



**Green  
Systems**



## GREEN SYSTEMS

Supporting the new energy vision  
with a multidisciplinary approach.

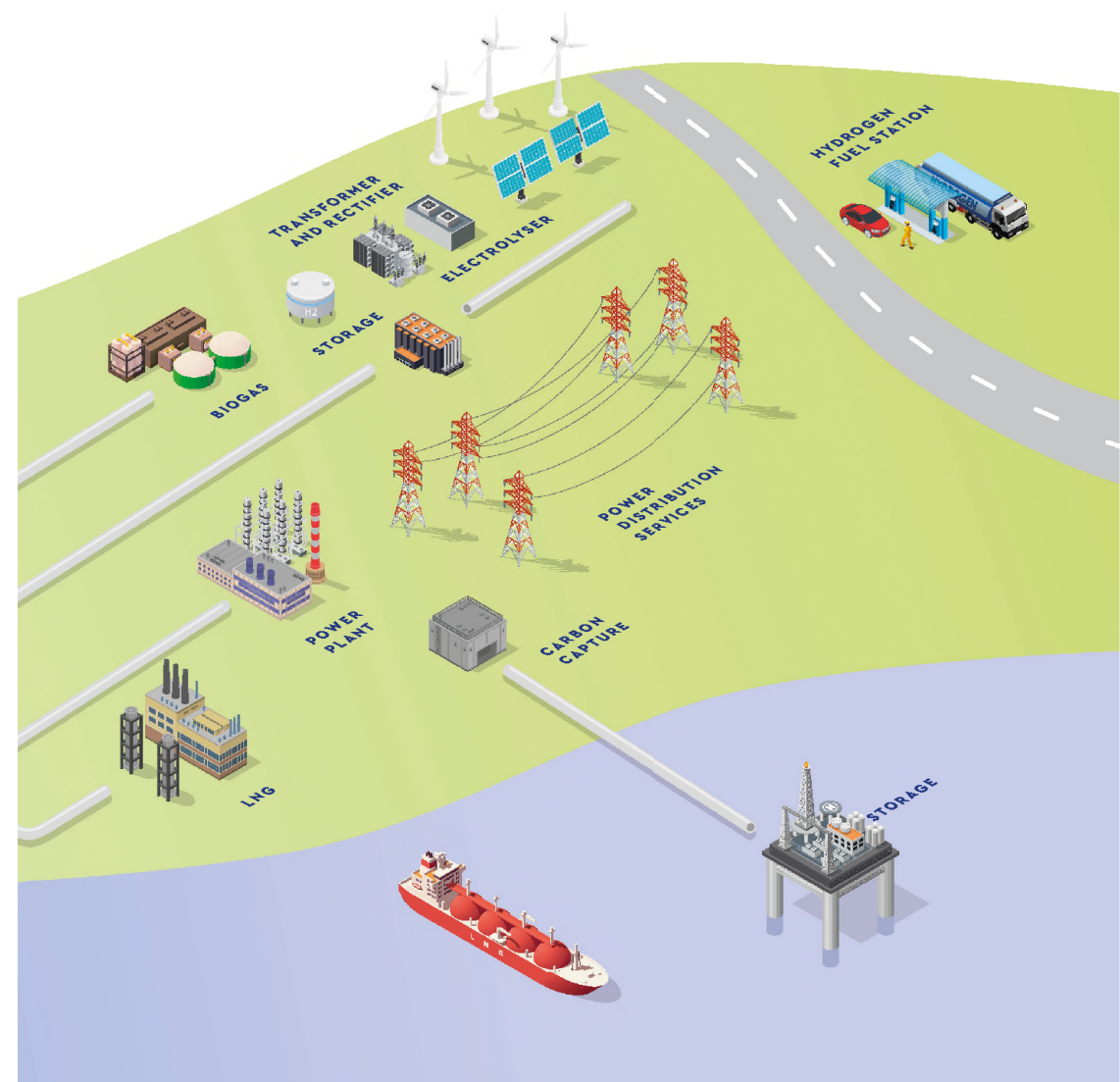
We trust in energy evolution: that means we know that sustainability will drive the next standard of our industry. In this scenario we want to support this new vision becoming the «one shop stop» contractor for the provision of sustainable systems for energy production.

Our Green Systems Business Unit leverages on the capabilities of Bonatti Engineering Centres of Fano (Italy), Milan and Mexico City. We can support our clients starting from selection of the best technology providers and managing the entire project life-cycle of the project, providing engineering, procurement, construction, commissioning, start-up and operation & maintenance of the plant.

Bonatti is your "cradle to operation" of sustainable energy systems.

As EPC Contractor we act in:

- Hydrogen
- Biogas and Biomethane
- Carbon capture utilization and storage (CCUS)
- Energy efficiency systems (cold ironing, retrofitting of existing power plants, etc)



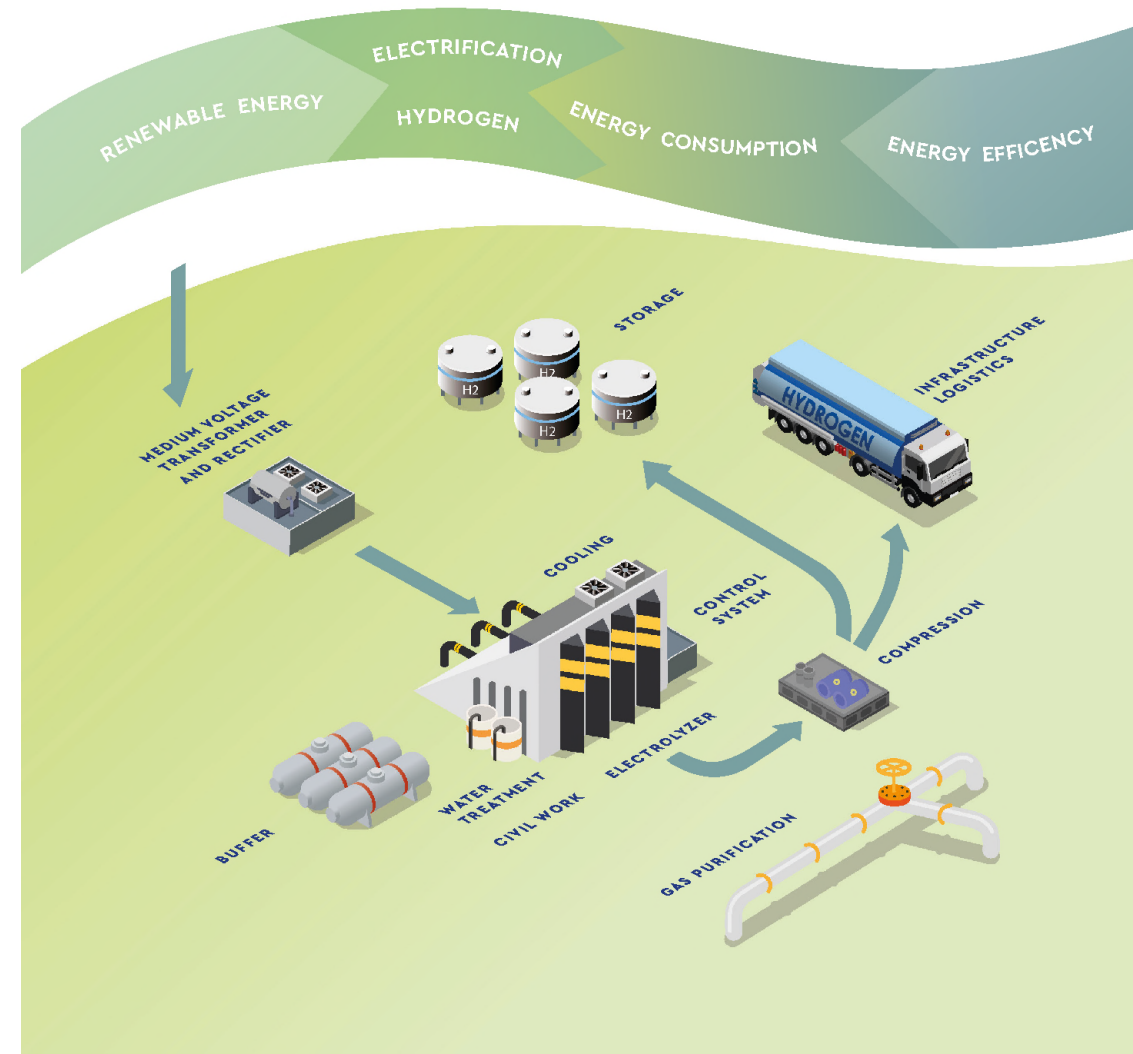
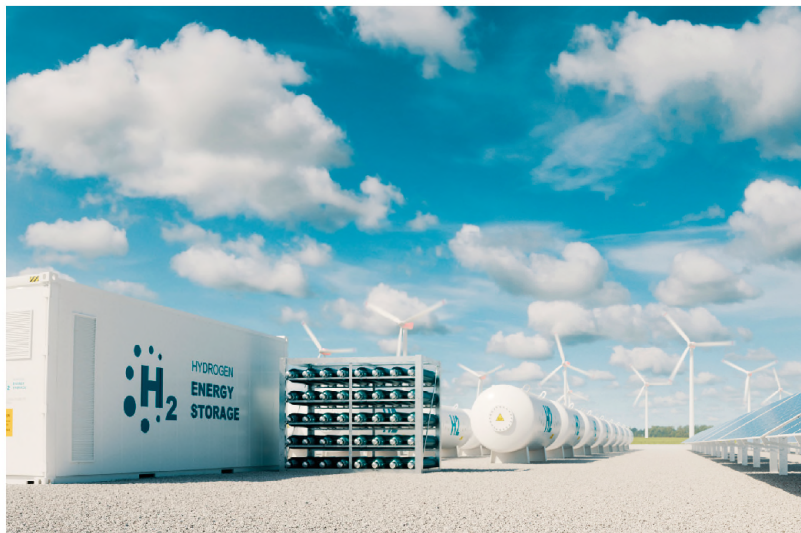
# HYDROGEN

European Union has committed to reach carbon neutrality by 2050. Electrification & Renewable can have a significant impact on the 55% of the CO<sub>2</sub> emissions.

45% of CO<sub>2</sub> are related to so called "hard to abate" sector (no scalable electrification, energy intense, CO<sub>2</sub> in production process). H<sub>2</sub> is a key driver to support the de-carbonization path in hard to abate sector.

## A NEW PILLAR TOWARDS A FULL DECARBONIZED WORLD

Hydrogen is a complementary energy vector to tackle GHG in the hard to abate sectors.





## BIOGAS AND BIOMETHANE

We have developed knowledge of both wet and dry (or semi-dry) biodigester with several technology providers as Veolia, Schmack, Hzi, etc.

The biogas plants have the aim to process the urban solid waste or agricultural waste in order to produce biogas with high content of  $\text{CH}_4$  through a biological digestion.

The biogas can be used «as is» through a gas turbine in order to generate power for local users or upgraded to biomethane and then delivered to the national gas grid.

This process can reduce the waste from urban or agricultural wastes creating energy from scraps and therefore it is a strong contributor to the «circular economy» effort.

Biogas production facilities require specific process knowledge to select the best bio-digestion process depending upon the waste composition, the sorting of the wastes to treat, prevention of odorous emissions, biogas upgrade to biomethane.



## MILAN AREA, ITALY BIOMETHANE PLANT

*EPCM of the Electro-Instrumental and Automation BOP for JV Sorgenia / Agatos*

The scope of the work includes the thermal island (biomass boiler) of the biomethane production plant.

This plant will treat 35,000 tons / year of OFMSW (Organic Fraction Solid Urban Waste) and will allow an annual production of approximately 4 million cubic meters of biomethane that will be injected into the Italian national gas network managed by Snam.



## CARBON CAPTURE

During the latest decades we gained a wide experience in EPC projects of gas purification plants, gas pipelines and compression stations executed for oil & gas sector. This expertise includes material selection, procurement of complex equipment and packages, construction and commissioning services provided to the major players of energy sector.

Due to this path, we have developed an extremely deep knowledge of complex compression systems that allows to step in the carbon capture usage and storage with a know-how transfer from traditional energy business into a sustainable one as CCUS.

The main steps of a ccus plant can be summarized as follows:

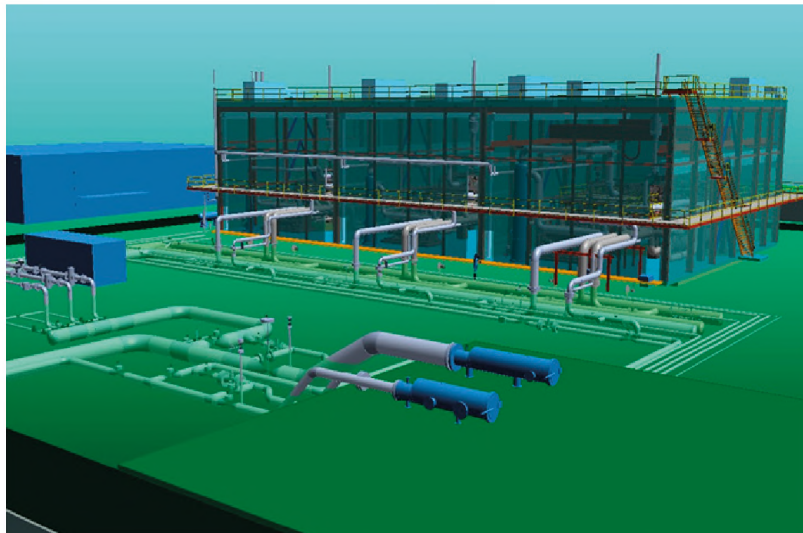
**flue gases collection**

**CO<sub>2</sub> separation and purification**

**CO<sub>2</sub> compression at supercritical conditions**

**transfer to storage location via pipelines**

The most common technologies for the CO<sub>2</sub> separation are ammina based (shell process and similar ones) and chilled ammonia ones (such as bh one). New technologies are under development such as ammonium salts or enzymatic adsorption.



Rendering of Porthos Project (Netherlands)

## RENEWABLE ENERGY, EXPERIENCES IN BIOMASS PLANTS

Biomass is plant-based material used as fuel to produce heat or electricity. Examples are wood and wood residues, energy crops, agricultural residues, and waste from industry, farms and households.

Approximately 86% of modern bioenergy is used for heating applications, with 9% used for transport and 5% for electricity. Most of the global bioenergy is produced from forest resources. Power plants that use biomass as fuel can produce a stable power output, unlike the intermittent power produced by solar or wind farms.

The IEA (International Energy Agency) describe bioenergy as the most important source of renewable energy. The IEA also argues that the current rate of bioenergy deployment is well below the levels required in future low carbon scenarios, and that accelerated deployment is urgently needed.

In IEA's Net Zero by 2050 scenario, traditional bioenergy is phased out by 2030, and modern bioenergy's share of the total energy supply increases from 6.6% in 2020 to 13.1% in 2030 and 18.7% in 2050.

### CROTONE, ITALY BIOMASS POWER PLANT



EPC for Biomasse Italia

### BANDO D'ARGENTA, ITALY BIOMASS POWER PLANT



EPC for San Marco Bioenergie

The scope of the work includes in both projects the thermal island (biomass boiler) of the biomethane production plant. The turn-key installation of 2 10MW steam turbine units and relevant wood chips boilers, civil works and plant auxiliary systems are also included.

Both project were executed by Bonatti subsidiary Carlo Gavazzi Impianti.



## COMPLEMENTARY SOLUTIONS FOR POWER GENERATION, TRANSMISSION AND DISTRIBUTION

Bonatti's subsidiary Carlo Gavazzi Impianti has full capability in EPC of any type of power plant. The references of Carlo Gavazzi Impianti range from nuclear plants to control system integration up to the recent renewable installations. This condition enables our Group to provide a full spectrum of services for power generation, transmission, automation and distribution fields.

The integration of engineering in all the disciplines with the capacity of directly executing construction and commissioning activities makes available to customers a complete package together with the advantage of a single interface avoiding disruptions and duplication of efforts.

The turnkey approach in power plant building is associated to a wide experience in HV/MV substations, revamping and rehabilitation of substations and grid control.



## ALGERIA SONELGAZ SUBSTATIONS

*Extension of 4 electrical Substations up to 400kv (Salah Bey, Bordj Bou Arreridj, Ramdane Djamel and Djelf) for SONELGAZ*

The Scope of Work includes engineering, procurement and installation of:

- Steel structures
- High voltage equipment
- Protection & control systems
- Telecommunication & telecontrol systems

Key Features: completed in 18 months and avoiding power shut down

## ALBANIA TIRANA SUBSTATIONS

*EPC of a 400/220/110 kv substation for PMU / MECE (final client OST – Albania National Grid Operator)*

Key Characteristics:

- Three voltage levels: 400 kV, 220 kV and 110 kV
- 24 bays
- 2 three-phases autotransformers 300 MVA 400/220 kV
- 2 three-phases autotransformers 90/120 MVA
- 8000mq

Key Features: Tirana 2 is the most important substation in Albania since connects its grid to the European one.

## ITALY RFI SUBSTATIONS

*Construction, maintenance and upgrading activities on EPC basis of HV substations for RFI (Italian Railway Network Operator)*

Key Activities:

- Ancona Substation: maintenance and upgrading of the HV section and Interconnection
- Bari Substation: maintenance and upgrading of the HV section and Interconnection
- Northern Italy System: construction, maintenance and upgrading of multiple substations

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