Mr. Federico Vallés,
Electricity Power Coordinator, Canal de Isabel II,
Region of Madrid, Spain
Canal de Isabel II key figures
Region of Madrid

- **6.36 million inhabitants served** (supply / sanitation)
- **479.87** hm$^3$
- **489.24** hm$^3$ treated in WWTP
- **124.72** hm$^3$ of **regenerated water** (12.01 reused)
- **2,808 employees**.
- **146.6** million euros invested.
- **107.07 MW installed** for electricity generation.
- **312.22 millions KWh produced** (68% of consume)
- **122.34 litres per capita per day of domestic consumption**
There is a close relation amongst water use and electricity demand in the urban water cycle.

This relation depends mainly on climatology.

- We need to pump more water in dry years and lift water from wells.
- Gravity helps our job in wet years.
Towards the Decarbonization of the EU Economy

Europe is challenged to decarbonize its economy in 30 years.

This objective is in line with the *Paris Agreement* and is a geostrategic objective for Europe.

We have the internal goal of reaching **100% self-consumption** by 2030.

How are we going to do it?
Canal water-energy full urban cycle

Installed capacity 2021: 107.5 MW

Drinking water

- Hydroelectric
- Solar
- Biogas generators
- Biogas micro turbine
- Dry sludge

Waste water

- Floating solar
- Micro turbine
- Gas station
- Methane reinjection
- Solar panels

*largest installed capacity company on the Region of Madrid
Water supply

Hydraulic Power Plants
9 facilities: 35.5 MW

9 hydroelectric microturbines
Installed capacity: 1 MW.

Solar Plants
Floating solar plant: 1.6 MW
12 MW In tender

Water collection

Drinking Water treatment

Water Distribution
Sanitation

Hydraulic Microturbines and Biogas Microturbines
7 facilities

Biogas power plants
16 facilities: 26 MW

Thermal sludge drying plant
2 facilities: 44.7 MW

Project Finished: Biomethane for injection into the natural gas network
1 facility
European ECO-GATE Consortium (Nedgia)

Biomethane for TRANSPORT
2 facilities

Photovoltaic solar panels
Installed power: 0.4 MW + 5 MW under tender
Sanitation

Waste Water Treatment plants are a source of energy.

Biogas is mainly Methane

Biogas Deposit

$\approx 10.5 \text{ kWh/Nm}^3$

$\approx 6 \text{ kWh/Nm}^3$

GAS NATURAL

PCI
Biogas use

Canal has sustainable source of own renewable energy from biogas.

Mainly used in the electricity power generation.
Biogas use

Biogas production reduces sludge

- 13% reduction

↓ >2,500 transport trucks

- 200,000 toneladas (t)
- Years

350,000
375,000
400,000
425,000
450,000
475,000
Electricity production and Consumption

*Last years Canal is producing a large amount of the energy that consumes.*
## Biogas use in Spain

According to Spanish Institute of Energy Saving and Diversification (IDAE) from the Environment an Energy Ministry the biogas has an **important potential in Spain**:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Inferior Range</th>
<th>Superior Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Treatment</td>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>Urban Waste</td>
<td>143</td>
<td>350</td>
</tr>
<tr>
<td>Agriculture Industry</td>
<td>295</td>
<td>295</td>
</tr>
<tr>
<td>Cattle</td>
<td>1.129</td>
<td>1.294</td>
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<tr>
<td>Agriculture</td>
<td>0</td>
<td>977</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1.655</strong></td>
<td><strong>3.004</strong></td>
</tr>
</tbody>
</table>

**Domestic Natural Gas Consumption in Spain**: 3,660 ktep
Conclusions

• There is a wide range of alternatives to reduce the impact of our activity.

• Biogas is a reliable source for energy:
  • Biogas for Electricity Power
  • Biogas for thermal use
  • Upgrading to Biomethane:
    • Biomethane for transport near origination point.
    • Biomethane for injecting on the natural gas grid.

• The effort is shared between companies and society.