CINDERELA

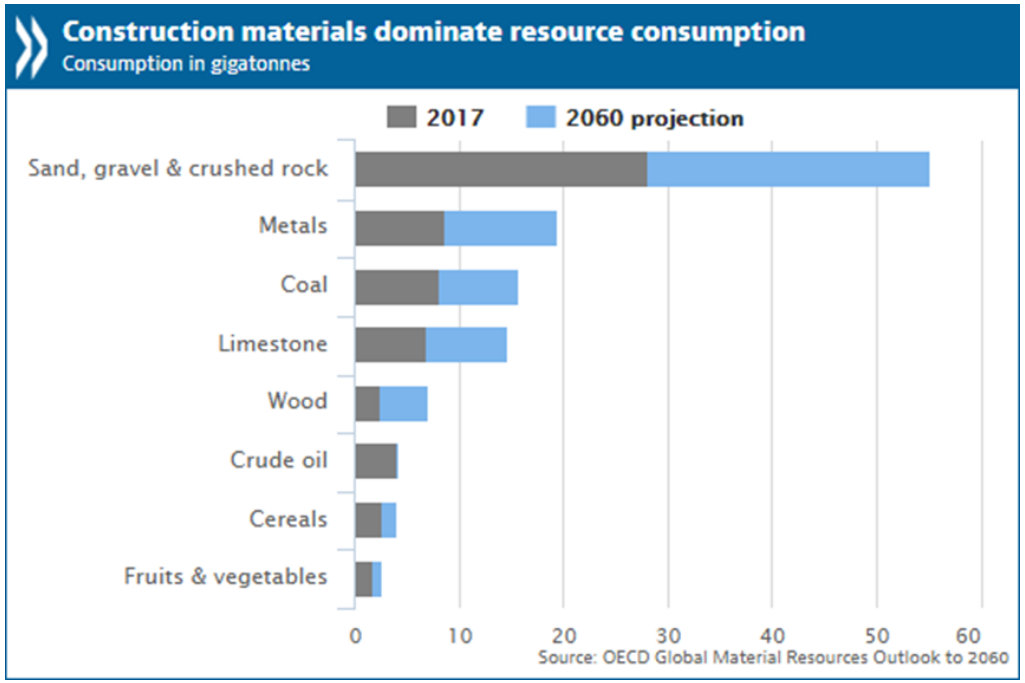
Untapping the potential of locally available secondary raw materials for a more sustainable urban construction sector trough a circular economy business model

New Circular Economy Business Model for More Sustainable Urban Construction

This project has received funding from the **European Union's Horizon 2020 research and innovation Programme under grant agreement N° 776751**

Construction sector

- Globally the construction sector more than doubles between 2017-2060 as does its use of materials, leading to almost 84 Gt construction materials use per year in 2060.
- Economic development, investment, construction activity and construction materials are closely linked.
- Construction sector is mostly driven by investment needs.
- Expansion of construction sector leads to an increase in construction materials use including consumption of raw materials.



Source: OECD, Global Material Resources Outlook to 2060: Economic Drivers and Environmental Consequences. Published on February 12, 2019.

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Circular economy in construction sector is a must

- In Europe, construction sector uses about half of all materials extracted, half of all energy consumed and one third of all water consumed.
- It also generates one third of all EU waste.

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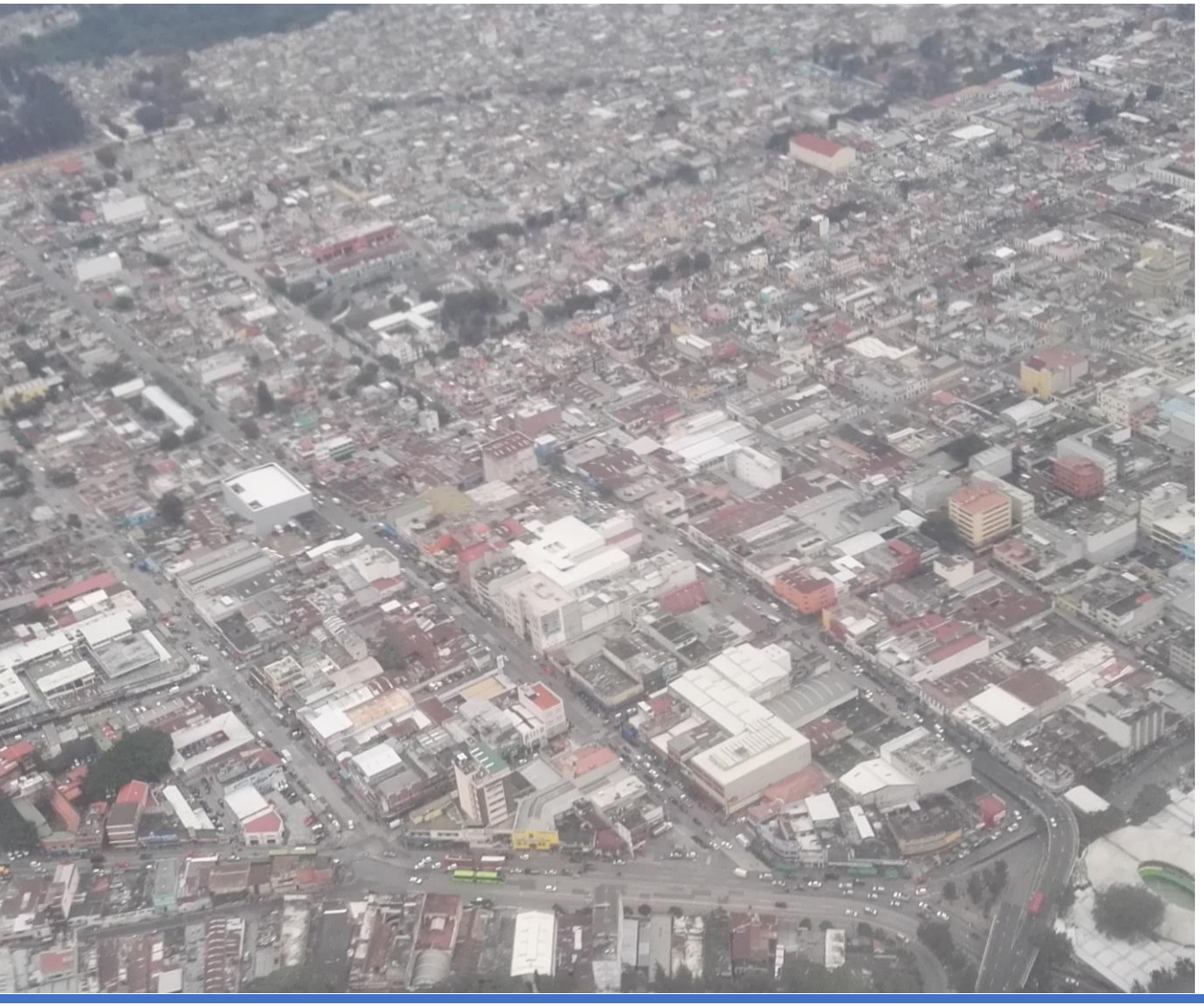
The potential of urban areas



- **Construction activities are mainly located in urban and peri-urban areas due to investment opportunities.**

86% of the developed world is expected to live in urban areas by 2050.

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The potential of urban areas

- Urban and peri-urban areas generate tons of different waste types that are currently unused such as:
  - construction and demolition waste,
  - waste from industries,
  - waste from municipal services,
- They could be turned into a valuable source of secondary raw materials (SRM) for the construction sector available locally and at hand if only adequate business practices, technologies and specialized knowledge were in place.

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CINDERELA boosts the waste to resource in construction

- **CINDERELA develops and demonstrates a circular economy business model (CinderCEBM) aided by a One-Stop-Shop (CinderOSS) service to help construction companies find how they can profit and deliver value to clients thanks to turning SRM recovered from urban waste streams into construction materials for building and civil engineering applications.**

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CINDERELA project in brief

CINDERELA (New Circular Economy Business Model for More Sustainable Urban Construction) is a large-scale demonstration project implemented under the flagship of the Horizon 2020 - Research and Innovation Programme of the European Union

- **Project title: New Circular Economy Business Model for More Sustainable Urban Construction**
- **Project Acronym: CINDERELA**
- **Project Number: 776751**
- **Starting date: 01/06/2018**
- **Duration in months: 48**
- **Budget: 7,635,365.25 EUR**
- **Project Coordinator: Slovenian National Building and Civil Engineering Institute (ZAG)**
- **Project partners: Bocconi University, Bexel Consulting, OpenContent, Fundación Gómez Pardo, TECNALIA, NIGRAD, IETU, AEDHE, TUDelft, 6.MAJ, Polo Tecnologico di Pordenone, KplusV**
- **www: www.cinderela.eu e-mail: info@cinderela.eu**

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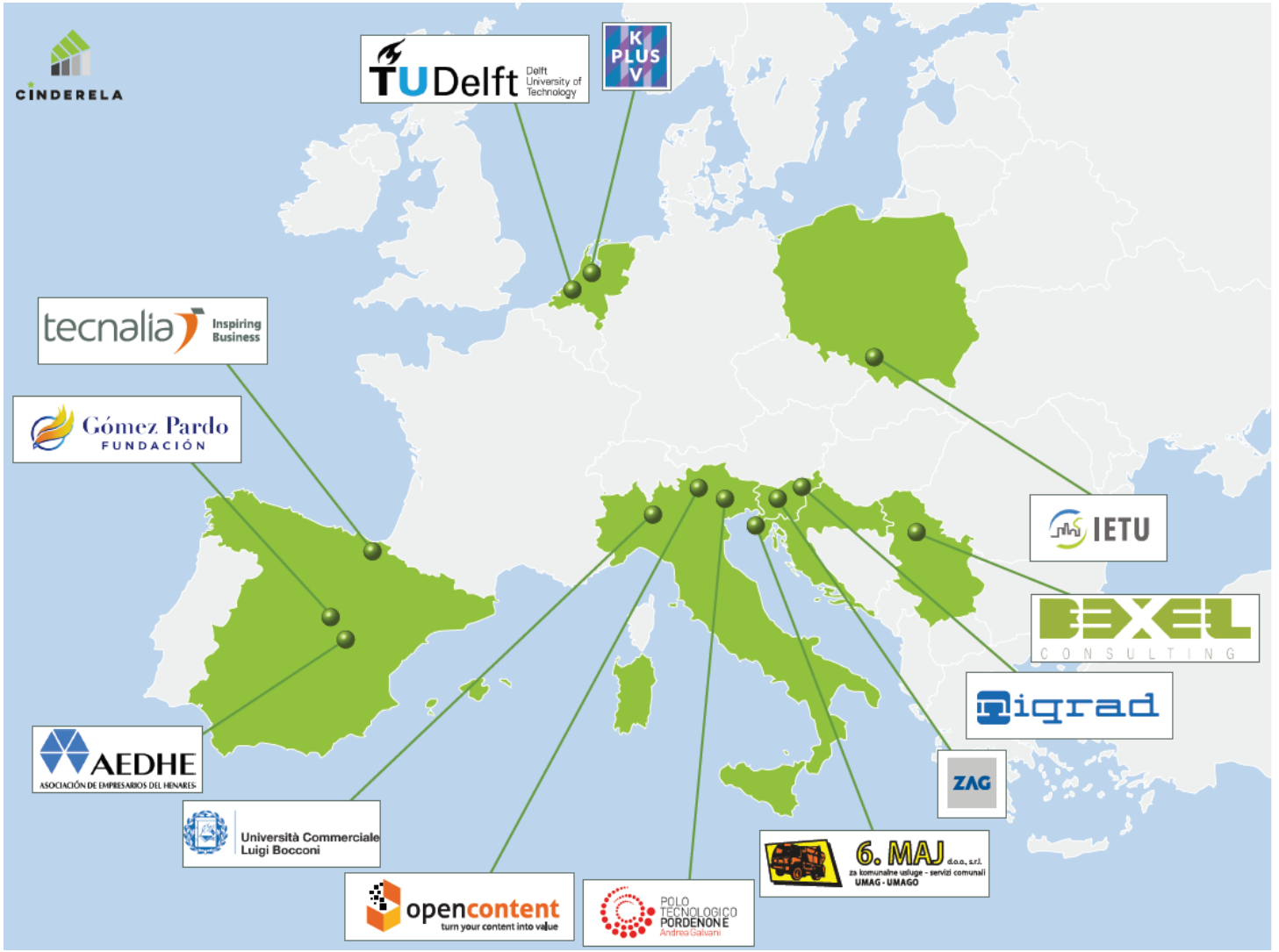
CINDERELA consortium



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CINDERELA action lines

1. assessing waste to resource opportunities
2. circular business model building
3. design, development and testing
4. pilot demonstrations
5. environmental, economic & social assessments

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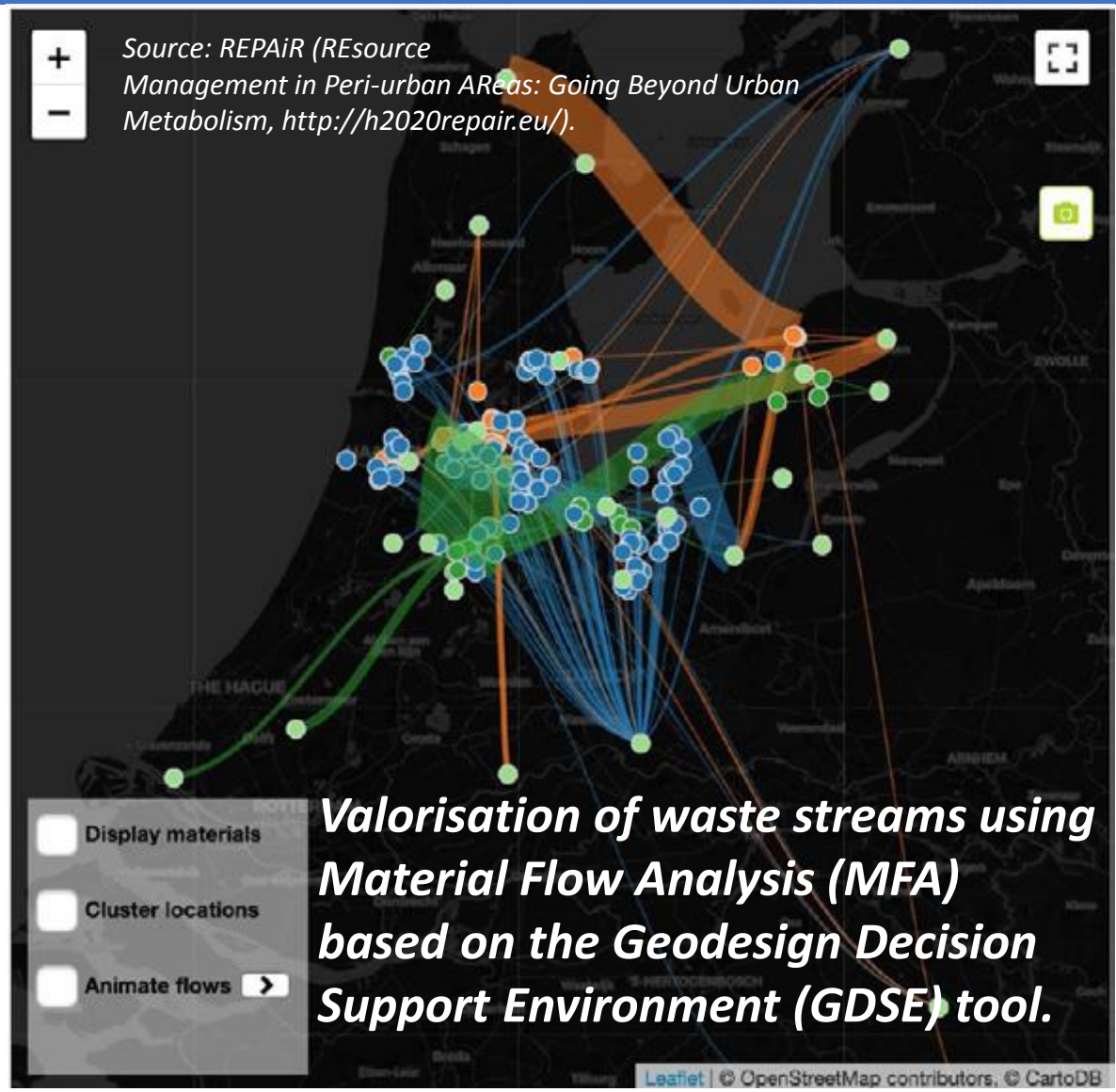
Asessing waste to resource opportunities

Define what is available and where

An open source and GIS supported tool **GDSE** (Geodesign Decision Support Environment), enables predicting the most optimal waste-to-product solution based on waste availability, quantity, and location.

Valorize waste potential for recycling into SRM-based construction products

CINDERELA develops a set of criteria that need to be taken into account by companies in order to have an understanding of the activities required to make their business model work in terms of composition, quantity, quality, availability and recyclability of wastes according to their intended use in construction works.



Valorisation of waste streams using Material Flow Analysis (MFA) based on the Geodesign Decision Support Environment (GDSE) tool.

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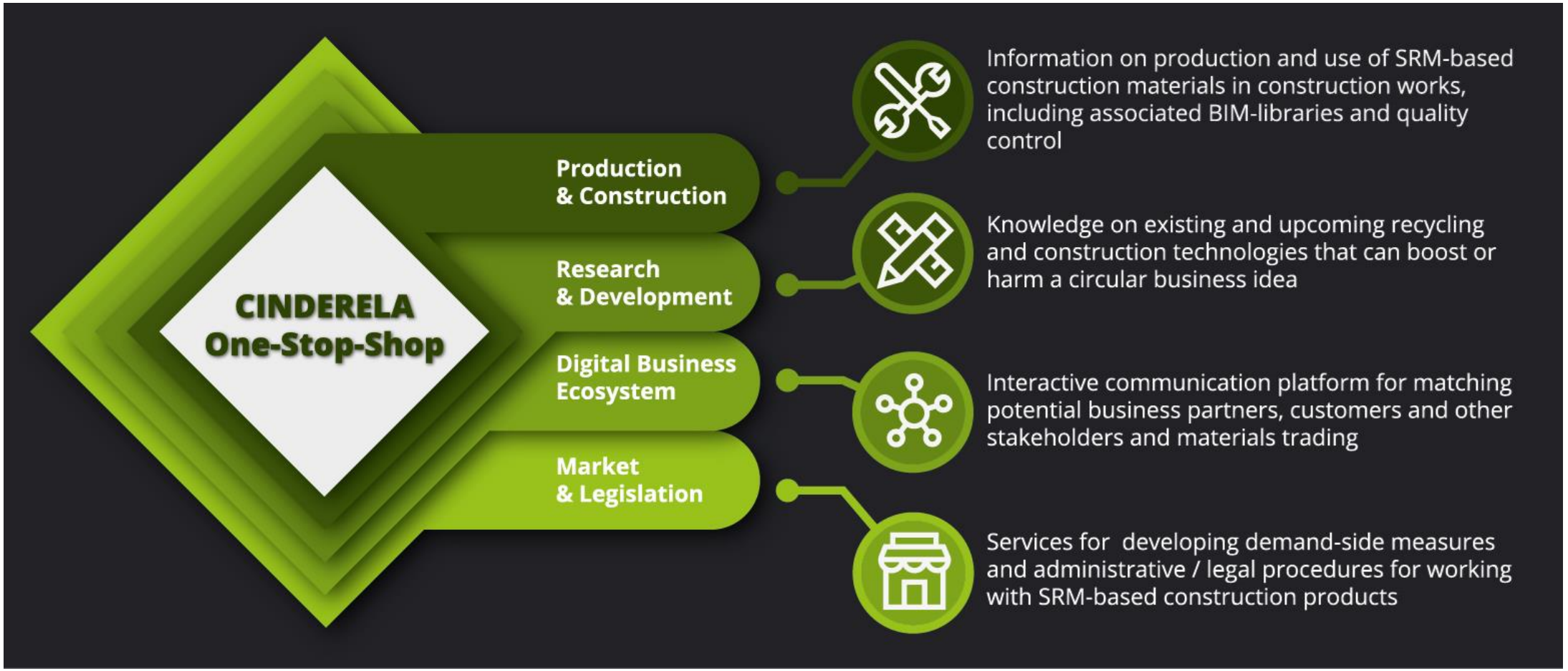
Circular business model building

CinderOSS provides a digital environment enabling setting of circular business models depending on local/regional conditions together with information on SRM availability and the associated stakeholders.



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Design, development and testing

Targeted waste types

- **Construction & demolition waste**
- **Certain types of industrial waste**

  e.g. waste from thermal processes (slags, sludges) from power and incineration plants, iron, steel & glass industry, extractive/mining industry etc.

- **Waste generated by municipal services**

  e.g. inert heavy fraction from municipal solid waste and sewage sludge from municipal waste water treatment, some fractions of municipal waste e.g. plastics.

SRM-based construction products and materials:

- **Recycled aggregates**

  e.g. aggregate from recycled construction and demolition wastes.

- **Manufactured aggregates**

  e.g. aggregates from recycled industrial wastes.

- **Hydraulically bound and unbound construction composites**

  e.g. green concretes.

- **Recycled soils.**

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CINDERELA Demo Pilots

CinderOSS and CinderCEBM are built upon and validated in real environments under six DEMO pilots:

- Phosphorous extraction as a step in a cascading recycling of sewage sludge as SRM
- Production of SRM-based construction products for building and civil engineering applications
- Geotechnical works with the use of SRM-based materials to revitalise a degraded area
- Construction of a building with SRM-based construction materials
- Construction of a road with SRM-based construction materials
- 3D printing of a building component involving combination of robotic 3D printing and recycled plastic waste

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Environmental, economic & social assessments

- Sustainability of CinderelaCEBM will be proven with the environmental, economic and social assessment through whole life (LCA, LCC and S-LCA).
- Environmental performance of the SRM-based construction materials will be assesed using Environmental Technology Verification (ETV) scheme.

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Benefits of CINDERELA

- creates new business opportunities for construction industry and SMEs based on waste materials available locally/regionally;
- provides evidence based knowledge on the enabling framework conditions for design, production and use of SRM-based construction materials;
- helps build confidence in innovative SRM-based construction materials providing reliable test data on their performance based on testing protocols in line with the construction sector requirements.

CINDERELA mobilizes stakeholders and resources for circular economy implementation in the construction sector on local/regional level.

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More info on CINDERELA

Contact us: info@cinderela.eu

Visit our website: https://www.cinderela.eu/

Follow us on LinkedIn: https://www.linkedin.com/in/cinderela-project-7329ba16a/

Follow us on Twitter: https://www.twitter.com/CinderH2020

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CINDERELA Partners

ZAG ZAVOD ZA GRADBENIŠTVO SLOVENIJE — SLOVENIAN NATIONAL BUILDING AND CIVIL ENGINEERING INSTITUTE

Università Bocconi — IEFE Centre for Research on Energy and Environmental Economics and Policy

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Gómez Pardo FUNDACIÓN

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Sigrad — Z vami že od 1857.

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TU Delft — Delft University of Technology

6. MAJ d.o.o., s.r.l. — za komunalne usluge servizi comunali UMAG - UMAGO

POLO TECNOLOGICO PORDENONE — Andrea Galvani

K PLUS V

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