Recovered wood, Finnish houses have what secondary resources?

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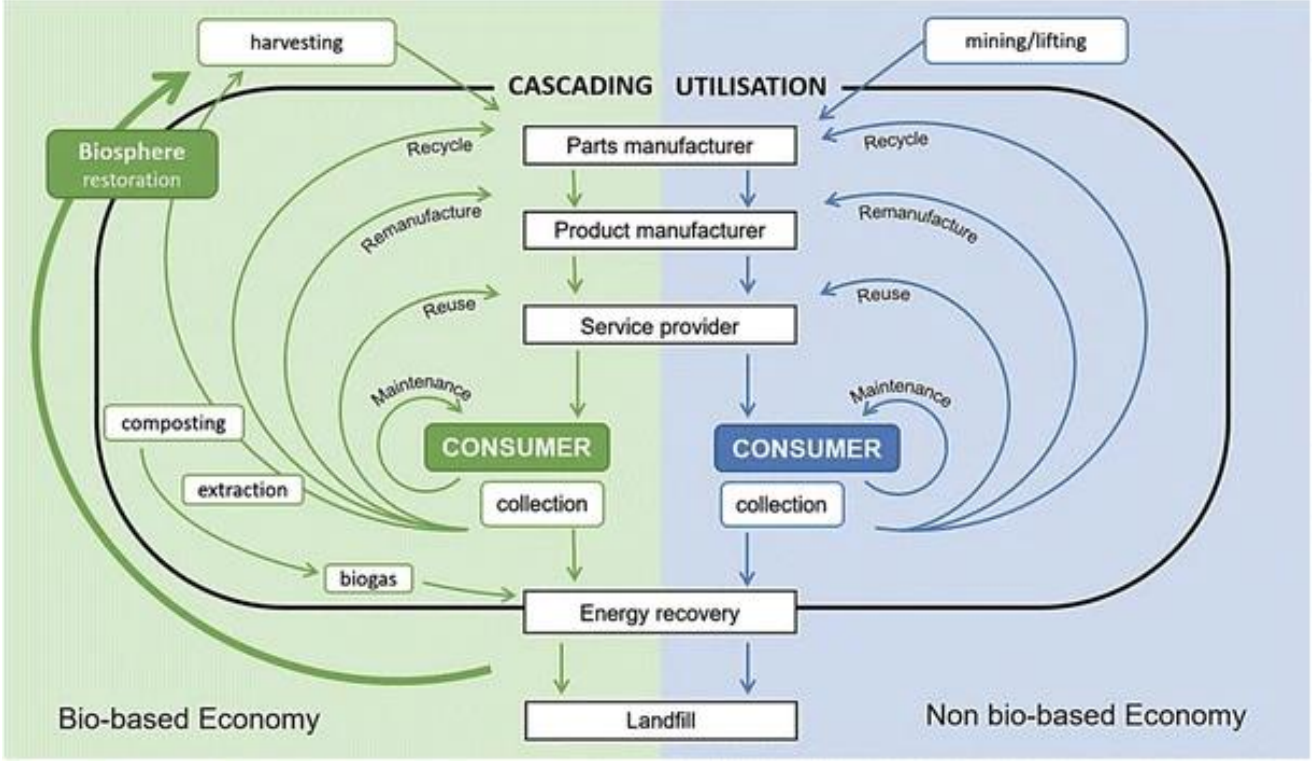
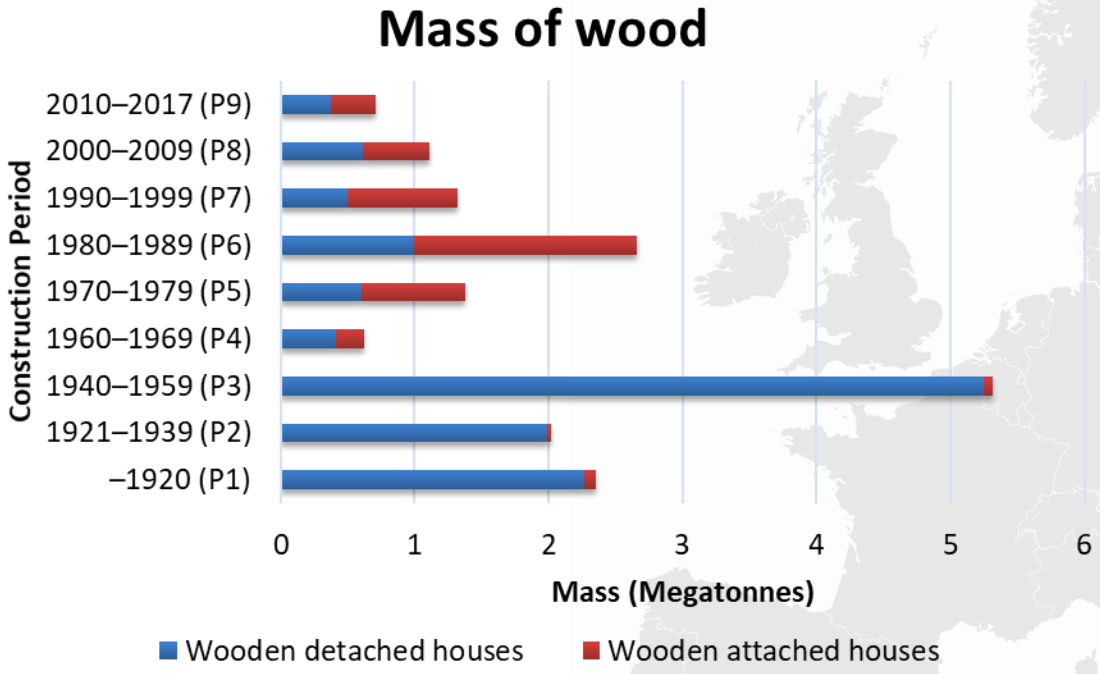
It is important to reduce, reuse and recycle



Challenges to effective cascading

- Quantity
- Characteristic
- Quality
- Availability

- 17.5 megatons of timber is in structural parts of existing residential houses in 2017.[(1)]
- 4 million tons of estimated amount are encapsulated in the houses built in 1940-1959. [(1)]



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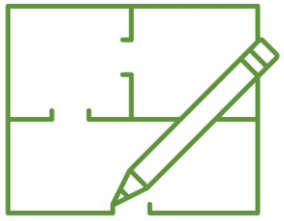
(1) Nasiri, B., Piccardo, C. and Hughes, M., 2021. Estimating the material stock in wooden residential houses in Finland. *Waste Management*, *135*, pp.318-326.

- **What quantity of wood is available in such a building?**
- **What we have as a secondary resource?**

20 Finnish houses commonly built in 1940-1959 in Finland

Methodology

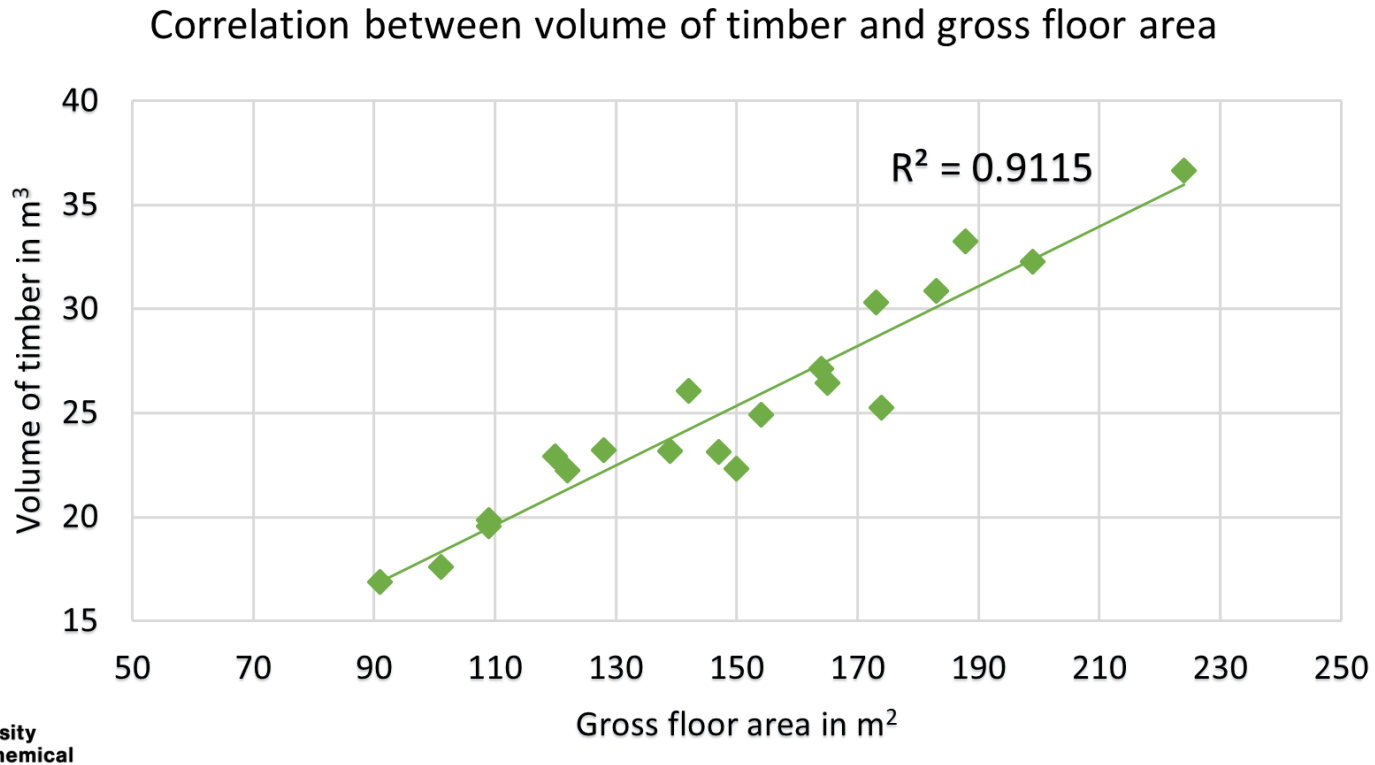


- Analyzing building documents

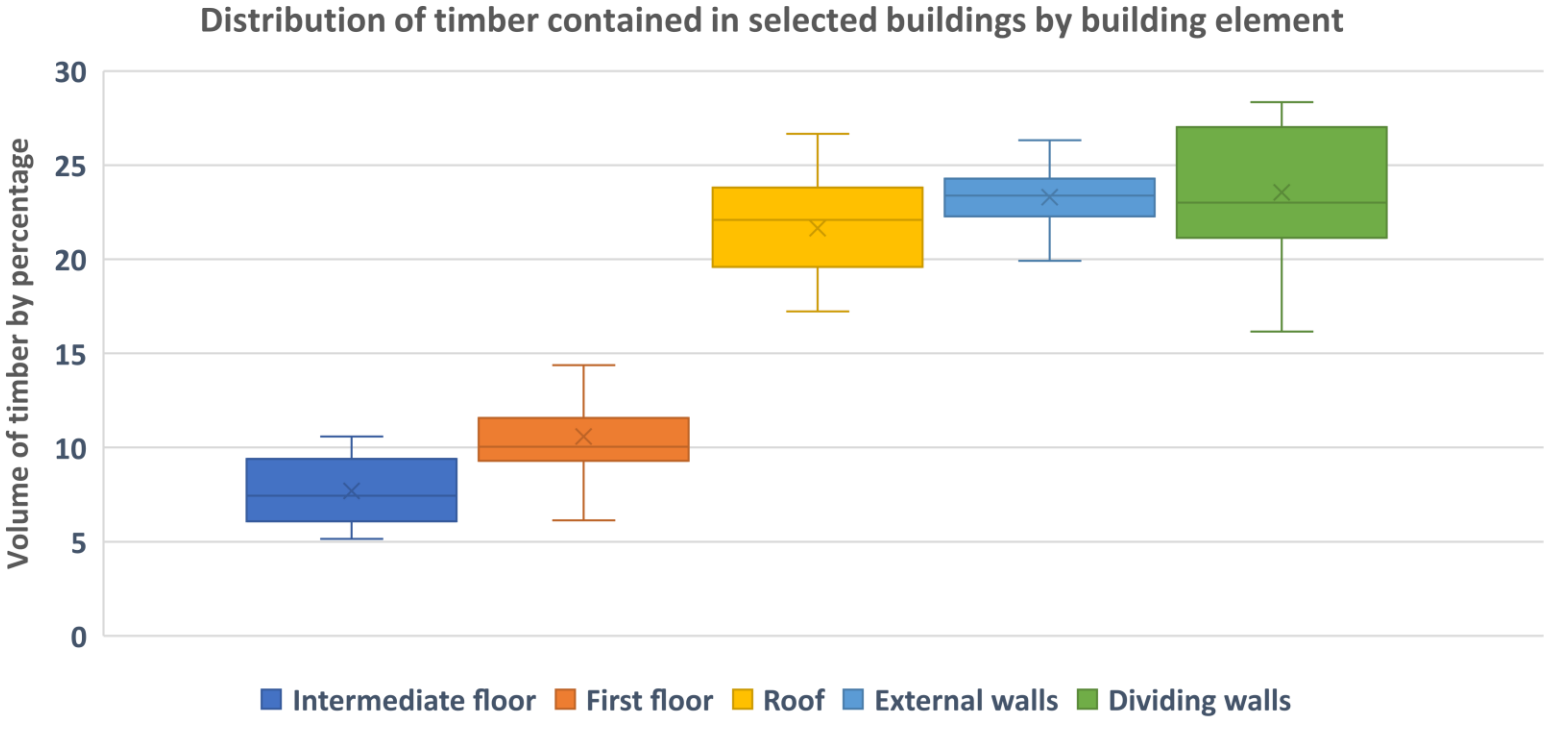
- Development of Inventory sheet
- Recording data

- Analysis of wood volume within a building and in comparison, to each other

- Volume of timber 17-37 m^3 and gross floor area of house were 90-225 m^2.
- An average of 0.17 cubic meters of timber per square meter of gross floor area per building.



- Highest volume of timber: dividing walls (24%), external walls(23%), and roofs(22%).
- Least volume of timber: Intermediate floors (7%) and first floors (11%)



75 mm × 150 mm

75 mm × 200 mm

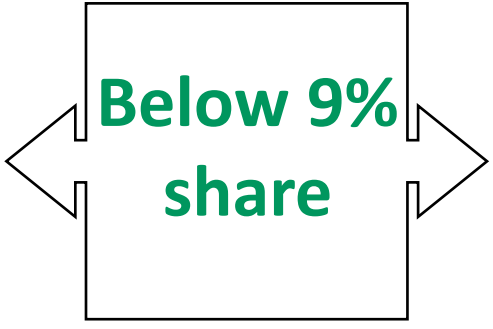
60 mm × 200 mm

50 mm × 200 mm

100 mm × 100 mm

100 mm × 200 mm

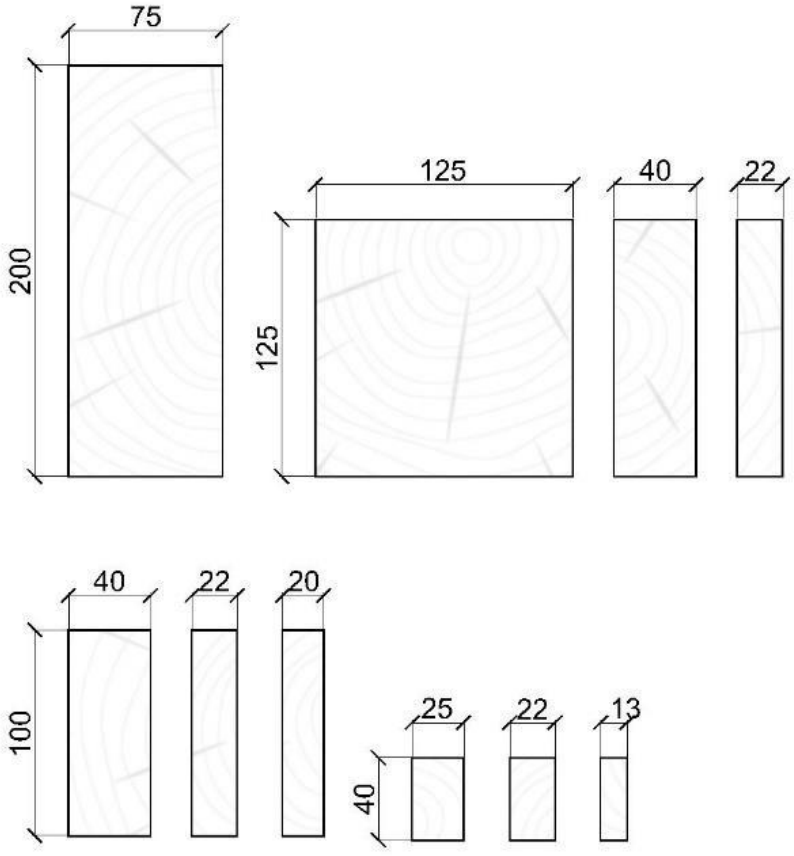
50 mm × 175 mm

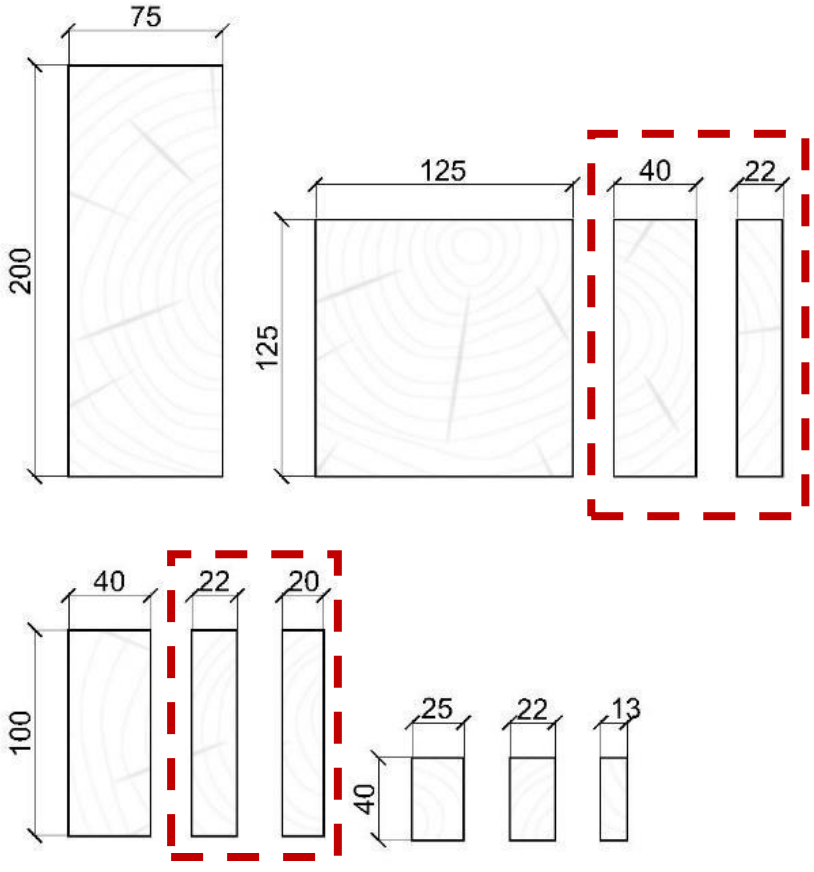


Floor joists

Floor battens

Beams


75
200
125
125
40
22
40
22
20
100
25
22
13
40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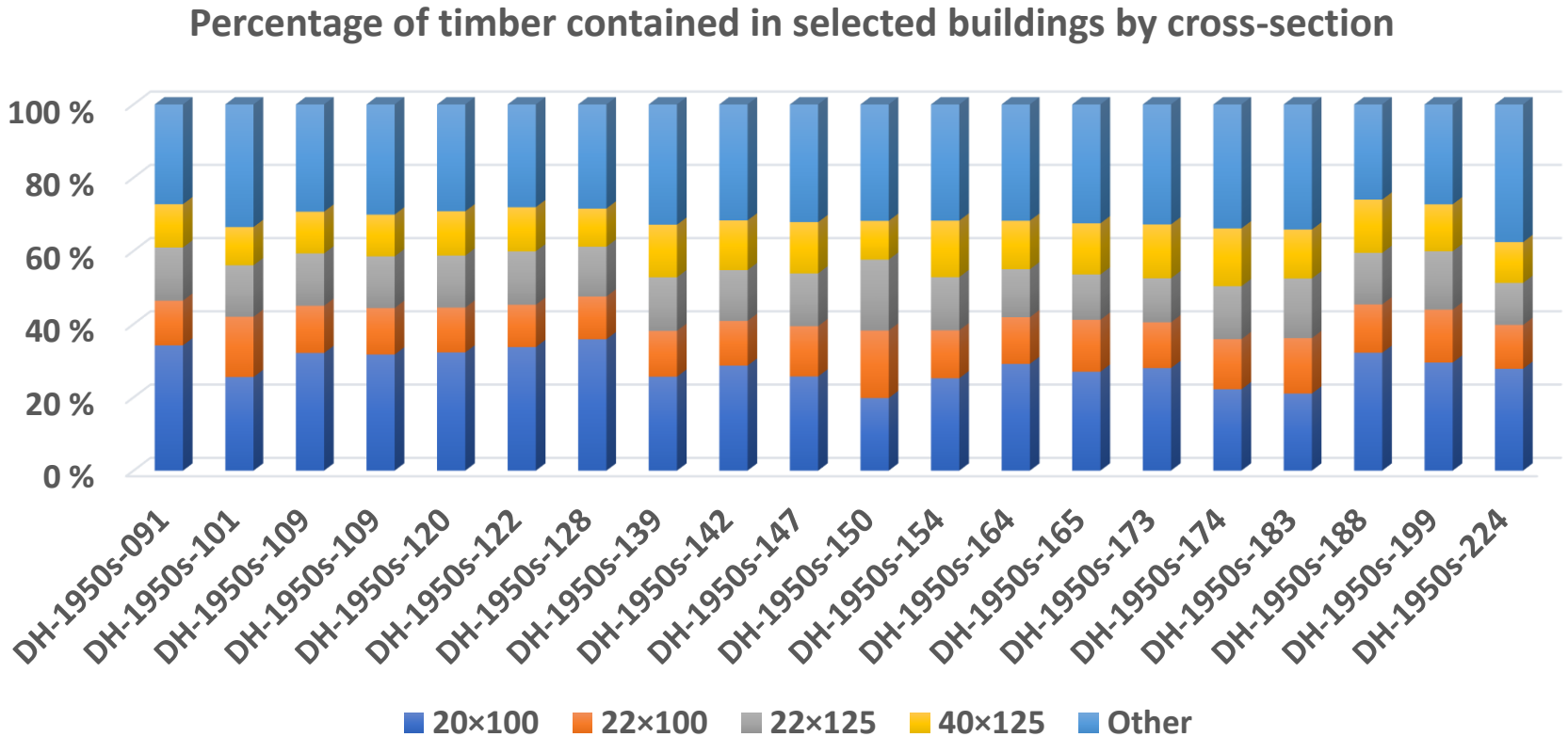
Percentage of timber contained in selected buildings by cross-section
100 %
80 %
60 %
40 %
20 %
0 %
DH-1950s-091
DH-1950s-101
DH-1950s-109
DH-1950s-109
DH-1950s-120
DH-1950s-122
DH-1950s-128
DH-1950s-139
DH-1950s-142
DH-1950s-147
DH-1950s-150
DH-1950s-154
DH-1950s-164
DH-1950s-165
DH-1950s-173
DH-1950s-174
DH-1950s-183
DH-1950s-188
DH-1950s-199
DH-1950s-224
20×100
22×100
22×125
40×125
Other

Are they theoretically reusable or recyclable?

Cross-section size	20 mm x 100 mm	22 mm x 100 mm	40 mm x 125 mm	22 mm x 125 mm
Proportion	28%	13%	13%	14%
Function	structural sheeting for walls	Battens	studs, top and bottom plates, and rafters	Cladding

- Breakage and damage to wood mainly arose from demolition as least care was taken for keeping the materials intact.
- Upon demolition, the materials recovered from the building were in different condition in relation to contamination, size and so on.
- The current demolition methods prioritize time and money over material recovery.

Espoo, Finland

Jyväskylä, Finland

Conclusion

- Timber available in existing buildings is potentially suitable for reuse or recycling.
- The design of these dwellings, however, makes it uneconomic to extract the timber intact.
- In addition to design, motivation of demolition contractors and demolition methods are barriers to reuse and recycling.
- It is possible to generate significant opportunities for disassembly and reuse of timber components by understanding the consistency and nature of the existing buildings and how they can be deconstructed.
- For future buildings, there is a clear opportunity and need to develop accessible, practical guidance on how to apply DFD(R) during the design process and on-site.

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