Intelligent and Sustainable Management Valdemingómez Technology Park

Medio Ambiente

CLOUD

Valdemingómez Technology Park

urbanismo, medio ambiente y movilidad
área delegada de limpieza y zonas verdes | MADRID

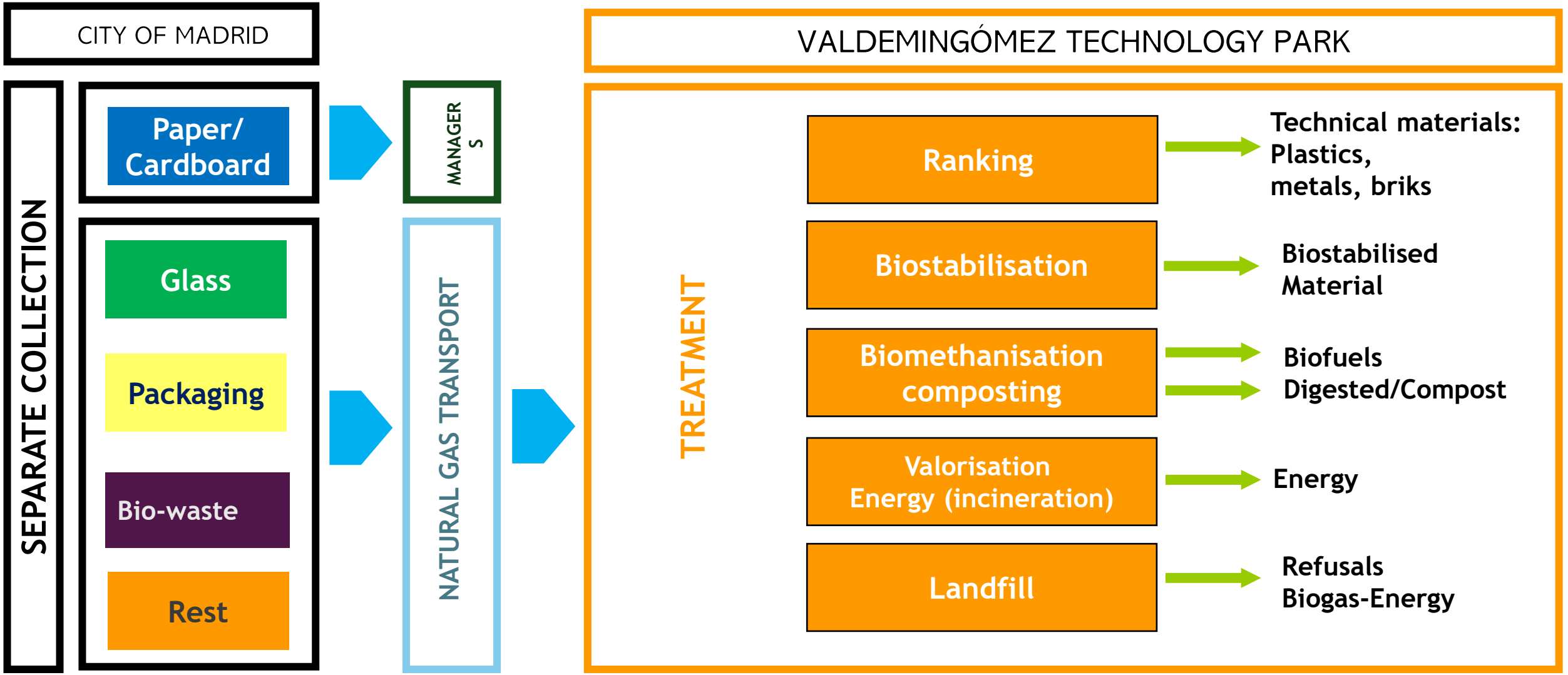
Capital Digital

01.

MADRID WASTE MANAGEMENT MODEL

VALDEMINGÓMEZ TECHNOLOGY PARK

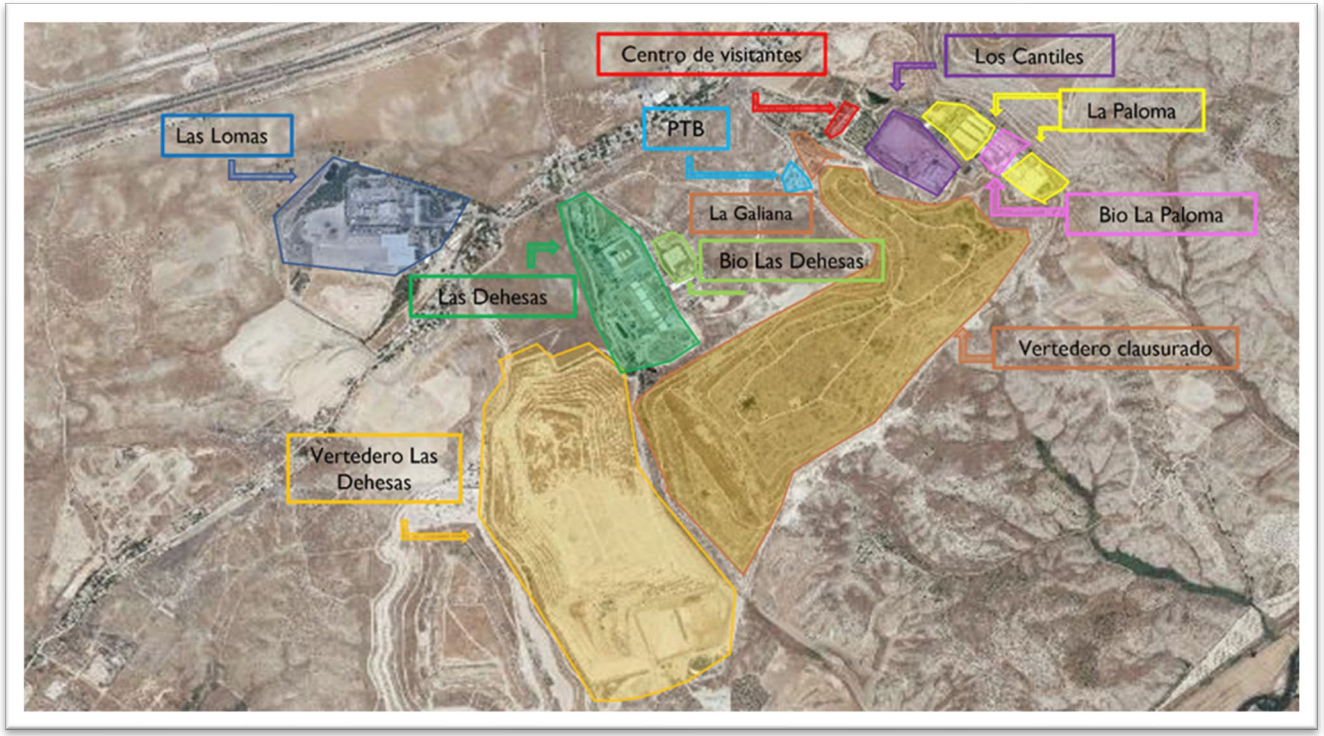
WASTE MANAGEMENT IN MADRID - I: THE PRESENT
Waste Management Model



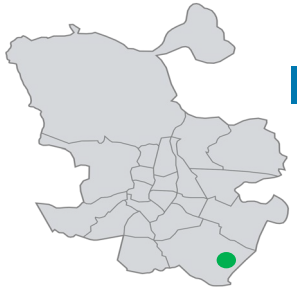
WASTE MANAGEMENT IN MADRID - II: The Technology Park - Treatment Plants

Consisting of 7 treatment plants:

- 3 sorting plants
- 2 composting plants
- 1 automated composting plant (under construction)
- 2 biomethanisation plants
- 1 plant for energy recovery from treatment rejects
- 1 cogeneration plant converting landfill biogas to energy
- 1 biogas treatment plant
- 1 landfill of 87 ha



WASTE MANAGEMENT IN MADRID - III: The Technology Park - Results



Population served	Treated waste	Complex Treatment	Results	Cost
3.2 million inhabitants 8 million tourists a year **before the pandemic** 500.000 commuters **before the pandemic**	1.2 million tonnes of waste 5 fractions 3,347 t/d 370 Kg/inhab. year	Technology Park Industrial complex 7 treatment facilities **1 under construction**	More than 67,000 t of Recovered Materials and 12,800 t of compost and biostabilised material. 273,521 MWh of electricity 139,651 MWht injected into the Enagas grid as biomethane Balance of emissions: -200,000 tCO2e/year	Management costs: 80-70 million 66,66 €/tonne Future investment costs: 46 million Revenues: 45% of costs

02.

MADRID AND INNOVATION IN WASTE MANAGEMENT

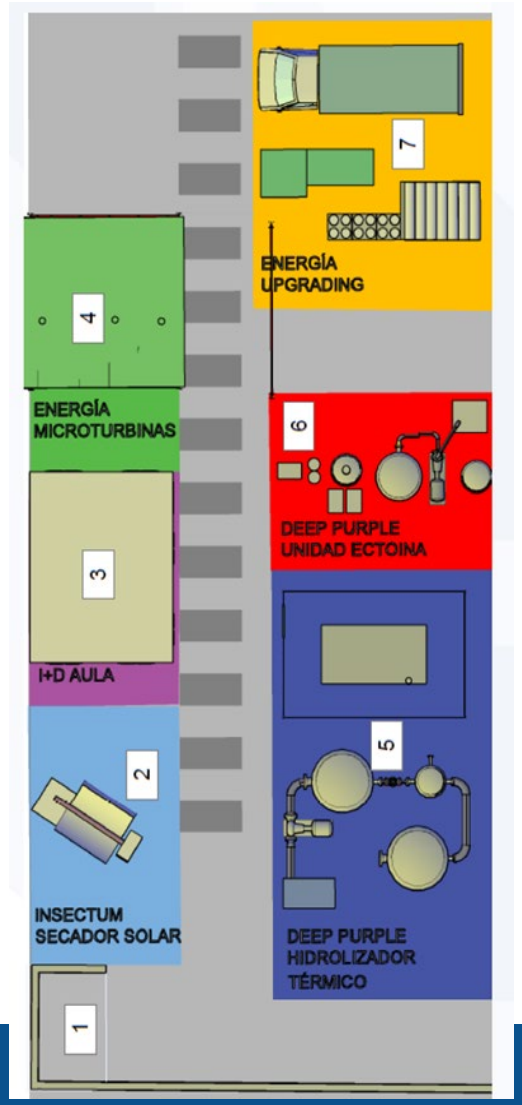
PRESENT

Advanced Data Acquisition ADA_ - Advanced Data Acquisition ADA_.

- ❑5 automations (RPAs)
- ❑Dashboards and management
- ❑**Communications: industrial 5G network**
- ❑Machine learning and artificial intelligence
- ❑Machine vision for stock control
- ❑Intelligent predictive maintenance

R+D+i Area Las Dehesas Biomethanisation Plant

- R&D centre for the development of **innovative pilot projects** aligned with the circular economy, which seek to obtain high added value products from innovative waste management processes and services. Ayto participates by providing support or as a partner.
- Concept of **URBAN BIOREFINERY**. Transformation of materials (biogas, leachates or bio-waste) through **CHEMICAL AND/OR BIOLOGICAL RECYCLING**, to obtain products of great value in different sectors (cosmetics, plastics, construction and fertilisers...).
- Projects to **improve the plant's energy balance**: self-supply of energy, production of biofuels for the plant's vehicles.



OTHER PROJECTS:

- Sustainable Mobility Project with the EMT: **Buses and Bicimad**
- GHG emission monitoring: **collaboration with ESA**
- Remote Stations Project: odorant gas monitoring
- **Participation in European projects**

FUTURE

ROBOTIC INSPECTIONS AT THE DEHESAS LANDFILL SITE

Use of landfill-side **robots for qualification-quantification of fugitive** biogas **emissions**
-. fully **autonomous**
-. Sensorised **OGI cameras to locate biogas leaks with AI**
Information platform:

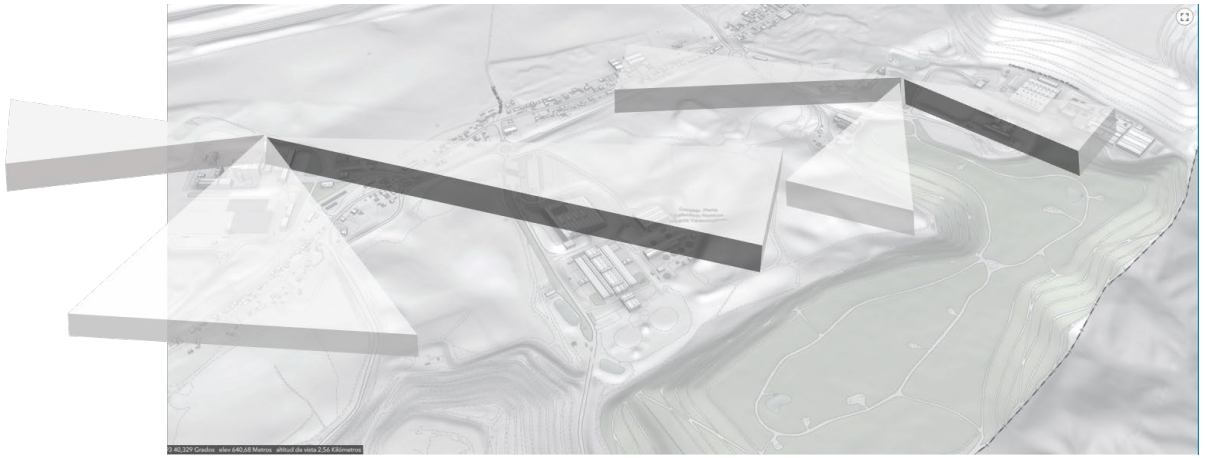
- **Digital twin**
- **Machine Learning** Tools **- learning**
- Transforming **Data into Knowledge**

Cantilever plant

- ❑**Information platform: towards Industry 4.0**
  - ❑Use of AI and predictive modelling
- ❑Fully sensorised and automated plant
- ❑**5G Corridor**
- ❑Intelligent street lighting
- ❑Waste treatment control through the use of IoT sensors (pit filling sensors, odour control, etc.)

SMART URBAN SPACE - USE CASES:

-. Pit fill level control (radar/ultrasonic/image analysis....
pending in-depth technical study)
-. Real-time waste characterisation: Application of AI and computer vision.
-. Integration with the PTV information system: Advance Data Acquisition (ADA_).
-. Intelligent preventive maintenance: Integration with plant SCADA
-. Autonomous driving of reject trucks between plants.
-. Environmental monitoring: sensors for concentration of SH2, CH4, NH3, etc.



03.

PLANT OF THE CANTILES -

TOWARDS INDUSTRY 4.0 IN THE WASTE SECTOR

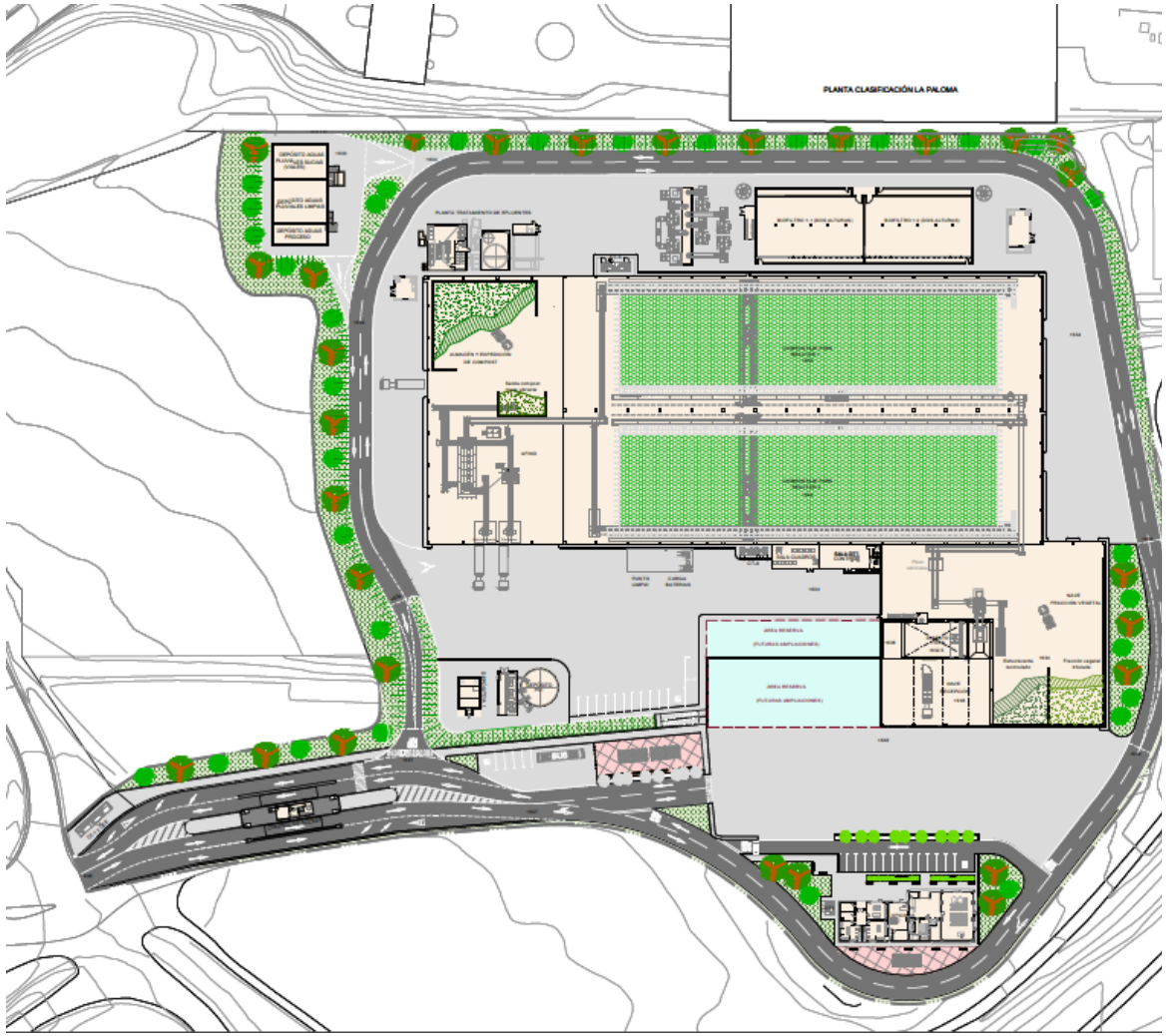
New Los Cantiles-I automated composting plant

BASIC DATA-I

- Design capacity:
  - 82,490 tonnes per year of Digest
  - 23,910 tonnes of Plant Fraction per year
- Production target:
  - 37,240 tonnes of compost per year
- Deadlines:
  - Contract signature: 17/08/2021
  - Start of work: 15/06/2022
  - Estimated implementation: 13 months →16/07/2023
  - Commissioning: 2 meses→17/09/2023
  - UTE operation: 3+2 years
- Investment:
  - 31.035.587,43 € incl. VAT

New Los Cantiles-II automated composting plant

- **Mixed contract** for the construction and operation of an automated composting plant.
- **Objectives:**
  - recycling of organic matter through the production of soil-quality compost.
  - Avoiding the emission of greenhouse gases and odours into the atmosphere.
  - Reduction of waste to landfill.
  - Energy efficiency:
    - Photovoltaic solar plant of almost 1 MW
    - Office building: Passive Hause
- **Construction project parameterised in BIM.**
- **Innovation:**
  - laboratory
  - area to carry out R&D projects
  - 125.000 € annual endowment for R&D&I projects
- Maximum **impact reduction**.
- **Complete sensorisation of the production process.**
- **Performance monitoring through AI processes.**
- Cantiles Waste Information Hub-



04.

INFORMATION PLATFORM PLANT OF LOS CANTILES

SOLUTION -

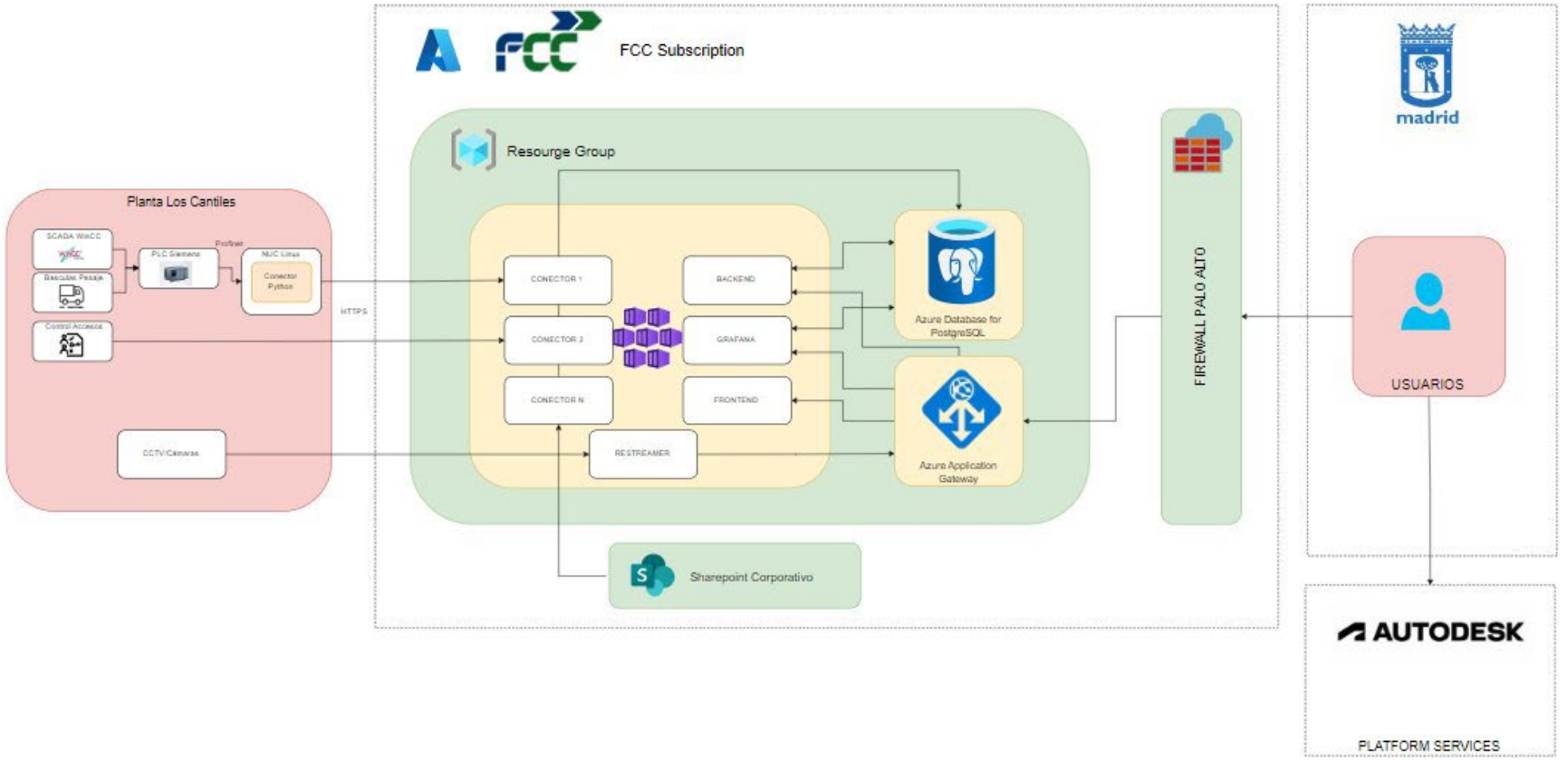
"Cantiles Waste Information Hub- "

To be taken into account...

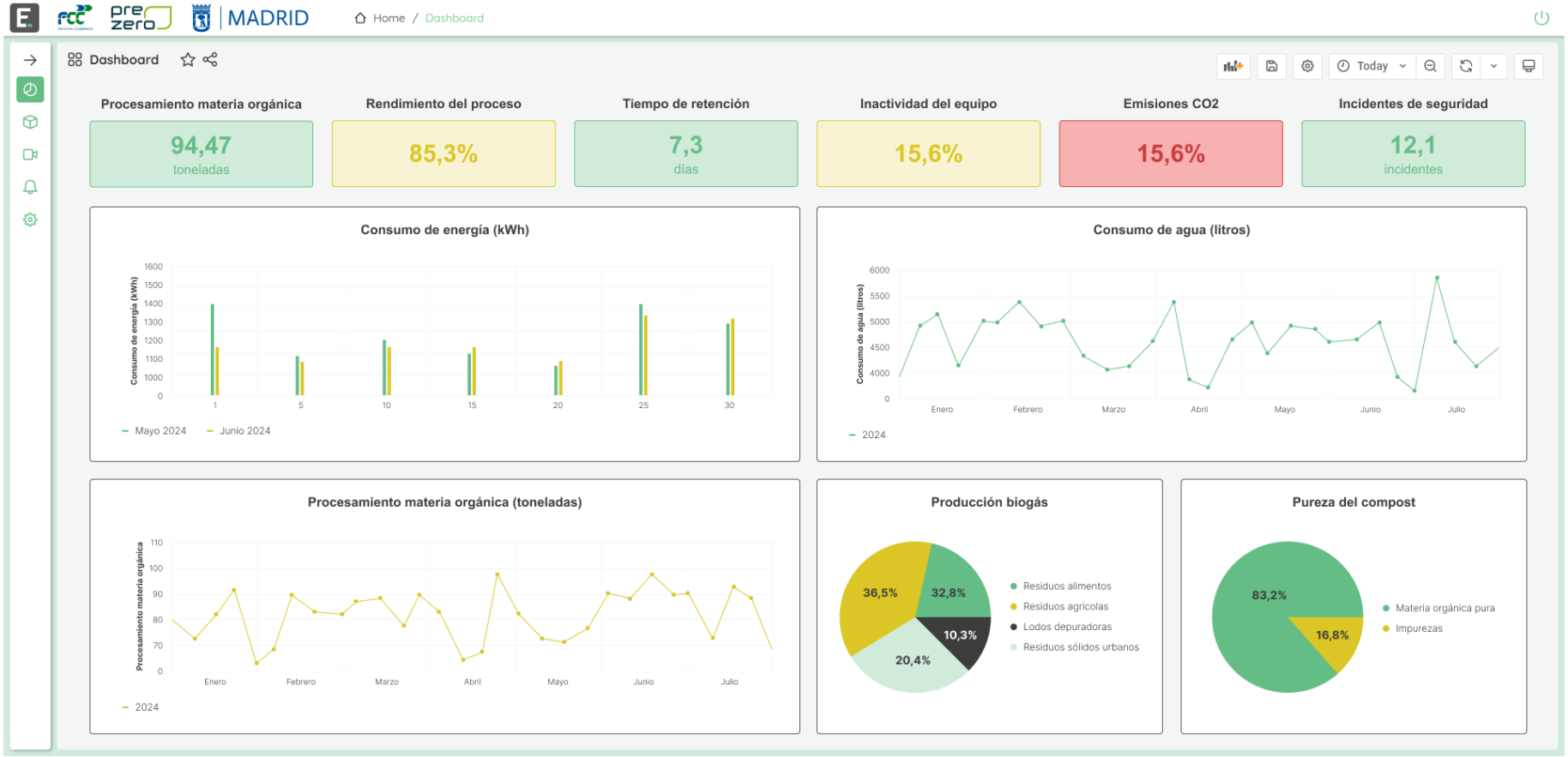
MANAGEMENT AND PRODUCTION DECISION SUPPORT SYSTEM

1. Real-time information on process data.
2. Collection of information from different heterogeneous sources.
3. Visual dashboards with enriched and automatically updated information.
4. Integration of 3D BIM model of the plant for efficient management.

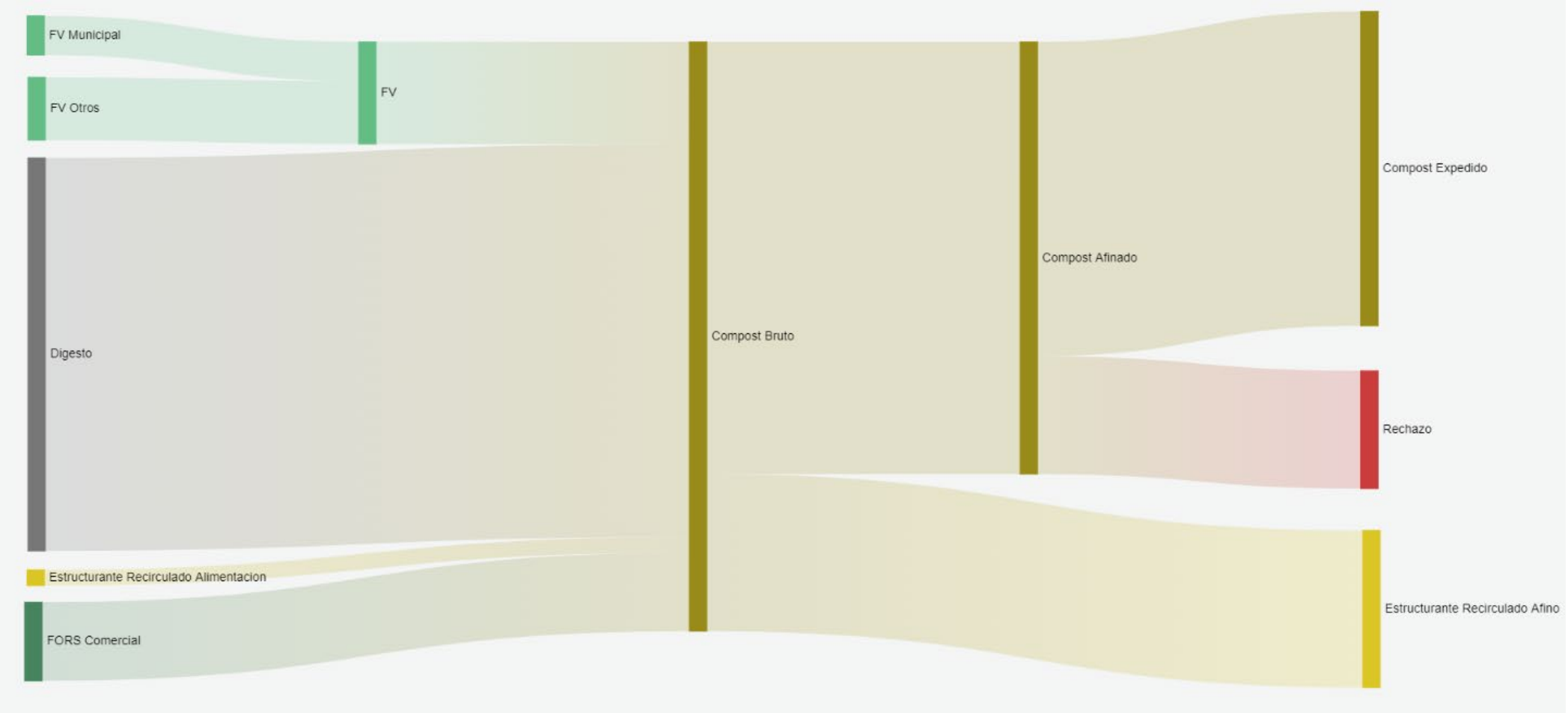
AQUITECTURE



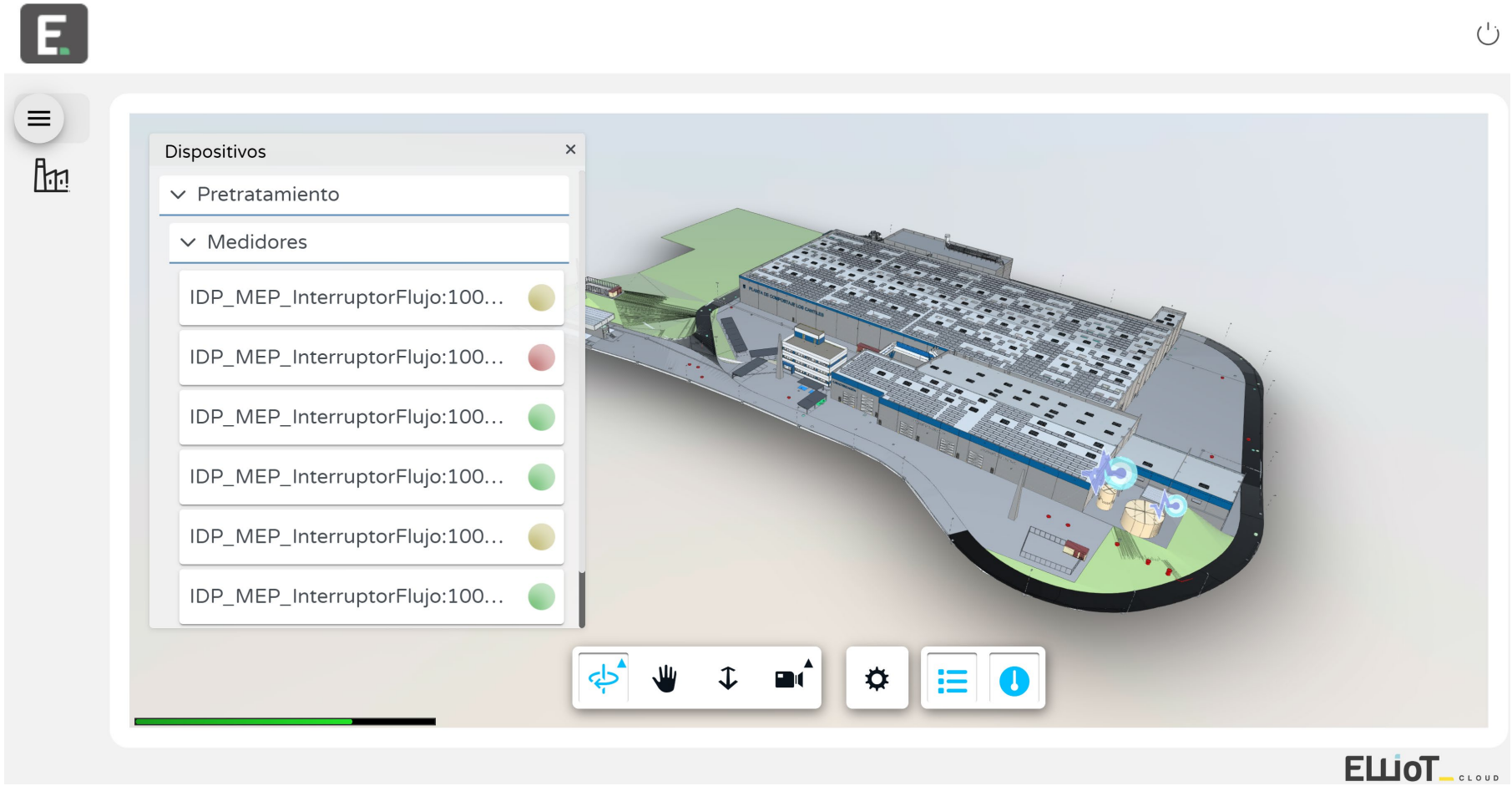
KPIs - KPIs - Scorecards



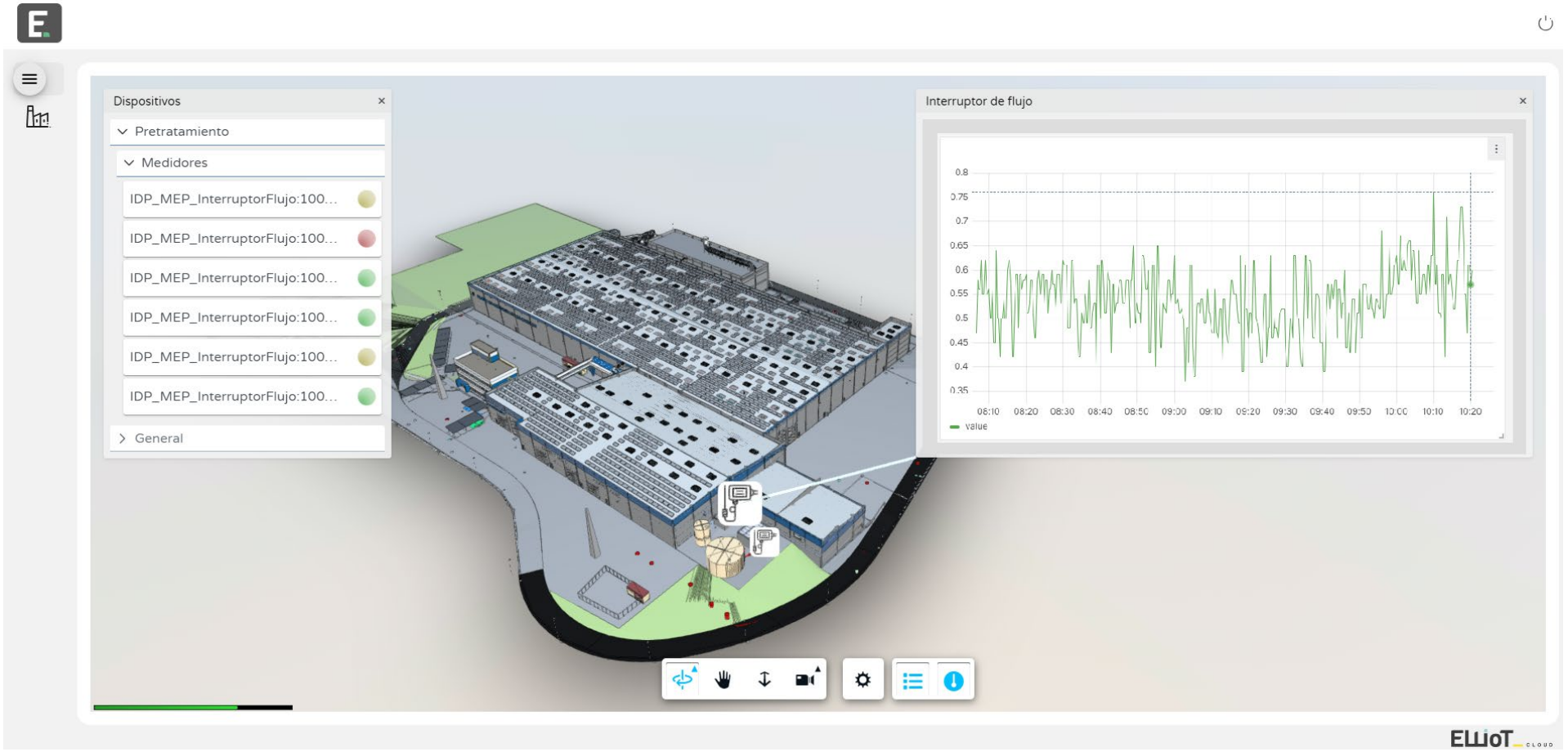
BALANCE SHEETS - Example Mass Balance Sheet



BIM INTEGRATION (3D) - Overview



BIM INTEGRATION (3D) - Real-Time Data



BIM INTEGRATION (3D) - Detail Visualisation

The project in the framework of the Digital Transformation Strategy

Framed in **the Digital Transformation Strategy of the Madrid City Council.**

Strategic Objective 2. **City Intelligence**

Strategic focus 4. **Managed on the basis of evidence and data**

Programme 8. **Evidence-based planning and management**

Capital Digital

Thank you very much!

SMARTCITY EXPO WORLD CONGRESS