

# PRECAST CONCRETE SOLUTIONS

- THE WAY TO NEW RESIDENTIAL MARKET LEADER IN THE NORDIC COUNTRIES

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FORECON OY

7.11.2019



Forecon

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3. **Share of Precast concrete buildings in new Dwellings**
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6. **Summary**

# Forecon Ltd, Finland

“ A research and expert service company specialized on Construction and Real Estate market and Business Environment

“ The Finnish member of the EUROCONSTRUCT –  
Group for Construction Market Professionals



“ Member in RAKSU-expert group in Ministry of Finance

“ We provide information to support decision-making

“ Main products

- Tailor-made forecasting services
- Euroconstruct®-reports
- Market-based development projects
- Construction market consultancy

“ Main customers

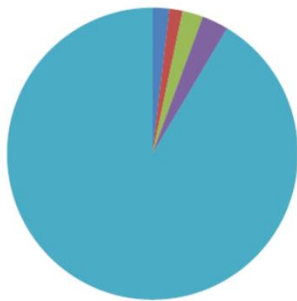
- Construction material producers
- Construction companies
- Federations and associations
- Ministries and cities
- Rental companies
- ...

# The Nordic countries as share of Europe/EUROCONSTRUCT

Iceland not included this time

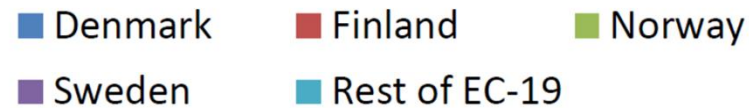
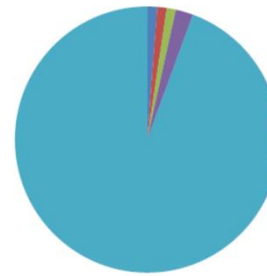


**GDP: 9% of EC-19**

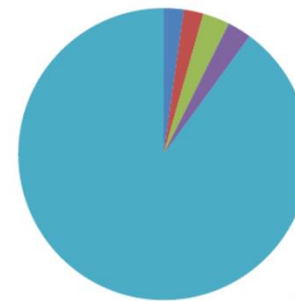


**Population: 5% of EC-19**

**Total 27 mill. inhabitants**



**Construction: 10% of EC-19**



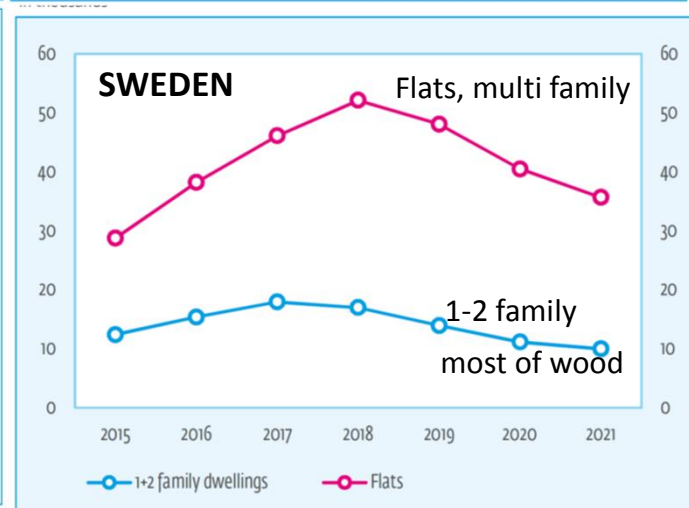
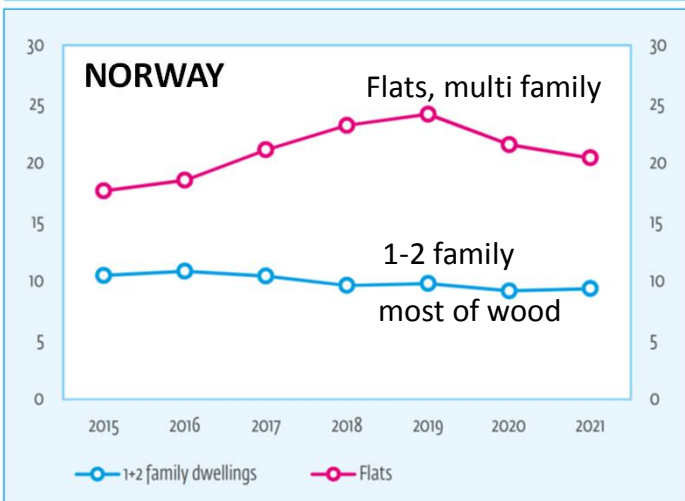
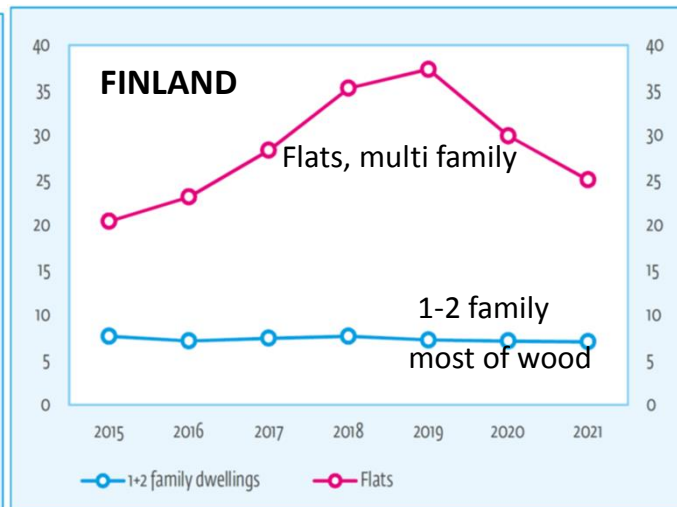
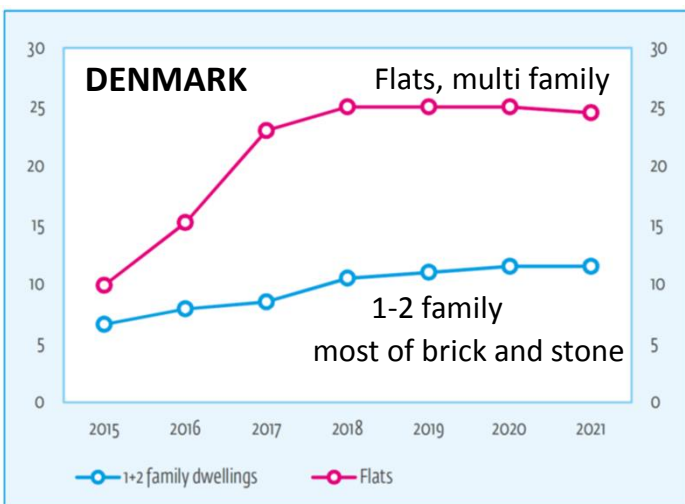
**Residential Construction 10% of EC19  
180 000 dwellings annually**

Anders Bjerre abj@cifs.dk

**Forecon**

# New dwelling completions in the Nordic countries 2015...2021

1000 dwellings



All Nordic countries are very active in building Flats.

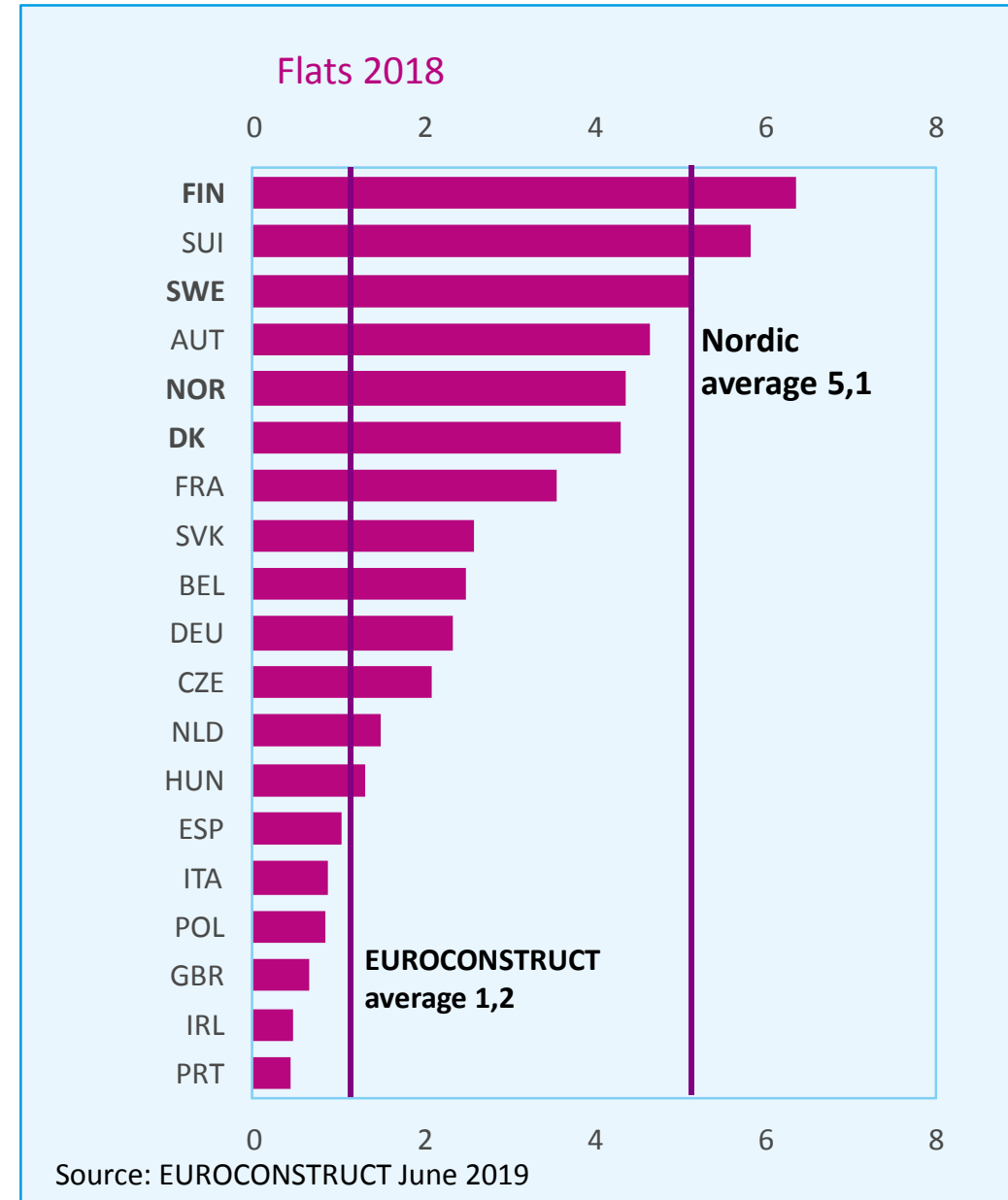
In the Nordic countries 75 % of new dwellings are in Flat Buildings

# Completions of new Flats per 1000 of population in 2018

number of dwellings

“The Nordic countries are very active in building new Flats, the average is 5,1 per 1000 inhabitants

“The EUROCONSTRUCT average is 1,2



# Why do we build so many Flats in the Nordic Countries

“The Share of Senior aged (65+) people is growing fast

“The amount of 1 person households is growing fast

“The Urbanisation rate is growing

- People are moving to (big) Cities, especially in Finland
- Most of new Dwellings will be built in 5 biggest cities in Finland

“More people like to live in Rental Dwellings

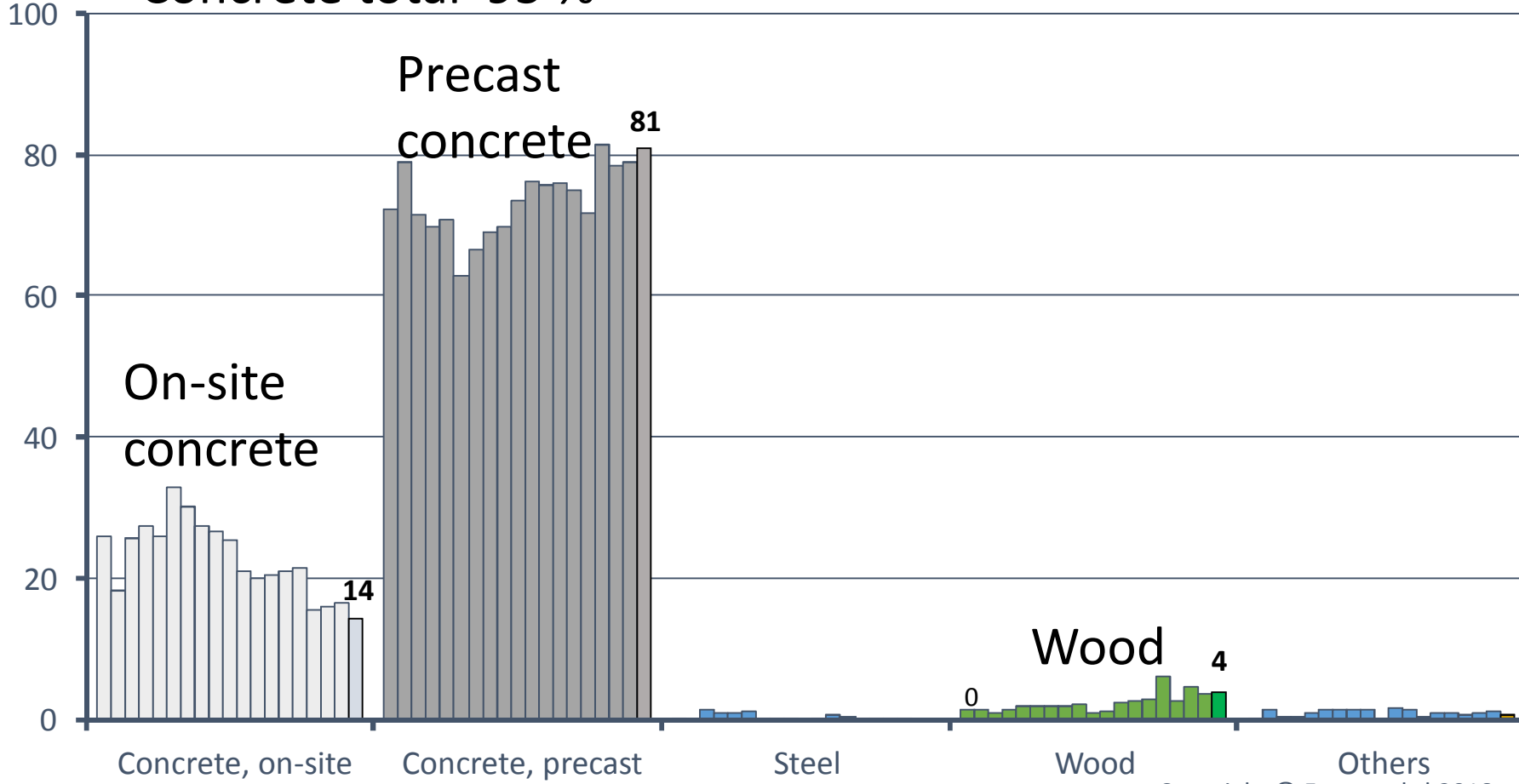
- Both private people and institutional investors are buying new rental Dwellings
- housing investment returns have been good until now

“The State grants housing subsidies to people with low incomes

- Housing policy “All citizens need good living conditions in the Nordic welfare states”

# Frame and Facade materials in new Blocks of flats, 2000 – 2018, Finland

(%-m3) Concrete total 95 %



**Facade materials  
%**  
**2018**

<b>Concrete</b>	<b>24</b>
<b>Brick</b>	<b>42</b>
<b>Plaster</b>	<b>17</b>
<b>Wood</b>	<b>7</b>
<b>Others</b>	<b>10</b>
<b>Total</b>	<b>100</b>

Source: Statistics Finland

7.11.2019

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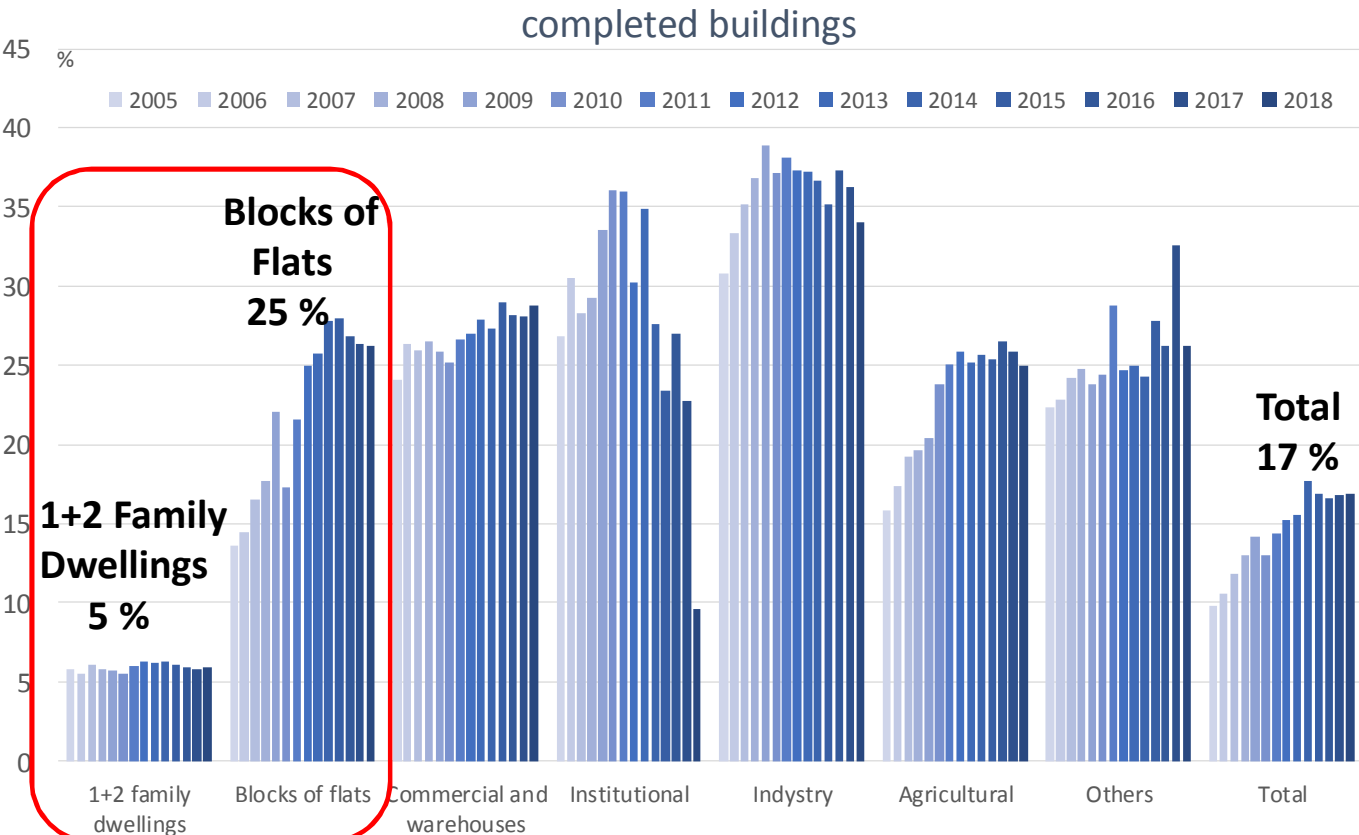


## Materials in new Blocks of flats, 2017, Sweden

Share of Frame materials, %	Concrete	Wood	Total			
	88	12	100			
Share of Facade materials %	Concrete	Brick	Plaster	Wood	Others	Total
	17	29	29	13	12	100

Source: Statistics Sweden

# Market share of reinforced concrete structures in Germany by type of buildings in 2005...2018



Source: Statistisches Bundesamt

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# Value of Precast Concrete production in Nordic and Romania - value % of all domestic sales of all construction products, 2018

		Denmark	Finland	Norway	Sweden	Nordic total	Romania	Romania PPP-adj.*
<b>Value of Precast concrete components</b>	<b>EUR mill.</b>	<b>743</b>	<b>804</b>	<b>540</b>	<b>584</b>	<b>2671</b>	<b>65</b>	<b>221</b>
<b>-share of domestic sales of all construction products</b>	<b>%</b>	<b>14</b>	<b>16</b>	<b>16</b>	<b>16</b>	<b>16</b>	<b>2</b>	<b>2</b>
<b>Value of Ready mixed concrete</b>	<b>EUR mill.</b>	<b>280</b>	<b>305</b>	<b>485</b>	<b>570</b>	<b>1640</b>	<b>330</b>	<b>1122</b>
<b>-share of domestic sales of all construction products</b>	<b>%</b>	<b>7</b>	<b>6</b>	<b>10</b>	<b>16</b>	<b>9</b>	<b>11</b>	<b>11</b>
<b>Precast+ Ready mixed total</b>	<b>EUR mill.</b>	<b>1023</b>	<b>1109</b>	<b>1025</b>	<b>1154</b>	<b>4311</b>	<b>395</b>	<b>1343</b>
<b>-share of domestic sales of all construction products</b>	<b>%</b>	<b>21</b>	<b>22</b>	<b>26</b>	<b>32</b>	<b>25</b>	<b>13</b>	<b>13</b>

\*PURCHASING POWER PARITY ADJUSTED CONSTRUCTION PRICES COMPARED TO NORDIC, 2018, Used coefficient = 3,2

⇒ All the Nordic countries use lot of Precast Concrete products

⇒ share of all used construction products is in Nordic 16 % and in Romania 2 %

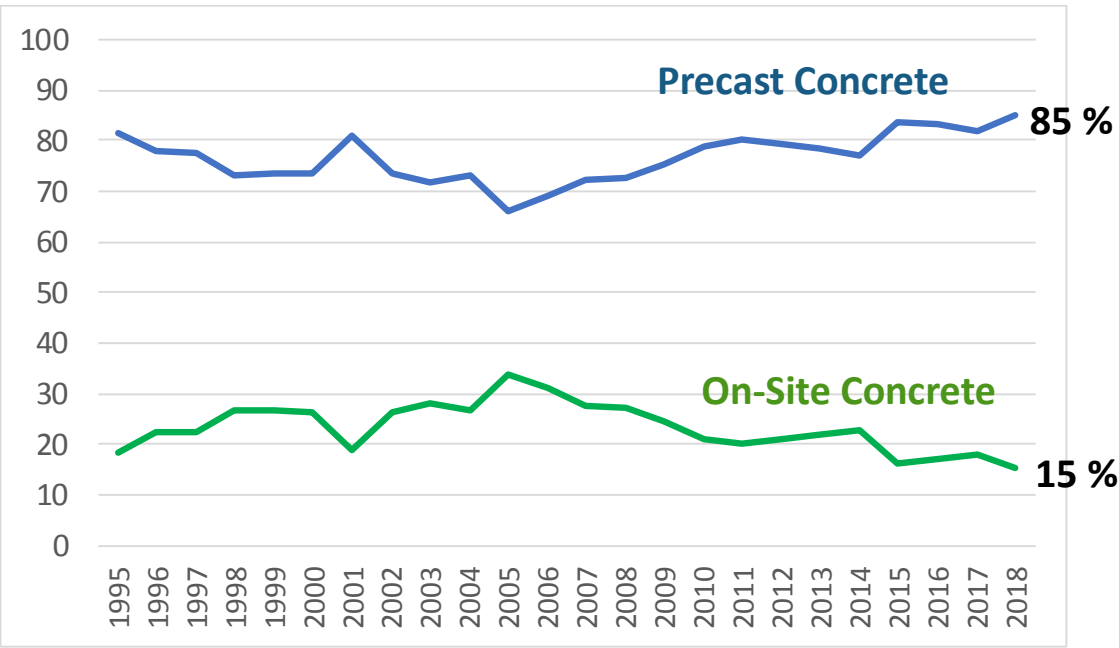
⇒ Romania is a Concrete country, share of Ready Mixed concrete of all sales is in Romania 11 %, in Nordic 9%

⇒ Romania has a huge growth potential in using Precast Concrete compared to Nordic countries

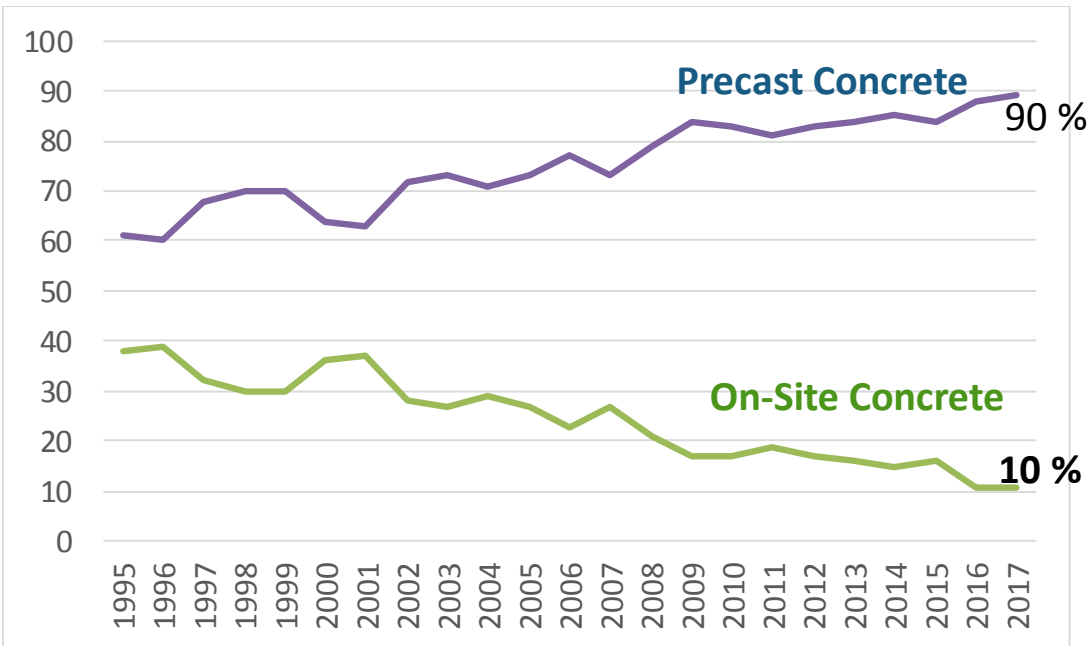
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# Share of Precast and On-Site Concrete framed Buildings in New Blocks of Flats in 1995...2018

Finland



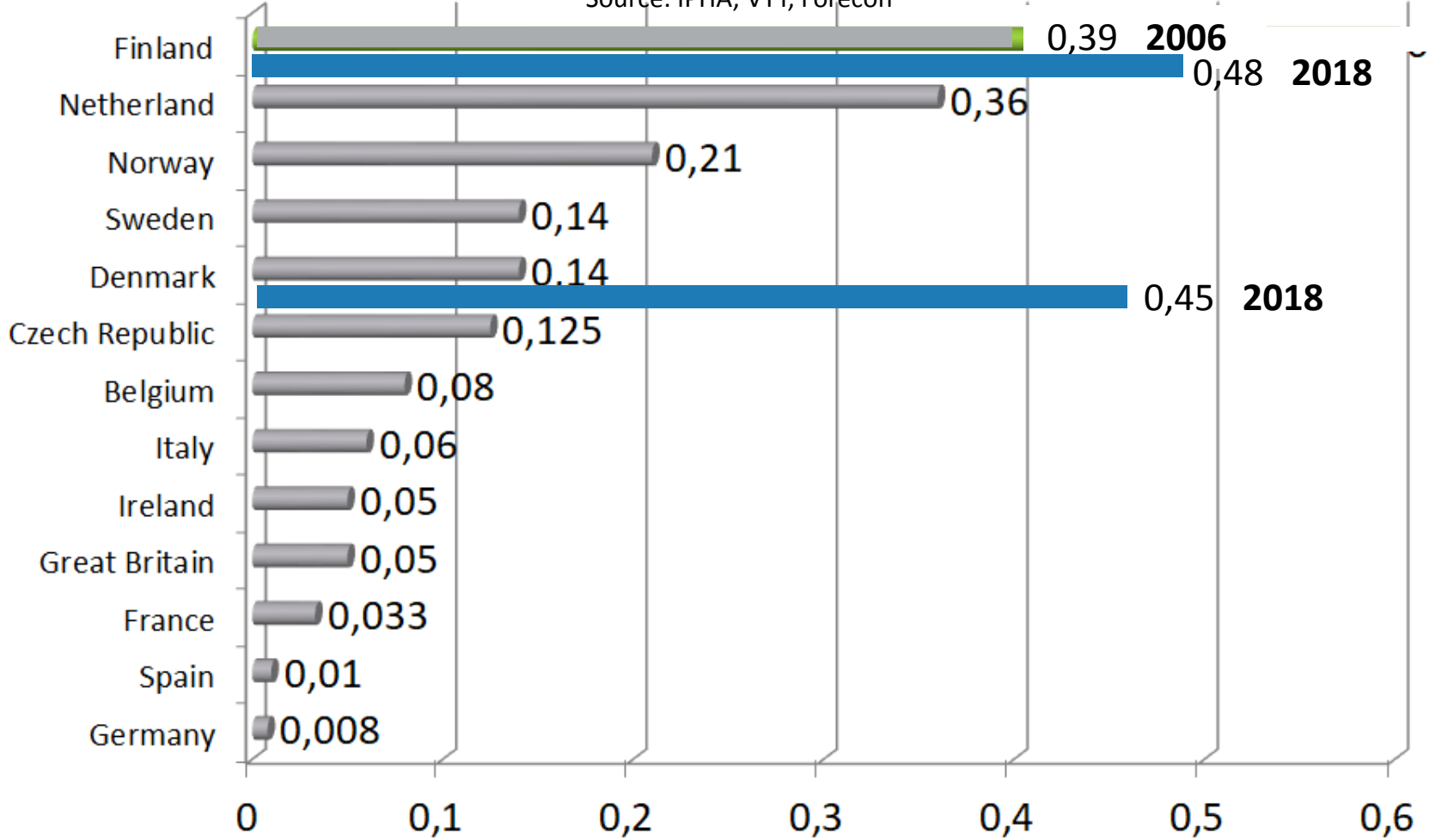
Sweden



# Use of hollow core slabs in some European countries

**Annual use of precast hollow core slabs per capita m<sup>2</sup>**

Source: IPHA, VTT, Forecon



Forecon

# Why do we build so many Precast Buildings in the Nordic Countries

- “ Open competitive standardized system, production and products
- “ Cold climate,
  - industrial indoor production secures the quality, effective production and material use
- “ The open system has been developed to meet new requirements
- “ Lack of Building workers
- “ Lower salaries in Precast Factories compared to Building Site
- “ Shorter construction time (not big difference)

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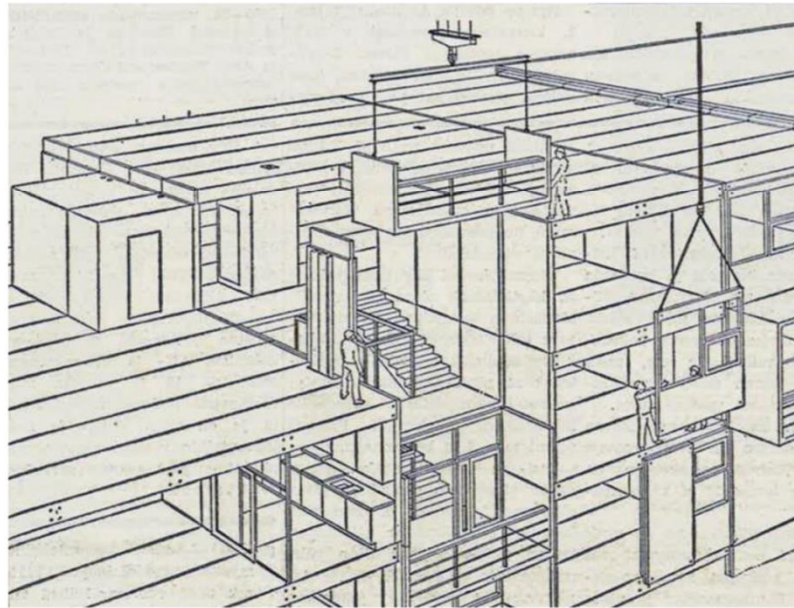
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# Development of Open Precast Platform, BES started in Finland in 1968

## Load-bearing Walls and Long Span Floors



25.5.2017

- Number of pieces = needed lifting/ assembly time
- Complexity and number of details
- Amount of needed site work; finishing, internal walls
- High adaptability, i.e. the interior can be modified easily when the users' needs change

The open system was too monotonic at the beginning and got bad image. System has been further developed to meet new requirements:

1980's Architecture,  
Resident-orientation

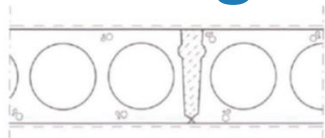
1990's Customer driven  
Automation  
Computer solutions  
Project control forms

2000's Lean production  
Logistic processes  
New facade solutions

2010's BIM, Digitalisation  
Cut of CO2 emissions,..

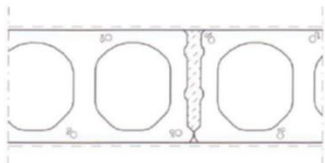
**Forecon**

# Hollow core slabs used in residential buildings



H=265 mm  
1970-1995

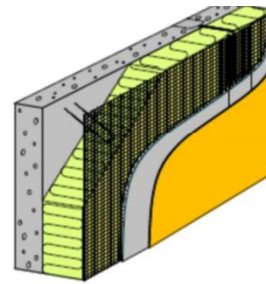
VP2  
Ontelolaattaväli pohja (265)  
- pintamateriaali  
- tasoite  
- esijännitetty ontelolaatta 265  
- ruiskutasoite



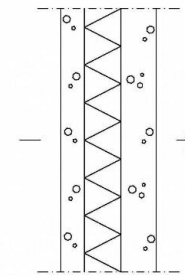
H=320 mm  
1995->

VP3  
Ontelolaattaväli pohja (320)  
1995-  
- pintamateriaali  
- tasoite  
- esijännitetty ontelolaatta 320  
- ruiskutasoite

# Precast Concrete Facade used in residential buildings



Plaster facade sandwich



Precast concrete sandwich

Precast concrete 150 mm  
Mineral wool 220 mm  
Plastering fixings stainless steel  
Plaster 25 mm  
- Base plastering in factory  
- Surface plastering on site

Most important and common products used in precast concrete flats are shown on the left.

Many other precast products are also used:

- “ Partition walls
- “ Staircases
- “ HVAC flue elements
- “ Foundations
- “ Balconies

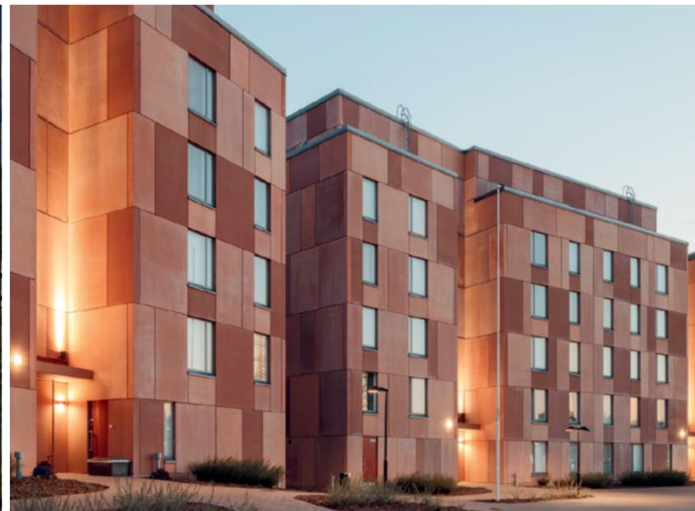
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# New subsidized rental apartment block in Vantaa, Helsinki area, precast concrete: sandwich facades, hollow core slabs

Special attention was in the design work paid to the division of units, details of unit joints and groove joints as well as to the edges of the units at the corners of the buildings. The balcony facades follow the same principles.

The three different terracotta tones on the facades were realised using the same coloured concrete mix with three different finishes on one unit.

The different finishes; beton brut, fine wash or acid wash expose the aggregate in the concrete in different ways allowing different textures and tones to be produced with a single concrete mix.





## Winner of "Good Building Award" in 2018, Tampere, Finland

**The award is based on the high quality of the building's architecture and use of art on part of the facade.**

The number of floors is rising in Finland

Big glazed balconies are common = "must" today



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# Wood Framed multi storey residential buildings are coming

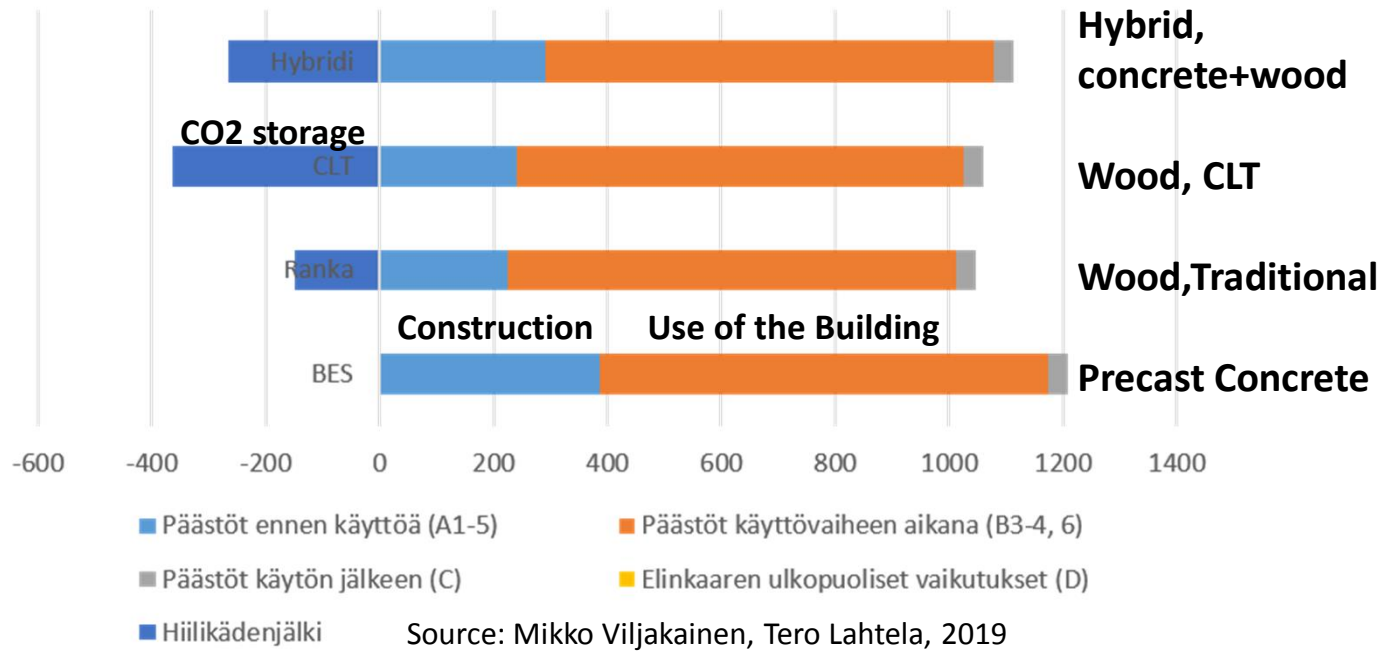
Wooden apartment blocks  
Austria  
Stefan Nussmueller



Finland



Comparison of lifelong CO2 Emissions of various frame materials of multi storey residential buildings



The CO2 Emissions of Precast concrete in Construction phase are high compared to wood. Use of building cause most of emissions. The difference is smaller in lifelong comparison. Wooden structures act as CO2 storage in the building.



# Threats for the Precast Concrete industry in residential construction in the Nordic countries

## Wood framed multi storey Flat buildings

- CLT (Cross Laminated Timber) is the main competitive material
- Local, renewable, recycled material, huge wood industry companies
- Lighter compared to Precast components,
- however weaker acoustic properties and needs more maintenance repairs
- Government and communities support wood construction, positive brand
- Sustainability ambitions of owners, residents and cities
- Gives great pressure for cement and concrete industry to cut CO2 emissions
- The construction of wooden flats is more expensive, and less available than Precast Concrete ones



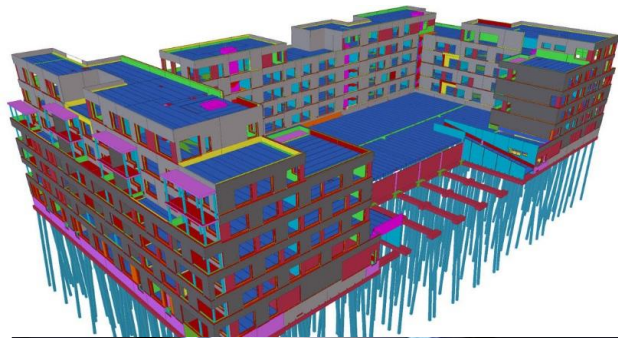
## New EU and national standards / requirements for Climate Change

- EU has promised to cut CO2 emissions at least 40 % by 2040 (from the 1990 level)
- Requirements for lower CO2 emissions of construction materials

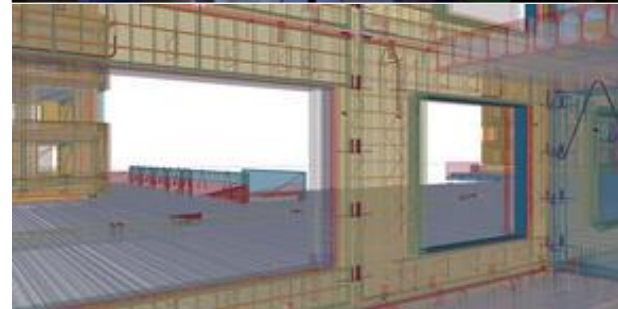
## Lower volume of new residential flat construction, especially in Finland

# Opportunities to Precast Concrete Buildings

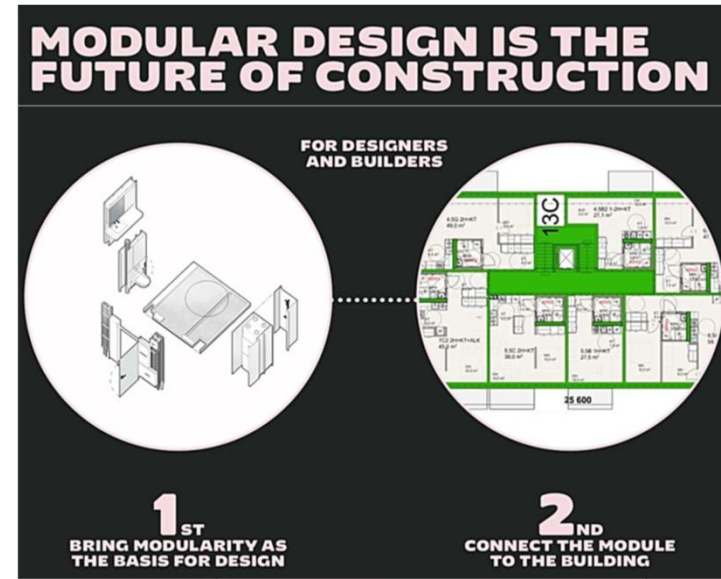
- BIM, Building Information Modeling and Modules



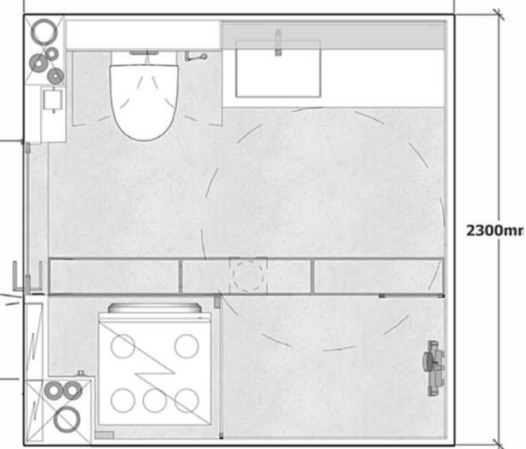
“ Digital modeling and solutions for planning, production, logistics, assembly on the site etc. of precast concrete products and buildings



7.11.2019 Source: TEKLA/Trimble and Fira



Modular Prefabricated bathroom





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# Summary

## “ All the Nordic countries

- Build lot of Flats (75 %) compared to 1+2 Family Dwellings (25 %)
- Are concrete-active Flat-builders and use lot of Precast Concrete products
- have developed the Precast concrete construction to meet today's requirements
- The 1+ 2 Family Dwellings are built of wood in Finland, Norway and Sweden

“ share of precast concrete houses is small, Denmark builds of stone materials (bricks, blocks,...)

## “ Reasons for very common precast concrete construction

- Open, standardized system, production and products, at the beginning strong input from whole industry
- All building companies, architects and structural engineers know how to build of Precast Concrete
- Continuous, versatile development work

## “ Threats: Growing popularity of Wooden Flats (CLT) because of :

- smaller Climate Change effects and CO2 emissions compared to concrete, Good image
- wood is renewable and more recyclable and, re-usable, but is so far more expensive to build

## “ Opportunities:

- cement and concrete has to cut CO2 emissions, serious work is done all the time
- To develop platform for additional prefabricated components, modules (bathroom, HVAC,...),
- To develop hybrid structures and buildings; using both precast concrete and wood

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# THANK YOU

