Precast Concrete in The Netherlands

29 September 2022

fib CEB-FIP

CONSIGLIO NAZIONALE DEGLI INGEGNERI

Contents

- Situation in The Netherlands
- Main structural precast applications
- Housing solutions
- Sustainable construction

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CONSIGLIO NAZIONALE DEGLI INGEGNERI

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Dutch Challenges

Space for nature, living , farming

Nitrogen discussion

Carbon dioxide

No emission in 2050

Shortage of labor force

Shortage in housing!

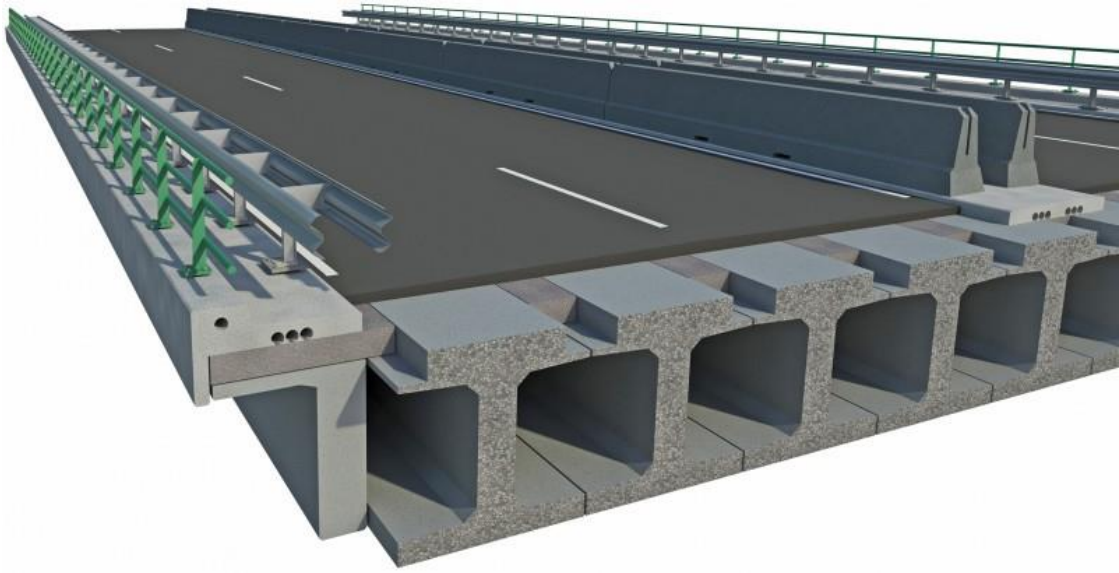
Increase of prices

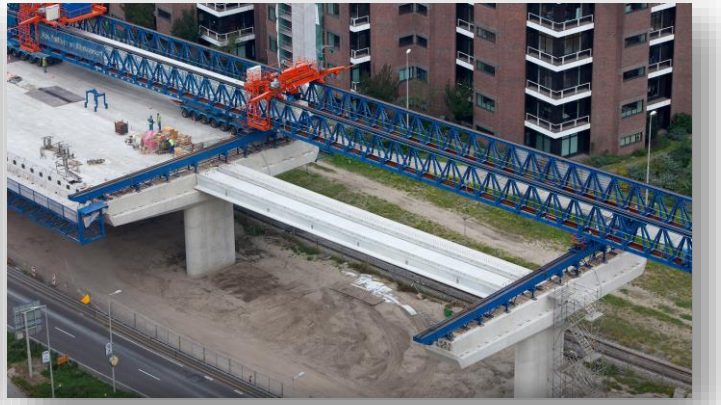
Dutch Challenges

Opportunities for structural precast concrete

Viaduct

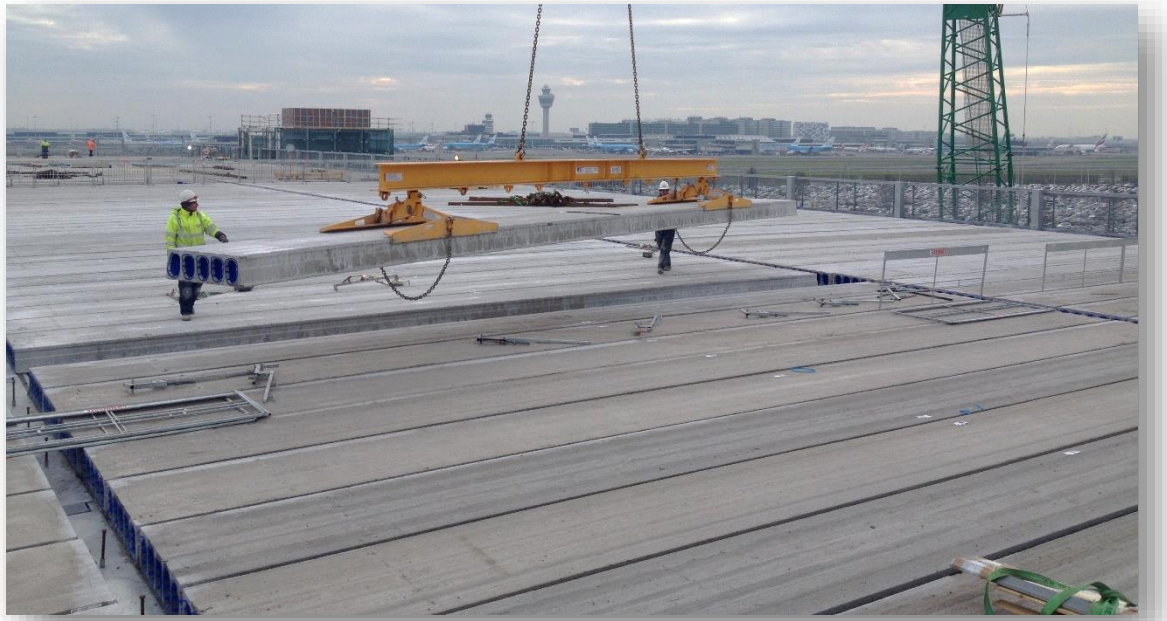
- Precast bridge beams



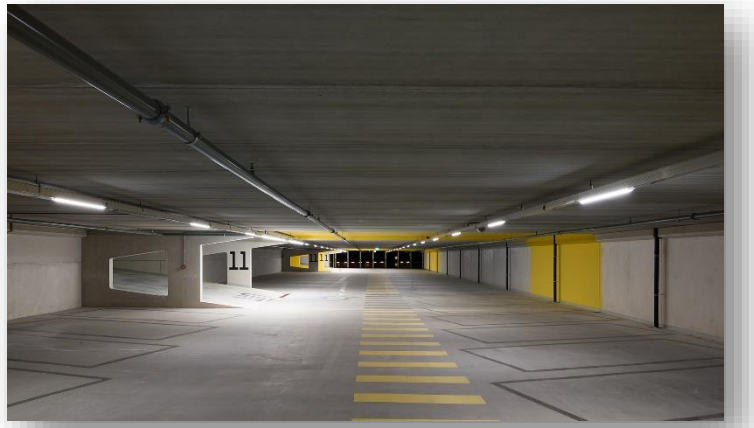


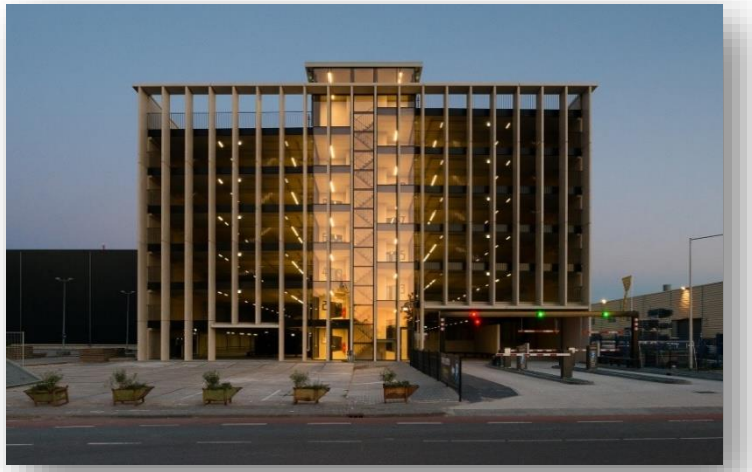
Parking

- Structure: steel or precast concrete
- Floors: hollow core or ribbed floors

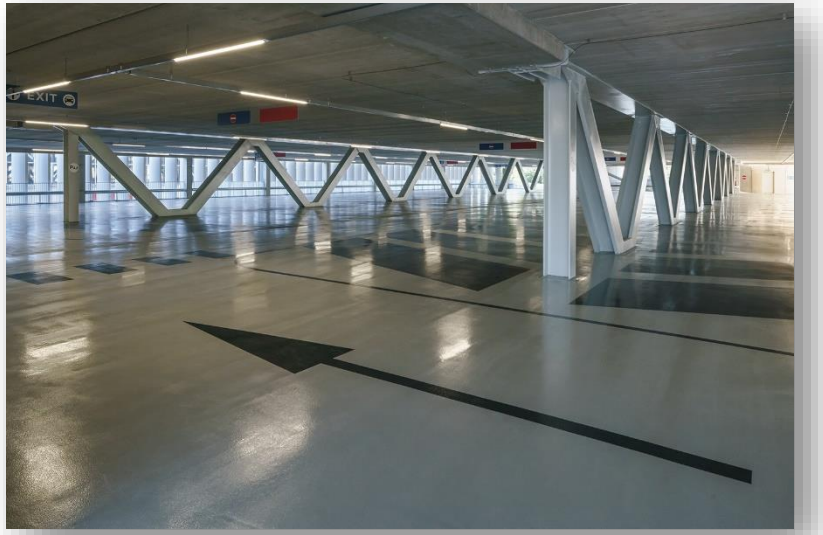


Parking





Mixed structures



Elements

- Beams
- Columns
- Floors:
  filigran, hollow cores,
  solid, (minor) ribbed
- Walls: solid ,double
- Stairs

Residential

De Hoven, Delft

Het Dok, Amsterdam

Residential

- Zalmhaventoren
- Height over 200 meter
- Build with hoisting shed

Facades

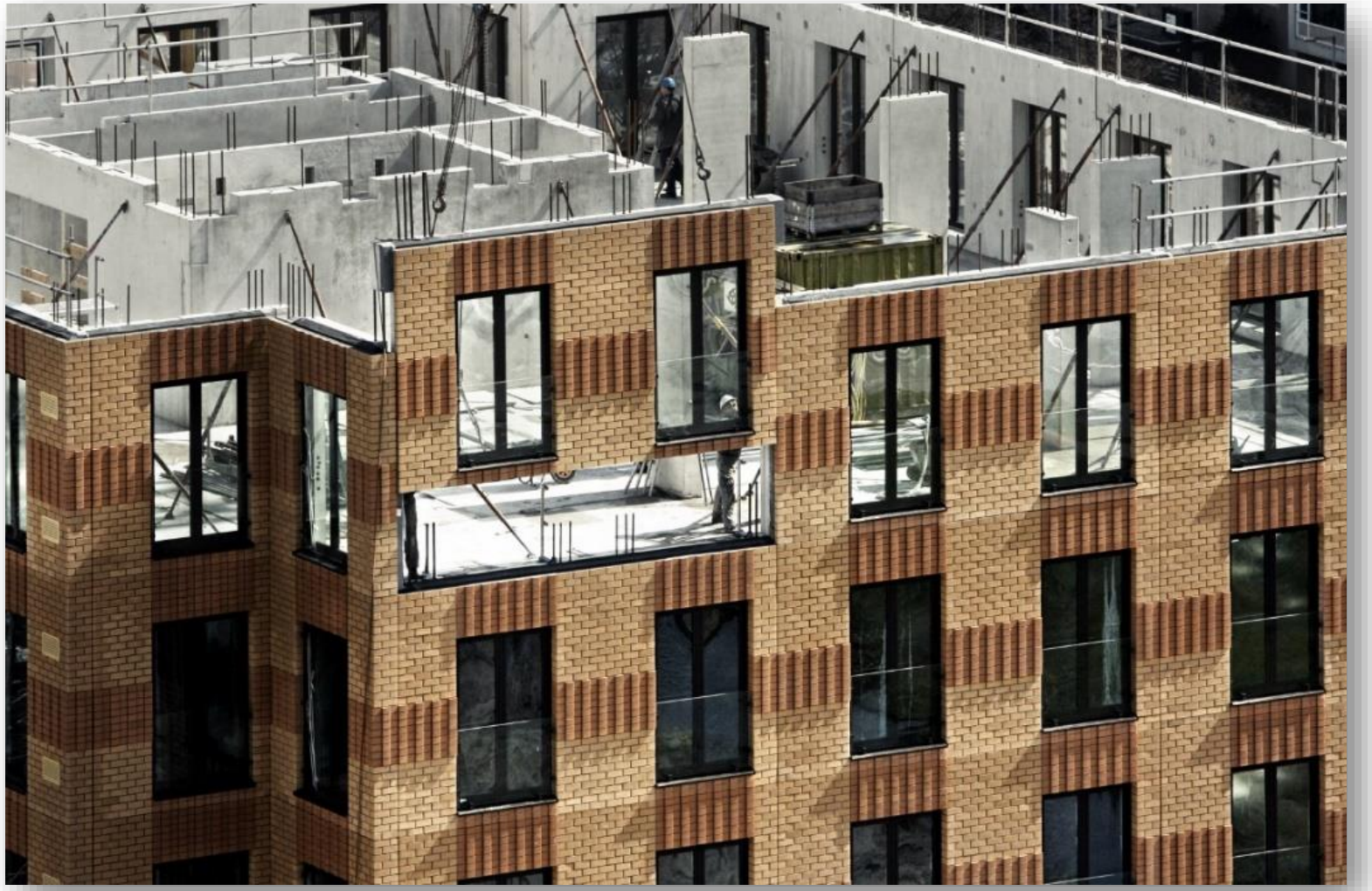
City office The Hague

Facades

- Special moulds and coloured concrete

Facades

- Sandwich wall with bricks

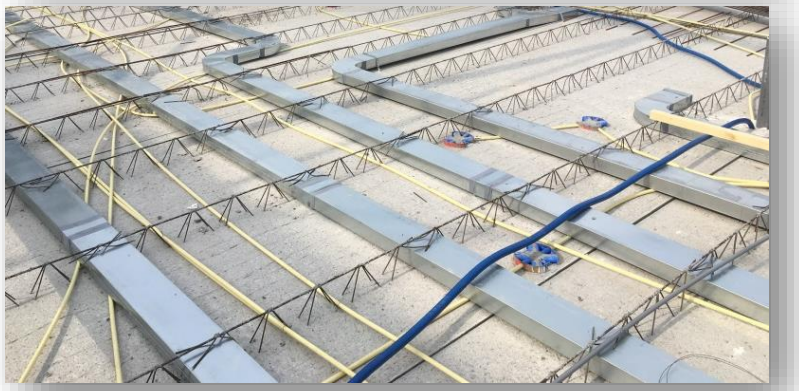


Logistics

- Structure: steel or precast concrete
- Floors: hollow core or ribbed floors

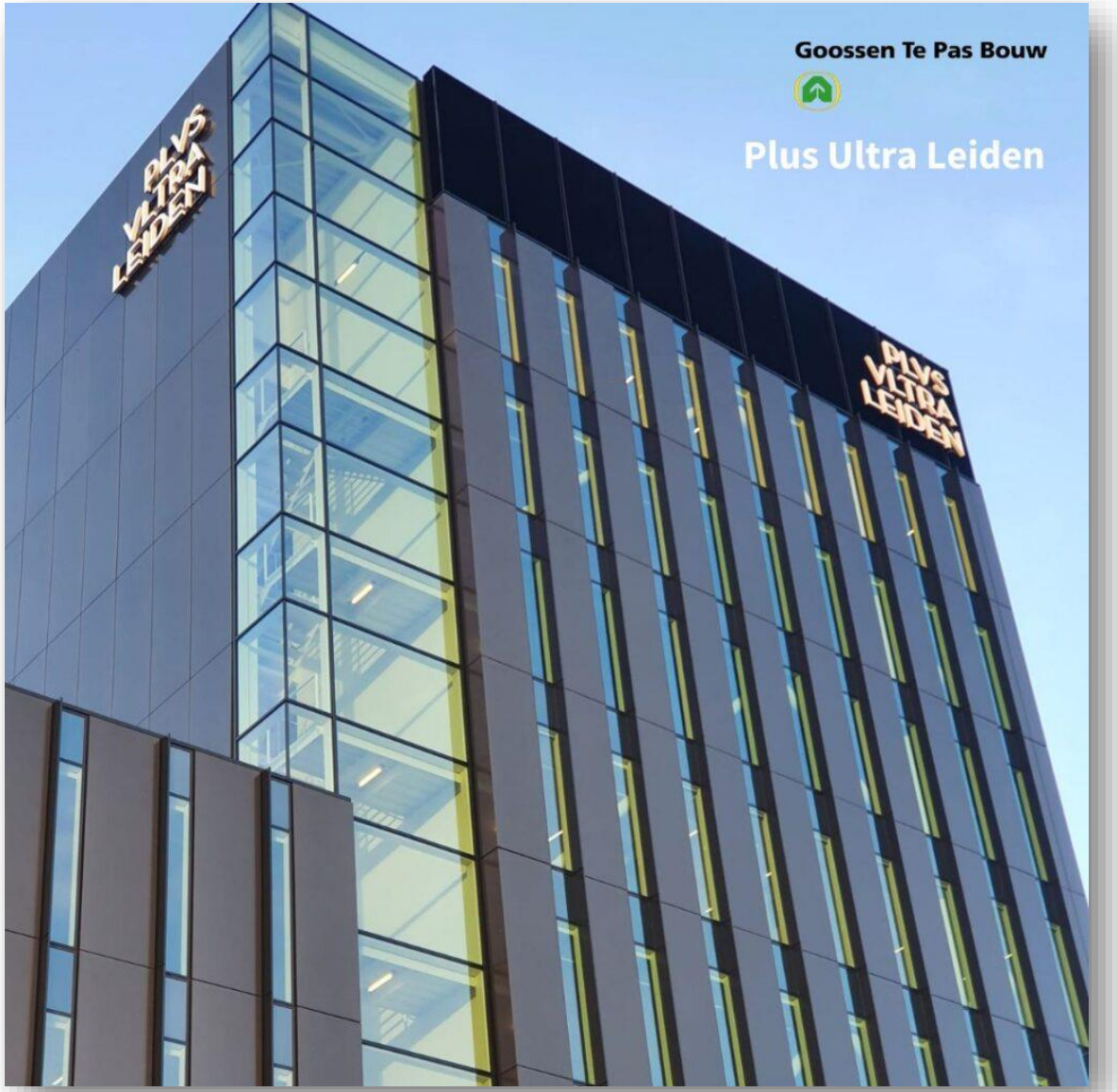
Commercial

- Flooring: precast or semi-precast



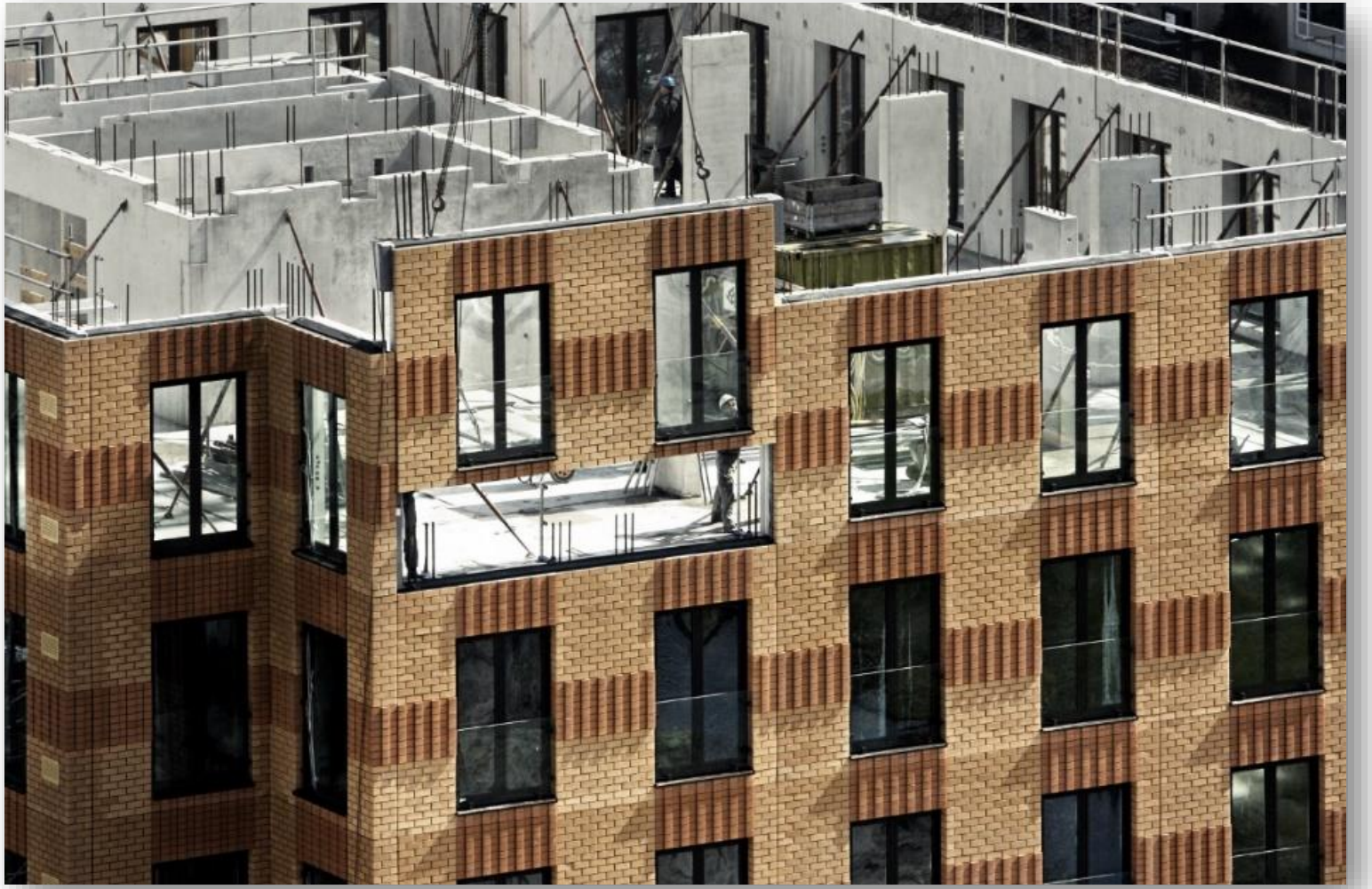
Commercial

- Plus Ultra Leiden



Commercial

- Symphony Amsterdam
  27 floors (97 meter)



Terraced house

- Structure precast walls double or solid
- Ground floor: minor ribbed floor or hc floor
- Storey floor: hollow core floor of filigran

Terraced house

- Structure precast walls double or solid
- Ground floor: minor ribbed floor or hc floor
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Industrialized housing

Dutch ministry: increase numbers of houses with 13% in 8 years…..

Ministerie van Binnenlandse Zaken en Koninkrijksrelaties

Stand woningvoorraad

Woningvoorraad
stand aan het eind van de maand
8.091.806 *
Nederland

CBS | Juli 2022 | *Voorlopig

Plancapaciteit

Totale plancapaciteit 2022-2030
aantal
1.033.900
Nederland

Inventarisatie plancapaciteit, BZK/ABF | voorjaar 2022

Industrialized housing

- Big demand for housing without available labour force…
- Search for standardised systems with installation included
- Fast … pref. 1 day per house
- With low amount additional water (= short drying time)

Industrialized housing

- Hollow core / piping floor
- Precast walls
- Precast facades
- Prefabricated roof

Industrialized housing

- Installation integrated floors

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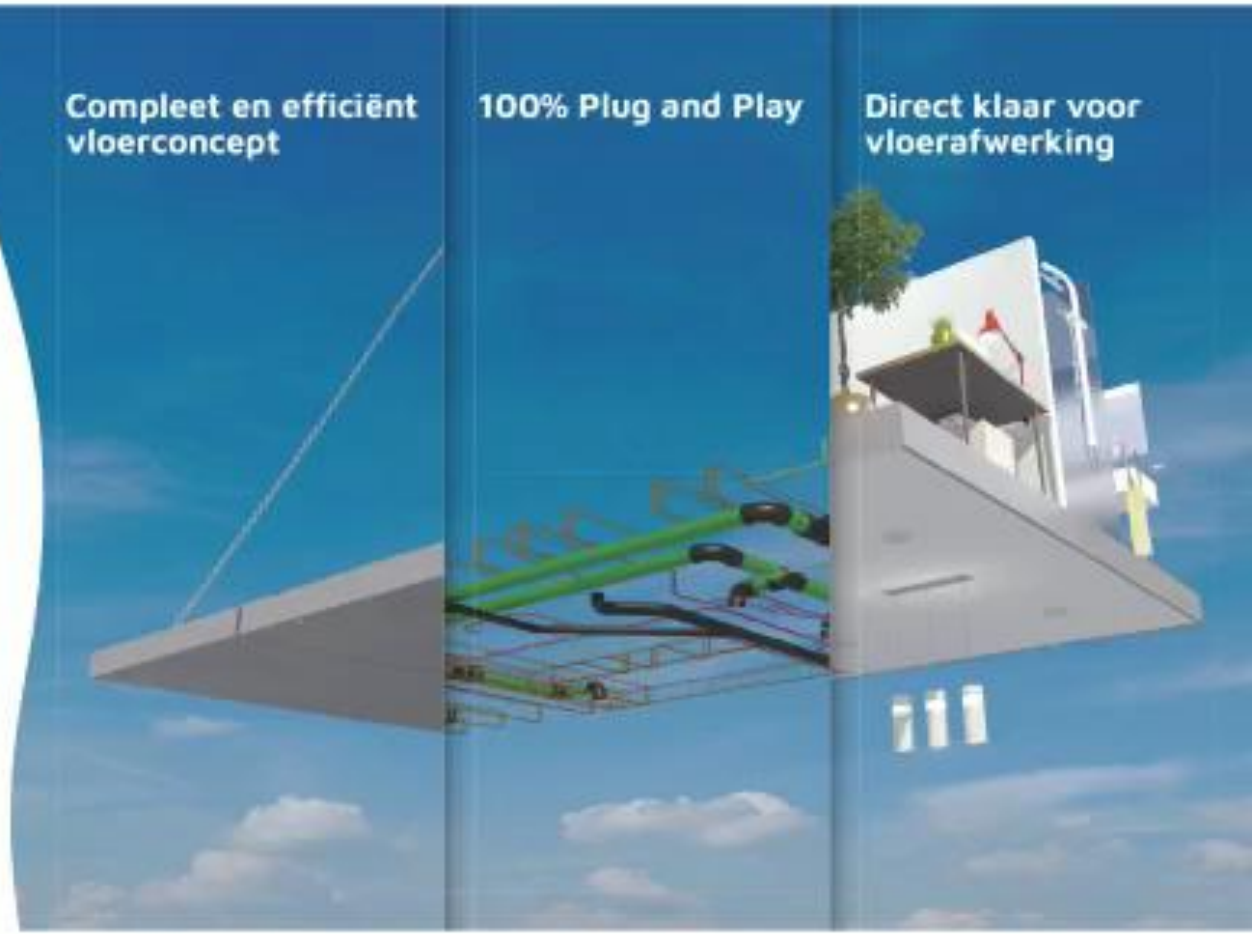
VBI

VBI Integraalvloer
Prefab
Next Level

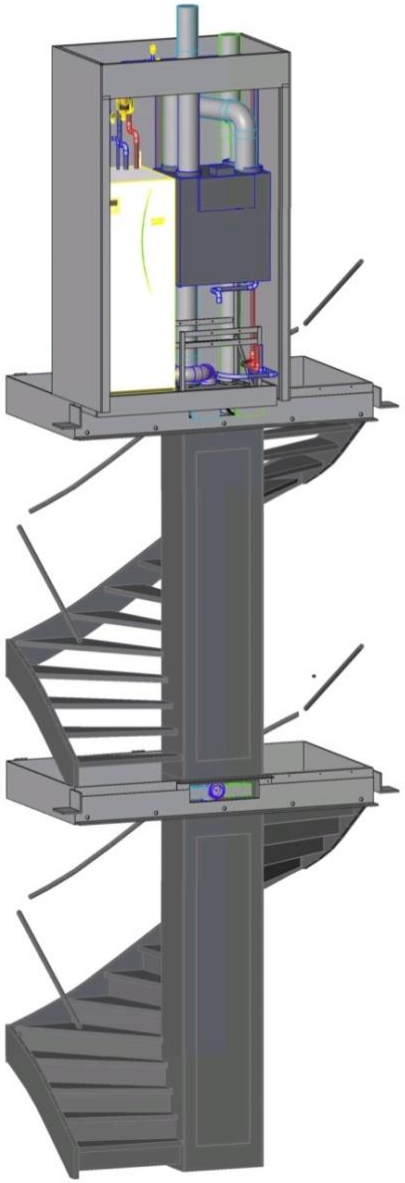


Industrialized housing

- Flat surface; no screed
- Piping integrated
- Plug and play
- Precast walls and facades
- Prefabricated roof

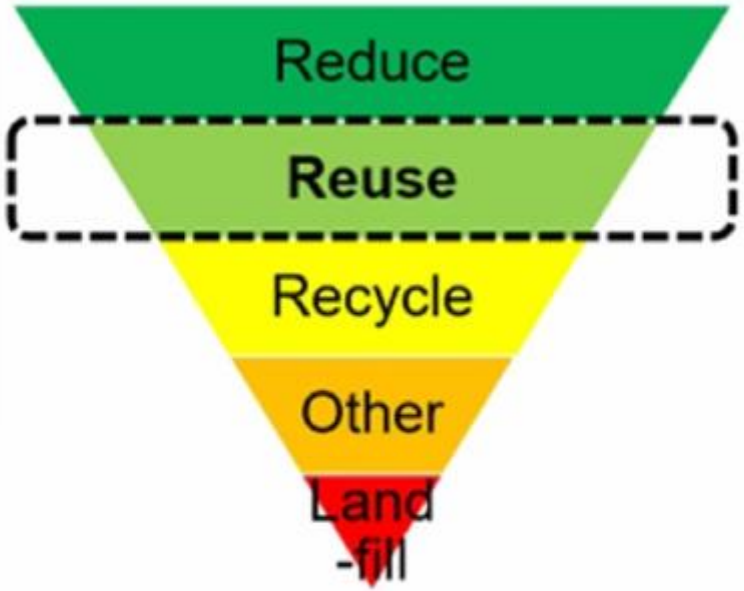
Industrialized housing

- Standardisation of installation components



Reusing elements

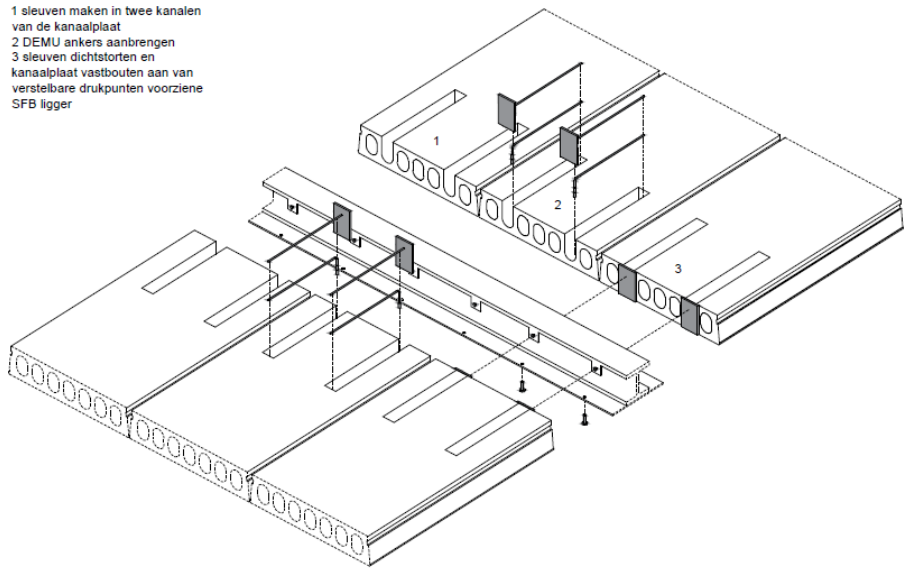
Circular economy
= re-use of (structural) elements
= increase of life-time
= reduction of environmental impact

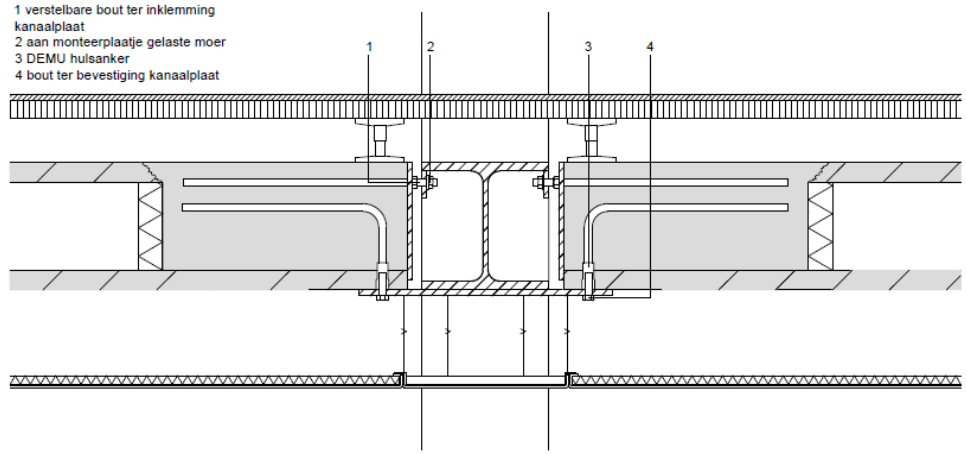


Focus on reuse

Re-use

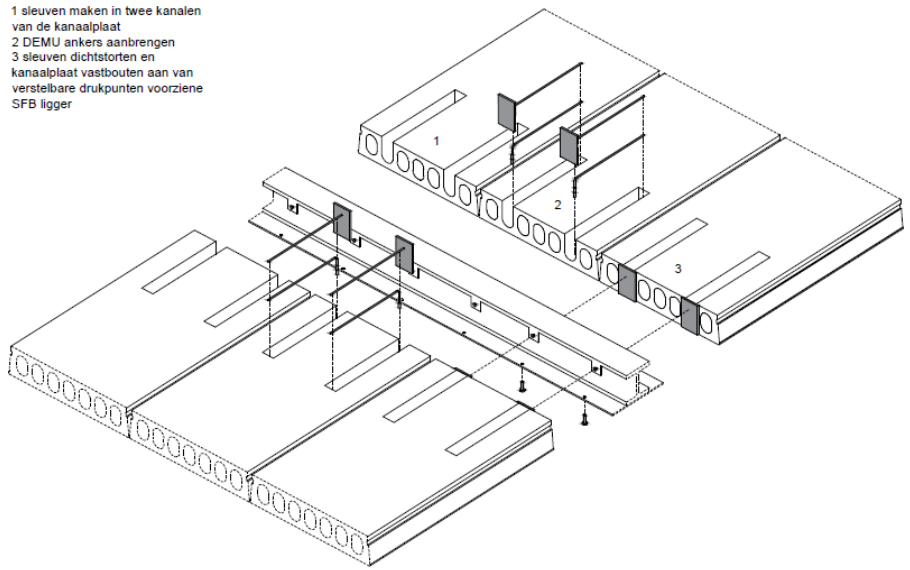
Courthouse Amsterdam; designed for re-assembly 2016





Re-use

Courthouse Amsterdam; designed for re-assembly 2016



Re-use

Dis-assembly has started in 2021 and it will be an office in the eastern part of NL in 2022

Circular bridge

Research project for re-using bridge beams:

ReCreate

- 12,5 M€ EU funded
- 4 Clusters:
  Finland (Uni Tampere)
  Sweden (KTH)
  Germany (Cottbus)
  The Netherlands (TU/e)

European Commission | CORDIS EU research results

HORIZON 2020

Reusing precast concrete for a circular economy

Fact Sheet | Results

Project description

DE EN ES FR IT PL

A concrete transition towards circular construction

Concrete – the most widely used construction material – underlies nearly every permanent structure on the planet. What happens to concrete when buildings are no longer needed? The EU-funded ReCreate project will investigate the systemic changes needed in the whole ecosystem of construction and demolition to make these practices more circular. By drawing from partnerships covering the entire value chain, the project will demonstrate deconstruction of intact precast structural components from condemned buildings for reuse in new buildings in real-life innovative pilots. The potential volume of the supply and demand for secondary concrete components in the EU will also be assessed. The project's overall goal is to boost concrete reuse and help the EU reach its ambitious energy and climate targets.

Fields of science

engineering and technology › environmental engineering › waste management › waste treatment processes › **recycling**
engineering and technology › civil engineering › architecture engineering › **sustainable architecture**
social sciences › economics and business › economics › **sustainable economy**

Project Information

ReCreate
Grant agreement ID: 958200

DOI
10.3030/958200

Start date 1 April 2021
End date 31 March 2025

Funded under
SOCIETAL CHALLENGES - Climate action, Environment, Resource Efficiency and Raw Materials

Total cost
€ 14 105 877,78

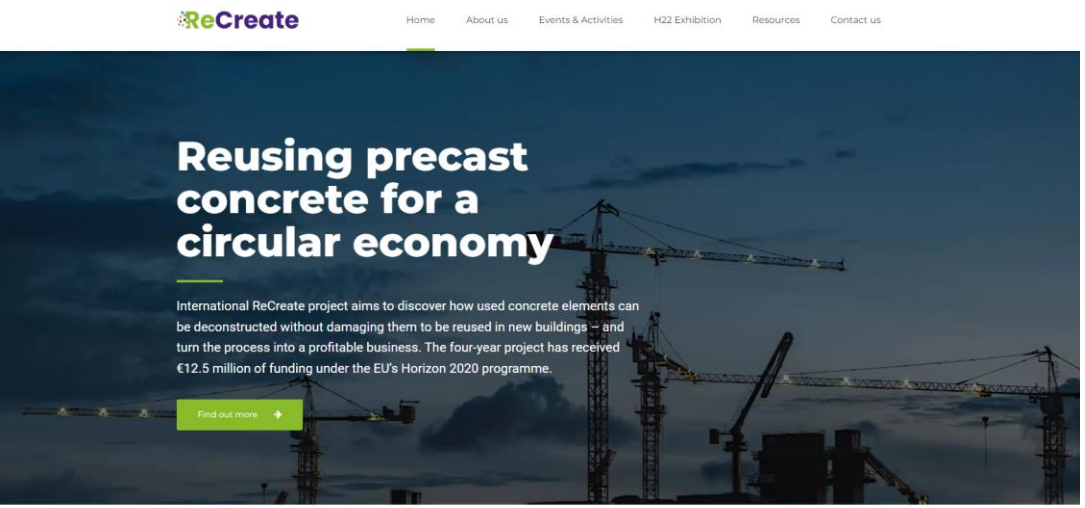
EU contribution
€ 12 494 045,02

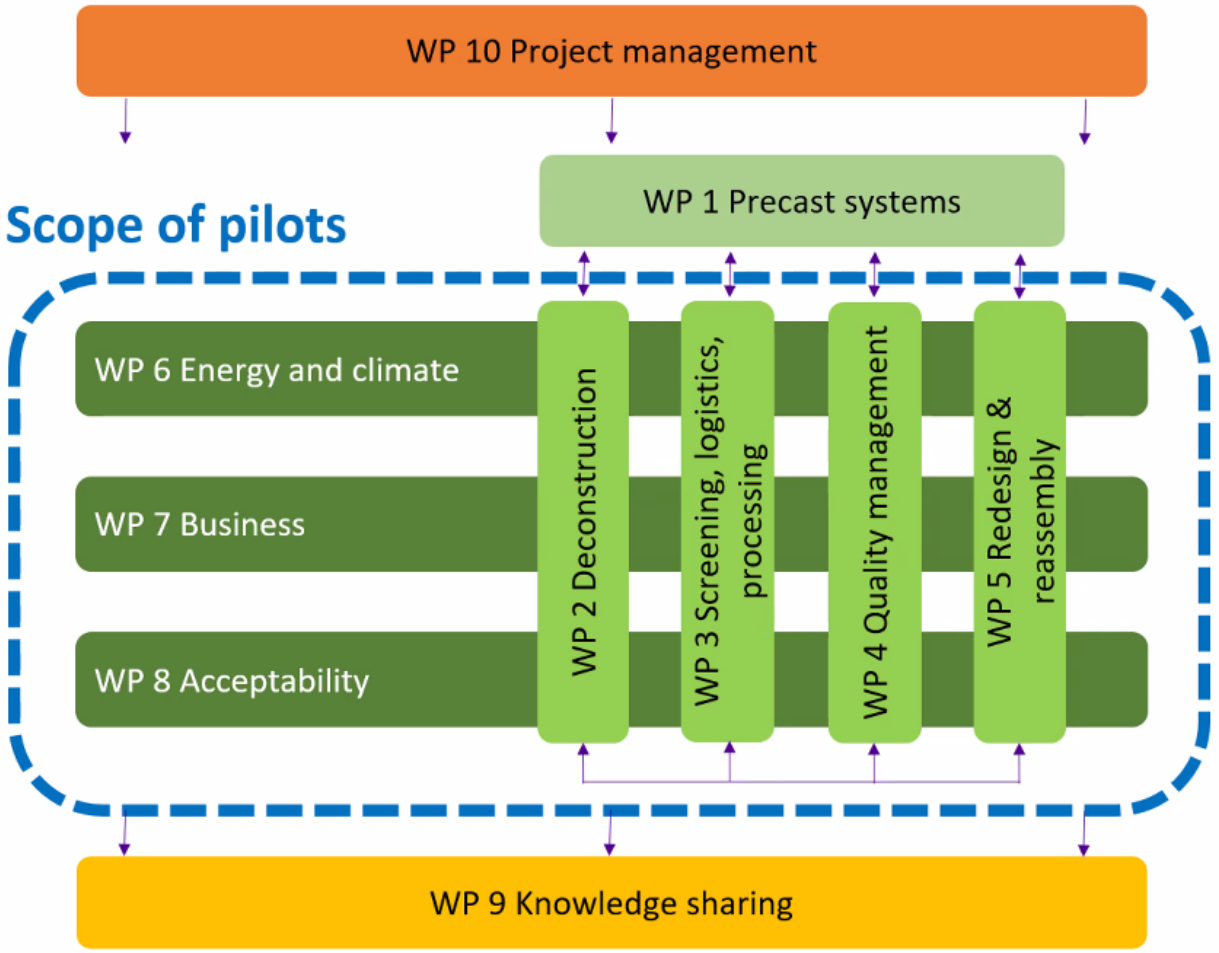
Coordinated by
TAMPEREEN KORKEAKOULUSAATIO SR
Finland

ReCreate

Tampereen yliopisto
Tampere University

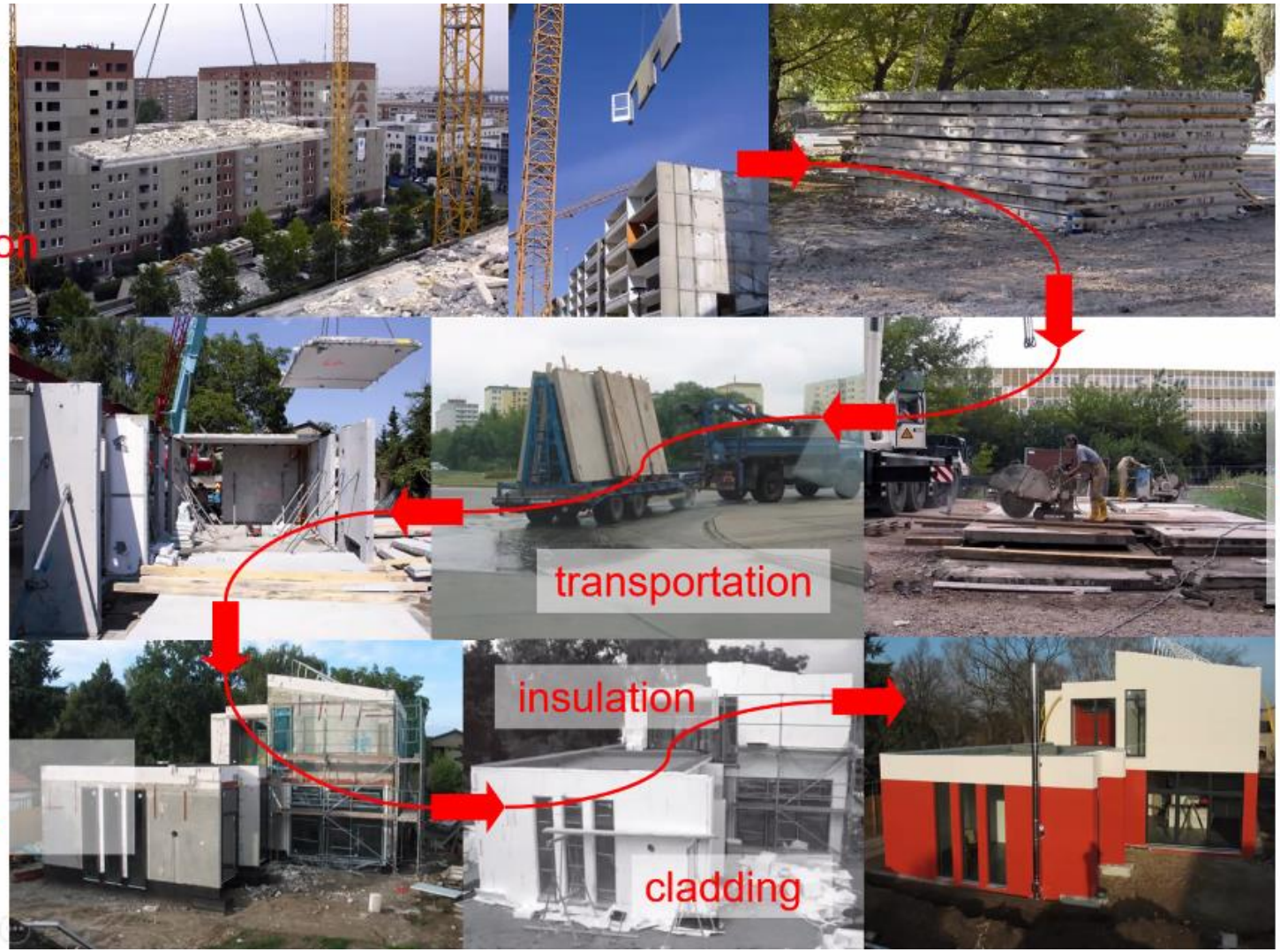
Work Packages





ReCreate

Tampereen yliopisto
Tampere University



Photos
courtesy of Mr.
Claus Asam

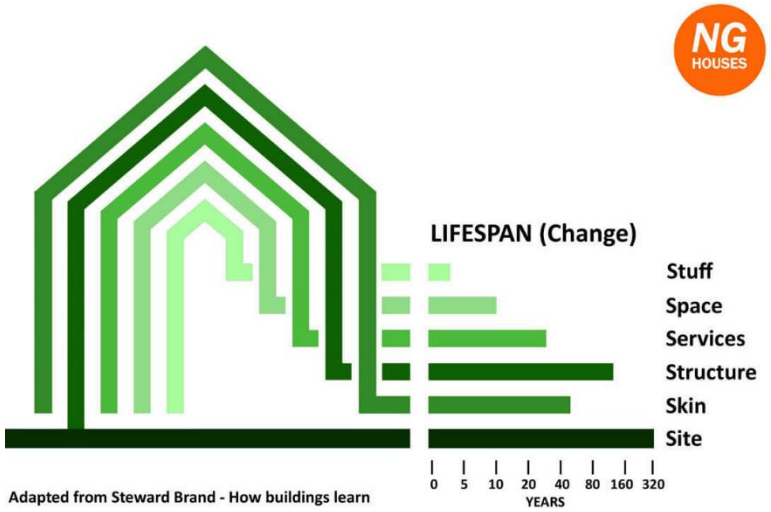
ReCreate
Dutch Cluster

- Disassembly office in Arnhem:
  Sandwich panels
  Hollow core slabs (with structural topping)

- Will be reused in an office and a sport facility

Design for re-assembly

- Building Circularity Index (BCI): an one number index



Technical life-time of the structure > 100 year

Type verbinding (TV)	Toegankelijkheid van de verbinding (ToV)	Randopsluiting (RO)	Doorkruisingen (DK)
Droge verbinding (1,0).	Vrij toegankelijk zonder extra handelingen (1,0).	Open – geen belemmering voor het (tussentijds) uitnemen van producten of elementen (1,0).	Geen doorkruisingen – modulaire zonering van producten of elementen uit verschillende lagen (1,0).
Verbinding met toegevoegde elementen (0,8).	Toegankelijk met extra handelingen die geen schade veroorzaken (0,8).	Overlapping – gedeeltelijke belemmering voor het (tussentijds) uitnemen van producten of elementen (0,4).	Incidentele doorkruisingen van producten of elementen uit verschillende lagen (0,4).
Directe integrale verbinding (0,6).	Toegankelijk met extra handelingen met volledig herstelbare schade (0,6).	Gesloten – volledige belemmering voor het (tussentijds) uitnemen van producten of elementen (0,1).	Volledige integratie van producten of elementen uit verschillende lagen (0,1).
Zachte chemische verbinding (0,2).	Toegankelijk met extra handelingen met gedeeltelijk herstelbare schade (méér dan 20% van de waarde) (0,4).		
Harde chemische verbinding (0,1).	Niet toegankelijk – onherstelbare schade aan het product of omliggende producten (0,1).		

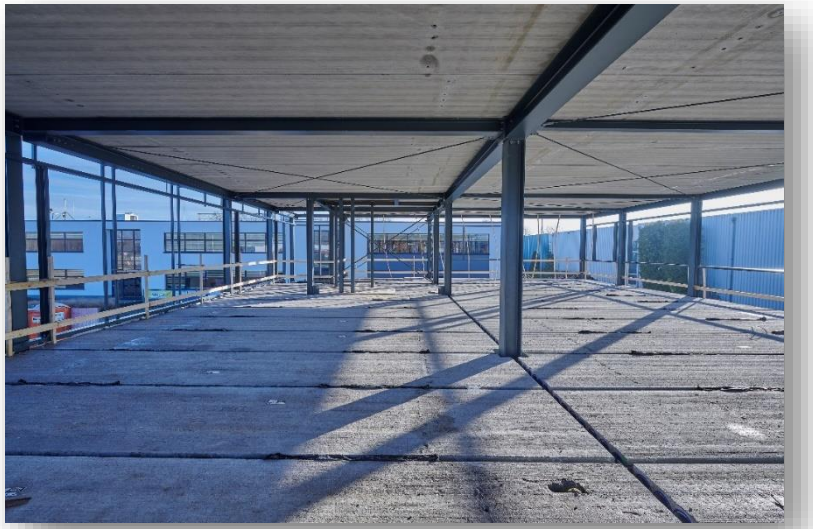
Design for re-assembly

- Circular structure (re-assembly)
- Hollow core floor without structural topping

Office PHOENIX CONTACT in Zevenaar

Design for re-assembly

Office PHOENIX CONTACT in Zevenaar



Design for re-assembly

Design for re-assembly

- Circular row house (re-assembly)
- Dry connections (no water)
- One day ready

Prototype

Prototype with facade

After disassembly prototype

Rebuild prototype

Thanks for your attention