Chile: The hidden champion for green Hydrogen[1]

Vicente PINTO
Investment Commissioner for ASIA, Director of Tokyo Office
InvestChile

Vicente Pinto is the Investment Commissioner for Asia at InvestChile where he acts as Director of the Tokyo Office at the Embassy of Chile to Japan. He previously served as Counsellor for Agriculture & Fishery Affairs, for the Embassy of Chile to Japan, where he helped ensure market access procedures related to the food industry. He received his degree as an Agronomy Engineer (Universidad De Chile) and an MBA (Universidad Austral De Chile). His expertise is in executive direction for foreign trade & investment companies, international and local, public and private organizations.

Of all the energy sources currently used in Chile, diesel oil, coal, and natural gas are still the most important. Much, if not all of them are imported. Its import comes associated with high GHG emission footprints, which constitutes reason enough to seek the greatest achievable substitution of these fuels and thereby advance towards the committed reduction in carbon neutrality. Japan is in a quite similar condition.

This dependence on fossil energy fuels is contrasted in Chile with our own recognized rich renewable energy sources and these energies are fastly complementing our needs. Solar farms and wind energy facilities, along with new transmission lines have been reducing the electric distance of many production facilities and this rapid deployment has led to have literally hundreds of fully approved projects for new PV or wind farms ready to be constructed, accounting for more that 20 times our actual generation capacity.

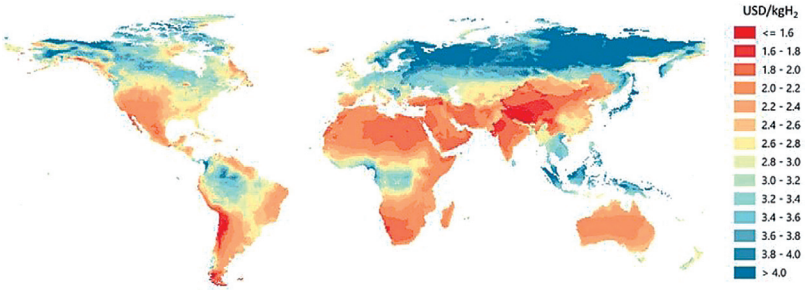
This large amount of renewable green energy can be used to produce green hydrogen (green-H_2) at the lowest cost, difficult to match in other parts of the world (see figure 1). This new source has been recognized in Japan and other countries as an essential vector for the transition towards the new energy economy.

Among many factors, green-H_2 basically favors: a) the achievement of the SDGs, specially those related to reducing CO_2 emissions to a zero net balance (decarbonization) in the near future; b) a greater independence from imported fossil products and c) creates a new export industry in our country.

Chile is committed to adapt to the impacts of climate change, reduce national emissions and reach total decarbonization by 2050. The achievement of these long-term goals (NDCs)[2] also embodies efforts with friend investor countries like Japan, Germany, USA and other, which are today leading the new Hydrogen Society. Chile is exploring to set joint goals based on partnerships on this regard.

The use of green-H_2 is very versatile, so it is important that it be considered as a source of improvement in the living conditions of its inhabitants. Given the above, the potential activities that integrate green-H_2 are extended to a range of systems: agriculture, aquaculture, local industry, public and private services,

Figure 1: Hydrogen costs from hybrid solar PV and onshore wind systems in the long term



Source: IEA (June 2019), The future of Hydrogen, Report prepared by the IEA for the G20, Japan; Figure 14 / page 49)

commerce and in the domestic sphere. It is estimated that the sooner a stable supply is reached, storage and distribution systems in these different uses will trigger competitive applications sooner than expected.

It is important to connect with the fact that green-H_2 has the capacity to act as an efficient means of storing, in the short or long term, surplus and intermittent solar and wind energy, accumulating it when demand is low and using it as required. Many times, it will be in combination with other fuels or it will definitely be able to replace them. This means incorporating it into many processes that are not necessarily going to be electrified and, consequently, it runs across various industries and different uses: co-generation in thermoelectric plants, combined use in heavy transport vehicles, in industries and establishments with an intensive thermal component and finally where the use of hydrogen is essential to the process. All of these activities generate high CO_2 emissions and many of them significant contamination by particulate matter (black carbon). The challenge is to seed active programs as countermeasure to avoid the effects of these emissions.

Green-H_2 is mainly stored and transported as compressed gas in tanks of various capacities and under pressure (700 bar). It can also be stored adsorbed to metal alloys (metalhydrides), as well as various other chemicals, where hydrogen can be used on demand, at low pressures and at room temperature. Liquid storage and transportation can only be done at very low temperatures (-252.8°C) and high pressure (1,013 bar), technology whose state of art is only used in the aerospace industry however it is under development for transporting high volumes in specialized ships.

Hydrogen energy storage systems (HES) also allow it to be used as a fast-response distributed energy resource for grid regulation and balancing, or even as a particularly relevant backup in times of loss capacity as a result of emergencies or catastrophes such as earthquakes or tsunamis. These systems can address needs that last longer than a battery (days or even weeks), simply by adding more storage tanks, thus effectively separating power from generation and usage. These HES also allow integration with gas networks through direct injection into them, which allows the use of existing infrastructure.

If the possibility of using green-H_2 directly in fuel cells is considered, it is a source to generate electricity and heat for different uses, requirements and at different scales. But green-H_2 can also be incorporated as an input for other industrial products such as ammonia or methanol, the use and applications of which are widely disseminated in different industries in Chile, the world and especially in Japan.

In these uses, a special mention must be done with Ammonia use in Japan. It is a widely recognized hydrogen carrier and its direct use in Japan can be favored on Chilean supply. Green Ammonia can become the most relevant technology to be considered for deploying green-H_2 production in Chile. Japanese thermal generators and other industries can benefit from this new source of ammonia, co-firing it directly can significantly reduce their CO_2 emissions and moreover limit their NOx emissions to levels approved by the Japanese standards.

This is a key moment to strongly start developing the green-H_2 economy in Chile together with Japan. Chilean government, together with the private sector are working to adapt the current legal framework and at the same time developing new ones, and will need to make bold decisions if it green-H_2 is to become the great clean energy carrier of the future. The integration of hydrogen in the Energy System for sectors as diverse as transport, heating, electricity, mobility and industry requires that future projects have the collaboration of energy providers, research institutions and technology manufacturers from both countries. InvestChile Japan is working to make it happen.

Note 1: IRENA (2019), Hydrogen: A renewable energy perspective, International Renewable Energy Agency, Abu Dhabi (Hydrogen: A Renewable Energy Perspective)

Note 2: National Determined Contributions

Meeting Request with InvestChile, Please Contact

JOI
E-mail: bd@joi.or.jp、TEL: 03-5210-3311

Vicente Pinto
Investment Commissioner Japan-Asia, InvestChile
E-mail: vpinto@investchile.gob.cl
URL: https://investchile.gob.cl/japan/