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INSPENET Brief

Ana Ludlow
VP Chief Government Affairs & Sustainability Officer at ENGIE México.

GUL QSR®
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Marine Assurance 2.0
Technology as an enhancer in risk management

Transformative LNG-to-Power Project
Lights Up El Salvador and accelerates Region's Energy Transition

Becht
A Technical Consulting Group

Hydrogen and its applications
Peru and Latin America

How Eddyfi Technologies
Keeps Stakeholders Beyond Current in 2023

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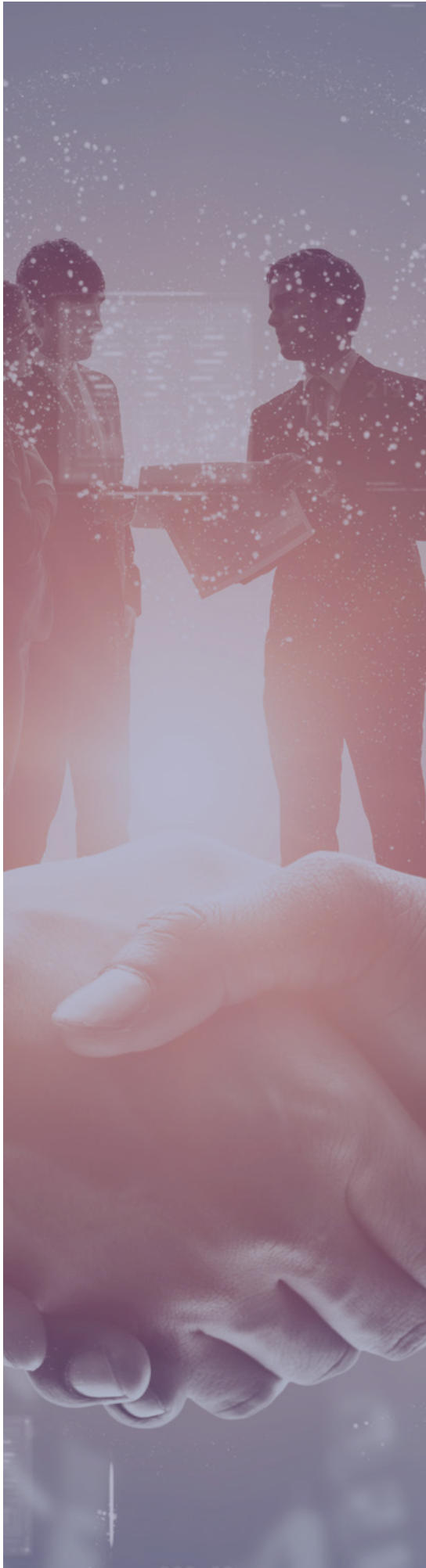

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Editorial

We start this New Year, sending our best wishes to our entire community of subscribers. After a season full of challenges, we assume this 2023, prepared to continue bringing you the latest trends and technological innovations in engineering, oil, gas, mining, maritime and new energies, now, through our first edition of Inspenet Magazine.

At Inspenet, we are moved by the passion to support other engineers and technicians to grow and develop, as well as to strengthen the capacity for comprehensive training management, through our diplomas, courses and consultancies, which have a positive impact on their professional future.

The digital world is moving fast, rapidly and Inspenet is changing, growing and adapting to the needs of our public to stay informed, that is why we created this magazine for you with interesting articles and topics that cannot be missed.

Happy and successful year 2023!

Francesco Solari

CEO of Inspenet

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NONDESTRUCTIVE TESTING: USES AND APPLICATIONS IN THE OIL AND GAS SECTOR

IMPLEMENTATION OF OPERATIONAL RELIABILITY AND MAINTENANCE MANAGEMENT IN THE INDUSTRIAL SECTOR

RECIENTES

INSPENET NEWS 06/12/2022

Noticias 1.- Versa Integrity Group ofrece servicios para realizar Pruebas de líquidos Penetrantes Para ampliar ...

Píldoras de conocimientos acerca del PMO, Metaverso y Blockchain

Píldoras 1. ¿Que es un PMO? 2. ¿Que habilidades debe tener un líder de PMO? ...

Los criterios de corrosión e inspección desde el diseño de activos

INSPENET NEWS 05/12/2022

Noticias 1.- Guided Ultrasonics Limited brinda servicios de alquiler de eq.ipos Para ampliar esta información: ...

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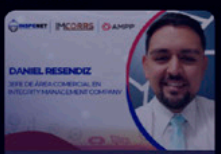

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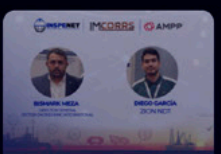
Apertura – IMCORRS 2022



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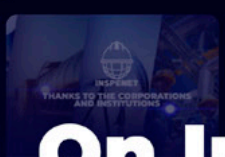
PROMOCIONES

Promo – Los estadios de Qatar (Parte 2)



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HYDROGEN:

Sustainable energy of the future?

The demand for energy worldwide has caused an excessive consumption of fossil fuels (oil, natural gas and coal), causing the intensification of the greenhouse effect, because the main products of combustion are: carbon dioxide (CO_2), carbon monoxide (CO) , oxides of sulfur and nitrogen, causing catastrophic effects such as acid rain and photochemical smog, consequently scientific research is currently being carried out to develop technologies for the generation of more efficient and less polluting energies, through other alternative sources such as renewable energies as clean and inexhaustible energy sources.

In this context, hydrogen represents the most innovative energy proposal of alternative fuels, with respect to fossil fuels and emitters of polluting greenhouse gases and with great energy potential.

however, it is a difficult fuel to obtain, and its processing from the economic point of view isn't profitable entails exorbitant expenses because it isn't found in isolation in nature and is stored in a gaseous or liquid state (Figure 1).

Figure 1. Hydrogen storage

Then! Could a pilot energy system based on this element be generated?

Considering all of the above, it is important to propose new alternative technologies, such as renewable energy sources, in this context hydrogen is presented as an element linked to solving environmental aspects. In the case of the use of hydrogen as a primary fuel, the issue of the impact on the environment is drastically reduced, since the only product of the electrochemical reaction is water vapor, so the emission of pollutants into the atmosphere is zero; which qualifies it as an energy vector protagonist of a viable alternative towards a sustainable energy model.

Sustainable technology

One of the main problems is the way to produce hydrogen, it is generally extracted from the compounds of which it is a part: water, gas, hydrocarbons, biogas, and biomass, among others. Separating hydrogen from these elements is a complex process.

There are three industrial methods to obtain hydrogen from different energy sources: molecular transformation, carbon gasification and electrolysis of water molecules (H_2O) into oxygen (O_2) and hydrogen (H_2), the latter method being the most expensive production process; however, the use of non-renewable energy as a source would lower costs and make hydrogen formed by electrolysis the most sustainable energy alternative on the market with zero CO_2 emissions (Figure 2).

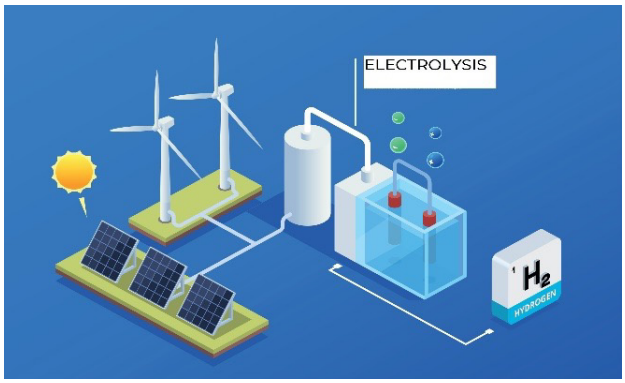

Figure 2. Hydrogen processed through alternate energies.

The difficulty to obtain 100% clean hydrogen has led to the classification of the resulting product according to its sustainable value: gray hydrogen, is the most used and the least respectful with the environment, due to its generation by fossil fuel. Blue or low-carbon hydrogen also processed from fossil fuels. The most ecological option is “green hydrogen”, produced from renewable energies, a 100% sustainable alternative.

So, will hydrogen be the clean fuel of the future?

There is still a long way to go with several questions and actions, especially in relation to the investment to carry out the energy transition implied by decarbonization, once the unresolved challenges have been overcome. It is expected that by 2050, the decrease in the price of renewable energies will end up making hydrogen generated by electrolysis into the most sustainable energy alternative on the market, through an economy based on hydrogen.

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TOWARDS A NEW GENERATION of quality processes

Since the end of the 20th century, we have witnessed how the progress experienced by the development of Information and Communication Technologies has generated a process of global change around which a series of denominations have been configured such as: knowledge society, new economy, digital economy, among others, all of which seek to bring together a complex process, which is still in full development today and therefore still inconclusive.

This new economic era is characterized by the fact that its new sources of wealth are knowledge, information and communication, as opposed to the traditional ones: natural resources and physical labor.
In it, innovation is increasingly important and intellectual work displaces the physical within the framework of an essentially unstable world and in a process of continuous change.
Certainly the implications of this new world order are not only visible in developed countries, but its repercussions are manifested globally, with a decisive and notorious impact in different facets that include: the political, economic, social and cultural spheres, among others, all of which have become part of our lives.

This dynamic of such rapid and marked changes suggests that the very way of managing organizations as it was done in the traditional economy will be ineffective in the new economy, making it imperative to devise new ways of doing and managing things, for which it is evident the direct impact in the field of administrative sciences including quality management, being immersed in the field of industries and organizations, which went from a system of artisanal production to mass production, later to production systems flexible and more recently to just-in-time production processes and the adoption of the network company, typical of the digital economy.

This is how quality management has evolved over time, going through various theoretical approaches or models, which have served as reference frameworks when carrying out different forms of application around it, these conceptions of how to establish quality in organizations have been successful and effective in each of the historical moments in which said applications have been carried out. However, in current times, and undoubtedly shaken by the "digital revolution", quality demands a more global vision and changes on the pillars on which it was supported in the traditional economy, changes driven to a greater extent by the accelerated use of information and communication technologies in all levels of our societies and organizations.

In this context, the need arises to analyze from a critical perspective the key elements of quality management on which it has been supported up to now, since the arrival of a new economy makes necessary the emergence of a new generation of processes of quality, as we have known it. All this transformation implies a change or an evolution in the way of managing business, hence the quality strategy, as it has developed throughout history, will continue to evolve in the future (but this time in a more fast), above all to adapt it to the prevailing market conditions, accentuated even more by the drastic, deep and fast changes that the arrival of the digital economy implies. Based on what was stated by Bruce D. Henderson of the Boston Consulting Group, "Evolution determines who survives and who is left out, both in the jungle and in business."

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IMPORTANCE OF
of equipment reliability for industry

The immediate way to create value is to prevent it from being destroyed. All companies experience to a greater or lesser degree a continuous destruction of value, due to the low reliability of their equipment and systems. Thus, we observe recurring failures, decreases in production volumes, loss of capacity, manufacturing errors, among others, in addition to events that affect security, the environment, and the corporate image.

The incidence of these factors arising from the maturity of the companies to achieve the benefits of the industrial optimization cycle: operate, gather information, analyze, take corrective measures, operate...

And to take better advantage of this virtuous cycle, the company must definitely show a superior performance in the four mentioned aspects. And precisely these four keys factors is where the philosophies and methodologies of operational reliability play a fundamental role, especially in the last 50 years.

If we add the benefits obtained directly from the application of the precepts of operational reliability, as we can call the use of different reliability methodologies, with the great gains that teamwork brings with it for the different applications, we will have as a result the best of two worlds: the increase in the availability and safety of equipment and systems; and a motivated human resource with a high sense of belonging.

In this way, the application and practice of these tools, which have undergone their own improvement cycle, definitively support companies in:

• The solution of recurring problems, through the available root cause analysis (RCA) methodologies that, well executed in multidisciplinary work teams, reach and solve the tangible root causes, but more importantly, the organizational root causes, whose solution completes the preventive cycle that avoids new failures.

• The prioritization of assets according to their criticality, through the tools of criticality analysis and RAM analysis (reliability, availability and maintainability, for its acronym in English).

• Obtaining optimal maintenance plans for equipment and systems, through the application of Reliability Centered Maintenance (RCM).

• The optimization of inventories and frequencies of maintenance tasks, through the use of cost-risk optimization models (CRO).

We then see how operational reliability offers a range of opportunities for improvement, which can be taken advantage of first, through knowledge of the available tools, and then with the strong and visible support of management.

There are many benefits that show us countless successful applications of operational reliability worldwide.

We also come across experiences where, for various reasons, the expected results are not achieved, but the potential is demonstrated if it is used consciously and has the proper commitment and support from management. It will also be required to have, to a sufficient degree, maturity in the basic aspects of preventive maintenance and a solid maintenance management.

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How the PMO should lead the DIGITAL TRANSFORMATION in an Organization in 7 steps?

So much has been written and talked about Digital Transformation that you open a cereal box and they will explain it to you (LOL) no jokes aside, despite the fact that it has been on this subject for years and there is plenty of literature, I can perceive from my experience that reality surpasses the fiction.

As a Technology Director (CIO, CTO, Systems Director, Technology Director or similar role), one of the great challenges is to promote and lead the Digital Transformation of your company always aligned with the strategic objectives of the organization.

So we are going to try to help all managers to put a little in context for better decision-making with the following concepts:

Digitization: it is the adaptation and transformation with technology, opportunity, competitiveness, flexibility, growth, innovation, leadership, personalization and adaptation to customers and their new demands and expectations.

Digital Transformation can be considered as the third stage or third phase of the adoption of digital technologies (digital competence → digital use → Digital Transformation), together with the improvement of the usability and application that is achieved through digital literacy.

PMO: The PMBOK defines the PMO as “a management structure that standardizes the processes related to the governance of an organization's projects.

Facilitating the shared use of Project Management resources, methodologies, tools and techniques.
Definition PMOfficers: "Create a totally disruptive business and knowledge model through innovation and based on the latest technologies as a catalyst for the entire organization, with the aim of being profitable and efficient in the face of the challenges of the 21st century."

How the PMO should lead the Digital Transformation in an Organization in 7 steps?

Step 1 - Understanding the context, objective approach and review of concepts
There cannot be something more obvious than understanding the context of the organization, as well as beginning to differentiate Digitalization vs. Digital Transformation.

Step 2 - Analyze alternatives, frameworks and models
Evaluate our current presence and where we want to go but without losing the main focus that are our customers (Customer Centric).

Step 3 - Define the business and technological solution, assumptions and risks
Digital Transformation is not a Project, it is a path to follow and once started there is no turning back. Defining the best (s) technological solutions is essential for today but more important for "tomorrow" (scalability, flexibility, adaptation, innovation).

Step 4 - Define needs and expectations
A fundamental step is to carry out a good Business Case that includes all or any of the following: Benchmarking exercises, market studies, information on the competition, new technological trends, etc.

Step 5 - Align PMO with TD Roadmap (Digital Transformation) anchor points and QuickWins
The PMO should lead the TD Program from strategy to execution. The Roadmap is that the PMO must follow based on the Strategy defined in the TD but aligned with the strategic objectives of the organization. The QuickWins are the value that you must contribute as we go through that Roadmap over time.

Step 6 - We start the PMO service, communication and change management
The Communication Plan is essential for the entire organization to be a participant, that only Senior Management is aware of pyramidal organizations from the last century, today the leading companies, as well as the people who contribute the most (and are happy) are organizations horizontal, as well as cross-cutting and goal-based.

Step 7 – Extra mile
We have to exceed the expectations of the stakeholders (internal and external), surprise and go one step further (be disruptive) and anticipate (create the future, prevent vs. correct).

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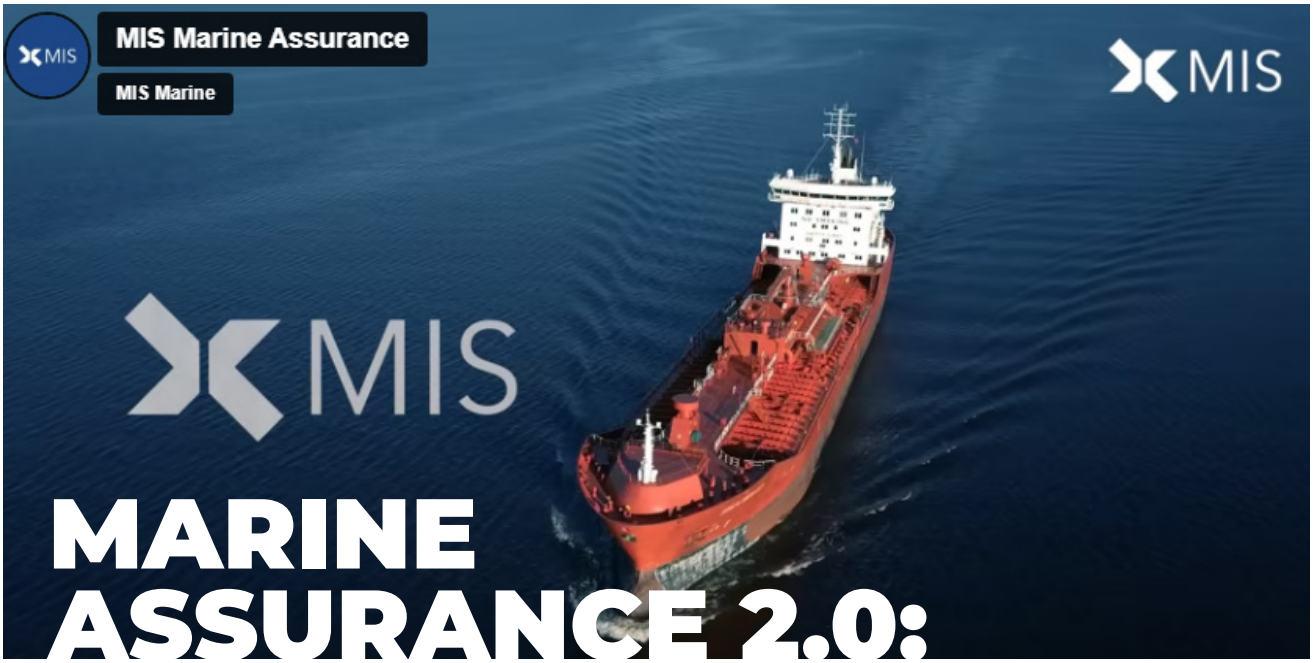

MARINE ASSURANCE 2.0:

Technology as an enhancer in risk management

Defining maritime and fluvial risk profiles

Each maritime and fluvial operation has a unique risk profile, which must be analyzed and defined. This activity is the fundamental basis for the development of the disciplines of Marine Assurance and Vetting, normally applied by energy companies, maritime transport, terminals and ports. The risk profiles are built based on the different types of operations that the company carries out or will carry out (maritime, fluvial or offshore), the characteristics of the products involved, together with the particular legal, contractual and operational responsibilities. This analysis allows to understand the principles of the real levels of, to later develop and apply the Vetting criteria that will be used to ships, barges or terminals in a specific way according to each condition.

Marine Assurance 2.0 – Technology as an enhancer for risk management

The application of intelligent technological solutions has made it possible to increase and enhance the capabilities of Marine Assurance in recent years, creating a new era. Today, Marine Assurance systems allow concentrating large volumes of information from multiple databases and individually processing each of these data, as required by different scenarios and according to the specific requirements of each operation. The application of artificial intelligence and big data allows not only to evaluate current conditions, but also to identify patterns or trends in the industry that alert Marine Assurance teams to risk situations that may not be considered within their processes. Enabling more companies to adopt Marine Assurance practices, while empowering those who already practice them.

Consolidating a portfolio of maritime and fluvial risks

With the different risk profiles identified, the Company's maritime and fluvial risk portfolio can be created. This allows the Marine Assurance and Vetting teams to not only have a better understanding of the particularities of each operation for effective risk management, but also allows the creation of operational efficiencies. Since, for example, a ship that does not meet the risk profile of a certain activity can meet the profile of another activity carried out by the same company, thus maximizing the possibilities of using the same ship, without compromising the standards of safety, environmental or operational.

Advantages and challenges of the risk portfolio in Marine Assurance

Having a risk portfolio allows creating a the different scenarios with corresponding levels of exposure, showing the company's vulnerabilities. This creates a much broader and focused vision, allowing comprehensive management of global and individual risks. In this way, it is possible to focus efforts on all areas of exposure, creating more effective and efficient processes. However, those companies that have different risk profiles within their risk portfolio have the challenge of having to process, in reasonable times, a large amount of data that comes from multiple sources of information and contrast it to verify that the ships, barges or terminals comply with the acceptable risk levels determined by the Vetting or Marine Assurance departments.

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BROAD AND DEEP TECHNICAL EXPERTISE TO RELENTLESSLY HELP OUR CLIENTS SUCCEED

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We are the group of technical consultants focused on 3 lines of action:

Improvement and Optimization of Assets - Focused on elements of security, reliability and profitability with actions in:

-Optimization of capital investments to keep assets operating continuously and reliably

-Maximizing profit margins while reducing emissions

-Optimizing the scope and duration of scheduled turnarounds

-Support to reliable operation through multidisciplinary evaluation and analysis

Strategic Investments - Partnering with our clients in the evaluation of stock options in:

-Modernized Project Processes to meet the demands of the current market.

-Feasibility studies for Decarbonization initiatives

-Production Assurance for Successful Startups of Assets

-

Pre-evaluation of Assets in Acquisition Transactions

-Engineering support for Investors and Future Owners, Users and Operators

Digital Future – Digital transformation consultancy with actions in:

-Support for more agile and better access to data in existing and remote facilities.

-Identification of Value Leaks: Determining where there are opportunities to apply Digital Transformation tools

-Selection of suppliers: Based on knowledge of the industry and development of selection criteria.

-Capture knowledge to increase staff experience and take advantage of lessons learned. (Connection, Mentoring and Training)

-Digital solutions: Solutions in niches where white spaces exist and value is being lost

-We develop strategies, workshops for engagement and education.

The quality and effectiveness that we have in our 3 lines of action is based on our values, our people, more than 1,500 experts around the world, and our multidisciplinary capabilities; Processes, Mechanics, Electricity and Instrumentation, Rotating Equipment, Corrosion and Materials.

Capabilities and experience that we can deliver at the operations site, supporting reliability management, plant shutdowns, projects and many other specialties. Bring us a problem and let us be part of the solution.

Bring us an idea and let us be part of the development.

Asociación Peruana de Hidrógeno

Hydrogen powered mining transport truck.
Photo: Twitter @AngloAmericanZA

HYDROGEN AND its applications in mining in Peru and Latin America

Hydrogen is a technology that since 2018 and up to the present day (end of 2022) has seen a constant increase in interest from actors in the public and private sectors, governments, banks and other actors related to the energy sector. The reason is simple: hydrogen represents an opportunity to effectively decarbonise activities in the economy where other technologies could face significant technical challenges.

Some examples of difficult-to-decarbonise activities where green or renewable hydrogen is positioned as an enabling technology are:

- The transport of heavy cargo: where the necessary batteries would be of dimensions in the order of tons of weight and cubic meters of volume.
- High temperature heat: where electric furnaces or solar thermal concentration are not capable of reaching the necessary temperatures (>600°C).
- The consumption of hydrogen as an industrial chemical reagent, where the conventional alternative is produced with natural gas with an impact of 9.6 kg CO_2eq/kg H_2

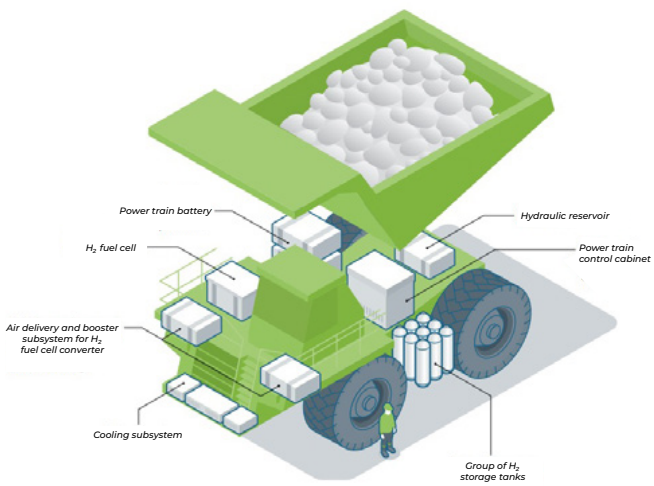
These three examples have a meeting point in the mining sector, where mining trucks need to mobilize from 100 to 300 tons of material, where process temperatures frequently exceed 600 °C and where steel production currently consumes important volumes of natural gas, with hydrogen as an intermediate, for the reduction of iron ore.

Given the current increase in the observance of environmental, social and governance criteria (ESG criteria) for the execution of investment projects, the mining sector, responsible for 4 to 7 percent of greenhouse gas emissions (GHG) worldwide*[1]*, will face pressure to reduce its environmental impact from governments, investors and society.
Given this scenario, mining companies around the world have begun to deepen their knowledge of hydrogen technologies and develop pilot projects.

An example of the above is Anglo American: which is currently developing two relevant projects in the world: one in Mogalakwena (South Africa) where, together with ENGIE, it has modified a mining extraction truck (CAEX) with a load capacity of 290 tons to diesel in a hydrogen-powered vehicle, which uses 3000 liters of diesel per day, generating eight tons of CO_2, which for an average mine, this totals 120 kton per year*[2]*. Their other relevant project is in Chile, where they have piloted the adoption of hydrogen to drive forklifts in order to understand how the technology works under Chilean climate and altitude conditions.

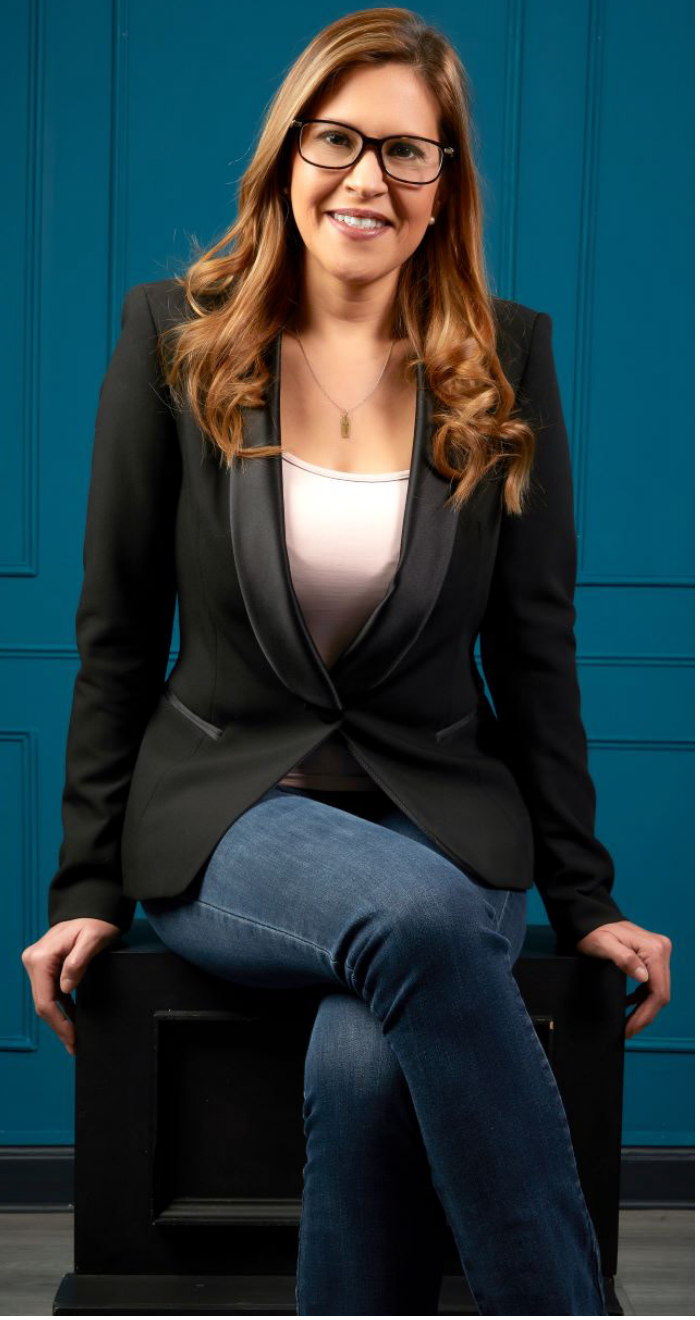
In Peru, the Peruvian Hydrogen Association (H_2 Peru) and the mining companies: Anglo American, ENAEX, Cerro Verde, MMG, Las Bambas, Southern Peru, etc. They are connecting with players in the green H_2 value chain such as technology service providers to explore and consolidate pilot projects in the country, especially considering that this sector has a fundamental role in Peru: contributing to 10% of PIB*[3]* and reaching 2.6% of greenhouse gas emissions nationwide (without considering the use of fuels in the sector)*[4]* .

According to the report "Bases and recommendations for the preparation of the Green Hydrogen Strategy in Peru" presented by H2 Peru this year, the mining sector could represent a potential demand for green hydrogen of 112 thousand tons per year in 2050, with an adoption that would begin from this decade reaching approximately 6 thousand tons of this renewable gas by 2030*[5]*. To put these values in context, a thousand tons of hydrogen are equivalent to the annual consumption of electrical energy of 14,000 average Peruvian homes*[6].*



Ilustration 1 - Diagram of a mining truck powered by hydrogen (Source: H_2 Chile, 2021)

Author:
H_2 Peru – Peruvian Hydrogen Association



Ana Ludlow,

is Vice President of Government Affairs and Sustainability at ENGIE and President of the Energy Committee of the National Chamber of Industrial Transformation. She has served as CEO of TAG Pipelines South and has overseen and managed 22 power plants in New England. He has more than two decades holding high-level positions in the energy, electricity and natural gas sectors, in Mexico and the United States. In this exclusive interview with Inspenet Brief, Ludlow talks about biomethane as the energy of the future, the potential and difficulties in Latin America and Mexico for the industrial development of this biogas, as well as the projection in Mexico for 2030 in the production of alternate energies.

What about the energy transformation that is happening in the world?

The global energy transformation refers to the efforts to change the way energy is produced and used around the world, with the goal of reducing greenhouse gas emissions and improving energy safety. This includes transitioning to renewable energy sources, such as solar, wind, and geothermal, and reducing the use of fossil fuels, such as coal and oil. It also incorporates the development of energy storage technologies to improve the stability of the electricity grid and allow greater penetration of renewable energy sources.

What are the potentialities for Latin America and Mexico of Biomethane?, Considered one of the main clean energy options

iThe potential for Latin America, according to this study, is close to 140 Mtoe (Mega tons of oil equivalent), coming mainly from the agricultural sector and livestock waste, refrigerators, hatcheries and sanitary landfills. For biomethane production, the Latin Ame-

rican market will undoubtedly adopt these technologies, because in addition to generating income, and reducing disposal and fertilizer costs, they solve a serious environmental problem.

Mexico has different characteristics that can be used as catalysts for this energy, such as the waste generated by the agricultural and timber industries, as well as the wealth of natural resources from energy crops such as sugar cane and corn, thanks to because we have ideal ecosystems for its production. Another factor that we could start to focus on is the use of urban waste; because we are one of the LATAM countries with the highest urban growth, according to INEGI data, more than 79 % of our population is urban. Regarding the commercialization and use of biomethane, we must not forget that Mexico has a solid structure for the transportation of natural gas, which can also be used for biomethane and that can mean a reduction in costs in its implementation.

What is the main difficulty facing biomethane production in Latin America?

The main difficulty facing biomethane production in Latin America is the lack of adequate infrastructure and production costs, which can be considered higher compared to other types of energy that we have already developed and mastered. In addition, because it is a phenomenon of global transition, we find ourselves in different regulatory and financing processes in which governments and companies are seeking to make changes so that biomethane production is more economically viable; however, it is important to understand that due to the magnitude of the change, we cannot expect it to be something immediate, rather we must understand that it is part of the medium and long-term energy transformation that is being considered globally.

Chile has proposed to be the first cheapest producer of hydrogen (H_2) by 2030, Colombia recently received the news that Ecopetrol was accepted as a member of its World Hydrogen Council Board and also has a roadmap, there are also visible efforts in Peru.

what is your projection in Mexico for 2030?

In Mexico, work is also being done so that the use of alternative energies is part of our reality, both the government and the private initiative have launched different actions aligned with the General Law on Climate Change; as well as international protocols such as the United Nations Framework Convention on Climate Change and its Kyoto Protocol; and some others focused on air care such as the Montreal Protocol on Substances that Deplete the Ozone Layer and the Vienna Convention for the Protection of the Ozone Layer (SEMARNAT). In addition, it is important to mention that within the Regulatory and Policy Framework for Renewable Energies, is stipulating that by 2024 65% of electricity come from fossil fuels. Goal that is monitored by the General Law on Climate Change, which seeks that 35% of electricity generation comes from clean energy for that same year (SENER).

In your opinion, is the world ready to switch from hydrocarbons to renewable energy sources such as hydrogen and biomethane?

I believe that we are still in the preparation process. This is an issue that is on the agenda of the entire world, not only for political or commercial reasons, but for the environmental needs of our planet and the way in which these impact people's lives, however, although it is a topic of global interest and action, we continue to solve problems such as the cultural and commercial adaptations that these changes entail, the international and national regulations for their management, the technological development that they require, among other things.

You were recently distinguished as one of the "100 Most Important Leaders of the Mexican Energy Sector".

What inspiring message would you like to communicate to all professional women in the industry?

It is an honor for me that my work is considered relevant and recognized in this way. I have more than 23 years in the energy industry in which I have always worked with the aim of positively influencing the sector and my country. Being part of this group is also a way to pave the way for more women interested in developing in the energy industry, where more workspaces and leadership positions need to be promoted, so that professionals can test their talent and demonstrate that the capacity and the good results, not of the gender, but of the commitment of each person.

PICARRO

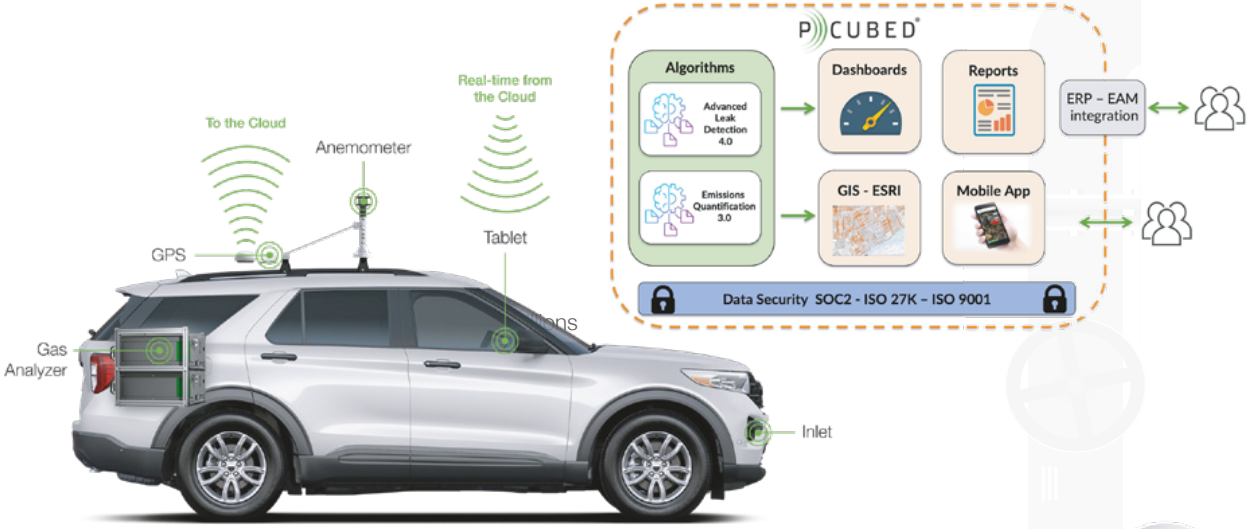
EMISSIONS MEASUREMENT AND ADVANCED LEAK **DETECTION SOLUTIONS**

PICARRO IS THE GLOBAL LEADER in Emissions Measurement, Emissions Reduction, Pipe Replacement and Advanced Leak Survey Solutions

- Vehicles equipped with parts per billion methane sensing technology drive through natural gas networks and collect methane data with unprecedented speed and sensitivity.

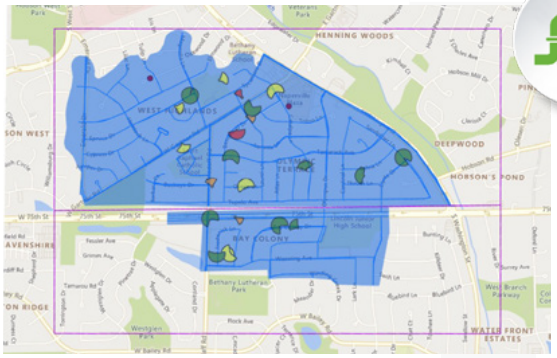
- Industry leading P-Cubed® analytics platform enables operators to measure and reduce fugitive emissions, assess system risk and improve leak survey efficiency.

- Over the last decade, Picarro has built the largest database of methane measurements in the world – billions of methane datapoints, millions of miles driven, millions of quantified leaks, with data collection accelerating



EMISSIONS MEASUREMENT

- The only data driven methodology to measure, quantify and report methane emissions across your network.
- Supports OGMP 2.0, NGSI, One Future, Veritas, Marcogaz.
- Adopted and implemented by multiple leading operators worldwide.

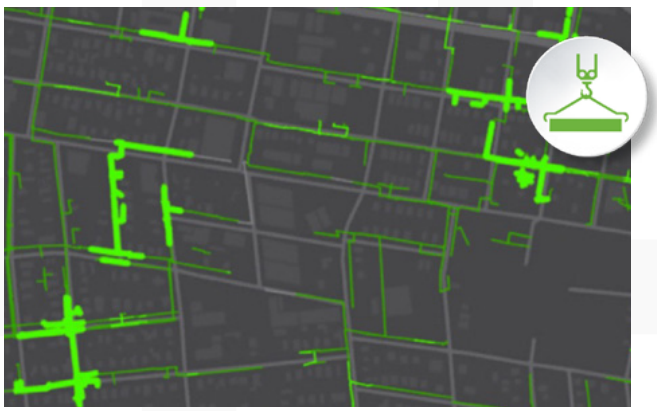


EMISSIONS REDUCTION

- 10% of leaks in a network typically account for up to 50% of total network emissions.
- Identify, quantify and prioritize repair of large emitters.
- Quantify emissions on your network and implement a cost-effective emissions reduction strategy.

ADVANCED LEAK SURVEY

- Priority assessment for each indication for prioritized repair of most hazardous leaks.
- Identify and quantify 3x more hazardous leaks at same leak survey budget.
- Increase safety while optimizing operational efficiency.



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SLOM
Sociedad Latinoamericana de Operadores Terminales Maritimo Petroleros y Monoboyas

INTEGRATION AS THE CENTRAL axle of the continuous improvement of maritime terminals

One of the great challenges that organizations have today to promote and maintain continuous improvement cycles is based on their ability to acquire new knowledge, process it, adopt it and drive the necessary changes effectively and efficiently. Even with these capacities, the constant technical, technological and social evolution drive the generation of innovation spaces to respond to present and future challenges.

The responsible management of a maritime oil terminal requires companies to have processes aligned with the best practices in the industry, ensuring the sustainability of operations through the premises of safe, environmentally responsible and efficient operations.

The maritime and fluvial tanker industry changes and evolves permanently in response to different social and market demands; Consequently, forcing maritime terminals to have to constantly ensure the adequacy of the interface between ships and the terminal itself.

A clear example is found in the growing global demand for energy, which has considerably increased the volumes of hydrocarbons, liquefied gases and chemicals transported by sea and river, using larger ships. This situation has forced many terminals and companies to carry out large-scale works and investments to adapt their operating capacities to the demands and requirements of the market.

On the other hand, those companies that do not adapt lose competitiveness, adding extra costs and structural operating inefficiencies, such as false freight, delays or unloading and top-off operations, to transfer cargo to smaller vessels that can enter its terminals.

However, the best results are not necessarily obtained through large projects or investments; high-impact efficiencies can be generated, seeking significant changes with actions that make a difference, (for example: the adoption of new technologies at low cost).

Undoubtedly, the universe of a maritime terminal includes multiple disciplines, such as planning, vetting, operations, maintenance, integrity management, the human factor, among others; Therefore, working focused on improving each of the links that make up the management of a maritime terminal is usually the key to achieving the desired objectives.

The problem then lies in how to obtain information and make use of experiences that allow building different visions and understandings that contribute to continuous improvement. This is where SLOM (Latin American Society of Maritime Oil and Monobuoy Terminal Operators) brings enormous value to the industry, making integration platforms with other key players in the sector available to operators of maritime, fluvial, monobuoy and multibuoy terminals. Promoting integration for the exchange of knowledge and experiences, and generating synergies that ensure the sustainability of the industry. Hence the importance of more maritime terminal operators and different members of the sector in the region and the world joining the Society and thus working together for the development of the industry, always demonstrating that integrated we can do more.

SLOM
Sociedad Latinoamericana de Operadores Terminales Marítimo Petroleros y Monoboyas

Author:
Latin American Society of Maritime
Oil Terminal Operators and Monobuoys

HOW EDDYFI TECHNOLOGIES Keeps Stakeholders Beyond Current in 2023

As industry witnesses the energy transition, Eddyfi Technologies is a vital stakeholder with its trusted inspection solutions leading the way to support environmentally friendly initiatives. These diagnostic technologies help ensure the continued health of infrastructure and critical assets, supporting sustainability goals and reducing the risk of potential environmental harm from industries that the world relies on every day. In fact, the company was ***recognized by Deloitte*** as one of Canada's top clean innovators providing processes, goods, or services that reduce environmental impact.

The energy sector is a good example where many of the company's solutions are deployed. The vast majority of Eddyfi Technologies' offering is concentrated in the midstream and downstream portions of the industry, acting as key elements to prevent environmental catastrophes without contributing to further extraction of resources. Asset owners can utilize diagnostics solutions to better plan and minimize potential failures that could harm the environment, workers, or the community.

Furthermore, these solutions are used in a variety of asset maintenance applications and linked to green technologies.

Whether it be through assistance of asset health monitoring for maximum productivity as automotive manufacturers and OEMs reduce their carbon footprint through initiatives including closed loop recycling, to the offering of robotic inspection solutions for wind turbines—one of the world's fastest growing sectors of clean and affordable energy—Eddyfi Technologies is conscious of being only part of a complex system composed of many other clean tech companies. The company takes this role seriously and remains committed to fulfilling these responsibilities towards the planet and its inhabitants in 2023 and beyond.

Best-in-class inspection technologies can be applied to any industry. Imagine not having to build a brand-new pipeline, pressure vessel, heat exchanger, refinery, or nuclear power plant. By contributing to asset integrity, Eddyfi Technologies helps prevent premature retirement of infrastructure and the waste it generates: think reduce, reuse, and recycle on a grand scale.

One such example of these technologies is the undisputed reference for heat exchanger inspections. Following the official product launch of Eddyfi Technologies ***Ectane® 3,*** operators can look forward to game-changing operations thanks to the company's commitment to pushing the limits of advanced non-destructive testing. Better defect morphology with C-scan imaging enables integrity engineers to see their asset's true colours and be proactive with a robust risk management program. The introduction of artificial intelligence through Magnifi® software gives operators confidence to make the call. With two major software releases a year, the future is Beyond Current for tubing inspectors in 2023.

At the end of the day, the company's goal remains to keep clients productive, save lives, and protect the integrity and productivity of the world's infrastructure and critical assets.

Eddyfi Technologies

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NATURGAS
ASOCIACIÓN COLOMBIANA DE GAS NATURAL

NATURAL GAS,
a strategic ally of the energy transition in Latin America

Natural Gas has managed to position itself as a key energy source for the Energy Transition in Latin America, thanks to its availability and important environmental benefits, translated into reductions of up to 99 percent of fine particles (PM2.5) and sulfur oxides. , a 75 percent reduction in nitrogen dioxides; at the level of climate change, its combustion represents reductions of between 30 and 50 percent of carbon dioxide compared to others (fuel oil, coal, firewood, gasoline, and diesel).

A milestone for the industry in the world this year occurred with the pronouncement of the European Parliament, which granted the category of sustainable energy to some uses of natural gas, to include them within the list of environmentally sustainable economic activities, known as "Taxonomy of the EU", thanks to the fact that its environmental benefits are compatible with the objectives of the energy transition.

In Colombia, the Colombian Natural Gas Association (Naturgas) has reiterated the relevance of natural gas to achieve the energy transition in Colombia and Latin America, which has great growth potential in the mobility sectors to replace liquid fuels, in the industries to replace coal and its ability to be applied in the development of new energy sources, such as hydrogen.

"According to Luz Stella Murgas, president of Naturgas, "natural gas is a key player in the energy transition in Latin America and has shown a very serious commitment to decarbonization and climate change mitigation. This is thanks to the fact that a third of its energy matrix is made up of renewable sources and its greenhouse gas emissions barely reach 8% of the world total, according to data from the Latin American Energy Organization".

Regarding the growth opportunities of natural gas in the region, in the recent edition of the ARPEL 2022 Conference, industry specialists pointed out the importance of strengthening investment in exploration which, according to the Gas Exporting Countries Forum (GECF), today is equivalent to 6% of global investment, a purpose that must be complemented with regulatory frameworks and stable public policies, in times where competition for capital is intense at a global level.

A recent analysis carried out by Naturgas reveals that North America, Russia and Asia are the regions with the highest gas production in the world, while South America produces 4%. In terms of energy demand in the region, in 2021 it increased by 1.8% compared to 2019, exceeding pre-pandemic values.

"From our experience, we have found that maintaining natural gas production is essential, not only to speed up the energy transition but also to reduce poverty rates, close inequality gaps, and the opportunity to develop its potential to protect food security. Increasing its production in Latin America represents a valuable opportunity to guarantee supply to homes, businesses, and industries and complete a fair, orderly, and responsible energy transition".

According to data reported by the GEFC, Latin America and the Caribbean are already part of the international natural gas market; and suggests that, to improve its presence, there be a greater volume of investments in exploration and production, in addition to betting on offshore to have greater participation in the international market.

NATURGAS
ASOCIACIÓN COLOMBIANA DE GAS NATURAL

Author:
Colombian Natural Gas Association (Naturgas)

Photo of EDP´s power Plant in Acajutla

TRANSFORMATIVE LNG-TO-POWER PROJECT LIGHTS UP El Salvador and accelerates Region's Energy Transition

Invenergy, the largest privately held global developer, owner, and operator of sustainable solutions, has reached commercial operations at the Energía del Pacífico (EDP) LNG-to-power project, located at the Port of Acajutla in El Salvador on May 1st, 2022. The completion of EDP is a major uplift in electric reliability and lower emissions through natural gas supply to the Central American region. The project represents the country's largest ever private foreign direct investment and is providing clean and reliable power to meet up to 30% of El Salvador's energy demand.

The commercial operations milestone for the state-of-the-art, historic energy infrastructure project was achieved despite significant obstacles as a result of the worst global pandemic in modern history. These challenges included supply-chain disruptions, travel restrictions, airport closures, and global financial volatility. Despite these unprecedented circumstances, EDP maintained the highest standard of COVID-19 health and safety protocols during construction to deliver the project.

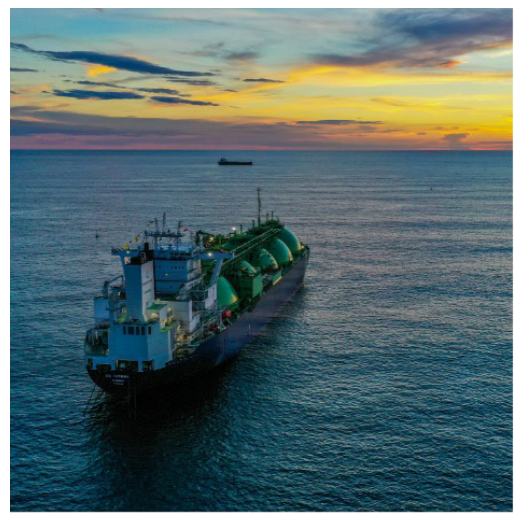
The project is comprised of a 380-megawatt (MW) natural gas-fired power plant, a permanently moored floating storage regasification unit (FSRU), a 1.8-km subsea pipeline that connects the power plant to the FSRU, three electrical substations and two 230-kV electric transmission lines, interconnected to the Central American Electrical Interconnection System, providing added grid reliability to the region and opening further opportunities for renewable energy in El Salvador.

The more than $1 billion transformative infrastructure project, was financed by leading global financial institutions U.S. International Development Finance Corporation, International Finance Corporation, IDB Invest, Finnish Export Credit Ltd and KfW IPEX-Bank. The project, which commenced building in early 2020, employed over 2,000 construction workers and its operations employ 80 people today. EDP has long-term contracts with seven local electric distribution companies under power purchase agreements.

El Salvador is a relatively small country with a maximum demand of 1,066MW and installed capacity of 2,081 MW that has been increased to 2,468 MW with EDP. In that condition, installing a plant for nearly 380 MW is a substantial impact on that system, representing 16% of the total capacity. A lot of solar plants have been installed in the last years, and with hydroelectric, biomass, and wind projects represent a big portion of the installed capacity that depends on not conventional renewable resources (45%). In this condition, EDP is introducing a new, clean, and more efficient source of energy to El Salvador, where most thermal generation was fueled by heavy fuel oil (HFO). EDP modifies El Salvador´s energy mix, adding LNG to the current hydropower, geothermal, solar, biomass, wind, and HFO sources to provide consistent and reliable energy.
EDP Project includes the development of the first offshore regasification vessel deployed off the Pacific Coast of Central America, demonstrating the viability of floating LNG as an energy source for land-based power generation in the region.

The FSRU with 137,000 cubic meters of storage and 280 mmscf/d of regasification capacity, receives LNG from ship-to-ship (STS) deliveries from LNG carriers (LNGC) positioned along the starboard side.

The project's construction and commercialization are already strengthening the Salvadoran economy. EDP supports local Acajutla communities through investments more than $500,000 per year in economic and social development projects. Multiple social impact projects have already been completed, including the remodeling of schools and community centers, paving of central roadways, electrification of homes and businesses, and infrastructure improvements, such as a new sewage and wastewater treatment plant. EDP is also committed to the environment and biodiversity in the region and helped create 150 artificial reefs, hosts educational workshops to promote the conservation of local ecosystems,



Author:
Energía del Pacífico (EDP)

Energía del Pacífico

GUL QSR® with the new QSR Axial Scanner

The QSR1® is GUL's quantitative short range (QSR) device, incorporating the latest guided wave technology and hardware.

The system is designed to semi-automatically scan predefined sections of straight pipelines for corrosion under pipe supports (CUPS).

This instrument is suitable for monitored guided wave scanning on predefined sections of straight pipelines, with the added compatibility to operate with GUL's cloud-based platform.

GUIDED ULTRASONICS LTD.

Quantitative Measurement of Corrosion Under Support

QSR® automatically provides a quantitative measure of the average wall thickness, as well as the minimum remaining wall thickness. Also automatically measures pipe diameter and pipe wall thickness around the pipe circumference from a single location in a fraction of a second.

BECHT NEWS

BECHT 2022 YEAR IN REVIEW

This past year was notable for geopolitical events and higher margins. It was great for us to once again be able to meet with our clients, and our colleagues, in person. Throughout the year, Becht continued to work on ways to bring higher value to our clients.

Some of the areas our clients found this value include:

Becht's industry-leading **Joint Industry Project (JIP) on High Temperature Hydrogen Attack (HTHA)** is unique in integrating an advanced, extensively validated damage model with all levels of inspection to provide a safe and practical solution to quantify cumulative damage and remaining life prediction. Our program delivers actual fitness-for-service of damaged equipment to allow safe replacement timing.

· Our holistic approach to Energy Optimization helped generate CO_2 emission reductions, indicative capital cost estimates, and initial project risk assessments to support a corporate strategy review session **The Process, Fired Heaters and Strategic Business Planning** groups will continue to expand this offering and toolkit in 2023, leveraging our collective experience in energy.

· In 2022, Becht supported multiple clients with Energy Transition Projects; evaluating brownfield revamps, repurposing of existing assets, and greenfield facilities **for processing renewable** feedstock to produce renewable diesel and sustainable aviation fuel blendstock. Through our broad bench of experts, we are able to provide a pathway to meet overall targets and provide insights into the economics and carbon incentives that will be required to achieve the Scope 1, 2, and 3 reduction targets.

· In-person training is back! With the integration of RPS, Becht tripled the number of **Training Courses** offered both publicly and privately, especially in the areas of process technology. Becht held its first large-scale in-person public training (5-week session) in Houston, TX. Plans will continue into next year with several training blocks back in Houston, and potential public in-person growth in Europe.

· Becht has made **wireless health monitoring** a reality at multiple sites. We are now providing breakthroughs in **Wireless Coke Drum Monitoring** while reducing total cost and expanding system analysis and scalability flexibility. Our web-based coke drum HMS software takes data and makes it truly usable.

· **Ammonia/syngas networks started in Asia and Americas, EMEA to come!** The nitrogen, ammonia, hydrogen, urea, and syngas industries are vital to the production of various petrochemical products for worldwide consumption. Becht hosts networking events quarterly to bring industry members together to discuss lessons learned about these complex process plants and share the knowledge to help each other bring the final product to market.

· · The steam methane reformer is a critical and often problematic asset. Becht has worked with numerous syngas owners to investigate their on-stream failures and found that most failures could have been prevented through the application of Becht's **SMR Gap Analysis assessment** which establishes the shortcomings in critical design and construction, process and inspection controls.

· · In 2022, Becht developed the **Stream Compatibility** model that allows for blending different streams (crudes, atmospheric bottoms, vacuum bottoms, FCC slurry,

etc) to evaluate the potential compatibility risk of the resultant mixture. The model relies on six different factors to generate overall prediction and gives the user a view of the overall risk profile.

· This year Becht doubled the **BechtCONNECT** client base, while developing enhanced client features such as manager approval, request KPIs, global search and an expanded Knowledge Library. Based on client feedback, we are now offering discounts on our training courses by pairing the TSA | BechtCONNECT offering with a routine training program.

· **Becht Industrial Group (BIG)** is a mechanical contractor specializing in turnarounds, major maintenance activities and other schedule driven projects with the sole purpose of "helping our partners win". BIG's experienced Executive Team is committed to Safety, Quality and Performance, and has developed strong relationships with other Strategic Partners.

• **Fitness-for-Service tool was incorporated into the DNV platform**. The DNV Synergi Plant software for integrity management and maintenance of petrochemical plants, refineries, and processing plant, is integrating our state-of-the-art FFS solution after an agreement between DNV and Becht. The FFS tool helps plant operators determine if equipment is safe for continuous service or serve as a guideline to make critical run-replacement-repair decisions.

· **IR Borescope** technology was originally developed for olefin heaters and is now updated for lower temperature applications present in most refineries. Heaters with poor viewport installations can be fully observed while online, aiding in detection of abnormal operations and hot spots without cutting in new viewports.

· The **Goldcup** contact pyrometer is the most accurate online temperature measurement ever developed as it creates a black body cavity on the tube with the heater

online. Becht's new generation will have modular configurations to allow application to many more heater styles (vertical cylindrical and cabin heaters) to bring the high accuracy capability to many more common heater designs.

· In addition to assisting plants with traditional Project Management Consulting, Becht is assisting Low Carbon and Alternative Fuels **Mega Projects** with Production Assurance expertise (from FEL 0 through startup) to provide greater reliability of safe, stable and sustainable production at start-up and throughout the life of the asset.

· **CorrExpert-Crude** was extended to function as a framework for continuous blend and assay corrosion evaluation and quantification. Further, with the system's ability to track protective sulfidic barrier layer from utilization of higher sulfur crude blends, case studies are being conducted to showcase how operators can take advantage of time dependent barrier layer growth and consumption by naphthenic acid corrosion as a way to optimize processing a diverse group of crude baskets.

We look forward to continuing to service our clients in 2023 and we welcome your challenges!

Author:
Charles Betch
CEO of Becht

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KNOWLEDGE NETWORK AND PROFESSIONAL CONNECTION

UPCOMING EVENTS IN THE ENERGY SECTOR

FEBRUARY 2023

LATAM FUTURE ENERGY
EUROPE FUTURE ENERG
VIRTUAL SUMMIT 2023
8-9 FEBRUARY 2023
VIRTUAL

PPIM
PPIM 2023 PIPELINE PIGGING & INTEGRITY
MANAGEMENT CONFERENCE
8-10 FEBRUARY 2023
HOUSTON, TX

EGYPS
EGYPT INTERNATIONAL EXHIBITION CENTER
13-15 FEBRUARY 2023
NEW ORLEANS LOUISIANA

ASME
NM.1 COMMITTEE MEETINGS
22-23 FEBRUARY 2023

ASME
B31.4 SECTION COMMITTEE MEETINGS
28 FEBRERO - 1 MARZO 2023

MARCH 2023

API AMERICAN PETROLEUM INSTITUTE
2023 SPRING COMMITTEE ON PETROLEUM
MEASUREMENT STANDARDS MEETING
6-10 MARCH 2023
SAN ANTONIO, TX

CMP
CONFERENCIA ANUAL
MARITIMA DE PANAMA 2023
7-8 MARCH 2023
PANAMA CITY

ILTA
EHS & S COMMITTEE MEETINGS 2023
14-15 MARCH 2023
SAVANNAH, GEORGIA

AFPM
2023 ANNUAL MEETING
19-21 MARCH 2023
SAN ANTONIO, TX

AMPP
AMPP ANNUAL CONFERENCE 2023
19-23 MARCH 2023
DENVER, COLORADO

SLOM
LATAM FUTURE ENERGY MEXICO,
CENTRAL AMERICA AND THE CARIBBEAN,
RENEWABLE ENERGY SUMMIT
29-30 MARCH 2023
DENVER, COLORADO

EXPO OIL & GAS MX
EXPO OIL & GAS MEXICO 2023
29-31 MARCH 2023
VILLAHERMOSA, TABASCO

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