



elyntegration

Grid Integrated Multi Megawatt High Pressure Alkaline Electrolysers
for Energy Applications

Document for media and press





This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement No 671458. This Joint Undertaking receives support from the European Union's Horizon 2020 research and innovation programme and Spain, Belgium, Germany, Switzerland.

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1 OBJECTIVE

The objective of this document is to compile information about ELYNTEGRATION project, rules for communication and general information that shall be useful for media and press to cover the developments and milestones of the project.

The document is divided in several sections providing answers and information about the most critical concepts related to the project.

This document shall be updated, translated and included in the official press kit of ELYNTEGRATION. The last version of the document will be uploaded to the project website.

2 GENERAL RULES

ELYNTEGRATION dissemination activities, under Grant Agreement 671458, have to follow some general rules which are detailed below. The partners must promote the project and its results, but always under the obligations agreed with the programme office.

Any communication activity related to the project, including electronic form must

- a) display the JU logo,
- b) display the EU emblem (included in the press kit and below) and
- c) include the following text:

"This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement No 671458. This Joint Undertaking receives support from the European Union's Horizon H2020 research and innovation programme and Spain, Belgium, Germany, Switzerland"



About the use of European Emblem:

http://ec.europa.eu/dgs/communication/services/visual_identity/pdf/use-emblem_en.pdf



3 PROJECT'S DESCRIPTION AND GOALS

The strategic goal of ELYNTEGRATION is the design and engineering of a robust, flexible and cost competitive Multi Megawatt alkaline water electrolyser, based on IHT technology, capable of producing - with a single stack - up to 4.5 ton H₂/day for energy applications.

ELYNTEGRATION will deal with cell design and improvements at stack level, including new materials for electrodes and innovative membranes, with the capability of working at high performance in a broad range of the electrolyser load. VITO and IFAM are in charge of the materials development, while IHT will lead the design of the cell topology and assembly of the final stack solutions, giving also support to the technical decisions.

The definition and design of an optimized balance of plant (BoP) for the dynamic operation of the electrolyser is led by FHA, including the analysis of the BoP components and streams which could derive in lower costs of the system, with the participation of industrial and technological partners (INYCOM and IHT)

An advanced communication and control system is being developed, according to the requirements of end-users in order to enhance the flexibility of the electrolyser providing grid services. INYCOM is the technology provider in charge of the developments, working together with IAEW for the definition of the services and requirements.

Technical developments are tested step by step and continuously during the project: from ex-situ characterization at laboratory level to in-situ testing at different scales (micro pilot to industrial size). The most promising results obtained in the project will be included in a final demonstration electrolyser working in an operational environment. Once validated and demonstrated at prototype level, the advanced constructive features will be integrated in the design of a multi-MW single stack alkaline electrolyser.

A feasibility study and market potential assessment will be conducted to determine the best possible markets, sectors and countries for the final product obtained after the ELYNTEGRATION project. The market study will focus on the national policies towards renewable energy and energy storage, with special attention to electricity prices in the power market and the provision of grid services to minimize the price of the hydrogen production. The business climate and risk perception of investors will be analysed as well.

An exploitation strategy will be developed, including a detailed business plan for the ELYNTEGRATION final product, which will be presented to the hydrogen community of the EU and different stakeholders like TSOs, DSOs, utilities, grid operators, in workshops and events during the project.

ELYNTEGRATION started in September 2015 and its duration is three years.



4 PROJECT PARTNERS: THE CONSORTIUM

ELYNTEGRATION project is carried out by a multi-disciplinary consortium, well-balanced and with complementary expertise, which aim at achieving the project objectives. The Consortium is coordinated by FHA and includes an alkaline electrolyser manufacturer, research organizations to develop the new designs and components (FHA, VITO, IFAM, IAEW) and an engineering and technology provider (INYCOM)

Fundación para el desarrollo de nuevas tecnologías del hidrógeno en Aragón, FHA (www.hidrogenoaragon.org)

The Foundation for the Development of New Hydrogen Technologies in Aragon is a private non – profit organization promoted by the Regional Government, other public bodies and private companies. Currently the Board of the Foundation is formed by sixty-six stakeholders belonging to all the economy sectors: automotive, chemistry, power generation, financial, educational, engineering, research and development centres and real estate. Its team of young professionals performs R&D as well as consultancy projects, in cooperation or assisting local and national companies.

Over the last nine years, FHA has been supporting the regional strategy for the uptake of H2 and FC technologies, publishing the Hydrogen Master Plan in Aragón (2007-2010 and 2011-2015), and showcasing the whole hydrogen chain (production, management and efficient use), obtaining the primary energy from renewable sources by means of processes currently available (photovoltaic and wind). The facility includes hydrogen production means (PEM as well as alkaline electrolyzers), storage, dispensing and final use in fuel cells, including vehicles (BEV and FCEV).

More than 1.000 people visit yearly the FHA premises, mainly from schools and universities, hence contributing to the wider awareness and dissemination to the society.

Industrie Haute Technologie, IHT (www.iht.ch)

IHT Industrie Haute Technologie SA (IHT) is a Swiss company, active in the engineering, manufacturing and maintenance of very large scale high pressure alkaline water electrolyzers (HP AWE). IHT owns and has further developed the process/know-how of the companies (Lonza, Lurgi, GTec) which originally conceived and then commercialized (during almost fifty years) large scale AWE. AWE systems based on core IHT technology have been sold and deployed worldwide and represent, still today, the-state-of-the-art in terms of performance and reliability for this technology segment.

Over the last years, IHT has concentrated most of its activities on the overhaul and the maintenance of large scale alkaline electrolyzers (up to 3.5 MW) and more specifically on the manufacture, supply, installation and commissioning of new stacks (up to 760 Nm³ H₂/h at 30 bar) and modular blocks (comprising several cells each of them having a capacity of almost 200 Nm³ H₂ /hour) in close collaboration with its customers i.e. chemical industry players, owners and operators of multi MW (up to 100 MW) AWE plants essentially used for base load production of H₂ directed to a variety of chemical uses (e.g. ammonia and fertilizers).



IHT has pursued a development strategy mainly focused on the up-grade of its HP AWE core technology in order to comply with the evolving needs of the chemical industry and preserve its leading technical position. Special attention has been drawn for instance to the replacement of specific materials and stack components in compliance with the most recent normative/regulatory frameworks.

More recently however, part of the IHT development programs have also been directed to design of most advanced prototypes directed to alternative applications such as e.g. large scale energy storage, centralized H₂ production for mobility, on and off-grid management services, power to gas, etc. These programs, not excluding, if necessary, a more radical reengineering of the core AWE technology are intended to pave the way to the next generation IHT products line specifically designed for the needs of the energy market

IHT is fully committed to maintain and strengthen its longstanding leading position in the evolving electrolysis market, continuing to provide cutting-edge solutions and contributing to push forward the benchmark standards of AWE technology.

Vlaamse Instelling voor Technologisch Onderzoek, VITO (www.vito.be)

VITO (Flemish Institute for Technological Research) is a leading independent, customer-oriented European research and consulting centre implementing client-driven research projects. We address the sustainability challenge by developing innovative products and processes that meet current and future human, environmental and industrial needs. Membrane technologies are arousing great interest as potentially cost-effective answers to a growing range of purification and separation needs. VITO has more than 30 years of experience and an extensive international track record in this domain. The combination of market relevance and high level expertise has made membrane technology one of our core competences.

Some 15 years ago VITO developed the ZIRFON® composite separator, which showed very high potential for solving the drawbacks of other alternatives to asbestos. Nevertheless, for certain applications, the first generation of ZIRFON® separator suffered from limited mechanical strength, and only limited industrial use due to its batch-wise fabrication at lab scale.

Mid 2006 collaboration was set up with AGFA as a technological and commercial partner. Several reinforced ZIRFON® separator versions were developed in the frame of this collaboration. In 2010 the product was licensed to AGFA. At present day, ZIRFON® PERL separator version is produced at industrial scale and commercialized by AGFA.

In the past 3 years VITO has developed new versions of Zirfon®, tailored for specific cell design and/or operating conditions, in the frame of the ElyGRID and RESelyser projects within the previous FCH JU programme. A vertical double-side coating set-up was constructed and implemented for the aforementioned research, and will be used for the production of the new separator membranes at lab-scale in the frame of the present project.

VITO has access to extensive up to date infrastructure for the characterisation of porous materials. The available characterization equipment includes pore characterization tools (from



mesopore to macropore size) as capillary flow porometry, N₂-adsorption/desorption, Hg-porosimetry, as well as FESEM/EDS, thermal analysis (TGA/DSC), XRD, FTIR, mechanical testing.

Fraunhofer-Institut für Fertigungstechnik und Angewandte Materialforschung, IFAM (www.ifam-fraunhofer.de/en.html)

Fraunhofer IFAM – as part of the Fraunhofer Gesellschaft e.V. – is an application-oriented non-profit research institute and cooperates closely with industrial and academic partners.

Fraunhofer IFAM Dresden is involved in fundamental and applied research to develop new sintered and composite materials, as well as cellular metallic materials manufactured with innovative technologies derived from powder metallurgy. The scope of our services includes the industrial implementation of the results we obtain, up to the manufacturing of prototype components. Substantial experience with technology and material structures makes it possible for us to design cellular metallic and composite materials in which combinations of properties are tailored to individual applications.

The design of materials and components is facilitated by special technologies, such as Electron Beam Melting, melt spinning, melt extraction, Spark Plasma Sintering, microwave sintering, 3D Metal Printing and moulding techniques. The development is focussed on lightweight materials, materials for tribological applications and thermal management, high temperature materials and hydrogen storage alloys to be used in transportation industry, electronics, energy technology, and mechanical engineering.

Instrumentación y Componentes, INYCOM (www.inycom.es)

Inycom is a Spanish technology company headquartered in Zaragoza. Founded in 1982, Inycom has more than 30 years of experience providing high quality services and solutions with added value in IT and Communications, energy and laboratory, electronics and medical equipment.

It has a staff of more than 350 professionals and 9 offices in Spain, 2 of them in Technology Parks, and 1 in Enschede, in the Netherlands. Inycom R&D Department has a wide experience delivering products for telecommunication companies and electric utilities based on software development and electronic design, focused on scientific and technical applications. They provide a strong expertise especially in renewable energies research.

In the Energy Sector, Inycom is an ESCO, offering services and products in the fields of measurement and data acquisition, energy efficiency, intelligent SCADAs, demand and generation forecasts and electricity markets assessment.

Inycom has been dedicated for more than ten years to R&D in energy, more specifically in renewables. After developing several commercial measurement equipment and software applications to automate validation of international standards, in the last 5 years Inycom has participated in the implementation of different microgrids, especially in large industries and



Technology Parks, integrating renewable energy sources and energy storage to improve the quality in power supply, energy efficiency and energy trading profitability.

Institut und Lehrstuhl für Elektrische Anlagen und Energiewirtschaft IAEW RWTH AACHEN (www.iaew.rwth-aachen.de)

The Institute of Power Systems and Power Economics (IAEW) is part of the Faculty of Electrical Engineering and Information Technology of RWTH Aachen University, established in 1870. IAEW's staff consists of about 40 fulltime members, 30 of these being scientific staff and as such researchers in the research groups Power Generation and energy markets, Network Planning and Network Operation, and System stability and security of supply.

The core areas of research and teaching at IAEW are the mathematical simulation, optimization, and evaluation of the expansion and the behaviour of power systems with respect to technical and economic aspects. In particular, the systems for power generation, power transmission and power distribution are considered, but natural gas systems also play an important role. Tools and models developed at IAEW in completed and ongoing dissertations of its staff members and within different projects have been applied in numerous research projects and in cooperation with partners in the industry, the energy sector, and in governmental institutions. More than 70 of these partners are members of the "Forschungsgesellschaft Energie e.V. an der RWTH Aachen" (FGE) affiliated to IAEW



5 THE FCH 2 JU AND H2020 PROGRAMME

The Fuel Cells and Hydrogen Joint Undertaking (FCH JU) is a unique public private partnership supporting research, technological development and demonstration (RTD) activities in fuel cell and hydrogen energy technologies in Europe. Its aim is to accelerate the market introduction of these technologies, realising their potential as an instrument in achieving a carbon-lean energy system.

Fuel cells, as an efficient conversion technology, and hydrogen, as a clean energy carrier, have a great potential to help fight carbon dioxide emissions, to reduce dependence on hydrocarbons and to contribute to economic growth. The objective of the FCH JU is to bring these benefits to Europeans through a concentrated effort from all sectors.

The three members of the FCH JU are the European Commission, fuel cell and hydrogen industries represented by Hydrogen Europe and the research community represented by the Research Grouping N.ERGHY.

Description from [<http://www.fch.europa.eu/page/who-we-are>]

More information about the FCH 2 JU and its activities can be found at <http://www.fch.europa.eu/>

Horizon 2020 is the financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness.

Horizon 2020 is the biggest EU Research and Innovation programme ever with nearly €80 billion of funding available over 7 years (2014 to 2020) – in addition to the private investment that this money will attract. It promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market.

More information can be found at <https://ec.europa.eu/programmes/horizon2020/en>



6 GENERAL CONCEPTS

6.1 Hydrogen: application, uses

Hydrogen is a widely used molecule. Hydrogen, at atmospheric temperatures and pressures, is a gas. As element, it is abundant on Earth but as part of compounds, such as water, alcohols or hydrocarbons.

Nowadays, hydrogen is used in chemical and petrochemical industries, and it also has several applications in electronics industries.

Hydrogen has been used mainly as reactant, as it is a good reduction agent and other properties as low viscosity and density, which it is of key importance for example in metal treatment.

Hydrogen is also crucial to other processes such as fertilizers production (to produce ammonia), refineries (for converting heavier crude fractions into other fuels by hydrocracking), petrochemical industries as the polymer and plastics production (hydrogen is used in the basis of these industries to produce methanol)

6.2 Hydrogen production

The most used large scale production method is steam reforming of light hydrocarbons, usually, steam reforming of natural gas (methane). Steam methane reforming is the process where a stream of steam reacts with the hydrocarbons producing syngas (a mixture of CO and H₂). This gas receives the name of syngas because it is a mixture widely used as basic in the synthetic chemical production of other compounds. In a second stage, the carbon monoxide (CO) is converted into CO₂ with the action of a catalyst (Nickel, Platinum) and high temperature.

Another process to produce hydrogen is the partial oxidation (with or without catalyst), by means of using oxygen to partially oxidise the hydrocarbons, producing carbon monoxide and hydrogen. Other method to produce hydrogen includes gasification, based on the partial oxidation also, where the raw material can be coal or biomass instead of methane or biogas.

All these methods are based on the reaction of hydrocarbons, while the production of hydrogen by water electrolysis requires water and electricity, so there is no production of carbon monoxide or carbon dioxide directly linked to the process.

Other methods to produce hydrogen could be the thermochemical cycles (I-S cycle) the photo catalysis (water plus sunlight) or biological process (by algae or other microorganisms)

6.3 What is electrolysis?

Electrolysis is an electrochemical process by which the pass of a direct electrical current (DC) causes a chemical change in which this substance loses and/or gains electrons. The losing of electrons is called oxidation while the gaining is the reduction.

An electrolytic cell is the device having two electrodes (where the change of electrons take place) separated by an electrolyte (the solution which conducts the electrons between the electrodes). The electric direct current enters through the negative electrode (cathode),



causing the gain of electrons of positive ions, while the negative ions move through the electrolyte to the positive electrode (anode) losing electrons, being oxidised thus at this electrode (anode).

Therefore, the electrolysis requires species being oxidised and reduced, an electrolyte between the electrodes and the use of an electrical direct current.

6.4 Alkaline electrolysis: the technology

The principle of alkaline water electrolysis is that water is reduced to hydrogen gas and two hydroxyl ions at the cathode. The hydrogen escapes from the surface of the cathode and the hydroxyl ions migrate under the influence of the electrical field from the cathode through the porous diaphragm to the anode, where they are oxidized to oxygen. The electrolyte used in alkaline electrolysis is potassium or sodium hydroxide.

Alkaline electrolyzers range between a few kilowatts to several megawatts. For example, an external system that could be used to provide the power (current to the electrolyser) could be directly the electrical grid or wind farms, which are in the range of several megawatts (typically 20-50 MW).

Nowadays, there are only a few electrolyser manufacturers, one of them being IHT (Switzerland), with the know-how and the capability of manufacturing such high capacity electrolysis units.

IHT state of art electrolysis units operate at high pressure (30 bar), the highest ever achieved for bipolar technology. Working at pressure shows many advantages, such as savings in the compression unit downstream of the electrolyser and faster reactive capacity of the stack and enabling longer standby times (required for intermittent, variable operation and low capacity factor).

6.5 The potential of H₂, grid services, energy applications and storage

Renewable energies are set to drive the decarbonisation of the power system as it is required by the European initiatives, together with the saving of electricity and decarbonisation of fuels. Wind power and solar photovoltaic are mature technologies but the high penetration in the energy mix of the countries will make more difficult to match the difference between supply and demand, therefore the need of a more flexible system arises.

The mismatch between demand and generation can be partially minimised through the optimisation of forecasting (knowing how the generation of electricity is going to be, and how the demand will be). Flexibility can be obtained making the demand side of the grid participate in the process, improving the connections between markets or having better capabilities storing the energy to be later dispatched.

Hydrogen can play a key role in the solutions proposed for the energy future system, as it is an energy carrier. Electricity can be converted into hydrogen by means of water electrolysis, obtaining a gas that can be stored, injected in the existent natural gas grid, or converted to other products.

Therefore, hydrogen could allow the integration or connection between electricity grids and other grids and markets, like gas grid. Or as it can be used in multiple industrial



applications (refineries, metallurgy,...) the potential of storing electricity and converting it into an added value product is countless. Furthermore, the deployment of water electrolysis could link the needs of the electricity grid in the future with the needs of decarbonisation in industry and transport, by means of using hydrogen in the process or in fuel cell electric vehicles.



7 ANNEX. REGLAS GENERALES (ESPAÑOL)

Las publicaciones o difusión del proyecto deben incluir

- 1) El logo de la FCH JU
- 2) El emblema de EU
- 3) El siguiente texto:

Este proyecto recibe financiación de la Fuel Cells and Hydrogen 2 Joint Undertaking bajo el acuerdo Nº 671458. Esta Iniciativa Conjunta recibe el apoyo de la Unión Europea a través del programa de investigación e innovación Horizonte 2020, así como de España, Bélgica, Alemania y Suiza

8 ANNEX. INFORMACIÓN SOBRE EL PROYECTO (ESPAÑOL)

El objetivo estratégico del proyecto ELYNTEGRATION es el diseño e ingeniería ingeniería de un electrolizador alcalino multi MW robusto, flexible y competitivo en coste, basado en la tecnología de IHT, capaz de producir con un sólo stack hasta 4.5 ton H₂/día.

Se están realizando mejoras a nivel de diseño de celda y stack incluyendo nuevos materiales para electrodos y membranas, persiguiendo mejorar la capacidad de trabajar con elevado rendimiento en un mayor rango de cargas del electrolizador. VITO e IFAM están a cargo del desarrollo de materiales, mientras que IHT lidera el diseño de la topología de celda y montaje de las soluciones para el stack, apoyando en la toma de decisiones técnicas.

La definición y el diseño de un balance de planta optimizado para la operación dinámica del electrolizador la lidera FHA, incluyendo el análisis de los componentes del balance de planta que podrían derivar en menores costes del sistema y de operación, participando en el proceso los socios tecnológicos e industriales del consorcio (INYCOM e IHT)

Las mejoras incluyen el desarrollo de un sistema avanzado de control y comunicaciones, alineado con los requisitos de los usuarios finales y proporcionando servicios de red, que permita mejorar la flexibilidad del electrolizador. INYCOM lidera estos desarrollos, trabajando en conjunto con IAEW para la definición de los requisitos.

Los desarrollos se ensayan de manera continuada durante el proyecto, desde la caracterización ex-situ a escala laboratorio hasta la in-situ a diferentes escalas (de micro piloto a tamaño real). Los resultados más prometedores se incluirán en una fase final del proyecto demostrativa, a escala industrial trabajando en un entorno operacional. Una vez validados y demostrados, las características se integrarán en el diseño de un electrolizador multi MW de un solo stack.

El análisis de los mercados y los estudios de viabilidad se realiza en el proyecto para determinar los modelos de negocio más atractivos para los sectores y países analizados, para el producto final diseñado den ELYNTEGRATION. El estudio de mercado se centra en las políticas nacionales relacionadas con energías renovables y almacenamiento energético, con especial atención a los precios de la electricidad en los mercados eléctricos y a la provisión de diferentes servicios de red con el objetivo de minimizar el precio de la producción de hidrógeno. Se analizarán también en relación a los casos de negocio, el clima empresarial y la



percepción del riesgo. Una vez avanzado el proyecto, se desarrollará una estrategia de explotación de los resultados y productos, incluyendo un plan de negocio para el producto final diseñado en ELYNTEGRATION, que se presentará a los diferentes agentes implicados en la comunidad del hidrógeno en Europa, así como a operadores de sistemas de distribución y transmisión eléctrica, gestores del sistema, operadores de red, en diferentes seminarios que se realizarán durante el proyecto.

El proyecto ELYNTEGRATION comenzó en septiembre de 2015 y tiene una duración de 3 años.

9 ANNEX. CONCEPTOS GENERALES (ESPAÑOL)

Aplicaciones y usos del hidrógeno:

El hidrógeno se utiliza constantemente en la actualidad. El hidrógeno, en condiciones de presión y temperatura atmosférica, es un gas. Como elemento es abundante en la tierra, pero formando parte de compuestos como agua, alcoholes o hidrocarburos.

Actualmente, el hidrógeno se utiliza mayoritariamente en la industria química y petroquímica, así como en metalurgia e industria electrónica.

El hidrógeno se utiliza como reactivo principalmente, por sus características reductoras, baja densidad y viscosidad que lo hacen de vital importancia en por ejemplo tratamiento de metales.

El hidrógeno es también muy importante en otros procesos como la producción de fertilizantes (producción de amoníaco), en las refinerías (para convertir fracciones pesadas en otros combustibles mediante el hidrocracking), industria de polímeros y producción de plásticos (como la base para producir metanol)

Producción de hidrógeno:

El método de producción a gran escala más utilizado es el reformado con vapor de hidrocarburos ligeros (como el metano, gas natural). El reformado con vapor se basa en la reacción de los hidrocarburos con vapor de agua para producir monóxido de carbono e hidrógeno. Este gas, conocido como syngas o gas de síntesis, tiene una amplia aplicación en la base de la industria de proceso. En una segunda etapa el monóxido de carbono (CO) se convierte a CO₂ e hidrógeno mediante el vapor de agua y catalizadores como Níquel o Platino.

Otro proceso para producir hidrógeno es la oxidación parcial (con o sin catalizadores) en la que, mediante el uso de oxígeno, se oxida parcialmente el hidrocarburo, produciendo hidrógeno y monóxido de carbono. Otro método es la gasificación, basado también en el anterior, pero en este caso las materias de partida pueden ser carbón o biomasa.

Todos estos métodos están basados en la reacción de los hidrocarburos (compuestos con hidrógeno y carbono), mientras que la producción de hidrógeno mediante electrólisis de agua requiere agua y electricidad, por lo que no hay generación directamente asociada de CO o CO₂.



Otros métodos a considerar son los ciclos termoquímicos (S-I), la fotocatálisis (agua y luz solar) o los procesos biológicos (algas u otros microorganismos)

Qué es la electrólisis:

La electrólisis es un proceso electroquímico, en el que la aplicación de corriente continua produce un cambio químico en una sustancia, la cual pierde o gana electrones. La pérdida de electrones se conoce como oxidación, y la ganancia reducción.

Una celda electroquímica es el dispositivo con dos electrodos (donde se produce el cambio de oxidación de las especies) separados por un electrolito (que conduce los electrones entre electrodos). La corriente continua entra por el electrodo negativo (cátodo) provocando que los iones positivos ganen electrones, mientras que los iones negativos se mueven por el electrolito hacia el electrodo positivo (ánodo), perdiendo electrones y oxidándose.

Por tanto, la electrólisis requiere de especies que se oxiden/reduzcan, electrolito entre los electrodos y el uso de corriente eléctrica continua.

Electrólisis alcalina:

El principio de esta tecnología se basa en que el agua se reduce a hidrógeno gas (H_2) y dos iones hidroxilo (OH^-) en el cátodo. El gas hidrógeno se desprende del electrodo y los iones migran hacia el ánodo donde reaccionan formando oxígeno (O_2). El electrolito utilizado puede ser hidróxido de potasio o de sodio.

Los electrolizadores alcalinos van desde unos pocos kilovatios de potencia hasta varios megavatios. Por tener una referencia, el sistema que debe proporcionar la energía o electricidad podría ser la propia red eléctrica o un parque eólico (que suelen estar entre 20-50MW)

Actualmente hay pocos fabricantes de electrolizadores de agua, uno de ellos IHT (Suiza) con la capacidad de fabricar unidades de electrólisis de dicha potencia.

El sistema normal que comercializa IHT opera a alta presión (30 bar), que puede tener grandes ventajas, como el ahorro posterior en compresión para almacenamiento del gas.

El potencial del hidrógeno: servicios de red, almacenamiento de energía

Las energías renovables están destinadas a jugar un papel clave en la descarbonización del sistema eléctrico tal y como lo requieren las iniciativas de la comisión europea, junto con el ahorro energético y la descarbonización del transporte.

Tanto energía eólica como solar constituyen fuentes renovables con tecnologías maduras e implantadas, pero la alta penetración de renovables en el sistema eléctrico podría conllevar cierta dificultad para hacer coincidir generación y consumo de energía. Esta diferencia o desacople puede minimizarse mediante la optimización de la predicción (tanto de generación como de consumo). Cierta flexibilidad del sistema eléctrico puede obtenerse también haciendo partícipes a los consumidores de energía, mejorando las interconexiones entre redes y mercados o teniendo mejor capacidad de almacenamiento para su posterior utilización.

El hidrógeno puede jugar un importante rol en las soluciones propuestas en el futuro sistema energético, ya que es un vector energético. La electricidad puede convertirse en gas,



mediante la electrólisis del agua, por lo que se cuenta con un producto que puede almacenarse, inyectarse en las redes de gas existentes o convertirse en otros productos de mayor valor añadido.

Por tanto, el hidrógeno puede permitir la conexión entre diferentes redes (eléctrica-gas), conectando también mercados, así como siendo usado en multitud de aplicaciones industriales (refinerías, metalurgia). Su potencial para almacenar electricidad y convertirla a otros productos es de clave importancia. Es más, el desarrollo de la electrólisis de agua podría enlazar las necesidades de la futura red eléctrica con más renovables con las necesidades de des carbonización de la industria y el transporte, mediante el uso de hidrógeno en los procesos o en el transporte con vehículos de pila de combustible.

10 ANNEX. FCH 2 JU Y PROGRAMA H2020 (ESPAÑOL)

La FCH JU es un partenariado público privado que apoya actividades de investigación, desarrollo tecnológico y demostración en Europa sobre tecnologías de hidrógeno y pilas de combustible. El objetivo de la FCH 2 JU es acelerar la llegada a mercado de dichas tecnologías, demostrando su potencial como herramienta que contribuya a la descarbonización del sistema energético actual.

Las pilas de combustible (como sistema eficiente de conversión hidrógeno-electricidad) y el hidrógeno (como vector energético) tienen un gran potencial para ayudar en la reducción de emisiones de dióxido de carbono, reducir la dependencia de los hidrocarburos y contribuir al crecimiento económico. El objetivo de la FCH JJU es acercar dichos beneficios a Europa aunando esfuerzos de diferentes sectores.

La FCH JU está formada por la Comisión Europea, industrias relacionadas con el hidrógeno y las pilas de combustible (representadas por Hydrogen Europe) y la comunidad científica (representada por N.ERGHY)

Horizonte 2020 es el programa que financia proyectos de investigación e innovación de diversas áreas temáticas en el contexto europeo, contando con casi 80.000 M€ para el periodo 2014-2020.

Investigadores, empresas, centros tecnológicos y entidades públicas tienen cabida en este programa.

[<http://www.eshorizonte2020.es/que-es-horizonte-2020>]