Thatched roofs in Finland

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COFREEN 2010-2013

- Concepts for using reed biomass as local bio-energy and building material

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2007–2013

Thatched (Common reed) roofs in Finland

1. How it started: 1943 → 2004
2. What has happened?
3. Today 66 thatched roofs
4. Who is responsible?
5. What next? Challenges, possibilities, threats

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Red threat : Reed - From Coast to Construction

Thatched roofs in Finland

1. How it started and what has happened

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1943 Building Information card* Reed and Straw roof covers was published.
After WW II we lost machines and craftmanship, also industrialization affected.

- 21-century: energy efficiency, CO2, natural materials…(attitude still chancing: responsibility for future, preserve nature, not to destroy environment)
- 2004-2007 Reed Strategy in southern Finland and Estonia -Project.

Satellite survey: 30 000 ha reed beds in southern Finland.
→ problem for water areas, landscape and land owners
→ possibility for local bioenergy and building material and same time solving em. problems and improving biodiversity.
→ 2010-2013 COFREEN-project
→ End of 2013 Multipurpose planning for coastal areas (VELHO-project).

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*= **Building Information Group is the leading provider of construction information in Finland**. Nearly all Finnish building professionals are clients of Building Information Ltd. The company publishes instructions for building and property management, regulations, contract documents and forms and product information both in printed format, on CD and on the Internet.

Thatched roofs in Finland

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2. Situation today:

- 66 thatched roofs.
- New Building Information card will be published in april 2013
  → 20 pages: regulations, instructions, pictures… for municipal officers, architects, builders etc.
- Test results and facts:
  - thermal conductivity ~0,055 W/mK measured by Technical research centre of Finland VTT.
  - fire safety guidelines: same distance between buildings as other materials

Still waiting:

- Harvesting support?
- More entrepreneurs for harvesting and building
- Nationally well-known and accepted building material

Thatched roofs in Finland

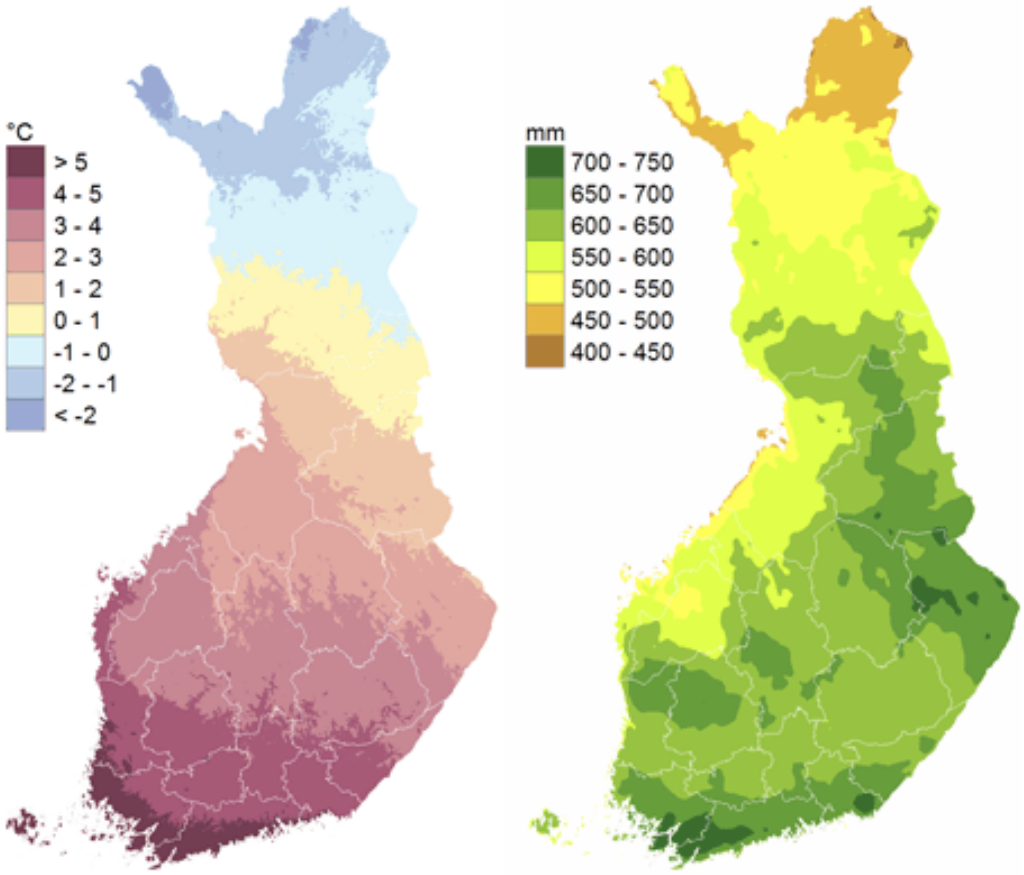
How these thatches last in Finland? Expected life-span?

Hard to say, because there is a lot of variables or parametres.

- Climate and also microclimate (S is worst for tile facade, N for wooden facade. Reed becomes mouldy like pine sapwood. So, it is sensitive material).
- Geographical position: Southern and northern finland. Also coastal areas and inland.
- Climate chance? 2013 → 2050 → 2100 (S Fin like S Swe)
- Material and work quality
- Type of construction: angle, substructures, heat flow…

Thatched roofs in Finland

Northern climate:



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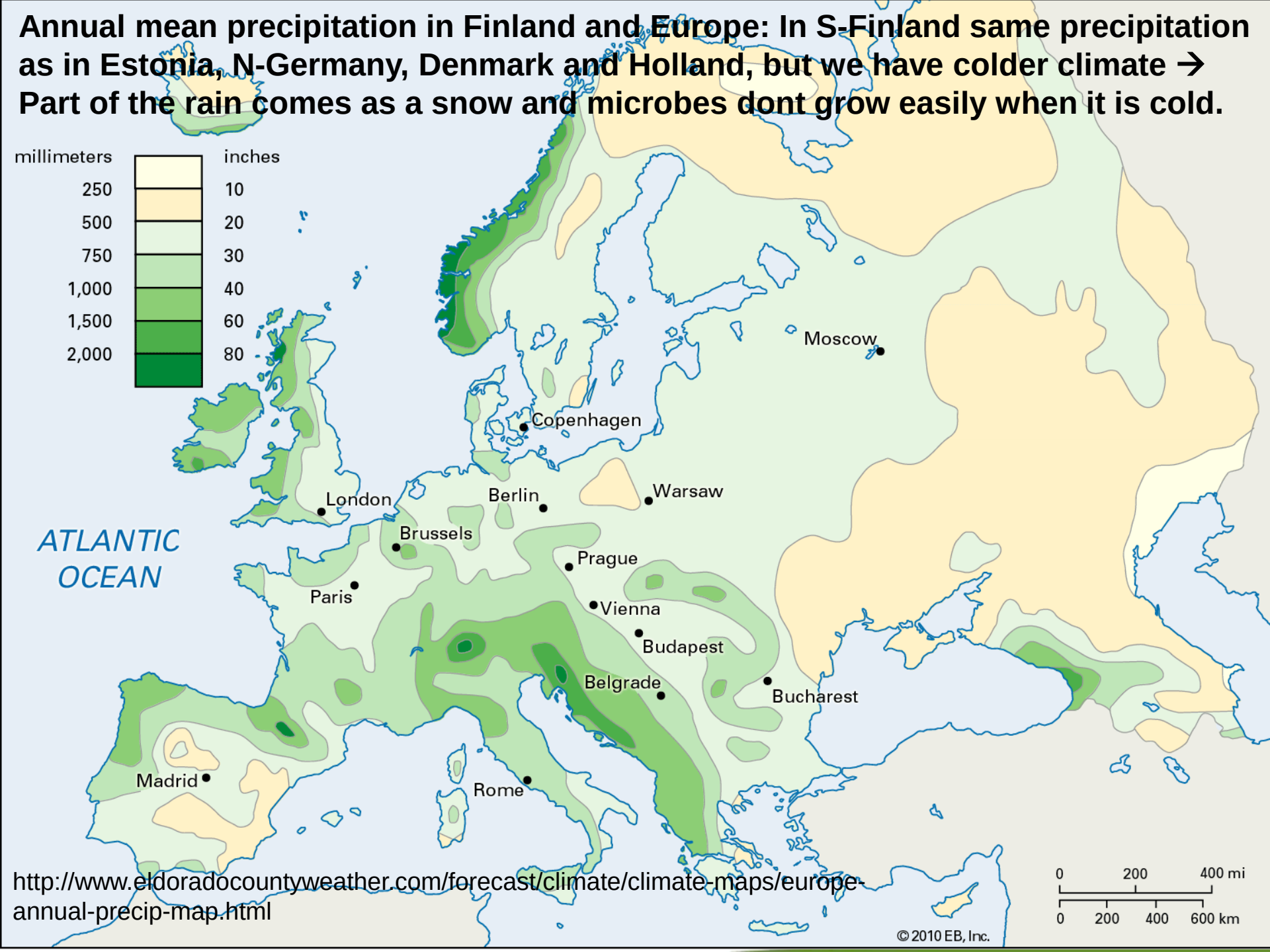
Annual mean temperature (map to the left, the unit °C) and annual mean precipitation (map to the right, unit millimetre), reference period 1981-2010.

https://ilmasto-opas.fi/en/ilmastonmuutos/suomen-muuttuva-ilmasto/-/artikkeli/1c8d317b-5e65-4146-acda-f7171a0304e1/nykyinen-ilmasto-30-vuoden-keskiarvot.html#h_Precipitation

Annual mean precipitation in Finland and Europe: In S-Finland same precipitation as in Estonia, N-Germany, Denmark and Holland, but we have colder climate → Part of the rain comes as a snow and microbes dont grow easily when it is cold.



http://www.eldoradocountyweather.com/forecast/climate/climate-maps/europe-annual-precip-map.html

Thatched roofs in Finland

Situation today:

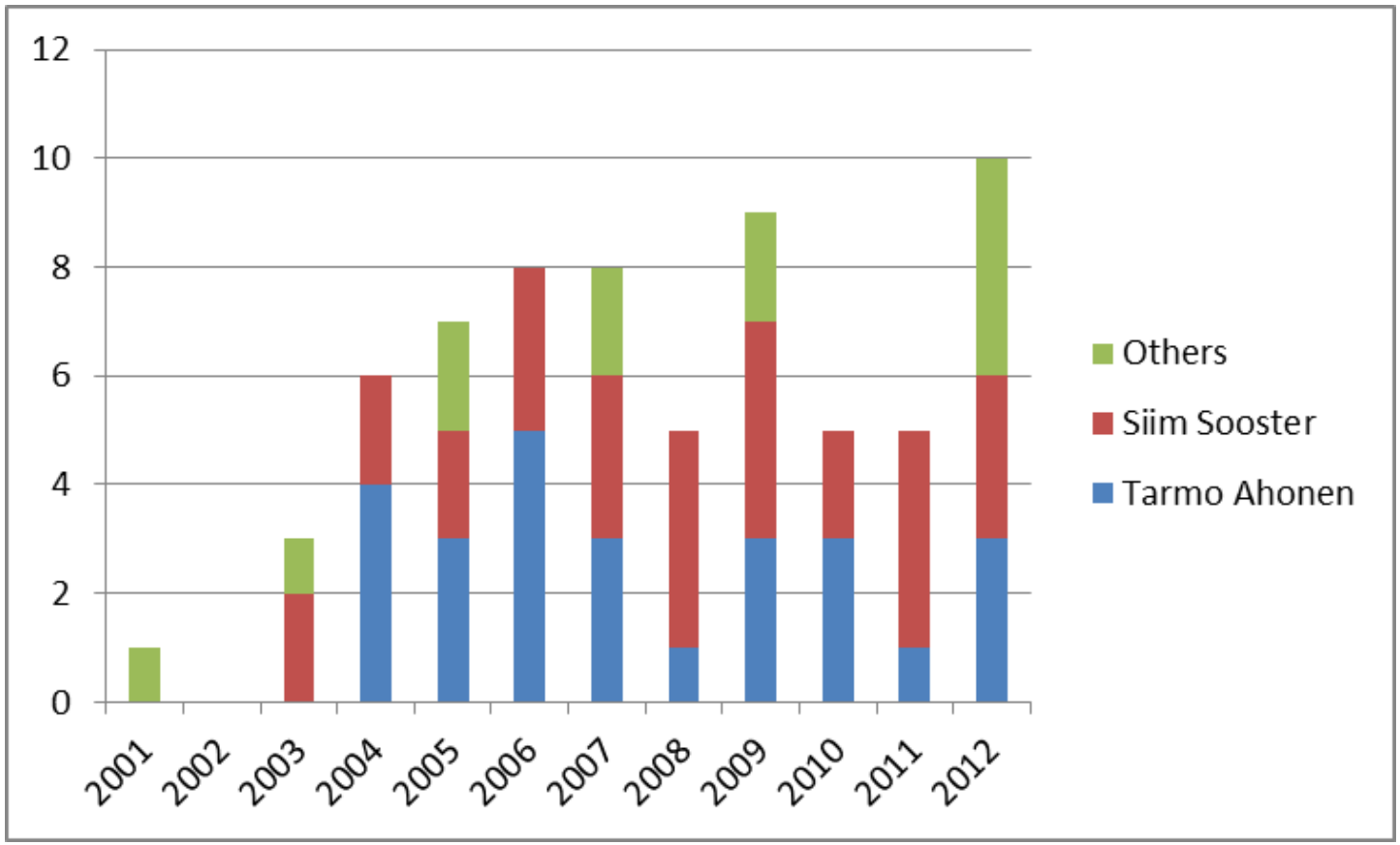
66 thatched roofs locating around Finland:

- 17 buildings with heating or possibility to live year-round
- 49 ”cold” buildings (= without heating or walls).
- 8 Residential buildings ★: Parainen, Livonsaari, Vihti, 2 in Lappeenranta, Kurikka, Ähtäri, Pihtipudas.
- 1 Office building ★: Biolan headquarters in Eura. The biggest thatch in Finland 1300 m2. 2009.

Thatched roofs in Finland

by the year of construction

amount



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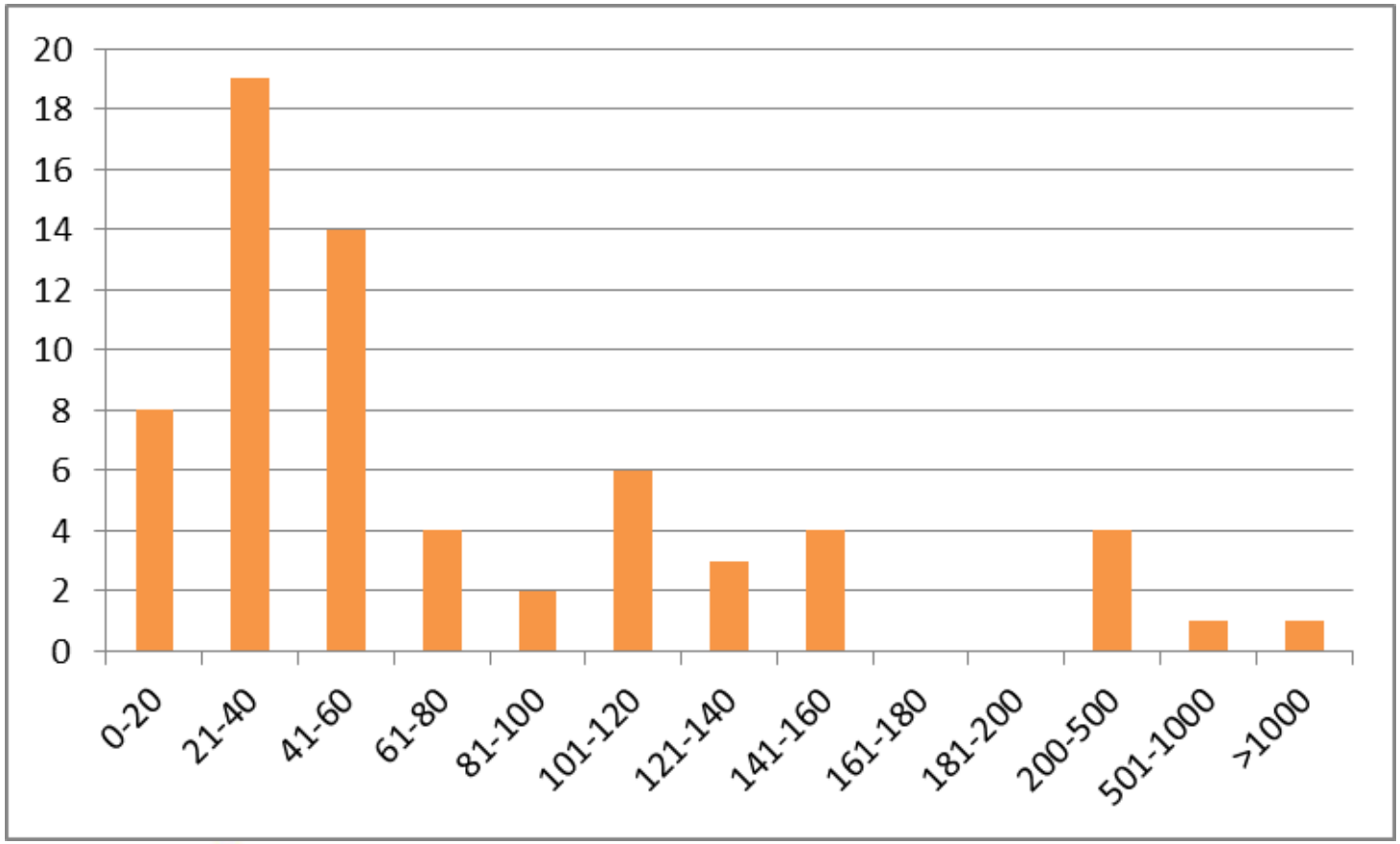
Thatched roofs in Finland

by the size of the roof

amount



size (m^2)

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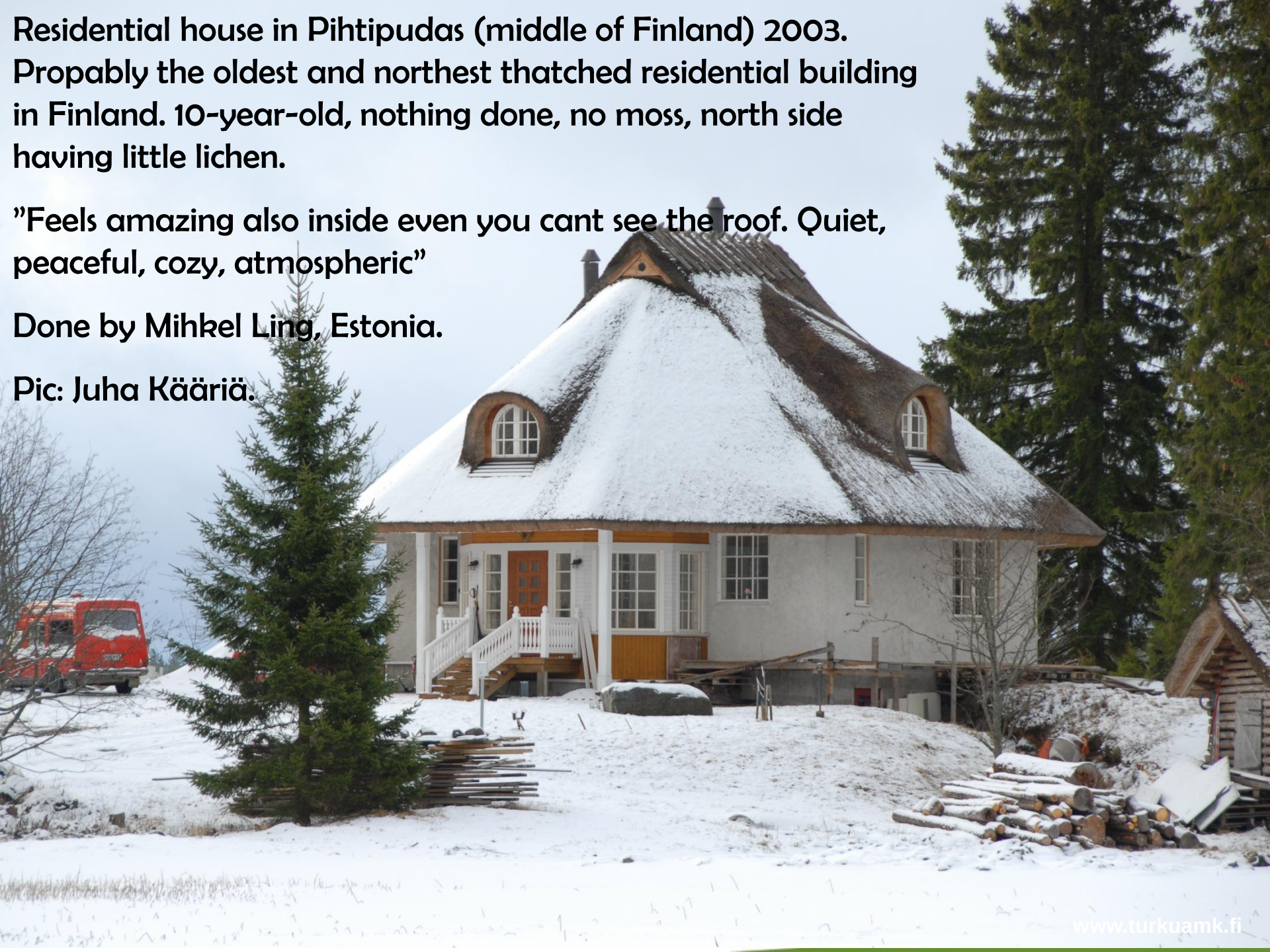
Residential house in Pihtipudas 2003.
(Facades waiting for plaster).



Residential house in Pihtipudas (middle of Finland) 2003. Propably the oldest and northest thatched residential building in Finland. 10-year-old, nothing done, no moss, north side having little lichen.

”Feels amazing also inside even you cant see the roof. Quiet, peaceful, cozy, atmospheric”

Done by Mihkel Ling, Estonia.

Pic: Juha Kääriä.

Defining thermal conductivity of reed insulation

Made by VTT Expert Services ltd 2012

Table 1. Thermal conductivity of the reed insulations, (EN 12667).

Sample / test specimene	Thickness of the test specimen d (mm)	Wet density/ moisture content. Dry density ρ / w (kg/m³) / (%-from dry mass)	Mean temperature T_m (°C)	Temperature difference ΔT (K)	Heat flux density q (W/m²)	Thermal resistance R m²K/W	Thermal conductivity λ_{10} W/(m·K)
Sample 1 / 1	146.4	92.2 /9.8	9.96	20.06	7.90	2.54	0.0577
Sample 1 / 2	147.0	88.2 / 10.3	9.96	20.07	7.91	2.54	0.0580
Sample 1/ 3	146.7	95.2 / 9.2	9.96	20.07	7.52	2.67	0.0550
Average	-	**91.9 / 9.8**	-	-	-	2.58	**0.0570***)
Sample 2 / 1	134.1	**87.1**	10.01	20.00	7.62	2.63	**0.0510**
Sample 3 / 1	147.0	90.2	9.97	20.08	6.92	2.90	0.0507
Sample 3 / 2	144.7	93.9	9.96	20.06	6.81	2.95	0.0491
Average	-	**92.1**	-	-	-	2.93	**0.0500**

*) *At equilibrium moisture content after conditioning at +22 °C / 50 % R.H.*

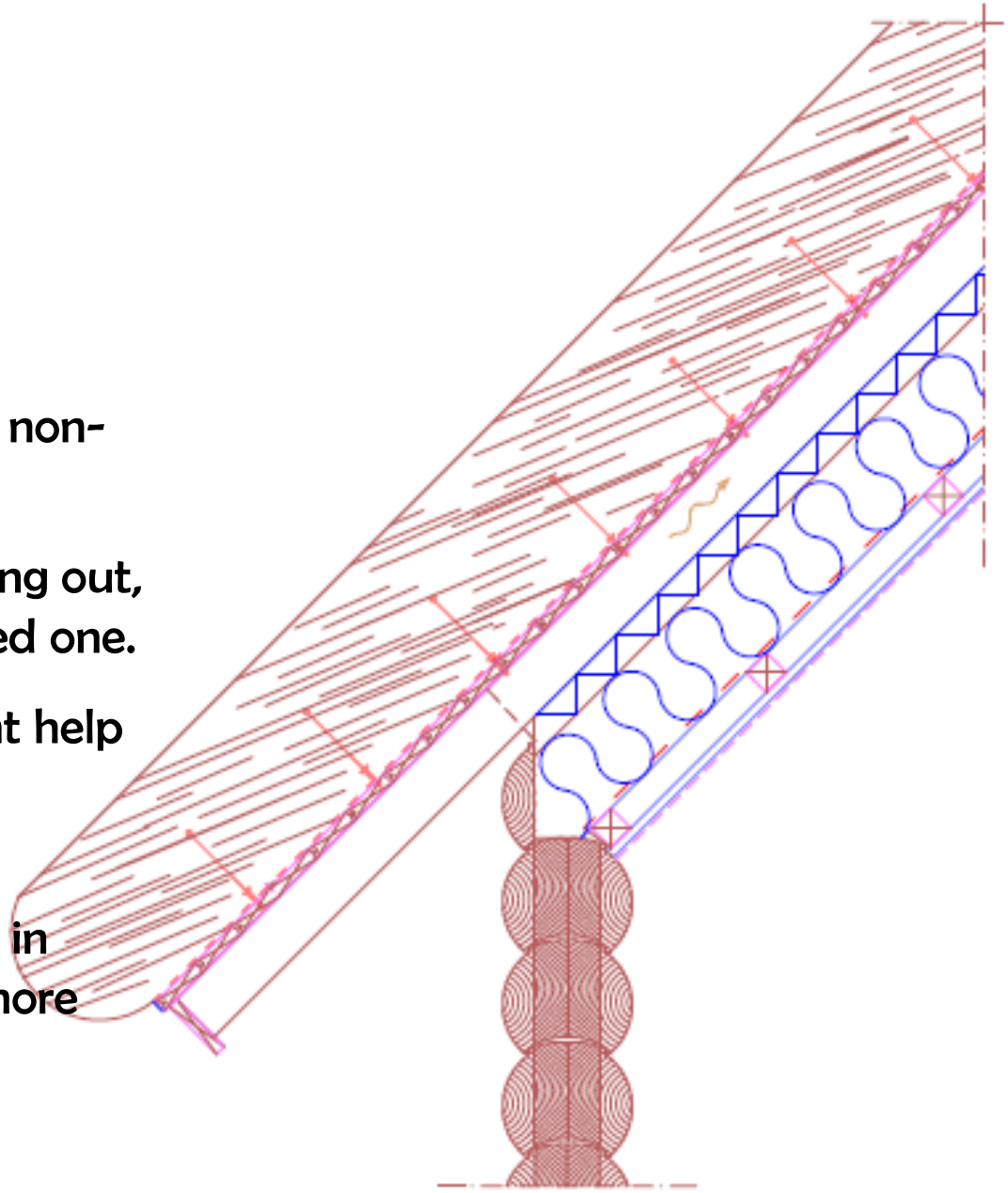
Finnish recommendations for thatched roofs 2013:

Possible to use either ventilated or non-ventilated roof structure.

Ventilated solution is good for drying out, but not as firesafe as non-ventilated one.

Heat flow from inside to out doesnt help much thatch to dry in ventilated structures.

Thatch is not part of the insulation in ventilated structures → need for more insulation → thicker structures.



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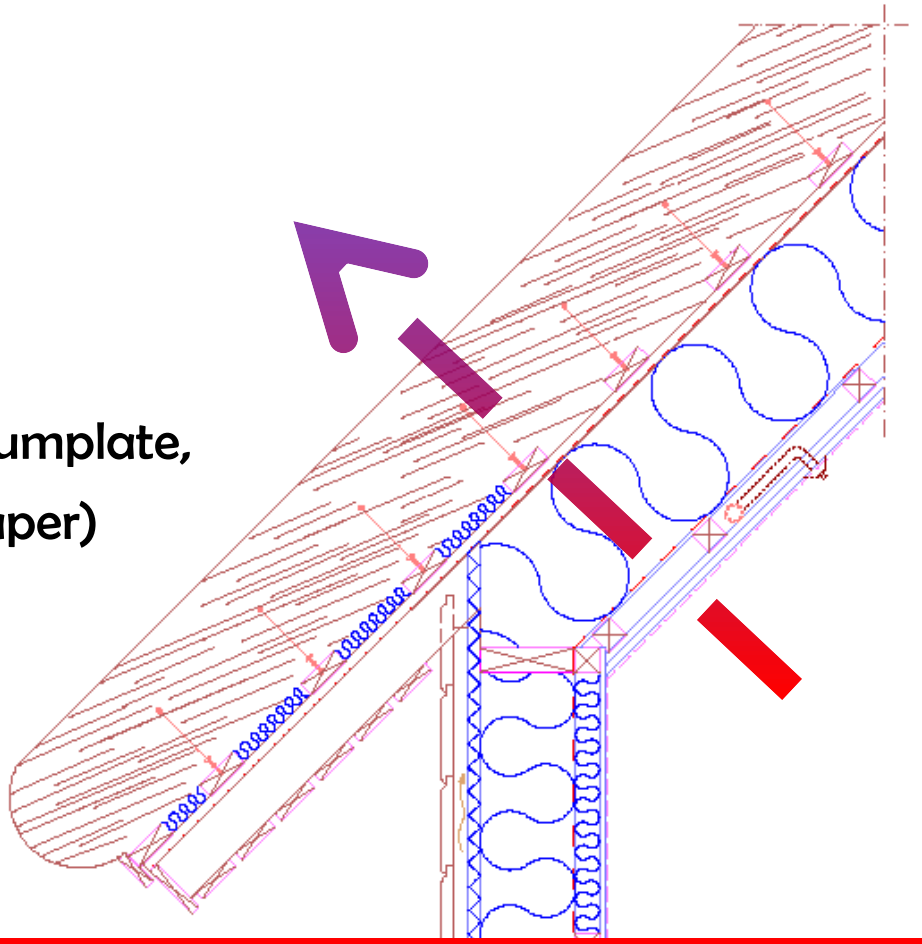
Recommendations for

New building:

1. Interior surface EI30: 15mm Firegypsumplate,
2. Vapour and air barrier (plastic or paper)
3. Load bearing beams and insulation
4. underlay (waterproof, windshield)
5. Small 20mm ventilation cap.
6. Ladders
7. 300mm Reed layer

Eaves: fireproof plate or wool



Thatch is part of the insulation in non-ventilated structures→ possible to reduce other insulation and save money.

Heat flow from inside to out helps thatch to dry. Thick insulation substructure layers reduce heat flow and drying times get longer.

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Finnish recommendations 2013:

Replacing old roof cover with thatch.

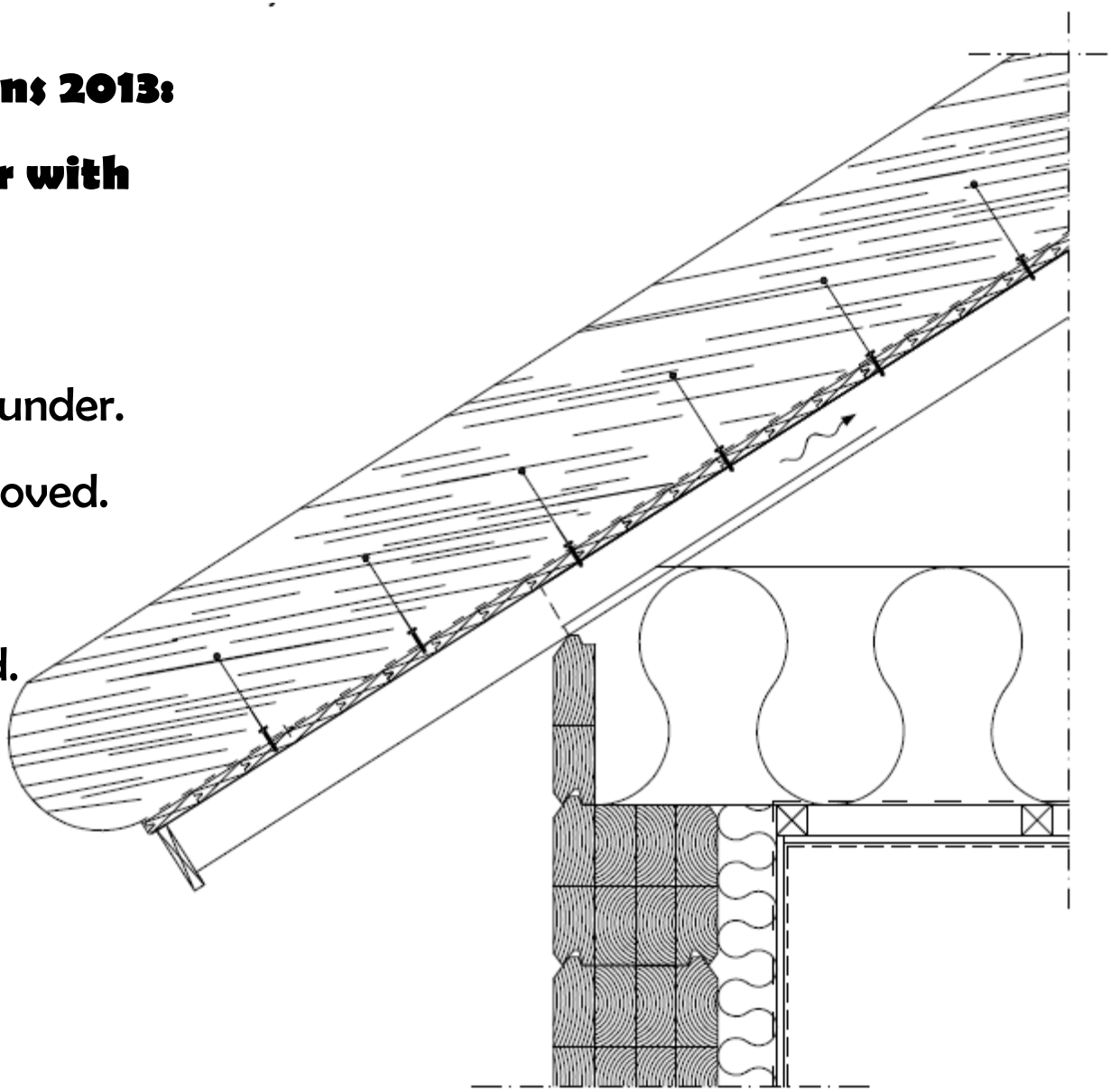
Roof angle > 35°

Bitumen sheets can be left under.

Steel and tiles must be removed.

Check understructures,

Pay attention to extra load.



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Fire safety

1. structural solutions. (Chemicals, retardants), Springler system.

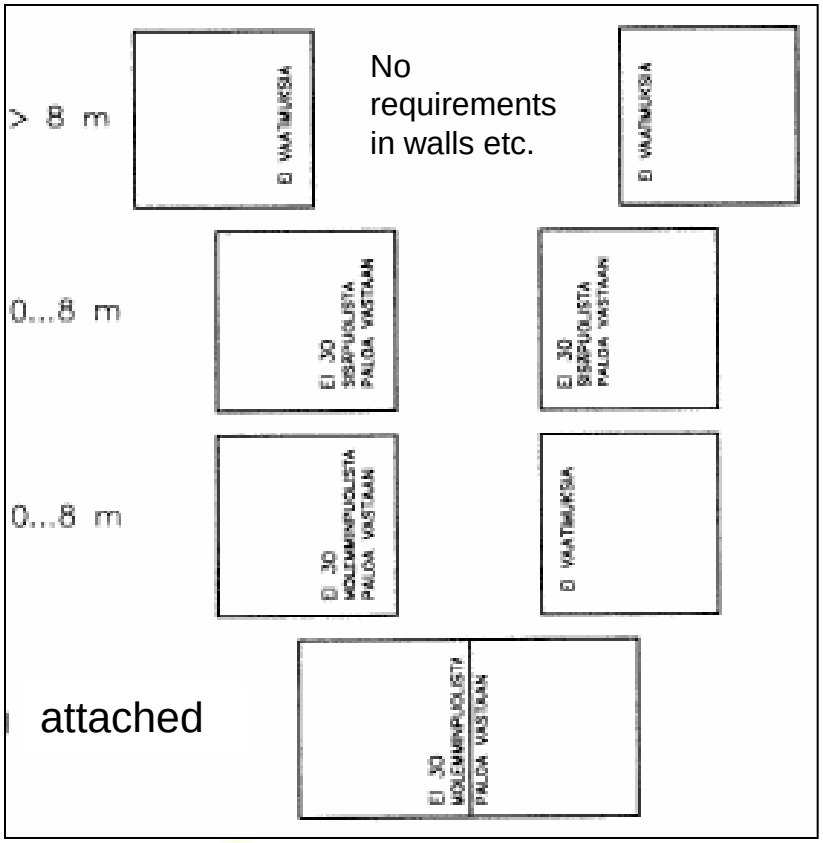
MASSIVE WOOD

Pic. FH Lubeck, residential house.

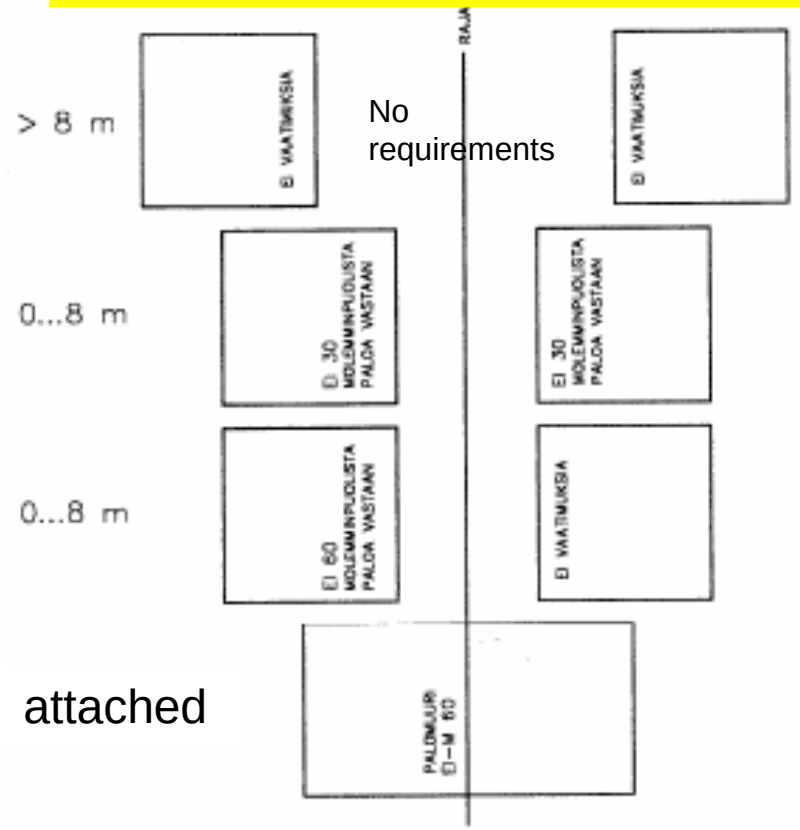
Defining distances between buildings for fire safety

Fire compartmentation (non-flammable roof covers: metal, cement…)

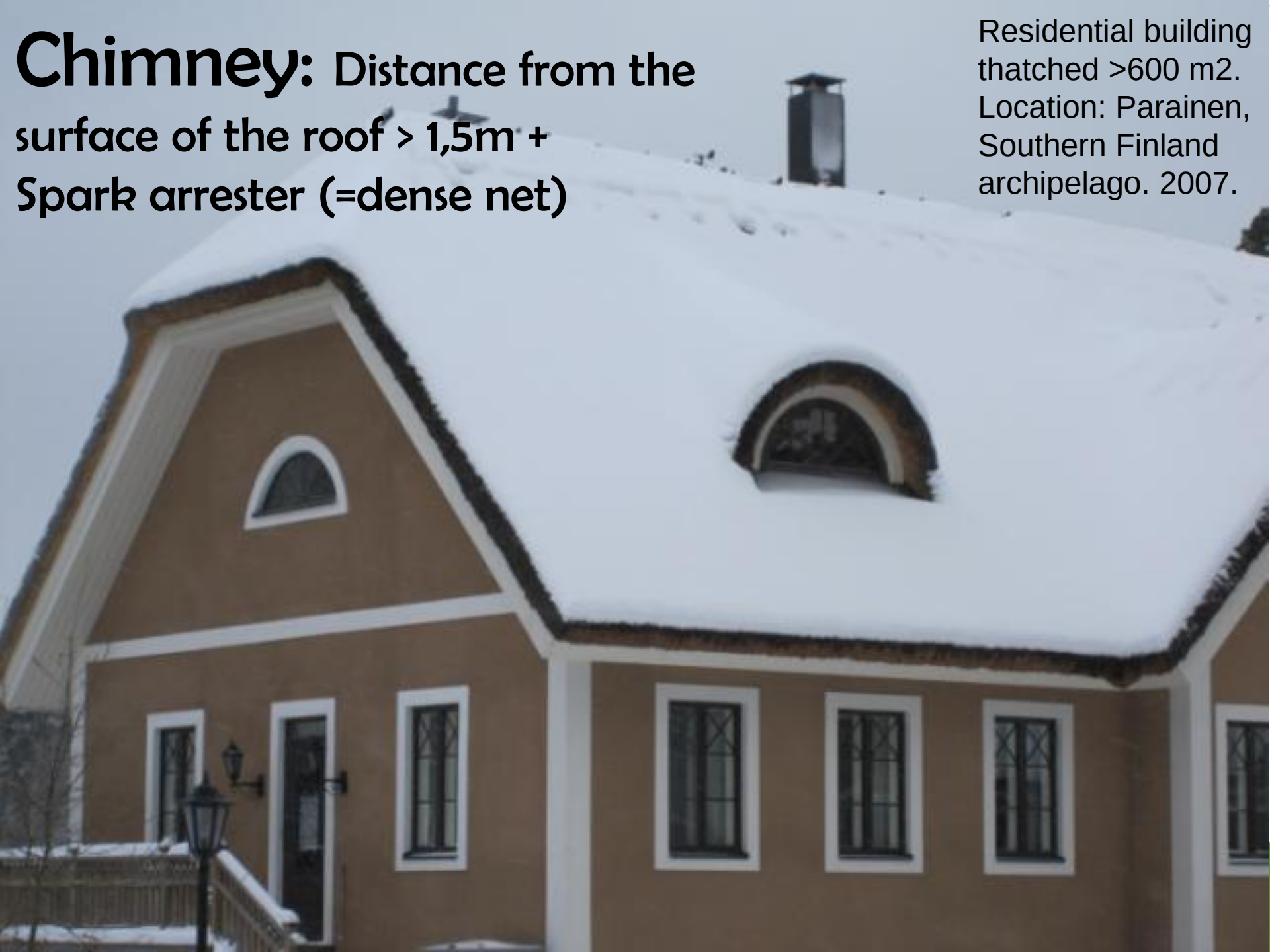
Buildings locating in same building land:



Buildings locating in different building land:



Recommendation: for flammable roof covers same distance as others


Chimney: Distance from the surface of the roof > 1,5m +
Spark arrester (=dense net)
Residential building thatched >600 m2. Location: Parainen, Southern Finland archipelago. 2007.

Finnish thatches


Mainly all our thatched buildings have traditional ridge

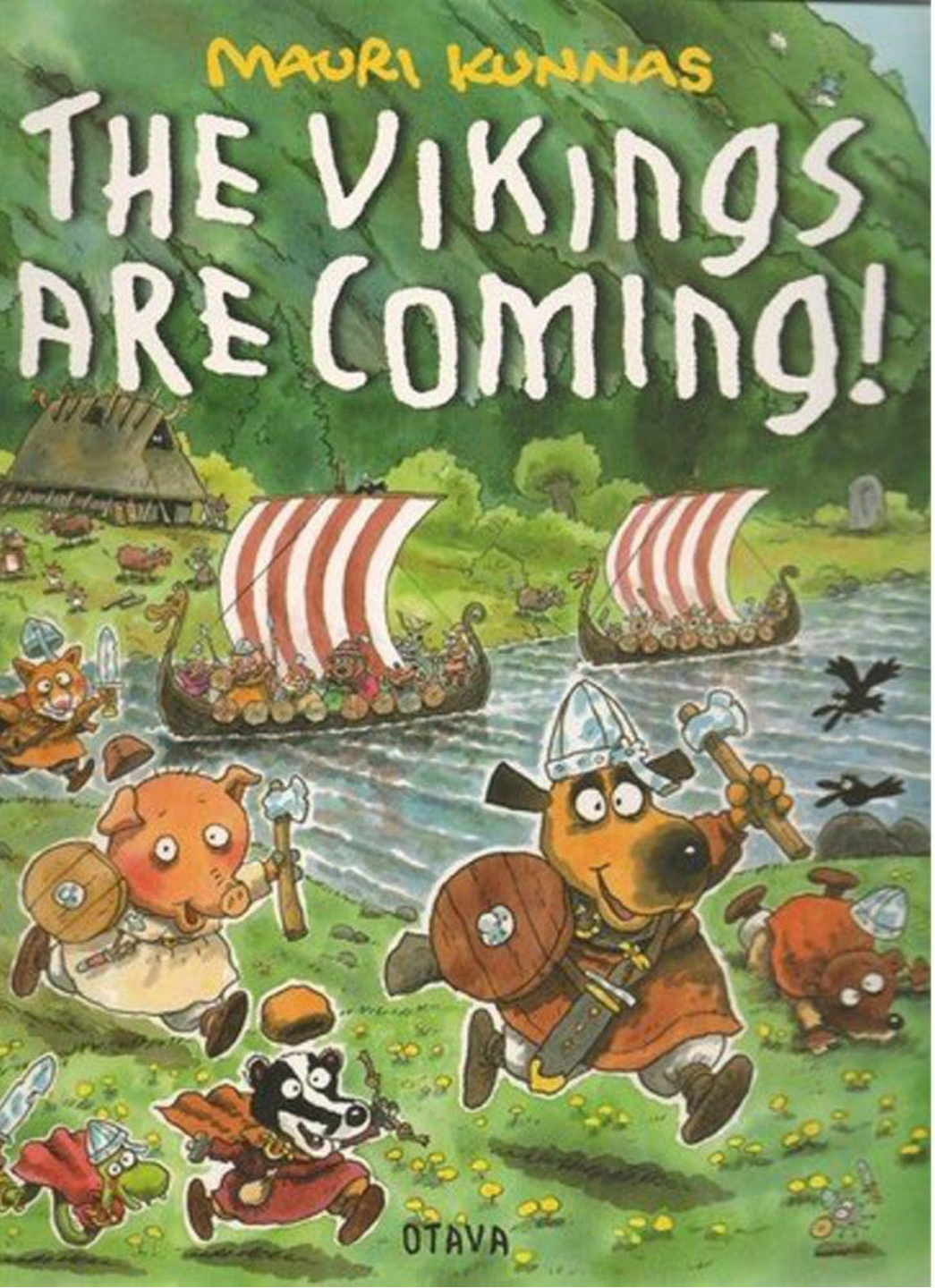
Residential buildings in Finland

Biolan, office building in Eura.


Residential house in Livonsaari

Thatched roofs in Finland.
Conclusions

- Geographical position affects to life-span of roofs: we cant change the position or climate. We can adjust constructions.
- We need more practical experience and knowledge.
- We have own reed beds→ why not to use.
- Attitudes changing towards more environmental friendly and energy efficient living.
- We need more thatched roofs!



Book for Children:

Vikings are coming!

(Thatched house in background)

Starting new company
2013: Ruokorakennus.fi
Need for contacts, reed...

Thank you!

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