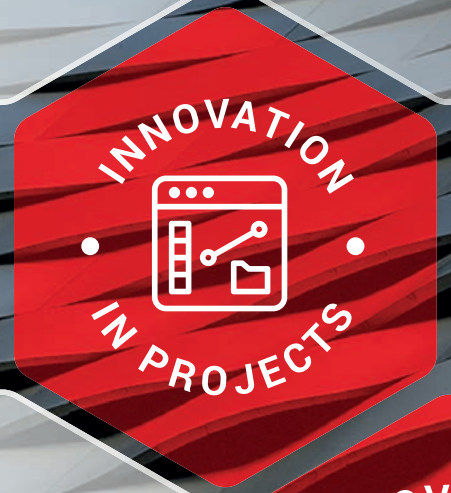
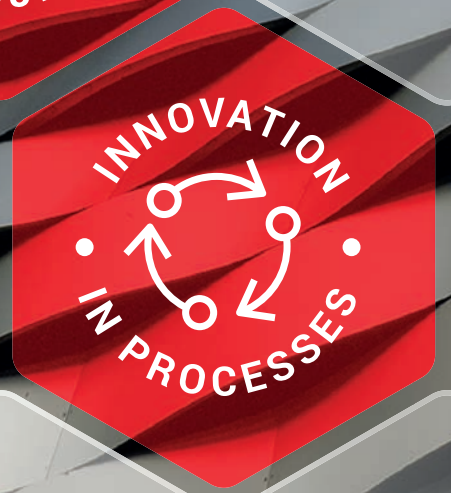
webuild





webuild group
innovation

April 2021

INDEX

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We build + We innovate = We sustain

We believe in Innovation as a key enabler
to build a more sustainable world for people and clients,
enhancing our building practices

webuild

We innovate for the Environment, People, and our Clients

Minimizing the environmental impact

Reducing risks in terms of Health and Safety

Improving building **efficiency and quality**

INNOVATION IN PROJECTS

DESIGN, PLANNING, DEVELOPMENT
- Robot monitoring / cleaning
- TBM Material reuse technique
- Predictive geophysical surveys

CONSTRUCTION TECHNIQUES
- Vertical Pipelines (risers)
- Inclined hydraulic tunnels
- Ground freezing
- Excavations in hyperbaric conditions
- Excavations at a 15-bar pressure

DIGITALIZATION OF SITES
- Digital sites
- TBM and plants monitoring system
- "Transparent" site
- Robot process automation
- Smart quality
- Life cycle BIM
- AI for TBMs

INNOVATION IN PROCESSES

MATERIALS
- Tailor-made concrete mix design
- Draining back fill grouting
- Ultra-high performance back fill grout

SAFETY, QUALITY, ENVIRONMENT
- Green TBM
- Sustainable sites
- Smart Safety
- Intelligent Biodiversity Monitoring
- Smart & Green Segment factory

02

Sustainable Performance

69% waste produced sent for recovery

-49% Carbon intensity* (2020 vs 2015)

-71% Lost Time Injury Frequency (LTIFR)** (2020 vs 2015)

91% local purchases

82% local personnel hired

Data as of December 31, 2020

* tCO2 scope 1-2/€m revenue
Scope1: emissions from fuels
Scope2: emissions from electricity

**Injuries occurred per 1 million worked-manhours

webuild

We build in an evermore **cost-effective**, **safe**, **fast** and **sustainable way**

Efficient **design** and **management processes**

Accurate **cost estimates** and **project timings**

Management of the project's complexity

Open Innovation Partnerships

Reduction of the **environmental impacts** and **safety risks**

Digitalization processes to support construction activities

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5P Models ▶

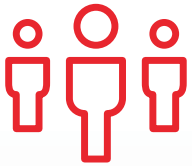
Our performance ▶

PLANET

Reduction of the environmental footprint by building **works that are resilient to climate change**

100%
reused excavation materials

69%
waste produced sent for recovery



PEOPLE

Safeguardingworkers' **inclusion, health and safety** and strengthening **internal skills**

>100
different nationalities

-71%
Lost Time Injury Frequency (LTIFR)*
(2020 vs 2015)

*Injuries occurred per 1 million worked-manhours

PARTNERSHIP

Promotion of **innovation and research activities** with **start-ups, suppliers**, while also collaborating with **universities**, **businesses** and the territory

>30
suppliers involved in Innovation activities

91%
local purchases

PROGRESS

Offering **solutions** that create value for **clients**, **suppliers** and the **territory**, improving the sector's efficiency

250
resources involved in Innovation activities on average

-49%
Carbon intensity**
(2020 vs 2015)

** tCO2 scope 1-2/€m revenue
Scope1: emissions from fuels
Scope2: emissions from electricity

PROSPERITY

Contributing to **satisfying new needs** to improve people's lives

-21 M
tons of CO_2 avoidable each year for ongoing projects

82%
local personnel hired

Data as of December 31, 2020

WE INNOVATE IN ALL OUR DESIGN AND PRODUCTION PHASES

webuild

Innovation scopes	DESIGN, PLANNING AND DEVELOPMENT	CONSTRUCTION TECHNIQUES	MATERIALS	DIGITALIZATION OF SITES	SAFETY, QUALITY, ENVIRONMENT
Innovative Solutions	• Robot monitoring / cleaning • TBM Material reuse technique • Predictive geophysical surveys	• Vertical Pipelines (risers) • Inclined hydraulic tunnels • Ground freezing • Excavations in hyperbaric conditions • Excavating at a 15-bar pressure	• Tailor-made concrete mix design • Draining back fill grouting • Ultra-high performance back fill grout	• Digital sites • TBM and plants monitoring system • "Transparent" site • Robot process automation • Smart quality • Smart equipment mgmt • Automated excavation material system • Life cycle BIM • AI for TBMs	• Green TBM • Sustainable sites • Smart Safety • HSE Controls with videocameras • Intelligent Biodiversity Monitoring • Smart & Green Segment Factory
Webuild's Business Areas	sustainable mobility	clean hydro energy	clean water	green buildings	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Our best practices in innovation

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DESIGN, PLANNING, DEVELOPMENT

BRIDGES AND VIADUCTS

Two types of **robots** with innovative applications: an **inspection robot** that scans and monitors the steel surfaces of the external deck to ensure the highest levels of control and safety; a totally eco-sustainable **robot-wash** used to clean the glass and photovoltaic panels on the deck.
This application allows an optimization of control activities, by reducing their frequency and increasing their reliability at the same time.
This solution increases the work's safety and reliability, also reducing management costs.

Implementation

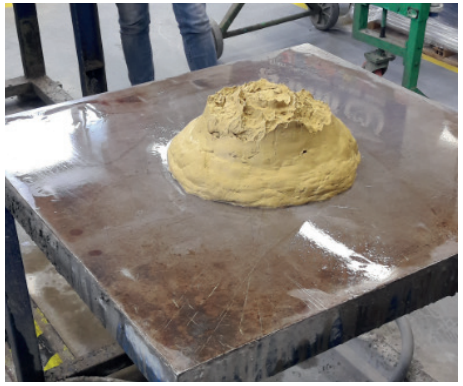
- **San Giorgio Bridge - Genoa**

webuild

DESIGN, PLANNING, DEVELOPMENT

TUNNELING

Study concerning the reuse of **materials excavated by the TBM**, as embankment materials to decrease the environmental impact and project costs, from a circular economy perspective.

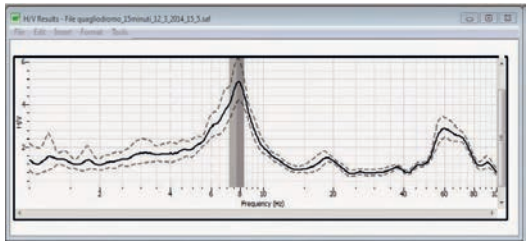


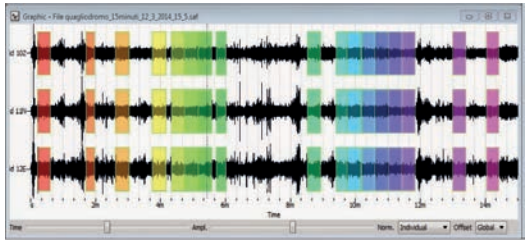
Implementation *

Multi-project

TUNNELING EXCAVATION TECHNIQUES

Geophysical investigations to **detect underground cavities** and **geological anomalies**, to reduce risks, prevent delays and cost inflation, during construction.





Implementation

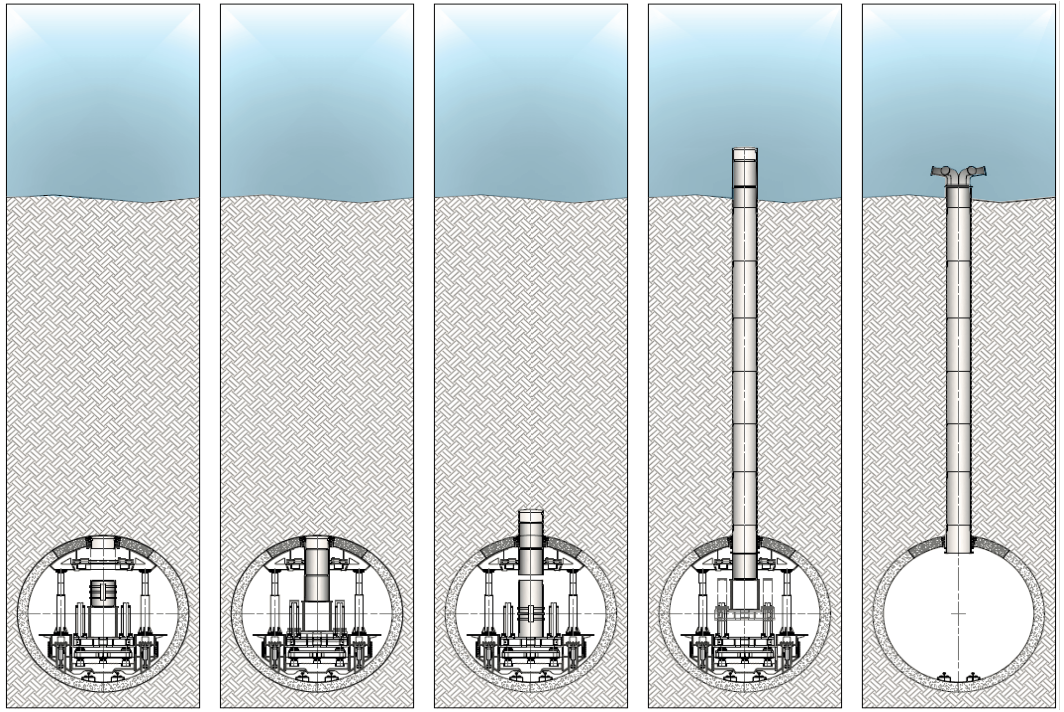
Multi-project

* potential

CONSTRUCTION TECHNIQUES

THE RISER CONCEPT

This innovative methodology, was used for **the first time in the world** by Webuild, to install **vertical pipelines** (risers), operating from the inside of a submarine tunnel, allowing the mechanization of the work process, also improving workers' safety, reducing risks and bringing environmental benefits and improved construction times.



Implementation

- **Riachuelo environmental restoration system, Argentina**

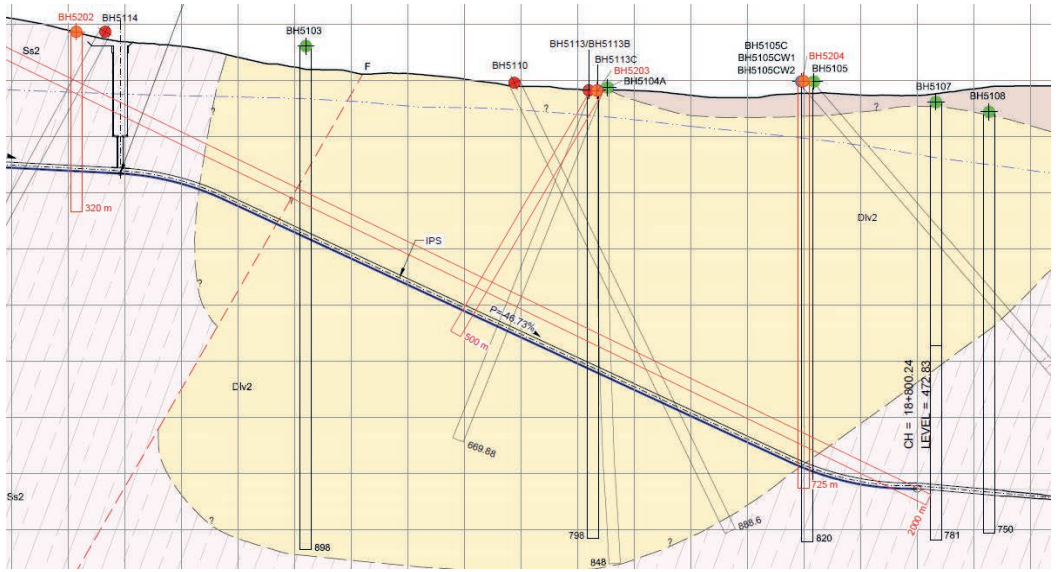
Multi-project

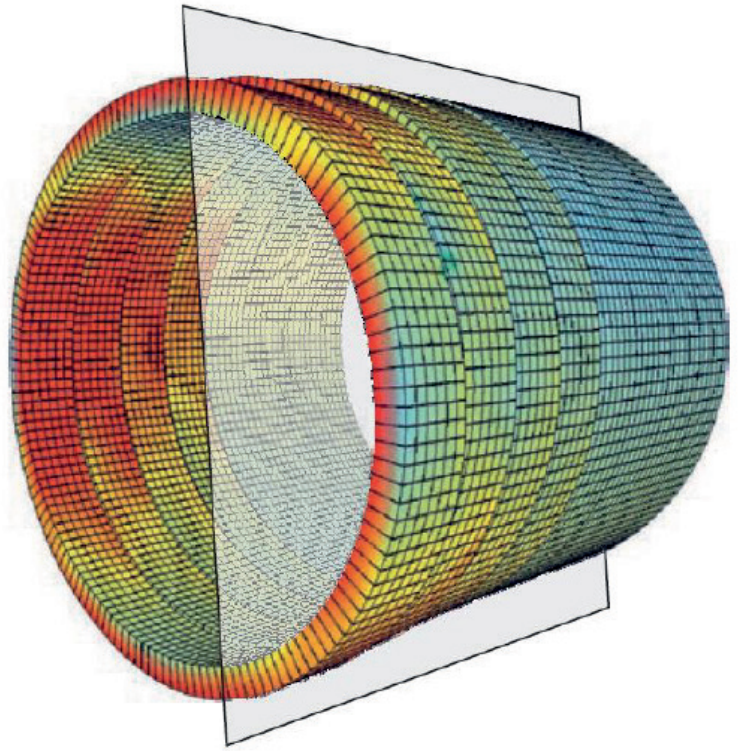
webuild

CONSTRUCTION TECHNIQUES

INCLINED HYDRAULIC TUNNELS

Technology used to build large **inclined hydraulic tunnels**, through mechanized excavation, and by developing alternative lining solutions, allowing a reduction of construction times and costs.





Implementation

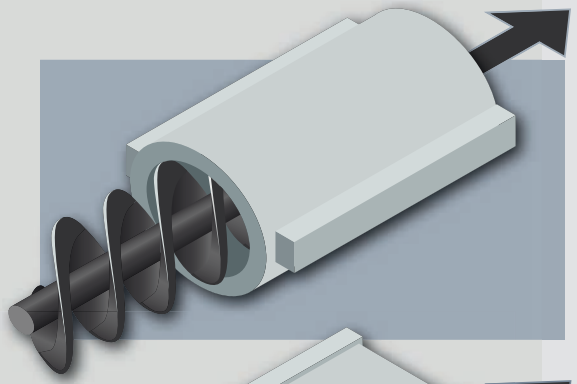
- **Snowy 2.0 Hydropower project, Australia**

webuild

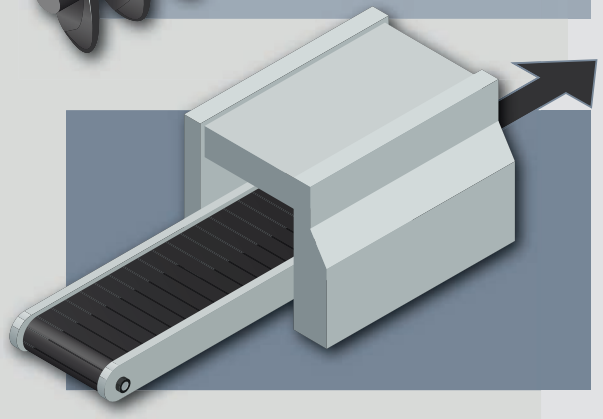
SNOWY 2.0

Innovative TBM systems to excavate between -9% and +47% gradients

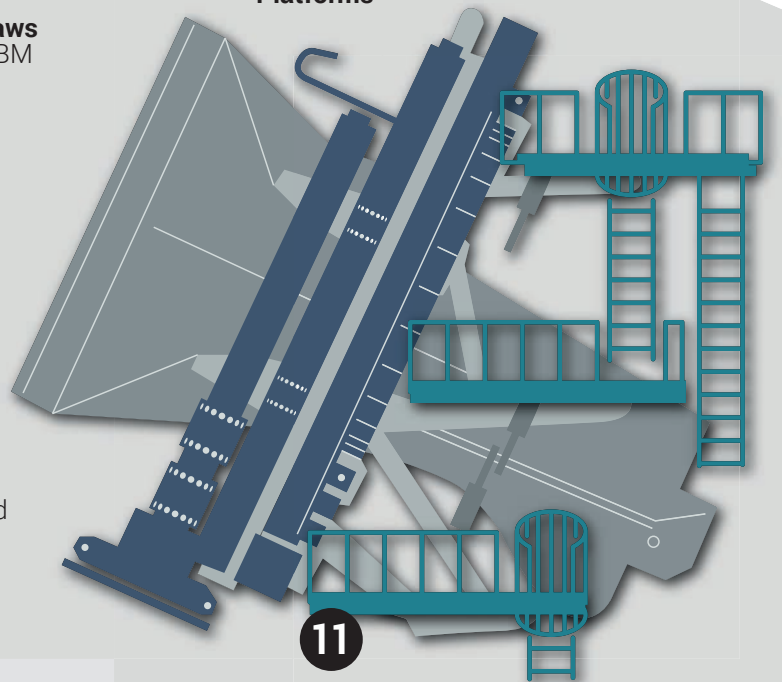
The TBM will excavate an Inclined Pressure Shaft at a maximum 25-degree (46.73%) gradient, in open mode



1 Screw Conveyor
A screw conveyor **draws the muck** from the TBM when boring **at steep slope**



2 Belt Conveyor
Sandwich-type conveyor belts installed in sequence on the back-up and along the inclined shaft **transport the muck to the base of the shaft**



4 Ring Building Platforms

3 Control cabin and personnel, engineer, firt-aid and rescue containers **adjusted during drive**

5 Segment-handling crane

Segment feeder equipped with hooks to secure the segments

CONSTRUCTION TECHNIQUES

ARTIFICIAL GROUND FREEZING

Tunneling technique: Ground Freezing

With this technique, to be used especially in **urban or sensitive contexts, from an environmental point of view** (i.e. under-crossings of watercourses), it is possible to carry out underground excavations by **freezing the groundwater** in the soil, stabilizing at the same time the land surrounding the excavation area.
Refrigerant fluids (Nitrogen and Brine) are used for this purpose. These never come into contact with the surrounding water-table, being recirculated **through special closed pipes**. The system used by Webuild employs the same circuit for the two fluids, making it, therefore, less invasive, easier to manage, safer and overall, more reliable.

Implementation

- **Isarco River Underpass (Brenner Base Tunnel)**

webuild

CONSTRUCTION TECHNIQUES

TUNNELING IN HYPERBARIC CONDITIONS

Tunneling technique: excavating in hyperbaric conditions

This innovative technology, through **pressurization** (through compressed air) of the **working environments**, allows to carry out excavations, emptying artificial tunnels under the water table, in dry conditions.

The system **reduces the impact on the surrounding groundwater to zero**, as no materials are introduced into it as, instead, in traditional systems (i.e. jet grouting, injections).

Implementation *

- **Naples-Bari HS / HC line, Naples-Cancello section**

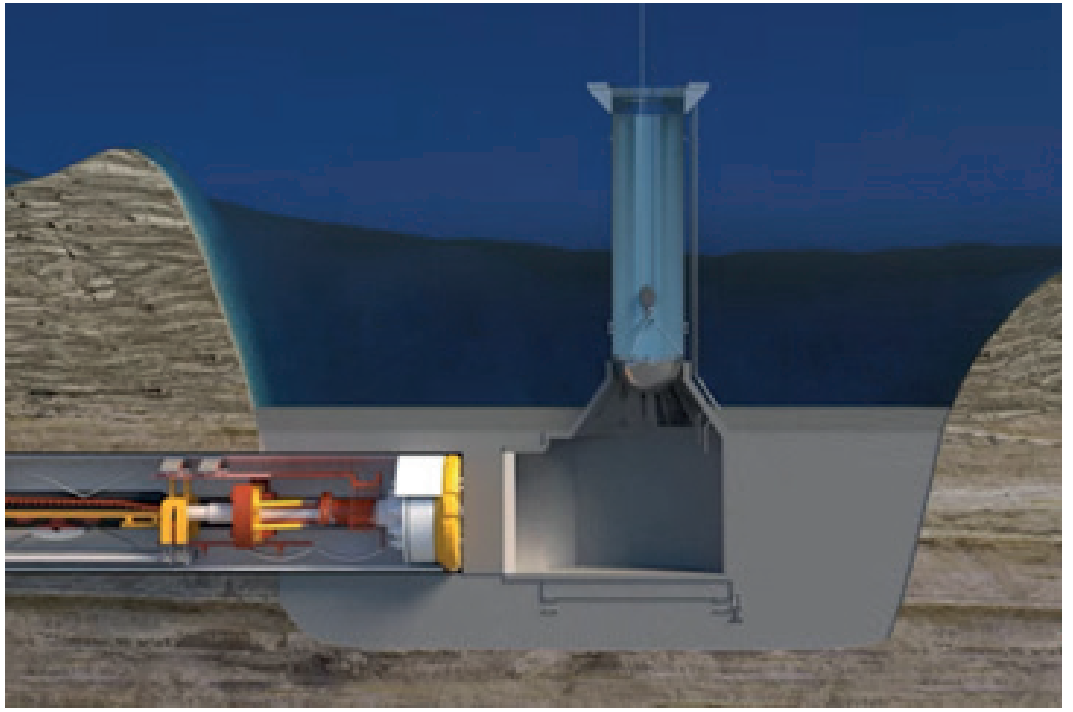
* potential

webuild

CONSTRUCTION TECHNIQUES

EXCAVATING AT A 15-BAR PRESSURE

The TBM used to excavate the 4.6-km-long tunnel **is a unique prototype, worldwide**. It is designed to withstand unmatched pressure conditions in the history of tunneling. The TBM could advance at **a maximum pressure of 15 bar, twice the speed of the previous world record**.
The machine was designed to carry out maintenance operations in hyperbaric conditions, even with saturation.
The muck evacuation system (in both open and closed modes) was designed to overcome the height difference of 185 m represented by the access shaft.
The design, execution and positioning of the inlet, at a depth of about 100 m on the bottom of the lake, is a technical innovation in terms of how a structure can contain a TBM.



Implementation

- **Lake Mead Hydraulic Tunnel - Las Vegas, U.S.**

webuild

MATERIALS

TAILOR-MADE CONCRETE MIX DESIGN

Concrete mix designs, and their related production processes, are **developed** and optimized **by Webuild**, even in poorly served areas. This is done to fully meet the technical specifications, also considering executive issues, durability, logistic organization, and transport optimization. And also, material usage, environmental protection and territorial context matters.

Implementation

- **GERD Dam, Ethiopia**
- **Koysha Dam, Ethiopia**
- **Neckartal Dam, Namibia**

Multi-sector

webuild

MATERIALS

INNOVATIVE MATERIALS

Draining backfill material for TBM tunnels, to reduce external hydraulic loads. These materials also allow a structural optimization and an increased durability of the work.

Ultra-high performance backfill grout for TBM. This material increases the work's ultra-high performance back fill grout and reduce construction risks.

Planned Implementation

- **HS / HC Naples-Bari rail line, Apice-Hirpinia section**

Implementation

- **Snowy 2.0 Hydropower project, Australia**

webuild

DIGITALIZATION OF SITES

DIGITAL SITE

Use of **digital technologies** to support **management processes in their execution phase** - from the site's start-up to when the project closes, to increase management efficiency, capitalize on the created know-how, while also promoting Corporate control and guidance.

Implementation *

Multi-sector

* potential

TBM AND PLANTS INTEGRATED MONITORING SYSTEM

An **Integrated System** has been designed and developed to collect, process and display, in real time, all the data collected by the TBM, and all systems and equipment used on site, including monitoring ones.

The system collects information from different sources in the site, transforming **disaggregated data** into information available in a single control room, which is then integrated and can be used.

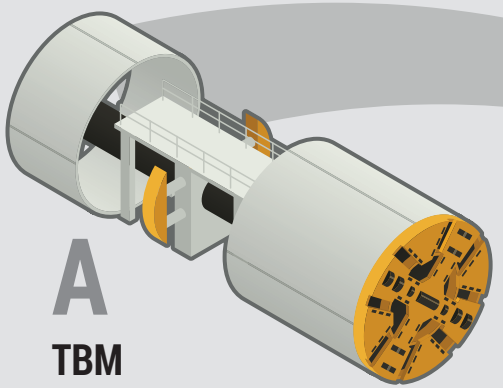
Implementation

- **Snowy 2.0 Hydropower project, Australia**

Multi-project

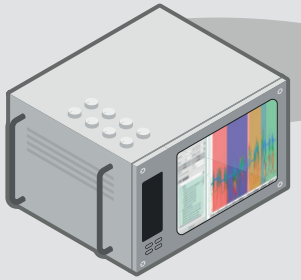
webuild

TBM AND PLANTS INTEGRATED MONITORING SYSTEM



A

TBM control systems

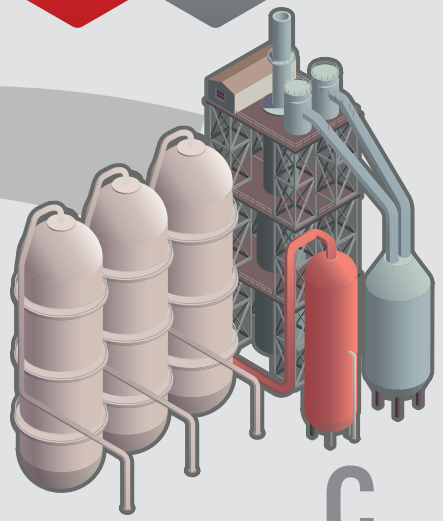


B

Other TBM systems

D

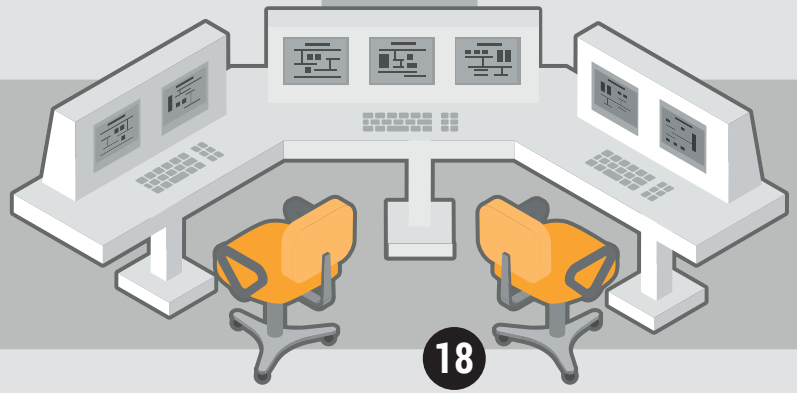
Additional data/documents, external to the monitoring system



C

Other systems and machinery

Interrelation between operations, production, geological data, and other parameters



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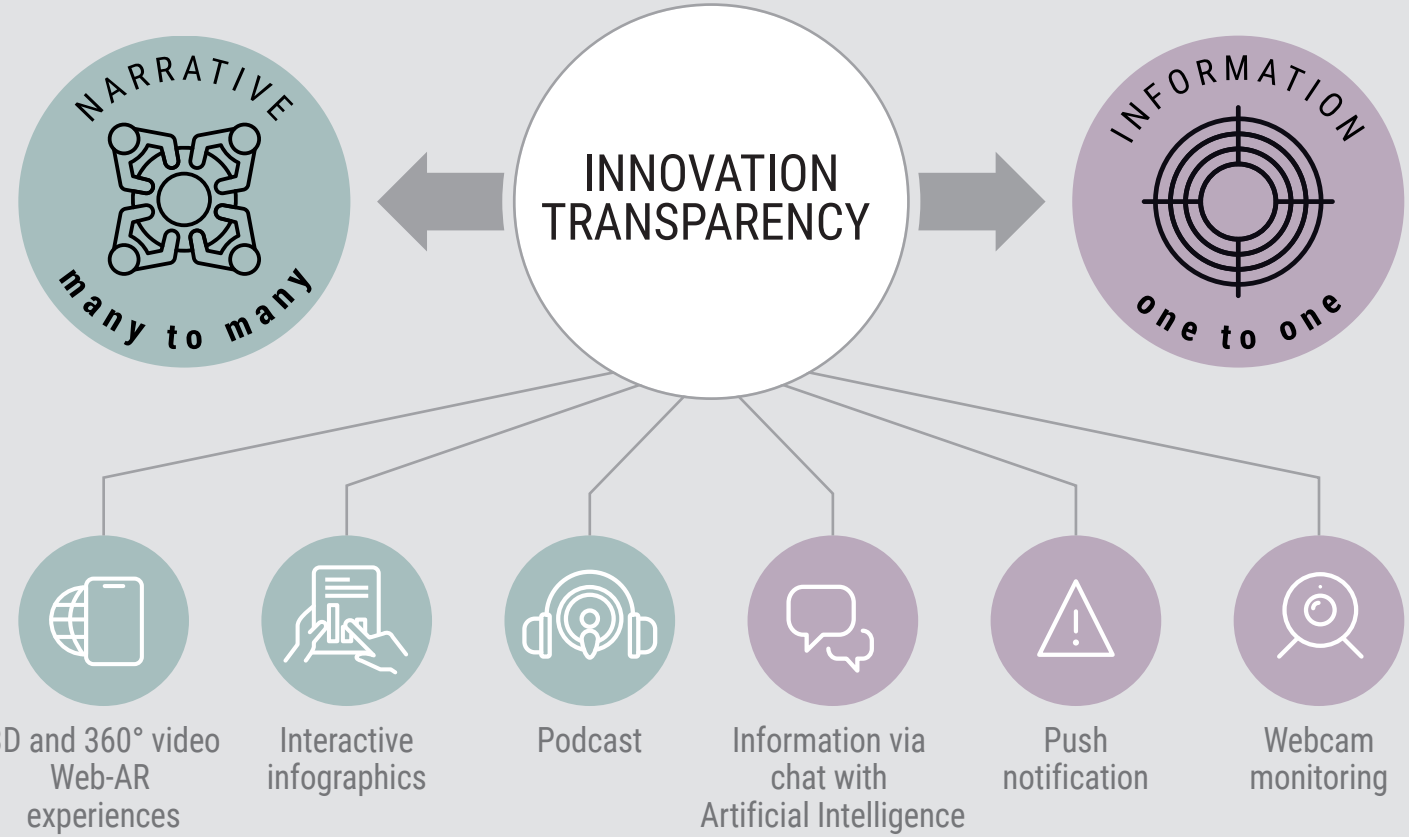
THE «TRANSPARENT» SITE



Implementation

Multi-sector

AI and Data Processing Automation

AI and **Big Data Automation** application to produce content targeted on business positioning

Web-AR and immersive 3D experiences

Evolution of communication products with an **immersive and engaging logic**, for our targets

Digital Infopoint

Development of an information system for citizens based on **WhatsApp** and **Artificial Intelligence** to manage requests on the status of works, and all information concerning the construction site

Sustainability Certification Tool

Use of an innovative **algorithm system** in the sector that makes use of big data for the **certification of content and the supervision of distribution channels**, from a SDGs perspective.

Digital Intranet Evolution

Development of **an automated information system with AI, for employees, also on construction sites**

webuild

DIGITALIZATION OF SITES

ROBOT PROCESS AUTOMATION

Webuild has embarked on a **digital transformation** path, in the procurement area, using RPA technology for the **automation** and **optimization of its processes**, with the aim of optimizing and re-engineering them. Among these: Vendor Master Data Management, Spare parts order creation, Spare parts RFP, Supplier Performance Management.

Greater growth and faster timings are due to the following reasons: 24/7 productivity, reduction of process times, elimination of repetitive activities with low added value, increased flexibility and scalability of provided systems and services, higher data quality to enable greater in-depth analyses.

Implementation

Multi-sector

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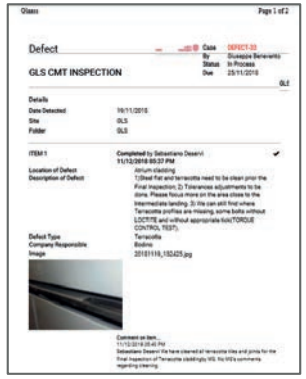
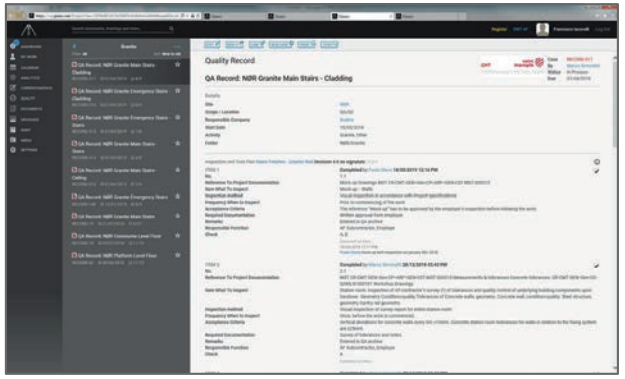
DIGITALIZATION OF SITES

SMART QUALITY

Use of IT tools for quality control activity management, workflow definition, and audits management, with an increase reliability of the recorded data, documentation sharing, and relevant timing reduction.





Implementation

Multi-sector

SMART EQUIPMENT MANAGEMENT

Computerized traceability and management of construction site equipment, tools, and Personal Protective Equipment.

Implementation *

- **Bicocca-Catenanuova rail section**

Multi-sector

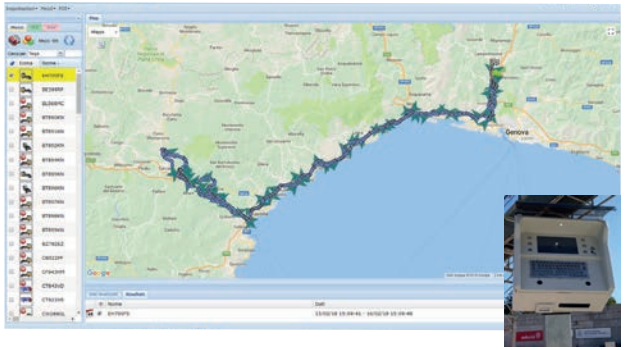
* potential

webuild

DIGITALIZATION OF SITES

AUTOMATED TRACKING SYSTEM FOR EXCAVATED EARTH AND ROCK

Automated system for tracking excavated earth and rock, with a GPS transport tracking system, the **digitization of Transport Documents on a web platform**, for greater reliability of activities and records, reduction of paper consumption and related filling-in times.



Implementation

- **Terzo Valico dei Giovi HS/HC railway line**

Multi-sector

"LIFE CYCLE BIM" - LCB

During 2019, Astaldi Engineering Service's BIM Group, signed a contract with BBT, through BTC, to implement the **BIM model for the Brenner Base Tunnel. It was named LCB, "Life Cycle BIM"**.

LCB includes: updating activities at the "as built" level of the BIM models; integration of data and information produced in the construction phase, for the work's future management; **4D simulation** of the work's construction; and integration of the BIM models in the GIS environment, for consultation purposes.

Implementation *

- **Brenner Base Tunnel**

Multi-sector

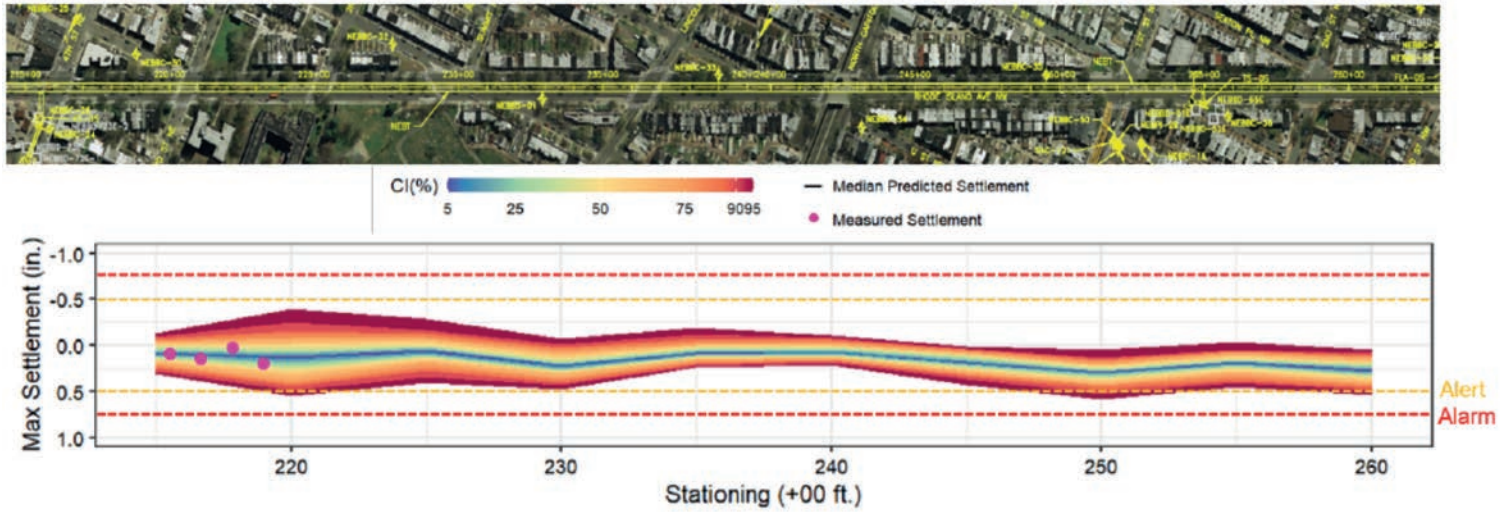
* potential

webuild

DIGITALIZATION OF SITES

ARTIFICIAL INTELLIGENCE (AI) FOR TBMs

Webuild and Lane Contruction (the Group's US subsidiary) are collaborating with the **Colorado School of Mines (CSM)** on a project where **Artificial Intelligence (AI)** is applied to the **TBM** used in the **Northeast Boundary Tunnel Project – NEBT**, in Washington DC., **to improve its operating efficiency**.
The system applies **real-time AI** to estimate parameters like tunneling-induced ground and building deformation, and cutter tool wear, while collecting significant amount of information to train robust performance prediction models.



Implementation

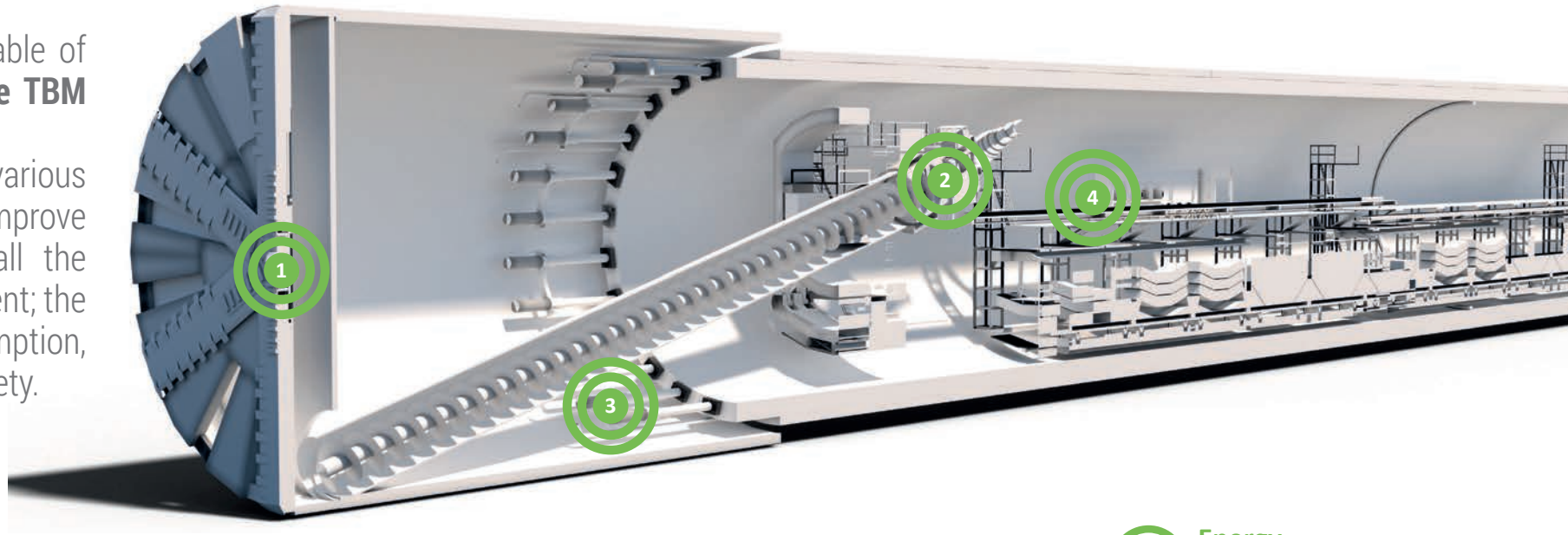
- **Northeast Boundary Tunnel Project – NEBT, U.S.**

webuild

SAFETY, QUALITY, ENVIRONMENT

TUNNELING

Study of the use of an **green TBM** capable of reducing the **energy consumption of the TBM** (KWh) **by 20%**.
This is possible by optimizing the various systems and devices on the machine to improve the efficiency of the excavation and all the numerous functions and auxiliary equipment; the result is a reduction in the energy consumption, faster excavation times and increased safety.



Energy efficiency measures

1. Energy
2. Muck transport
3. Hydraulic system
4. Otherservices

Planned Implementation

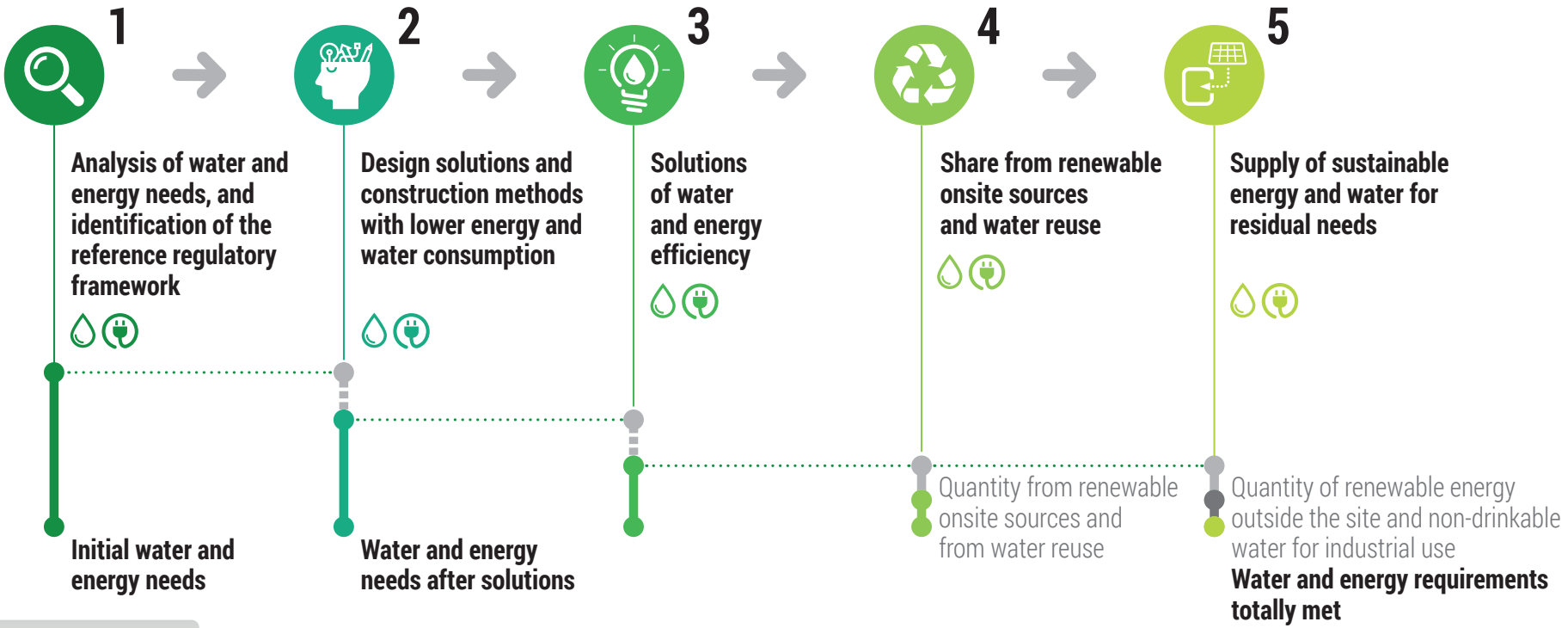
- **Gardena Bridge**
- **Fiumefreddo-Giampilieri rail section:**
  - **Lot 2**
- **Naples-Bari HS/HC railway line:**
  - **Orsara-Bovino lot**
  - **Hirpinia-Orsara lot**

webuild

SAFETY, QUALITY, ENVIRONMENT

SUSTAINABLE SITE

Webuild designs and implements construction sites used to build its infrastructure, by subjecting all industrial processes to the **assessment, efficiency and optimization** of environmental components, particularly **water, energy and material consumption**.



Planned Implementation

- **New projects in start-up phase in Italy**
- **Multi-sector**

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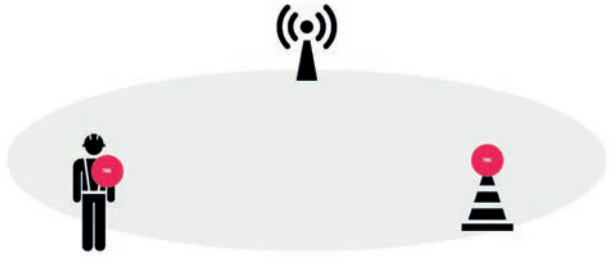
SAFETY, QUALITY, ENVIRONMENT

SMART SAFETY

Pilot projects with **sensor systems** for: interaction between human and machine, and/or human and suspended loads, delimitation of more dangerous areas, in-Vehicle Monitoring Systems. Construction-site vehicles equipped with cameras and white noise buzzer.



Implementation *

Multi-sector

SAFETY TUTORING ON THE JOB

Optimization of work-at-height procedures and skills-development, with planned and **on-the-job training**. Coaching for Supervisors.

Implementation

Multi-sector

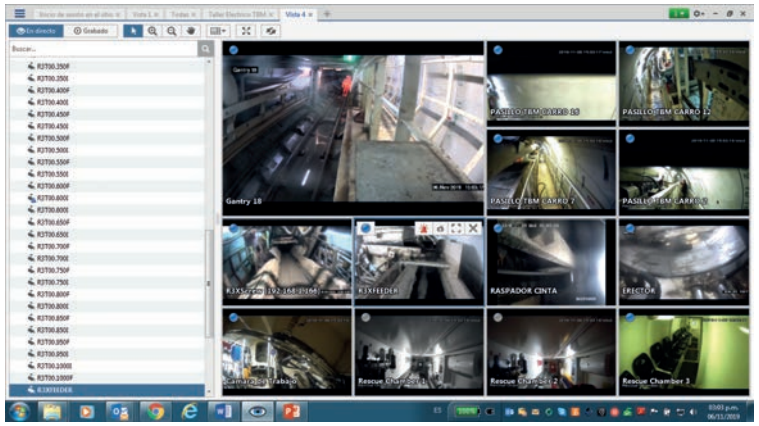
* potential

webuild

SAFETY, QUALITY, ENVIRONMENT

HSE CONTROLS BY VIDEOCAMERAS

Real time supervision of work activities to support the process optimization analyses, and the investigations in the event of anomalies, near misses, and incidents/accidents.



Implementation

Multi-sector

INTEGRATED PROTECTION OF THE ENVIRONMENT, WORKERS, AND COMMUNITIES

Webuild develops **integrated solutions** that ensure **environmental protection** from the design phases. The Group always considers the **health and safety of its workers** and **communities**, coordinating with the Authorities in charge. An example is the development of the Asbestos Protocol, for the Terzo Valico dei Giovi project.

Implementation

- **Terzo Valico dei Giovi HS/HC railway line**

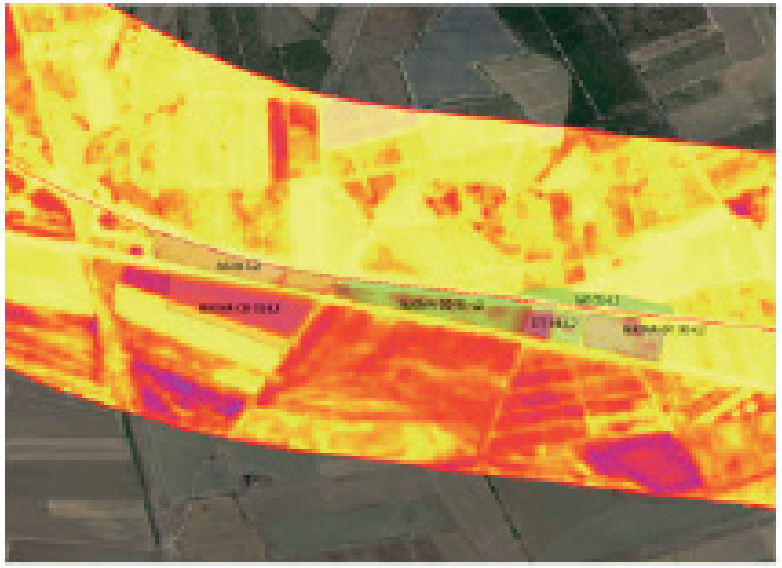
Multi-project

webuild

SAFETY, QUALITY, ENVIRONMENT

INTELLIGENT BIODIVERSITY MONITORING

Webuild **protects the territory** that hosts its construction sites establishing a close relationship with it. It does this with it, achieved through best practices -also innovative and smart- to safeguard the territory's peculiarities, fauna, flora, and biodiversity. Among the activities carried out: monitoring valuable crops monitoring through a satellite multispectral analysis; use of motion detection cameras for wildlife monitoring purposes.



Implementation

- **Bicocca-Catenanuova rail section**

Multi-sector

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SAFETY, QUALITY, ENVIRONMENT

ECO-SUSTAINABLE LOGISTICS CAMP

The logistics field is present for the entire duration of the construction site; therefore, it absorbs a lot of energy. The **sustainable logistics field** presents solutions for monitoring and PQI activities, Building Automation, on-site renewable sources, predictive maintenance systems for temporary MEP, rainwater, run-off water and civil water collections and reuse.

Implementation *

Multi-sector

* potential

SMART&GREEN SEGMENT FACTORY

Automated system that uses **high-efficiency** robotic technology with a systematic integration of innovative solutions, efficiency, circular economy, environmental footprint reduction, and the development of a more resilient and performing product. The **robotic factory can be dismantled and re-installed** in another area, according to a design-for-deconstructions perspective.

Planned Implementation

- **New projects in start-up phase in Italy**
- **Multi-sector**

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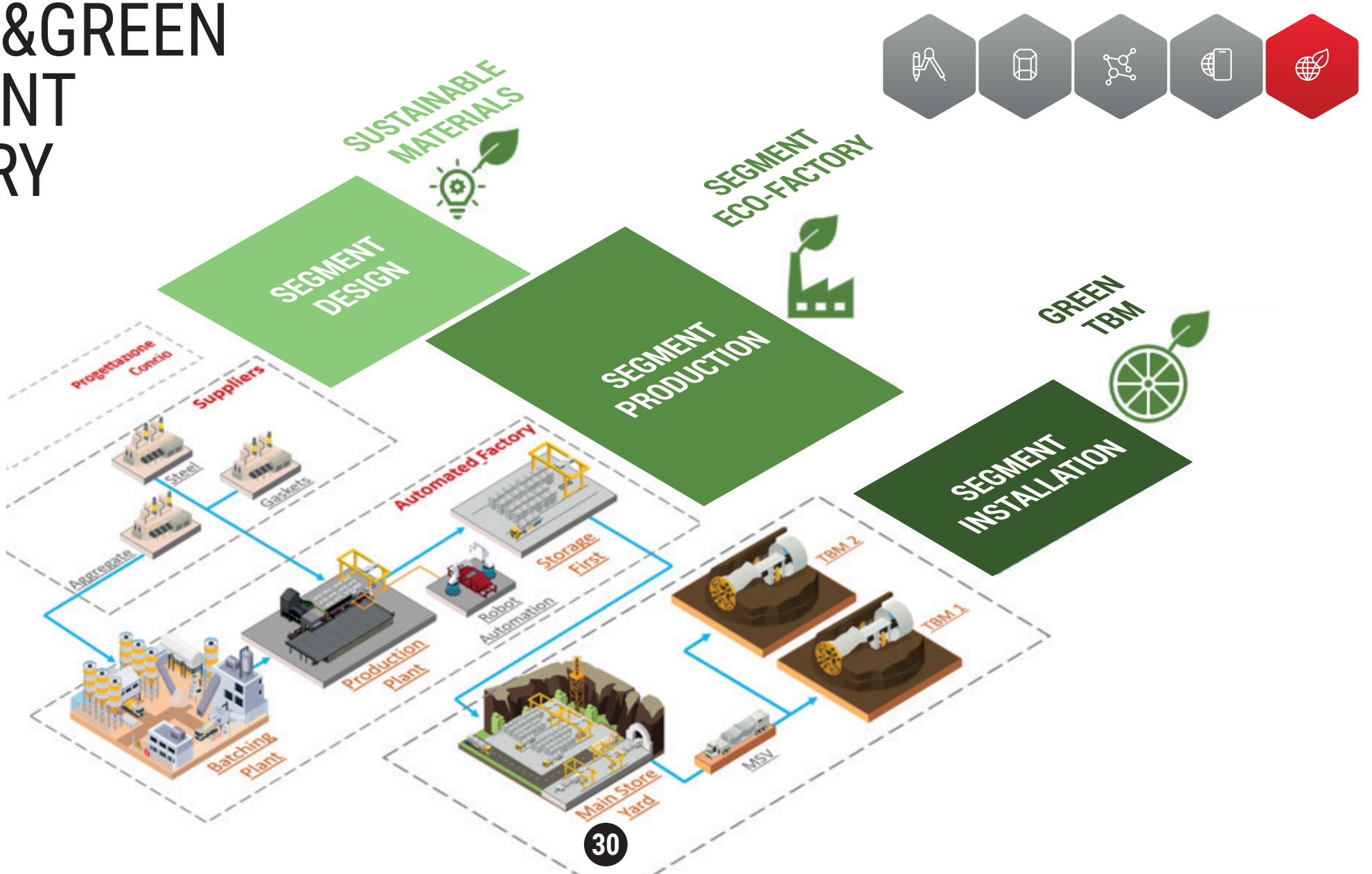
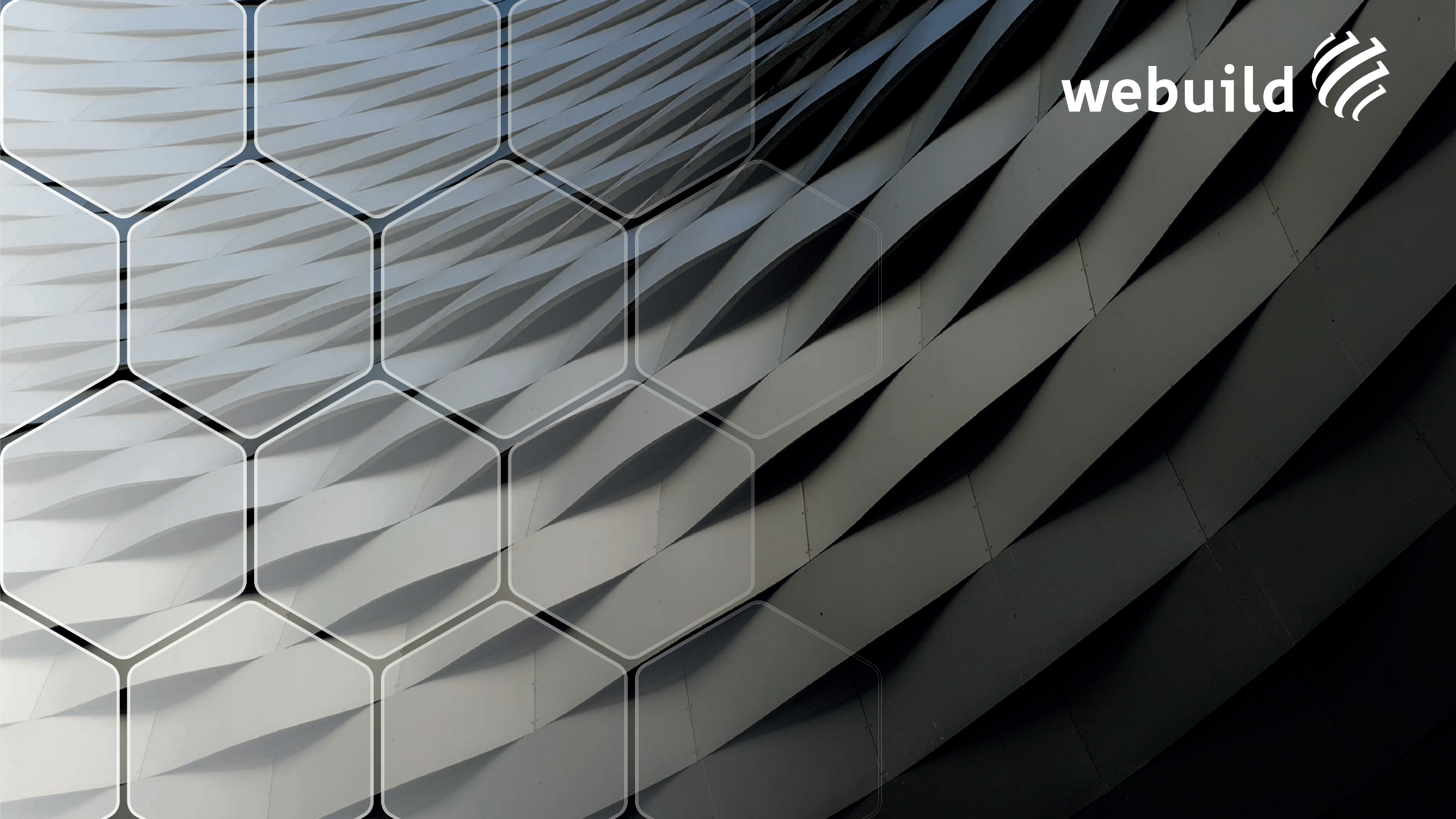
SMART&GREEN SEGMENT FACTORY

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