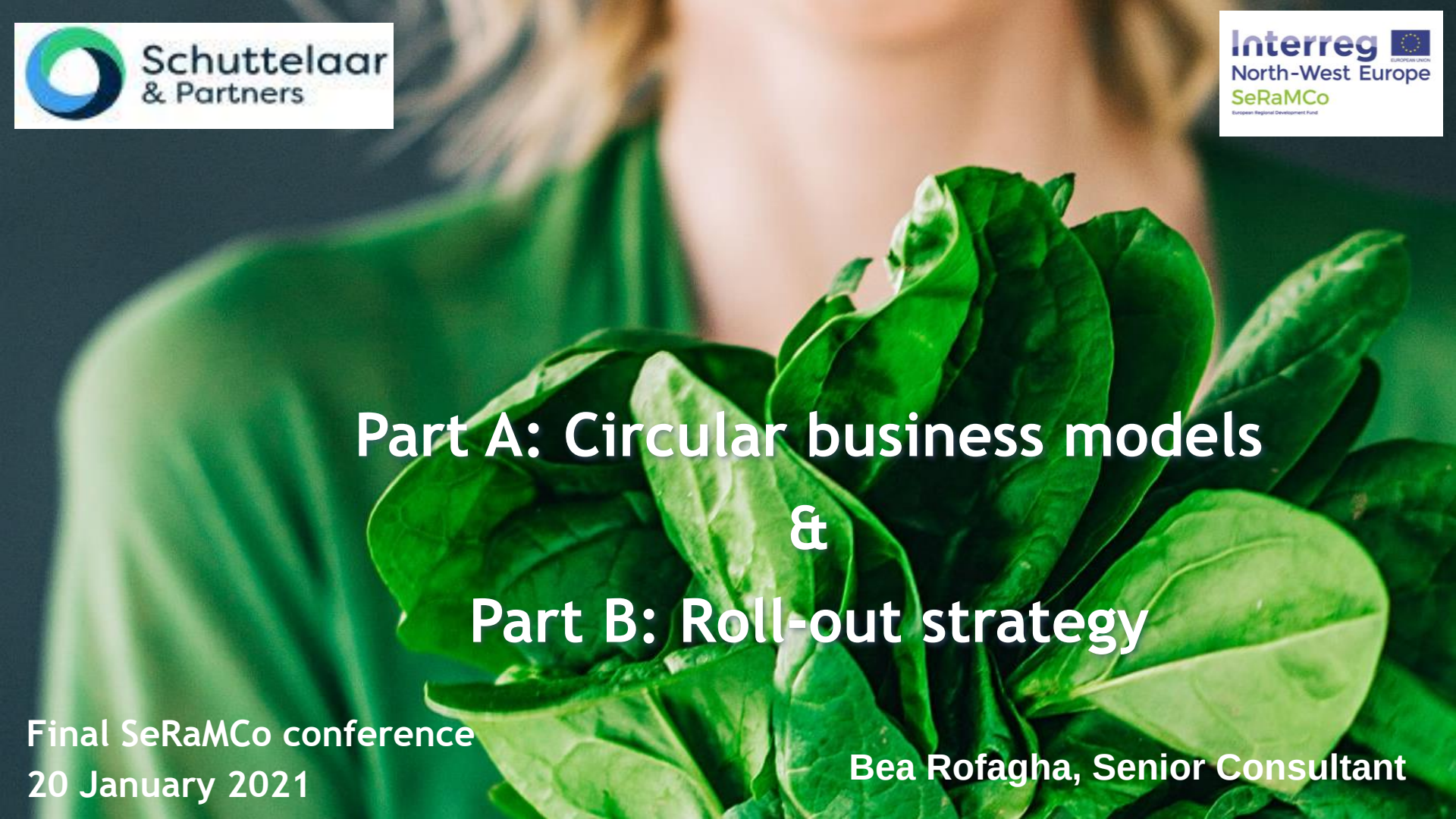
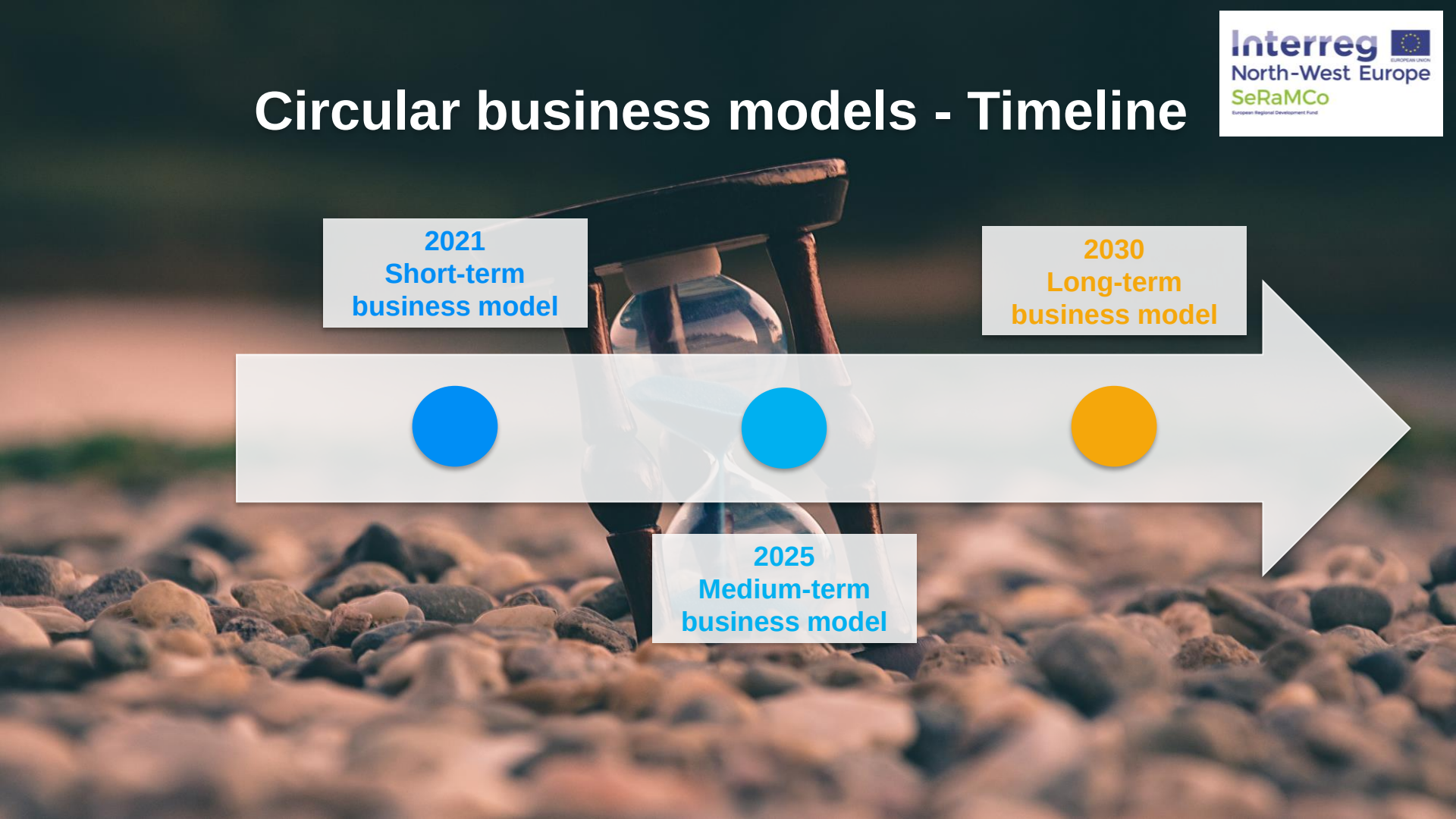


Part A: Circular business models
&
Part B: Roll-out strategy

Final SeRaMCo conference
20 January 2021

Bea Rofagha, Senior Consultant

Circular business models - Timeline



Short-term business model- CDW recycling

Interreg North-West Europe SeRaMCo

KEY FACTS

Timespan: **by now**
CDW Location: **on-site**
CDW Origin: **known**
CDW Type: **fairly homogeneous**

BEST PRACTICES

NATO site in Brussels in 2007;
Tottenham FC stadium in London

Value proposition

Big quantities of CDW resulting from the dismantling and selected demolition of the previous construction can be reused if a recycling plant is installed on-site or very nearby.

Key Players

- Recyclers
- Cement and concrete producers
- Contractors

Main technologies and processes

- Technologies for selected demolition
- Mobile crushers
- Washing equipment
- On-site concrete production

Revenue mechanisms

- Price of mineral waste removal and transport
- Price of primary sands and aggregates and their transport replaced by secondary materials generated from CDW
- Incentives to promote the reuse of CDW

Material streams processed

- Inert CDW
- Mineral CDW

Strengths

- High material-efficiency
- Natural sands and gravel conserved;
- Landfill is avoided;
- CO2 emissions caused by transport of bulky raw materials are drastically reduced.

Weaknesses

- High quantity of CO2 emissions by cement production are not affected;
- Noise and dust generated in an urban environment.

Opportunities

- The material loop for mineral CDW is closed;
- The introduction of new technologies is spearheaded;
- Awareness is raised and new business opportunities for all partners involved are created.

Threats

- The economic viability;
- Certification and norms in place;
- To obtain insurances for the new construction might be more complicated.

Short-term business model- CPPs production

Interreg North-West Europe SeRaMCo

KEY FACTS

Timespan: **by now**
CDW Location: **in-house**
CDW Origin: **known**
CDW Type: **fairly homogeneous**

BEST PRACTICES

Beton Betz

Value proposition

Roughly 5% of the concrete CPP producers use in their production ends up as waste. By reusing this percentage into the production of new concrete, the need for primary aggregates is reduced by up to 5%, and the costs for landfill of these production remains are avoided.

Key Players

- CPP producers
- Contractors

Main technologies and processes

- Smart crusher which recovers the sand, gravel and cement from concrete.

Revenue mechanisms

- Reduction of costs for primary raw materials by 5%
- Reduction of costs for landfill by 5%
- Reduction of transport costs from
- quarry and to landfill by 5% each

Material streams processed

- In-house, concrete CDW

Strengths

- 5% of landfill is avoided.
- 5% reduction in the costs of sand and gravel excavation and transport by 5%.
- The CO2-intensive production of cement is also reduced by 5%.

Weaknesses

- One-time investment into a (mobile) crusher and sieves;
- Noise and dust produced
- Extra space and the storage needed;
- Extra manpower needed to supervise the production.

Opportunities

- In the light of the increasing importance of circular public procurement, the re-use of own concrete waste would anticipate future tendering criteria, which go beyond the pure economic concerns.

Threats

- Low cost of primary raw material;
- Presence of quarries nearby;
- Lack of incentives to recycle rather than landfill
- Regular maintenance of equipment

Medium-term business model- recycled CDW feeding CPP Production

Interreg North-West Europe SeRaMCo

KEY FACTS

Timespan: **by 2025**
CDW Location: **close-by recycling facilities**
CDW Origin: fairly **known**
CDW Type: **fairly homogeneous**

KEY ASSUMPTIONS

- availability of sand and aggregates in NWE
+ prices of natural sand and aggregates
+ innovation
+ legislation in circular economy
+ financial investments for circular economy
+ certifications for recycled products
+ digital tools
+ cooperation among key stakeholders

Value proposition

The increasing urbanization will provide profitable business opportunities for CPPs made from recycled CDW: more old buildings will be demolished to leave room for new ones, producing a high amount of waste which can resourcefully re-invested in new construction activities.

Key Players

- Key customers: builders and contractors
- Key suppliers: recyclers and CPPs producers, aligned in the production process

Main technologies and processes

- Crushing and washing equipment
- Digital tools, data banks and virtual marketplaces

Revenue mechanisms

- The builder pays for the transport and processing of demolition waste, and for the CPPs produced and delivered.
- The recycling company is paid input and output gate fees per ton of material processed.

Material streams processed

- CBTC selectively demolished at demolition sites in the near-by cities.

Strengths

- Landfill is avoided and the material loop for mineral CDW is closed.
- Sand and gravel extraction from quarries and their transport is avoided.

Weaknesses

- Matching supply and demand may prove difficult and hamper construction projects.
- The performance of recycling facilities if not substantially modernized.

Opportunities

- In the light of the increasing importance of circular public procurement, the re-use of own concrete waste would anticipate future tendering criteria, which go beyond the pure economic concerns.

Threats

- The low price and abundant availability of primary raw materials in some regions in NEW
- The low price of recycled aggregates in some regions in NWE.

Vision for long-term business models

KEY FACTS

Timespan: **by 2030**

CDW Location: **coming from demolished, urban buildings**

CDW Origin: **both known and unknown**

CDW Type: **heterogeneous**

KEY ASSUMPTIONS

+ Integrated recycling and concrete precast production facilities located nearby urban centres

+ Buildings conceived as material banks

+ Secondary raw materials of diverse quality and origin will be identified and classified through demolition audits and material passports

+ Other non-European countries will implement a circular model in response to an increase in construction demand

Part B:
Roll-out strategy

Final SeRaMCo conference
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10 KEY MESSAGES

to the industry and public authorities

1. **CDW is too good to be wasted**. *Its circular re-use diminishes the depletion of sands and gravels from our environment and is an alternative to backfill and landfill.*

2. **Cities have a big demand for CDW re-use.** *It's in cities where the demolition of buildings generates huge amounts of CDW and big construction projects are realized.*

3. **The public sector is about to shift to strong sustainability requirements for new buildings**. Innovative material re-use is one of its strong assets.

4. **Get a competitive edge by proposing to use CDW** as secondary raw materials.

5. **Re-use your own concrete waste** which results from concrete precast production.

10 KEY MESSAGES

to the industry and public authorities (cont'd)

6. **Anticipate the rising prices of primary raw materials** by investing into knowledge and experience with secondary raw materials.

7. **CDW re-use is feasible.** Currently available technologies allow to do a high-quality recycling of CDW and to replace natural sands and aggregates by secondary aggregates without compromising the quality of final concrete precast products.

8. **Sorting CDW in the demolition phase** facilitates the re-use of CDW in building projects.

9. **CDW sourced locally** or geographically close to the construction project makes its re-use more CO_2-friendly because of limited transport of bulk materials.

10. **SeRaMCo partners can support** you with expertise in your transition to a more sustainable material re-use.

TO WHOM?

Businesses

- Concrete precast producers in North-West Europe
- Recyclers and aggregate producers
- Construction companies

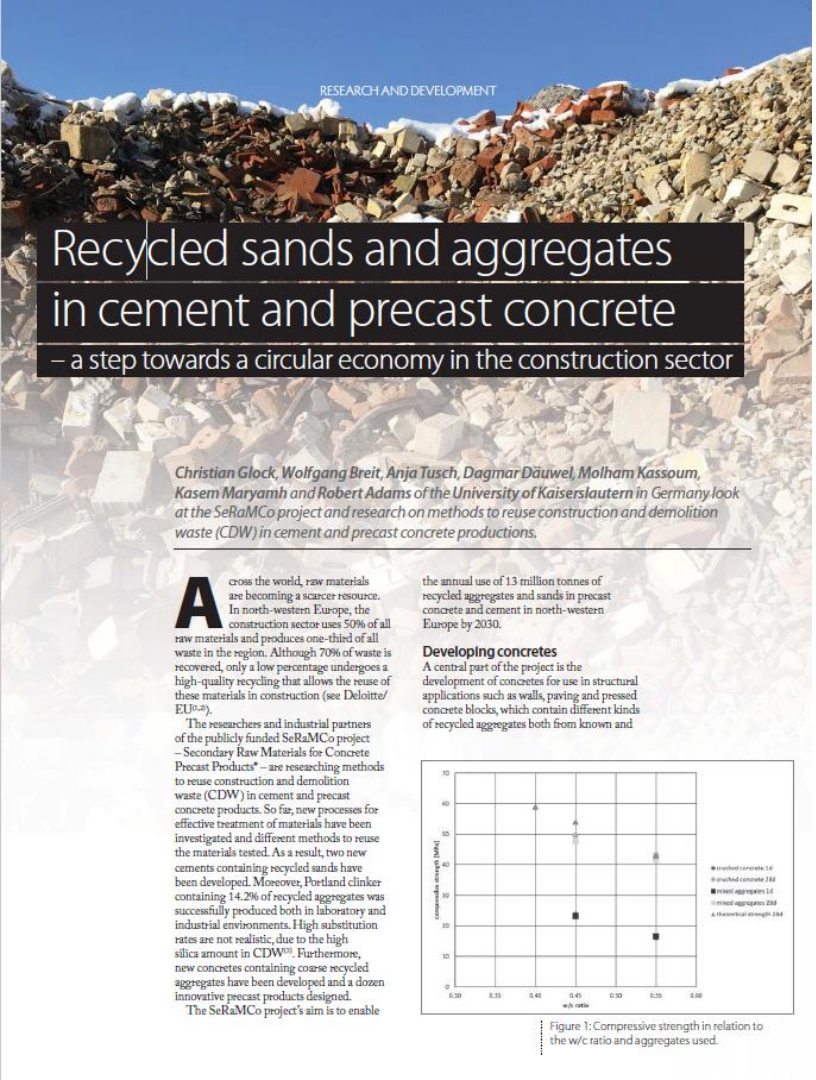
Public authorities

- On local and regional levels in NWE

EU trade associations

- BIBM = concrete precast producers in Europe
- UEPG = aggregate producers in Europe
- EQAR = recyclers in Europe

Students and researchers at universities and research institutes



RESEARCH AND DEVELOPMENT

Recycled sands and aggregates in cement and precast concrete

– a step towards a circular economy in the construction sector

Christian Glock, Wolfgang Breit, Anja Tusch, Dagmar Däuwel, Molham Kassoum, Kasem Maryamh and Robert Adams of the University of Kaiserslautern in Germany look at the SeRaMCo project and research on methods to reuse construction and demolition waste (CDW) in cement and precast concrete productions.

Across the world, raw materials are becoming a scarcer resource. In north-western Europe, the construction sector uses 50% of all raw materials and produces one-third of all waste in the region. Although 70% of waste is recovered, only a low percentage undergoes a high-quality recycling that allows the reuse of these materials in construction (see Deloitte/EU[1,2]).

The researchers and industrial partners of the publicly funded SeRaMCo project – Secondary Raw Materials for Concrete Precast Products* – are researching methods to reuse construction and demolition waste (CDW) in cement and precast concrete products. So far, new processes for effective treatment of materials have been investigated and different methods to reuse the materials tested. As a result, two new cements containing recycled sands have been developed. Moreover, Portland clinker containing 14.2% of recycled aggregates was successfully produced both in laboratory and industrial environments. High substitution rates are not realistic, due to the high silica amount in CDW[3]. Furthermore, new concretes containing coarse recycled aggregates have been developed and a dozen innovative precast products designed.

The SeRaMCo project's aim is to enable the annual use of 13 million tonnes of recycled aggregates and sands in precast concrete and cement in north-western Europe by 2030.

Developing concretes

A central part of the project is the development of concretes for use in structural applications such as walls, paving and pressed concrete blocks, which contain different kinds of recycled aggregates both from known and

Figure 1: Compressive strength in relation to the w/c ratio and aggregates used.

Interreg North-West Europe SeRaMCo

HOW do we roll-out our results ?

- **Publications** with (inter)national outreach

e.g. for CONCRETE magazine (UK), CPI International, BFT International Precast Journal, Construction and Building Materials (Elsevier), Allgemeine Bauzeitung

- **Regional and (inter-) national conferences/meetings/workshops/webinar**
- **Informal meetings** with local building authorities, ministries, construction companies, cement producers, standardization bodies ….
- **Online** newsletter, website, social media (LinkedIn, Twitter, YouTube channel), website

YouTube

Schuttelaar & Partners

Will SeRaMCo have LONG-TERM impact ?

We build a (virtual) community by

- ❖ Spreading the knowledge acquired
- ❖ Sharing SeRaMCo's research findings and experience with industry, research, regulators, policymakers and the public

We help to innovate businesses in recycling, cement and precast production, and design & construction

Our 3 pilot projects will last.


Schuttelaar & Partners
Interreg North-West Europe SeRaMCo
Thank you for listening !
Final SeRaMCo conference
20 January 2021
Bea Rofagha, Senior Consultant