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Introducing RECONMATIC project – new solutions for **Construction and Demolition Waste Management**

WP6 workshops, 2024

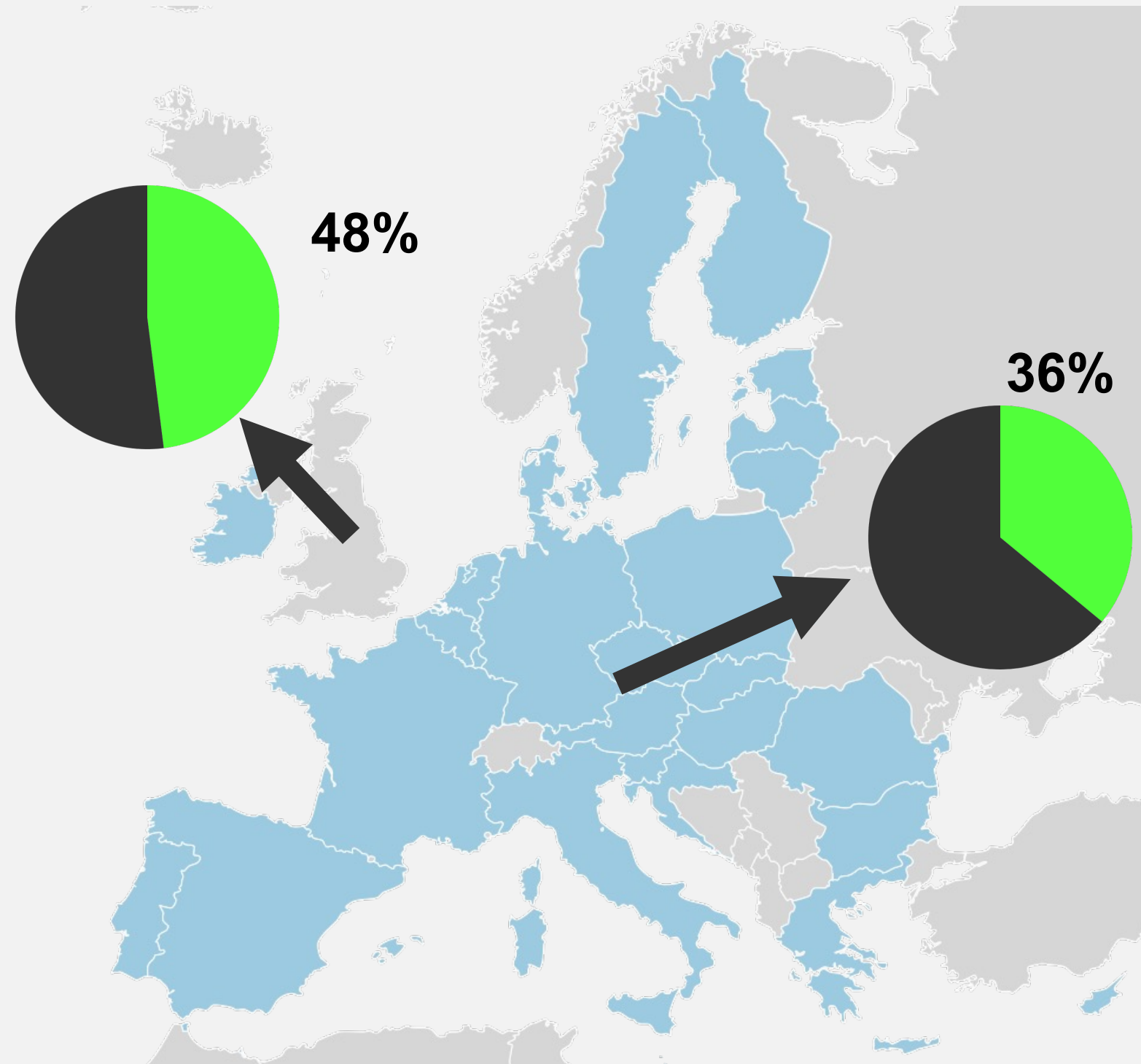
J.A. Ferriz-Papi
University of Salford, UK

Y. Wang
University of Manchester, UK

A. Arevalillo Roman
Tecnalia, Spain

J. Valentin
Czech Technical University in Prague, CzechRepublic

WP6 workshops | Introduction



CONSTRUCTION AND DEMOLITION WASTE PROPORTION

- MORE THAN 10 BILLION TONNES IN THE WORLD
- 35%-65% OF LANDFILL VOLUME OCCUPATION
- CHINA, US AND EU ARE THE BIGGEST PRODUCERS
- EU-28 RECOVERY RATE AROUND 90%
- MAINLY IN LOW VALUE USES
- CHALLENGES TO ACHIEVE :
 - THE NEW GREEN EUROPEAN DEAL
 - EU FRAMEWORK DIRECTIVE
 - ZERO ENERGY AND WASTE TARGETS BY 2050

AIM:

To identify the main challenges to successfully implement the principles of circular economy in CDW management and outline digital and automated solutions to be developed in the RECONMATIC project.

WP6 workshops | Challenges

TASKS & SUBTASKS

- T5.1: Selection of highest added value solutions for CDW (TEC) M11-M34
 - 5.1.1. Extension of service life and fitness for use of construction products/systems (TEC)
 - 5.1.2. Methodology to increase the added value of reused or recycled CDW based materials (TEC)
- T5.2: Integration with the building ecosystem (CVUT) M15-M28
- T5.3: Overcoming barriers to introduce new products (containing elevated contents of recycled materials) into the market (UMAN); M17-M32
- T5.4: Digitised quality control and quality assurance (TEC) M23-M36
- T5.5: Validation of the methodology (ITC-AICE); M33-M45

DELIVERABLES

- D5.1. (T5.1, T5.2 & T5.3) Report with recommendations to overcome market barriers and guideline with methodology to provide new added value uses to CDW, including traceability and quality assurance requisites (M32) TEC
- D5.2. (T5.4) Guideline to ascertain quality assurance including proposal for revision/generation of harmonized test / product standards (M36) TEC
- D5.3. (T5.5) Report including the results of the demo cases (M45) ITC-AICE

WP6 workshops | RECONMATIC vision and objectives

Implementation of digital and automated solutions in the waste value chain can improve performance substantially and open realistic pathways for energy and waste zero targets from a bottom-up approach

- Building Information Modelling (BIM)
- Geographic Information System (GIS)
- 3D printing
- Geo-spatial data analysis
- Artificial intelligence (AI)
- Virtual Reality (VR)
- Augmented reality (AR)
- Blockchain
- Internet of Things (IoT)
- Cybersecurity
- Robotics etc.



Machines available for waste sorting. Left to right: a) Pellenc, b) MaxAI, c) ZenRobotics.

WP6 workshops | RECONMATIC vision and objectives

Mission #1 | Avoid Waste

- Integrate secondary materials in design
- Mitigate future waste generation using smart design (LCA)



Mission #2 | Minimise Waste

- Reuse recycled products and by-products
- Prefer durable materials
- Employ digital construction planning
- Segregate waste on site and reuse



Mission #3 | Reduce Waste

- Asset management using digital twins
- Continuous structural health monitoring
- Mitigate waste and segregate
- Force reuse during refurbishment



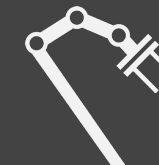
Mission #4 | Presort Waste

- Deconstruction planning using digital twins
- Enforce selective waste selection
- Dismantle when possible



Mission #5 | Sort and Treat Waste

- Use effect logistics concept and digitalised waste management in plants
- Introduce automated solutions for waste sorting and treatment



Mission #3 | Valorize Waste

- Develop and produce new competitive recycled materials
- Avoid inefficient recycling solutions
- Use products from locally recycled materials



WP6 workshops | RECONMATIC vision and objectives

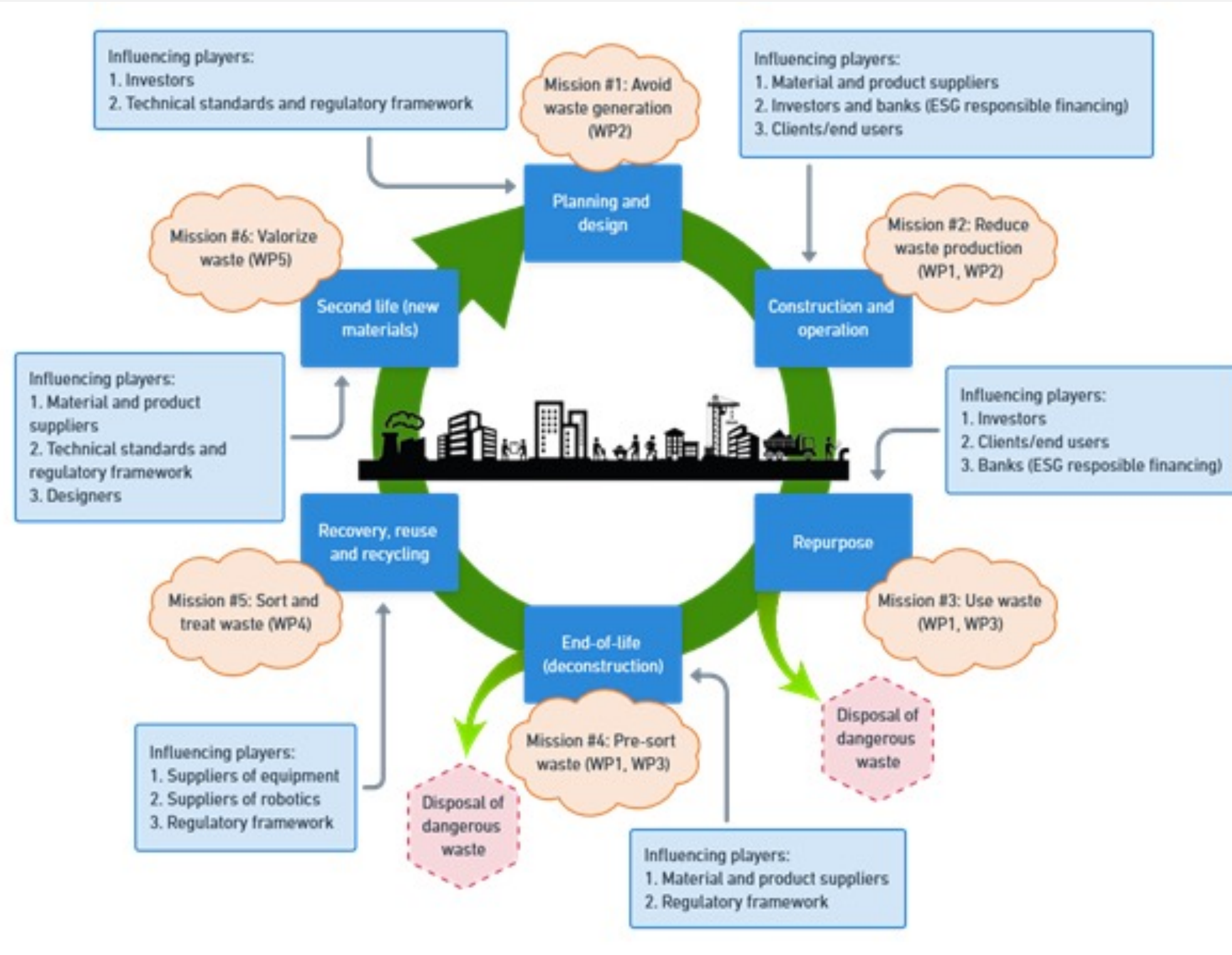
1. The CDW stream has to be minimized
2. Produced CDW has to be treated and better controlled, so that recovery can be developed in high-value construction products, with the right traceability and quality assurance

Special emphasis is given to:

- Waste traceability data
- LCA and environmental sustainability
- stakeholders collaboration
- Integrated and easily adoptable solutions
- QA



WP6 workshops | RECONMATIC vision and objectives



WP6 workshops | Outline of RECONMATIC implementation

CDW whole value chain

- Digital protocol for sustainability and circular assessment
- Digital information management system for integration of solutions and stakeholder collaboration

Design and construction

- Material mapping tools for reusability
- BIM waste predictive tools
- Advanced BIM models with active waste management processes
- Blockchain tracking tools

Use and end of life

- Digital twin generation with as-built material identification
- EoSL material datasets
- Automation of waste audits

Off-site sorting and logistics

- AI-based automation for waste sorting
- Improved logistics for waste collection and automated management at off-site treatment
- Automated recognition by sensors
- Processing of new recycled materials

New materials derived from CDW

- Extension of material service life
- Added value assessment of new materials
- QC & QA
- Overcoming market barriers

Communication & dissemination

- Training material and sessions

- Communication, dissemination, branding

- Contribution to legal, regulatory and standardization frameworks

WP6 workshops | Outline of RECONMATIC implementation



- CVUT, ENVI, STR, JAIP
- TEC, ICAT, AEICE, ITC-AICE, RECSO
- USAL, UMAN, MS, BIMBOX, LECYC
- UTH, ANAK, AUTH, ERGO, SKYDE
- FN
- ITFR
- ETRI, CACE
- Demonstration cases



WP6 workshops | Outline of RECONMATIC implementation

OUTCOMES

- Knowledge of reuse, dismantling and high value recycling of CDW to achieve zero waste
- Heightened awareness of feasibility of technologies and methods/solutions of the project
- Increasing by 50% the reusability of construction products in post demolition and reduce of waste
- New or updated standards for reuse and recycling of CDW and related new materials
- Materials for further educating future stakeholders

IMPACTS

- Holistic and replicable solutions for more circular and climate neutral construction
- Acceleration in green and digital transition of manufacturing and construction sectors
- Sustainable, flexible, responsive and resilient supply chain of construction materials
- Upskilling of workforce in manufacturing and construction
- Creation of high skilled jobs in digitization, automated construction, AI, advanced robotics
- Increased European productivity, innovation, competitiveness, resilience, sustainability
- Major contributions to CO2 reduction, carbon neutral and zero waste initiatives in climate control



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The **RECONMATIC project** has been funded by the European Union under Grant Agreement No. 101058580 and by the UK Research and Innovation as part of the UK Guarantee programme for UK Horizon Europe participation.

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THANK YOU FOR YOUR ATTENTION

Juan A Ferriz-Papi (j.a.Salford@Salford.ac.uk)

Yong Wang (yong.wang@manchester.ac.uk)

Alfonso Arevalillo Roman (alfonso.arevalillo@tecnalia.com)

Project coordinator

Jan Valentin (jan.valentin@fsv.cvut.cz)