FROM CIRCULAR ECONOMY TO THE FIGHT AGAINST THE CLIMATE CHANGE

FEAD's 40th Anniversary & Biennial Conference

2 June 2022 10:00 – 12:00
IFAT Munich

Hybrid Event

Welcome and opening

Peter Kurth,
FEAD President

Virginijus Sinkevičius,
Commissioner for Environment

Nikolay Sidzhimov,
Vice Minister in charge of waste management

Keith Bury,
FEAD past president

40 YEARS
FEAD European Waste Management Association

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Block 1: Markets as key condition for success

Petr Kratochvil,
ECOBAT s.r.o.

Holger Kuhlmann,
BASF

Prof. Dr. jur. Helmut Maurer,
European Commission

Moderated by Valérie Plainemaison, FEAD Secretary-General

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New Regulatory Framework for Batteries

- **10.12.2020:** European Commission published a proposal for a Regulation concerning batteries and waste batteries.
- *IMCO, ITRE and ENVI Committee at EP* – last vote March 2022
- **From 20.04.2022:** The interinstitutional negotiations (trilogue) between European Parliament and Council started, and will finish Q2 2023
- Key provisions for more circularity in Batteries:
  - Mandatory recycled content, as a key signal to trigger investments
  - High collection targets, to deliver the needed tonnages
  - Quicker delegated acts, to allow to deploy investments on time

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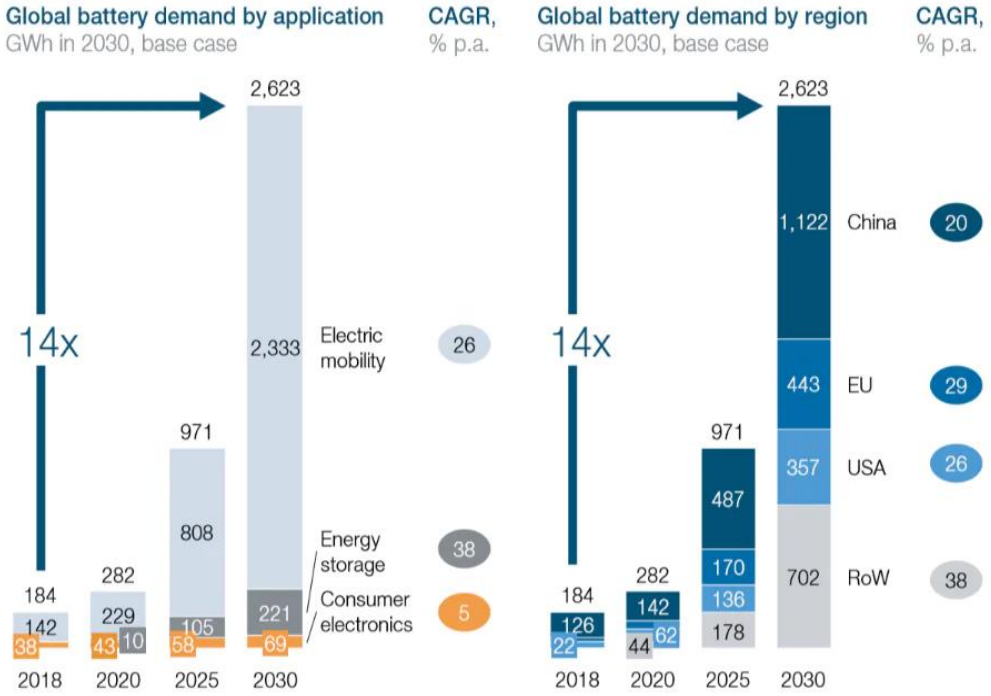
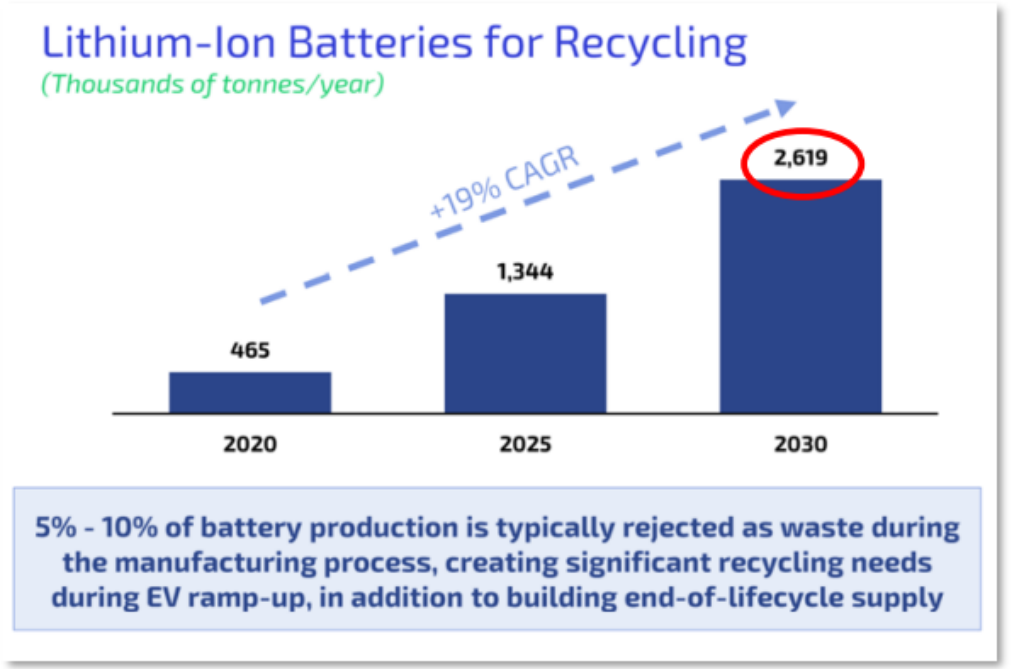


Source: European Commission. Impact Assessment Report - Proposal for a Regulation of the European Parliament and of the Council concerning batteries and waste batteries, repealing Directive 2006/66/EC and amending Regulation (EU) 2019/1020.

The global battery demand in Europe to increase 14x by **2030**



Source: https://about.bnef.com/electric-vehicle-outlook-table-of-contents/

Lithium-Ion Batteries for Recycling worldwide in **2030**: 2 619 000 t
(Europe is reflecting 20 – 25%: 523 000 t)

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Name	Country	Operator	Battery type	Processable	Capacity
Redux Recycling GmbH	Germany	WEEE Ireland	Lithium Rechargeable	Yes	0 t
Umicore	Belgium	Bebat	Lithium Rechargeable	Yes	7000 t
ACCUREC Recycling GmbH	Germany	Stibat	Lithium Rechargeable	Yes	2500 t
Akkuser Oy	Finland	Recser	Lithium Rechargeable	Yes	1000 t
Euro Dieuze Industrie	France	Corepile	Lithium Rechargeable	Yes	2000 t
Nickelhütte	Germany	GRS Batterien	Lithium Rechargeable	Yes	1000 t
UTE VILOMARA	Spain	Ecopilas	Lithium Rechargeable	Yes	0 t
SNAM- St Quentin-Fallavier	France	ARN	Lithium Rechargeable	Yes	1500 t
SNAM- Viviez	France	ARN	Lithium Rechargeable	Yes	1500 t
Duesenfeld GmbH	Germany	ARN	Lithium Rechargeable	Yes	4380 t

Source: Eucobat 2021

Recycling capacity in the EU in 2020:
20 880 t

Lithium-Ion Batteries for Recycling in 2030:
500 000 t

→ Recycling capacity needs to be increased by 25x until 2030 to manage the flow of End-of-life batteries

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Waste Batteries in the Czech Republic

FEAD Biennial Conference, IFAT Munchen, 2.6.2022

RNDr Petr Kratochvíl

Waste batteries in CZ

- **Act on End-of-Life Products** 542/2020 Coll. Covering
  - Batteries and accumulators
  - Electric and electronic equipment
  - End of Life Vehicles and Tyres
- Strictly on principal of **extended producer responsibility**
- **2 compliance schemes** for take-back of batteries
- Companies put **batteries on the Czech market**
  - Portable batteries …2.346
  - Industrial batteries …..333
  - Automobile batteries ..156

Portable batteries

- compliance scheme **ECOBAT** is dominant
- collection started in 2002
- 22.000 collection points
- 2.000 tons collected in 2021
- collection efficiency 48%
- 50% of waste batteries exported to EU countries

Automotive – Industrial batteries

- **individual approach** of battery producers prevailing
- ECOBAT serves round 115 clients
  - Toyota CE
  - Jungheinrich, Linde, Toyota MH
- high efficiency and closed loop of **Pb – acid** batteries
- The only **recycling facility** in CZ:
  - Kovohutě Příbram
  - Pb – Acid batteries
  - Zn Alkaline batteries
  - Li-Ion batteries from 4Q_2022 – small scale

Challenges

- frequent **fire incidents** – Li-Ion/Li batteries - transport, storing, recycling
- **lack of recycling capacities** for LiIon/Li batteries
  - expensive
  - in-mature recycling market
  - preference for acceptance of production than collected waste
- historical waste issue (solar system Li-Ion batteries)
- coming **notification process** for LiIon batteries as a barrier
- How to reach and check mandatory **recycling efficiency?**
  - 2009 – 2021 only paper-work
  - LiFePo sub-type and other batteries with very low recyclable content

Lithium batteries as **the most expensive waste**

I am ready for discussion!

Block 2: Innovation, green & digital economy

Pablo Kroff,
SUEZ

Johannes Schön,
REMONDIS Digital Service GmbH

Andréas von Kaenel,
Cortexia

Elena Jimenez Coloma,
Prezero Spain & Portugal

Moderated by Claudia Mensi, FEAD Vice-President

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The SUEZ BioResourceLab & the need for readiness in times of change

Pablo Kroff
R&D program manager, CIRSEE

IFAT, Munich, June 2nd, 2022

SUEZ in a nutshell

160

For 160 years, SUEZ has been a key player in environmental services.
Today, our services span across, **water services, recycling and recovery & air quality,** incorporating smart and digital solutions with a unique expertise and know-how across **the entire value chain**:

- Consulting
- Design
- Construction
- Long-term operation
- Financing

5 continents;

35,000 employees;

~7 billion € revenue;

66 million people served by drinking water production plants operated by SUEZ;

3,1 TWh renewable energy produced;

4,2 million tonnes of CO2 avoided on behalf of the Group's customers;

2 million tonnes of secondary raw materials produced.

Scarcity of water, of land for feed/food, climate change, overpopulation, overconsumption, environmental concerns, biodiversity loss

The new SUEZ BioResourceLab

Advanced R&I platform for organic waste valorization

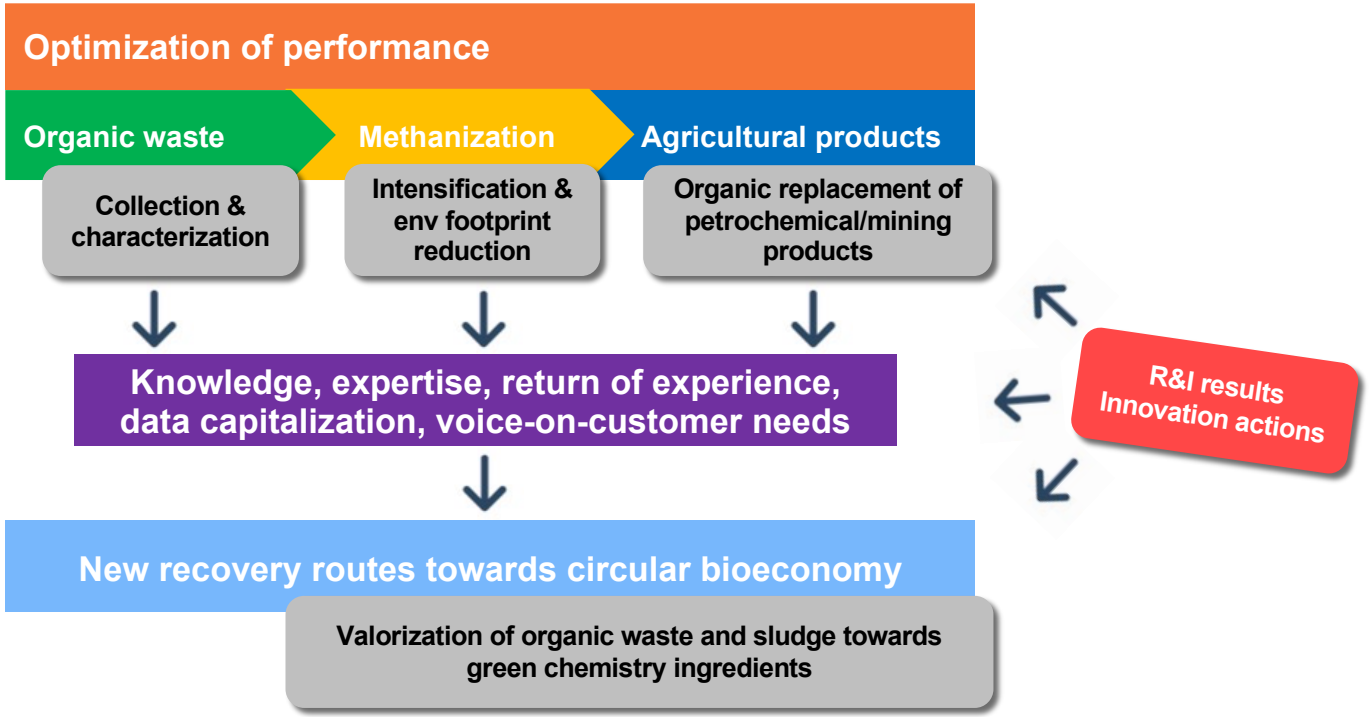
The BioResourcelab is a key asset for SUEZ vision for organic waste

The BioResourcelab key figures

- 1000 m² of offices & technical space including laboratories and pilot facilities
- Capacity of 20 people
- 5 million Euro CAPEX investment

Goals

- Optimize existing treatment processes and technologies
- Explore new ways of valorizing organic waste to produce *bioenergy, biofuels, biomaterials, alternative fertilizers and raw materials for green chemistry*
- Foster relevant innovation to produce new resources on a territorial scale
- Preserve the environment through resource protection and valorization of organic waste flows
- Use circular economy rationales to accelerate the transition to a virtuous bioeconomy.



Example of collaborative projects to materialize this vision

AFTER | BIOCHEM

The AFTERBIOCHEM project

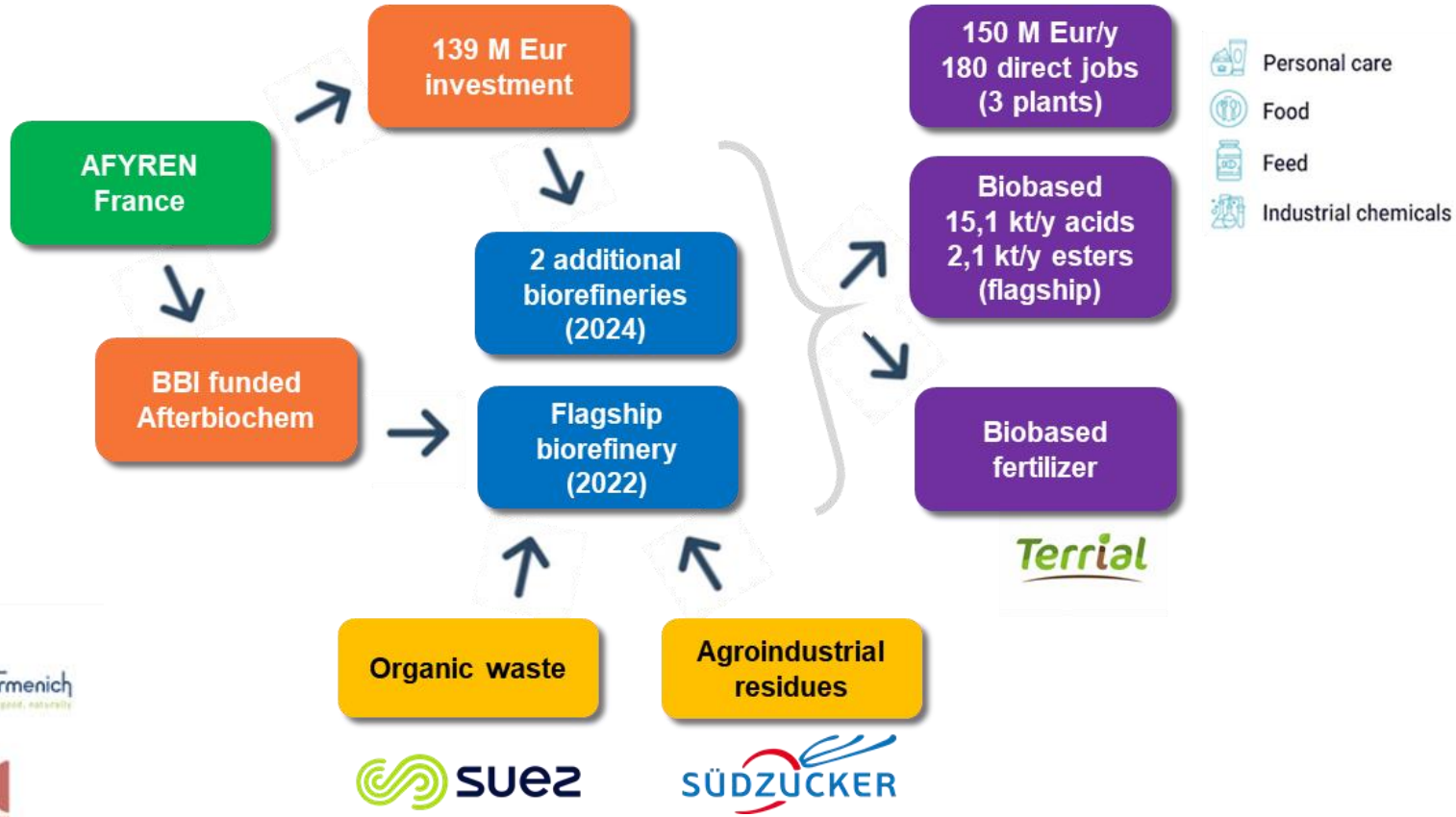
AFTER BIOCHEM

Bio-based Industries Consortium

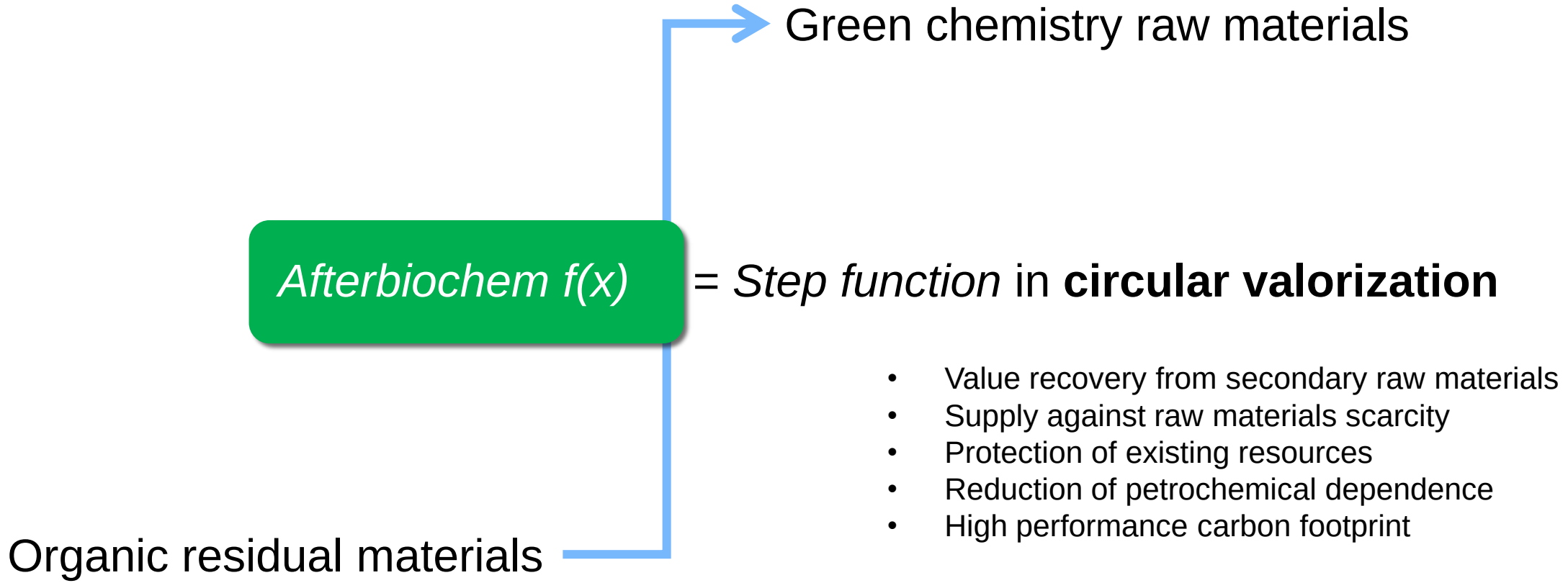
BBI JU

European Union

Action	Innovation action, flagship project
Leader	Afyren Neoxy (France)
Partners	12 partners (EU)
Funding	20 Mill Eur (BBI JU contribution)
Start date	04 May 2020
End date	30 April 2024



Afterbiochem: Step-function towards dedicated waste valorization



- Value recovery from secondary raw materials
- Supply against raw materials scarcity
- Protection of existing resources
- Reduction of petrochemical dependence
- High performance carbon footprint


PELLENC ST
THERE IS
NO SUCH
THING AS
WASTE

The SUEZ BioresourceLab & the need for readiness in times of change

IFAT, Munich, June 2nd, 2022

Pablo Kroff
R&D program manager, CIRSEE
pablo.kroff@suez.com

Empower your environmental services with

AI to optimise the quality, safety and efficiency of urban services

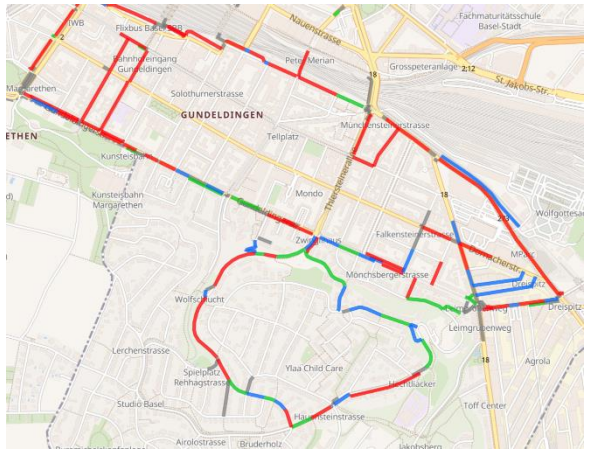
Cortexia AI Waste Management Solution

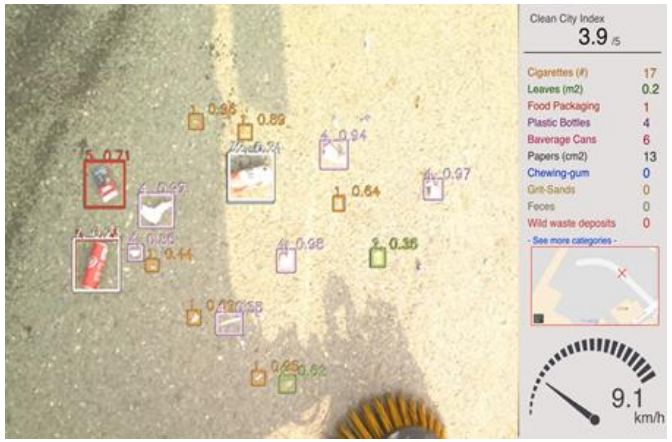
Andréas von Kaenel

SOLUTION

Monitoring urban cleanliness

Quality management and data driven result-oriented cleaning





Manage urban cleaning…

- Cleanliness level monitoring
- Resource savings
- Environment preservation

… thanks to automatic litter detection…

AI Computer Vision and continuous learning for precise litter recognition

… onboard any vehicle.

Real-time detection with data privacy.

Cleaner with less resources

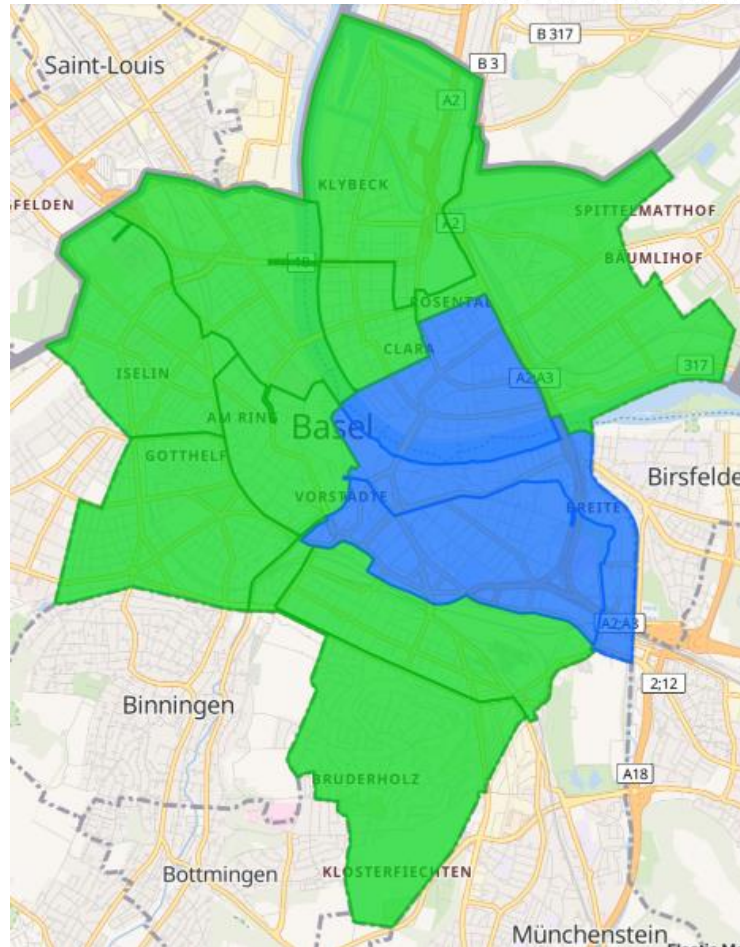
- Cleaner streets and more uniform cleanliness all over the city

VILLE DE GENÈVE

- Reduction from 3 to 2 sweepers
- 20% less cleaning machine hours

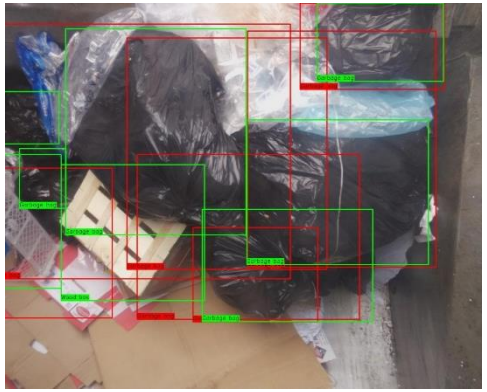
Kanton Basel-Stadt

- 15% less sweeping machines

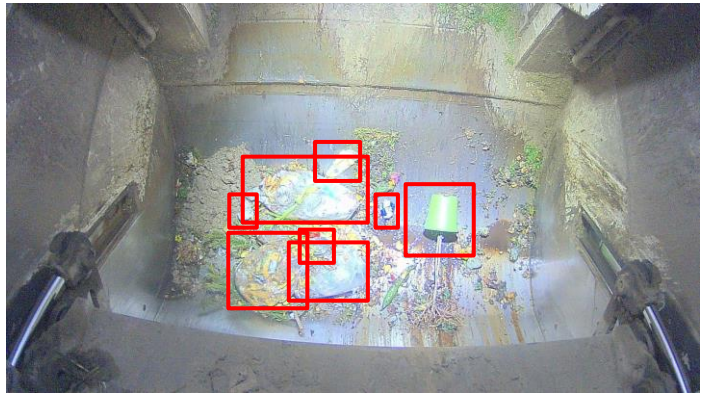


Waste quality monitoring

Municipal waste



Biowaste



DATAFLEET

REMONDIS®

IM AUFTRAG DER ZUKUNFT

Working for safer and cleaner cities

DATAFLEET

- AI-based collection of environmental data, such as traffic signs, potholes or illegal dumps
- Leveraging the USP of waste collection vehicles
- Aim: to make cities cleaner and safer
- In-house development by REMONDIS Digital
- Solution not limited to use in REMONDIS vehicles
- Successfully used in more than 15 cities

Every day, street walkers ensure that traffic safety obligations are met, but...

... data is not digitally recorded in all cities

... data is not always available centrally

... data is subjectively evaluated

... data is quickly outdated

... not all routes are accessible for street walkers

... more than 4,000 km have to be covered each year in wind and weather

... physical strain causes high failure rates

... difficult to find trained and motivated people

Practical example WBO Oberhausen:
DataFleet supports the daily work of the street walkers in Oberhausen

- 3 DataFleet systems
- control the entire road network of 550 Km
- in a rotation of 2 weeks

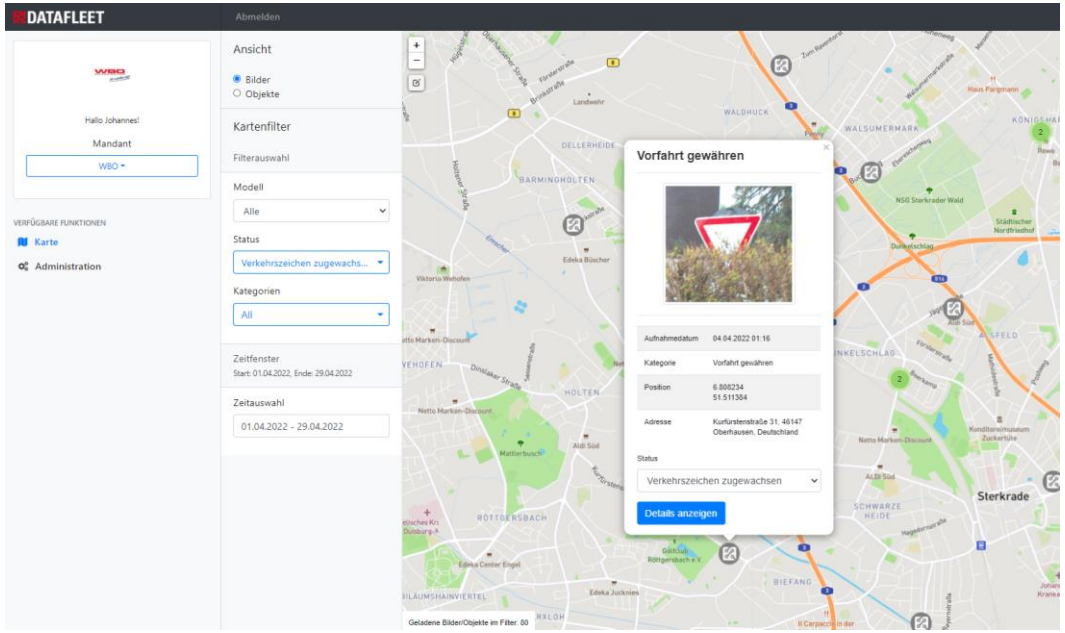
REMONDIS
IM AUFTRAG DER ZUKUNFT

Practical example WBO Oberhausen:
DataFleet supports the daily work of the street walkers in Oberhausen

> 1,000 traffic signs checked per day

8 different types of mangle

for example 80 overgrown traffic signs in April



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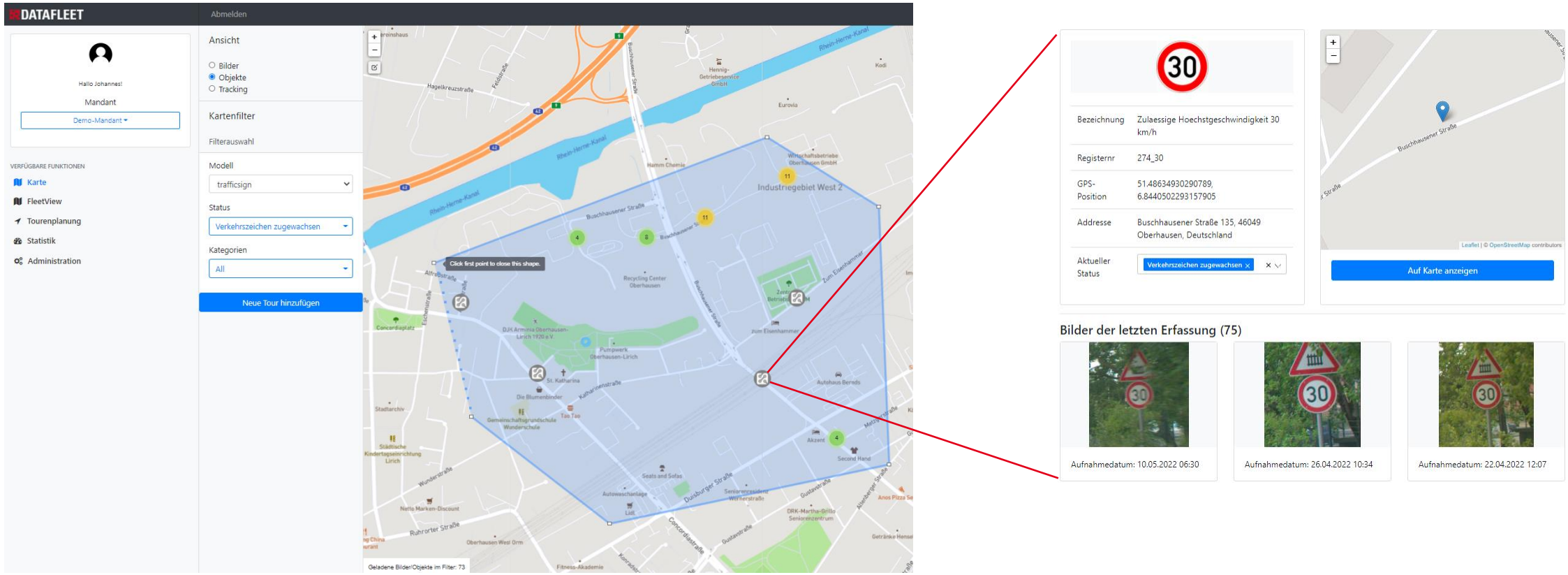
Practical example WBO Oberhausen:
The data can be used to plan optimized maintenance



Let’s go further & challenge us !

Where the shoe pinches ?

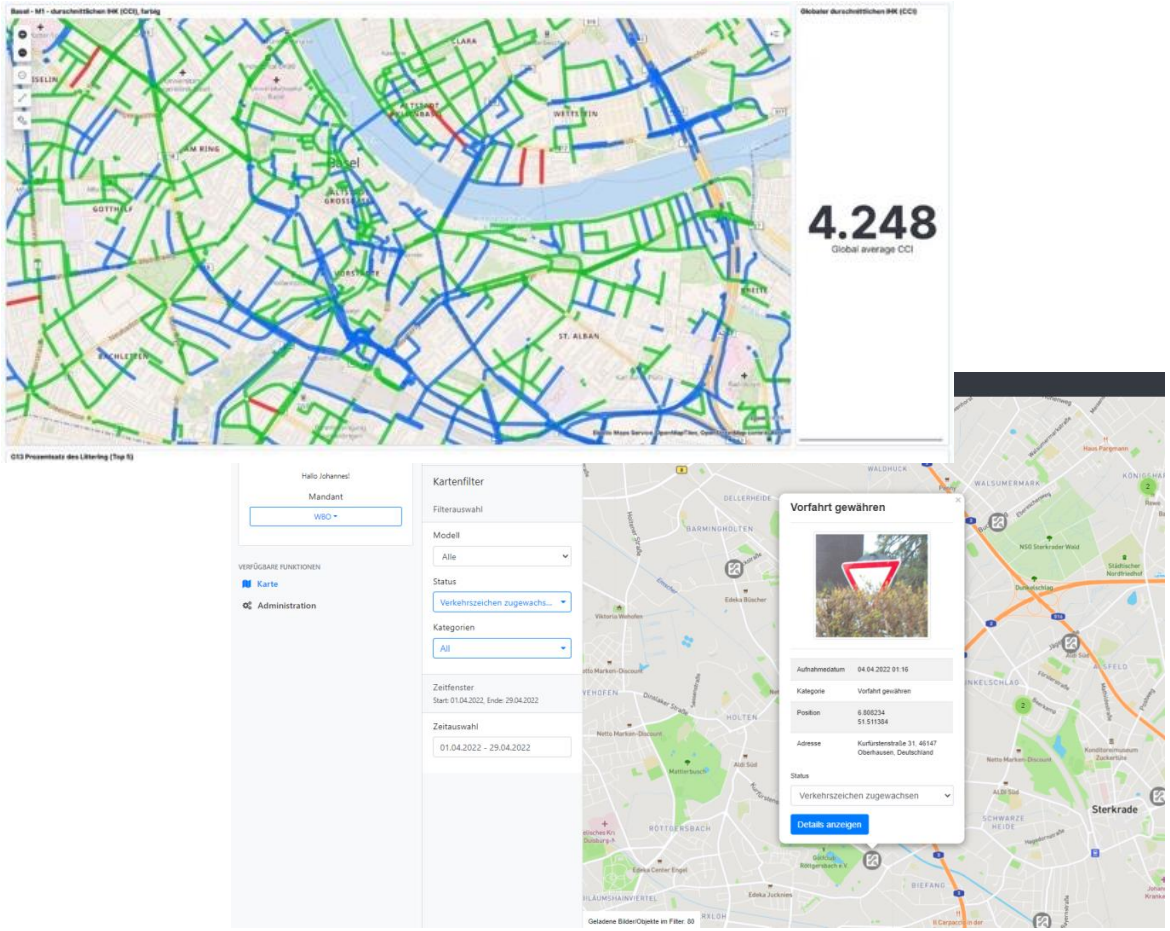
- Clean city, security, waste quality, infrastructure management …

Define your targets …

- Quality of service, resources, process optimization …

… and reach them together

- Ramp-up projects in limited time



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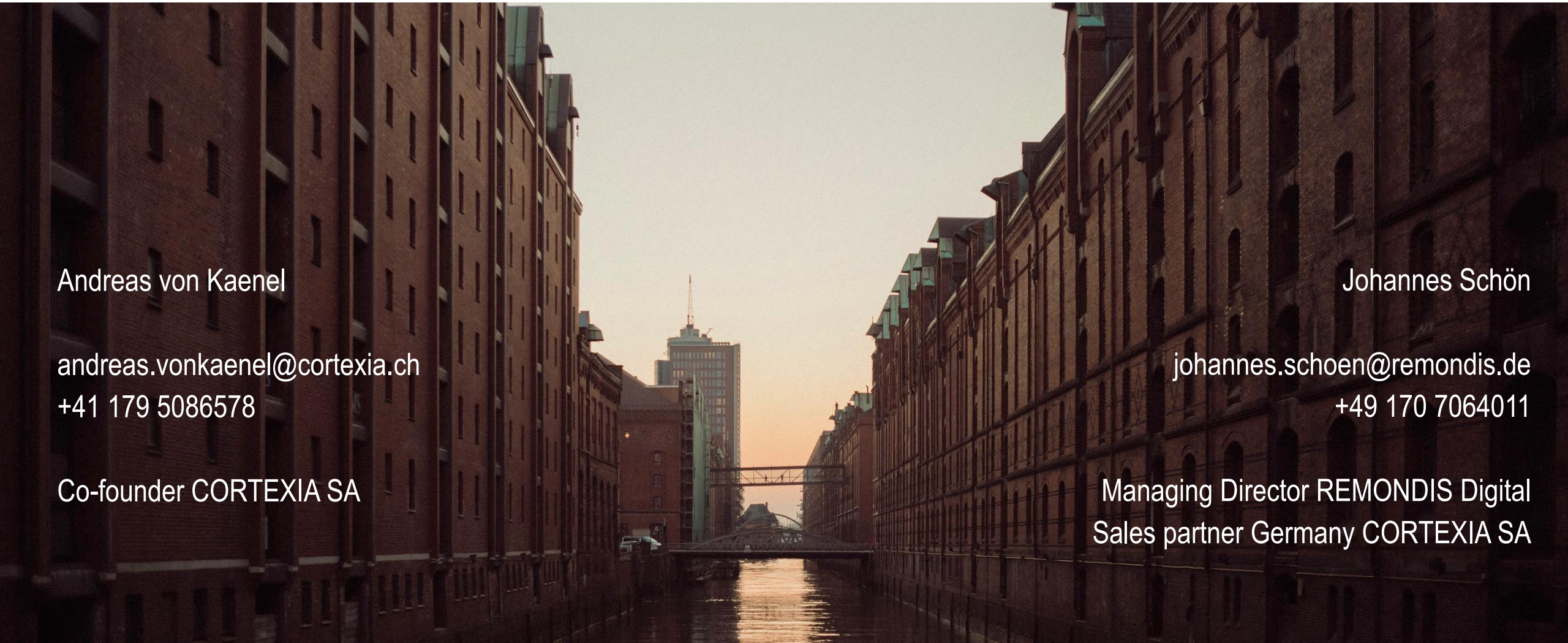

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Sales partner Germany CORTEXIA SA

Wind Blades Recycling Project
Futur-e Compostilla

June 2022

LM WIND POWER
a GE Renewable Energy business

prezero

endesa

Wind Blade Recycling Project

Wind farms Spanish situation 2022-2030

Spain is **one of the European countries with the largest fleet of wind turbines,** with total power **28 073 MW** and 21 430 turbines. Around **12 600 wind turbines will reach the end useful life** (25 years) **in 2030**.

PNIEC (National Energy and Climate Plan) targets to reach 42% energy consumption from renewables in 2030. Wind energy installed power should increase 80%, reaching **50 GW in 2030**.

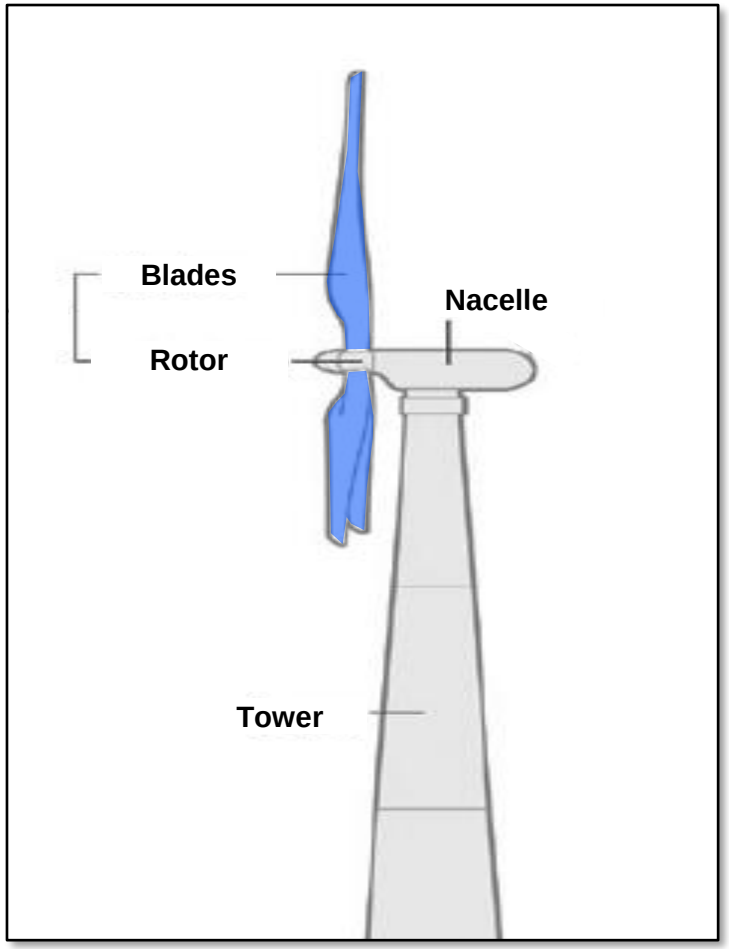
Repowering: Replace old models by new and more efficient models **increase wind farm electricity output** while **reducing** the **environmental impact** of new capacity.

- Main destination of EOL wind blades is **landfilling**. New alternatives for its valorization must be tackled.
- With an aging wind fleet there will be an **exponential growth** of **blades generated as waste** in the coming years.
- There are currently **no regulations** forbidding blades in landfills, but this will soon become an **unsustainable practice**.

We must establish a circular economy solution for EOL wind blades.

Recycling of Blades

Treatment of Wind turbines end-of-life materials



3.5 MW wind turbine with a total weight of 500 tons.
Source: Vestas 2018, ETIP Wind, PwC Strategy & Analysis

Turbine materials	EoL treatment	Total weight percentage
Steel / Iron	100% recycling	89%
Aluminum and alloys	100% recycling	1,3%
Copper and alloys	100% recycling	0,6%
Fiberglass / Carbon fiber	~90-100% to landfills	5,7%
Plastics	100% recycling	2,7%
Lubricants / Other fluids	100% recycling	0,4%

Wind blades are the most difficult components to recycle.
Fiberglass and carbon fiber composites are the main material in windblades with reduced valorization alternatives.

Wind Blade Recycling Project

Repowering and potential market in Spain

Repowering

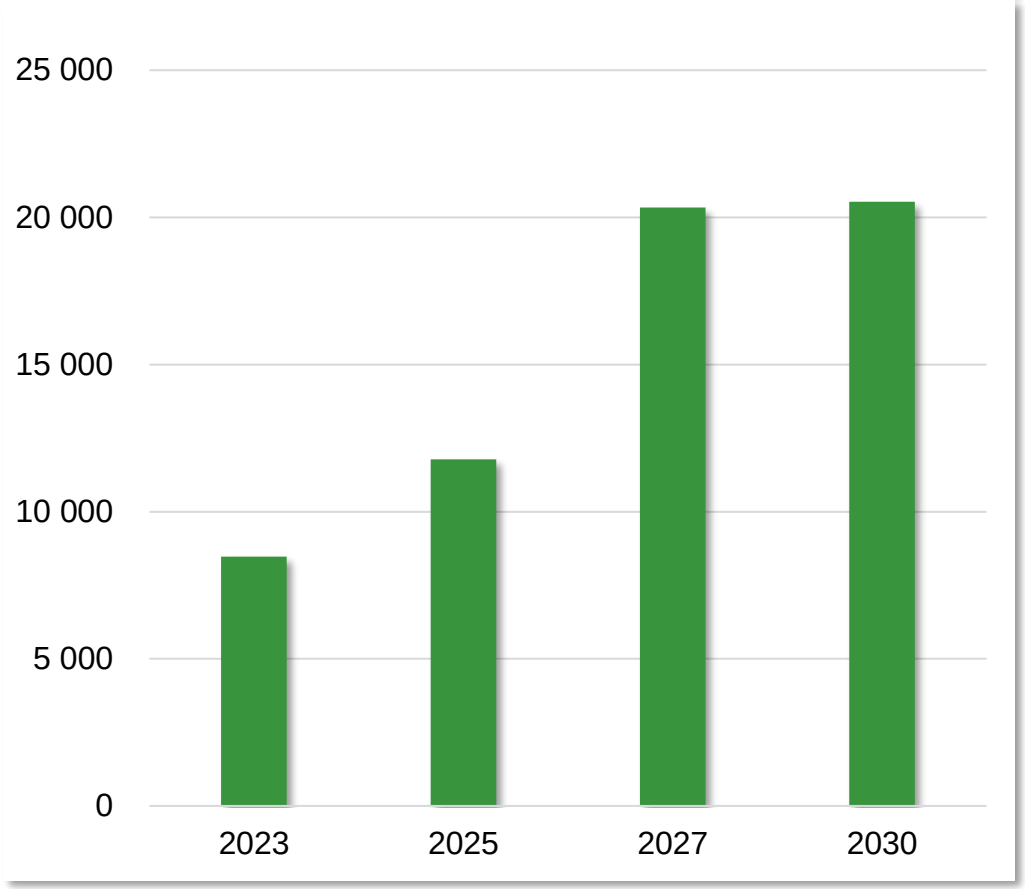
- **Best locations for wind turbine parks are already devoted to this purpose** but installed equipment are inefficient if compared with state-of-the-art wind turbines.
- **Development** of more efficient **wind turbines** provides the opportunity to replace the oldest wind turbines by new equipment with **optimal performance**.

Technological improvement:
To increase **renewable electricity production** in EoL wind farms that were installed in the geographical areas with **better wind quality by replacing old Wind turbines with state-of-the-art (SOTA) ones.**

Reduced environmental impact:

- **SOTA wind turbines require,** if compared with oldest technology, **less number of wind turbines for** higher electricity production. Repowering reduce environmental impact of oldest Wind farms.
- SOTA wind turbines have a **lower rotational speed than first generation ones, producing less noise impact.**

Potential market for recycled blades (tons)



Source: internal elaboration

Wind Blade Recycling Project

Motivation

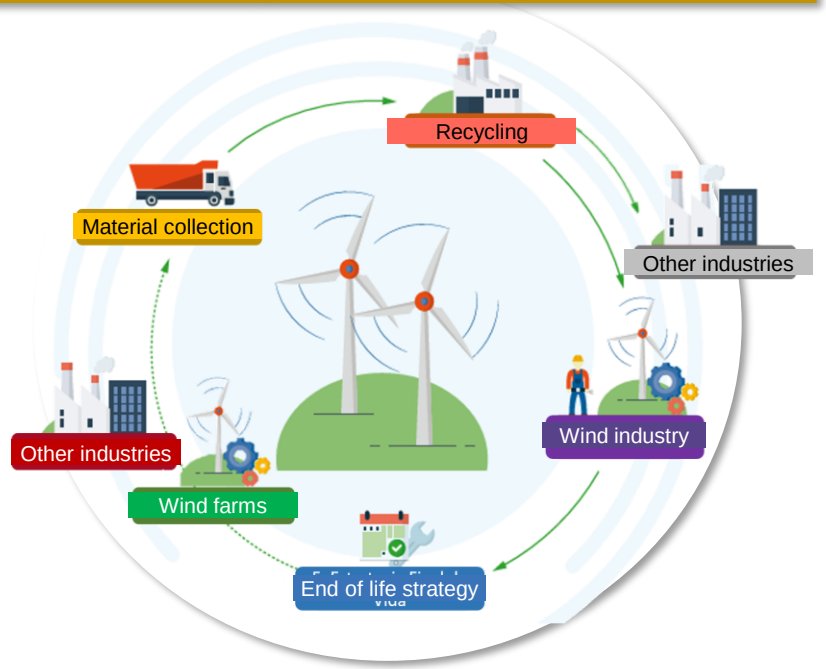
To provide a circular solution to the wind energy industry for the valorization of wind blades.

Industrial scaling of technologies and processes that promote the **reuse and recycling** of blades&scraps.

To convert EoL wind blades in secondary raw materials and identify its off-takers.

GOALS

- The Project aims to **develop a versatile plant for treating EoL blades & scraps by its conversion in different secondary raw materials for different applications.**
- The Project **aims to provide a circular solution for the valorization of wind blades avoiding its landfilling..**
- Project will make it possible to apply secondary raw materials in **different industrial sectors.**



Wind Blade Recycling Project

Process

INPUT

EoL blades from **repowering and dismantling** of wind farms.
Composites waste from other sectors.
Post-industrial wind blades manufacturing waste (**scrap**).

WIND FARM

INDUSTRIAL PRE-CONSUMPTION (SCRAP)

INDUSTRY

PICKUP

TRANSPORT

RECYCLING PLANT

1. RECEPTION
2. CLASSIFICATION / DOWNLOAD
3. PRE-TREATMENT
   Mechanical grinding
4. TREATMENT

6 000 tons/year

Investment: 8.5 M€

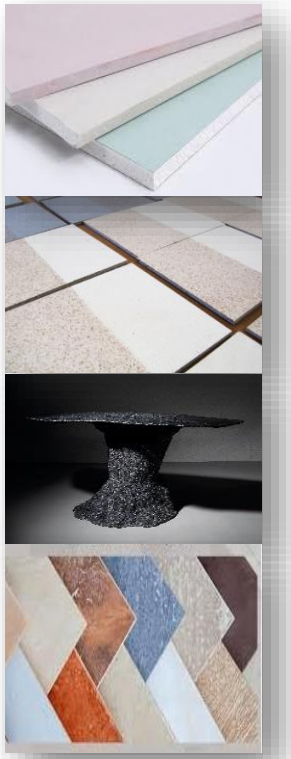
30 Jobs

OUTPUT

Recycled material for different industrial applications.

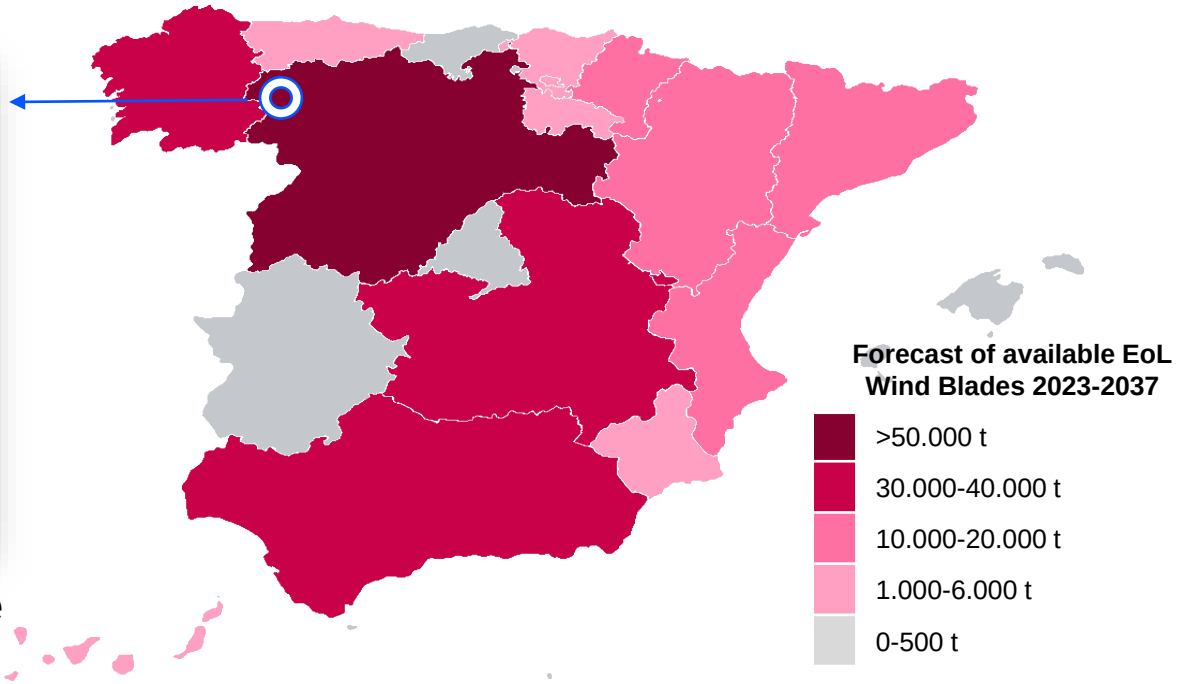
POTENTIAL APPLICATIONS

- Insulation panels
- Pavements
- Furniture
- Tanks / Pipes
- Cement / Mortar
- Plastics
- Ceramics



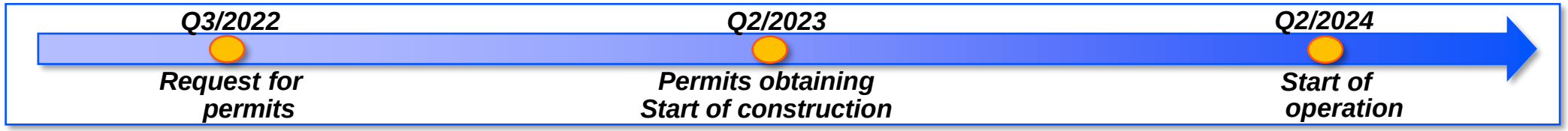
Wind Blade Recycling Project

Location and planning



The Project is located in Cubillos del Sil (northwest Spain) in the ENDESA's Power Plant.
Northwest of Spain concentrates an important amount of EoL Wind turbines for the period 2023-2037.

Futur-e Endesa plan promotes initiatives to attract economic activity and employment in those areas affected by the progressive closure of thermal power plants. **Compostilla Thermal Power Plant (1 050 MW)** was closed in September 2020, and now it is currently being dismantled.



Wind Blade Recycling Project

Partners

- **First electricity company in Spain** and the second in Portugal, within **Enel**, **the largest electricity group in Europe**. Endesa currently has 2.7 GW of installed wind capacity in Spain.
- The company's plan is based on a **48% growth in installed renewable power**, rising to 4 000 MW between wind and photovoltaic energy.
- **63% of its peninsular generating park will be free of emissions at the end of 2024**.

- German company integrated into the **Schwarz Group**, focused on the **circular economy and the management and recovery of waste**.
- **It offers urban, waste treatment and recycling services** with the aim of closing the circle, reducing the consumption of raw materials and lengthening their life cycle.
- In Iberia, it **manages more than 140 treatment facilities**: eco-parks, composting plants, industrial plants, circular economy plants, transfer centers and controlled deposits.

- GE has one of the broadest portfolios of **renewable energy projects** in the industry and **one of the largest installed bases in the world**: more than 370 GW.
- LM Wind Power is a **manufacturer of wind turbine blades and is one of the main players in the wind industry** with more than 400 GW of power installed worldwide, **manufacturing more than 175 000 blades since 1975**. It has **manufacturing plants in Ponferrada and Castellón**, which produce 2 000 MW per year, with Ponferrada being its plant with the highest production activity in Europe (more 1 400 tons/year of scrap both).

Consortium made up of leading companies in the Wind sector and in Waste management and circular economy guarantees a circular and efficient solution for the management of EoL blades.

Thank you!

Block 2: Innovation, green & digital economy

Pablo Kroff,
SUEZ

Johannes Schön,
REMONDIS Digital Service GmbH

Andréas von Kaenel,
Cortexia

Elena Jimenez Coloma,
Prezero Spain & Portugal

Moderated by Claudia Mensi, FEAD Vice-President

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Block 3: CO2 reduction

Dr. Bärbel Birnstengel, Prognos AG

Ella Stengler, Managing Director CEWEP

Chaim Waibel, Plastics Recyclers Europe

Unico van Kooten, EU Secretary DWMA

Prof. Dr. jur. Helmut Maurer, European Commission

Moderated by Valérie Plainemaison, FEAD Secretary-General

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CE Delft
Committed to the Environment

prognos
providing orientation.

Presentation of key results

CO_2 reduction potential in European waste management

FEAD's Biennial & 40th Anniversary Conference
From Circular Economy to the fight against Climate Change

Dr. Bärbel Birnstengel / Richard Simpson (Prognos AG)

Munich 02/06/2022

Key facts

amounting to **505** **Mt**

(~ 19 % of the total waste generated in 2018)

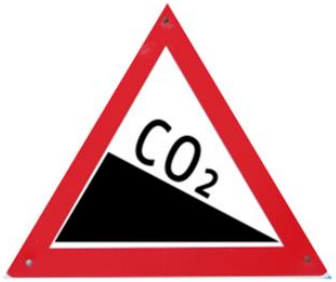
27+1

regional focus EU member states plus UK

10

waste streams with high resource potential,

considering separate collected amounts **and** the potential within mixed waste streams



2 projections until **2035**

compared to a baseline plus **several sensitivities**

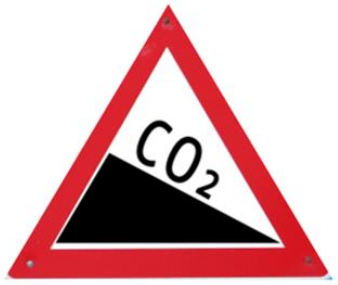
CE Delft prognos

Committed to the Environment

Key results

Starting with **13** **Mt CO_{2eq}** in 2018 when adopting a 20-year time horizon

Reduction potential **-150** **Mt CO_{2eq}** by 2035 compared to 2018 by successfully applying current waste legislation and adopting it to C&I waste



Reduction potential **-296** **Mt CO_{2eq}** by 2035 compared to 2018 by increasing efforts and reducing landfilling to a minimum

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Key observation

01 The waste management industry has cross-industrial interlinkages by making valuable waste derived content available to the whole economy as secondary resources for material and energy uses

02 For more ambitious projections, the municipal waste targets need to be extended to commercial and industrial wastes, and waste suitable for recycling and energy recovery should be diverted from landfills.

03 Additional potentials are beyond the current legislation. To achieve maximum CO_2 avoidance, policy makers are advised to make optimal use of all available capacity for recycling and waste to energy.

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Block 3: CO2 reduction

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40 YEARS
FEAD European Waste Management Association

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