

THE ONLY EVENT GATHERING THE ENTIRE HYDROGEN VALUE CHAIN ACROSS THE AMERICAS

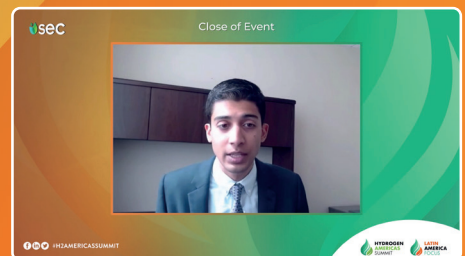
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HYDROGEN AMERICAS SUMMIT

8 - 11 JUNE 2021 | VIRTUAL

EXECUTIVE SUMMARY



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Editor's Note

The first Hydrogen Americas Summit brought together 245 registered delegates representing all the key players in hydrogen development in the Americas. Over four days the Summit welcomed various presentations, panel discussions, fireside chats, videos, and key announcements, shared the very latest advancements and most technologically developed hydrogen projects, not only in paper, but the projects under construction and development.

The Hydrogen Americas Summit was inaugurated this year as one of four Hydrogen-focused events in Sustainable Energy Council's portfolio. Our awareness of the climate threat paired with a prospect of increasing benefits that will result from shifting to a hydrogen economy, have convinced us that global crises also create global opportunities. The best response to the current situation is through an innovative mindset and collaboration – two key notions that were repeated most often at this year's Summit among politicians, regulators, business representatives and sustainable energy players.

During the Summit a consensus emerged that hydrogen, the most abundant element in the universe, is a key component of the energy transition and a greener future and should be promoted with adequate policies and investments. The objectives are now to lower the costs of production, as well as scale up the technology to bring it from pilot schemes to larger projects.

Latin America is in a privileged position to become one of the world's hydrogen powerhouses. With vast renewable resources in the region, such as wind, water, solar and others, the continent is well positioned to become a major green hydrogen exporter, supplying global markets with the required green energy, and meeting North America's energy demand.

From Canada to Patagonia, via the USA, Caribbean and all Latin America, Governments and Private Sector are cooperating and collaborating to advance hydrogen as structural part of our future. The Sustainable Energy Council is proud to be bringing together the entire sustainable energy value chain to work together for a greener future in a unique environment showing not only plans, but actions and real projects in the hydrogen development.

While we're waiting for the physical gatherings to be possible again, we are supporting businesses in the best possible way to keep their focus on the most pressing sustainable energy topics, subjects, key projects, available opportunities, and missing solutions. Let's get to work, let's continue our collaboration, and let's meet again in 2022 at the 2nd Hydrogen Americas Summit.

Tiago Marques

Vice President Production

Sustainable Energy Council

Summit Day 1 – Tuesday 8th June 2021

Keynote Opening Address

Max Correa, Head of Hydrocarbons & New Energy Division, **Ministry of Energy, Government of Chile** shared the country’s vision for hydrogen with green hydrogen playing a critical role in decarbonization. Hydrogen has been dubbed as the missing link to achieve decarbonization for lots of different sectors and Chile will use it to decarbonize fossil fuel emissions, particularly in mining and heavy industries. Chile also has an ambitious plan of investments in green jobs as well one of the most competitive resources to produce hydrogen and derivatives and be one of the top hydrogen producers and exports.

David Livingston, Senior Advisor, **Office of the Special Presidential Envoy for Climate, US Department of State** thanked the Sustainable Energy Council for taking a lead on these issues to discuss the transformative opportunities hydrogen presents. Climate goals are a climate challenge as well as an opportunity. President Biden’s Strategy is an opportunity to invest in people, to create jobs and to create solutions for decades do come. Real commercialisation of hydrogen in massive scale is in sight. The real ambition is for hydrogen to achieve the goal of dropping the costs and to become 1\$ per one kilogram in one decade: 1: 1 : 1. Sectors such as cement and other industries which are backbone of the economy will also have the opportunity to use hydrogen to decarbonize. The US is looking forward to leading green hydrogen not only at home but globally and looking at different options.

There may also be a role for nuclear energy to produce hydrogen. New technologies in nuclear are ideal to produce hydrogen as they do not require a grid connection and can run at higher temperatures, and institutions such as the Idaho National Lab are developing projects to get nuclear hydrogen to scale.



Max Correa, Head of Hydrocarbons & New Energy Division, **Minister of Energy, Government of Chile**



David Livingston, Senior Advisor, Office of the Special Presidential Envoy for Climate, **US Department of State**

Session 1

Commercial Opportunities in Hydrogen Supply Chains and Trade

Hans Kulenkampff, President, **H2 Chile** moderated the first session of the Hydrogen Americas summit, looking at issues such as the green hydrogen importers and exporters of the future, how to approach economic growth and other national interests with domestic hydrogen and where the opportunities lie for regional collaboration.

Wayne Leighty, Hydrogen Commercial Manager, **Americas, Shell** mentioned the company’s ambitions and target of net zero emissions from own operations in 2050 or sooner with hydrogen playing a key role in the decarbonization and hard to abate end users. Shell has innovative solutions with the hydrogen refuelling station doubling the performance at half the cost. As part of a consortium with Toyota and Kenworth Truck Company the three new new large capacity refuelling stations for heavy duty are creating a heavy-duty market in LA. Other usages Shell sees is the development of a liquified hydrogen market, clean refineries and the production of green hydrogen from renewable electricity.



Wayne Leighty, Hydrogen Commercial Manager, Americas, **Shell**

Christopher Cannon, Director of Environmental Management, **Port of Los Angeles** presented the Shore to Store Grant Project with Kenworth, Toyota, Shell, the world's first fuel cell EV powered truck made history on Pikes Peak with the Port of Los Angeles already at the forefront of refuelling stations for heavy duty. More demonstrations are necessary to show the heavy truck work. However these demonstrations are expensive and there is a need for economies of scale to bring costs down. Infrastructure is key for the future of hydrogen projects however hydrogen infrastructure fits nicely with a refuelling station. Mr. Cannon also stressed that future demonstrations provide opportunity to prove the technology's viability in the heavy-duty sector and there is the need to bring overall costs down. Future public funding opportunities can be leveraged to generate the necessary infrastructure network with options such as grants, taxes and other government support. Key corridors will be essential to expanding renewable hydrogen generation and the strategic movement of goods.



Christopher Cannon, Director of Environmental Management, **Port of Los Angeles**

David Burns, VP, Linde Clean Hydrogen, **Linde** presented the vision from the leading industrial gases and engineering company. Linde sees a hydrogen momentum with trends for clean hydrogen but some developments are required such as cost reductions, end user adoption and building the larger hydrogen ecosystem and regulatory framework creating supportive policies. The choice of colour is heavily influenced by natural resources and government support. With wide adoption and economies of scale the cost will decline. New applications will drive adoption.

Linde is well positioned across the entire value chain with hydrogen liquefaction being critical for efficient local and long-distance distribution in the absence of pipelines. Uses for hydrogen in regional and local transportation are also noteworthy.

Session 1: Commercial Opportunities in Hydrogen Supply Chains and Trade

The Hydrogen Momentum
Choice of color heavily influenced by natural resources and government support

Natural resources

Natural gas for Blue H₂

Solar & Wind for Green H₂

Optimal resources: Least Most

Source: IEA Council, McKinsey
*See broadly future mobility (deployment of EV to FCEV + earlier retirement of diesel vehicles/trucks)
**IEA stands for internal combustion engine. All new medium- and heavy-duty trucks to be zero-emission by 2045.

Government support for Clean H₂

- New federal policies under development
- California LCFS - \$200/t GHG
- 45Q
- TMM FCEV and 1K HRS by 2030
- **Hydrogen Strategy for Canada**
- Blue and green
- Eight strategic pillars incl. intl. markets
- \$50b sector by 2050
- \$1.5 b Low-carbon and Zero-emissions Fuels Fund
- **National Strategy for Green Hydrogen**
- 5 GW electrolysis by 2025; 25 GW by 2030
- \$1,5 USD/ kg Green H₂ by 2030
- Top exporter

PEM electrolysis cost evolution

\$/kg Illustrative Example

2020

2030

Capex & Power Price

-50%

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David Burns, VP, Linde Clean Hydrogen, **Linde**

Session 2

Public-Private Partnership and International Collaboration

Andrew McAllister, PhD, Commissioner, **California Energy Commission** led a debate on the market ambitions and policy reality, incentivization of hydrogen production in the regulatory environment, leveraging government expenditure in private investment, the policies and public acceptance in safety concerns for hydrogen, as well as Government investment. The Commission is doing active work as they plan their energy transition to 100% carbon free energy by 2045 and hydrogen is shaping to be a critical element of this transition. California has a large hydrogen economy with mostly brown hydrogen and there is the awareness of pivoting towards green hydrogen with industry and transportation being key sectors in this transition.

William Zobel, Executive Director, **California Hydrogen Business Council** expressed positivism in getting to zero carbon goals via the use of hydrogen. The Business Council is focused on the commercialisation of hydrogen and fuel cells technology. One of the key aspects will be on lowering the cost of hydrogen making it more available to different sectors and people and scaling up will bring down the costs. It's critical to give positive signals to investors and regulators can help establish the framework for carbon intensive industries, demonstrating that the various different types of hydrogen can be used. Would be important to move away from a carbon wheel and adopt a matrix that would include a variety of feedstocks.

Mr. Zobel believes hydrogen will be an international market with wind and solar being the industries of tomorrow as oilfields are today. Looking at the pipeline distribution system and how to decarbonize, its important to understand that system and the kind of enhancements for retrofits needed to be made in the future. The State controls the assets so before looking at multi state or multi provincial we need to ensure standards are met at a state level. Power and gas sectors will drive the demand given the huge volumes and can help kickstart the market.



William Zobel, Executive Director, **California Hydrogen Business Council**

Keith Malone, Public Affairs, **California Fuel Cell Partnership** highlighted that the State is at a very important stage of hydrogen development. Other partners who are aggressively pursuing hydrogen development, such as Japan, South Korea or Germany are looking at California given its unique attributes and as a key piece of the puzzle in the way the State is pursuing its strategies in energy transition and hydrogen deployment.

In terms of policies, there is the need for predictable incentives such as tax credits, taking the example of the solar industry with a stable playing field and key market signals. On the transportation side of the equation, stakeholders have been synchronising the vehicles and hydrogen production across the various sectors, trying to align demand with production.

Grant Strem, Chair, **Proton Technologies Canada Inc** pointed out that there will be ubiquitous low cost hydrogen not only in California but all around the world, with Proton Technologies playing a big role. The first project is showing the opportunity for 25 cents per kilogram of hydrogen making it competitive towards natural gas. With stability and carbon intensive Mr. Strem believes there should be a skew of incentivisation that would direct California towards a net zero the fastest.

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Grant Strem, Chair, Proton Technologies Canada Inc

In terms of opportunities and different markets, whilst we can look at the heavy trucks and vehicles, powering the grid can be a “low hanging fruit” with the infrastructure ready and the need for power increase as a first market opportunity.

Session 3

Risks and Returns in Financing Hydrogen

Pat Spearman, Senator, State of Nevada brought us the vision from the Government and as a federal actor which is supporting and looking forward to promoting hydrogen as a real opportunity for development and creation of projects, jobs and a clean environment. Nevada offers several opportunities and is uniquely placed to develop clean technologies such as solar and hydrogen. Senator Spearman also reinforced the openness of the Government actors to support the new technologies, to legislate and implement regulations what will contribute towards clean developments.



Pat Spearman, Senator, **State of Nevada**

Vishal Shal, CEO, **Hydrogen Technology Ventures** shared how very low costs in solar energy and others are starting to impact the economics of renewables. Utilities are under pressure to decarbonize and thinking of hydrogen for long term planning both in Europe as the US. The utilities want to enter long term contracts to buy hydrogen. Industrial sectors and refineries are using grey hydrogen and want to convert to green hydrogen with the policy mechanisms currently evolving. There are exciting projects such as a Green Ammonia project in Oman in advanced discussions for the offtake. Green ammonia is heavily utilized in the fertilizing sector, but we're also seeing Japan and European markets looking at ammonia as a source of power. De-risking and mitigation is critical and the Government can play a role in this sense.



Vishal Shal, CEO, **Hydrogen Technology Ventures**

Monica Caamano, Head of Research, **Alcazar’s** presentation focused on managing the risks in hydrogen. Whilst low-carbon hydrogen is not yet cost-competitive against fossil based hydrogen, carbon intensity is the ultimate measure of the success of any low-carbon hydrogen strategy. Dr. Caamano called to attention the fact that hydrogen needs an open and competitive market with pricing being a critical factor with different elements of influence with “Power and hydrogen closely intertwined”.

Clark Fangmeier, Executive Director, **Siemens Energy** highlighted the company has a presence in the whole hydrogen value chain with major green initiatives to drive hydrogen related initiatives and investments with a strong growth in green hydrogen production drives cost competitiveness. Different areas for hydrogen by 2030 are trains, SUVs, and trucks as well as other sectors such as steel, ammonia and refineries. Siemens’ current focus is on early projects in reference to applications, establishing networks and partnerships in hydrogen, the development of the value chain and technology improvements.



Clark Fangmeier, Executive Director, **Siemens Energy**

Session 4

The Very Latest in Hydrogen Fuel Cells with a Focus on Hard to Abate Mobility

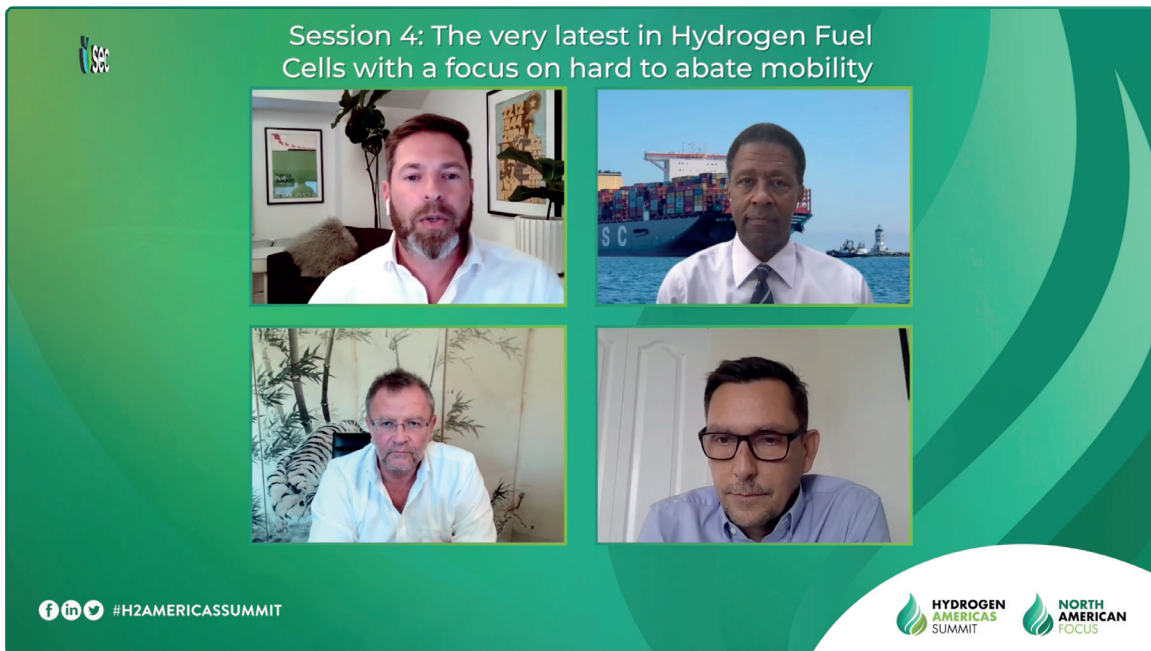
Morry Markowitz, Executive Director, **FCHEA** pointed that Hydrogen in the US is now part of the discussion with \$17.6 billion dollars being the total value of the H2 market in the US today. There are current markets such as large-scale stationary installations, Backup Power, Material Handling, Fuel Cell Vehicles, Fuel Cell Buses and Hydrogen Fueling Stations. In addition, there are new markets such as trucks, trains, marine, aviation, ports (air and water), drones, microgrids, renewable energy grid stabilization, decarbonization of industrial applications. The Roadmap to a US Hydrogen Economy lays out a plan to develop a hydrogen economy and a high-growth pathway for hydrogen with scaling up this sector to build jobs and investments and provide significant environmental benefits and improve air quality.

Brian Goldstein, Executive Director, **EIN** moderated this lively debate around the very latest in Hydrogen Fuel Cells with a focus on hard to abate mobility, from R&D to market viability, investigating opportunities in shipping, planes and trucks as well as overcoming infrastructural limitations with cross-sector collaboration and commercial opportunities in the decarbonization of transport.

Christopher Cannon, Director of Environmental Management, **Port of Los Angeles** pointed that billions of dollars will be required to transform and retrofit heavy trucks and this is a challenge for an industry faced with a totally different business model, because of the range, the user experience, and the infrastructure needing to be less heavy than a battery. The port can play the role of both a convener and a facilitator in the energy transition.

Jean-Louis Kindler, CEO, **Ways2H** noted that using waste and biomass as feedstock to produce energy is a good option to ensure the grid can become greener, deal with the issue of landfills and it could be done to produce a fuel that has zero carbon. Waste or biomass to hydrogen is very important, there is some carbon, but it's renewable, and if we connect this system to CCS solutions we become carbon negative. Medium or long term using waste or biomass solutions means we can go beyond carbon zero to carbon negative.

Nicolas Pocard, Vice-President of Marketing, **Ballard Power Systems** asks a key question: What would it take to convert light vehicles and heavy duty vehicles to a larger scale in California? Cost reduction is the answer. We need to succeed in the cost reduction. The automotive supply chain is changing and we're starting to see companies developing components at a best cost and we can hit the targets we are looking at the end of the decade and by scaling up the technology. Mr. Pocard also believes we don't need a technological shift but to keep working towards reducing costs and industrialization with cheaper components.



Morry Markowitz, Executive Director, **FCHEA**, **Brian Goldstein**, Executive Director, **EIN**, **Christopher Cannon**, Director of Environmental Management, **Port of Los Angeles**, **Jean-Louis Kindler**, CEO, **Ways2H**, **Nicolas Pocard**, Vice-President of Marketing, **Ballard Power Systems**

Session 5

The Next Hydrogen Market in Americas?

Val Miftakhov, Founder & CEO, **ZeroAvia** shared the opportunities in hydrogen and aviation. ZeroAvia is the first practical zero emission aviation powertrain with a vision for renewably-powered long range, lower costs & zero emission hydrogen-electric aviation. Hydrogen is now considered the fuel of choice for any serious decarbonization of aviation with the hydrogen momentum growing significantly with a

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historic flight on Sep 24, 2020 of the world's largest hydrogen-electric aircraft. Mr. Moftakhov also mentioned that Government support has been crucial for the company to achieve its goals with the Jet Zero council, started by the private-public partnership with the UK Government and companies such as Rolls Royce pushing forward for the next level of developments in aviation powered by hydrogen.

Jessica Verhagen, CEO, **Hydra Energy** highlighted the company has put the first commercial hydrogen co-combustion trucks on the road helping heavy duty fleet operators reduce fuel costs and emissions. Hydra also looks at truck conversion with a business model for chemical partners by buying waste hydrogen on a long term contract from chemical companies. With an innovative model the company is also working with natural gas distributors where they displace the natural gas proving a cost effective opportunity.

Ben Nyland, President & CEO, **Loop Energy** presented the company as a market leader hydrogen fuel solutions for the net generation of zero emissions vehicles and power generators. We also heard from a series of different partners of Loop Energy on how collaboration is key to move hydrogen projects forward towards a massification of technology deployment.

The image shows a video frame with a green background. At the top left is the SEC logo. To its right is the text "Session 5: The next Hydrogen Market in Americas?". In the center is a video feed of Ben Nyland, a man with glasses wearing a blue suit jacket over a white shirt, sitting on a yellow sofa. Behind him is a wall with the "LOOP" logo. Below the video feed, the text "BEN NYLAND" and "PRESIDENT & CEO, LOOP ENERGY" is displayed. At the bottom left of the frame are social media icons for Facebook, LinkedIn, and Twitter, followed by the hashtag "#H2AMERICASSUMMIT". At the bottom right are the logos for "HYDROGEN AMERICAS SUMMIT" and "NORTH AMERICAN FOCUS".

Ben Nyland, President & CEO, **Loop Energy**

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Summit Day 2 – Wednesday 9th June 2021

Opening Keynote & Fireside Chat

Accelerating Hydrogen Technology in the Near Term

Ricky Sakai, Vice President of New Business Development, **Mitsubishi Heavy Industries** and **Rob Hanson**, CEO, **Monolith Materials** discussed the opportunities and the successes of the partnerships between both companies and what lies ahead in the future of hydrogen. Energy transition is a major focus of Mitsubishi and hydrogen a big component of other technologies that must be pursued. Developing technologies by partnership and investment such as the partnership with Monolith Materials is critical to produce affordable hydrogen in the future and without emissions.

Both speakers also discussed some of the projects and energy sources including in Nebraska which offers singular conditions for development such as natural gas, water, and lots of wind to produce electricity. It's situated right in the middle of the corn belt and it has a lot of potential in the agriculture sector. The first project is the ammonia plant that has a ready market in the agricultural sector but also a future as fuel for engines, maritime, fertilizers.

Mr. Sakai pointed out that in Japan ammonia is seen as an opportunity to be an energy carrier. Japan is looking for sources of hydrogen and the Japanese utilities also see a high potential for this. Both speakers pointed that energy resources are not uniformly distributed around the world and we will need all types of technologies to decarbonize. We are also seeing the reality of climate investment in the climate tech arena. We are rebuilding the world energy infrastructure which will equally need lots of investment. Greentech 2.0 is coming.

Here is the example of how successful collaboration between both companies and their vision for hydrogen will accelerate the progress and deployment of hydrogen for the benefit of society.



Ricky Sakai, Vice President of New Business Development, **Mitsubishi Heavy Industries** and **Rob Hanson**, CEO, **Monolith Materials**

Session 6

Pathways to Green Hydrogen in American Hydrogen Economies

According to **John Oyen**, Manager of Business Development, **ABB** energy demand is rapidly increasing and will double within 10 years. Energy demand of hydrogen can be covered through system efficiencies, an eco system which can be expanded for further flexibility and independency. ABB's Project Development Optimization sustains that efficiency gains with early involvement and you can maximize the value and utilization of energy with ABB Adaptive Execution™. Reliable, cost efficient and maximized through active coordination and control are the benefits from a good energy management. ABB Ability™ system also adds value to the operational performance, asset management, mobility and enterprise-wide efficiency. ABB is therefore a company at the very forefront of innovation and efficiency when it comes to developing solutions and techniques for hydrogen and clean energy advancement.

John Oyen, Manager of Business Development, **ABB**

Dr. Sunita Satyapal, Director, Hydrogen and Fuel Cell Technologies Office, Office of Energy Efficiency and Renewable Energy, **U.S. Department of Energy** shared the perspectives from the U.S. Department of Energy on hydrogen and fuel cell technologies. The Energy Policy Act (2005) Title VIII and Energy Policy Act of 2020 provide key authorization with hydrogen being part of a broad portfolio of activities. The main priorities are a) hydrogen's low cost, clean hydrogen generation: \$1 - \$2/kg; b) Low cost, efficient, safe hydrogen delivery and storage; c) End use applications to achieve scale and sustainability, enable emissions reduction and address environmental justice priorities.

Hydrogen will also be key in hard to decarbonize sectors such as steel, cement, ammonia, heavy duty and trucks, sustainable aviation fuels, energy storage and blending and export potential. The US has different projects in different regions such as: H2 for Marine Application in California, H2 from Renewables in Texas, H2 for Data Centre in Washington, H2 for Steel Production in Missouri, H2 from Nuclear in East US or Workforce Developments across the states. Dr. Sunita Satyapal also reinforced the importance of collaboration and coordinating across global partnerships: IPHE, Ministerials, Mission Innovation, IEA, etc.

Priya Chhiba, P.E., Engineering Manager, **ESI Energy Consultants** made the case for the opportunities in hydrogen from nuclear energy. It can contribute to efficiencies and have a beneficial relationship. Hydrogen can also help build a case for licence renewal in nuclear with several public partnerships currently underway to prove nuclear as part of the hydrogen economy.

Session 7

Commercial Opportunities in Blue Hydrogen for Existing Gas Markets

Joaquin Narro, Managing Director, **Alcazar** moderated this session composed by a group of presentations and discussion around the topics of:

- Hydrogen Distribution as a key proponent to falling costs
- Combining cost and carbon efficiency in Hydrogen distribution methods
- Safety, Policy and Cost considerations in Hydrogen Blending
- Sustainable opportunities in Natural Gas Infrastructure Integration

Joaquin Narro, Managing Director, **Alcazar** presented several ideas namely that the gas sector is an enabler for greater energy efficiency and renewables integration and the fact that Blue hydrogen offers many strategic benefits. Natural gas infrastructure, such as pipelines, heaters, turbines and steel mills, has the potential for future conversion to hydrogen. Mr. Narro also touched on the fact that pipeline transport works in a very similar way to natural gas, where hydrogen flows under pressure through pipes and sharing the important thought that “The wheel does not need to be reinvented: why not use natural gas as a vector for transporting hydrogen?”



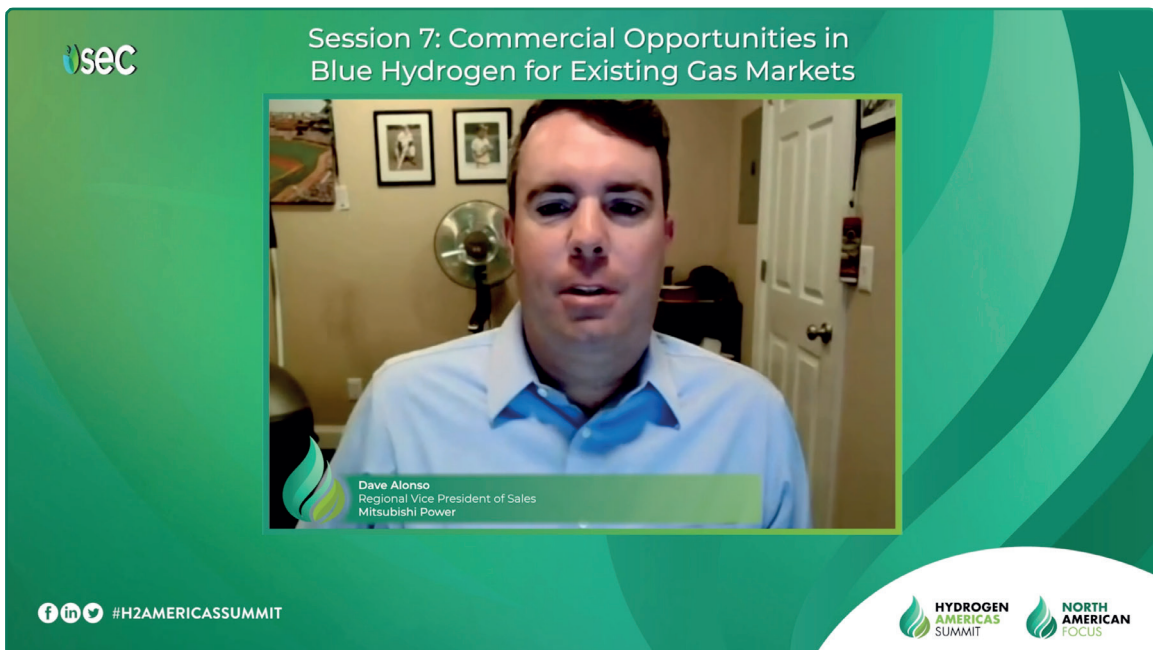
Joaquin Narro, Managing Director, **Alcazar**

Dr. Brian Anderson, Director of the National Energy Technology Laboratory, **U.S. Department of Energy** introduced the NETL as one of 17 U.S. Department of Energy (DOE) national laboratories; producing technological solutions to America’s energy challenges. There are commercial opportunities in blue hydrogen for existing gas markets but efficient hydrogen transportation, storage, and distribution will be key to economics. R&D is key to advance hydrogen developments and advancements. Efficient hydrogen transportation will require storage capacity at market centres and potentially along pipeline infrastructure. NETL’s expertise aligns with R&D needs and is establishing regional partnerships for engaging and coordinating hydrogen production, transportation, storage, and end use. The Administration is kick starting the economy with federal spending and support giving an opportunity to re-envision the entire infrastructure system to support aggressive climate goals. It is being used as an opportunity to use a catalytic shift that will present an opportunity for decarbonization.



Dr. Brian Anderson, Director of the National Energy Technology Laboratory, **U.S. Department of Energy**

Dave Alonso, Regional Vice President of Sales, **Mitsubishi Power** stated that no other company has more hydrogen combustion expertise. MHI's approach to energy transition is to contribute to achieving a carbon-neutral world by 2050 through decarbonization technologies and hydrogen value chain. The group has a vast network of collaborations in different sectors both in the hydrogen and the ammonia value chain. Mitsubishi is not only developing hydrogen infrastructure globally but also regionally. One of the project examples provided was the H2@Scale in Texas where MHIA participates in a project to demonstrate renewable hydrogen can be a cost-effective fuel for multiple end-use applications.

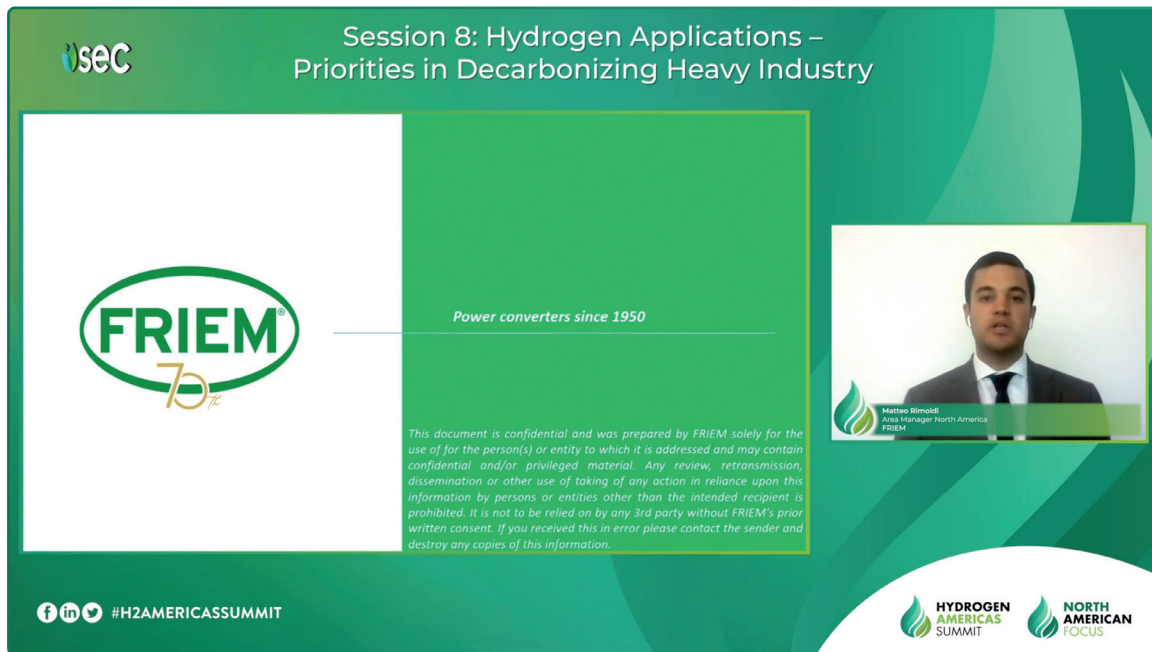


Dave Alonso, Regional Vice President of Sales, **Mitsubishi Power**

Session 8

Hydrogen Applications – Priorities in Decarbonizing Heavy Industry

Matteo Rimoldi, Area Manager North America, **FRIEM America** shared the high expertise of the FRIEM group which has more than 70 years of experience. FRIEM Group is a technology provider specialized in designing and manufacturing Power Electronics with a worldwide presence. With the HQ in Milan it provides solutions in 5 continents and 27 countries, with a production capacity scalable up to 1GW / year of Rectifiers with 3 test rooms for testing up to the rated current, 24/7 support and state of the art technology with in-house developed design. The FRIEM group holds a central position in the energy transition sustaining the green hydrogen production through electrolysis, produce green hydrogen through electrolysis (Power to Gas) and convert green hydrogen into energy (Gas to Power).



Session 8: Hydrogen Applications – Priorities in Decarbonizing Heavy Industry

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Matteo Rimoldi
Area Manager North America
FRIEM

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HYDROGEN AMERICAS SUMMIT NORTH AMERICAN FOCUS

Matteo Rimoldi, Area Manager North America, **FRIEM America**

Dr Laura Nelson, Special Advisor, **Green Hydrogen Coalition** moderated a lively panel looking at meeting key challenges in the built environment with clean tech innovation and some key questions:

- What is the future of decarbonized Industry?
- What sectors will be first to meet net zero?
- Where can industry cut emissions today with available technology?

Sanjay Shrestha, Chief Strategy Officer, Plug Power mentioned the company currently supplies clients Walmart, Amazon and NASA. Regarding the biggest technical challenge with regards to deployment of green hydrogen, the technology is here already. It is necessary to scale up, to bring the costs down and integrating it with renewable electricity and intermittency of wind and solar, optimising the system design but there is not major technical bottleneck.

For **Maurizio Stucchi**, Head of Industry, **FRIEM America** the technology is there but we need to maximise the whole value chain with the challenge being to bring all the pieces together in order to have affordable and viable hydrogen. This economy would come from mass production of equipment and it's a mass customization instead of mass production. We need to meet different requirements from different customers and have the regulations in place.

Dr. Eng. Maurizio Ponzetto, Senior Director Power System, **Neeltran** mentioned the cost of energy must be the lowest possible with opportunities in refinery and heavy industries to be the first to decarbonize. Partnerships for green hydrogen usage for industrial applications are key and will also have to take into consideration the location factor. We also need to be ensuring the reliability, quality and efficiency of the network.

All pannelists agreed that hydrogen will bring social benefits: quality of life, right to live in a clean environment, quality of jobs and is an opportunity for the economy to grow in a sustainable direction. Hydrogen will bring growth for a better future!

Session 9

Regional Hydrogen Progress in Canada and the US

H.E. Dale Nally, Associate Minister of Natural Gas & Electricity, **Government of Alberta, Canada** shared how Alberta has taken significant steps towards the energy future and will continue to be a source of energy for North Americans. Alberta is the number one destination for renewable investments in Canada. Investments of more than 2 billion dollars have been made in the renewable electricity market since July 2019. Also, Alberta is bring forward its target of phasing out coal power plants and will now complete this by 2023. H.E. also mentioned that Alberta is producing fossil fuels under the highest ESGs standards in the world. The Government is finalising the Roadmap for hydrogen and providing investor confidence. Alberta’s geology is also suited to store emissions underground and the government is announcing a new tax credit to support carbon capture in Alberta. There is also a programme with incentives in the petrochemical sector. There are also other ways of support the Government is looking at such as harmonising standards and other regulatory changes as well as establishing hydrogen hubs. Alberta’s Government is at the forefront of renewable energy production with a clear plan matching its ambitions.



H.E. Dale Nally, Associate Minister of Natural Gas & Electricity, **Government of Alberta, Canada**

Dr. Aaron Hoskin, Sr. Manager, Intergovernmental Initiatives, Fuel Diversification, **Ministry of Natural Resources, Canada** started his presentation by underlining Canada’s advantages such as abundant feedstock, leading innovation, a strong energy sector, international collaboration, access to export markets, and a unique starting point with 10 of the top hydrogen producers in the world. Hydrogen clusters and projects are currently forming across Canada with consultations with all the stakeholders and communities which took place and had some interesting findings such as: there is growing momentum for hydrogen, Canada has great opportunities domestically and in the international context, however actions are required across the whole value chain. Formation of new clusters around the country either large scale or blending with natural gas can also be part of the hydrogen strategy. Amongst the recommendations for guide actions are strategic partnerships formation, de-risking investments, codes and standards as well as innovation along the value chain. Enabling policies and awareness from the market are also key, together with international markets and regional blueprints. The 2021 budget will support hydrogen development with billion dollar plus Clean Fuels Fund, multiple tax measures, and also support for R&D and innovation.



Dr. Aaron Hoskin, Sr. Manager, Intergovernmental Initiatives, Fuel Diversification, **Ministry of Natural Resources, Canada**

Bruno P. Allaire, President & COO, **Pristine Energy** brought us the pathway to accelerating Canada’s national hydrogen strategy. Mr. Allaire noted that whilst hydrogen is a solution, the prices remain too high vs. fossil fuels. One of the options is to look into natural hydrogen which enables ultra-competitive hydrogen production, which is significantly cheaper than current prevailing production methods. Natural hydrogen can help Canada adopt the global energy transition quicker, offset the loss of revenue from future oil and gas production, create new jobs in the green hydrogen economy and allow the country to become world’s leading producer of carbon free hydrogen. The development of a nationwide refuelling network enables increasing demand for hydrogen and the rapid adoption of fuel cells. Natural hydrogen can also play a huge role in this movement towards a leader in carbon free emissions with potential for natural hydrogen in Alberta, Manitoba, Ontario and Quebec.

Summit Day 3 – Thursday 10th June 2021

Opening Keynote Address



H.E. Omar Paganini, Minister of Industry, Energy and Mining shared Uruguay's latest developments regarding green energy and hydrogen. Uruguay has been introducing renewables in their energy matrix for a long time which has transformed Uruguay from an importer of electricity to a net exporter. The country is at the forefront of green sources of energy including the promotion for hydrogen. Its unique positioning as well as the Government's drive and other conditions such as the respect for the rule of law and a business friendly environment, make Uruguay one of the key countries to develop hydrogen.



H.E. Omar Paganini, Minister of Industry, Energy and Mining, **Government of Uruguay**

H.E. Rosilena Lindo, Undersecretary of Energy of the **Government of Panama** presented the different reasons why the country is primarily positioned to become a hydrogen hub. Panama has a unique position between North and South America being the logistics and transportation hub of the Americas, with a high percentage of cargo moving through its port and Canal. The canal will continue to play a key role in the transportation of hydrogen and green fuels and Panama can become one of the key hydrogen bunkering centres. The Government has taken measures to advance its green policies through Governmental alliances, dialogue with the hydrocarbon sector as well as updating its policy framework and an ongoing study for hydrogen feasibility.

H.E. Miguel Lotero, Deputy Minister of Energy, **Government of Colombia** brought the vision from Colombia, a country with a unique positioning for the energy transition and production of renewable energy. Colombia is also finalising the discussions for its National Hydrogen Strategy and will move forward with implementing and attracting investment to the sector with the support of the Government and the established energy sector the country has. Colombia has increased its capacity by more than 200 MW in 2020 bring one of the countries with best performance in the energy transition in the region and the government is working very actively to attract investment into the country. The Government has also been working on regulatory frameworks in the power sector and is currently working on the Hydrogen Strategy to entice investments and promote activities in the sector. The country is fully committed to energy transition and innovation will be at the centre of the hydrogen base economy.

Session 10

LATAM's Commercial Opportunities: A Future Green Hydrogen Exporter

Juan Ricardo Ortega, President, **Grupo Energía Bogotá (GEB)** reinforced the fact that GEB is one of the biggest energy groups in the Americas, being investors in Guatemala, Brazil, Peru and of course Colombia. The Group partners with other companies and sometimes leads the projects and developments. In Colombia for example the company has invested in gas transmission and owns the largest gas transmission company in the country and also partnering with Enel for electricity generation and transmission in the city of Bogota. There is a huge potential for hydrogen from solar and connections with Brazil.

There is also the potential for Colombia to produce blue and green hydrogen. Even though there is no internal mining market, but the country can produce hydrogen for export and the installation would make transport costs very low. The generation potential is very high such as in La Guajira with solar and wind power with great opportunities.

Ing. Alejandro Stipanivic, President, of **ANCAP** promoted the company as a key partner in the energy transition. ANCAP is a group of ventures and the biggest industrial company in Uruguay, including La Teja refinery La Tablada distribution plant which have enormous potential to decarbonize and be part of the hydrogen revolution. Hydrogen is key in ANCAP's transition towards a low-carbon and sustainable energy company, complementing the path already begun with biofuels and several decades of experience in the production, storage, purification and use of hydrogen at its La Teja refinery. ANCAP participates in the inter-institutional hydrogen group together with MIEM and UTE since its inception in 2018. Currently we can find the H2U Project Roadmap with private investment and government support and the data room currently under progress. There are pilot projects for heavy duty transportation together with high potential to partner with ANCAP for offshore wind to hydrogen projects.



Session 10: LATAM's Commercial Opportunities:
A Future Green Hydrogen Exporter

ANCAP – A

Hydrogen Americas Summit

Latin America Focus

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Ing. Alejandro Stipanivic, President, of **ANCAP**

Franklin Chang Díaz, CEO, **Ad Astra Rocket Company** presented the company as being present in the Americas and fully focused on developing clean energy infrastructure particularly on green hydrogen storage and utilization. One of the key projects is currently in Costa Rica, a country with high potential for green energy deployment in the wind, solar, geothermal and hydroelectric sectors. Ad Astra inaugurated Central America's first hydrogen transportation project in 2017 and is striving to continue to invest and move forward with projects in the critical area of hydrogen.

Kevin J Sylla, CEO, **Pristine Energy Inc.** looked at the fundamentals of natural hydrogen. Natural hydrogen offers several key opportunities including enabling ultra competitive production of hydrogen, which is cheaper than the current prevailing production methods. Natural Hydrogen can help South America to adopt the energy transition more rapidly, offset the loss of revenue from future oil and gas production declines, create new green jobs and offers the region the opportunity to become a leading producer and exporter of carbon free hydrogen.



Kevin J Sylla, CEO, **Pristine Energy Inc.**

Session 11

Policies, Regulations and Financing LATAM's Green Hydrogen Revolution

Pedro van Meurs, President & Founder, **Van Meurs Corporation** provided a setting the scene presentation looking at the hydrogen industry and its regulatory framework. Given the specifics of the sector, Dr. van Meurs suggested that the hydrogen regulatory framework should preferably be a "one-stop-shop". The suggested organization of the regulatory Hydrogen Development and Coordination Department could be: a) overall hydrogen development planning, b) development of the regulatory framework, c) hydrogen project assistance and d) specific hydrogen tasks. Dr. van Meurs considers this can be a simple roadmap which may result in an efficient introduction of hydrogen.

Alfonso Blanco – Bonilla, Executive Secretary, **OLADE** shared the current situation and prospects of hydrogen as an energy source in Latin American countries. According to Mr. Bonilla, The region has more than 25% renewable energy as primary energy, which is the highest percentage in the energy matrix compared to the rest of the world. However, during the last decades it did not incorporate renewable energies at the same speed as the increase in electricity demand. More can be done to decarbonise Latin America and

there are some key projects such as decarbonization of mining in Chile, Guanacaste demonstration plant, Verne Project of ANCAP and Hychico, a private initiative to mix with natural gas to increase the power of combustion engines.

Stephanie Gil, Practice Manager, Energy and Extractives Global Practice, Latin America and Caribbean, **World Bank** shares they are a key institution which supports the green energy transition. The World Bank is partnering with several governments including Chile and others to advance their hydrogen promotion.

Alexandre Siciliano Esposito, Head Department BNDES Energy Division, **BNDES** provided the vision from Brazil in the current hydrogen sector. The country has massive potential in terms of hydrogen production from the renewable sector which in fact already accounts for a big percentage of energy production. The BNDES has been actively supporting new and green sources of energy and will support hydrogen as a key part of the energy transition.



Tiago Marques, Vice President Production, **Sustainable Energy Council**, **Alfonso Blanco – Bonilla**, Executive Secretary, **OLADE**, **Stephanie Gil**, Practice Manager, **Energy and Extractives Global Practice, Latin America and Caribbean, World Bank**, **Alexandre Siciliano Esposito**, Head Department BNDES Energy Division, **BNDES**

Session 12

Green Hydrogen's Applications to Transform LATAM's Economic Landscape

H.E. Francisco de Queiroz Maia Júnior, Secretary of State for Economic Development & Labour (SEDET), **Government of Ceará, Brazil** shared the vision from the State of Ceará, which is connected with the current global movement and is trying to innovate towards its development whilst improving its own energy future and the planet's. Ceará State has a consolidated project underway for more than 20 years in the area of certified renewable energies such as: photovoltaic, wind and most recently offshore and we support the project of transforming green hydrogen in energy. Ceará wants to be a player of production, distribution, export of hydrogen as a green fuel both in Latin America and around the world. This fuel which can be produced in Ceará, due to the natural conditions available, which will contribute to Ceará's and global net zero carbon targets enabling the State to become a great player and exporter of green hydrogen. For this purpose the Government has created a work group, and celebrated a protocol with the key institutions in Ceará including the Port of Pecém, which is associated with the Port of Rotterdam in Europe, the Federal University of Ceará and the Industries Confederation to structure its competitive advantages as a global player.

Another important element is the level of investment in clean energies in the State's energy matrix, from the 7GW under conclusion, 4,7 GW are already in place with the rest under development. More than 48% of the energy matrix is composed by clean energies. Another important element to mention is the mapping for energy potential the Government is doing which shows a total in 643 GW in solar energy, onshore wind of 94GW and offshore wind's potential of 117 GW. This is important not only for the production of renewable energies but also to transform these into hydrogen as a green fuel.

Symone Araújo, Director, **ANP Brazil** provided the important vision from Brazil, which is a country that already produces renewable energy and is positioning to become one of the hydrogen leaders. Brazil is in a privileged position in the energy transition given its natural resources, with developments in the renewable energy sector and projects taken by the government for its advancement such as the successful Brazilian biofuels policy RenovaBio Programme, the development of Brazilian fuel cells technologies in buses and urban transports, to the expected National Hydrogen Policy Guidelines in August 2021. ANP is actively promoting these activities with clear regulations particularly in non negotiable principles such as the RD & I activity and its development in Brazil.



Symone Araújo, Director, **ANP Brazil**

Ricardo Narváez, Deputy Technical Director, **Institute of Geological and Energy Investigation Ecuador** brought the vision from Ecuador where currently the only energy use for H₂ is in the hydrocarbon processing sector at Esmeraldas refinery. However, the country offers many opportunities in the renewable sector. Hydropower offers opportunities but it depends on rain cycles and therefore offers some challenges. Regarding energy storage, there are opportunities in the mid-term storage alternative which could fulfil power demand in the dry season. There is an energy storage potential assessment in the national grid based on pilot scale data which will allow for further projects to be scaled up in the future.

Ricardo José Ferracin, Coordinator of Nucleus for Hydrogen Research, **Department of Renewable Energies, Itaipu Technological Park Foundation/FPTI** showed us the latest developments in hydrogen at the ITAIPU TECHNOLOGICAL PARK whose main purpose is to integrate and transform knowledge and technology into solutions for the progress of society. The park has a renewable energy centre with an hydrogen integrated system and technology operating and the conceptual model in sustainable H₂ "Application Versatility". The park is working with its partners to become a global centre for hydrogen innovation and technological development particularly in Brazil and to develop solutions for the wider public and energy sectors.

Asuncion Borrás, Senior Vice President of Business Development, **ENGIE** shared the vision from ENGIE global and Chile and its important green projects in country. ENGIE is the 1st independent power producer globally with 31GW renewable energy production. As a front-runner in the development of an industrial-scale hydrogen economy worldwide ENGIE is developing critical projects in Chile particularly in hard to abate sectors, such as mining. Chile also has specific conditions such as the levels of oxygen in high altitudes which add to complexity of hydrogen operations. Some of the projects are the Hydra project where green hydrogen will be utilized to decarbonize the heavy-duty mobility (mining haul trucks). Another project is the HyEx where H₂ as feedstock for a new ammonia plant to provide decarbonized blasting services for the mining industry and potential Green Ammonia exports.


Rinaldo S Brutoco, Chairman and CEO, **H2 Clipper Inc.** brought us a technology to unlock the hydrogen economy looking at mobility and transportation. The Pipeline in the Sky Technology will be radically competitive and provide a 100% green, 21st century version of the hydrogen dirigible to deliver large quantities of liquefied hydrogen at a cost per kilogram that is more attractive than any other alternative.

Summit Day 4 – Friday 11th June 2021 Session 13

Blue Hydrogen in LATAM: Short Term Necessity or Long Term Solution?

His Excellency Carlos Zaldivar, Vice Minister of Mines and Energy, **Government of Paraguay** highlighted the country is one of the co-owners of the hydroelectric dam of Itaipu with Brazil and Argentina and is the sole owner of Carai's Dam. The country is characterised as being one of the main producers of renewable energy. The Government is directing important resources to the development of its energy infrastructure. From the point of view of demand, Paraguay is determined to develop a more sustainable energy matrix so it can be part of the social, economic and environmental development whilst ensuring high rates of energy return. The country's condition reinforces the natural investment in renewable energy sources with energy security and sustainability as key driver for the current and future generations. The greatest challenge is to change the energy matrix from the demand side whose biggest sources continue to be the biomass with 44% and the hydrocarbons with 40% with power being in last place at 16%. Paraguay is also building a legal framework to build technical capacity for new technologies and the development of infrastructure and is a country with optimal conditions to attract investors to the renewable energy sector.

Dr. Vernon Paltoo, President, **National Energy Corporation of Trinidad and Tobago** presented the country's energy landscape being one of the most established energy producers in the continent with several projects in different energy areas. To ensure that the NGC group is prepared for multiple future scenarios it is pursuing initiatives within the green hydrogen space to ensure the company contributes to the long-term sustainability of the NGC Group and the wider downstream energy sector. Trinidad and Tobago offers significant potential for blue and green hydrogen and the NGC Group expects to become a major player in multiple subsectors across the Sustainable Energy value chain. Blue hydrogen and CCS are a pathway to T&T's hydrogen industry development with several developments taking place recently such as Carbon Capture and Carbon Dioxide Enhanced Oil Recovery Steering Committee agreed by Cabinet on February 18th, 2021; the Public Private Cooperation with international companies and the Universities in Trinidad and Tobago, as well as the Hydrogen Economy Study that is being undertaken in cooperation with IDB is earmarked for completion in Q1 2022.



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Session 13: Blue Hydrogen in LATAM:
Short term necessity or long term solution?

Dr. Vernon Paltoo
President
National Energy Corporation of Trinidad and Tobago

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Dr. Vernon Paltoo, President, National Energy Corporation of Trinidad and Tobago

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Santiago Sacerdote, General Manager, **YPF TEC** provided the vision from a technology company pushing for hydrogen and energy transition in Argentina. YTEC is currently leading the H2ar Consortium with more than 40 international and local companies working together to take advantage of the great opportunities Argentina offers in the new global hydrogen economy. Currently there is a challenge to decarbonize as soon as possible, however the dilemma of hydrogen colours is typical from the supply side and Argentina is looking at how to tackle the challenge from the demand side. According to Mr. Sacerdote the optics should not be so much on the dollar per kilogram but on the dollar per ton of CO₂ to offset or reduce. The path ahead is multicolour and is the path of minimal cost to decarbonization. A second idea is that there is no singular customer profile in the world. In Europe for example, more value is placed in carbon alternatives. In Japan they will transition with blue ammonia and the prices depend on the cost of the base cost rather than the transportation and logistics and in this sense, one option for a specific market is not necessarily the best for another. At the beginning at least, we are not predicting a single market but different markets which differentiate segments by products, regions or even pricing affected by local issues. Argentina is taking a multimodal approach to production, since it faces a segmented market, but also provides the opportunity for a competitive offer for each of these segments.

Session 14

Hydrogen Regional Cooperation and Public - Private Partnerships

Dr. Erwin Plett, Managing Director, **Low Carbon** moderated a debate with important panelists focusing on the public private partnerships in the hydrogen developments and how can private enterprises and governments collaborate to promote hydrogen deployment in Latin America.

Hans Kulenkampff, President, **H2 Chile** shared the associations aims of accelerating the energy transition through the promotion of hydrogen technologies, communicating the challenges and opportunities and bringing forward projects from 2035 to 2025. Hydrogen needs scalability, cost and public acceptance and public-private partnerships are key to achieve that. The development pyramid is a way to frame the hydrogen development, with the base being *knowledge*, both in public and private. The next level are the *concepts* and *projects*, through comparisons and collaboration for solutions to promote the projects and ensure they are profitable. In the next level we look at the *challenges of financing* and the final level will be to have profitable *bid rounds*.

Pablo Tello, Technical Advisor, **Decarbonization Project, Program for Renewable Energy and Energy Efficiency (4e), Deutsche Gesellschaft für Internationale Zusammenarbeit GIZ** works in partnership with Government, Agencies and private sector to push the issues in the public agenda and concrete projects in terms of hydrogen and other clean energies. As an example, in CORFO they worked to create the enabling conditions for the solar industry with public and private sector to collaborate and work together regarding the regulatory framework which boosted both sides. The GIZ covers the whole value chain and in Chile and LATAM and Caribbean, we have the first support for Patagonia's project trying to export the Chilean Know-How and example to other countries.

Flora Montealegre, Executive Delegate represented **CRUSA Foundation** shared their focus looking at issues of sustainability in Costa Rica, and is involved in the development of sustainable transportation as well as pushing the green hydrogen agenda in Costa Rica. A key role CRUSA Foundation sees for itself is as a convener for public and private partnerships, through funding or mobilizing resources from others and promoting these partnerships in the climate change. In the case of hydrogen, there are several advantages in Costa Rica, it's just starting to build the ecosystem but it has the advantage of almost 100% renewable energy and the electric sector is already developed, together with a National Policy to commit the country to decarbonization of its economy.

The Government approved in 2019 a very comprehensive decarbonization strategy reducing the greenhouse gases particularly in the transport sector and it was identified that action was needed. CRUSA gathered Ad Astra and IDB and other partners, such as the Toyota Foundation. The Foundation is also seeing challenges in terms of acceptance and even skepticism on hydrogen projects in Costa Rica with a either/or attitude and CRUSA has started to build knowledge through studies, including the study of the potential for hydrogen export with partners. The Hydrogen Alliance and private partners are ready to do investments in the sector to get an investment project in place.

Thibault Ménage, Head of Caribbean Development, **HDF Energy** represented the vision from the private sector. HDF Energy has several hydrogen projects in the region and counts with several experts in its team looking at becoming a technology hydrogen-to-power chain in countries such as Martinique and French Guyana, the biggest hybrid power system using hydrogen storage. As a company, they are ready to start projects however, they have noticed some countries, when it comes to hydrogen have not been focusing on it as Chile which is at the forefront. The approach is to start with the business model and solutions, analysing and studying the sector to come up with relevant solutions and a concrete project. Enhancing the knowledge curve; they create a bankable project and then there might be the financial gap at the end where the development agencies and institutions come to play a role. HDF has decided to specialise in the energy sector with experience in project structuring and bankability, particularly long-term storage projects and using an attractive structure which is PPA, Power Purchase Agreement.

Session 15

Where is Hydrogen taking LATAM's & Caribbean Energy Transition?

Igor Raičević, CEO, **Ecuasemillas S.A Ecuador** and CEO, **Seedsem EIRL, Peru** shared the vision from Ecuador and Peru and how through partnerships you can produce hydrogen with innovative strategies and on different scales.

Gaelle Dupuis, Co-Funder and General Manager, **H2 Perú** brought us the road to green hydrogen in Perú. The country's climate ambition is to raise to 15% the participation of non-conventional renewable energies within the electricity matrix (5% today) with clear potential for new projects to be renewable and competitive. Peru's ability to generate renewable energy will allow the production of green H2 at competitive prices with solar, water and power as major sources of renewable energy production in country.

Eng. Sergio Raballo, Chairman Director, **C.A.P.S.A – Capex S.A. Group** looked at the Chile and Argentina opportunities and the Hychico project. Both countries have excellent potential to produce competitive H2. The region as a whole will become an exporter for hydrogen from green energy sources and is moving fast towards this goal. Hychico's project has H2 Facilities since 2009, and wind parks with a capacity of 34 MW, as well as h2 underground storage facility since 2010. Hychico is working along with strategic international partners and organizations involving wind turbines, electrolysers, H2 infrastructure and R&D Centres and aims to operate a Large Scale Hydrogen Production facility and supply renewable energy and hydrogen for regional and international markets.



Dr. Erwin Plett, Managing Director, **Low Carbon, Hans Kulenkampff**, President, **H2 Chile**, **Pablo Tello**, Technical Advisor, **GIZ**, **Flora Montealegre**, Executive Delegate, **CRUSA Foundation**, **Thibault Ménage**, Head of Caribbean Development, **HDF Energy**

Duna Uribe, Executive Commercial Director, **Pecém Industrial and Port Complex** shared the Green Hydrogen Hub in Pecém Port Complex which is one of the largest green energy projects in the continent. Located in the State of Ceará, which offers one of the largest renewable energy potential in Brazil, the Industrial & Port Complex of Pecém is located 50 km of Fortaleza in the State of Ceará in Northeast Brazil. It consists of port facilities, a free trade zone (ZPE Ceará) and an industrial area with a total area of more than 13.000 hectares. The Complex of Pecém aims to become the main industrial, port and logistics hub in Brazil by 2050, generating added value for customers with a focus on innovation, sustainability and operational efficiency. The project offers excellent conditions, such as the

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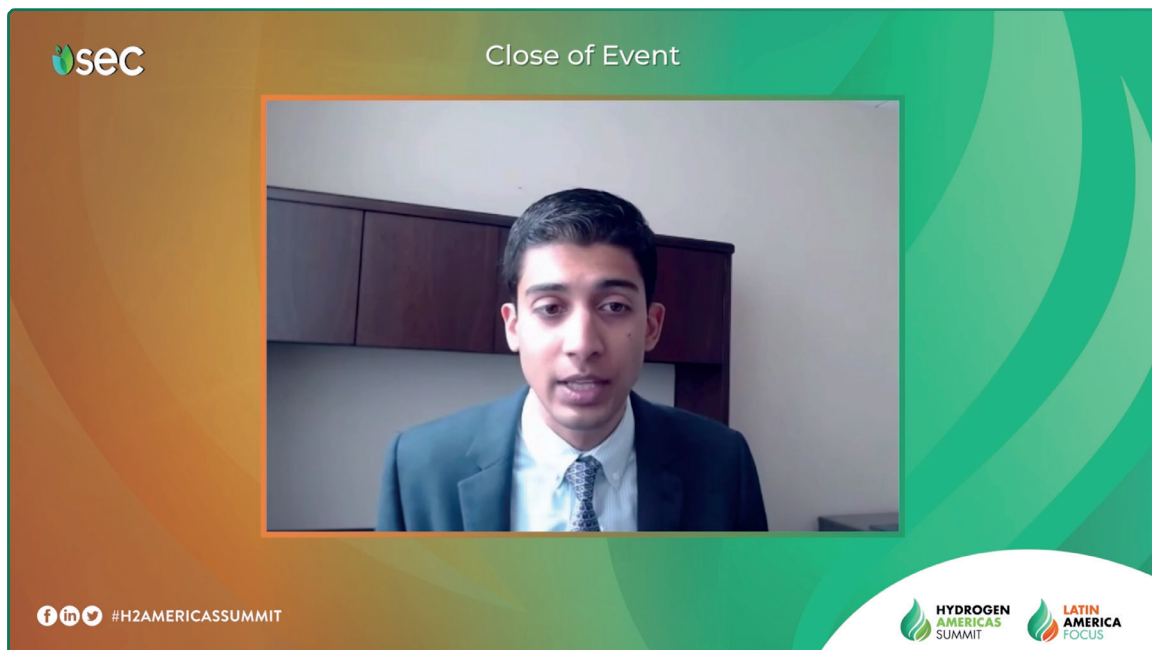


port infrastructure, suited electric network for electrolyzers, natural gas network connecting the port and the industrial area, perfect scope of installed industries for green H2 market; and 3,613 ha available area for new plant installations with free tax zone.

Charley Rattan, Hydrogen Trainer and Business Advisor, **Charley Rattan Associates** focused on Methanol, Ammonia & Hydrogen and their usages and potential. Mr. Rattan called to attention the synergies between Hydrogen Ammonia and Methanol as important parts of the Net Zero Agenda. Methanol and Ammonia can also both be useful for transport and distribution of hydrogen, however Ammonia needs to be treated with respect and carefully given its inherent characteristics.

Rodrigo Lobos R., Senior BD Hydrogen Chile, **Enel Green Power** shared the vision of a global company investing in renewable energies around the globe and in Latin America. Enel's presence in Chile is vast with operating plants: 4,7GW and under construction: 2,2GW. Mr. Lobos highlighted that hydrogen needs to be renewable, fed by 100% renewable power with no other commercial production method which holds parallel sustainability features and lower costs of electrolyzers and renewable LCOE, which will make green hydrogen cost competitive with fossil fuels and preferable to other nongreen alternatives.

Varun Sivaram, Senior Advisor to the US Special Envoy for Climate Secretary John F. Kerry, **US Department of State**, thanked the organisation for the remarkable Summit. Secretary Kerry has made it clear that the Biden Administration is committed to 2050 net zero goal in order to limit the rise of temperature rise to 1.5C with hydrogen playing a big role. The IEA tells us that half of the emissions reduction will have to come from technologies that are not yet ready for market, with hydrogen representing one of the biggest technologies and ecosystems to scale up. Its not only about deploying clean technologies, we will also need to demonstrate, develop and scale technologies which are not ready yet but will play a role to achieve net zero.



Varun Sivaram, Senior Advisor, **US Department of State**

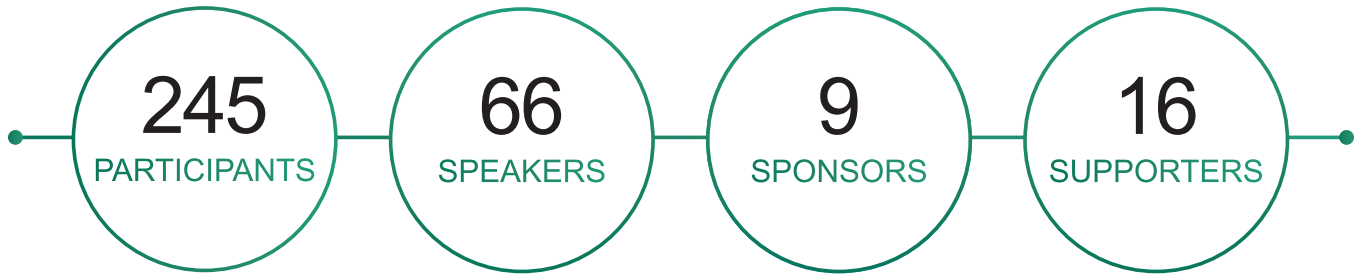
We need to start working on achieving these targets right now and we need the coalition to work together to achieve the hydrogen economy. However Mr. Sivaram warned that hydrogen might not be used for everything and all the different expectations so it's important to keep the expectations bounded to what is most practical. We also need to note the perspective that hydrogen should and will play a role in decarbonising the industry, particularly in some of the existing uses: refining, fertilizers, synthetic fuels and aviation. We start constructing the curve towards areas which are more speculative but keeping present the idea that other technologies were not necessarily developed for their current use, such as solar and others.

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There are four very important avenues for international cooperation, which are: 1. Create demand, countries need to act together to create harmonised policies that will create demand and sending signals to be scaling up clean energy; 2. We need investment in technologies and a push for innovations such as investments in the next generation of electrolysers and end use technologies; 3. Developing high capacity clean power sources whether that will be wind, solar or batteries, as well as innovations in the end use; 4. The fourth way we can cooperate is developing certification and technical standards for the future hydrogen economy. Clear standards to accurately measure what the impact of emission reduction are and the priorities to develop and deploy clean hydrogen technologies. Mr. Sivaram is equally delighted with the fact the Hydrogen Americas Summit has brought together the Western Hemisphere to discuss the development of clean technologies and their deployment around the world and exhort us to “roll up our sleeves” and work together for a brighter future.

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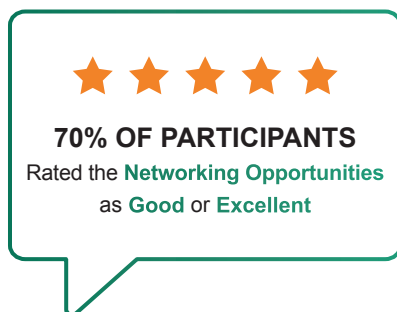
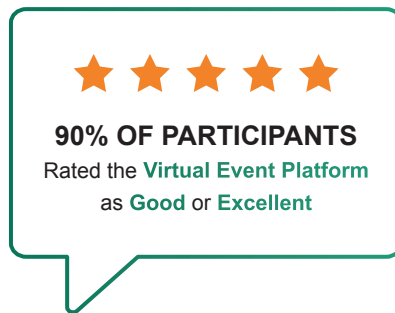


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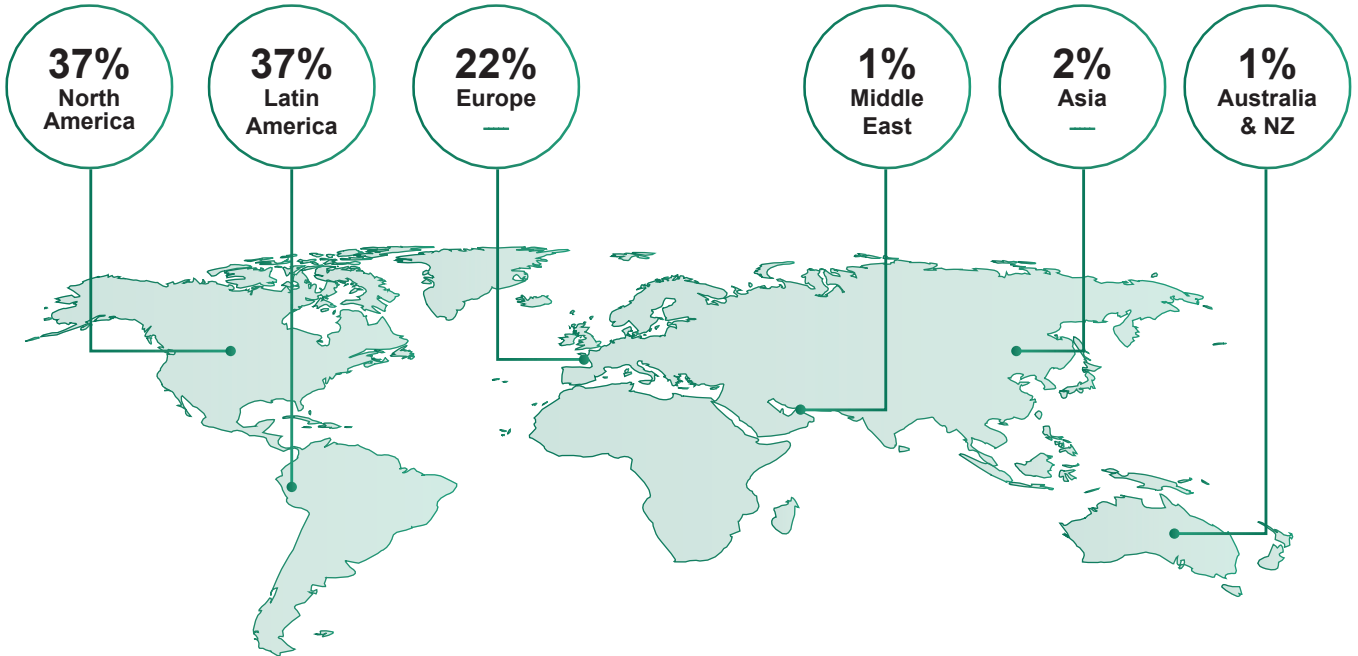


Government Representative

PARTICIPANTS' SATISFACTION RATES



PARTICIPANTS' GEOGRAPHIC LOCATION



PARTICIPANTS' TESTIMONIALS

“Really interesting watching the presentations of hydrogen experts, both technically and politically.”



GUILLERMO ANTONIO RIOS PAVIA
Chief of Development and Innovation
Grupo Lodemo

“The summit included a great depth and breadth of topics, expertise, and perspectives on the emerging hydrogen economy.”



WILLIAM BOLGIANO
Associate Attorney
Venable LLP

“Fantastic diverse speakers and exhibitions available.”



AARON SMITH
Director
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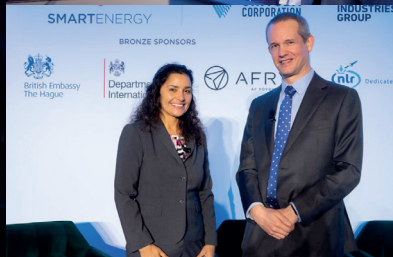


The Sustainable Energy Council World Hydrogen series bring together governments and companies across the hydrogen value chain to drive forward the industry and ensure hydrogen plays a pivotal part in the energy transition.

For Programme & Speaker enquiries, please contact
TIAGO MARQUES +44 20 7978 0008

For Sponsorship enquiries, please contact
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