

Energy (demand) transformations for sustainable and beautiful future

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Energy (Demand) Decent Living and Sufficiency

→ 2050: Sustainability transformation

service provision
(consumption)

Sufficiency
Decent Living
Standards

Sufficiency corridor

overconsumption
(obesity)

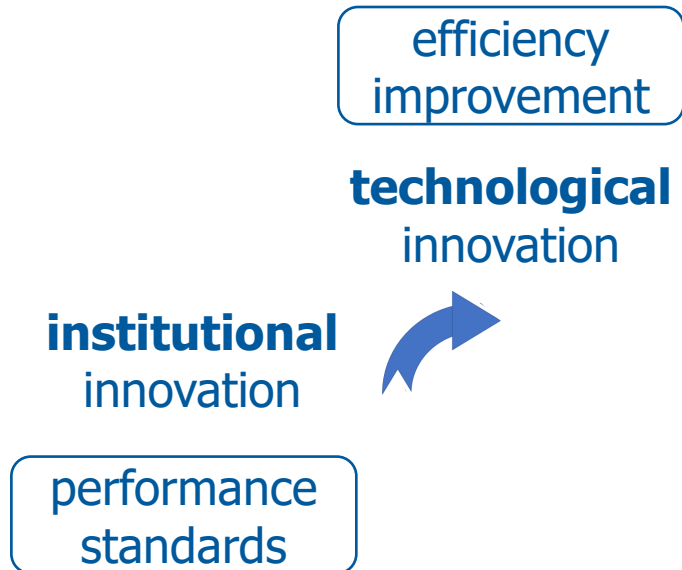
Basic Access

wellbeing

→ **New values and norms; new morality and ethics
for a just, safe and beautiful future for all**

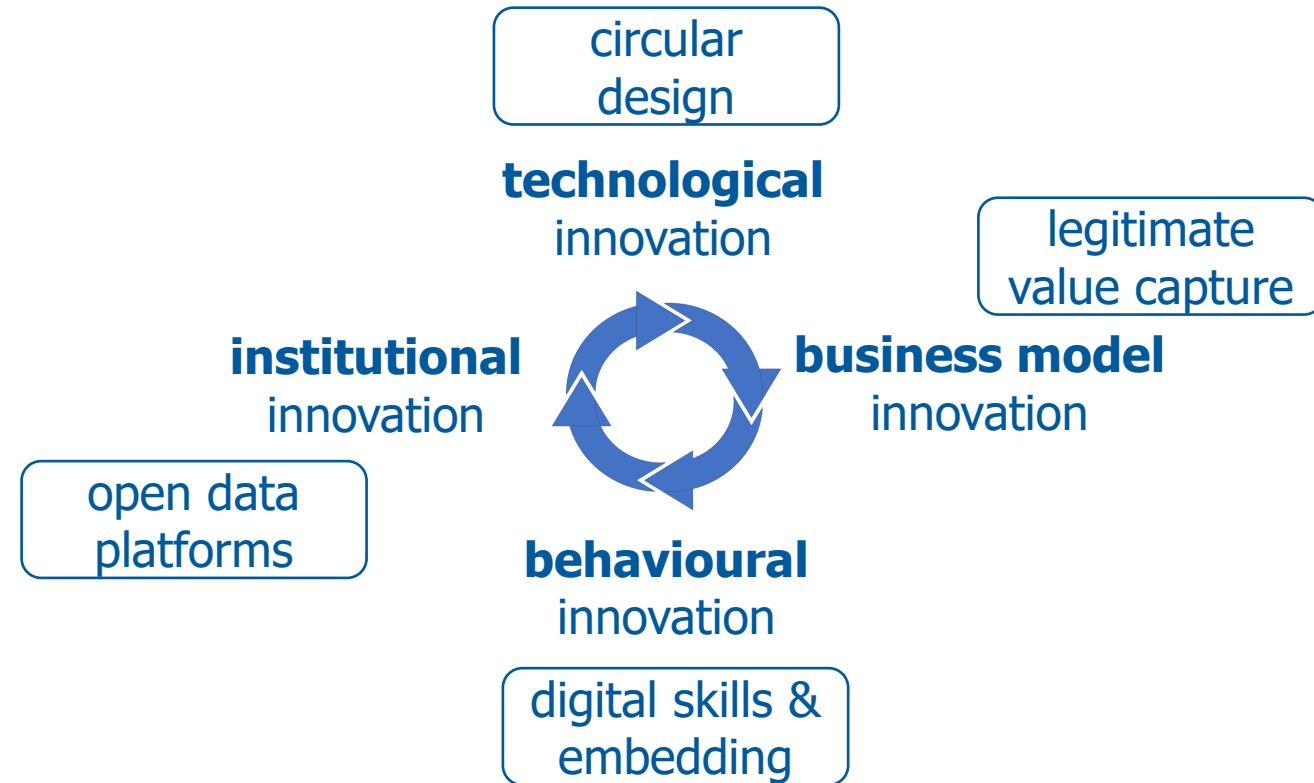
conversion efficiency

e.g., devices



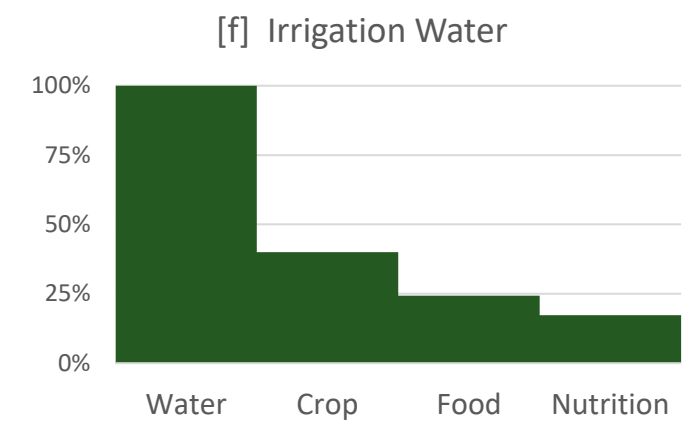
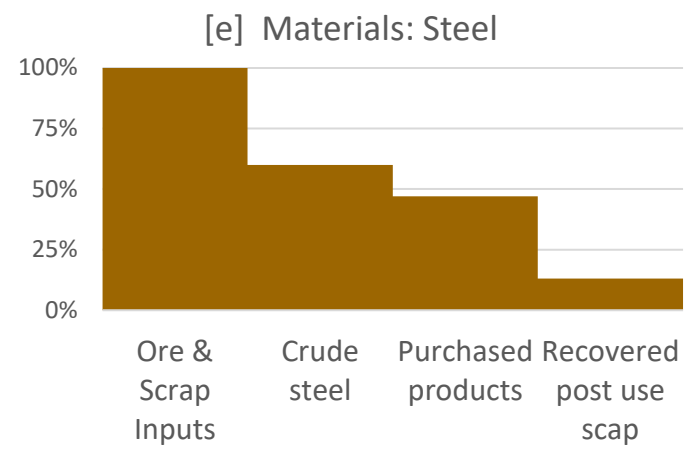
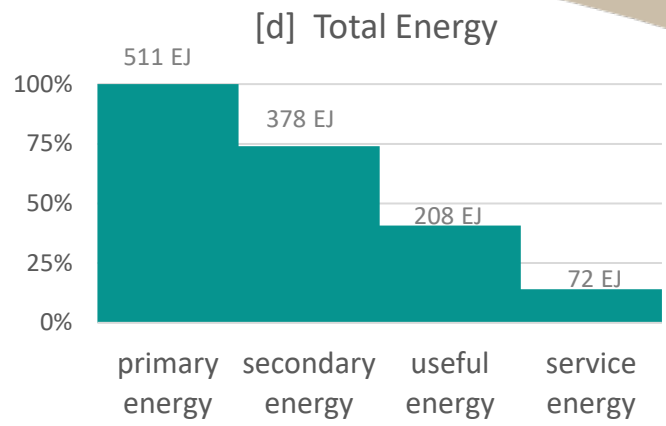
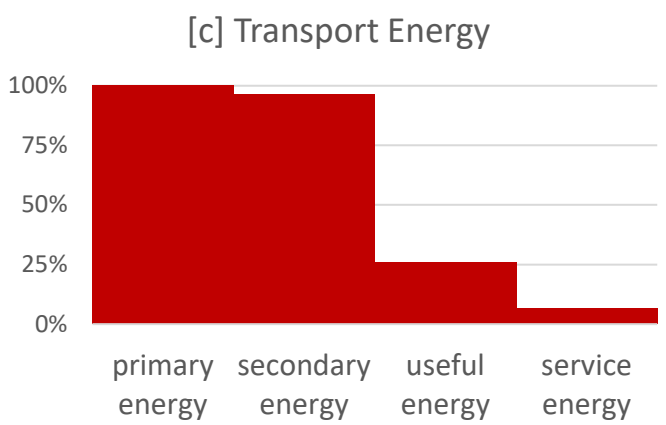
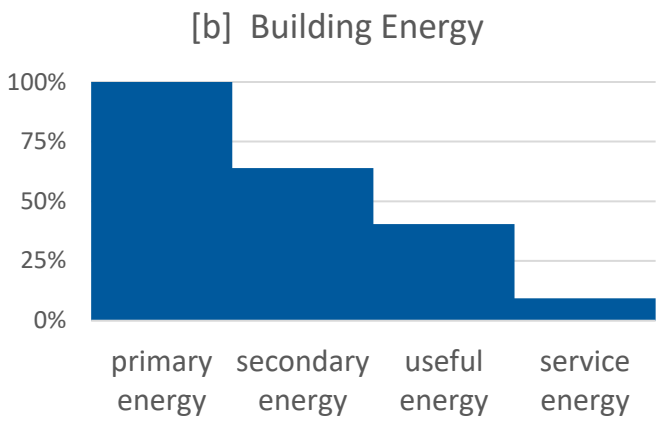
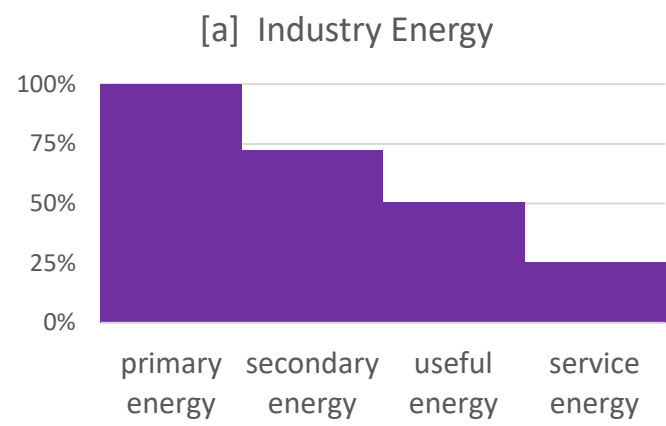
service efficiency

e.g., device convergence



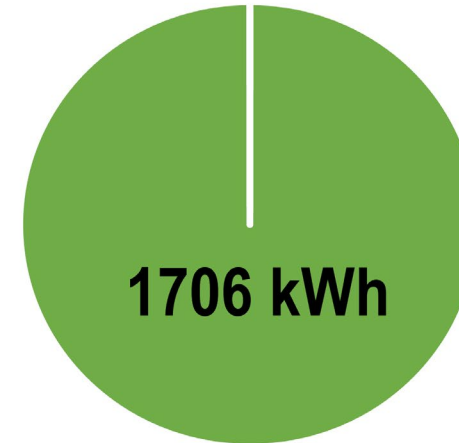
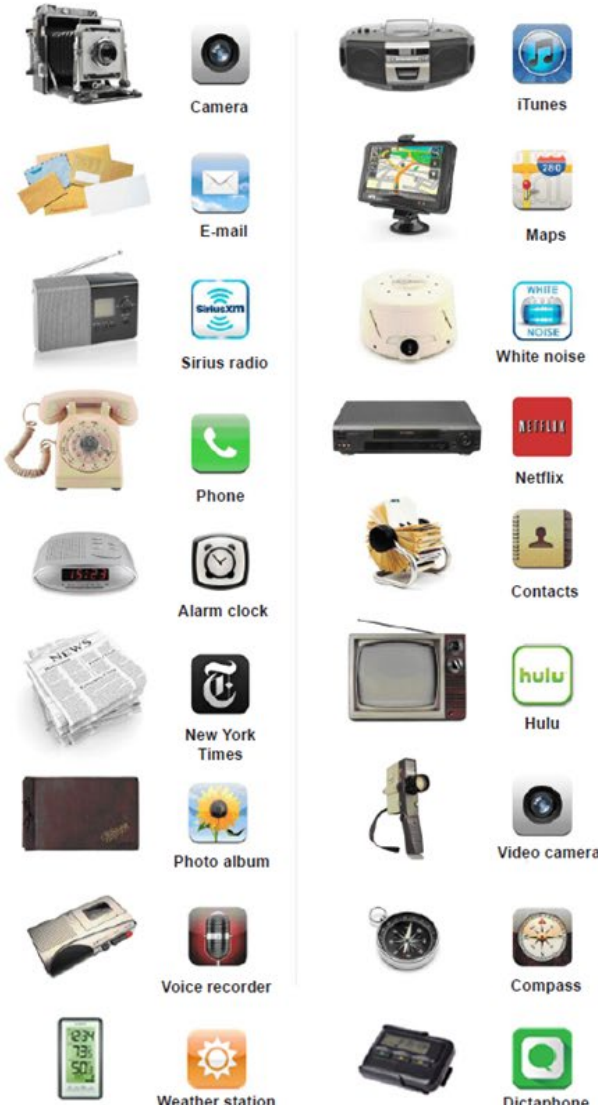
Tapping the enormous potential for services-led transformation

Source: Wilson, Grubler, and Zimm (2022). Energy-Services Led Transformation. In: *Routledge Handbook of Energy Transitions* (Ed: Araujo).
 Data from: Grubler et al. (2018), De Stercke (2014), Nakicenovic et al. (1993), Nakicenovic (1990).

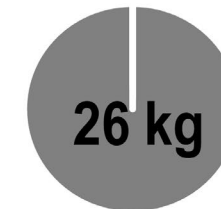


← savings
 ← amplify back up through resource conversion cascade

Impact of IC Technology Convergence



Embodied energy



Weight

Disruptive End-user Innovations



(1) From ownership to usership – (2) Sharing Economy – (3) From atomized to connected

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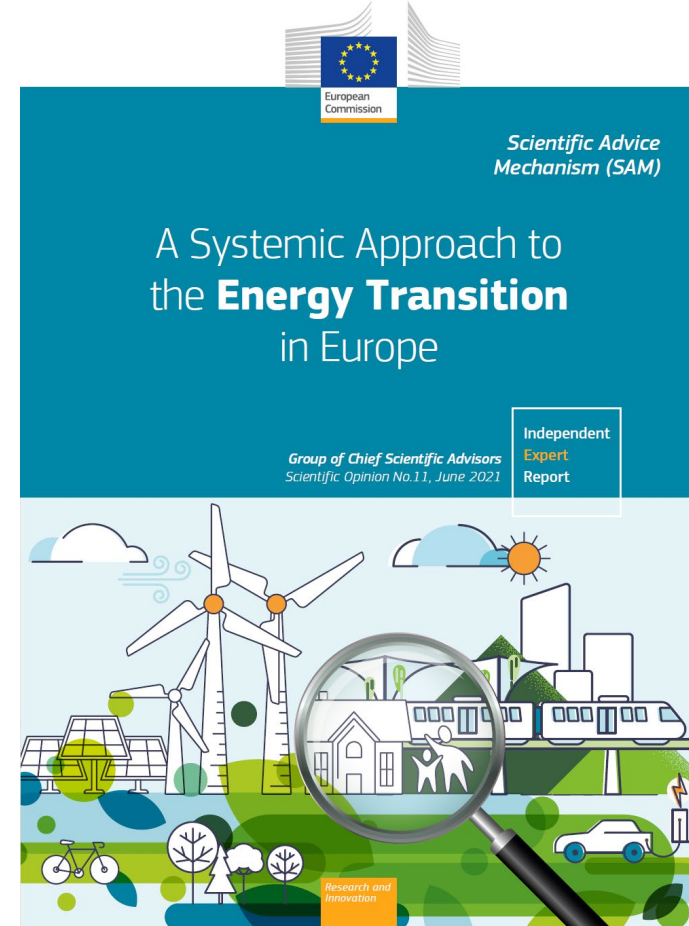
- ➔ Change in behavior, preferences, sufficiency, and services (usership rather than ownership)
- ➔ New business models, integration, efficiency, and reuse (sharing and circular economy)
- ➔ Digital Revolution and ICT convergence (Society 5.0) with appropriate “social steering”



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THANK YOU



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