Reuse of HVAC products – Learnings from Finnish pilot projects

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The built environment relies heavily on linear practices

29 %

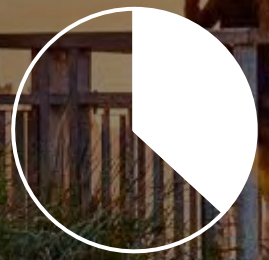
of climate emissions in Finland

35 %

of all waste

50 %

of all virgin resourses



30 %

of biodiversity loss

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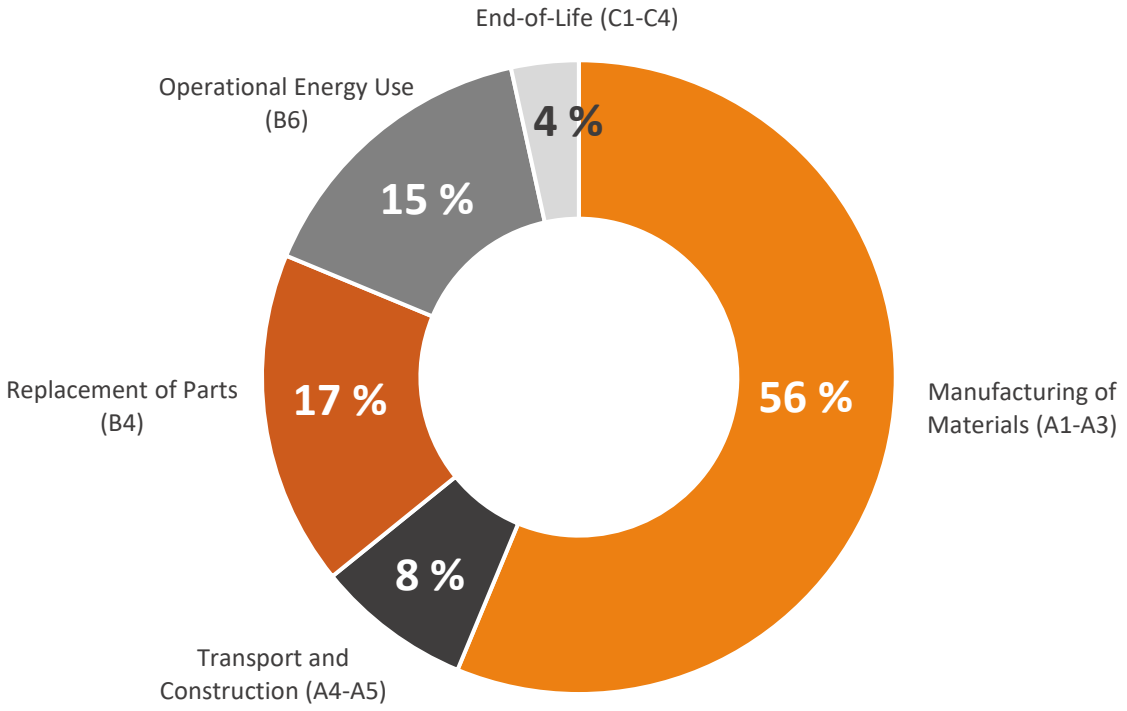
60–70 % of a building's whole life carbon emissions stem from materials

Example, school building, 50 year evaluation period



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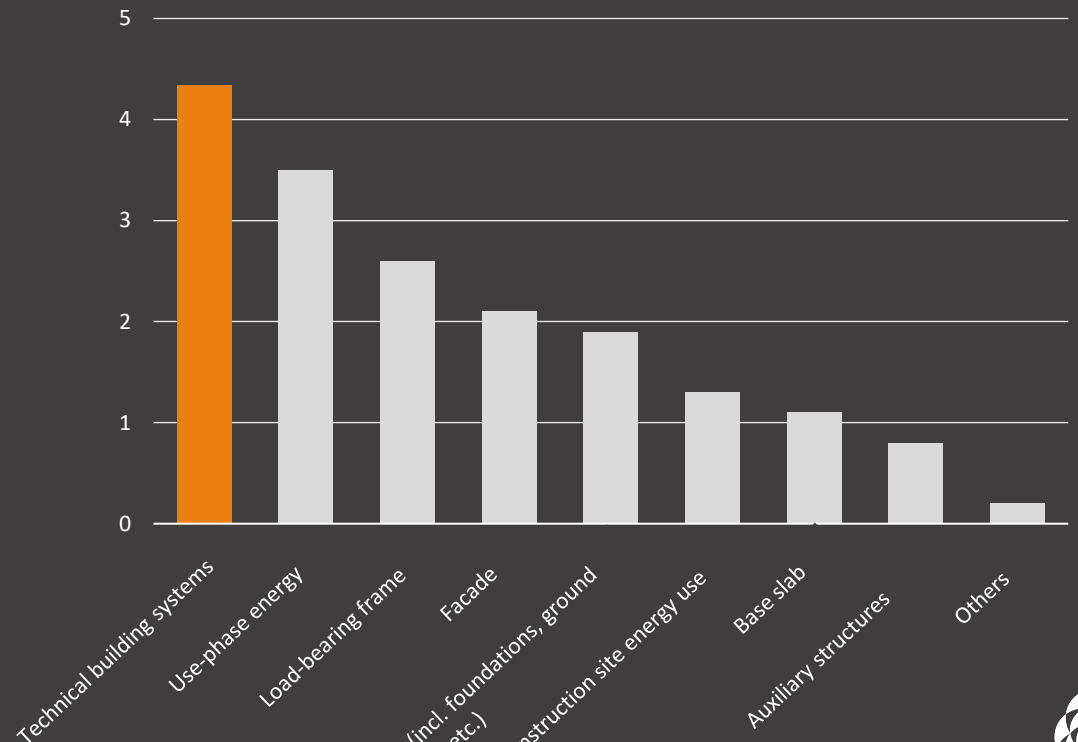
Depending on building type, technical building systems may even be the single biggest source of emissions

Sources of whole life carbon emission by source, example school building



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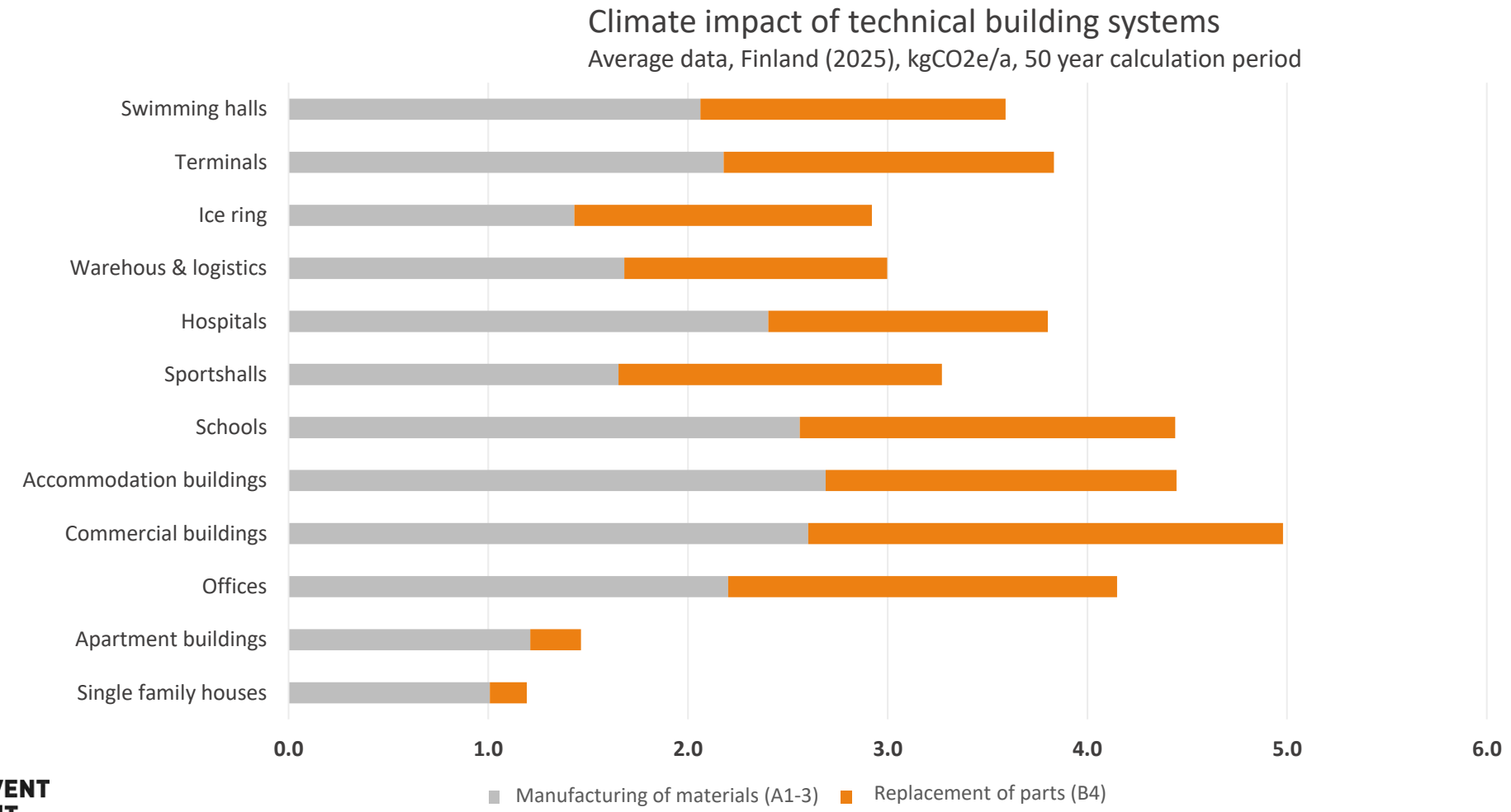
Technical building systems play a key role in non-residential buildings – replacement of parts a key source of emissions



Background report_MEP system emission default values, Granlund 2024

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Decarbonization isn’t the only incentive for reuse and refurbishment.

Other drivers:

- Corporate strategy
- Sustainable financing including EU taxonomy 7.1 and 7.2 (New construction, Renovation)
- Green building certifications, such as BREEAM and LEED
- EU ETS and CBAM, ”polluter pays”
- Circular Economy Green Deals
- Shorter supply chains protect against geopolitical instability and disruptions caused by extreme weather events

Joint project explored refurbishment and reuse possibilities and bottlenecks

- Nine participating companies and organizations including product manufacturers' association, property owners, contractors, HVAC-designers, and wholesellers.
- Goals:
  1. Map current state of circularity
  2. Identify technical building systems with the greatest potential for reuse
  3. Develop a process for refurbishment and reuse
  4. Test the process in two real-life pilot projects
  5. Produce guidelines for all stakeholders

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Challenges

- Rapid product development (e.g. energy efficiency)
- Contractors’ revenue models
- Inadequate data flow
- Low awareness of possibilities
- Lack of marketplaces
- Legislation (e.g. refrigerants)
- Liability and warranty issues

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Assessment of refrubishment and reuse potential

System	Product	Cost, new (€/m2)	Emissions,new (kg CO2e/m2)
Ventilation	Ventilation ducts	18,5	7,79
	Diffusers	14,6	0,18 - 1,09
	Pumps and fans	7	0,03
	Ventilation unit	21,1	11,95
Heating, cooling, water	Radiators	13,3	1,5
	Chilled beams	10	1,5
	Chillers	12,5	3,78
	Plumbing fixtures	Taps: 3,7 WCs: 3,8 Washbasins: 1	Taps: 0,03 WCs: 0,52 Washbasins:0,52

System	Product	Cost, new (€/m2)	Emissions, new (kg CO2e/m2)
Electrical systems	Light fixtures	44,8	18,7
	Trunking	1,47	3,2
	Switchboards	19,24	4,03
	Transformers	3,3	3,8
	Cable trays	7,8	1,67
	Electrical sockets and cables	4,1	9,29

Savings potential:

- Significant
- Average
- Low

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Process Description - Dismantling

1. Evaluation of reuse potential

2. Dismantling plan

3. Dismantling

4. Transportation, storage, possible refurbishment

Data flow

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Reuse/ refurbishment is most attractive when:

1. The product is easy to dismantle intact (designed for disassembly)
2. The carbon footprint and/or cost of a new product is high
3. Refurbishment is simple (manufacturer or other actor offers a service, or product is very simple, e.g. ventilation duct)
4. Product is hidden (no aesthetic requirements)
5. The product can be updated/ reused on site (no need for transportation and storage)

Each project is unique and has different priorities. Refurbishment/ reuse needs to be assessed case-by-case.

Overall climate impact of office renovation pilot was reduced by over 50%

Reused systems and products	Quantity	Cost saving € *	Climate impact kgCO2e
Ventilation			
Ventilation ducts	41,4 m	423	219, 6
Chilled beams	14 pcs	10 500	1389,0
Heating and Cooling			
Radiators	16 pcs	3 488	2164,8
Cooling pipelines	83 m	1 799	440,2
Water and drainage			
Water pipes	11 m	137	110,5
Drainage pipes	20 m	358	200,9
Kitchen tap	1 pcs	218	11,0
Cleaning closet tap	1 pcs	179	11,0
Staff kitchen tap	1 pcs	167	11,0
Toilet seats	2 pcs	902	208,8
Tap with bidet	1 pcs	188	6,9
Total saved		**18 359**	**4773,7**

Circular Business Models for Product Manufacturers

SERVICE AND REPAIR	UPDATE ON-SITE	TAKE-BACK	PRODUCT-AS-A-SERVICE
Services for the maintenance and repair of products. The maintenance business may also include the sale of spare parts and the provision of technical support.	Upgrading products directly at customer premises. This may include software updates, hardware modifications, or installing accessories on existing equipment.	Old products or equipment taken back for remanufacturing or servicing and resale. This may include upgrading components or other refurbishment. Products designed for disassembly and refurbishment.	Client leases the equipment for a monthly fee. Property owner avoids expensive one-off investment and manufacturer can provide additional services, such as mainentance or updates.

KONE Swegon Danfoss Signify PHILIPS

Product data management, resource efficiency, use of recycled materials

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Get in touch!

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