Prioritising Safety in Green Hydrogen

Training to Strengthen Safety Standards at Brazilian Port Hubs

The challenge

The development of a green hydrogen market and its derived technologies (PtX) is crucial for Brazil's development and climate goals. It directly engages the maritime and port sector, since the sustainable fuels like green Methanol and Ammonia should be used to reduce greenhouse gas (GHG) emissions from ships, port equipment and vehicles. Furthermore, the national value-added PtX products can be commercialised internationally through Brazilian ports.

The state of Ceará, where the Pecém Complex is located, has positioned itself as one of the most promising hydrogen hubs in the country, launching multiple policies and programmes for this purpose. The Port of Pecém is considered the 'house of hydrogen' in Brazil, hosting the country's first projects, and aiming to achieve over 10 GW of electrolysis capacity. With six pre-contracts signed, totalling approximately US$30 billion in investments by 2030, a significant increase both direct and indirect jobs is anticipated in the port terminals and surrounding companies.

Alongside the job creation comes the increasing demand for expertise in safe handling practices. Unfortunately, the Brazilian Technical and Vocational Education and Training (TVET) system does not provide the relevant qualifications necessary to meet this demand. A shortage of trained personnel could hinder the adoption of hydrogen, thereby slowing decarbonisation efforts. Addressing this knowledge gap within ports is crucial for Brazil's climate contribution and the success of its hydrogen initiatives and competitiveness.

The solution

A pioneering project aims to enhance the H2 readiness of Brazilian ports by building the capacity of port staff, with the Port of Pecém serving as the initial reference point. This initiative will qualify port personnel and companies involved in the green hydrogen (GH2) value chain to safely store and handle hydrogen and its derivatives, such as green ammonia, e-methanol and Liquid Organic Hydrogen Carriers (LOHC).

The team from TÜV Rheinland, SENAI Ceará and GIZ.

A technical training programme focused on occupational health and safety and green hydrogen (GH2) within Brazilian port areas will be developed based on national and international standards. The pilot will train operators from hydrogen companies and the port terminal and aims for future replication across Brazil and internationally.

How it will be done

This challenge will be addressed through a Public-Private Partnership between TÜV Rheinland Akademie, the National Service for Industrial Training - SENAI Ceará and GIZ, as part of the International Hydrogen Ramp-Up Programme (H2Uppp) of the Federal Ministry for Economic Affairs and Energy (BMWE) of Germany. The activities will be divided into four work packages (WP):

WP1: Preparation and Kick-Off: Includes the development of the training syllabus, modules, workload, bibliography, and strategy; stakeholder mapping; and timeline of activities.

WP2: Training Delivery & Certification: Comprises training the operational staff at the port complex and a "Training of Trainers" (ToT) programme with suggested

modules on protective measures for safe hydrogen handling, applications of occupational health, legal framework and challenges, and properties of hydrogen. Part of ToT embraces an international technical mission of SENAI trainers to Germany to learn about the distribution strategies and technical issues related to green ammonia, green methanol, and LOHC.

WP3: Evaluation & Future Roadmap and Replication: Involves a report on possible replication sites and a final report containing lessons learned, best practices, and achieved results.

WP4: Dissemination Activities: Includes the development of a flyer and teaser, dissemination events and meetings, and a press release through German and Brazilian communication channels.

TÜV Rheinland is primarily responsible for the overall project management, including communication with stakeholders, financial management, quality assurance, project reporting, overall monitoring, and evaluation. SENAI Ceará is tasked with the technical and logistical support in this consortium by developing and implementing training programmes customized for the purpose of this project, by providing international and national training experts, and delivering input based on international standards. GIZ is closely overseeing and accompanying the planning, execution, and delivering of the four work packages.

Expected impact

The project aims to enhance awareness and knowledge regarding the safe handling, storage, and certification of hydrogen and its derivatives in port environments. This initiative also seeks to support the socio-economic, technological, and environmental development of the region.

A key outcome is the strengthening of a qualified workforce to meet the demands of green hydrogen projects—initially focused on the Port of Pecém, with potential expansion to other Brazilian and international ports. At least 150 professionals will be trained, with a target of 30% female participation. To ensure long-term impact and scalability, the training materials developed under this public-private partnership (PPP) will be freely accessible and designed to meet high safety standards.

Additionally, the project also emphasises the training of trainers, enabling local capacity building and facilitating replication in other regions. The final phase will include an evaluation report identifying potential replication sites, as well as a comprehensive summary of lessons learned, best practices, and achieved results. Dissemination activities will support broader engagement through the development of promotional materials (e.g., flyer and teaser), targeted events and meetings, and press releases distributed via German and Brazilian media channels.

The project at a glance	
Duration	11.11.2024 to 31.05.2026
Country	Brazil
Objectives	Enhancing and securing safety standards for the Green Hydrogen Hub at the Pecém Industrial and Port Complex.
Partners	TÜV Rheinland Akademie GmbH Serviço Nacional de Aprendizagem Industrial – SENAI Ceará
Outputs	• Training of Trainers on protective measures, occupational safety in the context of hydrogen, legal framework and challenges, and properties of hydrogen. • Third-party tests followed by international security standards and certification for interested workers by TÜV Rheinland. • Report on possible replication sites • Roadmap • Bilingual (PT-EN) course handbook/guideline. • At least 150 professionals trained, of which 30% are preferably women. • Make the developed training material available free of charge.

The International Hydrogen Ramp-up Programme (H2Uppp) of the German Federal Ministry for Economic Affairs and Energy (BMWE) promotes projects and market development for green hydrogen in selected developing and emerging countries as part of the National Hydrogen Strategy.

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