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Beyond operational
towards circularity and a life-cycle approach in today's energy discourse

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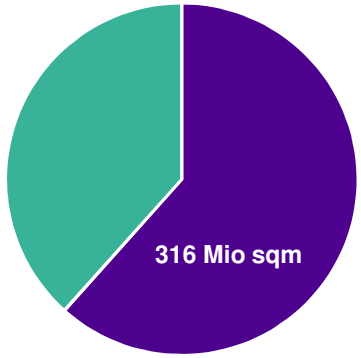
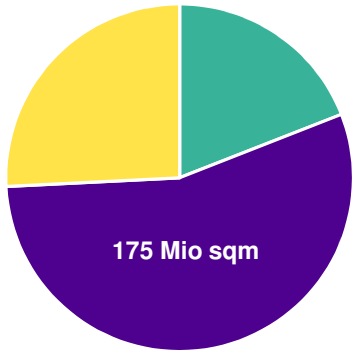
Buildings in Finland

Image source: https://www.annelkv.fi/tampere-amuri-kerrostalo-5/



60% residential buildings



19% built until 1959

55% built 1960 – 1999

26% built after 2000

Tampere, Amuri (1970)

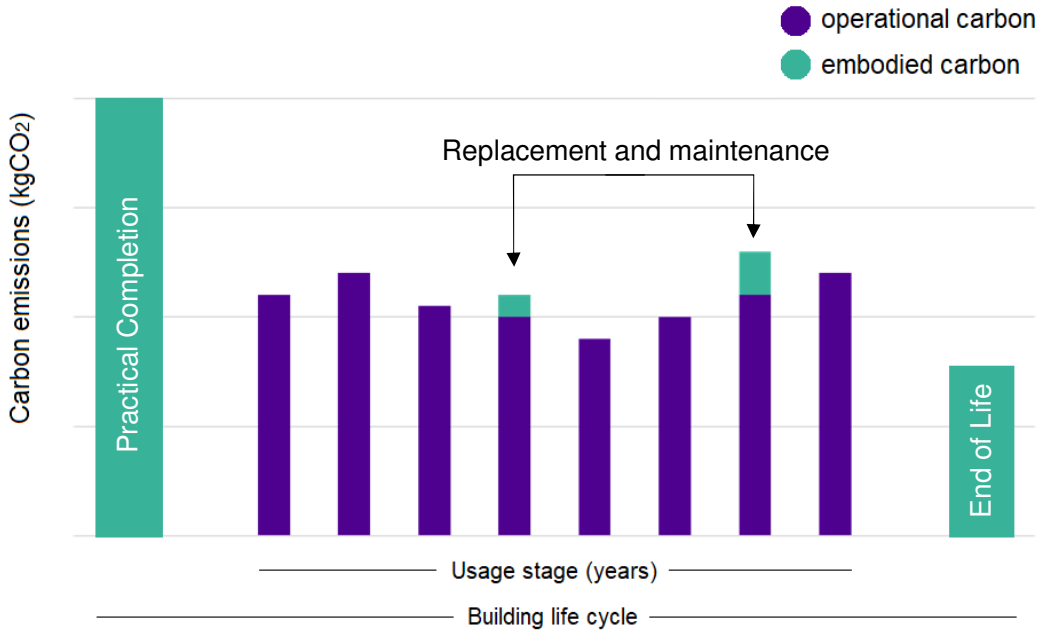
Finnish residential buildings

… play a key role in Finland's energy transition targets.

The largest potential for the reduction

…of operational energy can be found in these older Finnish apartment buildings.

Hirvonen, J., Jokisalo, J., Heljo, J., Kosonen, R. (2019). Towards the EU emissions targets of 2050: optimal energy renovation measures of Finnish apartment buildings.



Excavation

(Transportation)

Manufacturing

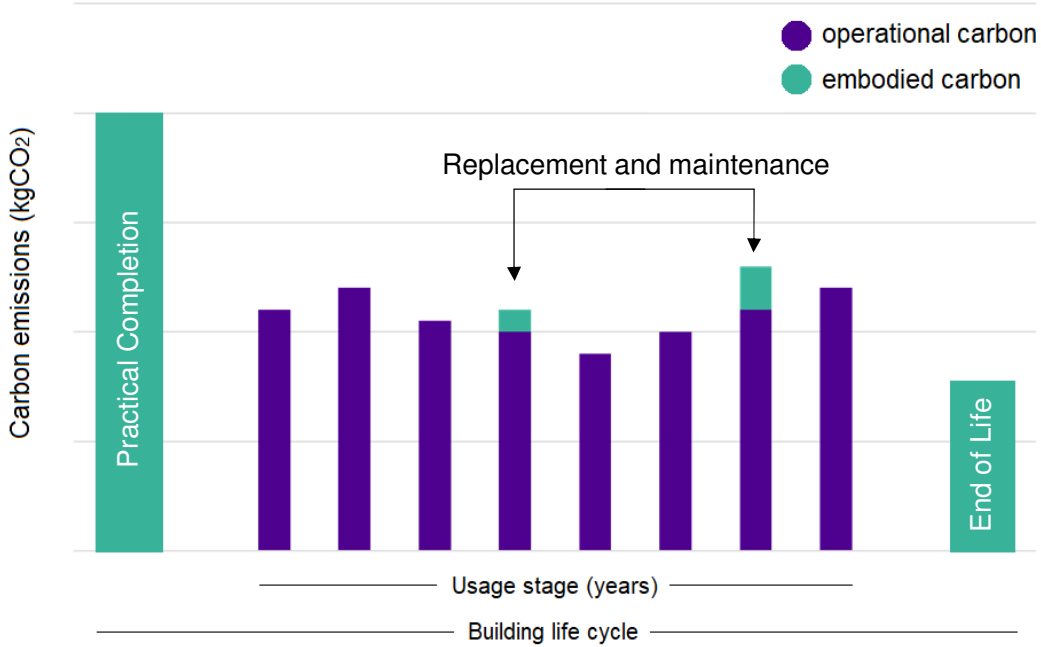
Transportation

Construction

Use

Demolition

Operational and embodied energy

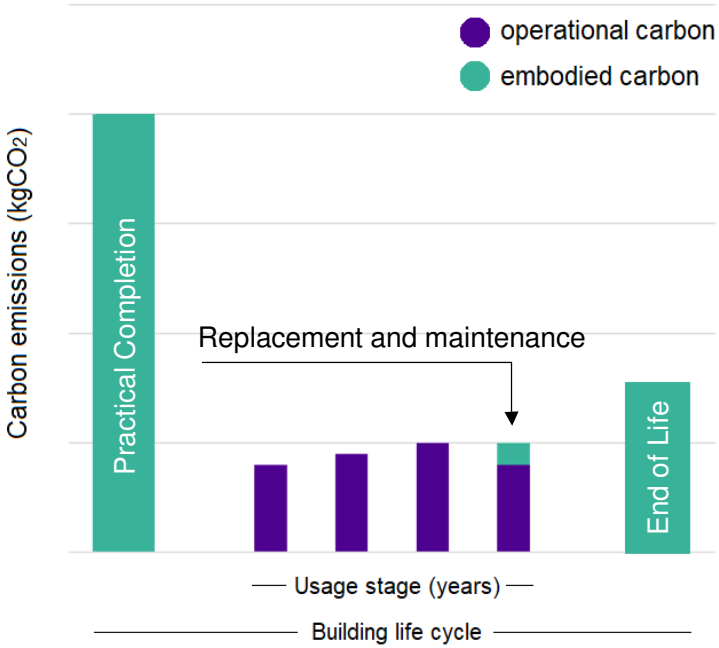


The share of operational energy is typically 80-90% of a residential building's life cycle energy.

Ramesh, T., Prakash, R., Shukla, K.K. (2010). Life cycle energy analysis of buildings: An overview.

HOWEVER

Operational and embodied energy



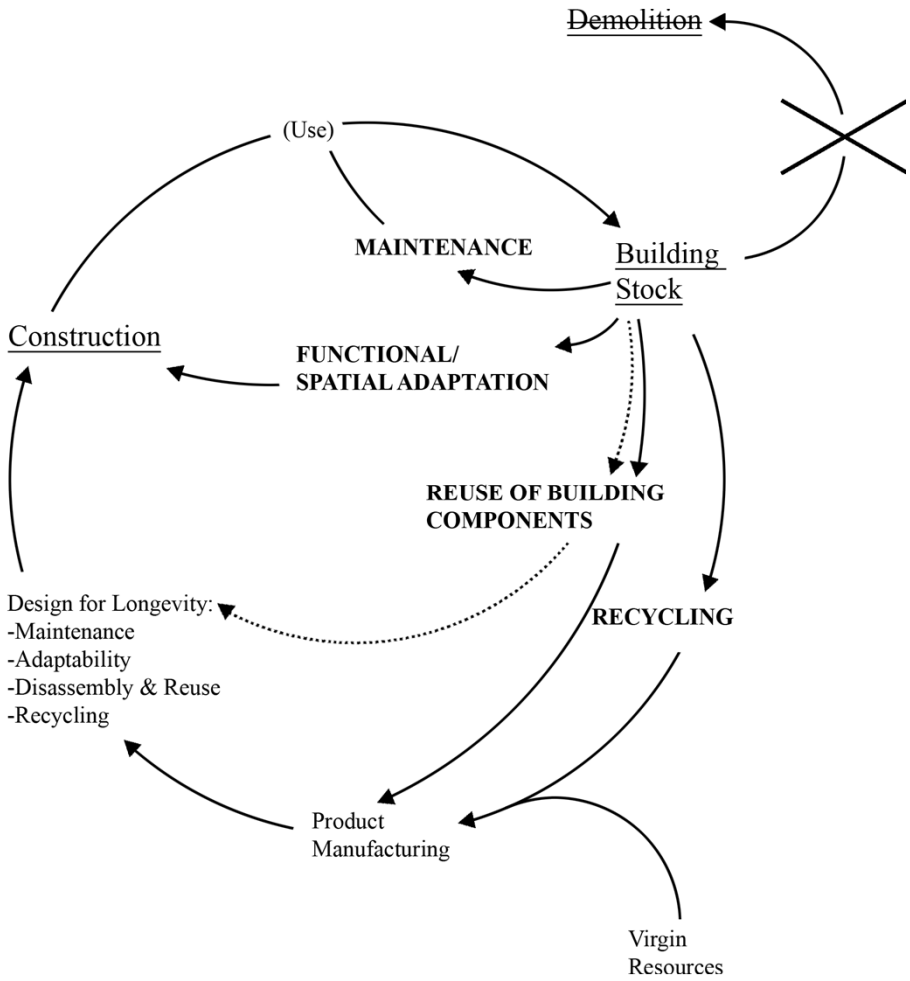
Shift of focus towards increased efficiency in operational energy

Buildings demolished in Tampere between 2000 and 2018 reached an average life of 50 years

Huuhka, S. & Kolkwitz, M. (2021). Stocks and flows of buildings: Analysis of existing, demolished, and constructed buildings in Tampere, Finland, 2000–2018

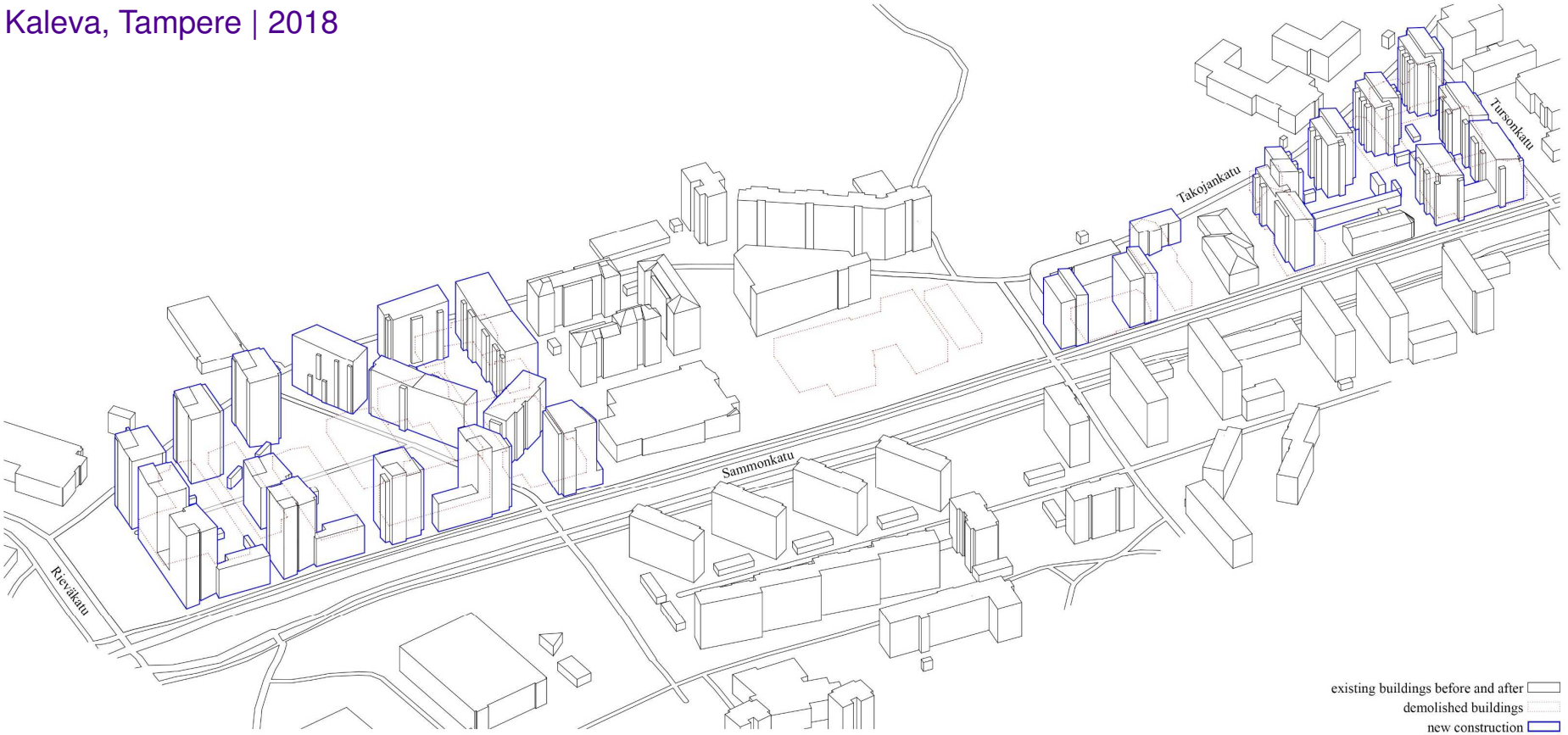
Our overall target must be an architecture of endurance*

*Hassler, U. (2011). Langfriststabilität: Towards a Sustainable Development of the Built Environment.

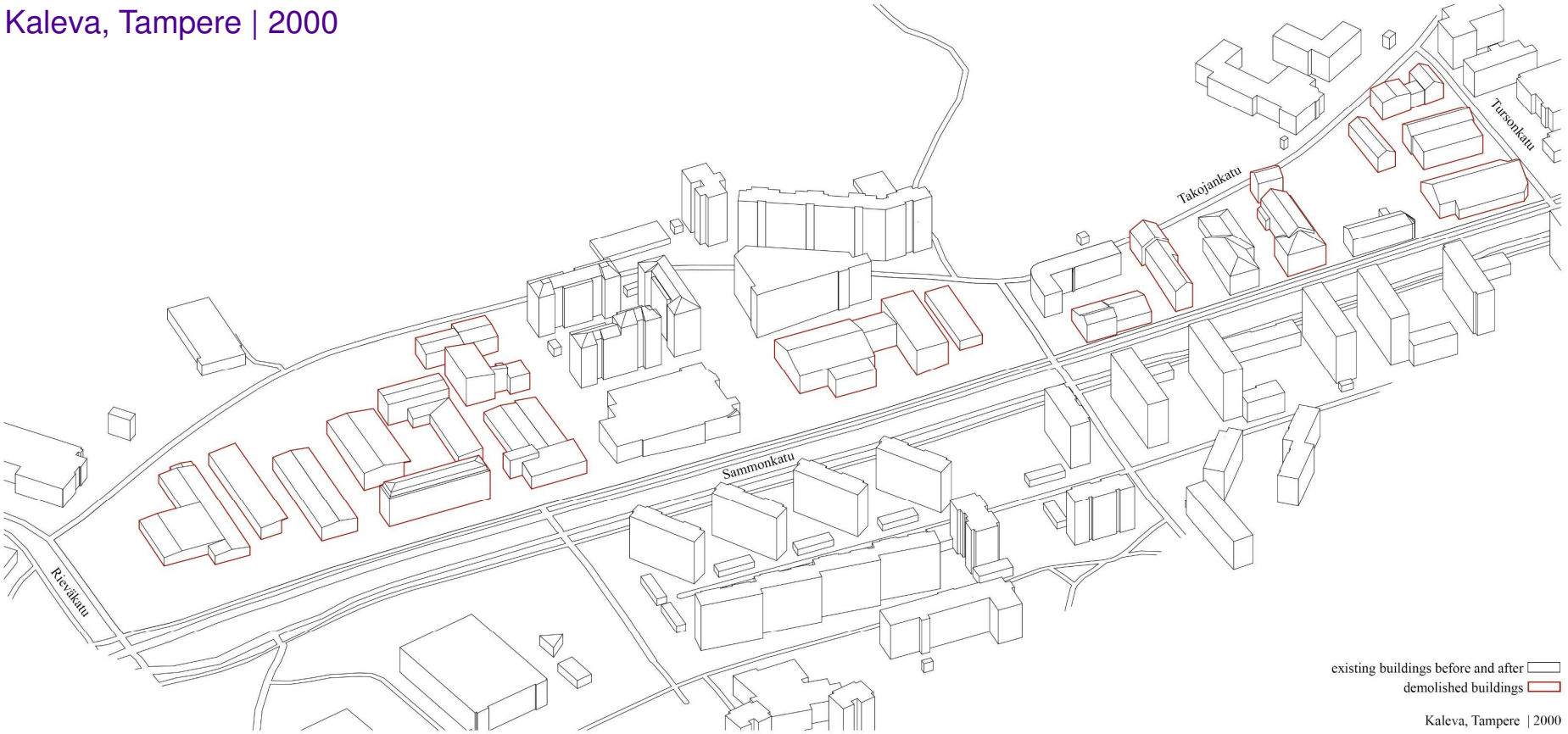


Building stocks should be considered not only as deposits of raw materials but also reserves of space.

Kaleva, Tampere | 2018



Kaleva, Tampere | 2000



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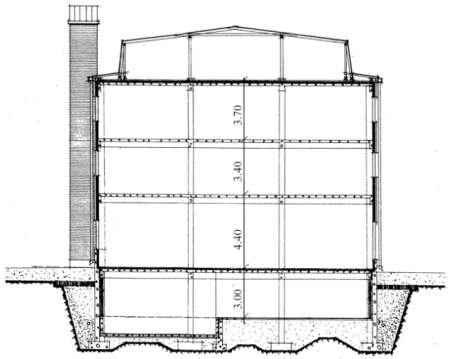
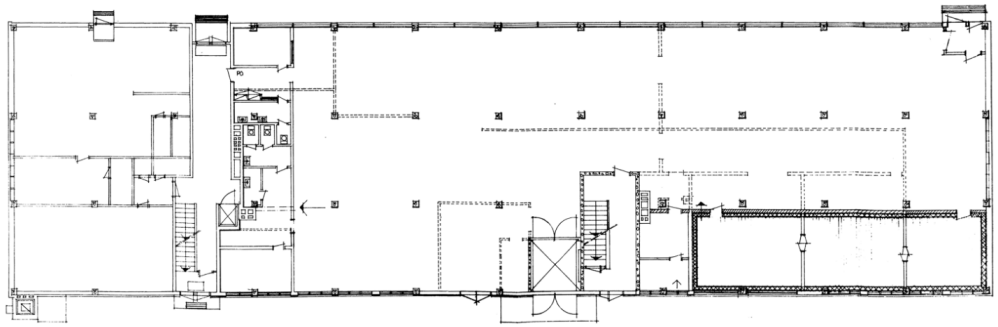
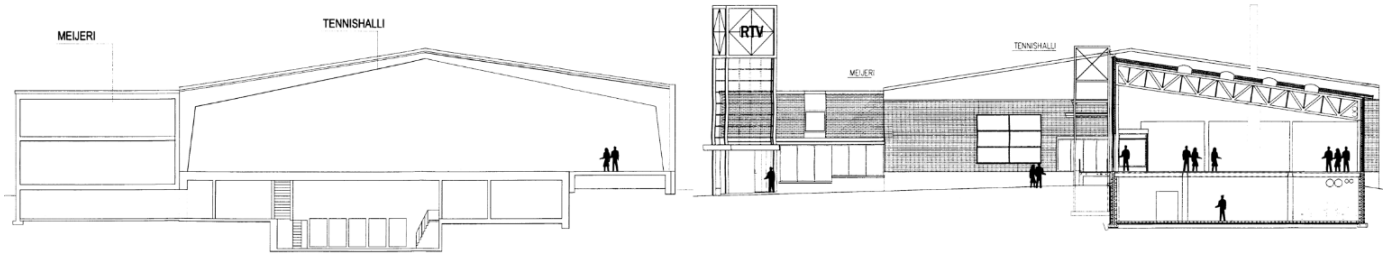
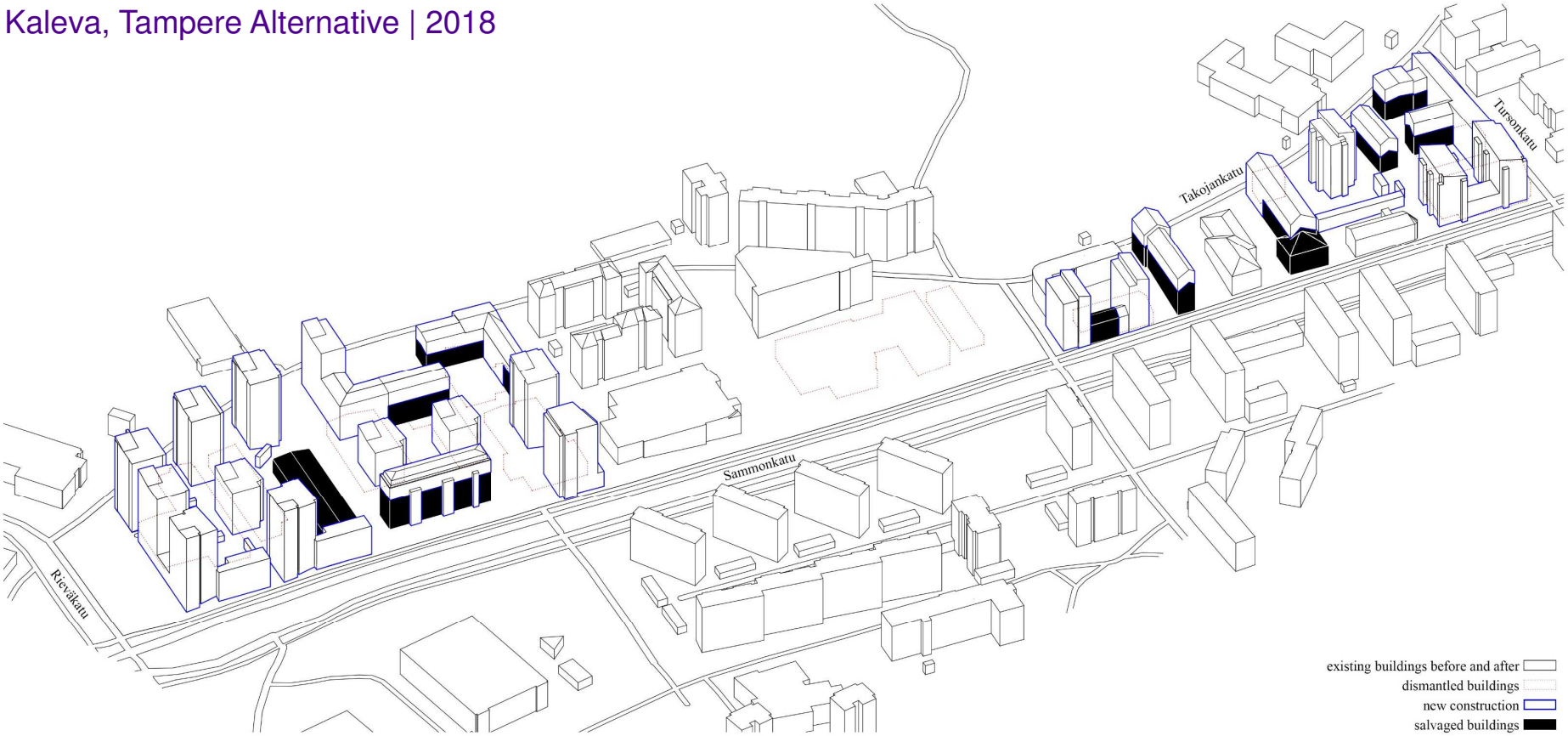
Buildings demolished in Kaleva, Tampere | 2000 - 2018

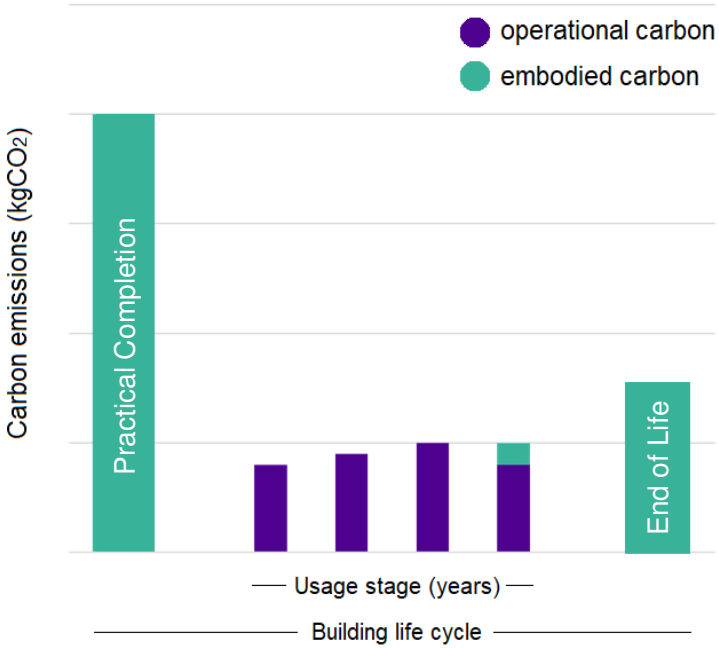






Kaleva, Tampere Alternative | 2018





From **short life cycle**, **high embodied** and **significant operational energy** to...

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…Extended Building Life Cycles…

Former headquarters of the GDR toll. Renovation and extension by PETERSENARCHITEKTEN

…Low Embodied Energy…

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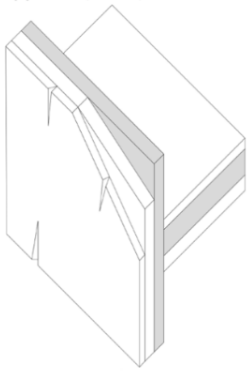
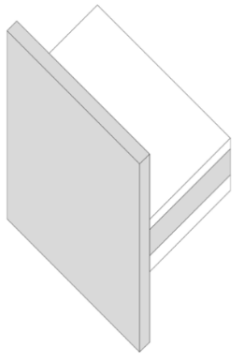
…Low to No Operational Energy!

existing facade
(partial frost damage)

approx. 0,36 W/m²*K

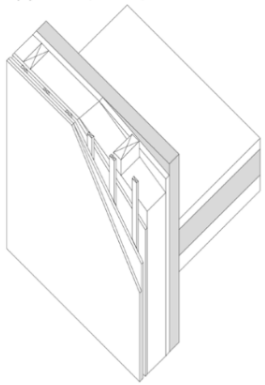


keep the existing
concrete core



renovated facade
(prefab balloon frame elements)

approx. 0,14 W/m²*K



THE GREENEST BUILDING…
…IS THE ONE ALREADY BUILT!

Carl Elefante, former president of the American Institute of Architects