



TECHNISCHE
UNIVERSITÄT
WIEN

Plus-Energy Office High-Rise Building

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- Main usage:
Laboratories
- Constructed:
1970
- Net floor area:
≈ 8,000 m²
- Height:
≈ 55 m



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- Main usage:
Offices
- Refurbished:
2014
- Net floor area:
 $\approx 13,500 \text{ m}^2$
- Height:
 $\approx 55 \text{ m}$

primary energy demand (non renewable) in kWh/(m²_{GFA}·a)

500
450
400
350
300
250
200
150
100
50
0

typical new office
building 2014

458

- social rooms and kitchens
- other appliances (copiers, beamers, ...)
- IT workplaces
- communication (telephones, switches)
- server + UPS
- measurement, control and regulation
- other electrical components
- elevator
- lighting system
- ventilation system
- warm water + drinking water
- cooling + server cooling
- heating



primary energy demand (non renewable) in kWh/(m²_{GFA}·a)

500
450
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typical new office building 2014

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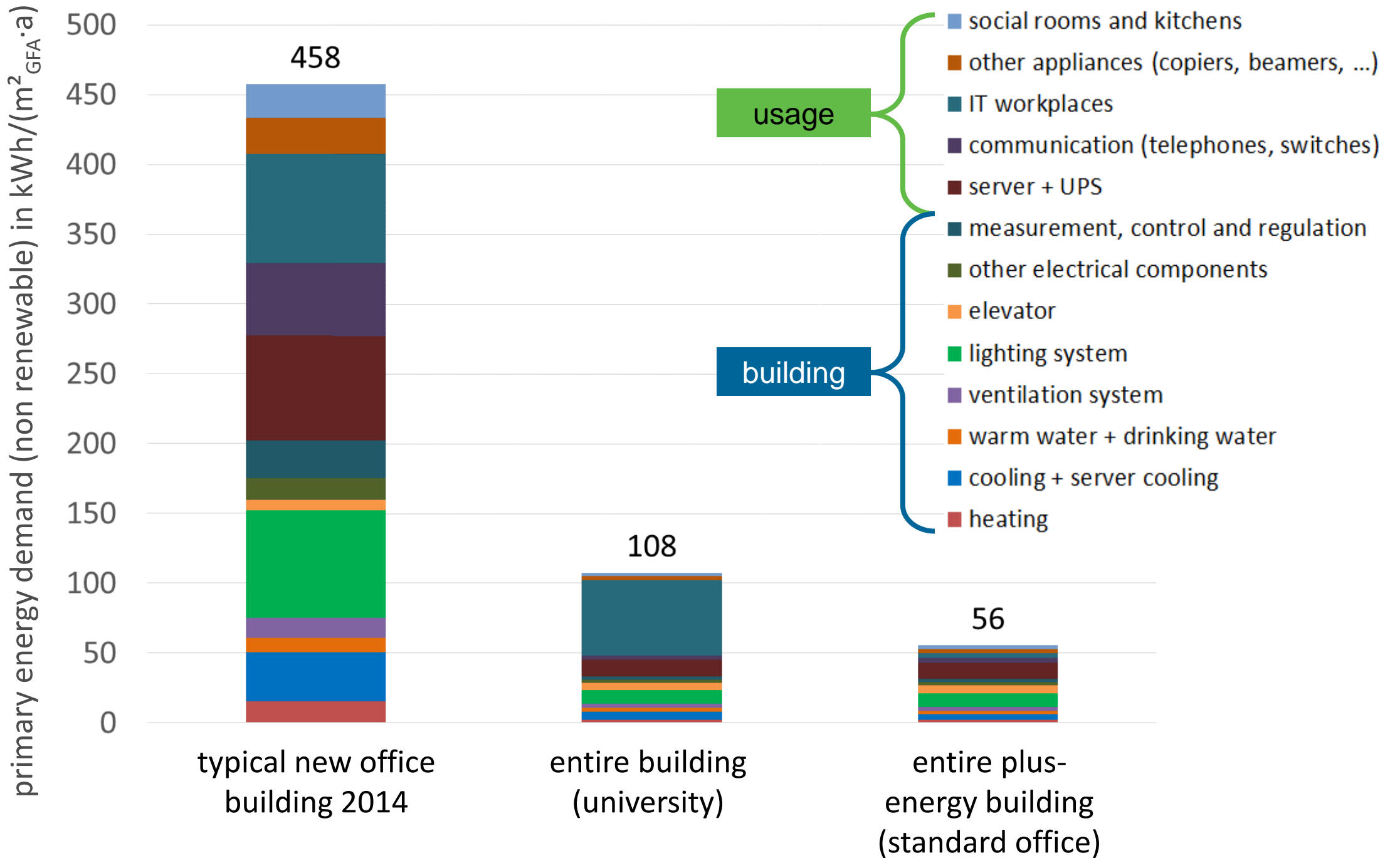
-88%
energy
reduction

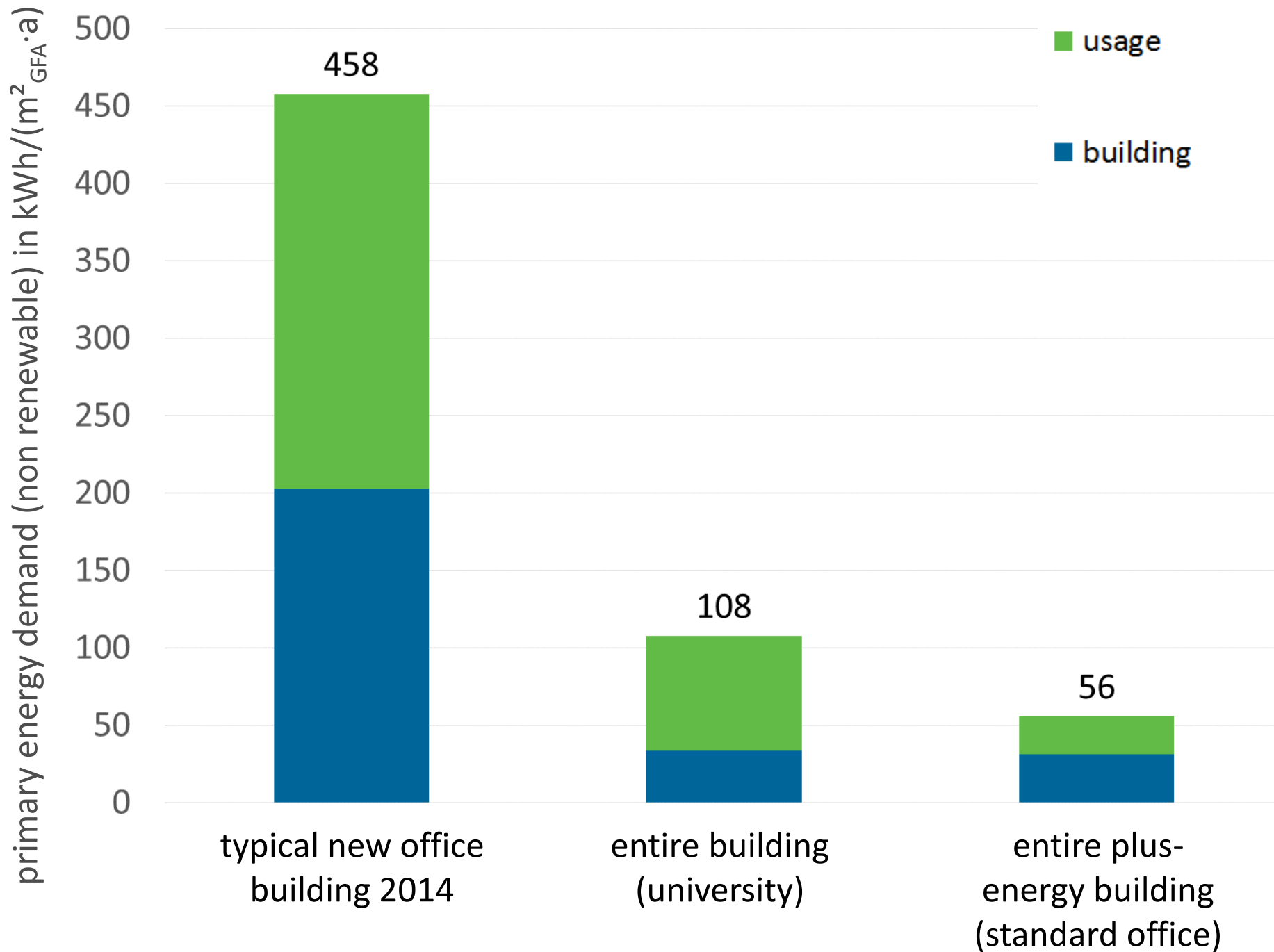
entire plus-energy building (standard office)

56

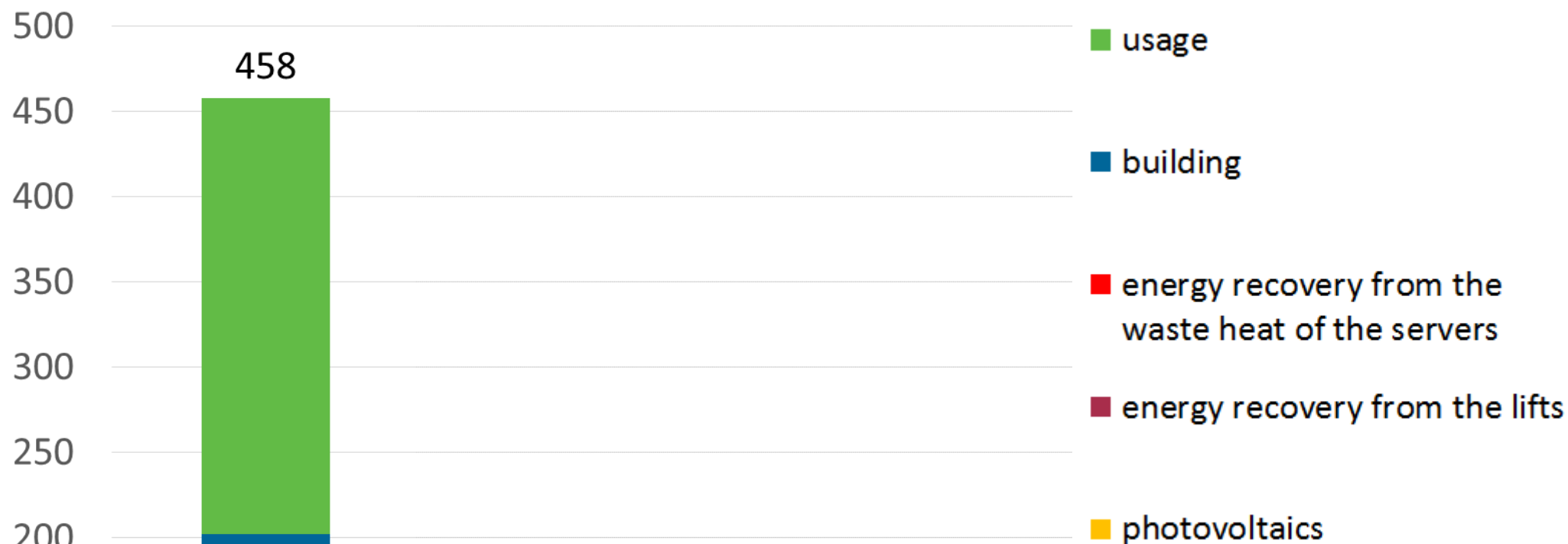
9.300
optimized
components

- social rooms and kitchens
- other appliances (copiers, beamers, ...)
- IT workplaces
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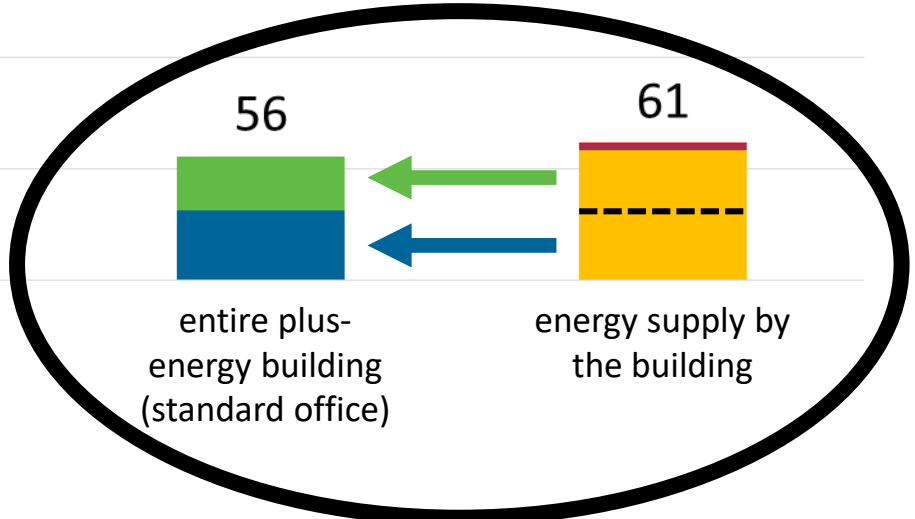




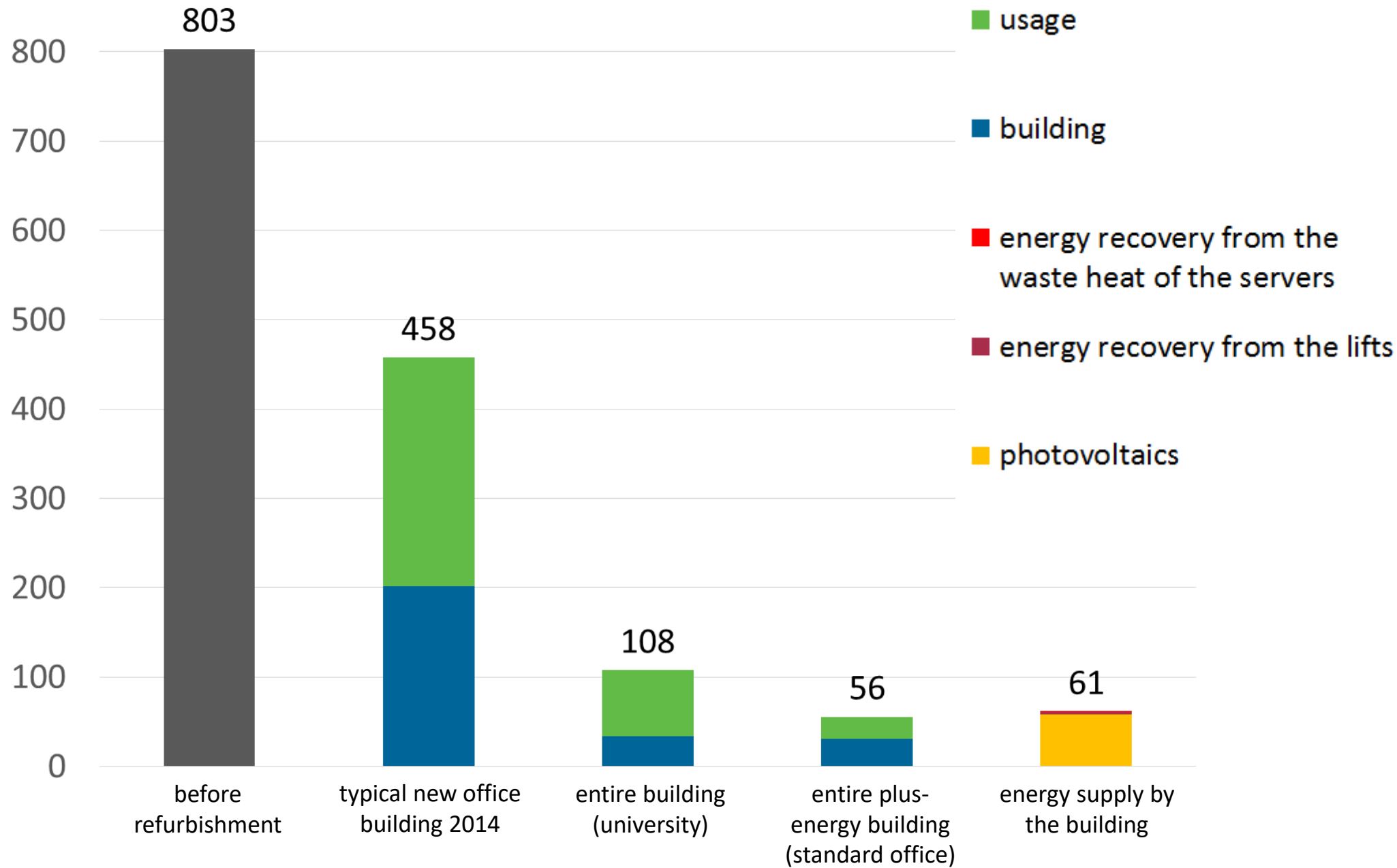
primary energy demand (non renewable) in kWh/(m²_{GFA}·a)



plus-plus-energy building



primary energy demand (non renewable) in kWh/(m²_{GFA}·a)



How do you build a (Plus-)Plus-Energy Office High-Rise Building?

(1) Utilization of local (renewable) resources

- Sun, ambience, etc.
- Think outside the box → unexpected energy sources

(2) Enhancement of energy efficiency

- Minimization of the electrical energy consumption → nit-picking
- Minimization of the heat and cooling demand → decouple building from external influences (building insulation, etc.)
- Educate the users and convince them of the vision “Plus-Energy”

(3) Simultaneous, integral planning

- Intensive exchange between all project partners

Open Challenges

Green IT → energy-efficient computers / servers / IT services

Energy **storage technologies** and energy **load shifting**

Grid infrastructure must be able to **handle decentralized** renewable energy **supply**

