



Francisco RO-RO ship, River Plate, Argentina

Galileo brings on demand LNG to the marine industry

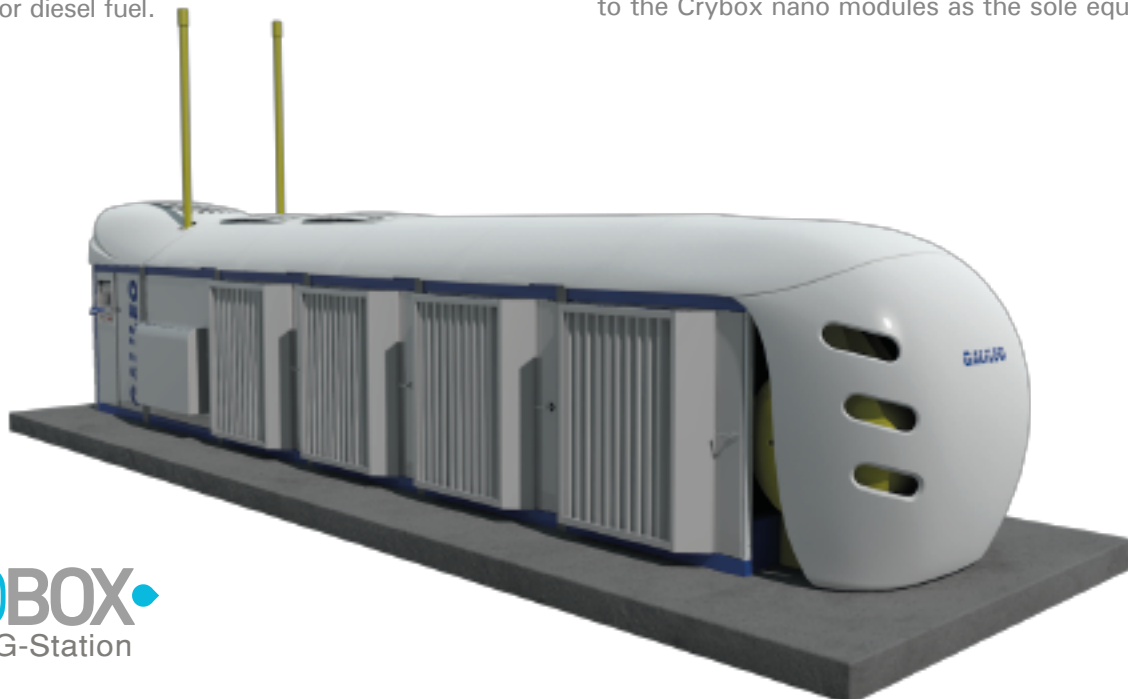
Buquebus adopts Cryobox® solution

Cryobox® technology will make Buquebus the first maritime company to supply its own LNG, the cleanest fuel on the market - with the highest performance.

This is possible in view of the fact that the Cryobox® is an LNG production nano station designed so that the private industry and communities can become their own LNG suppliers. Until now, major technological barriers and the need for long term capital investment prevented industries such as marine, oil and gas, long-haul trucking, rail, mining services from using LNG as a low cost and low carbon alternative for diesel fuel.

"LNG will allow "Francisco" to reduce combustion emissions by 98%, in marked contrast to traditional fuels," says Anibal Argomedeo, Buquebus's Technical Manager. At the same time, it is estimated that the 66 tons per day (ton/day) of LNG production required for its two daily frequencies will generate 50% savings within the operating expense. Seven Cryobox® nano stations with a capacity of 84 tpd will be responsible for this LNG production.

At the Francisco's christening event, López Mena referred to the Cryobox nano modules as the sole equipment that



CRYOBOX
Nano LNG-Station

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can be transported to wellheads anywhere in the world, regardless of distance; gas is liquefied and its volume reduced 600 times, which makes it easy to carry in trucks to their points of destination, at a very low cost.

On February 2014, Buquebus has been honored with the annual Black Diamond Award. This award is given to the top LNG fuel project to advance technology, open new markets, and achieve the smoothest execution considering the degree of difficulty.

Innovation and Efficiency

In terms of savings, it would be appropriate to compare these equipments with the 'mini LNG production-station' due to their size, production volume of LNG, investment and operating costs. In that case, while the latter requires a capital investment (CAPEX) of around \$ 310 per ton of LNG, the nano station requires only a \$ 170 per ton of LNG. If we consider the annual operating expenditure (OPEX), the comparison is of 390-210 dollars per ton. Therefore, the use of a nano LNG production station as Cryobox allows savings of 50% in CAPEX and OPEX 40% per annum.

"It's a real breakthrough in the field of technology. We were about to buy from USA a project which involved a huge liquefaction plant. We met Galileo's team and they



Cryobox® units and LNG storage



Buquebus LNG facility
San Vicente, Buenos Aires Province, Argentina

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showed us that their undertaking is far more efficient," said Buquebus President Juan Carlos López Mena.

"Cryobox® is the result of five years of development & investigation, built on 30 years' expertise in the manufacturing of gas compressors in Argentina," says Osvaldo del Campo, Galileo's CEO. "At the same time, it represents a worldwide innovative leap, as it is one-of-a-kind equipment, due to its compact dimensions and modular configuration."

Each Cryobox® unit applied to the Buquebus project is conceived as a module that can reach a maximum of 12 ton/day (4,480 GGE/day or 7,000 gal/day) of LNG. This feature allows a flexible installed capacity that can grow at the pace of the demand, through the progressive addition of modules.

"The River Plate, "Francisco's" high speed and the 100 meter boat length are proof that LNG is the best fuel for heavy transport, and that Galileo's technology contributes to make it happen," adds del Campo.

Dual fuel supply

In terms of vehicle supply Cryobox® is a dual equipment because, besides LNG, it also generates CNG depending on demand. This allows the simultaneous availability of adequate fuel for every need: CNG for urban vehicles which profit from the low cost of this fuel, and LNG for heavy transport and long distances, including boats, where saving is linked directly to the performance and autonomy originated in the higher energy density of the fuel.

The same concept can be applied to the Galileo's Virtual Pipeline® System for gas distribution by road, where the best alternative is CNG up to 250 miles, and beyond that distance, LNG.

"I imagine fleets, stations on motorways offering both CNG and LNG, major stations producing LNG for small-scale distribution using our Virtual Pipeline® system for other stations and industries. I also imagine its use in bunker operations for the fuelling of commercial or private boats, such as yachts and ocean-going vessels. This offers a highly competitive tool; the cost of transportation is one of the essential factors of the market products to bear in mind. The fact that ships can operate on LNG radically change the cost structure of the different industries," del Campo concludes.

Awarded project

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Multiple configurations

The Cryobox® is also a "Plug & Play" module that can be sent to any destination by trailer for its immediate commissioning, since it can be installed at a fueling station and then connected straight to a gas pipeline distribution or to a modular treatment plant which allows gas pre-conditioning at a remote natural gas field. Biomethane can be also considered as a source for liquefaction or gas compression.

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Therefore, this product presents multiple standard configurations that offer similar production capacities, but

from different inlet pressures, as it is shown in the exhibit below:

		CRYOBOX-500-11	CRYOBOX-600-15	CRYOBOX-600-4
Inlet pressure				
	psi	156	213	57
	bar R	11	15	4
LNG production capacity				
	gal/day	7 683	9 013	8 274
	ton/day	12.48	14.64	13.44
	l/day	29 091	34 126	31 329
	nm ³ /day	16 640	19 520	17 920
	kg/h	520	610	560
LNG delivery conditions				
Pressure	psi	29-58	29-58	29-58
	bar R	2-4	2-4	2-4
Temperature	- F	225.4 - 243.4	225.4 - 243.4	225.4 - 243.4
	- C	143 - 153	143 - 153	143 - 153
Transfer method to the storage tank: differential pressure, no need for venting or pumping		+	+	+
No boil-off / No emissions		+	+	+

Notes:
 • Performance parameters refer to natural gas composed by 100% Hydrocarbons and a reference specific gravity 0.65 kg/m³ (0.276 lb/ft³). Inert gas portions have to be deducted. Deviations in the Specific Gravity may modify the performance. • Performance values refer to an average ambient temperature of 22 °C (72 °F). For other temperatures, performance has to be corrected by temperature correction charts. • All performance parameters contained in this datasheet have a tolerance of ± 10%

CRYOBOX

Now, LNG can drive your projects

Galileo

Since 1983, Galileo has been a global reference in modular technologies for both CNG and LNG production and transportation. Its portfolio includes the widest range of compressors and pumps for vehicles and vessels; pipeline boosters and wellhead compressors; and the Virtual Pipeline[®] system, for gas distribution by

road, which can reach remote communities and industries without pipeline network connection. Based in Buenos Aires, Argentina, with a Service and Training Hub in Los Angeles, USA, Galileo exports and provides ongoing assistance to customers in 65 countries in Latin America, USA, Europe, Africa and Asia.