BIO NOVA

BY cefla

SOLUTION

cefla

Making Your Life Better.

THE CEFLA SOLUTION

To support agricultural businesses - or, in any case, companies that produce agro-industrial waste - as they transition away from traditional combustion-based energy sources, Cefla has developed NOVAbio SOLUTION by Cefla, a solution that incorporates a CHP version of Bloom Energy's Energy Server™ fuel cell module to produce both electricity and thermal energy. This:

- eliminates in-atmosphere emissions of pollutants (NOx, SOx, CO, particulate matter)
- boosts performance (efficiency exceeds 80%)
- reduces biomass input by 30%: improved efficiency means the digester needs less power to produce biogas. Electricity output remaining equal, savings in terms of agricultural biomass input at the digester vary from 30 to 50%.

The modular NOVAbio SOLUTION by Cefla solution starts from a power rating of 250 kW (and relative multiples thereof). Should more power be needed it can easily be customised. Plug&Play logic also makes it easy to install.


NOVA


THE FUTURE
OF ENERGY
STARTS HERE

WHY FUEL CELLS?

Clean, reliable energy, affordable for everyone, enabling businesses and communities to responsibly take charge of their energy.

Bloom Energy's innovative solid oxide platform for distributed generation of electricity is changing the way we think about energy. This technology looks to the future. It provides low-carbon energy, laying the groundwork for a net-zero-emissions tomorrow.

Fuel cells convert the chemical energy of fuels into electricity and heat, but without any combustion as occurs with traditional cogeneration. Power remaining equal, electrical efficiency is 20% higher, and CO_2 emissions are significantly reduced.

An innovative, reliable technology. Businesses and communities face growing threats to their energy supplies. To respond to such challenges, the 'fuel cell' technology integrated into the Cefla solution consists of an on-site power generation platform that delivers highly reliable, continuous 24/7 energy.

Fuel cells are highly efficient systems that can run on different sources: natural gas, biomethane, biogas, hydrogen blends and even 100% hydrogen.

CLEAN ENERGY

AIR QUALITY IMPACT

Since there is no combustion, Energy Servers produce virtually none of the harmful particles that form smog, cause asthma and worsen public health. This means genuinely low environmental impact. In addition to energy, fuel cells produce water and carbon dioxide: pollutants such as NOx, SOx, CO (nitrogen, sulphur and carbon oxides) are absent, CO_2 emissions are low and there is no need for fume purification.

Efficient, saves 30% of incoming natural gas

Plug&Play, easy installation and maintenance

Clean, without pollutants

Versatile, combines different primary sources

Resilient, guaranteed continuity of service

*In 2024, NOVA SOLUTION by Cefla - installed at the Cefla plant in Imola - reduced CO_2 emissions by about 300 tons compared to grid sources (electricity and gas).

In 2024, the Bloom solution allowed a reduction of approximately 320 tons of SO_2 and more than 1,100 tons of NOx, (100% and 99.8% respectively compared to grid alternatives).

NO_x:

2023 Emissions of NO_x from Products (lbs)	**9,276**
2023 Domestic NO_x Reductions vs. Grid Alternatives (lbs)	**2,450,898**
% Reductions vs. Grid	**99.8%**

SO_2:

2023 Emissions of NO_x from Products (lbs)	**32**
2023 SO_2 Reductions vs. Grid Alternatives (lbs)	**704,416**
% Reductions vs. Grid	**100%**

Based on comparison to 2022 EPA and GRID non-baseload emissions rates inclusive of line losses as a proxy for marginal emissions.

ENVIRONMENTAL IMPACT

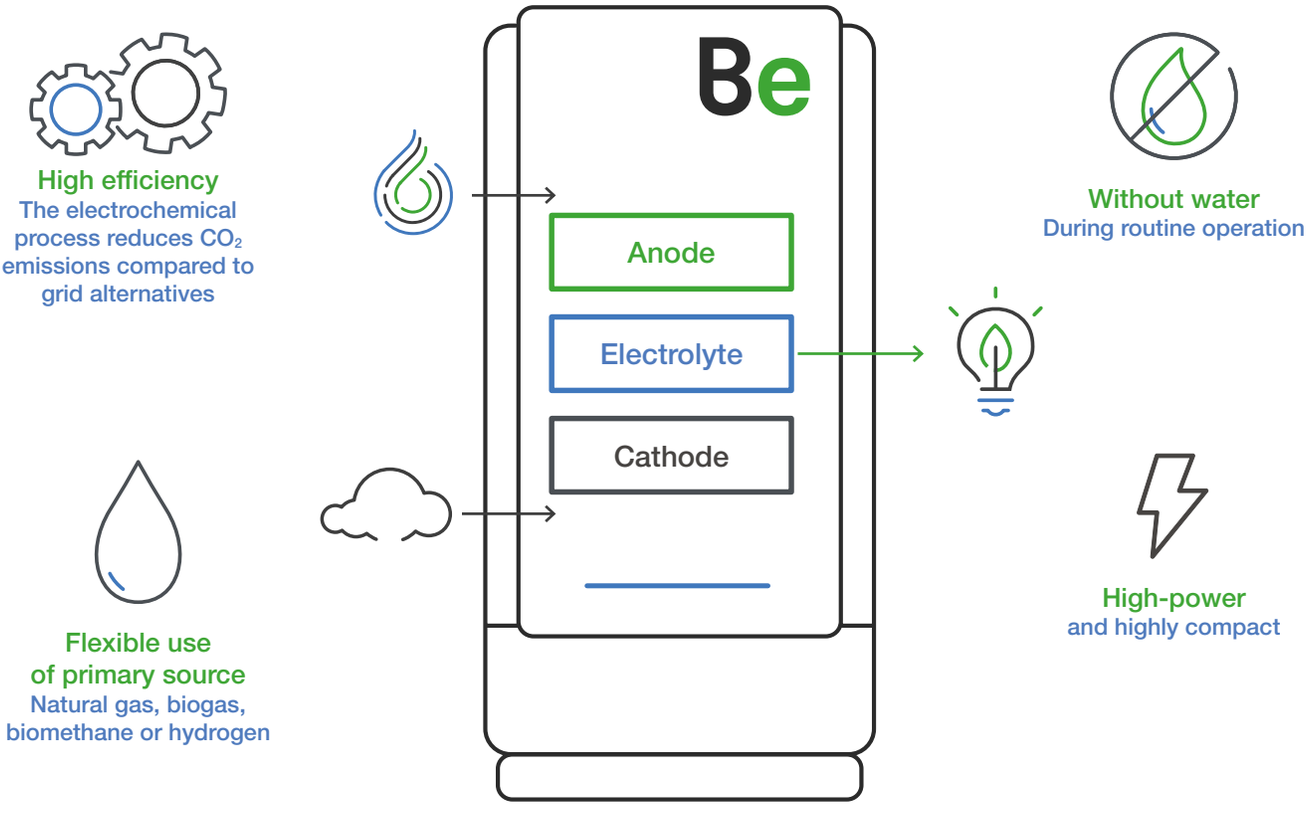
- 98% of the material replaced during the revamping phase is recovered and regenerated to avoid wasting resources.
- Water consumption is significantly reduced: water is used during start-up for a few hours and once the electrochemical reaction is stable the water is retrieved from the wet zone.
- No chemicals used: no lubricating oil, no urea to reduce emissions, no starter batteries or any type of acid.

CARBON IMPACT

Cefla has chosen to provide a solution with Energy Servers™, which convert fuel into electricity at the highest efficiency of any power solution available today. By using fuel more efficiently, servers fuelled with natural gas produce lower-than-average carbon emissions.

Silent and compact: significant energy generation with a small footprint.

NOVAbio SOLUTION by Cefla can easily be remodulated and lets customers customise and resize their configuration to cope with growing business and energy demands. Additionally, noise levels are rather low, <70dB(A) at 1 metre: an absence of rotational mechanics means the only noise is that produced by the cooling fans.



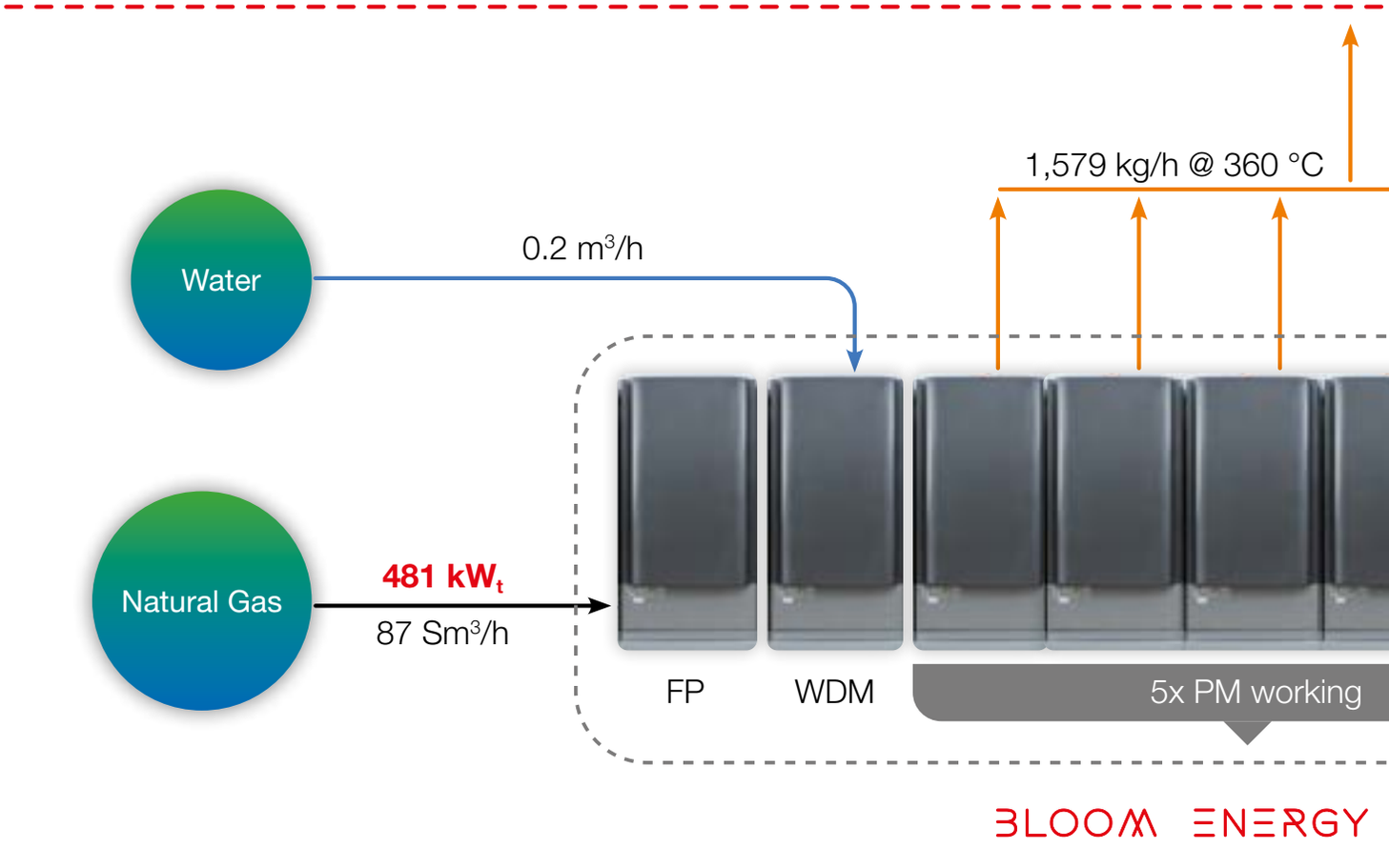
OPERATING

DIRECT USE

(ambient air pre-heat @ 30 °C)

Direct hot air → 148 kW_t

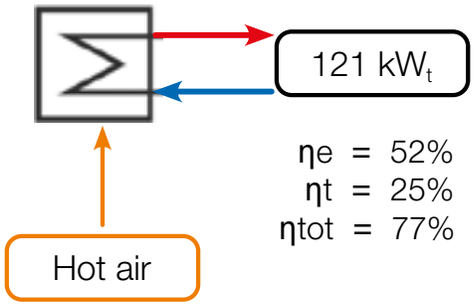
ηe = 52%
ηt = 31%
ηtot = 83%

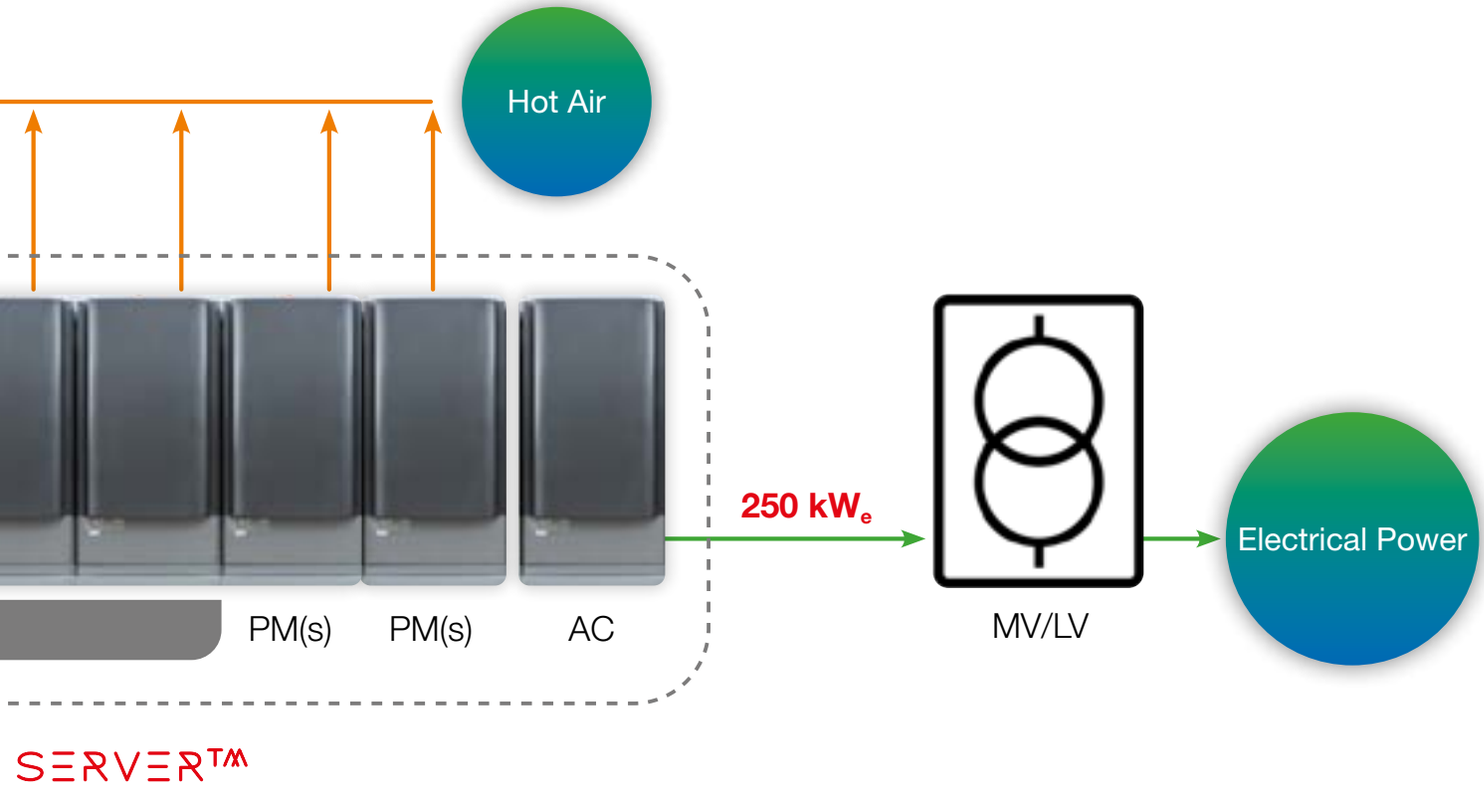


DIAGRAM

HOT WATER

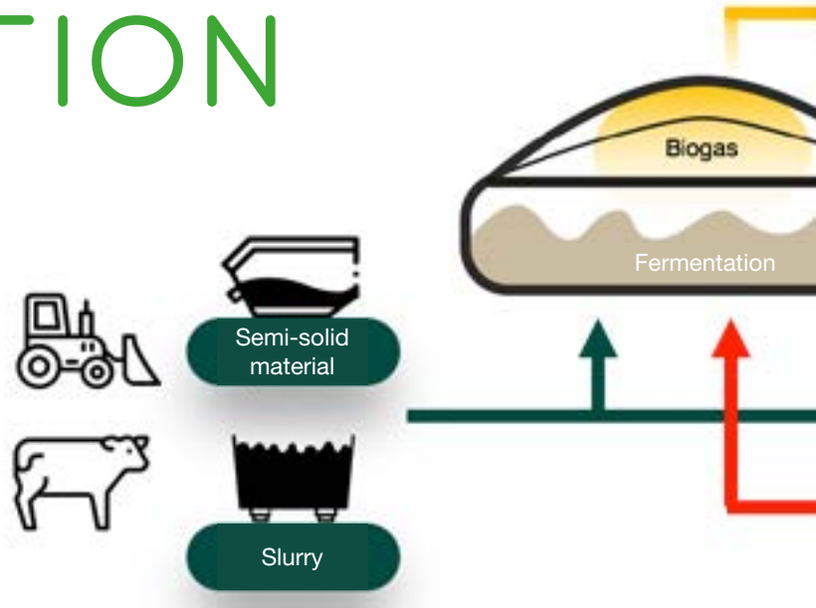
(delivery 90/70 °C)



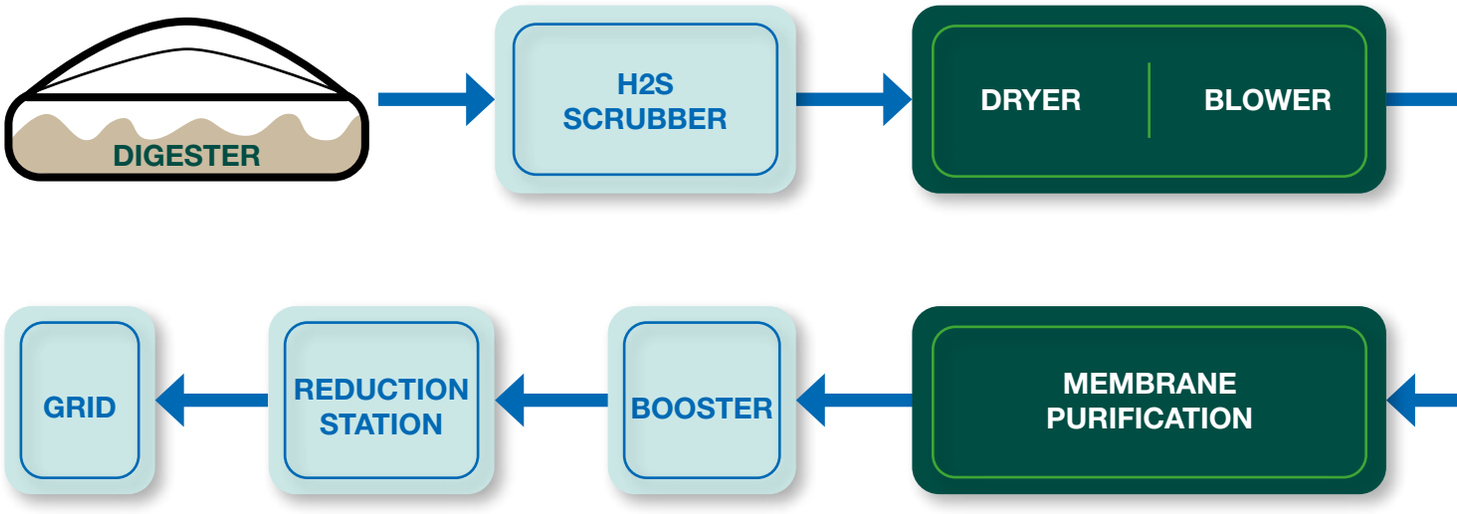


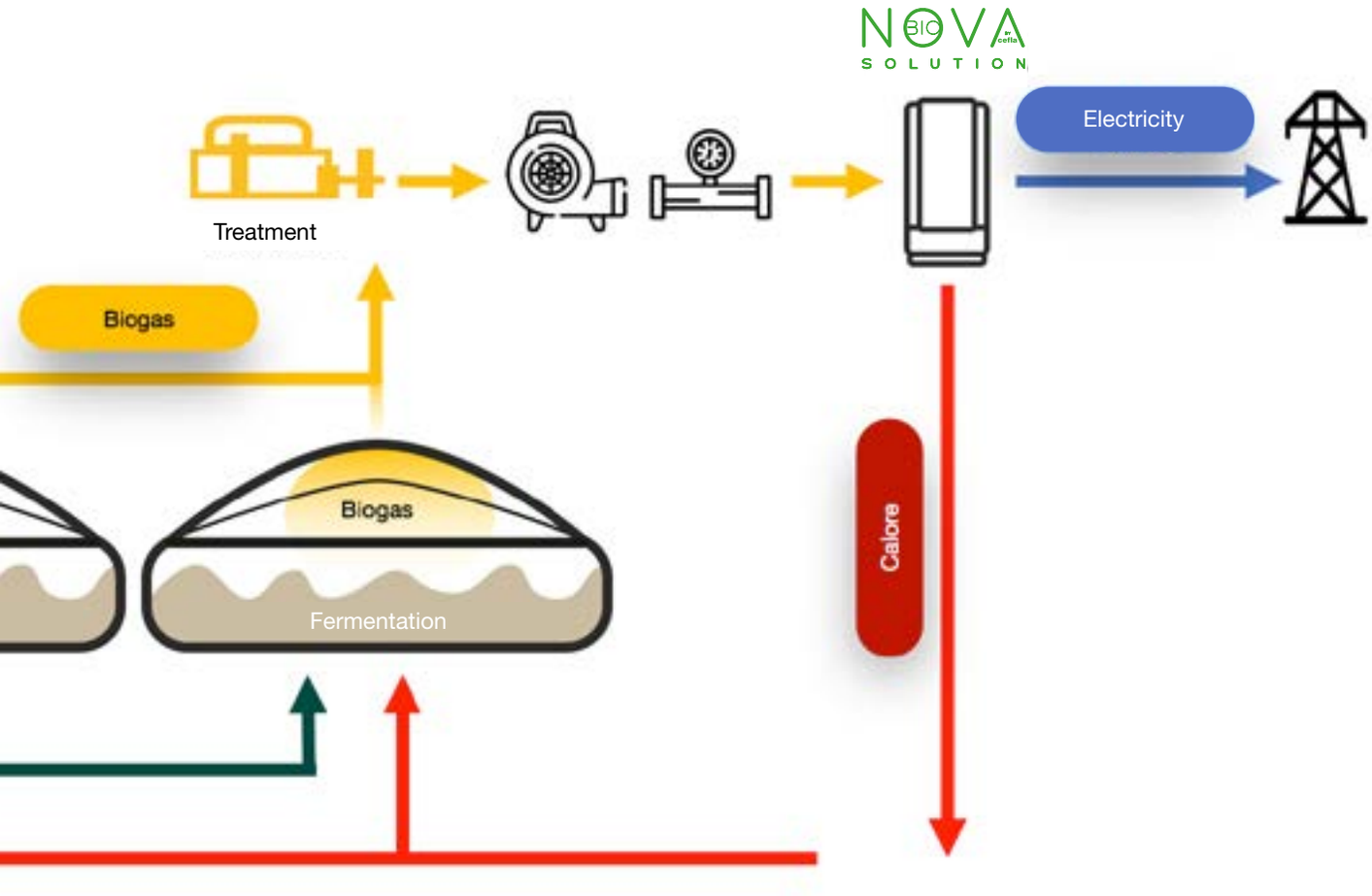
SERVER™

NOVABIO SOLUTION BY CEFLA FOR INCENTIVIZED ELECTRICITY GENERATION

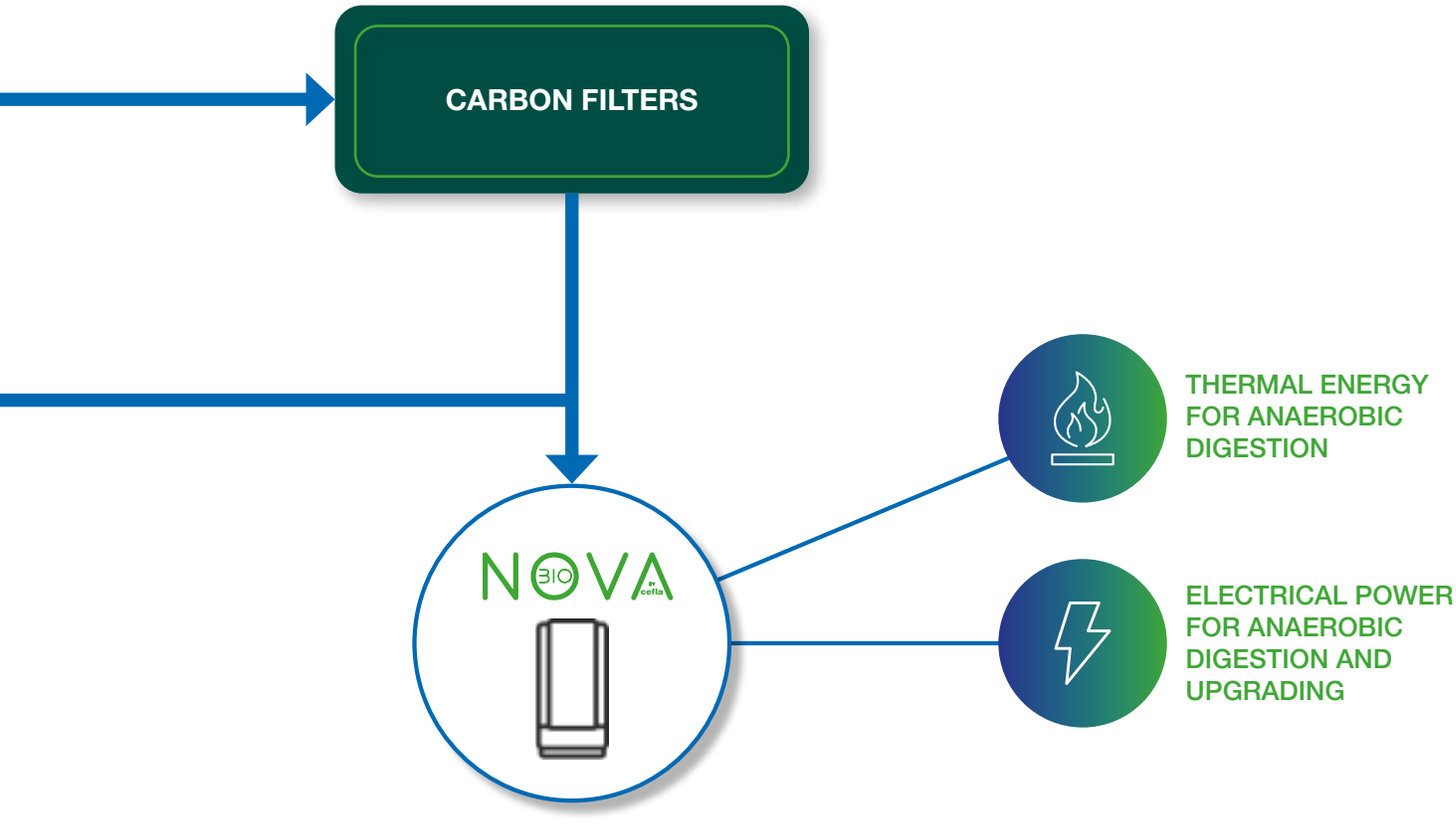


NOVABIO SOLUTION





FOR BIOMETHANE



NOVABIO SOLUTION BY CEFLA

MODULE 250

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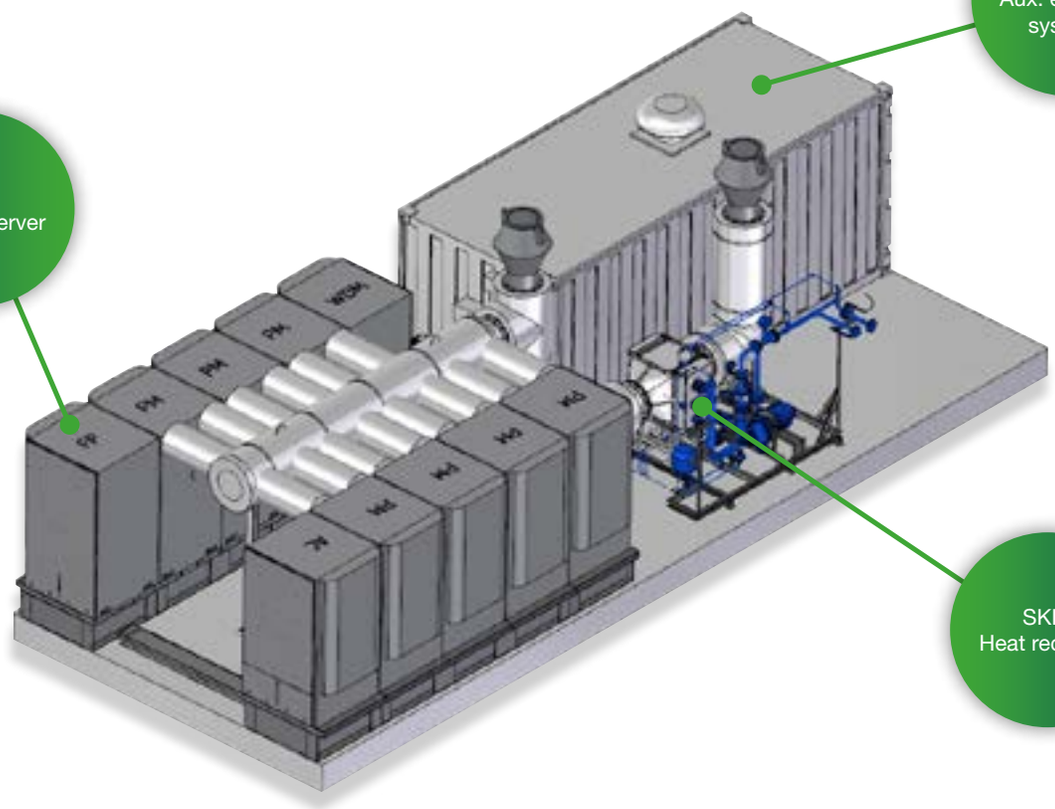
Dimensions:
13 x 5 m
Surface area:
≃ 65 m²



MODULE 1,000
::
Dimensions:
27.7 x 4.9 m
Surface area:
≃ 140 m²

Founded in 1932, in Imola (Italy), Cefla has designed and built technological systems for major Italian projects, including the *Teatro alla Scala* theatre and several high-profile office towers in Milan. It also provides management services for infrastructure, production lines and energy systems for leading players in Italian industry through its Engineering Business Unit.

It also handles the construction and maintenance of primary resource distribution networks (electricity, water, gas...).

Today, **Cefla** is a multi-business group consisting of 3 business units and large-scale production plants all over the world. Each business is a success story combining products, processes and innovations. Yet they are all part of a shared quest for improvement in which partnerships and skills interact to generate excellence and ensure satisfaction for all customers and stakeholders.
The **Engineering Business Unit** - which has long-standing experience and solid expertise in the construction and management of technological systems for the civil and industrial plant engineering sectors and in highly efficient, sustainable energy production - focuses on improving well-being and comfort in the places where people live, work and share leisure time. **Technology to Enhance Your Wellbeing**.

For further information visit
www.ceflaengineering.com | www.cefla.com

2023 Net Emission from Bloom Projects:

-992,481

Metric Tonnes CO_2e

REGION	PERCENTAGE REDUCTION VS. GRID
USA	18%
Korea	46%
India	56%
Japan	34%
Taiwan	18%
Italy	10%
Global Weighted Average	29%

BLOOM ENERGY

Bloom Energy empowers businesses and communities to responsibly take charge of their own energy management. The company's innovative solid oxide platform for distributed generation of electricity and hydrogen is changing the future of energy.

In 2024, Bloom Energy Servers achieved more than 992,000 metric tonnes of CO_2 reduction vs. grid alternatives. Today, Fortune 100 companies around the world are turning to Bloom Energy as a partner to deliver low-carbon energy and a net-zero future.

For further information visit www.bloomenergy.com

TIMELINE

1960s — First hydrogen fuel cell built by Bloom co-founder Jim McElroy as part of NASA's Gemini program.

2001 — Dr. Sridhar's team at the Space Technologies Laboratory at the University of Arizona creates an electrolyzer to convert carbon dioxide into oxygen for NASA Mars Missions. Company originally founded as Ion America, in Sunnyvale, California.

2008-2010 — Bloom Energy Server launches additional deployments at Walmart, Coca-Cola, FedEx, Bank of America, and others.

2022 — First installation of an Energy Server in Italy by sports car manufacturer Ferrari. Partnership with Cefla.

2024 — 80MW installed on a single site. 1 GW agreement with AEP.

TECHNICAL SPECIFICATIONS

POSSIBLE CONFIGURATIONS

Parameters	Unit of measure	250 kWe | 300 kWe	
Main inlet source	-	Biogas	
Calorific Value – LCV (Biogas)	kWth/Sm^3	5.5	
Inlet pressure of primary source	bar	0.85 - 1	
Incoming calorific value*	kWth	481	577
Primary source consumption	Sm^3/h	87	105
Effective electrical power**	kWe	250	300
Heat recovery***	kWth	121	146
Electrical efficiency (guaranteed)	%	52	52
Thermal efficiency	%	25.2	25.2
Overall efficiency	%	77.2	77.2
Atmospheric emissions:			
:: CO_2 (carbon dioxide)	% mass	5.73	
:: H_2O (water)	% mass	4.71	
:: O_2 (Oxygen)	% mass	14.57	
:: N_2 (Nitrogen)	% mass	73.73	
:: AR (Argon)	% mass	1.26	
:: CO - NOx - THC - VOC	% mass	irrelevant (CARB Certificate 2020 attached)	
System noise emissions	dB(A)	<70 dB(A) at 1 metre	

*Guaranteed electrical efficiency
**Efficiency at 400 Volt, 50 Hz, net of aux. consumption of Energy Server™
***Hot water @ 70/90°, ISO conditions | 15°C, 0 m a.s.l.

WHAT POWERS YOU

cefla

Making Your Life Better.

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