



## GRASSHOPPER

Grid Assisting Modular Hydrogen PEM Power Plant

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### D8.1: Project Website

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## Executive Summary

The deliverable D8.1, carried out by Abengoa Innovación, is a public document of the GRASSHOPPER project, produced in the context of WP8, Task 8.1 Dissemination activities. The WP8 will disseminate the project philosophy, objectives, challenges, progress and results as widely as possible outside the consortium through communication activities in addition to the general public. The WP also aims at exploiting the technology and know-how developed in the project by offensively protecting IPR through patent applications and developing the exploitation and business plan. Task 8.1 aims at the dissemination activities of the GRASSHOPPER project, being the project website the main tool for dissemination and coordination of the project.

This document provides a summary of the structure and functionalities of the website developed for the GRASSHOPPER project. The details of the website management system, the administration tools and the various links to the social networks for the dissemination activities are provided. Sections of the public and private areas of the site are also briefly described.

During the first six months of the project, the GRASSHOPPER project website has been created and the initial contents have been uploaded. This website is under constant development and updated on a day-to-day basis with news and events.

All the consortium members will contribute actively to the maintenance and constant updating of the website. The partners will make an especial effort to publish in the website any piece of news related to the GRASSHOPPER project. When the news refers to future events where the project is going to be represented, the information will be published with sufficient anticipation.

The website is available online and can be accessed at [www.grasshopperproject.eu](http://www.grasshopperproject.eu).

In July 2020, it decided to remodel the website and improve its appearance, providing better accessibility and modernizing the design, always based on the original designs. Still, both graphic design and content organization work was carried out.

The resulting website is much more attractive and accessible from different devices, thus reinforcing the project's image of innovation.

During the following months, new content, images, articles, and video pieces will be incorporated that help in the dissemination of the project information.

The present updated document shows the main changes tackled and briefly summarises them in an extra added new chapter.



## Document History

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2.0	12/11/2021	Final	ABENGOA	Updated version

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## List of Acronyms and Abbreviations

Abbreviation	Definition
WP	Work package
PEM	Proton Exchange Membrane
BOP	Balance of Plant
PCS	Power Conversion System
FAQ	Frequently Asked Questions



## 1 Introduction

The project website is part of the dissemination and exploitation work package of the Grasshopper project. It serves as first source of information to the public, as concerns objectives, structure, partners and advisory boards involved but particularly with regards to activities, news and public project results. This document presents the first step in achieving the partial objective.

At the same time, the project website was planned as main document exchange point among project partners. The documentation generated during project meetings and along the project will be uploaded in the website intranet sections and will be only available to project partners. Documentation generated in the project, such as deliverables and reports, will also be included in the website private area.

The website is hosted and maintained by the partner Abengoa and will be updated regularly. The website will be a key communication tool to increase project visibility of the project among industrial communities, researchers, and the general public. It will be also a key tool for sharing information among all Grasshopper partners.

The website will be updated throughout the life of the project, including up-to-date information on the project, news, events, and public documents.

The webpage is expected to attract individual visitors as well as stakeholders with an interest in the Hydrogen PEM power plant. Academic and technical audiences will also have the opportunity to benefit from published research data and reports.

## 2 Structure of the project website

### 2.1 Public Website

The public website intends to provide an overview of the project available to a wide audience, an introduction to the consortium and team members, project activities and results, as well as contact information for any interested parties. The partners involved in Grasshopper are featured on the website and all their logos are linked to their own websites, as well as to the advisory board. The purpose of the website is to inform the general public about the ongoing and completed research activities through technical project publications. All the information displayed on the project website will be updated and maintained on a regular basis.

This area shows a fixed information:

- a) The project name + logo.





## GRASSHOPPER

### Grid Assisting Modular Hydrogen PEM Power Plant

b) Partners logos.



c) FCH JU & EC logos.



d) The following text: “This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement No 779430. This Joint Undertaking receives support from the European Union’s Horizon 2020 research and innovation programme, Hydrogen Europe and Hydrogen Europe research.”

e) Login, Contact us, Search button, Subscribe and Last News and Events.

The different sections available in the website are listed below.



### 2.1.1 Home section

The homepage gives an overview of the project goals and aims. This is the first view for the Grasshopper user. The homepage of the Grasshopper website presents overall project information, a summary, news & events, and links.

The figure below shows this homepage.

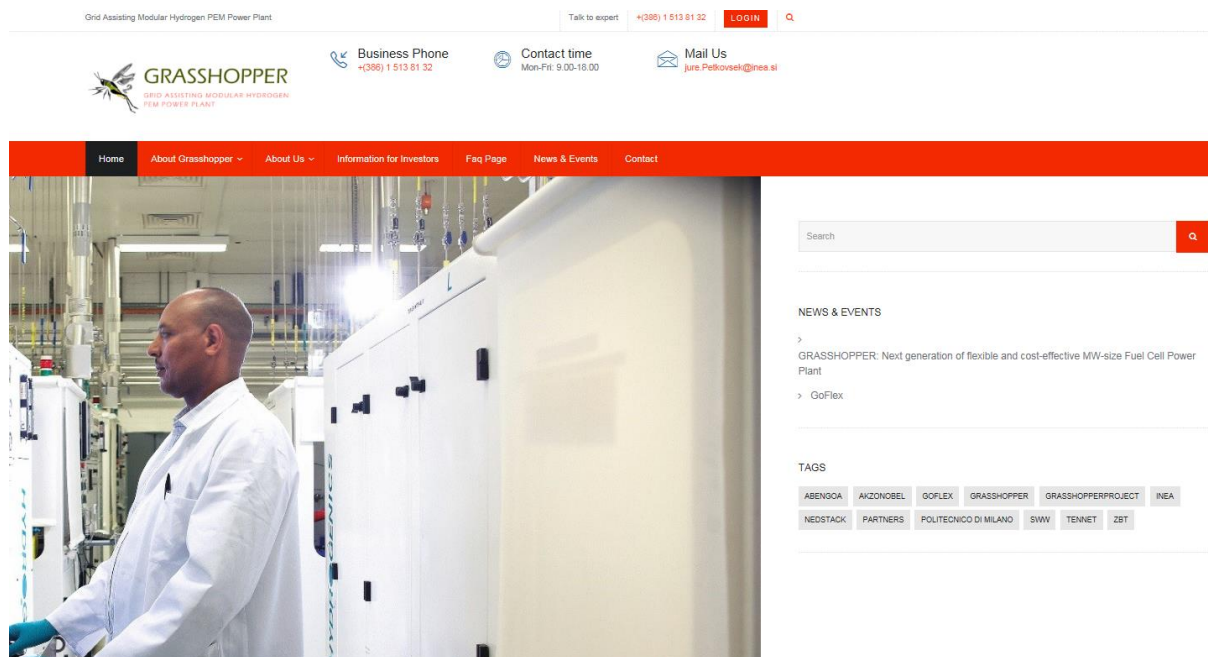


Figure 1 – Home section

### 2.1.2 About Grasshopper section

This area of the Grasshopper website is divided in six subsections. Each one could be accessible through the pop-up submenus that appear when selecting “About Grasshopper” at the main menu. Each subsection gives the visitor a clear picture on the project. This part of the website will mainly remain static throughout the project.

“About Grasshopper” includes the following subsections:

- Scope - Description of the main goals of the project
- Objectives
- Why Grasshopper?
- Facts and Figures - Key project figures and project field
- Results - Public deliverables, presentations, articles, etc.



- Related projects – Other European projects related to Grasshopper project

The screenshot shows the top navigation bar of the Grasshopper website. The 'About Grasshopper' menu is open, displaying the following options: Scope, Objectives, Why Grasshopper?, Facts and Figures, Results, and Related projects. The main content area features a large blue banner with the word 'Why' and a question mark icon. To the right, there is a search bar and a 'NEWS & EVENTS' section with three items: 'GRASSHOPPER: Next generation of flexible and cost-effective MW-size Fuel Cell Power Plant', 'GoFlex', and 'SWW'.

## Why Grasshopper?

Large and dynamic MWe size Fuel Cell power plants are one of the key enabling technologies for the new renewable based energy infrastructure<sup>1</sup> which is one of the key reasons for EU to support development of PEM Fuel Cell Power Plants (FCPP) so far. In previous projects, such as DEMCOPEM-2MW, the technical feasibility of stationary MW FCPP has been proven. However, it has also become clear that with this SoA technology a fundamental joint innovation as proposed in the GRASHOPPER project is needed to reach a CAPEX level of < 1,500 €/KWe. This level is required to open above mentioned markets. In addition, dynamic operating capability is a new feature necessary for economical participation in renewable energy markets. This target will be fully integrated in the GRASSHOPPER design (including implementation of Demand Response programmes for the local grid).

### NEWS & EVENTS

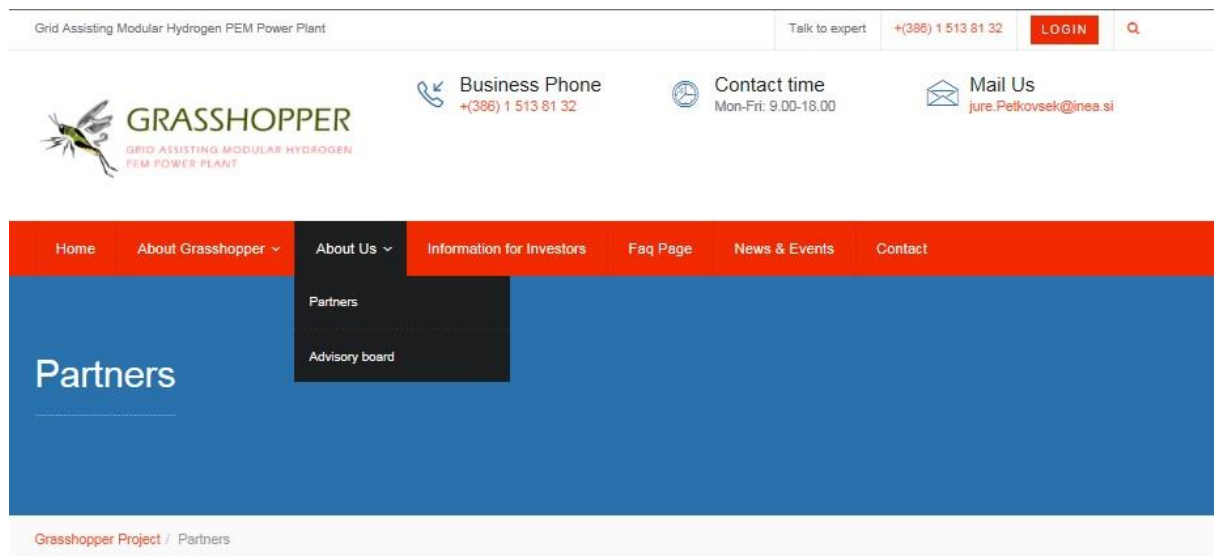
- > GRASSHOPPER: Next generation of flexible and cost-effective MW-size Fuel Cell Power Plant
- > GoFlex
- > SWW

Figure 2 – About Grasshopper section

### 2.1.3 About Us section

This area is divided in two subsections: “Partners” and “Advisory Board”.

Each subsection includes logos, brief company descriptions and links.



## Partners



Figure 3 – About Us section

### 2.1.4 News & Events section

This Grasshopper section includes information related to News and Events

Possible news items such as changes of legislation, European directives and policies, innovations from the field related to Grasshopper project and hydrogen and fuel cells. The events section shows the coming forums, conferences, meetings, initiatives, demonstrations and activities related to the topic.

At the right side, the latest news is shown as well as upcoming events.

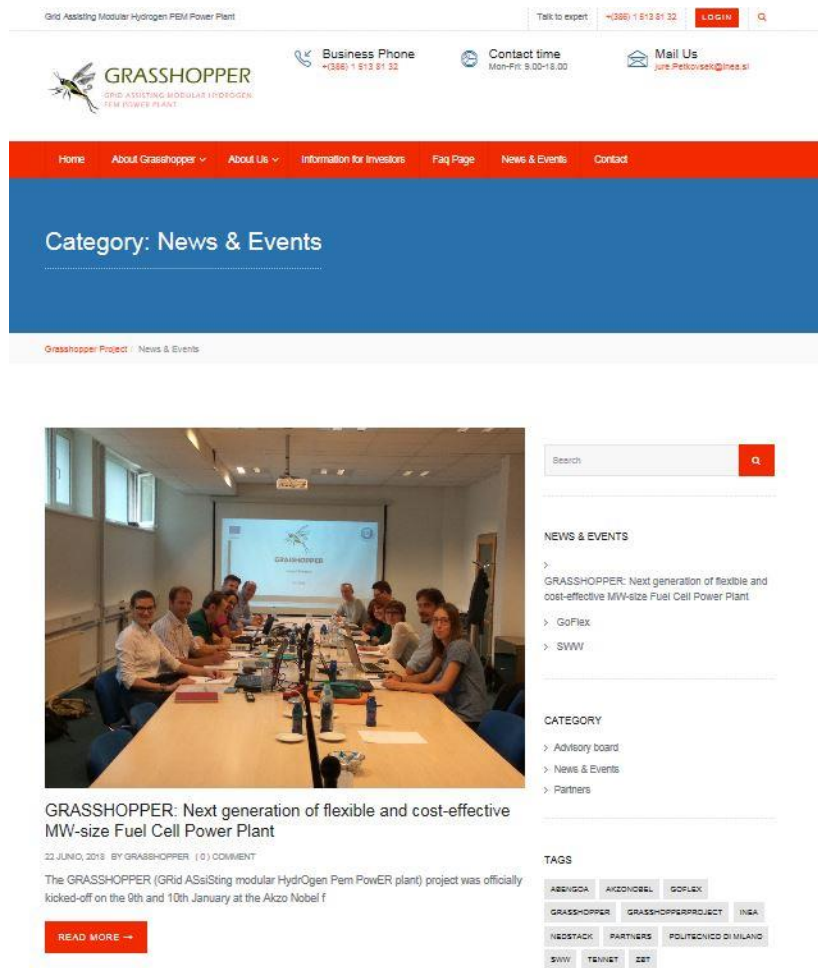


Figure 4 - News & Events section

### 2.1.5 Information for Investors section

This section will include relevant information for the different investors. The contents of this section will be added once the project develops to the sufficient level.

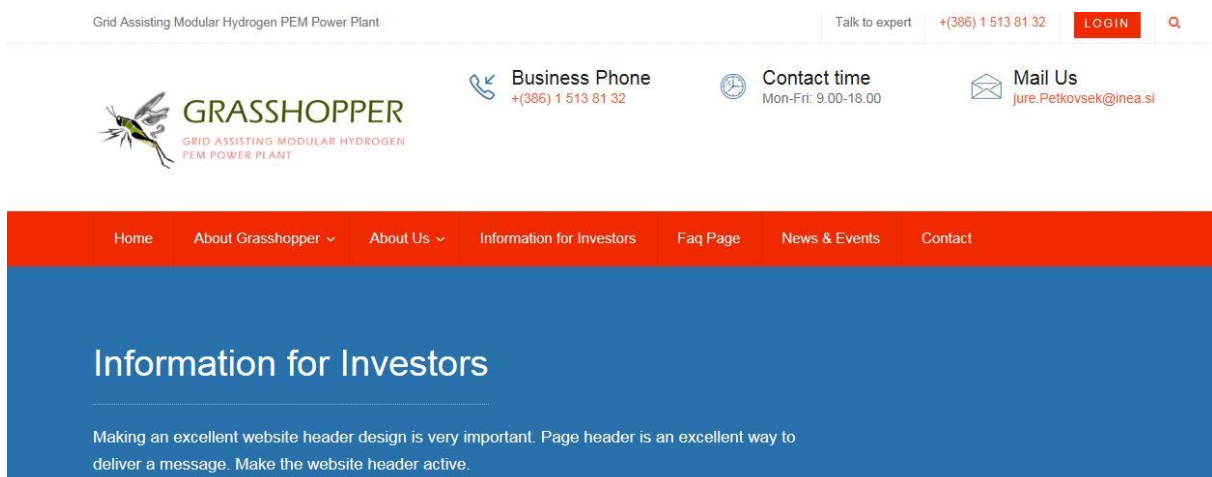


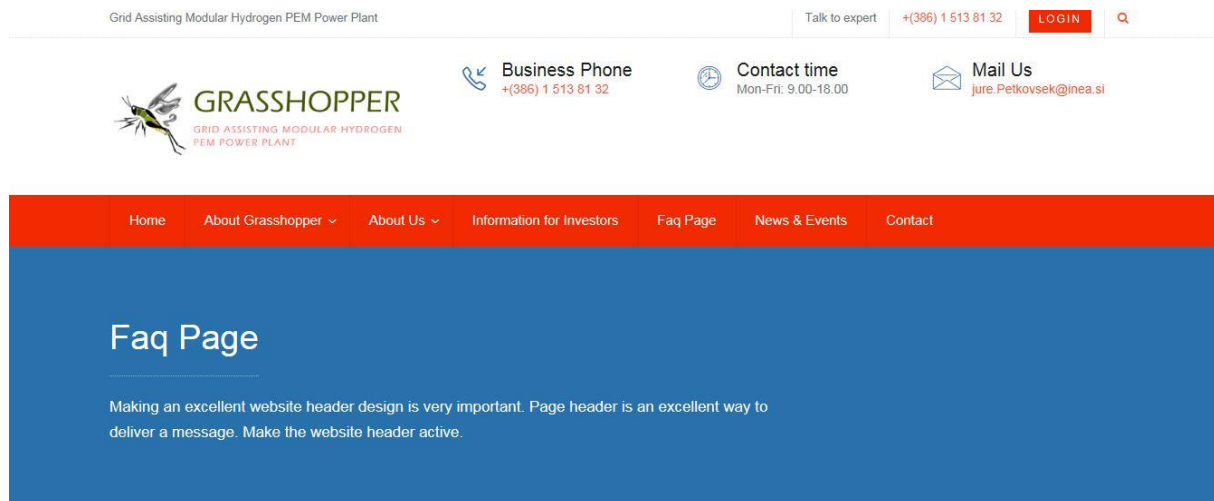
Figure 5 - Information for Investors section



### 2.1.6 FAQ section

In this section will be the answers to some of Frequently Asked Questions (FAQ) about our services.

The contents of this section will be added once the project develops to the sufficient level.



**Figure 6 – FAQ section**





## 2.2 Private Website

Grasshopper Intranet is an area accessible only by authorized users and designed specifically to facilitate communication within the consortium. The objective of this platform is to have a secure and private place to share information and documents between partners. This platform can also be used to keep working versions of documents such as on-going version of reports and deliverables and to have a repository of deliverables, meeting minutes and all documents relevant to the project.

Only the partners have access using a personal username and password – they are invited to join by the administrator. When this step is done and the account is activated, the user can be accessed by clicking the Login button on the Grasshopper website.

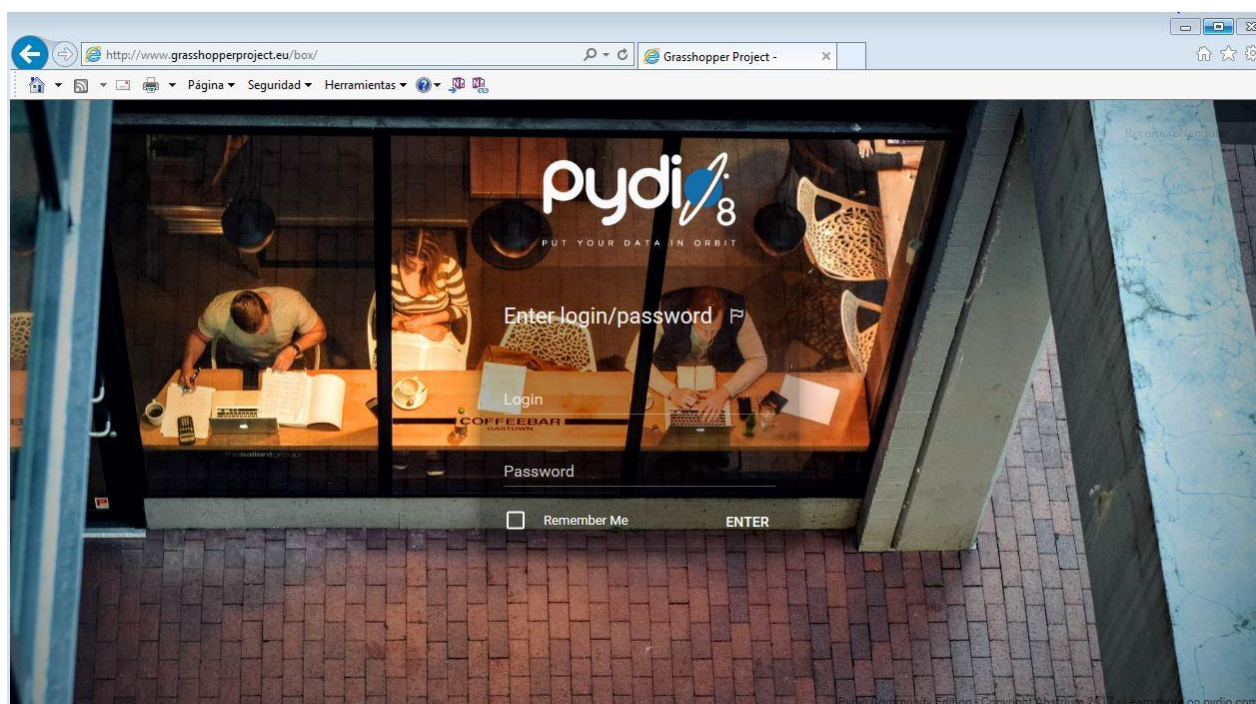


Figure 7 – Private area

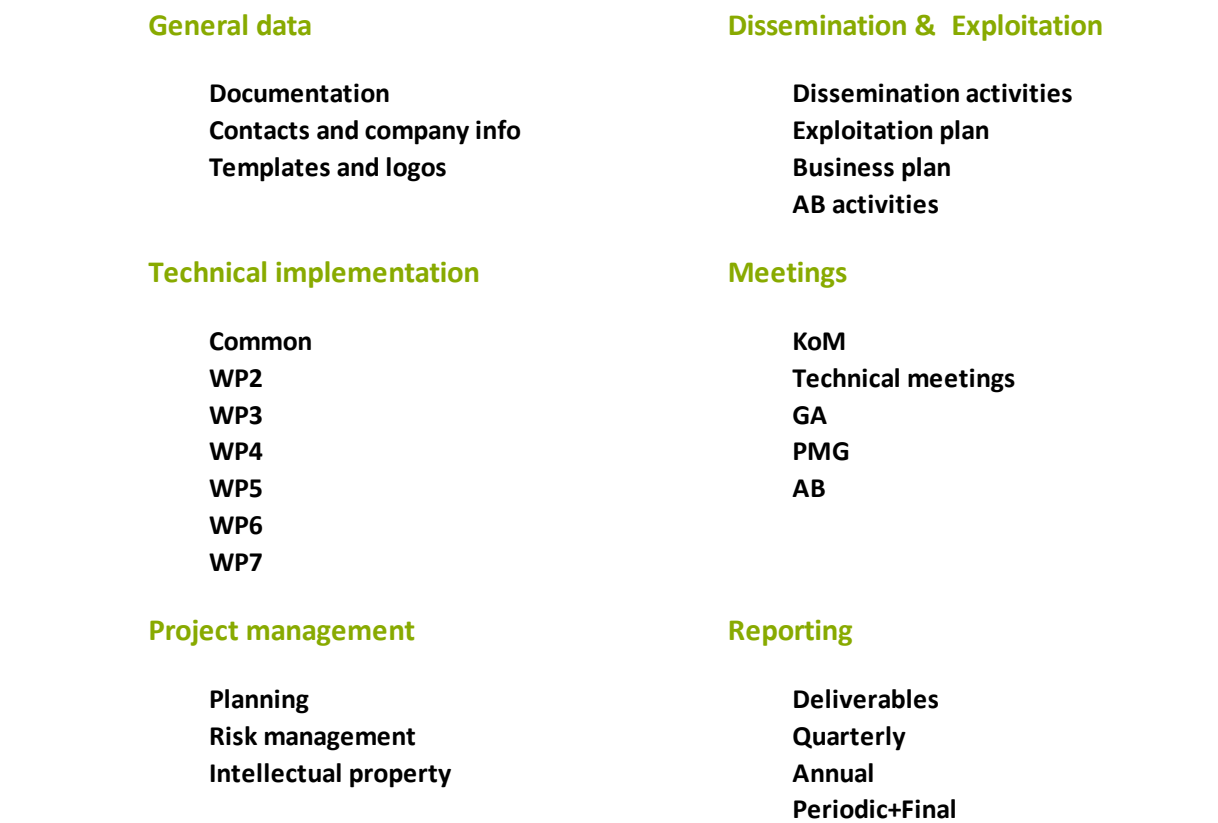


Figure 8 – Private area structure

### 3 Structure of the new design

As mentioned in the Executive Summary, in July 2020, it decided to remodel the website and improve its appearance.

The following sections will describe the different areas of the website.

#### 3.1 Public website

##### 3.1.1 Landing Page

The Landing Page is the first page visitors see when accessing the web page and tries to introduce the project information in a summarized and attractive way in all its aspects to get the visitor's interest. And to enhance the image of innovation of the Grasshopper project.

In turn, it consists of several parts:





- **Animated Banner:** At the top of the page and under the Fixed Top Menu, you will find this animated Banner that introduces the title and slogan of the project, and in turn has a button with a Roll-over effect that links to the project's YouTube video.

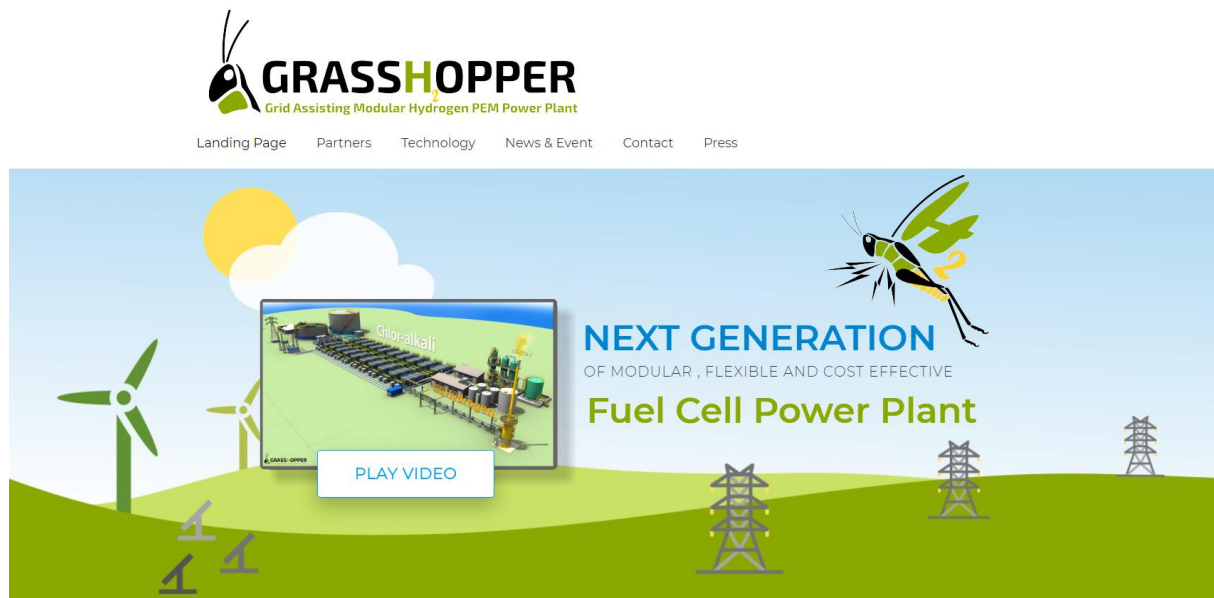


Figure 9: Animated Banner

- **About the project:** There is a short text which introduces the main function of the project.

#### — ABOUT THE PROJECT

### Why GRASSHOPPER?

The technical feasibility of PEM MW Fuel Cell Power Plants (FCPP) has been well demonstrated, but **a major step in fuel cell stacks and system costs is still needed.**

In addition, a **dynamic operating capability** is a new necessary feature to participate in **renewable energy markets.**

GRASSHOPPER proposes major coherent improvements on MEAs, stacks, and system design to **reduce CAPEX and add flexibility.**

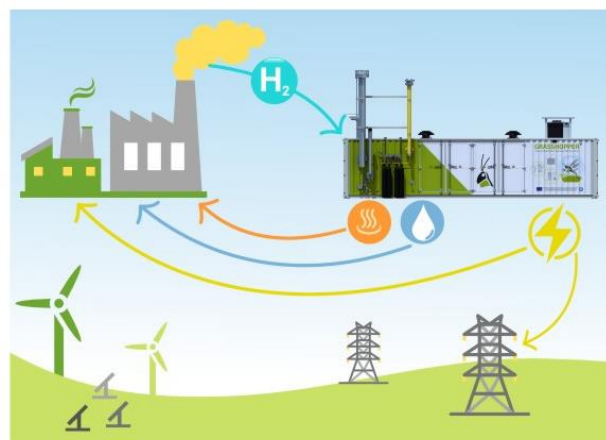


Figure 10: About the project



- Grasshopper – The Objectives: Another small block of text is accompanied by interactive images that represent the project’s main objectives and show short answers if we hover the mouse over each one of them.

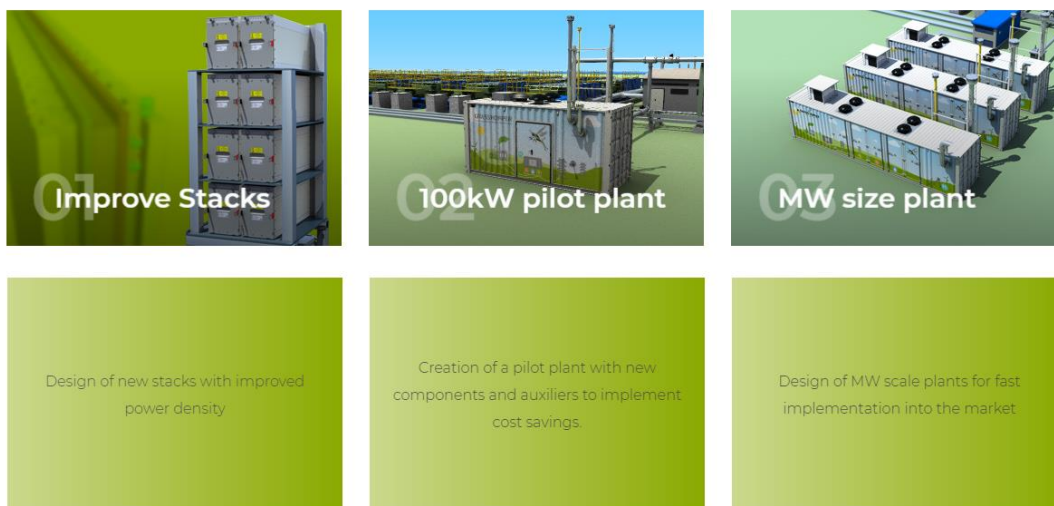
— GRASSHOPPER

## The Objectives

GRASSHOPPER aims to create a next-generation MW-size FCPP which is more **cost-effective** and **flexible in power output**, accomplishing an estimated CAPEX < 1500 €/kWe at a **yearly production of 25 MWe**.

The MW-size FCPP unit will be based on learnings from a **100 kW pilot plant** design, implementing **newly developed stacks and MEAs**.

This pilot plant is large enough to implement **cost savings** and validate operation flexibility and **grid stabilization** capability via fast response.



**Figure 11: Grasshopper – The Objectives**

- Full name and Contract number: In this horizontal band we can see the origin of the Grasshopper name as well as its EC Contract number and some interesting figures from the project represented with custom-made icons and moving numbers to make them more attractive.

FULL NAME: GRASSHOPPER

GRid ASSisting Modular HydrOgen Pem PowerER Plant

EC contract: 779430

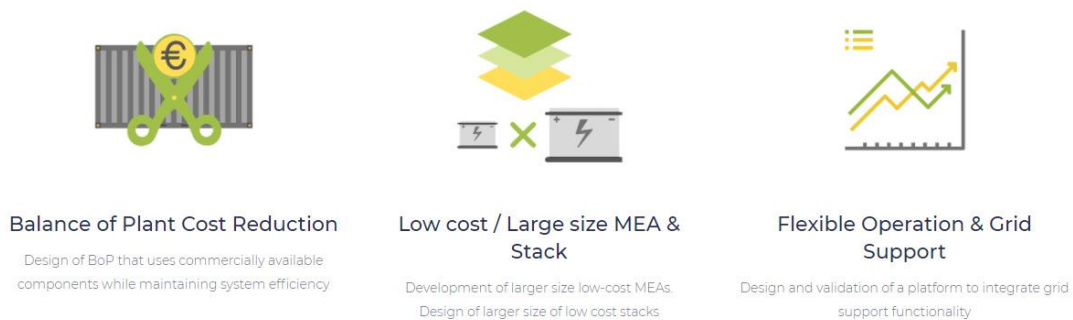




**Figure 12: Full name and Contract number**

- The Activities: Here we can see the three Activities that are sought in the project represented by three Images and a short description of each one of them, reinforcing the message of the work being done in Grasshopper.

## The Activities



**Figure 13: The Activities**

- Site and About: In these sections it can be seen where the geographical destination of the project container is, and the future design of a MW container through two images and two small texts that accompany them.



#### THE SITE

### 100kW Pilot plant

Design and validation of a 100kW pilot plant at Nouryoun facilities in Delfzijl. A real industrial environment where the pilot plant will be using H<sub>2</sub> produced as a byproduct of the chlor-alkali electrolysis.

#### ABOUT THE PROJECT

### MW-scale Commercial plant

Design of a low-cost, flexible and modular MW size FCPP. Ready to go to market.

**Figure 14: Site and About**

- Partners and Advisory board: This part of the Landing Page refers to the companies and people that are part of the project, with this piece we represent the international character of the project as well as the value of innovation in the people who make it possible.



9 COUNTRIES  
European Partners



Advisory Board



**Figure 15: European Partners and Advisory Board**

### 3.1.2 Partners

This page offers information about the Partners of this project, with an introduction to each of them and their Logo, and a link to their websites.





**ABENGOA**

Abengoa is a technology company that applies innovative solutions for sustainable development in the infrastructure, environment and energy sectors while providing long-term value for its shareholders via management characterized by the fostering of entrepreneurial spirit, social responsibility, transparency, and rigor. Abengoa develops three different activities: Engineering and Construction, Infrastructure Concessions and Industrial Production.

The enterprise, Abengoa Innovación, S.A. is a company headquartered in Seville (Spain). Its objective is the organization and operation of businesses and activities related to the production and the storage of electric energy using different technologies, as well as the production of energy from renewable sources, and its clean and efficient use.

The main activities carried out in recent times are in the areas of energy efficiency and energy storage, power electronics, aerospace, electromobility, development of hydrogen and fuel cell technologies and power generation plants based on fuel cells.

Abengoa Innovación's workforce comprises 51 Engineers and Licentiate, experts in different disciplines, who have been developing projects in the hydrogen and fuel cell sector for 15 years.

<http://www.abengoa.com/>

**INEA**

INEA is the leading company in Slovenia in the field of energy management solutions, industrial automation, process computer control and manufacturing informatics.

Founded in 1987, is now an SME with 50+ highly educated employees which develops, installs and supports industrial and residential energy management and control systems. Its major interests lie in the areas of efficient energy use, CHP implementation and development and implementation of energy monitoring and targeting systems. INEA's experts are active in research projects in the fields of smart grid solutions, advanced control technologies and fuel cells and hydrogen technologies.

INEA's relevant experiences include those with peak-demand levelling, load shedding, process scheduling and the use of internal power generation facilities in the field of electricity and heat management. More than 50 demand response management systems have been implemented and installed in various industries with total installed power of 250 MW, generating in total 35 MW demand response.

Partnering with Slovenia's biggest DSO company INEA implemented and demonstrated the first Virtual Power Plant system based on own Demand Side Management technology.

INEA has been a member of Hydrogen Europe since 2010.

<http://www.ineasi>

**JM Johnson Matthey**  
Helping science advance technology

JMFC is a leading developer, manufacturer and supplier of fuel cell catalysts, membrane electrode assemblies (MEA), catalyst coated membranes (CCM) and other components to fuel cell and electrolyser developers worldwide. JMFC is a partly owned subsidiary of Johnson Matthey plc, a speciality chemicals company and world leader in advanced materials technology with over 13,000 employees in over 30 countries. JMFC develops, manufactures and supplies catalysts, electrodes and MEAs for low temperature proton exchange membrane (PEMFC) and direct methanol fuel cells (DMFC), proton exchange membrane water electrolyzers (PEMWE) and high temperature phosphoric acid based fuel cell systems (PAFC) and currently produces several hundreds of thousands of electrode/CCM/MEA product parts per annum.

With 130 permanent employees, almost all based in the UK. Over 50% of the staff is professional technical personnel with science and engineering qualifications, working in research, product and process development. Significant investments have been made in recent years in world-class fuel cell materials and component research and MEA testing facilities at the parent corporate Technology Centre in Sonning Common, near Reading, and in the world's first dedicated electrode and MEA manufacturing facility in Swindon, Wiltshire. Of particular relevance are the multimillion € investments in recent years in advanced production scale coating and converting equipment fully contained in clean rooms with Class 1000 capability. The instrumented coating line has interchangeable coating head capability allowing coating of widths up to 650 mm at speeds up to 30 linear m/minute and has sophisticated dimensional control QC systems. The converting line enables the high-speed integration of membranes, catalyst layers and edge seals. Senior personnel have considerable experience in participating in, and leading, government supported R&D projects and JMFC has well-established administrative, financial and legal support groups to manage these projects and ensure successful delivery of the contractual requirements.

<http://www.matthey.com>

**Nedstack**  
New Fuel Cells

Nedstack fuel cell technology B.V. (NFACT) manufactures and commercializes PEM fuel cell stacks. Our customers are system integrators of PEM fuel cells for stationary and transport applications. Together with partners Nedstack also delivers large stationary fuel cell systems, such as the largest PEM power plant in the world, and have developed and delivered pre-commercial products for road and maritime transport applications. Nedstack was established in 1999 in Arnhem (The Netherlands) as a spin-off from the PEM fuel cell activities within the company AkzoNobel. Since that time, over 300 man years have been spent growing the company commercially. NFACT has developed PEM power plant knowhow in both the Delfzijl PEM 70 kW pilot power plant, the Solkay 1 MW PEM power plant in Lille as well as the 2 MW PEM power plant developed and operated under the recent DEMCOPEM project. Nedstack is an active member of the New IC Industry Grouping. In previous FCH-3U funded projects Nedstack has built up a successful track record of technical development as well as overall project management.

<http://www.nedstack.com/>

**POLITECNICO MILANO 1863**

Politecnico di Milano is a public technical university organized in 12 departments and a network of 6 Schools of Engineering, Architecture and Industrial Design. The number of students enrolled in all campuses is approximately 40,000, which makes it the largest Engineering School in Italy. On the last QS ranking, Politecnico di Milano ranked 28th in the world, 9th in Europe and 1st in Italy among the Engineering and Technology universities. Support to the project will be granted by the Group of Energy Conversion Systems (GECOS), belonging to the Department of Energy. The GECOS group currently includes three full professors, four associate professors, eight assistant professors, and about 20 among post-doc and PhD fellows. GECOS group has a wide and recognized background in power plant and energy system simulation and optimization, focusing on advanced energy conversion systems for clean power generation and industrial processes. Over the last years, a particular focus has been devoted to the research in the area of carbon capture technologies, renewables, cogeneration, hydrogen production and fuel cells. In these fields, since 2008 the GECOS group has participated and is currently contributing in over 16 projects financed by EU FP7 (e.g. CAESAR, CACHET-II, DEMOVS, ASCENT, H2TRUST, DEMCOPEM) and H2020 programs (e.g. CEMCAP, BIONICO, STEPWISE, FLEDGED, ELECTROU), with roles including Project Coordination and WP Leader.

<https://www.polimi.it/>

**ZBT**

The fuel cell research centre "Zentrum für BrennstoffzellenTechnik" (ZBT GmbH) since founded in 2001 is supporting industry to speed up the market introduction of fuel cells and hydrogen technologies. ZBT employs an interdisciplinary team of almost 100 qualified personnel, most having many years of experience in the field of research and development. Their extensive expertise and the outstanding infrastructure are incorporated in numerous co-operative ventures with industrial companies and research partners. Projects and services of ZBT cover a wide range from the development of reformers, fuel cell stacks and completely serviceable systems, the testing of production and manufacturing technologies for cell components and whole fuel cell stacks through to the testing of market-based developments with a view to licensing. The portfolio of the development service provider ZBT is geared consistently to the needs of the industrial partners. ZBT is a non-profit limited company (GmbH), CEO is Prof. Dr. Angelika Heinzl, Shareholder is University Duisburg-Essen.

<http://www.zbt-duisburg.de>

**Figure 16: Partners**



It also includes a section dedicated to the Advisory Board, with its description and a link to their websites.

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### Advisory Board

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**GoFlex** (Generalized Operational FLEXibility for Integrating Renewables in the Distribution Grid) is an H2020 funded demonstration project on topic LCE-02-2016 – Demonstration of smart grid, storage and system integration technologies with increasing share of renewables: distribution system. GoFlex's Exploitation Manager will exchange experiences with GRASSHOPPER on the topics of DSM technology validation, Lateral Project Networking and business model development.

<http://www.goflex-community.eu>



Nouryon Industrial Chemicals is a worldwide company, producing and marketing high purity salt, chlorine, caustic lye, hydrochloric acid, chloromethanes and monochloroacetic acid (MCA). Hydrogen is produced as a by-product in chlorine production.

Nouryon is a long time partner in FCPP projects (e.g. EOSDEMO, DEMCOPEM). In GRASSHOPPER Nouryon will provide the location and OSBL for the FCPP.

Nouryon will take part in the workshops for development of the FCPP business case.



SWW StadtWerke Wunsiedel is an innovative German based utility (DSO/ BRP) already involved in a range of smart grid projects. SWW wants to refurbish their overall ICT structure and prepare their energy supply and grid management system for future demands and energy markets. For GRASSHOPPER SWW will especially provide their expertise on market regulations issues and business model development.



Tennet is a leading European electricity transmission system operator (TSO) with its main activities in the Netherlands and Germany. With over 23,000 kilometres of high-voltage connections we ensure a secure supply of electricity to 41 million end-users.

Tennet will take part in the workshops for development of the FCPP business case. As grid owner Tennet has in depth knowledge about pricing structures, regulations and specifications relevant to grid support FCPP.



**Figure 17: Advisory Board**

### 3.1.3 Technology

This page is intended to help visitors understand everything that has to do with Grasshopper's technology works on. It has a brief introduction that helps to understand the project a little more and three differentiated sections that talk about three main technical characteristics of the project. And it also works as a FAQ for some questions you may have about the system's features.



- **BOP:** This section explains the process characteristics of our project, includes a video made for this section where we can see in a simplified way how the process works. We also have some questions that if we click, we can get elaborate answers to each of them.



The grasshopper pilot plant is not only a **testing environment** for the new stacks but also a playground to explore the **optimum plant configuration**. In order to push the penetration of stationary Hydrogen power plants into the market, several key aspects need to be addressed. Although the main one is of course lowering the price of the system, giving them extra functionalities is also important.

To **reduce the Levelized Cost of Energy** of a Hydrogen power plant, Grasshopper aims to **extend the lifespan** of the system and especially the fuel cell stacks **to their maximum**. A larger lifespan means a more profitable investment.



What flexibility are you talking about?

Depending on the application, a power plant has different requirements. For example, nuclear or coal-fired power plants work as a "baseload", meaning they will always produce roughly the same amount of energy no matter how large the demand is. Most of them use non-renewable fuel. On the other hand, "peak" power plants adjust quickly to the demand of the grid. These two combined supply the required power to the grid, and as you can imagine their technology is quite different.

**Flexibility in a Hydrogen fuel cell power plant means** two different things. First of all, **the ability to dynamically change the power output on demand**. This allows the use of the technology both as a baseload or peak power plant. On the other hand, flexibility also means a **wide range of applications**. A dynamic operation opens the door for many different sectors:

- A portable generator for temporal installations or encampments
- Emergency generators for critical loads like Data Centers and Hospitals,
- Electrical Grid services and balancing
- Combined generation of electricity and heat for industry or housing

The list can go on...

Why a containerised solution?

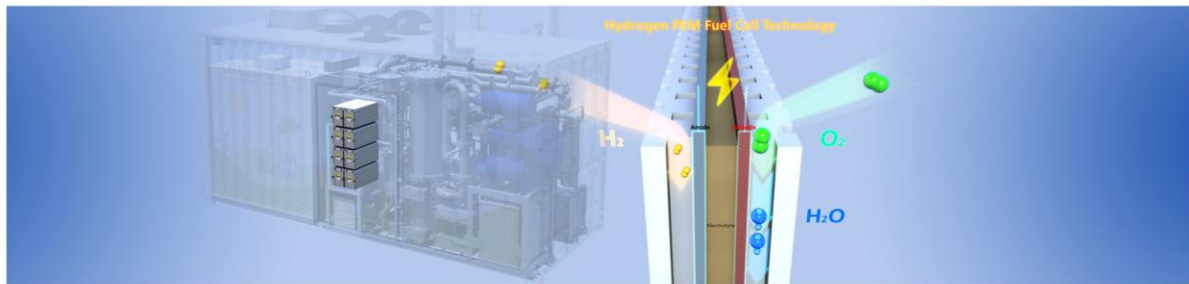
Is it suitable for cogeneration or CHP?

What are the auxiliaries consumption of Fuel Cell Plants

**Figure 18: Technology**

- **Fuel Cell Modules:** In this section the visitors can see information about the PEM with a video made for this purpose, as well as another couple of FAQs from which we can get answers if we click on them.





Hydrogen PEM Fuel Cells are used in the GH project. These units, frequently called stacks, use Hydrogen as fuel and atmospheric air as comburant to generate electricity. Contrary to heat engines where the fuel is used to generate heat through combustion, and then transforming that thermal energy into movement and/or electricity, fuel cells produce a very controlled REDOX reaction and using the produced voltage and current directly as electric power. Check out the video on the right for a graphical representation.



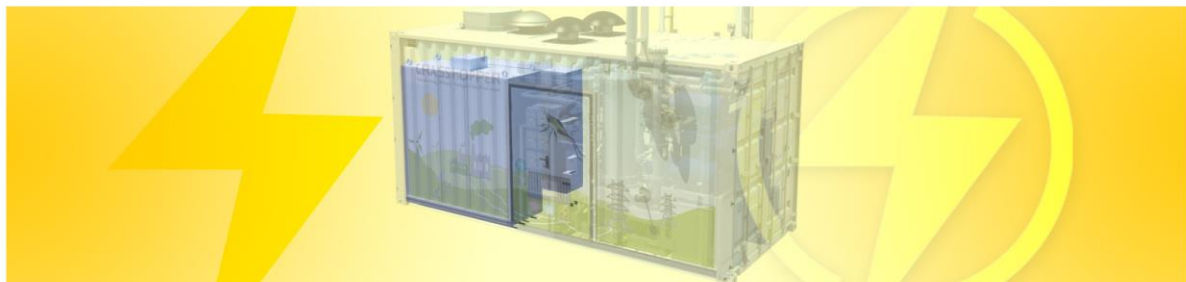
What makes GH special is the increased expected lifetime of the stacks. With all the improvements. The increased power density compared to earlier generations of stacks for stationary applications is also a big benefit. With a 300 cm<sup>2</sup> active area, 100kW can be achieved using only 4 stacks. This is not only an advantage in reducing the Fuel Cell manufacture costs, but also in the rest of the plant, with less piping and easier construction.

▼ What exactly is PEM a Fuel Cell?

▼ What makes the GH Fuel Cell special

**Figure 19: Fuel cell modules**

- PCS – The electrical system: The last part of this page informs the visitors about the electrical system of our plant and contains a few FAQs from which we will get answers by clicking on them.



As part of the BOP, the electrical system in the Grasshopper pilot plant is designed using commercial components. Available without the need for specific design or manufacturing. The power conditioning system is integrated with grid codes, allowing for direct injection of energy into the grid, or with capabilities to work as an isolated system.

▼ Autonomous system

▼ Fast response for Grid balancing

▼ One connection

▼ Advances towards Blackstart

**Figure 20: PCS**



### 3.1.4 News & Events

This tab is a blog-style page, where visitors can find the headers of the published news or events. On the right side of the page, the visitors can discover different functionalities, such as links to the title, tags, and categories and a box for searching.

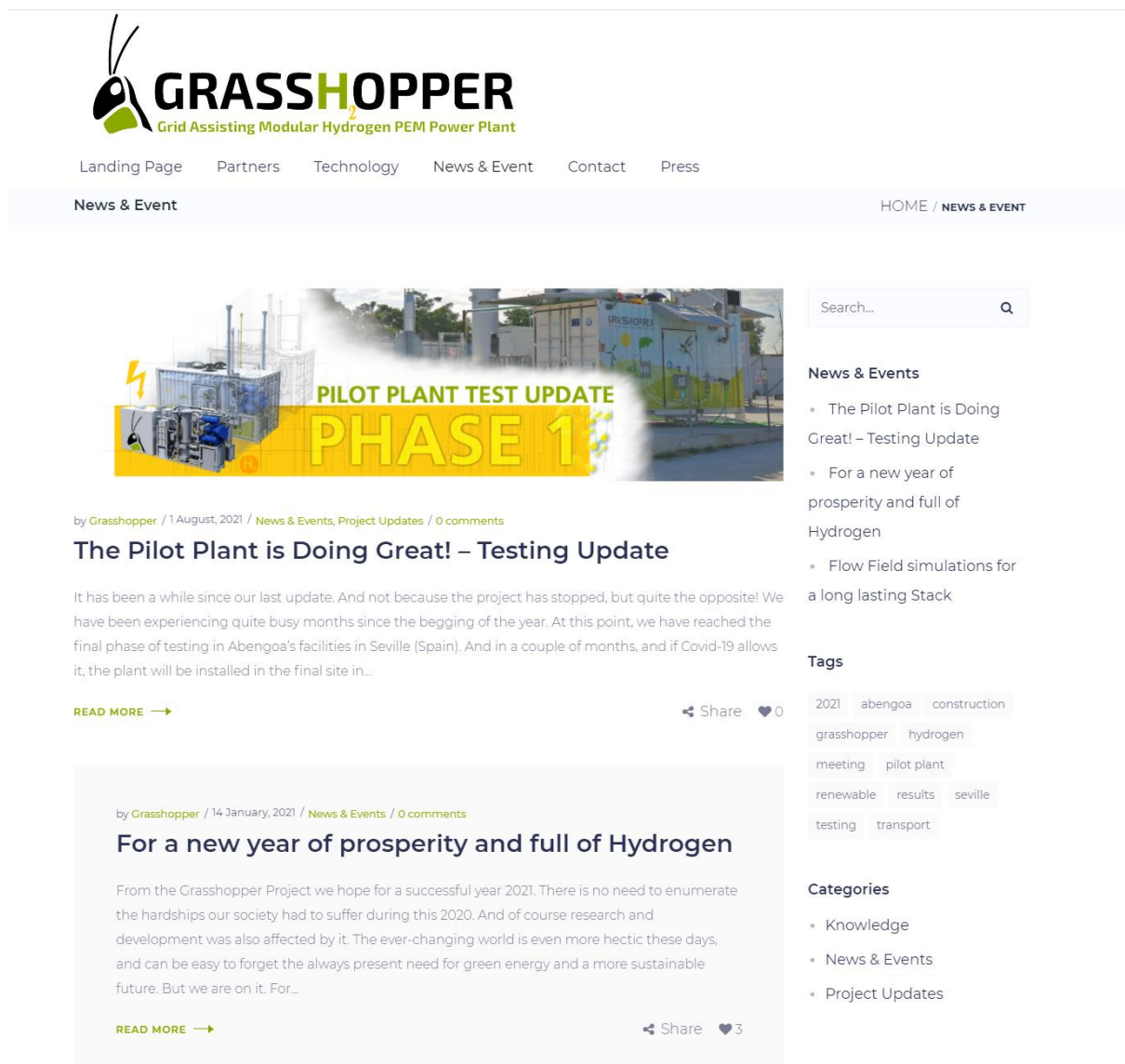


Figure 21: News & Events



### 3.1.5 Results

In the results section, visitors can find all the public documents produced within the project's scope, scientific articles, and other documents related to the Grasshopper project.


Results HOME / RESULTS

As an European Project, Grasshopper aims to create market-ready products that will push the Hydrogen sector forward. But also to generate new knowledge, ideas and solutions that the whole society can enjoy. Therefore, in this section you can find all the public documents produced within the scope of the project. Enjoy!


**PUBLIC DELIVERABLES**

**SCIENTIFIC ARTICLES**


**OTHER DOCUMENTS**

 **Modelling and optimization of a flexible PEMFC power plant for grid balancing purposes**  
European Fuel Cell Forum, EFCF 2019  
International Journal of Hydrogen Energy, Volume 46, Issue 24  
[DOWNLOAD HERE](#) →

---

 **GRASSHOPPER project: grid assisting modular hydrogen PEM power plant**  
European Fuel Cell Forum, EFCF 2019  
[DOWNLOAD HERE](#) →

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 **Comparison of humidification systems for flexible stationary PEMFC power systems**  
European Fuel Cell Technology & Applications Piero Lunghi Conference, EFC 2019  
[DOWNLOAD HERE](#) →

---


 **Simulations of a flexible 100 kWel PEM Fuel Cell power plant for the provision of grid balancing services**  
Applied Energy Symposium. 100% Renewable: strategies, technologies and challenges for a fossil free future  
Pisa, Italy.  
[DOWNLOAD HERE](#) →

Figure 22: Results

### 3.1.6 Contact

There is a particular space dedicated to contact. Visitors can find a form to send messages, questions, or whatever. Also, some emails of people involved in the project are provided for more direct contact.



**Name \***


**Email \***

**Select contact motivation**

Considering a possible application

Please choose the main reason for your contact so it can be answered as soon as possible by the adequate department.

**Message body \***

Soy humano  hCaptcha  
Privacidad - Condiciones

Submit

## Let us know **about you!**

Either if you are part of an institution or organization interested in the technology, a professional from the energy sector and industry looking for solutions, or an individual wanting to know more, in Grasshopper we are eager to get to know you.

Marijan Vidmar

[marijan.vidmar@inea.si](mailto:marijan.vidmar@inea.si)

Maria Tejada Valderrama

[maria.tejada.v@abengoa.com](mailto:maria.tejada.v@abengoa.com)

Jos Lenssen

[Jos.Lenssen@nedstack.com](mailto:Jos.Lenssen@nedstack.com)

Figure 23: Contact

### 3.1.7 Press

In this section the page has two parts, one is a small kit of files that we provide to the press so that they have the resources and information to correctly illustrate their articles. This Kit will be updated with the evolution of the project adding new downloadable content for the press thus helping the project to become better known.

MATERIALS FOR ARTICLES

## Press Kit

Download our Presskit filled with resources for you to make an article about Grasshopper.

Images, logos, brochure...

Click here for [download](#)

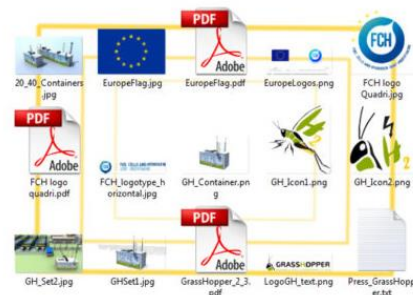


Figure 24: Press Kit

In this block each of the links that we have found that refer to the Grasshopper project are compiled, also including a small flag to indicate in the language that they are written, thus helping the natural positioning of the page with the exchange of links of interest.



TALKING ABOUT GRASSHOPPER

## Links World

Here you can find some links where the Grasshopper project was named.

 11/02/2021 – <https://www.industriambiente.com/>

Abengoa Innovación finaliza la construcción de la planta piloto del proyecto Grasshopper para la producción de energía a partir de hidrógeno

 [External Link](#)

 10/02/2021 – <https://energiainlimpiaparatodos.com/>

Abengoa Innovación avanza con planta piloto del proyecto Grasshopper para la producción de hidrógeno

 [External Link](#)

 10/02/2021 – <https://www.energetica21.com/>

Abengoa Innovación finaliza la construcción de la planta piloto del proyecto Grasshopper para la producción de energía a partir de hidrógeno

 [External Link](#)

 10/02/2021 – <https://fuelcellsworld.com/>

Abengoa Innovation Completes the Construction of Grasshopper Pilot Plant for Power Production from Hydrogen

 [External Link](#)

 10/02/2021 – <https://www.engineeringnews.co.za/>

Abengoa Innovations completes construction of pilot plant for hydrogen power in Spain

 [External Link](#)

 10/02/2021 – <https://www.chemengonline.com/>

Abengoa completes Hydrogen-Power Pilot Plant

 [External Link](#)

 10/02/2021 – <https://www.worldenergytrade.com/>

Abengoa concluye la construcción de una planta piloto que producirá energía a partir de hidrógeno

 [External Link](#)

 10/02/2021 – <https://www.energias-renovables.com/>

Abengoa Innovación se sitúa en el corazón de la nueva generación de centrales eléctricas

 [External Link](#)

 10/02/2021 – <https://www.abengoa.com/>

Abengoa Innovación completa la construcción de la planta piloto del proyecto Grasshopper para la producción de energía a partir de hidrógeno

 [External Link](#)

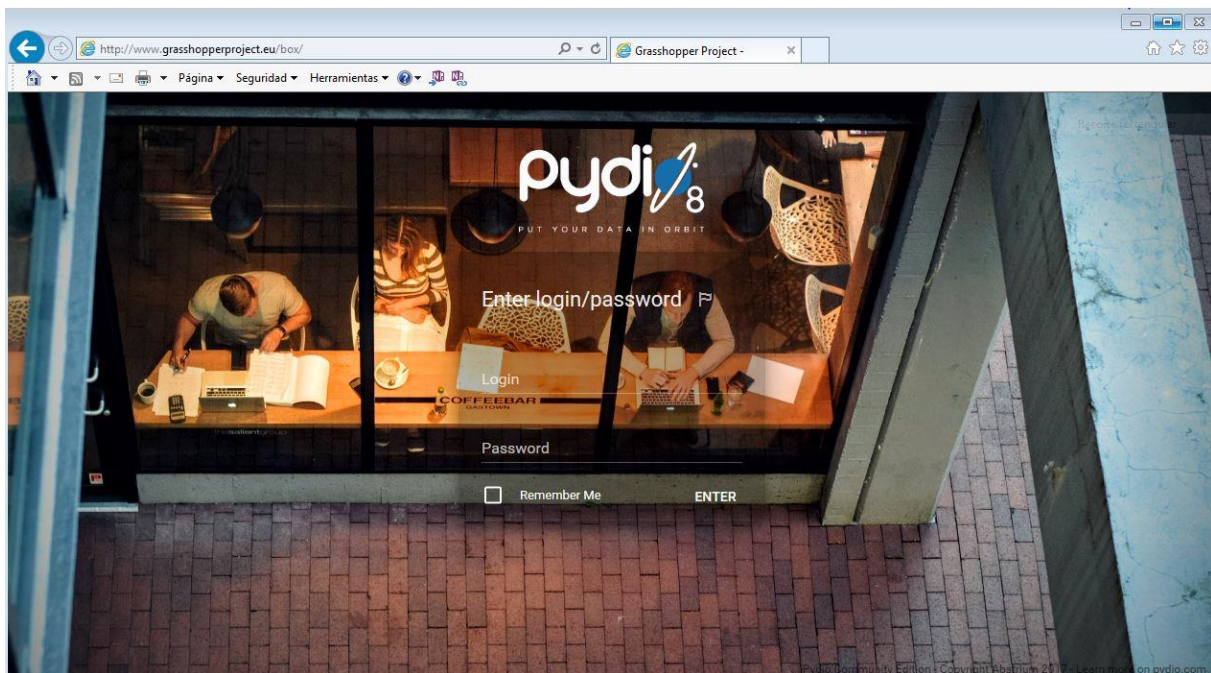
**Figure 25: Links World**

### 3.2 Private website update

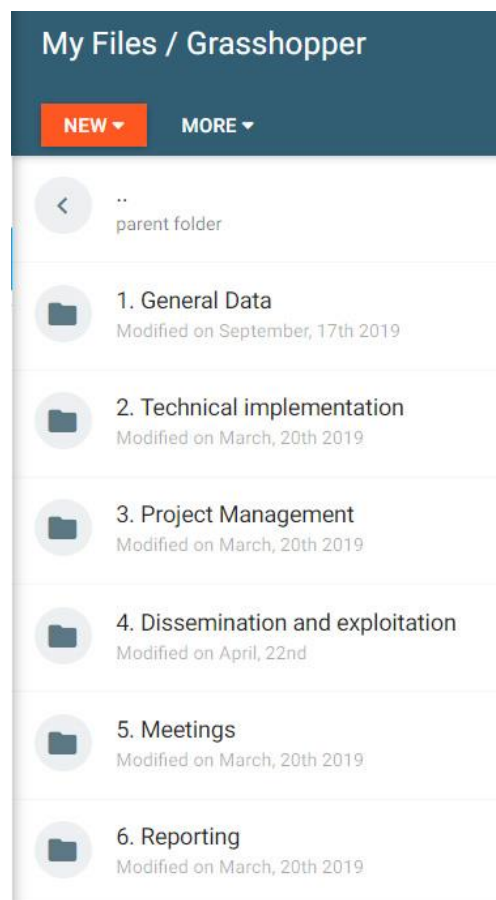
Grasshopper Intranet is an area accessible only by authorized users and specifically designed to facilitate communication within the consortium. The objective of this platform is to have a safe and private place to share information and documents between partners. This platform can also be used to maintain working versions of documents, such as the current version of reports and deliverables, and to have a repository of deliverables, meeting minutes, and all documents relevant to the project.

Only the partners have access using a personal username and password (the administrator invites them to join). When this step is done and the account is activated, the user can be accessed by clicking the Login button on the Grasshopper website.





**Figure 26: Private website**



**Figure 27: Grasshopper files**



## 4 Web statistics

A small statistical study has been carried out to see the evolution of the visitors to the page since it is an interesting information to assess its usefulness. In this case we are showing data from July 2020 to the update, November 2021.

Here we can see some general data with an interesting volume of visits for an activity as specific as the one we are representing.

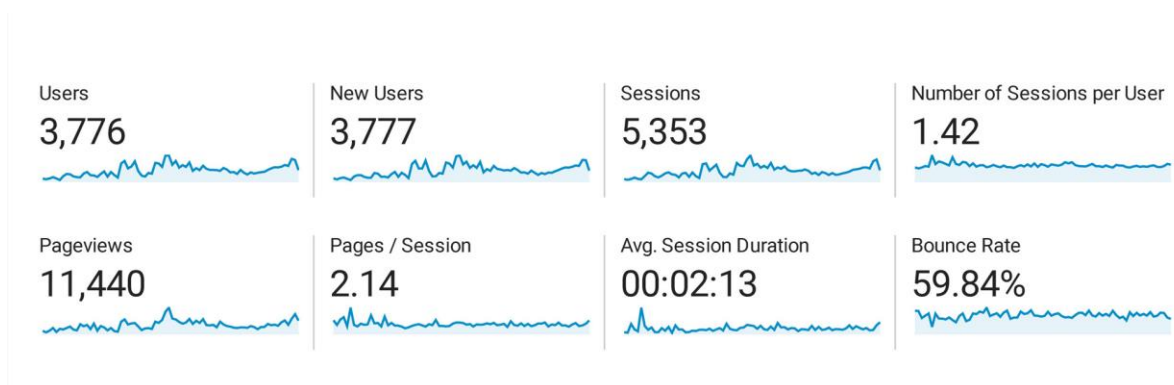


Figure 28: General figures

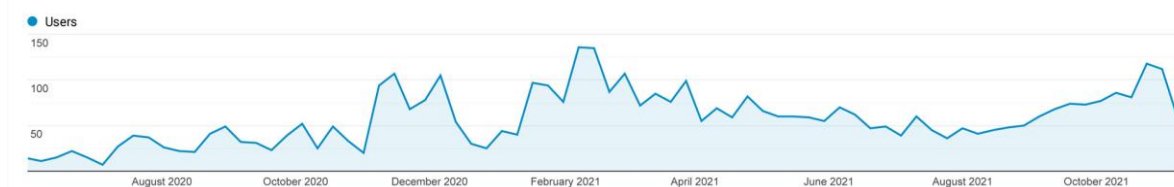


Figure 29: Visits evolution graph over time



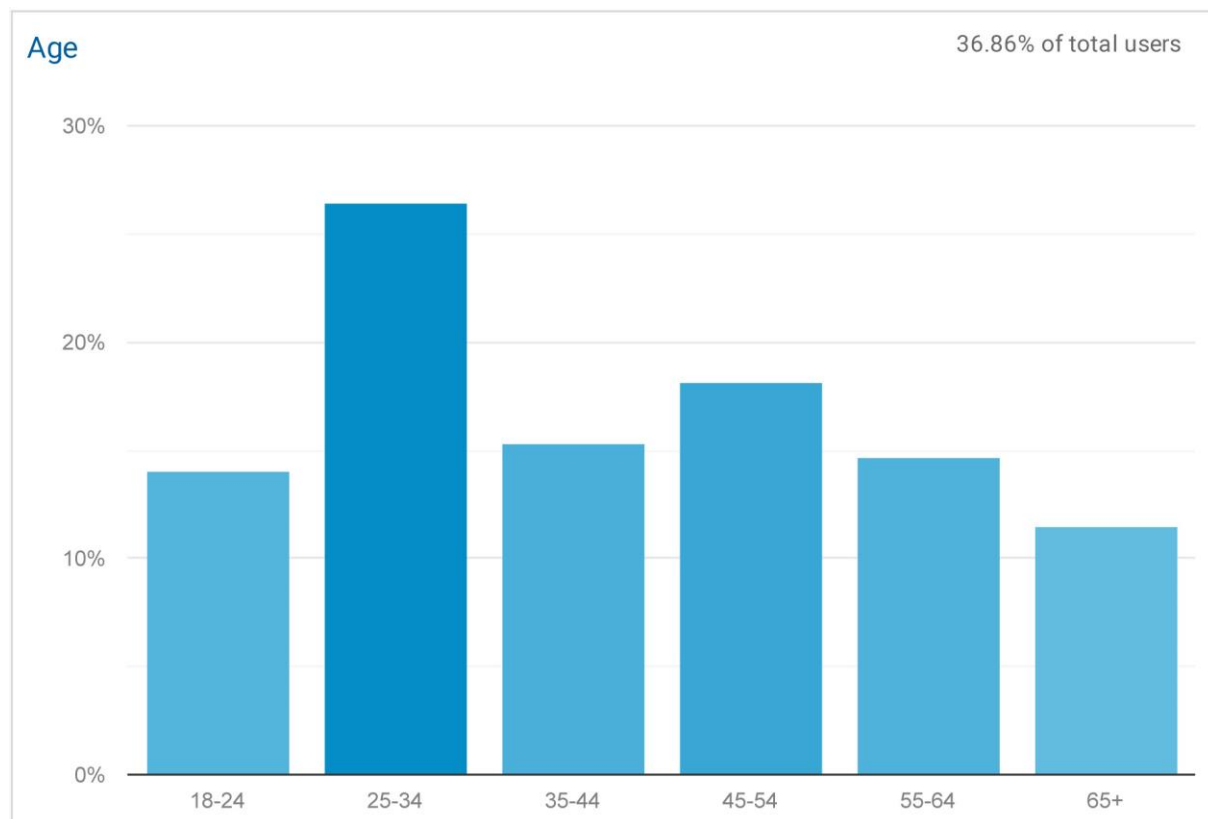
Page	Pageviews ↓	Unique Pageviews	Avg. Time on Page
	<b>11,207</b> % of Total: 100.00% (11,207)	<b>8,513</b> % of Total: 100.00% (8,513)	<b>00:01:58</b> Avg for View: 00:01:58 (0.00%)
1. /	<b>5,147</b> (45.93%)	<b>3,902</b> (45.84%)	00:02:47
2. /hydrogen-fuel-cell-technology/	<b>1,211</b> (10.81%)	<b>880</b> (10.34%)	00:02:26
3. /news-event/	<b>980</b> (8.74%)	<b>627</b> (7.37%)	00:00:49
4. /partners-4/	<b>859</b> (7.66%)	<b>683</b> (8.02%)	00:01:07
5. /contact/	<b>599</b> (5.34%)	<b>476</b> (5.59%)	00:01:10
6. /why-containerized-hydrogen-power-plants-make-sense/	<b>541</b> (4.83%)	<b>436</b> (5.12%)	00:02:28
7. /the-grasshopper-pilot-plant-is-ready-for-testing/	<b>476</b> (4.25%)	<b>380</b> (4.46%)	00:02:20
8. /press/	<b>241</b> (2.15%)	<b>204</b> (2.40%)	00:01:47
9. /the-100kw-pilot-power-plant-is-under-construction/	<b>163</b> (1.45%)	<b>114</b> (1.34%)	00:00:46
10. /flow-field-simulations-for-a-long-lasting-stack/	<b>119</b> (1.06%)	<b>99</b> (1.16%)	00:02:15
11. /news-event/page/2/	<b>105</b> (0.94%)	<b>86</b> (1.01%)	00:00:30
12. /because-appearance-matters-take-a-look-at-our-exterior-design/	<b>83</b> (0.74%)	<b>65</b> (0.76%)	00:02:02
13. /grasshopper-next-generation-of-flexible-and-cost-effective-mw-size-fuel-cell-power-plant/	<b>68</b> (0.61%)	<b>55</b> (0.65%)	00:01:47
14. /for-a-new-year-of-prosperity-and-full-of-hydrogen/	<b>61</b> (0.54%)	<b>54</b> (0.63%)	00:00:43
15. /periodic-consortium-meeting-seville-2020/	<b>55</b> (0.49%)	<b>44</b> (0.52%)	00:00:48

Figure 30: List of sections ordered by number of visits

Country	Users	% Users
1.  Spain	573	15.12%
2.  United States	383	10.11%
3.  Netherlands	302	7.97%
4.  Germany	291	7.68%
5.  Italy	202	5.33%
6.  United Kingdom	171	4.51%
7.  France	163	4.30%
8.  India	163	4.30%
9.  Finland	149	3.93%
10.  Canada	105	2.77%

Figure 31: List of countries of origin of the page visitors





**Figure 32: Graph of the ages of the page visitors**

## 5 Conclusion

Grasshopper website is the main online tool to present and disseminate all the results and events under the framework of the project. The website is carefully designed to address the identified target groups in the most effective way, and it is the easiest way to ensure the visibility of the project for the EU as well as target audiences, consortium, stakeholders and general public.

The Grasshopper website has been designed as an interactive tool for public information and communication among partners. It will also be a repository for deliverables and a work area for the project participants to share information between each other. It can be continuously improved and updated, in order to maximize the results and share the results with target audiences.

All the information available in the website (also including file depot and intranet pages) will be updated during the project lifetime following project and partners' needs and suggestions.