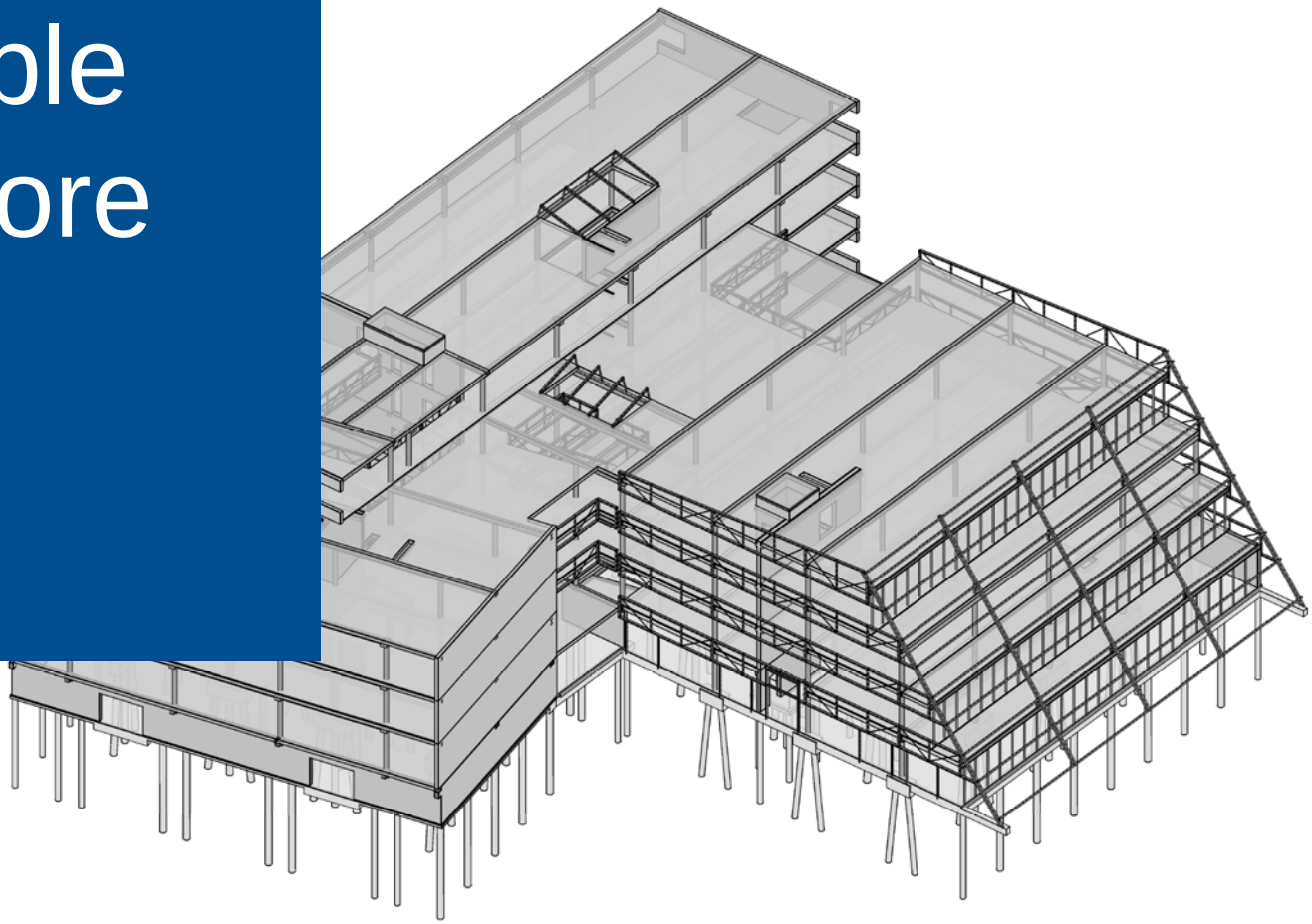
The Sustainable Hollow Core



Flexibel comfort

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Issues for sustainable buildings

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Sustainability Issues

Management (MAN)

- Fast and clean erection

Energy (ENE)

- Aquifer thermal energy storage
- Use of heat pumps
- Energy efficient installations (elevators, lighting, other equipment)

Water (WAT)

- Reuse of rain-water for WCs & roof
- Water meters

Sustainability Issues

Health & Wellbeing (HEA)

- Flexibility of the structure
- Comfort aspects (temp, air, sound etc)

Transport (TRA)

- Public transport connection; bicycle use
- Electric car charging stations

Materials (MAT)

- FSC certified wood
- Materials from ISO 14001 certified suppliers
- Reduction of use of materials

Sustainability Issues

Waste (WAS)

- Waste free construction site

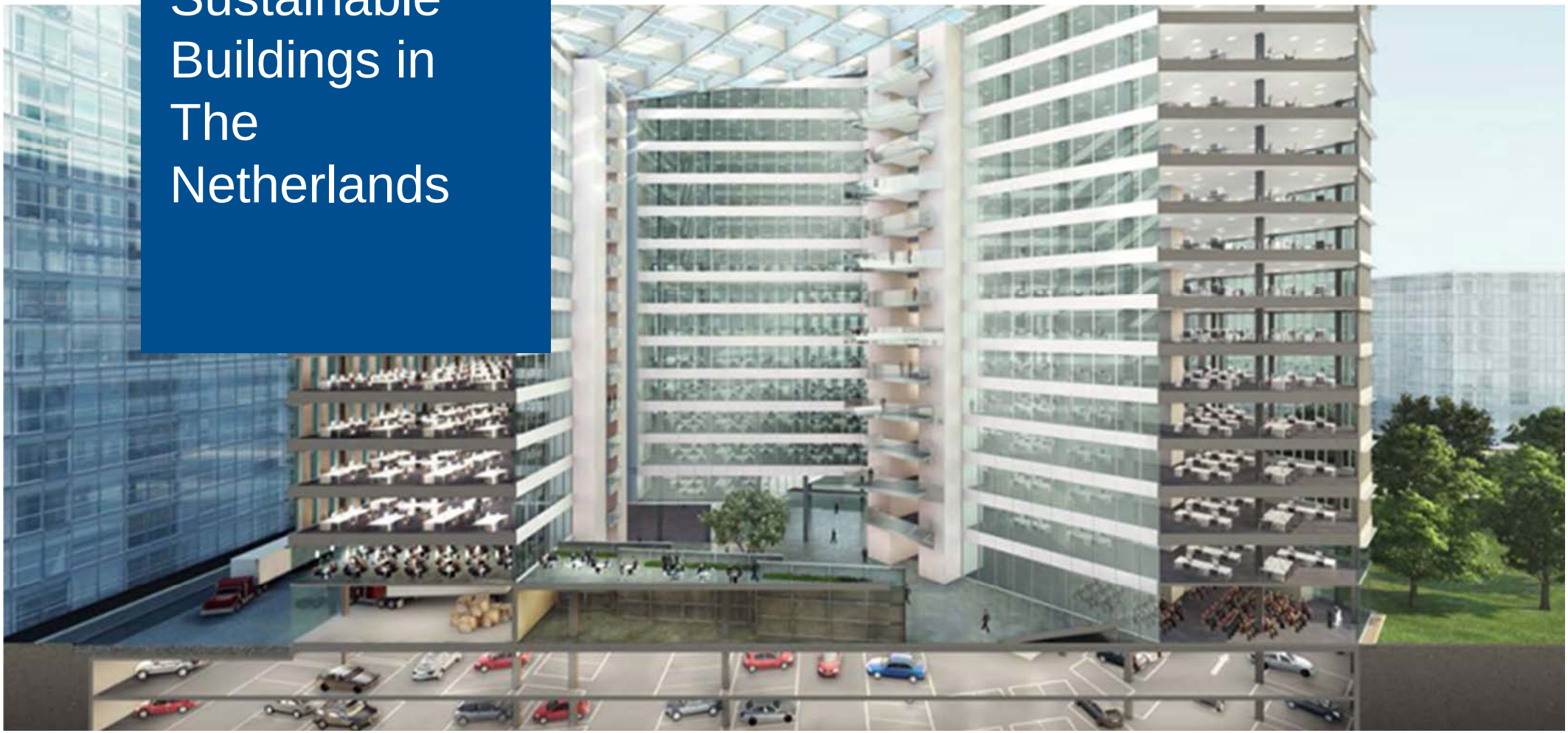
Pollution (POL)

- Dangerous substances

Land Use & Ecology (LA)

- Ecological corridor for e.g. breeding birds

Sustainable Buildings in The Netherlands



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The Edge Amsterdam

- Quick assembly: 7 work days per floor
- Material efficiency: less reinforcement and concrete
- Flexibility: column free 16,2m spans

European Air Transport Command (EATC)

- Much light, spacious and flexible use
- Healthy indoor climate and fresh air
- Clever use of flooring mass

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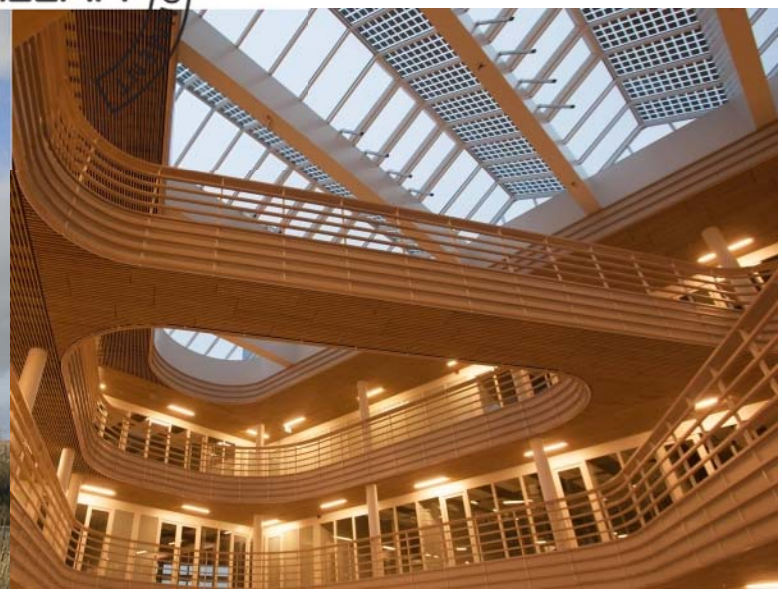
Stadskantoor Utrecht

- Open floor layout for maximum flexibility
- Fast erection in busy urban setting
- Flexible structure for long life time of use

Watercampus Leeuwarden



- Open floor layout for maximum flexibility
- Much light, spacious and flexible use
- Flexible structure for long lasting time of use

First Rotterdam

- Open floor layout for maximum flexibility
- Fast erection in busy urban setting
- Flexible structure for long lifetime
- ISO 14001; secondary raw materials

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Heerema Group Leiden

- Open floor layout for maximum flexibility
- Flexible structure for long lasting time of use

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VBI Hollow core floors were applied in these buildings!

BREEAM 4/5 stars Excellent/Outstanding.

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Case

Sustainable Building for Sensata

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Sensata Technologies Holland in Hengelo

- 5 storeys
- 9000 m² flooring for office and laboratory
- 2500 m² flooring for parking
- Ambition: BREE-AM Outstanding

- Long spans (maximize the flexibility in order to increase life time)
- Use of secondary materials
- Design for re-assembly
- Designed for vertical flexibility (floors (also roofs) are designed with same (high) live load)

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Sensata Technologies Holland in Hengelo

- Hollow core slabs “VBI Green line”
- HC “Take Back” agreement
- HC with polymer concrete in part of roof

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Sensata Technologies Holland in Hengelo

Hollow Core Slabs: VBI Green line

- Blast Furnace Slag (CEM II/BS)
- >30% of secondary materials
- Third party secondary materials

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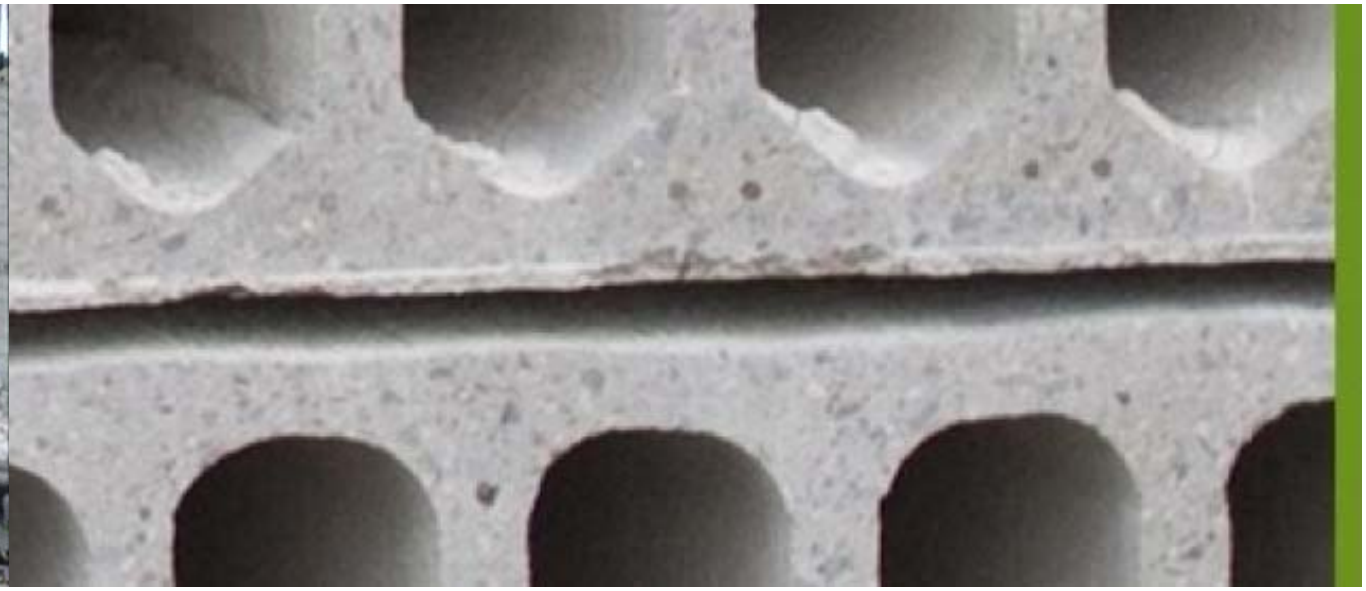
Sensata Technologies Holland in Hengelo

Hollow Core Take Back Agreement



After disassembly the HC’s will be taken back by VBI for

- Re-using or
- Recycling

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Sensata Technologies Holland in Hengelo

Prototype HC slabs with geopolymer concrete (no portland clinker)

- Cooperation with Heidelberger / ENCI
- Patent pending
- Prototype; only 4 slabs in the roof
- Designed with over capacity

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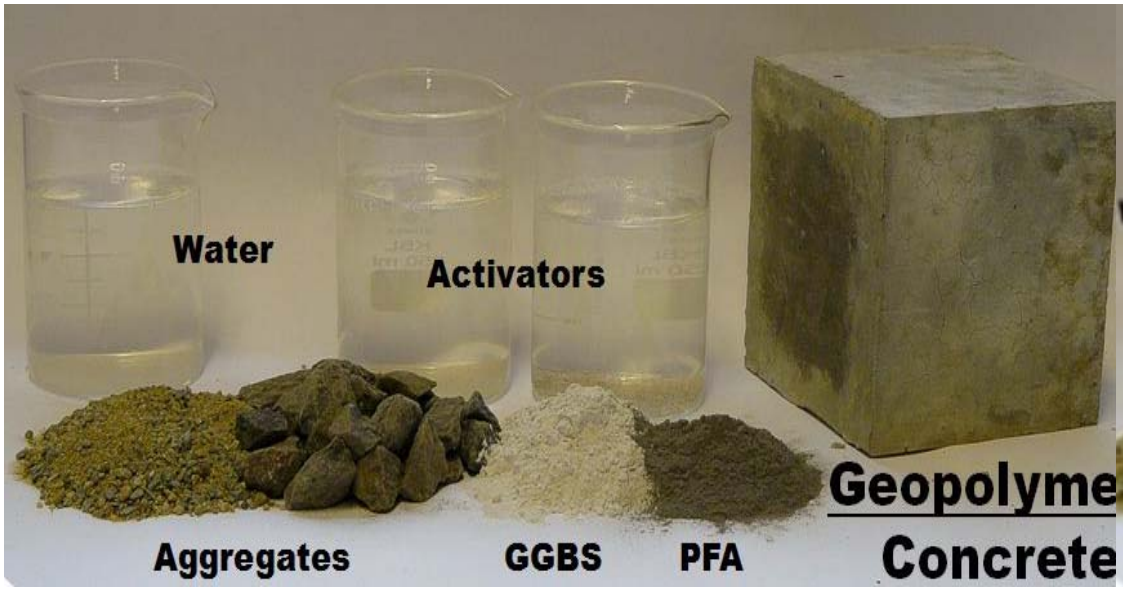
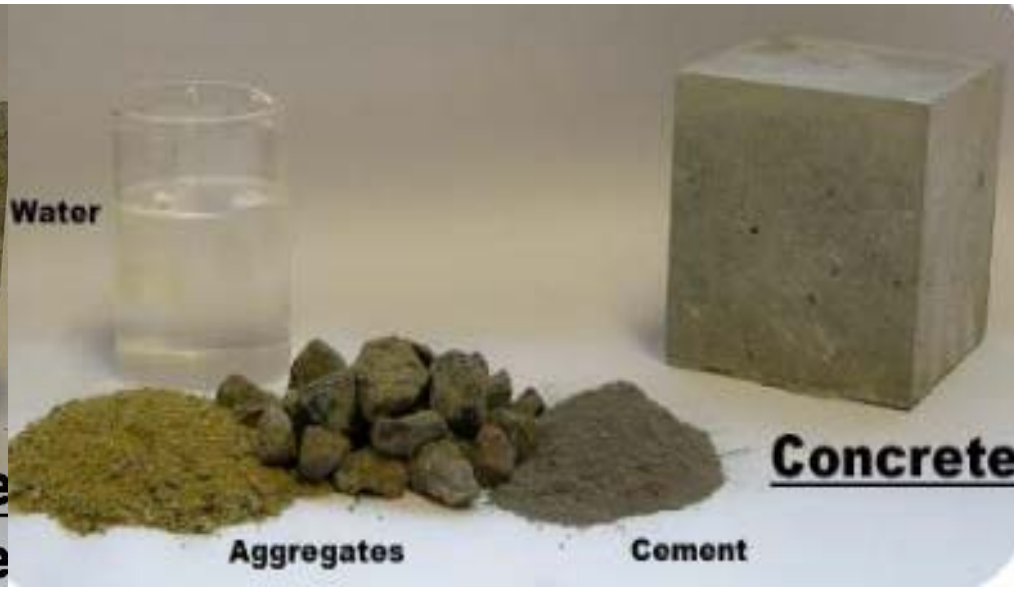
Sensata Technologies Holland in Hengelo

Geopolymere Concrete **vs** **PC Cement Concrete**





Reaction: polymerization
Water plays no role in the reaction
Reaction result: AluminiumSilicate (AS)

Reaction: Hydration
Reacts with water
Reaction product:
CalciumSilicateHydrates (CSH)

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Sensata Technologies Holland in Hengelo

4 slabs with geopolymere concrete as prototype in the roof

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HC slabs with geopolymere concrete

- Not (yet) industrialized
- Research on long term effects
- Research on production aspects

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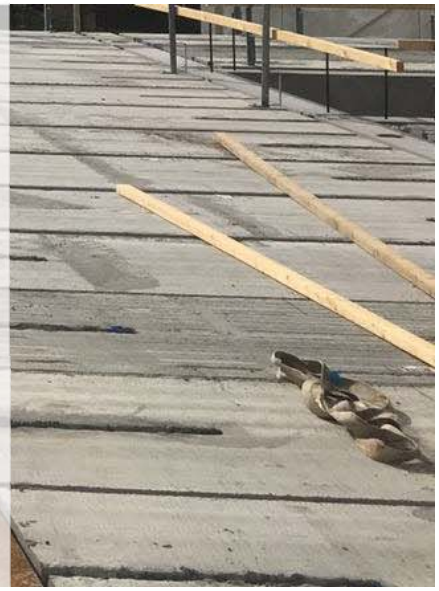
Sustainability of concrete floors

Global comparison	*CO2 Index*
Solid concrete floor	100
Hollow Core floors	50
+ reduce raw materials	
Hollow cores GreenLine	30
+ use secondary materials	
Hollow cores GP	15
+ alternative binder	



Hollow Cores and Sustainable buildings:
BIG OPPORTUNITIES

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Sustainable hollow cores as business case

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