EC Project:
Smart Elements for Sustainable Building Envelopes

http://www.sesbe.eu

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Contents

Overview

What is the project about?

§ Development of multifunctional façade sandwich elements for new buildings and refurbishment

What is new?

§ Thinner and more lightweight with same or better thermal performance, including sealant system

§ Multifunctional surfaces

Ø Easy-to-clean, self cleaning

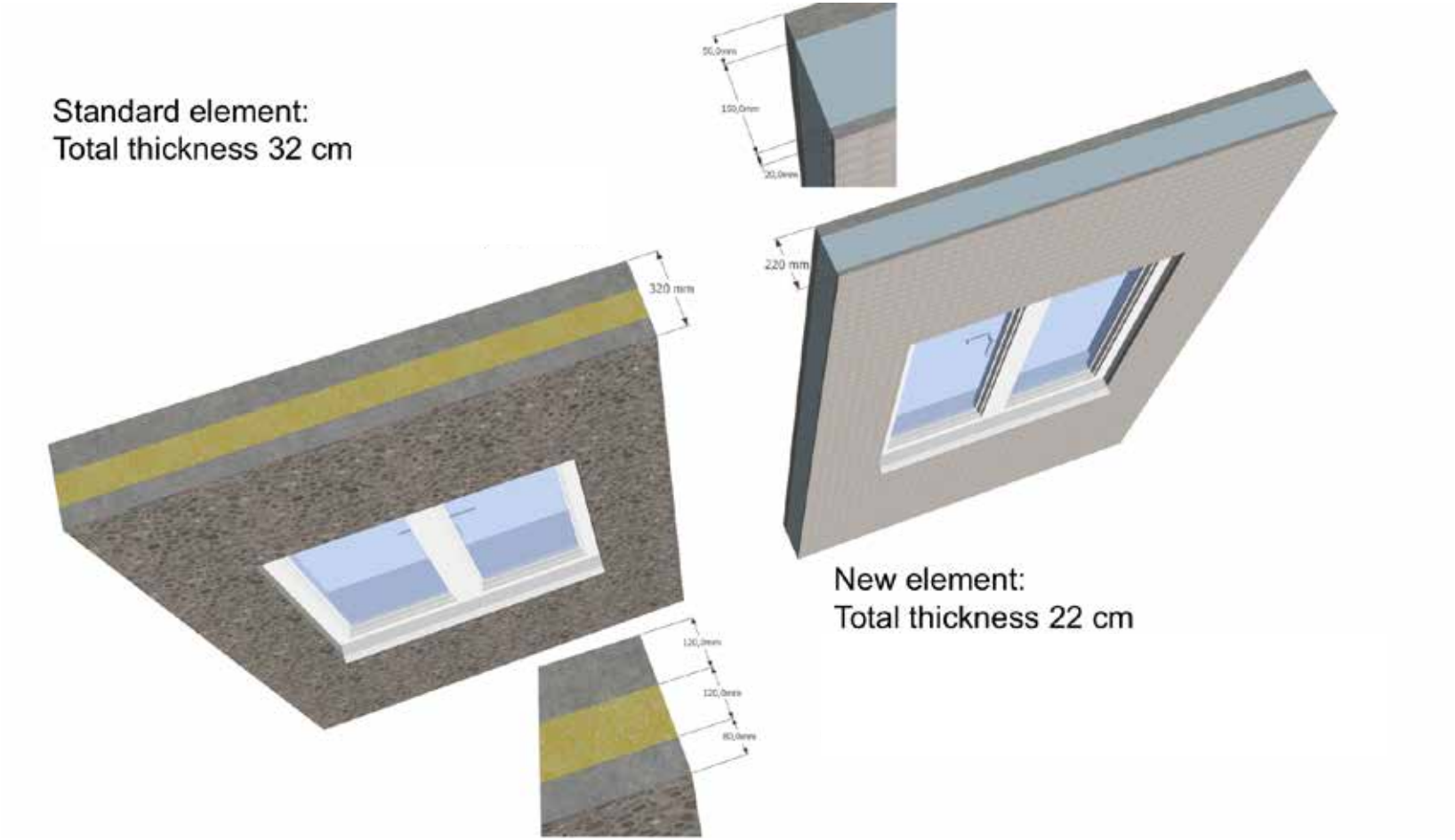
Ø Heat reflective, improved fire resistance

Duration of project

§ 3,5 years, project start 01. Aug. 2013

Goals of project

Geometry



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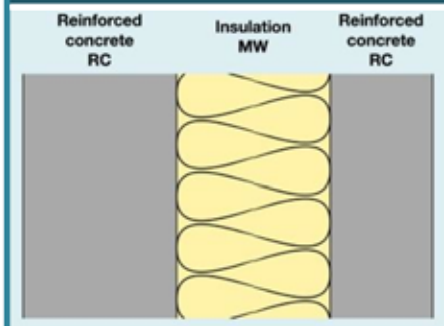
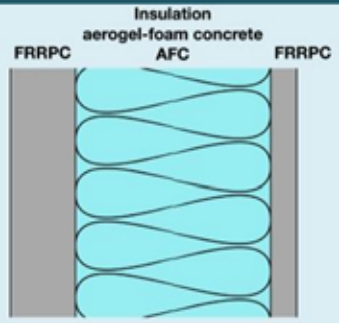
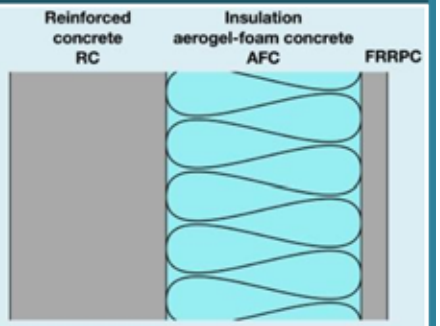
Goals of project

Mass and thermal performance

	Standard/Old sandwich elements			New sandwich elements			New half panel on old concrete		
									
Material	**RC**	**MW**	**RC**	**FRRPC**	**AFC**	**FRRPC**	**RC**	**AFC**	**FRRPC**
ρ (kg/m^3)	2400	60	2400	2300	130	2300	2400	130	2300
d (m)	0,12	0,12	0,08	0,05	0,15	0,02	0,12	0,12	0,02
d_{tot} (cm)		**32,0**			**22,0**			**26,0**	
m (kg/m^2)	288	7	192	115	20	46	288	16	46
m_{tot} (kg/m^2)		**487**			**181**			**350**	
λ (W/(m·K))	2,3	0,045	2,3	2	0,025	2	2,3	0,025	2
R_n (m^2·K/W)	0,052	2,667	0,035	0,025	6,000	0,010	0,052	4,800	0,010
R_{si}+R_{se} (m^2·K/W)		0,170			0,170			0,170	
R_{tot} (m^2·K/W)		2,924			6,205			5,032	
U_{tot} (W/(m^2·K))		**0,34**			**0,16**			**0,20**	

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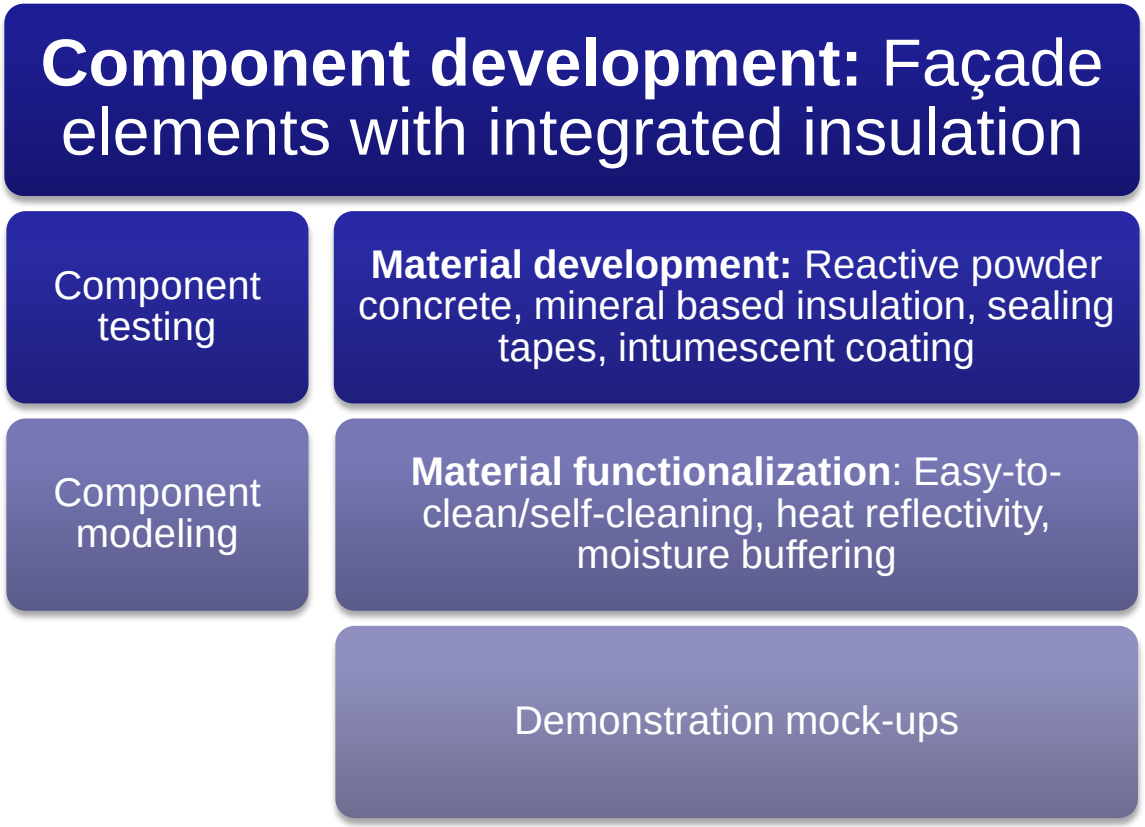
Goals of project

Advantages

- Less transport costs
- Easier mounting of panels
- Better thermal performance
- Better durability
- Better fire resistance due to the use of mineral based insulation material
- Functional surfaces

Project approach and partner consortium

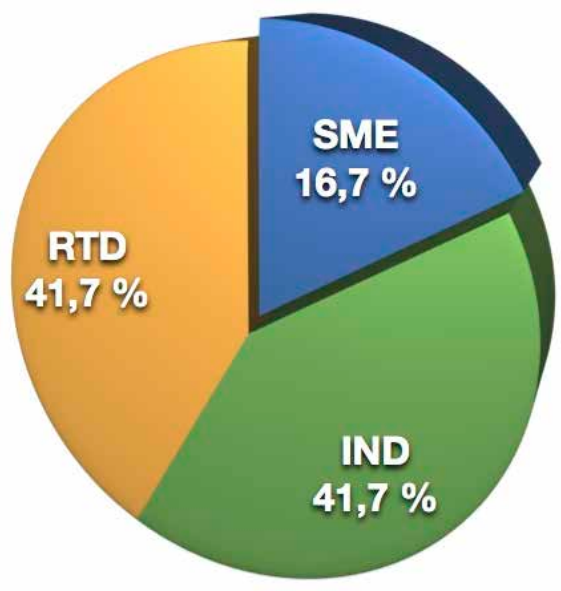
Approach



Project approach and partner consortium

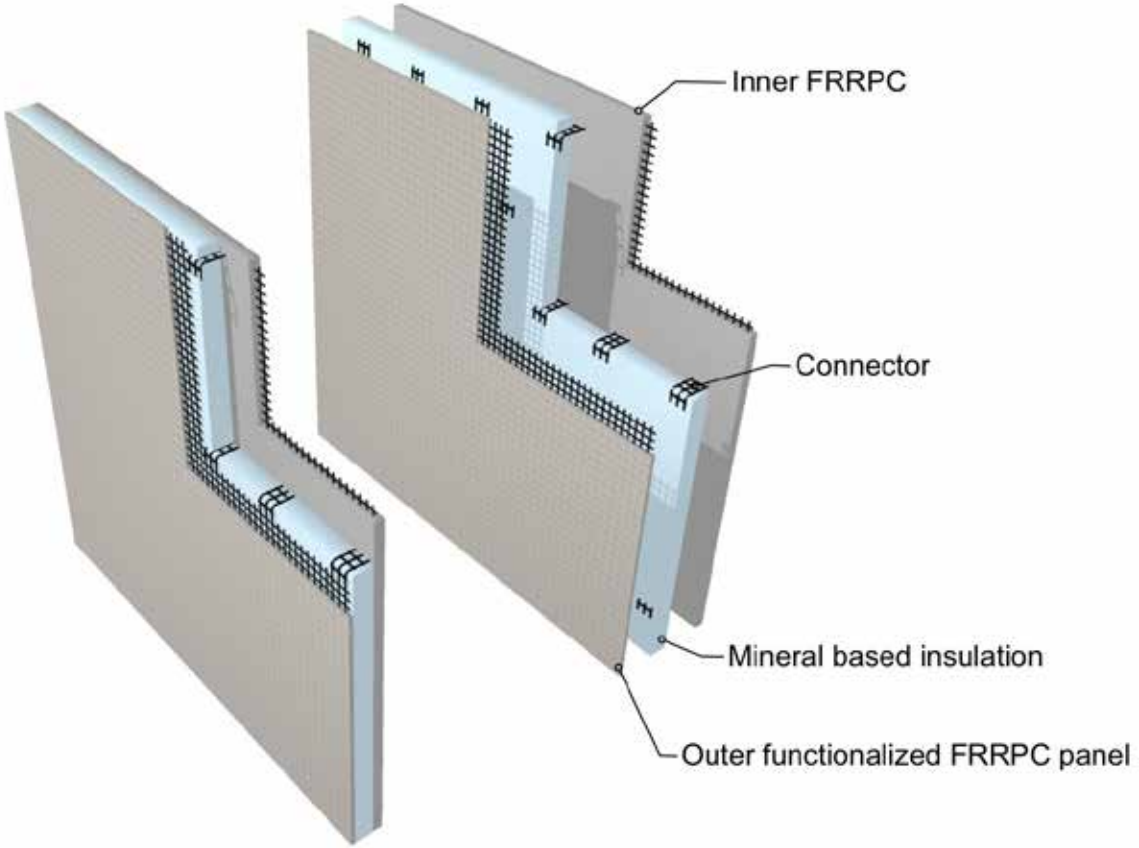
Partner consortium

- Coordinator: CBI Swedish Cement and Concrete Research Institute
- Four material producers
  - Svenska Aerogel
  - Aercrete
  - Tremco illbruck GmbH
  - Tremco illbruck Coatings, Ltd.
- Three element producers and constructors
  - Acciona
  - Mostostal
  - Projektengagemang
- Five research institutes: CBI, SP, ITB, ITE, University of Uppsala



Examples of ongoing work

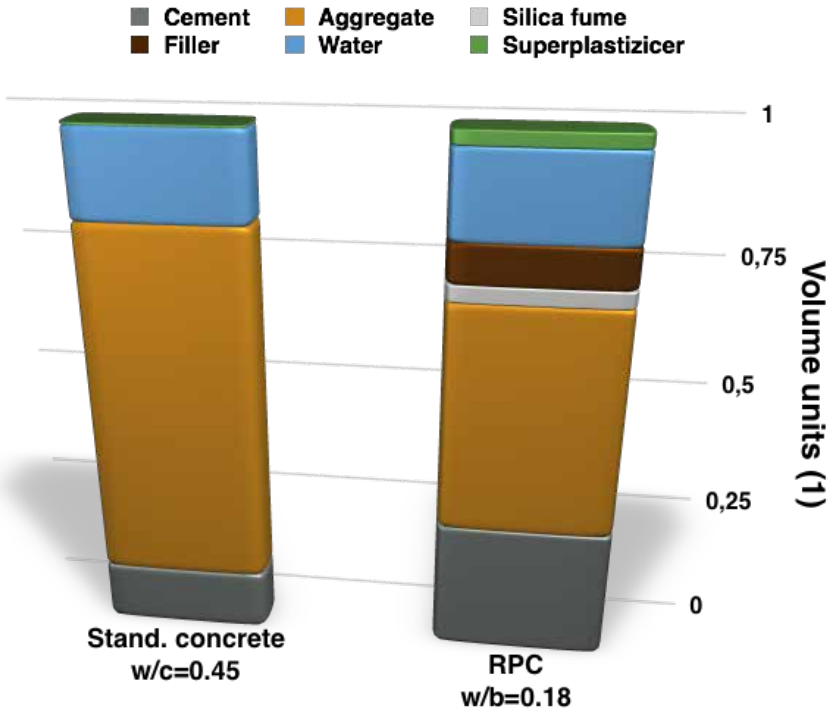
Reactive powder concrete and foam concrete

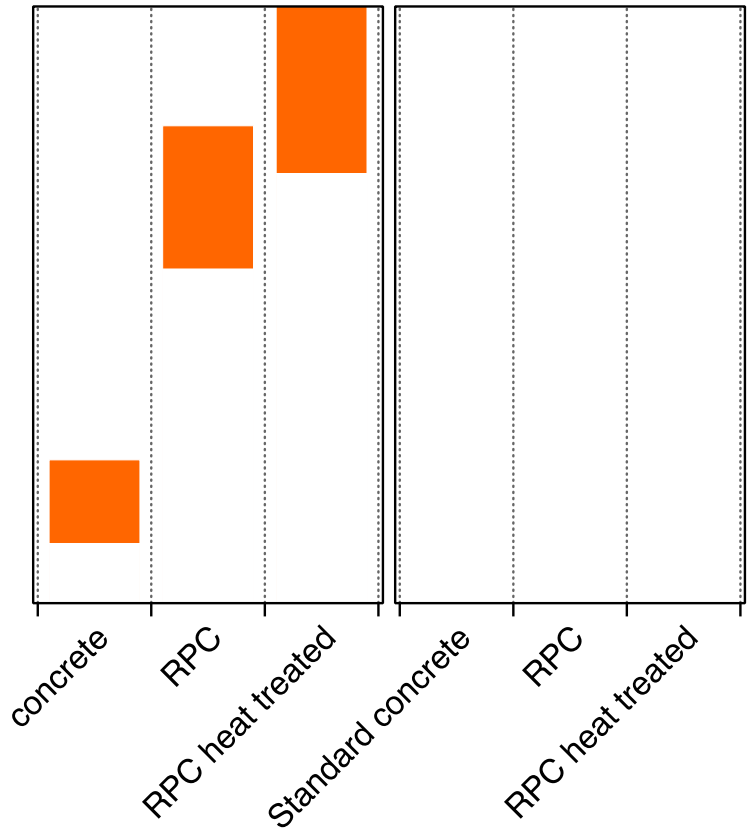


Examples of ongoing work

Reactive powder concrete

§ Composition and Strength





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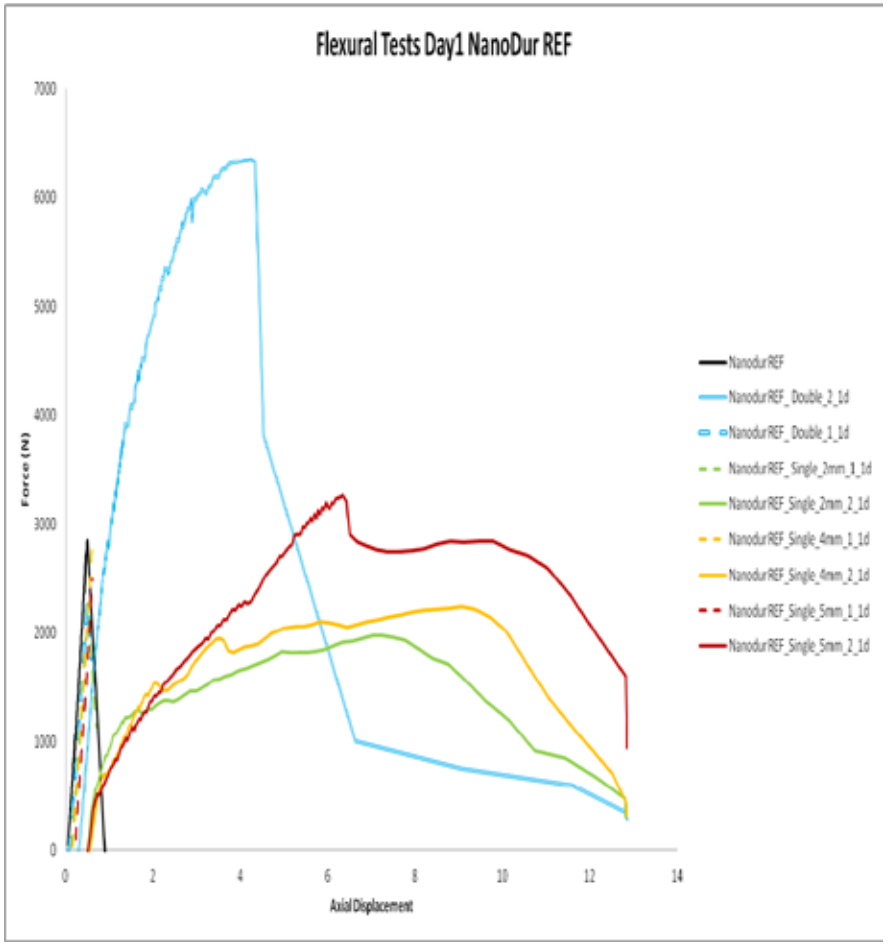
Examples of ongoing work

Textile reinforced reactive powder concrete

§ Textile mesh à Carbon grids

3d-grid



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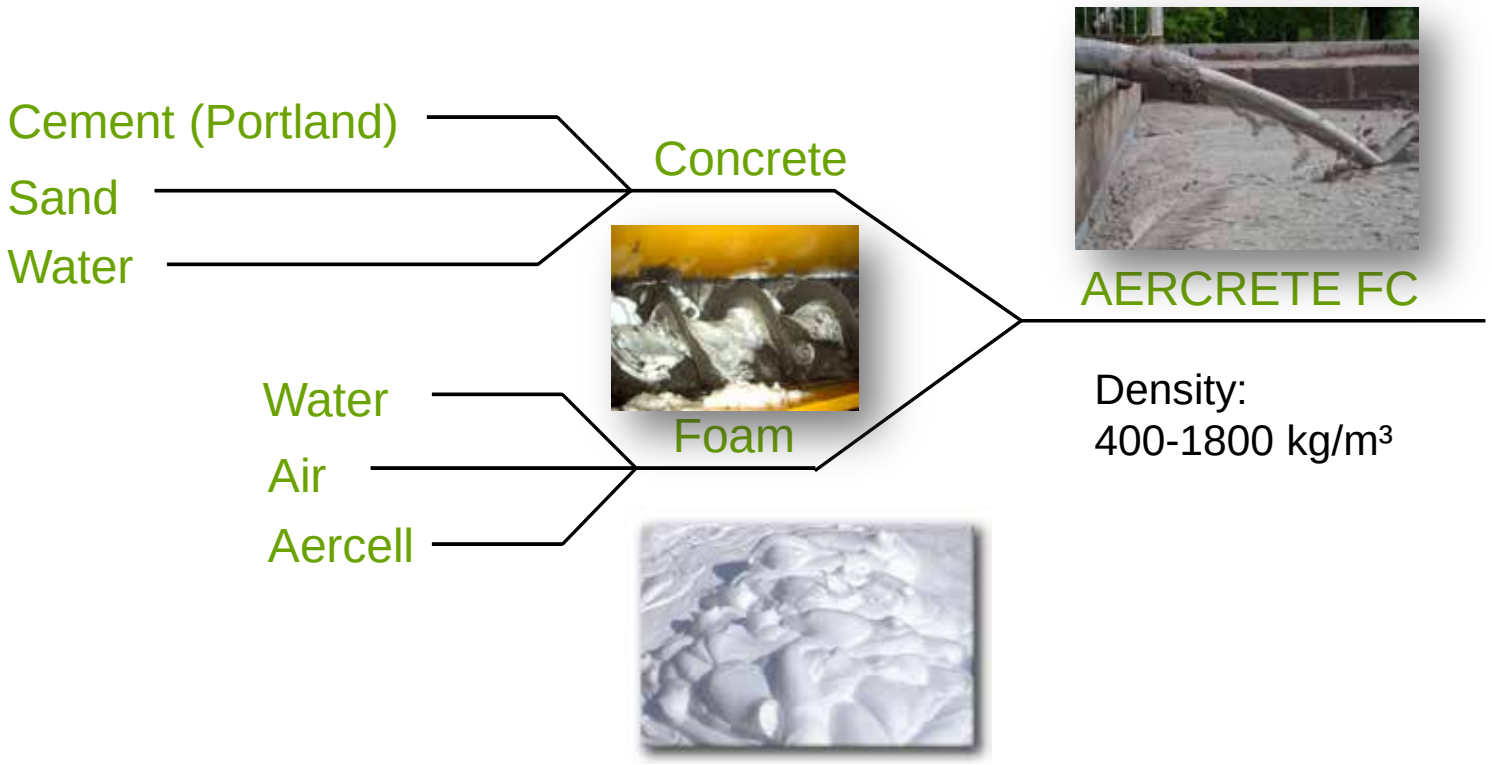
Examples of ongoing work

Foam concrete



Examples of ongoing work

Foam concrete

- Goal: densities =< 200 kg/m^3
- Incorporation of nano material for improving l

220 kg/m^3 **450 kg/m^3** **750 kg/m^3**

Future challenges

Material

- Meet the goals for the proposed materials
- Reach suitable setting/curing times

Sandwich elements

- Find optimal casting/assembling process
- Define optimal and possible design for the panels
- Meet the goals concerning thermal transmittance in conjunction with minimized mass and width of the panels

Acknowledgements

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