PRF Newsletter

## PRFNEWS #26/// OCTOBER 2022

DRHYVE
portable HRS
1YEAR

Main ///

#### HYDROGEN PROJECTS

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**/// NEW PROJECTS** 

/// 1st LNG REGASIFICATION
PLANT IN COLOMBIA

/// SOCIAL RESPONSABILITY

/// REFERENCE PROJECTS

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Main ///

### PRF HYDROGEN SOLUTIONS



It was in August 2021 that the 1st hydrogen refuelling station in Portugal - DRHYVE - went into operation.

After a year, working without interruptions and supplying two buses and a light vehicle, the station made more than 750 refuellings that corresponded to about 8 tons of hydrogen fueled (data as of 16/09/2022).

The 2nd DRHYVE unit is on its way to Austria, for a new customer, to make proof of concept, on a rental basis.

DRHYVE with us towards a greener future!



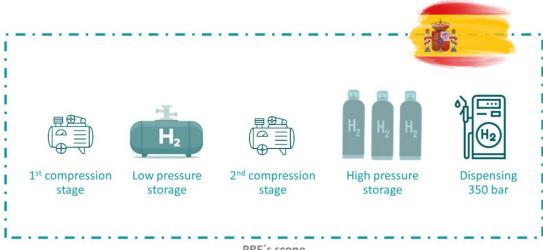




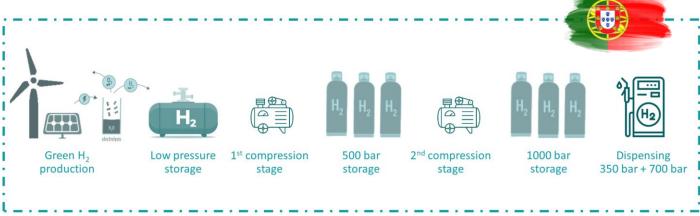
With the know-how acquired over the years in the construction of LNG refuelling stations (more than 80 stations built), the transition to the construction of hydrogen refuelling stations happened naturally and today we are building a station in Madrid (350 bar) and another one in Portugal (350 and 700 bar).

#### **ONGOING PROJECTS**





PRF's scope





Main ///

# TRENDS IN PRODUCTION, DISTRIBUTION AND STORAGE OF GREEN HYDROGEN IN PORTUGAL

the benefit of having one of the lowest electricity production prices in Europe, and these represent the largest portion in the production cost of hydrogen.

From the transportation and storage point of view, initially, the use of hydrogen trailers in the gaseous state and pressurized containers will be the most viable option in order to support the development of this market. In the medium term a certain evolution and improvement in the efficiency of liquefaction technologies is expected to make possible the flow of a larger volume of hydrogen, mainly to regions that are not directly supplied by National Gas

Transportation Network and make use of regasification plants, a solution that will be used in a very similar way to natural gas

becomes competitive in the market for having

In the long term, in a more mature and developed economic scenario, there will be a need for centralized production close to the large renewable generation centers. At this moment the use of the current natural gas transportation pipelines will be of great importance. It is worth mentioning that this pipeline is relatively recent, modern and built with excellent quality steel (API-5L-X70).



The rise in the average temperature on the earth's surface, namely due to the increase in greenhouse gas emissions, has raised several questions on how to mitigate this trend and one of the most prominent measures is to increase the participation of renewable energy sources and reduce the participation of fossil fuels in the national energy balance. However, electricity production based on renewable energy sources presents the impasse of seasonality in availability and the most adequate way to guarantee national energy security is with large scale storage, namely with hydrogen.

According to the trend of most of the countries that already have strategies defined, the production of hydrogen will be essentially by electrolysis of water. Therefore, Portugal

Initial investigations indicate that although hydrogen tends to embrittle high-strength carbon steels, continuous monitoring plans (predictive maintenance) and pilot projects to study the material's behavior with the gradual increase in the percentage of hydrogen, make it possible to use that material for the current operational parameters of the networks.

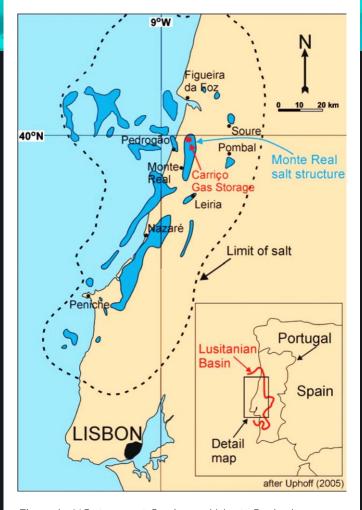


Figure 1 - NG storage at Carriço and Monte Real salt structure in the Lusitanian Basin. (DEEP.KBB UT and REN)

The secondary networks, for gas distribution purposes, are predominantly built in high density polyethylene. Research and practical studies show that the physical-chemical properties of pipes in this material are not affected with the use of blends and neither with pure hydrogen, therefore not being an obstacle to the energy transition intended in the National Strategy.

#### Large volume

storage can be achieved in the six rock salt caverns at Carriço. These have a current storage capacity of 300 Mm3(n) and can be converted for use with mixtures or pure hydrogen. However, the construction of new units will be necessary to secure the national strategic reserve. The positive side is that preliminary studies indicate the possibility of implanting new cavities in the Monte Real salt dyke, mainly in the municipalities of Nazaré, Caldas da Rainha and Peniche (Figure 1).

In this sense, the country having a policy of technological support and investment in the energy transition to hydrogen becomes a strong candidate to be at the top of the production and supply in Europe. From a technical point of view, Portugal has a favorable structure (roads, pipelines, caverns and the deep-water port of Sines) and that can be adapted aiming at the gradual maturation of this economy.

































Reference Projects ///

### MOOV LNG MOBILE REFUELLING STATION













Project ///

### PRF GAS SOLUTIONS

1st PROJECT IN COLOMBIA

PRF Gas Solutions is driving the Latin American market with turnkey technical solutions for the energy industry, with the installation of a portable regasification unit for COLON LNG Marketing and Ecopetrol in Colombia.

Colon LNG Marketing, announced the start of a small-scale LNG supply pilot project for Ecopetrol to supply LNG to the Pacific Southwest region of Colombia.

The LNG associated with this pilot project is taken from production facilities in the United States and





then transported using large capacity LNG carriers by Total Energies to the AES Costa Norte LNG terminal, from where it is reloaded into smaller parcels and transported to Buenaventura, Colombia. Once in Buenaventura, the LNG is converted from liquid to gaseous state using a portable regasification unit, supplied and installed by PRF Gas Solutions, and injected into the domestic grid of the city of Buenaventura. This LNG supply pilot project was achieved through the collaboration developed by both Ecopetrol and CLM that allowed to achieve in record time a safe and reliable implementation and that will allow Ecopetrol to validate the technical and economic effectiveness of small-scale LNG solutions, bringing Natural Gas to remote locations of the Colombian National Gas Transportation System and thus ensuring the accompaniment of the sustainable growth and development of these communities.

Natural gas network reaches two thousand families in Oliveira do Hospital, Portugal. Since July, the natural gas network reached the city of Oliveira do Hospital, Portugal, being able to serve about two thousand families and 12 local businesses, besides being prepared to distribute renewable gases.

The project in Oliveira do Hospital belongs to Beiragás, the concessionaire for natural gas distribution in 59 counties in the Center Interior region, and should reach 30 kilometers of network, serving 12 local companies and about two thousand families, which may serve 12 local businesses and about two thousand families.



Currently, six kilometers have been built, covering the urban mesh and the industrial zone, with another four kilometers expected to be completed by the end of the year. The regasification unit was built by PRF Gas Solutions.





To celebrate the 31st anniversary PRF Gas Solutions gathered the whole team in a special two-day event. In a different environment, the employees experienced two days of conviviality and celebration.

In this event, the entire PRF Gas Solutions team was joined by another winning team, sponsored by PRF Gas Solutions, who honored us with their presence, João Ferreira & David Monteiro,

leaders of the Portuguese Off-Road Championship.

PRF Gas Solutions would like to thank all its employees for their commitment, dedication and contribution to the excellent professional team we have built.

"No one can whistle a symphony. It takes a whole orchestra to play it."

H. E. Luccock, Professor.







The proliferation of invasive species and the regression of native species is a problem that affects our forest. Aware of this reality and aware of its role in preserving the environment, and as part of the ongoing reforestation project of the Marrazes forest (which began in 2021, with the planting of 3000 trees, out of a total of 6000), PRF Gas Solutions organized an event, with employees and their families, aimed at combating these species and increasing knowledge about invasive species that can have a significant impact on public health and biodiversity.

This action was organized by União das Freguesias de Marrazes e Barosa, under the supervision of the Environmental Interpretation Center of Leiria City Hall.

Move with us towards the future.





Project ///

#### PIPED DOMESTIC GAS

Pilot phase covers 240 families in three neighborhoods of Maputo.

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At least two hundred and forty families will be contemplated in the consumption of piped domestic gas in Maputo City.

"We want to reach more neighborhoods in Maputo City so that the capital stops tr ansporting the canister and has piped gas. To have half of the Maputo neighborhoods with piped gas, by 2030, will be our great satisfaction", said Moisés Paulino, national director of hydrocarbons and fuels in the Ministry of Mineral Resources and Energy (Mireme) of Mozambique.

Following other projects carried out in the country, PRF - Gas Solutions Mozambique is the company responsible for implementing this project and building the piped gas facilities.

Project ///

#### **ENH KOGAS/PRF DRILL**



PRF Gas de Moçambique actively participated in a drill organized by ENH Kogas in April 2022 in Maputo. The objective of the drill was to test the emergency

response capability not only of the technical teams, but also of the public emergency teams. The lessons consolidated during the drill will enable all stakeholders and a better provision in case of emergency. PRF Gas Solutions recognizes the great value in conducting this type of drill because a good response in case of emergency can safeguard the most important thing, life.

### Project /// PROGAS

Following its expansion policy, PROGAS has progressively increased its points of sale and, besides already having representation in most Provinces of Angola, has established partnerships in the Province of Luanda, with distribution chains:

- SUPERHELLO ARREIOU NOBLE GROUP
- ANGOMART NOSSA CASA
- NEWACO GROUP, SA MINHAMART
- STAR ONE KIBABO KERO JUMBO



There has also been growth in the execution of gas installations, having recently completed gas installations in the following companies:

- Extrulider Aluminum Industry
- Ferlaca Thermolac industry
- Granofino Food Industry
- Foodtec Food Industry
- Dulceria Nacional Food Industry





Summit ///

### 5th HYDROGEN AND FUEL CELLS SUMMIT



PORTO. PORTUGAL

The 5th Hydrogen & Fuel Cells Energy Summit took place on 16th & 17th March, 2022 in Porto, Portugal. For this fifth edition, the event gave updates on the European Hydrogen & Fuel Cells market and its developments, as well as focusing on current challenges for the industry such as the current and future status of hydrogen infrastructure for the automotive sector in Europe, the forecast on its regulatory framework, and the production of green hydrogen, among others. Over the two days, the event gave in-depth perspective on novel technologies and solutions, the road towards achieving massive production of green hydrogen in Europe.

It was a pleasure to share our hydrogen projects with a great audience at the 5th Hydrogen & Fuel Cells Energy Summit. The presentation was runned by Bruno Faustino, Hydrogen Business Unit Manager at PRF Gas Solutions, which was one of event's sponsors.

Congress ///

### 8th INTERNATIONAL LNG CONGRESS



This year's Congress focused on innovative industry-led content: industry trends and research, challenging topics, and new technologies. The Congress program was reserved for experts from leading gas companies, EPC's, local gas companies, LNG shipping and trucking companies, truck and fleet owners, ports and LNG terminals to share exclusive case studies, new research and knowledge.

PRF Gas Solutions had the opportunity to showcase all of its LNG solutions through an exhibition booth.



Summit ///

### WORLD HYDROGEN 2022 SUMMIT & EXHIBITION



ROTERDAM, THE NETHERLANDS

The urgency of climate action has never been greater. Governments are under pressure to accelerate work on their climate roadmaps to ensure a successful transition to net-zero economies by 2050, with Hydrogen playing a key role in decarbonizing industry and enabling storage, transport and trade of green energy.

It was on this reality that the World Hydrogen 2022 Summit & Exhibition took place in Rotterdam.





The Summit was a premiere event and a good place for PRF Gas Solutions to share its projects in this area through the presence with a stand and a presentation in the H2 Tech Series, through Hugo Antunes, Project Manager of the Hydrogen Business Unit.

At this event we had the honor of receiving His Excellency João Galamba, Portugal's Secretary of State for Environment and Energy at our booth.

It was exciting to be side by side with other innovative companies that bring their technology to the world. Being in Rotterdam, a city that is undertaking a tremendous amount of innovation in hydrogen, was the perfect stage to get together and share our technological advances.





Lisbon in April, sponsored by PRF Gas Solutions. With hydrogen playing a central role in many nation's decarbonization plans, the Summit sought to answer the "elephant in the room": How do we produce truly clean green hydrogen in the volumes needed to support this expanding hydrogen ecosystem, at prices comparable to gray or blue hydrogen?

With this in mind, the 3rd Green Hydrogen Summit provided a comprehensive overview of the entire green hydrogen ecosystem, including the regulations and incentives that countries are implementing, the business models for implementing electrolysis projects, the infrastructure upgrades needed to transport and store hydrogen at scale, and the industrial applications for the hydrogen being produced.

With an audience consisting of government representatives, energy providers, project developers, suppliers and investors, utilities, etc., the Summit brought together key players to share the latest case studies, inspire action, and make the connections to realize the potential of green hydrogen.

PRF Gas Solutions made a

PRF Gas Solutions made a presentation of its Hydrogen projects through José Dias, Process Engineer in the Hydrogen Business Unit.







Hannover Messe helped to maximize commercial and technological partnerships and served as an important vehicle for the presentation of our solutions in the area of renewable energy, with emphasis on the DRHYVE station - 1st portable station for the supply of hydrogen to vehicles, which was

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the driving force of PRF Gas Solutions' participation.

In addition, our participation allowed the presentation of all our solutions in the sector of combustible gases to the German market, a relatively new market for us (we started the construction of the first LNG refueling stations in 2022), but of primary importance in our expansion policy.

In addition to joining the exhibition component at Hannover Messe, PRF Gas solutions also participated in the event's conference program. On June 1st, the panel discussion entitled "Innovating in EV-charging systems", in the scope of the "Portugal Makes Sense" conferences, counted with the presence of Bruno Faustino, Manager of PRF's Hydrogen Business Unit, to present the work developed by PRF Gas Solutions in the hydrogen area, namely in mobility.



Congress ///

# WORLD HYDROGEN NORTH AMERICA

HOUSTON, USA

PRF Gas Solutions was present at the WORLD HYDROGEN NORTH AMERICA Congress, which took place in April in Houston.

This event provided unparalleled opportunities for growth and contacts covering the entire hydrogen value chain. During these 2 days, Bruno Faustino and André Gameiro, PRF Gas Solutions delegates were able to join industry leaders in debates that aimed to shape the future of the hydrogen industry, debate and challenge key industry issues, such as







- · The global vision and economics of hydrogen;
- · Achieving low-cost hydrogen production and conversion:
- · Policy and commercial strategies;
- · Optimizing hydrogen in mobility and industry.

In this year's edition, over 500 exhibitors presented solutions that can evolve and "revolutionize" your business and your way of working! During these 3 days, PRF Gas Solutions took advantage of the latest trends and innovations in this sector, met with potential new suppliers and partners and socialized with customers. In an atmosphere conducive to meeting and developing activities in this very important sector, SITL is the essential meeting point for creating new logistics connections.

PRF sponsored the event and was exhibiting at the joint stand with AFGNV.









Forum //,

### 4th GLOBAL LNG FORUM

MILAN. ITALY



The 4th Global LNG Forum is a flagship gas industry event that brings together established industry experts and professionals from different LNG sectors every year. Industry peers gather to share the latest developments and challenges within their organizations, discuss future plans, technical solutions and insights into the LNG market.

This two-day event covered the most critical topics and updates in the LNG industry. This year the focus was placed on demand and supply dynamics, the growth of the global LNG infrastructure, the role of "small scale" LNG in the LNG economy, and the latest technologies that help make LNG more accessible.

PRF Gas Solutions, as in previous editions, was present with an exhibition booth and was one of the sponsors of the event,

Congress ///

### 4th INTERNATIONAL CONGRESS AND EXHIBITION COLOMBIA

**OIL AND GAS** 

#### BOGOTA, COLOMBIA

The International Congress and Exhibition Colombia Oil and Gas, held in Bogota, brought together Latin American flagship oil and gas companies and global suppliers to the industry. The "Colombia Oil and Gas 2022" congress allowed us to share ideas and experiences, present to the market all our solutions for the gas sector, and was attended by our new Business Developer for Latin America, Cristina Gallardo.





Conference ///

# WORLD HYDROGEN PROJECTS AND WORLD HYDROGEN DECARBONISING THE GAS GRID

BARCELONA, SPAIN

During the month of May, two conferences were held in Barcelona, with the aim of presenting advances in the decarbonization of gas networks and updating knowledge about the latest projects in the hydrogen area.

At the World Hydrogen Decarbonizing the Gas Grid event we were able to learn about the plans and priorities for future gas infrastructures, revealing knowledge from transport and distribution companies, storage, compressors and engineering companies, as well as promoting the sharing of PRF Gas Solutions' experience obtained in the Portuguese project to inject hydrogen into the grid, Green Pipeline Project.



At the World Hydrogen Projects event, strategies to connect the entire value chain and accelerate successful hydrogen projects were discussed.

PRF Gas Solutions was present with a booth and sponsored both events.



Forum ///

### BALTIC LNG & GAS FORUM

KLAIPEDA, LITHUANIA



Under the motto "Capitalise on LNG and gas uptake in the Baltics", the BALTIC LNG & GAS FORUM was held in Klaipeda, Lithuania on June 7-8.

PRF Gas Solutions participated in this two-day event on LNG and gas infrastructure development in the Baltics, which covered the following topics:

- · Driving energy security in the Baltics;
- · Hydrogen, green gases and decarbonization;
- · LNG and gas development;
- · Market regulations and policy;
- · Small scale infrastructure;
- · Trading and pricing for gas and LNG in the Baltics.









Summit ///



With Brazil undergoing significant reforms to its natural gas regime and the renewable energy market growing, PRF Gas Solutions has stepped up its presence in this market and was exhibiting at the Brazil Oil, Gas and Energy Summit 2022, which took place in May in Rio de Janeiro, Brazil.

The summit brought together key players in the energy sector in Brazil and provided updates on the present and future of the industry, the development of a vast market, the great opportunities in the country, and the present and future of the energy sector.

Present at the summit were Moisés Ferreira and the new Business Developer in Brazil, Luíz Camargo.

### BRAZIL OIL, GAS AND ENERGY SUMMIT 2022

RIO DE JANEIRO, BRAZIL



Conference ///

### EUROPEAN HYDROGEN ENERGY CONFERENCE (EHEC)



MADRID, SPAIN



This year, the Spanish Hydrogen Association (AeH2) has taken on the organization of EHEC 2022 to continue to boost the use of hydrogen technologies worldwide. This edition had the esteemed collaboration and support of the European Hydrogen Association (EHA), Hydrogen Europe (HE), Hydrogen Europe Research, Hydrogen Technology Collaboration Programme (IEA Hydrogen TCP), International Association for Hydrogen Energy (IAHE), International Journal of Hydrogen Energy (IJHE), Institute for the Diversification and Saving of Energy (IDAE) and the Community of Madrid and PRF Gas Solutions was exhibiting and was one of the sponsors of the event.

The event took place in Madrid between May 18 and 20.

