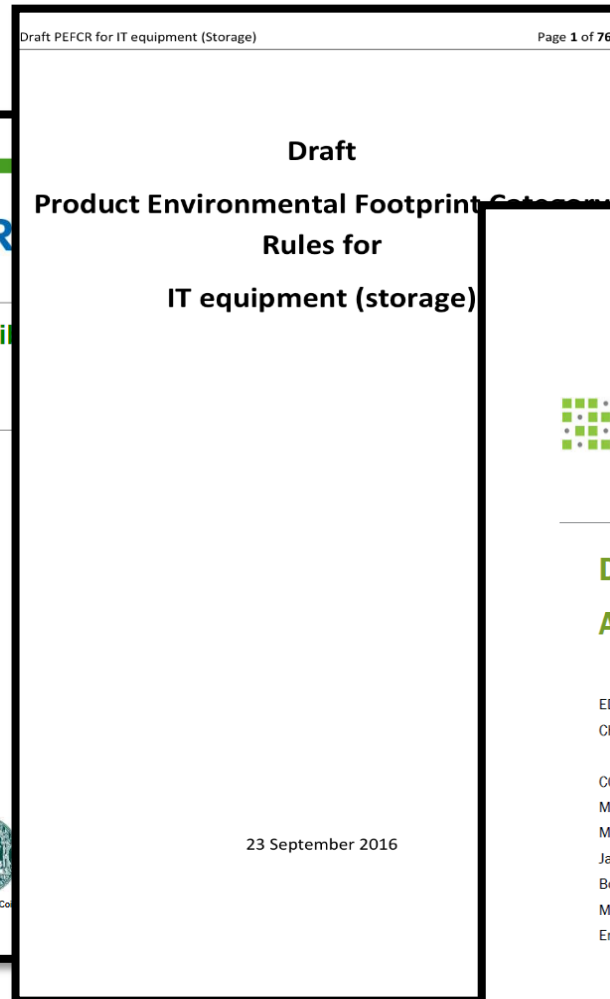
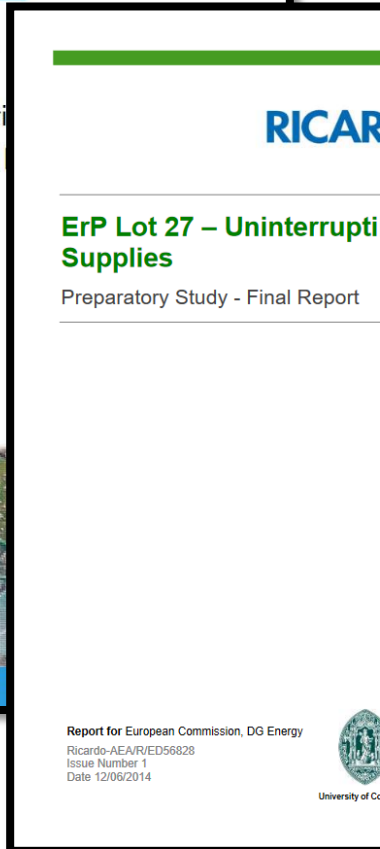
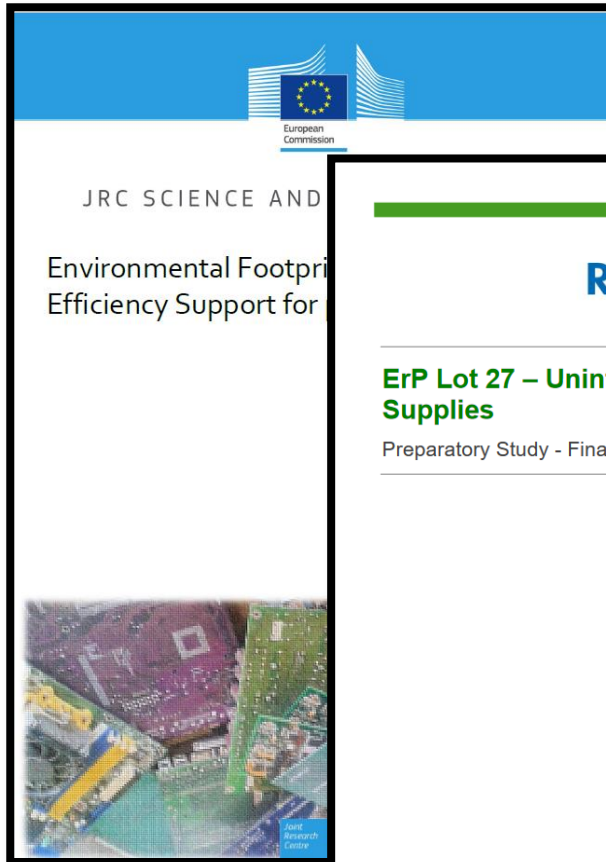




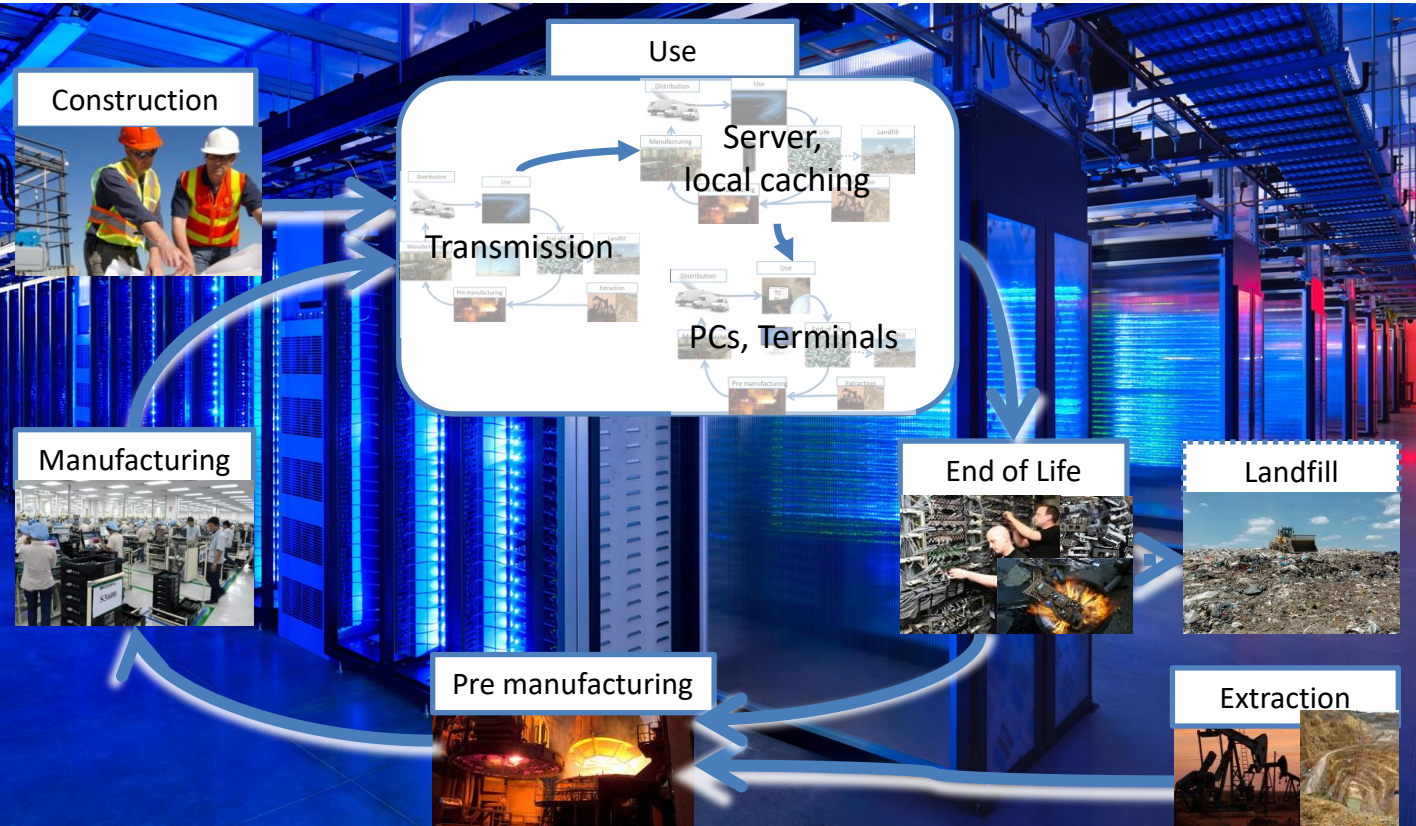
- 160 server racks, 500 m2 floor space, packed with 2U servers, virtualisation
- ICT capacity ca. 6kVA per rack
- Total ICT energy consumption is approximately 1 MW
- Hot and cold aisles in combination with in-row coolers
- Compressors are only required 20 % of the time
- UPS modular unit with 90% efficiency at the given partial load
- PUE* of 1.42

$$* \text{PUE} = \frac{\text{Total Facility Power}}{\text{IT Equipment Power}}$$

Data sources – selected examples

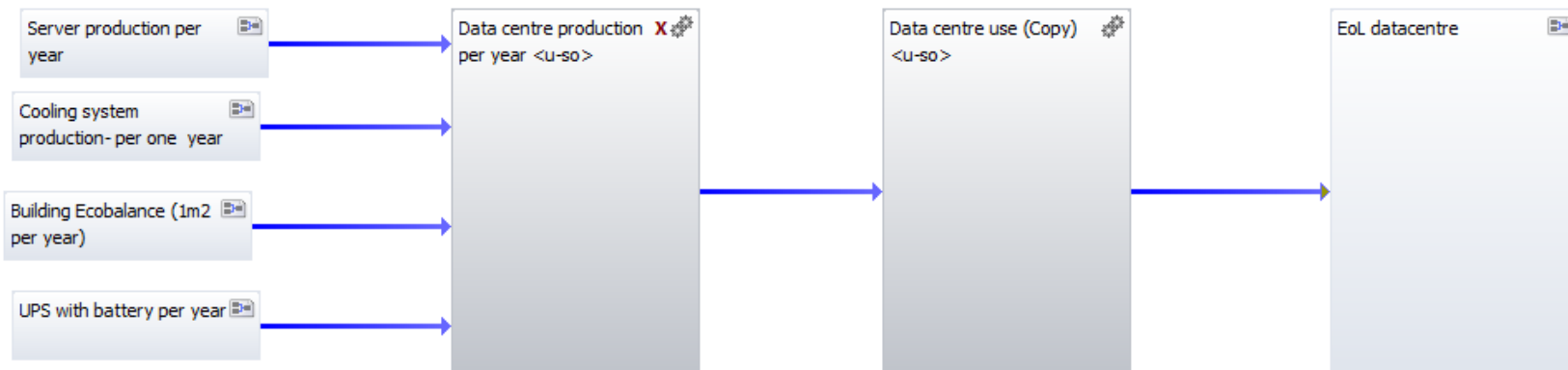


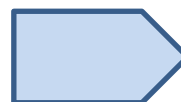
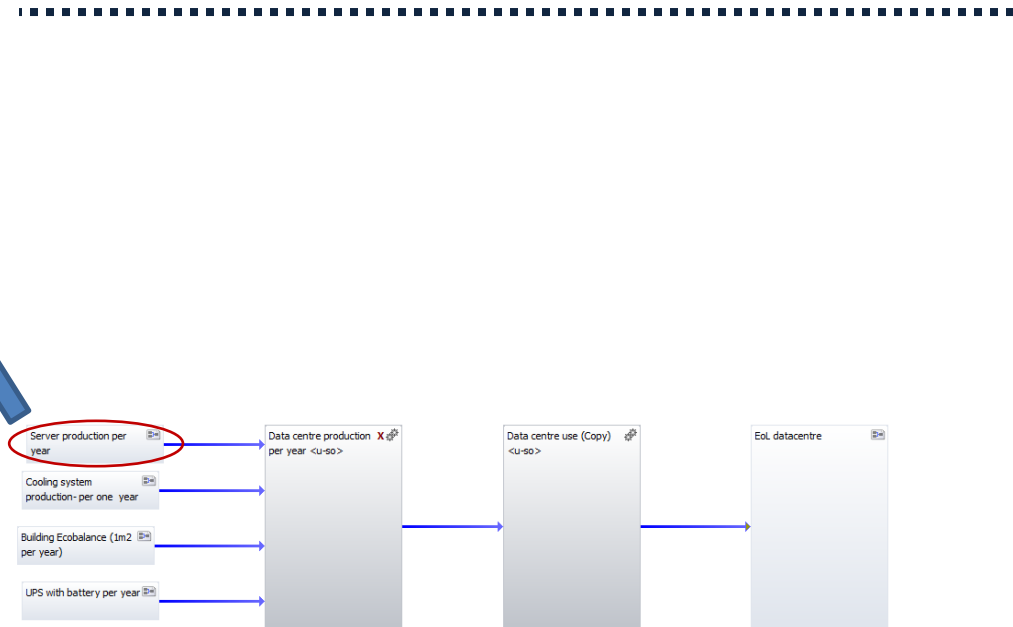
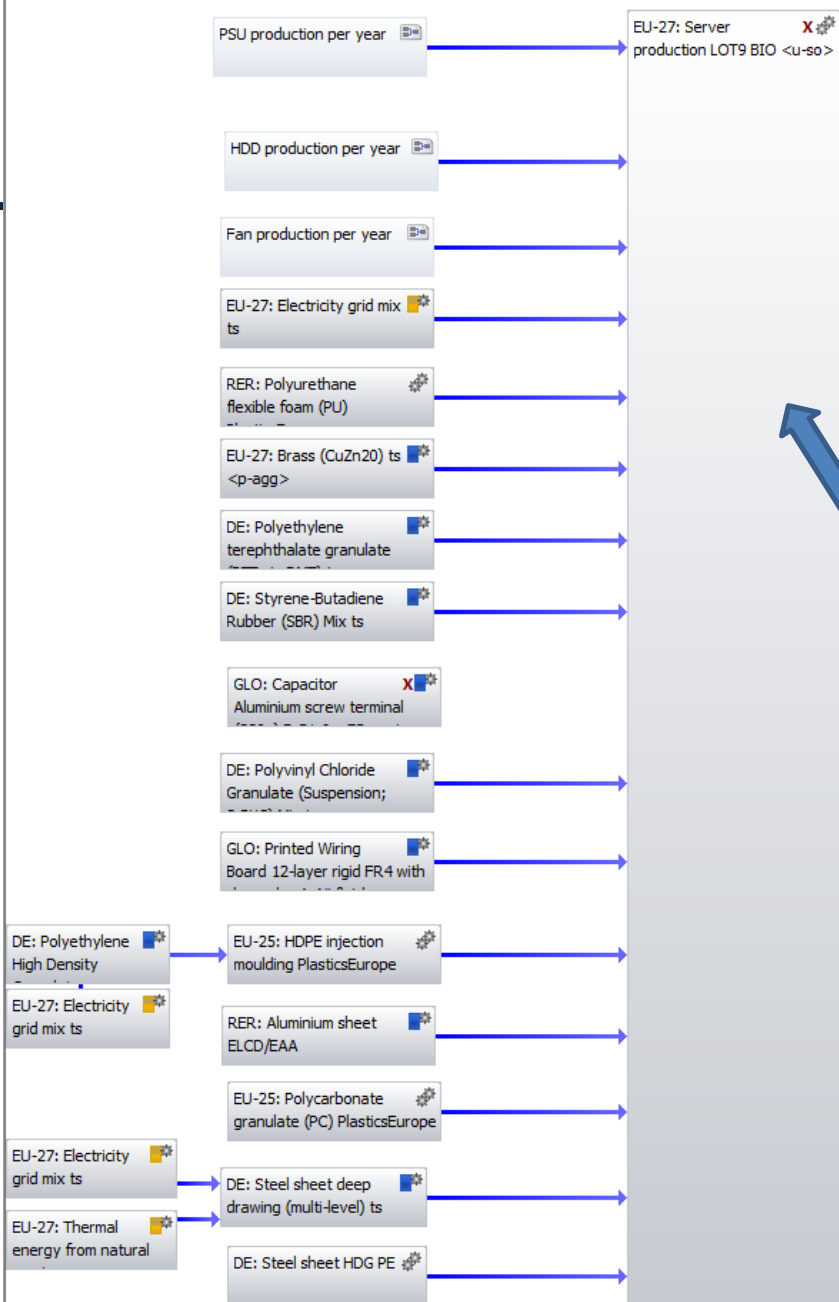
System boundary



Life cycle modelling

- GaBi software
- Secondary data used in modelling
 - GaBi database is used for electronic parts e.g. PCB, cable
 - Data from industries (associations) with GLO or EU27 for materials etc., consistent with GaBi data
 - Data available in ELCD for electricity, transport (original GaBi data)

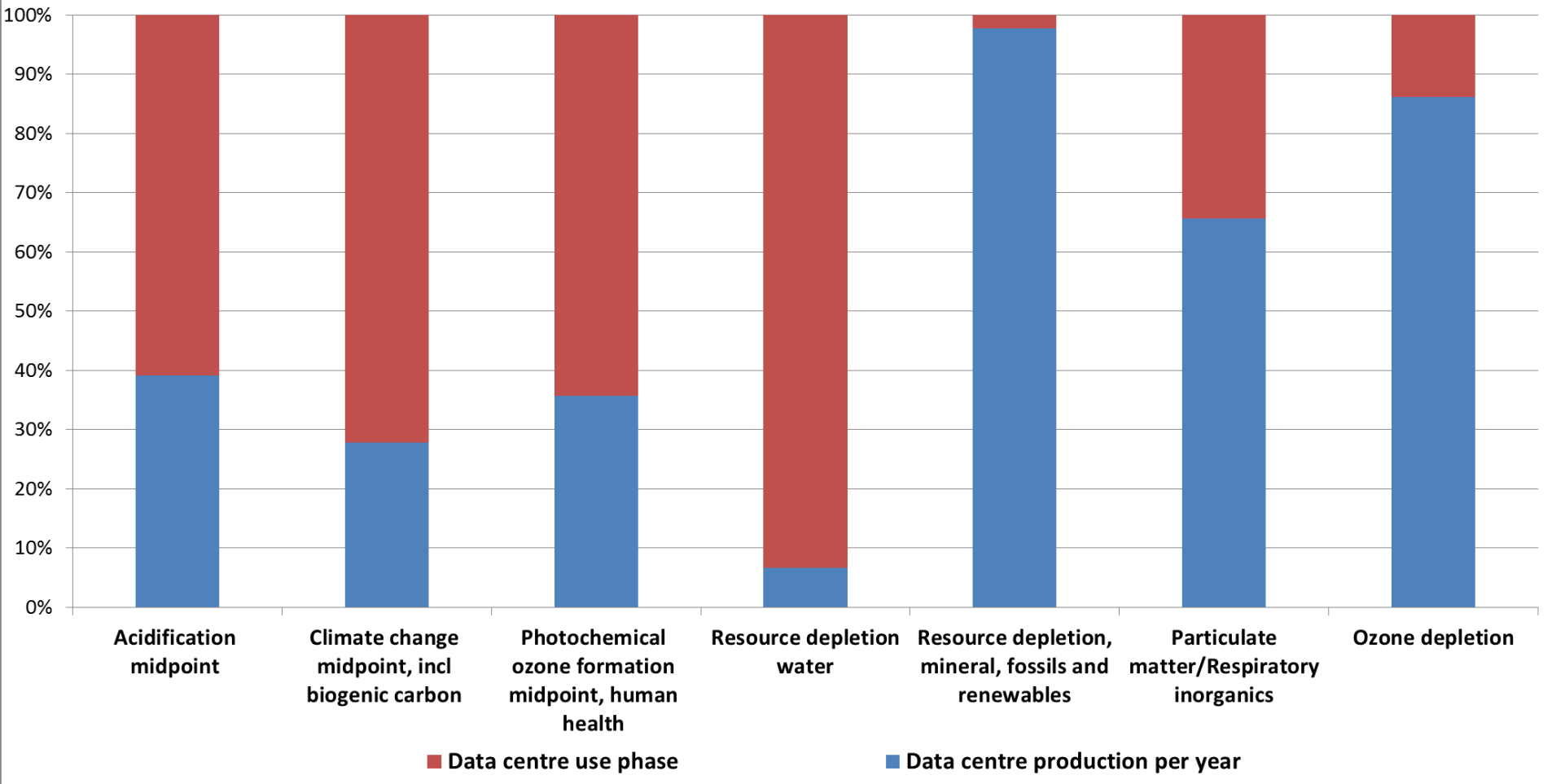




Life cycle modelling

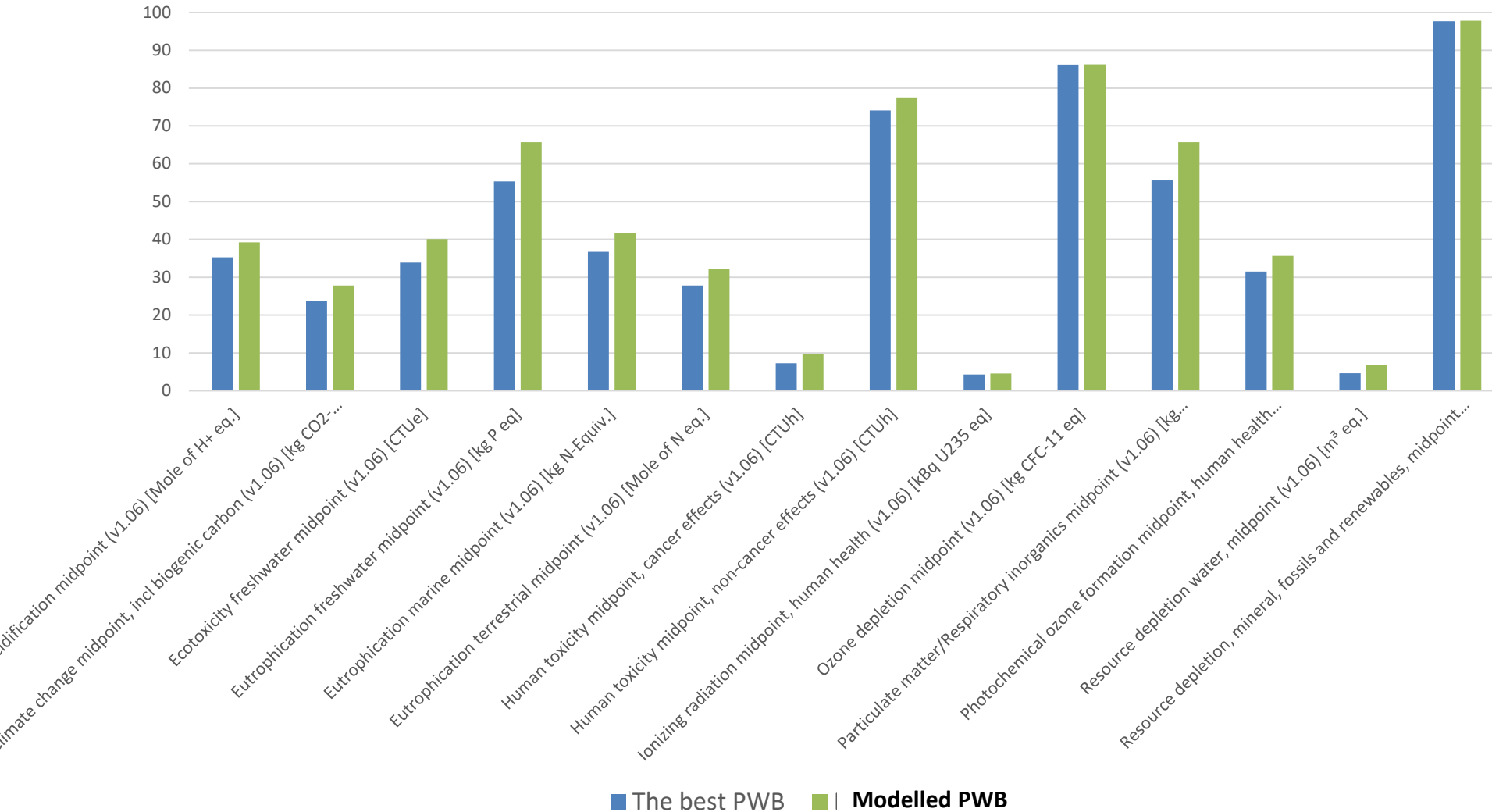
Life cycle impact assessment results

Using ILCD/PEF recommended methods





PWB – sensitivity of assumption on PWB layers



Summary

- Data centres are globally relevant environmental impactors, growing further in relevance
- Focus for improvement so far is practically exclusively the use stage energy consumption
- Beyond energy and beyond Climate change, other impacts are similarly relevant
- For other impacts, the production stage is about of same relevance as use stage

Outlook: with use stage now being optimised, production gets even dominant and needs to get attention

Any questions?



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