OFFSHORE WIND POWER SYSTEMS OF TEXAS, INC

OWPST GREEN STEEL SOLUTIONS

For millennia, steel has been made using coal to remove oxygen from iron ore, emitting vast amounts of CO2 in the process. Traditional steelmaking is the most significant industrial contributor to carbon dioxide emissions, currently accounting for 7 percent of total CO2 emissions globally. In Italy, the ILVA Taranto steel plant, equipped with five blast furnaces, is the largest steelworks in Europe, accounting for approximately 40% of Italian steel production.[1] The dioxin emissions by the IVLA Steel Plant accounted for 90.3 per cent of the overall Italian emissions, and 8.8 per cent of the European emissions.

Various studies estimate that integrated steelmaking emits approximately 2,000 kilograms of carbon dioxide per ton of steel produced, roughly half the amount produced annually by the average passenger car. Operation of the blast furnaces that produce crude iron account for an estimated two-thirds of those emissions, on average. There are cleaner ways of making steel, such as using hydrogen instead of coal in the ore reduction process, and emitting water instead of CO2, which, if implemented on a large scale, could significantly reduce the industry's emissions and, if done correctly, could increase production capacity and decrease costs for both manufacturers and consumers.

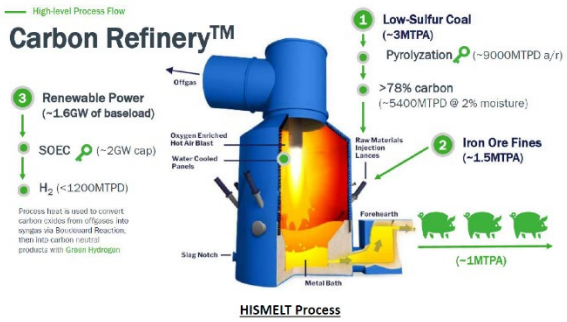
Worldwide, environmental policy regulators and governmental agencies have all brought attention to the issue of greenhouse gas (GHG) emissions from steel production and have begun to put in place new regulations and requirements for steel mills to meet new standards, as well as significant market changes to require all steel products produced to be produced as "green steel." The U.S. House-passed version of the America COMPETES Act of 2022 (H.R. 4521) seeks to establish a Department of Energy-led research and development program specific to low-emissions steel manufacturing. According to the Congressional Research Service, Federal and state regulations have required steelmakers to control various air emissions, water discharges, and waste generation, however, at present, no such federal standards exist for greenhouse gas emissions. The inevitability of future regulations represents a potential risk for steelmakers investing in long-lived production facilities that may be required to endure expensive retrofits when future regulations are enacted.

Because of this, reducing greenhouse gas emissions from steelmaking will require new technologies in an industry that traditionally has spent little on research and development domestically. Several new approaches to reducing iron ore to elemental iron are in developmental phases and implementing them is likely to require significant capital investments. OWPST can offer a fully funded alternative, making the conversion to Green Steel not only possible, but economically viable.

1-https://www.reuters.com/article/us-ilva-eu-idINBRE98P0H520130926

1210 Woodmoor, Grapevine, TX 76051 USA
682-367-0652
www.offshorewindpowersystemsoftexas.com

GHG emissions from steel making greatly depend on the technologies and operations involved. Most common methods of mining iron ore and turning it into steel emit large volumes of greenhouse gases.



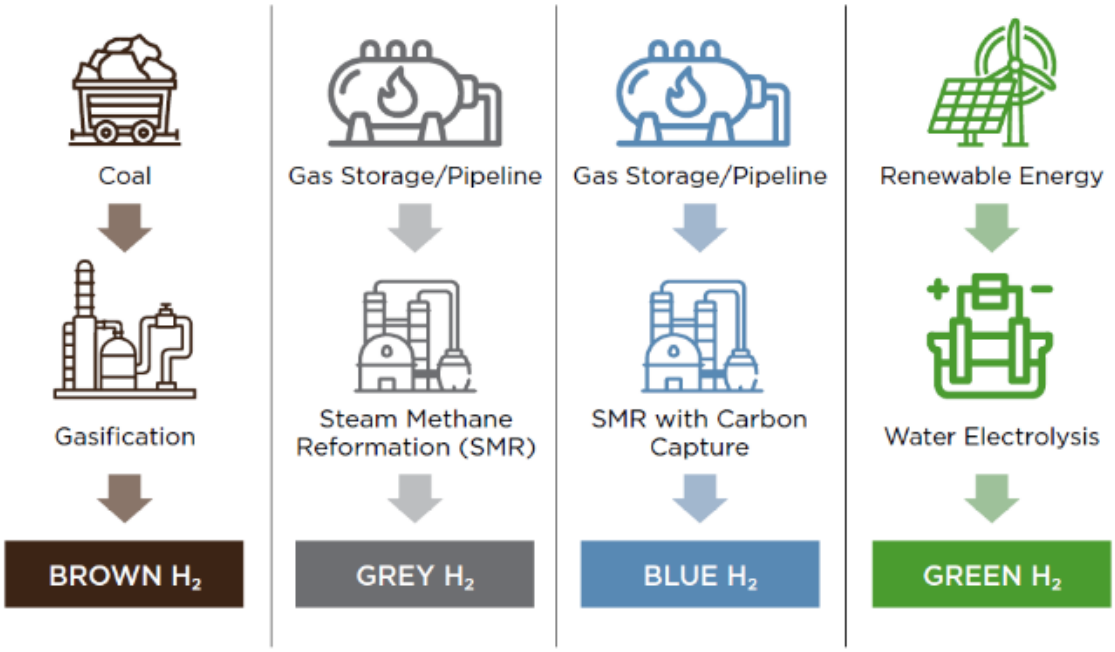
HISMELT Process

There are different methods of the melt process of producing steel – gas furnace, which basically is a large gas stove; the electric arc method (most predominate today); and the newly developed HIsmelt[2] process developed by the Swiss. In the pursuit of Green Steel, each of these production methods can benefit from OWPST's ability to generate large amounts of renewable energy, deionized water and hydrogen from a turnkey system solution.

Unfortunately, the limiting factors that are restricting industry from implementing clean, more efficient methods of production of steel are three-fold – renewable power, water and hydrogen. In order to make a significant impact on the GHG emissions from worldwide steel production, all three of those resources are needed in large volume capacity, supplied through renewable resources. Fortunately, OWPST is prepared to participate in this mandated transition by **offering a complete, turn-key system** for all three that can dramatically reduce or even eliminate steelmaking emissions.

WHAT IS GREEN STEEL?

It is the processes of making steel, not the steel itself that is the issue in making "Green Steel." Green Steel is the manufacturing of steel without the use of fossil fuels. While there is not yet a standardized definition of "Green Steel," it is widely accepted that in order to receive a certification, steel producers will need 100% renewable power supplied at the point of production, the factory floor, and more specifically the melt process, on a 24/7 basis.



2- Engineering 360 – Ironmaking 101 -from Ore to Iron with Smelting and Direct Iron Reduction

When considering the overall design of the production facility, there are some factors that must be addressed. For example, because Green Steel must be produced entirely with renewable energy, a project must include enough energy resources to power the entire process, including the hydrogen production, as well as all other processing, pumping and manufacturing. In the event that insufficient power is being supplied to the facility, the system needs to be able to compensate for the ebb and flow of power generation. OWPST has engineered a package of hydrogen storage and power generation to compensate for shortfalls in capacity to ensure that the system remains functioning when wind power production is not sufficient.

Reliable sources of renewable electricity for Green Steel production can be found both onshore and offshore, but offshore production may be preferred over onshore for a variety of reasons:

- Offshore offers much larger capacity power generation, with offshore turbines capacity being up to 10x that of onshore turbines. In addition, the wind resource is better and more consistent offshore.
- Unsuitable terrain onshore makes construction difficult, expensive, and/or impossible.
- Existing coastal cities or communities make onshore siting unfeasible.
- Local government zoning restrictions targeting industrial land usage, especially for large-scale coastal facilities
- Possible regional unrest posing a greater security risk to shore-based facilities
- Existing offshore infrastructure suitable for hydrogen production and transport may be cheaper to adapt than constructing new onshore infrastructure

Even though the offshore hydrogen industry doesn't have a long history, decades of offshore experience with both the oil and gas industry and the wind power industry provides many useful parallels to draw from. Some challenges associated with marinization are already well understood though, as the hydrocarbon and wind industries already addressed them when they began their own transitions from onshore to offshore applications:

- Large-scale hydrogen production facilities on land take up considerable space, and at the 100+MW scale they have a significant footprint. Finding the optimal size of a production facility to maximize limited space will be an important factor in initial planning and design of the facility, or when refitting an existing facility for hydrogen production.
- Environmental factors vary greatly depending on the region, and no two locations are the same. When designing the facility, typical and extreme wave and wind conditions at the site can drive decisions regarding the size, shape, and mooring arrangements when applicable.
- The proximity to renewable energy sources and any existing hydrogen infrastructure is also important to consider.

For example, a facility close to a windfarm may reduce any power transmission losses and cable length but could require longer pipelines for exporting the hydrogen to shore.

One major issues in the development of Green Steel facilities are the basic and initial requirements of "large capacity volumes of production of both power and hydrogen," and to accomplish this a project needs a design for large capacity output of both products. In order to produce the amount of Hydrogen necessary for a large scale Green Steel operation, approximately 600 metric tons per day of green hydrogen, which also must be produced utilizing renewable resources. This will require massive

amounts of deionized water and with the current drought and surface water issues across the globe, the only viable option is large scale, ocean-sourced, desalination.

The world is on the cusp of a new era of offshore hydrogen production of industrial volumes and the stage is set for producing green hydrogen from offshore wind and deionized seawater. Building on existing and proven technology, offshore wind farms have the potential to become future production hubs for green hydrogen production at scale to meet increasing demand.

The potential for offshore hydrogen production is significant - but realizing this potential is not without its challenges. While it took decades for wind and solar to achieve grid parity with fossil fuels, green hydrogen needs to be cost-competitive with 'grey' hydrogen within a decade. Because it is still in the early stages of commercial offshore hydrogen development, success will depend on several factors. Most importantly, how can it be scaled up and still make it safe and profitable? One of the largest hurdles remains cost. BloombergNEF estimates that a mid-range price for offshore wind-to-hydrogen will be around $7/kg in 2025, dropping to $1/kg by 2050.

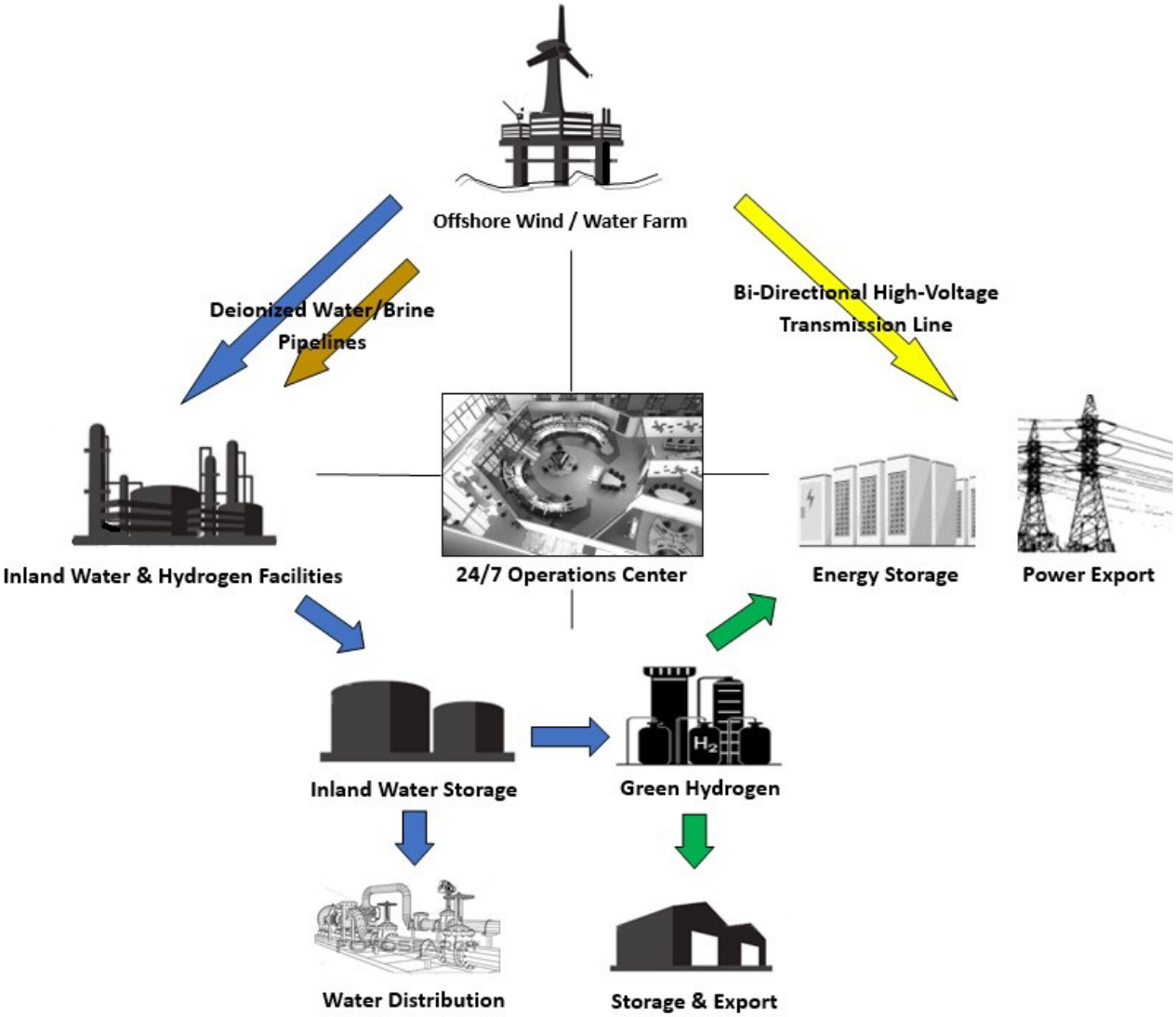
TITAN PLATFORM FOR HYDROGEN PRODUCTION

The OWPST TITAN Platform represents a generational breakthrough in cost-effective seawater desalination applications. As a stand-alone platform, it can produce up to 30 million gallons of potable water per day, fully powered by wind energy. Due to a 10MW+ wind turbine built into the hull, the TITAN nearly eliminates the high cost of power electricity needed to desalinate and deionize seawater for producing hydrogen. OWPST's business proposition consists of the following processes and revenue streams.

- **Electrical power** – the TITAN's commercial wind turbine system will produce consistent power to the exported steel plant electrical needs and processes, compensating for low wind days by banking power, known as "Net-Metering." This is accomplished by exporting any excess power to the grid for credit that can be used to buy back power at times when the required wind resource is not available offshore- thus maintaining certified renewable energy sources.
- **Deionized Water** – The TITAN's internally housed reverse osmosis water desalination plant will produce up to 30 million gallons of deionized water per day per platform. This quantity is scalable by adding additional offshore platforms to the overall system. The low cost of renewable energy that is used to run the reverse osmosis systems allows the company to produce water at a much lower cost than any conventional onshore desalination plant.
- **Hydrogen** – Hydrogen is not produced onboard the TITAN, but is produced onshore in a conventional hydrogen production facility, included as part of OWPST's proposal, that is fed desalinated and deionized water directly from the offshore TITAN. Having the feedstock for hydrogen production being produced with a negligible cost for power means that the production of hydrogen will cost less than hydrogen produced by conventional means.
- **Oxygen** - pure oxygen is a by-product of the process of making hydrogen and the sale of green oxygen to be utilized in the steel making process can be included in any purchase agreements.

- **Brine and minerals** – Most of the salts and minerals that have been extracted from seawater during the reverse osmosis process will be reclaimed and can be sold for industrial use. These minerals include Chloride, Sodium, Magnesium, Sulfur, Calcium, Potassium, Bromine, and other elements. These minerals are not dumped back into the ocean, thereby preserving the natural condition of the sea.

OWPST TURNKEY SYSTEM APPROACH



GREEN HYDROGEN PRODUCTION

OWPST is currently developing a system capable of producing 600 tons of green hydrogen per day, with anticipated increases of volume to 2400 tons in future expansions of the plant. The OWPST business proposition includes hydrogen production and onshore storage of deionized (DI) water that has been created offshore on the TITAN platform. The onshore storage facility and adjacent hydrogen production plant will be designed, constructed, operated, and maintained by OWPST for the life of the project. In addition to hydrogen production, OWPST brings a full range of support services for the entire project,

including environmental impact studies and permitting, marine and coastal engineering, water pump station and treatment experience, and design of pipelines and storage tanks.

The TITAN represents the lowest cost solution on the market. OWPST is capable of funding the entire project on the condition of a 20- year purchase agreement for delivered product.
The key advantages presented by OWPST are as follows:

- Funding that includes all-risk insurance for the project. Funding is initiated by a customer's purchase agreement, and insurance covers both the customer and OWPST's financial exposure.
- The use of renewable wind energy to power the deionization processes will significantly reduce the costs compared to conventional inland desalination plants.
- Locating the deionization plant several kilometers offshore assures virtually sediment-free water, dramatically increasing process efficiency and nearly eliminating the amount of energy required for the initial filtration stage of production. TITAN provides the most energy-efficient water deionization process in the world.
- The TITAN project benefits greatly from recovered salts and minerals for further processing to sell into the minerals markets for agricultural use, pharmaceuticals, and other industrial uses. These salts and minerals are not dumped back into the ocean. Harvesting these salts and minerals helps to keep the water intake clean and natural.
- Scalability is assured by the ability to add TITAN platforms as required. Each platform will provide up to 30 million gallons of deionized water per day. There is no practical limit to the number of platforms that can be installed for a project.
- The favorable economic impact for local communities cannot be stressed highly enough. One project represents hundreds of local jobs during construction, and nearly 100 local jobs perpetually thereafter.

For further information, contact Offshore Wind Power Systems of Texas:

Mr. Douglas Hines
President
(682) 367-0652
dhines@offshorewindpowersystemsoftexas.com