



FLUIDCELL

ADVANCED M-CHP FUEL **CELL** SYSTEM BASED ON A NOVEL BIO-ETHANOL **FLUID**ISED BED
MEMBRANE REFORMER

FCH JU GRANT AGREEMENT NUMBER: 621196

Start date of project: 01/04/2014

Duration: 3 years

WP10 - Exploitation & Dissemination

D10.6

Final dissemination activity report

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Topic: SP1-JTI-FCH.2013.3.4 Proof of concepts and validation of whole fuel cell systems for stationary power and CHP applications at a representative scale
Funding scheme: Collaborative Project
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Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	
CON	Confidential, only for members of the Consortium	

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Content

1. EXECUTIVE SUMMARY	3
1.1. Description of the deliverable content and purpose	3
1.2. Deviation from objectives	3
2. Description of the activities	4
2.1. Web-site.....	4
2.2. Public communications	4
2.3. Workshop and Conferences.....	5
2.4. Scientific papers.....	8
3. ANNEXES	10



D10.6
Final dissemination activity report

Proj. Ref.: FluidCELL-621196
Doc. Ref.: FluidCELL-WP10-D106-
DLR-POLIMI-21092018-v11.docx
Date: 21-09-2018
Page N°: 3 of 12

1. EXECUTIVE SUMMARY

1.1. Description of the deliverable content and purpose

This report summarizes the dissemination activity carried out along the duration of the FluidCELL project.

Different actions have been taken to disseminate the project achievements. They included activities dedicated to public (i.e. web-site, public presentations summarizing the main targets, newsletter, flyer, specialised magazines) as well as to selected audience through oral presentations, posters and papers in scientific conferences and journals. In many cases works presented during the conferences have been selected for publication on special issues of the journals.

1.2. Deviation from objectives

No deviations.

2. Description of the activities

The dissemination activities carried out in the second part of the FluidCELL project are described according to the following categories.

- Maintenance of a web-page;
- Preparation of public presentations, leaflet and newsletter;
- Attendance to conferences;
- Organization of a workshop;
- Publication of scientific papers;
- Publications to specialised magazines

In the second part of the project, including the extension, the attention was mainly devoted to the scientific community, since the partners of the project took part to many conferences.

The dissemination to the general public was performed in conjunction with other projects related to membrane reactors (e.g. Bionico Project) through the creation of a common newsletter, in order to increase the number of recipients. There were also publications to specialised magazines

2.1. Web-site

A web-site www.fludicell.eu was prepared at the beginning of the project. The portal was adopted to quickly communicate news and events related to FluidCELL.

Since the web-site can be visited by both general public and scientist, it contains general information about the objectives of the project/partnership, main achievements as well as detailed activities/results realized in the project.

All the confidential deliverables are uploaded on the private area of web-site to be shared with the partners, while public deliverables can be downloaded also from the public.

A complete list of dissemination activities, reported in the next sections, is available also on the web-site. Some statistics about the web-site are available from October 2016 to august 2018: more than 1800 users entered the web-site, but about half of them were not looking for this page (bounce rate = 52.55%) and only 11.7% of the users visited the web-site more than once. The average time spent on the web-site is 2 minutes. Detailed statistics can be found in the annex.

2.2. Public communications

i) Public presentations:

The non-confidential project presentation is considered an efficient way to communicate the key-point of the project. The purpose of the public presentation is to present the objectives and the status of the projects, the activity and achievements as well as the events related to the field. The public presentations can be downloaded from the website (<http://www.fluidcell.eu/content/presentations>). The first objective of the public presentations which can be downloaded by any visitor of the web-page is to inform about the project content. Furthermore, not including any confidential content, it could be used by any beneficiary in the consortium to present the FluidCELL project, goals and achievements.

Three public presentations have been delivered during this period:

- The 1st public presentation, describing the project, objectives, consortium and main activities.

- The 2nd public presentation at month 18 with the latest information on the status of the project, activities and achievements.
- The 3rd public presentation shows the progress in the testing and the preparation of the components of the m-CHP unit.
- The 4th public presentation at month 52 (extended end of the project) that shows the entire evolution of the project to the latest results: the prototype and its testing activities.

ii) Leaflet:

As part of the dissemination activity a leaflet of the project has been drafted and printed. This leaflet includes the main information of the project. The leaflet was distributed by the partners at most of the conferences they attended.

iii) Newsletters:

The newsletters are available in the public website (<http://www.fluidcell.eu/content/communication>) and they were also sent via email to the companies/organization involved in the fuel cell and hydrogen sector. To increase the impact and widen the dissemination of the FluidCELL project a common newsletter with other projects involved in membrane reactor technologies was drafted and disseminated in the second part of the project. Finally, the final issue of the FluidCELL newsletter is published for the closing of the project.

iv) Specialised online journal:

FluidCELL project have been disseminated in two different online specialised digital publications:

- Impact (<https://impact.pub/>): Impact is a series of high-quality, open access and free to access science reports designed to enable the dissemination of research impact to key stakeholders. The publication features content from the world's leading research agencies, policy groups, universities and research projects. Impact is published under a CC-BY Creative Commons licence. The publication is distributed to 35'000 stakeholder readers including funding agencies, policymakers, NGO's, universities, academic agencies, research institutes and private sector. In addition, each publication is distributed through IngentaConnect.com the world's largest platform for scholarly information, used by 1.5 million visitors a month and with 30'000 libraries registered.
Title: Fuelling the future: Advanced m-CHP fuel cell system based on a novel bio-ethanol fluidized bed membrane reformer. Impact Magazine, Nov. 2016.
- Open Access Government (<https://www.openaccessgovernment.org/>): Open Access Government is a digital publication that provides an in-depth perspective on key public policy areas from all around the world, including health and social care, research and innovation, ICT, blockchain innovation, government, environment and energy.
Title: Are m-CHP systems the answer to reducing emissions? Open Access Government, Page 264-265 (ISSN 2055-7612 * August 2017).

2.3. Workshop and Conferences

Attendance to workshop and conferences was one of the main ways adopted to communicate the project achievements to the scientific community. Compared to scientific publications, workshop and conferences are really useful because there is a real-time response from the scientific community.

i) Workshop organization

The FluidCELL project was one of the organisers of the 3rd European Workshop on Membrane reactors: Membrane Reactors for Process Intensification, held in Villafranca di Verona, Italy, March 9-10, 2017. The other partners involved in the organization of the event were the projects:

- Memere (<https://www.spire2030.eu/memere>)
- Ferret (<http://www.ferret-h2.eu/>)
- Romeo (<http://www.romeo-h2020.eu/>)
- Bionico (<http://www.bionicoproject.eu/>)

The projects are part of a larger community that accounts for several public-private partnerships, such as the Fuel Cell and Hydrogen Joint Undertaking (FCHJU, <https://www.fch.europa.eu/>) and the Sustainable Process Industry through Resource and Energy (SPIRE, <https://www.spire2030.eu/intro>).

The workshop was successful, with 90 participants, 17 speakers, and 34 contributions collected in the booklet of abstracts. It is worth to mention that part of the audience was composed by people from the industry, which is a sign of their interest in the potentialities of the research in this field. The booklet of abstracts was distributed to the people attending the workshop. Many works presented during this workshop were selected for publication on a special issue of the journal Chemical Engineering and Processing – Process Intensification. Details of the workshop are described in D10.5.

ii) Conferences attendance

The partners of the FluidCELL project actively attended several conferences, giving significant contributions with their presentations (oral or posters). The complete list of these works is reported in Table 1.

Table 1 List of conferences

Institution	Type of work	Title	Conference
1 - TECNALIA	Oral presentation	Palladium based membranes and membrane reactors for hydrogen production and purification	WHEC 2016 - 21st World Hydrogen Energy Conference 2016; Zaragoza (ES); 13-16/06/2016
1 - TECNALIA	Oral presentation	Advanced m-CHP fuel cell system based on a novel bio-ethanol fluidized bed membrane reformer	WHEC 2016 - 21st World Hydrogen Energy Conference 2016; Zaragoza (ES); 13-16/06/2016
1 - TECNALIA	Oral presentation	Fluidized bed membrane reactors for hydrogen production using thin Pd-based (<5 µm) supported membranes	ICIM 2016 - 14th International Conference on Inorganic Membranes 2016; Atlanta, GA (USA); 10-13/07/2016
1 - TECNALIA	Oral presentation	Advanced m-CHP fuel cell system based on a novel bio-ethanol fluidized bed membrane reformer	HYCELTEC 2017 - VI Symposium on Hydrogen, Fuel Cells and Advanced Batteries; Porto (PO); 20-23/06/2017
1 - TECNALIA	Oral presentation	Advanced m-CHP fuel cell system based on a novel bioethanol fluidized bed membrane reformer	EHEC 2018. European Hydrogen Energy Conference 2018. Malaga (Spain), 14-16 March, 2018
1 - TECNALIA	Oral presentation	Thin supported Pd alloy membranes for hydrogen separation	MR4PI, 3rd European Workshop on Membrane reactors: Membrane Reactors for Process Intensifications. Verona, 9-10/03/2017

1 - TECNALIA	Oral presentation	Palladium membranes reactors for hydrogen production	EHEC 2018. European Hydrogen Energy Conference 2018. Malaga (Spain), 14-16 March, 2018
1 - TECNALIA	Other (article for magazine)	Fuelling the future	Impact Magazine. Nov. 2016
1 - TECNALIA	Other (article for magazine)	Are m-CHP systems the answer to reducing emissions?	Open Access Government, Page 264-265 (ISSN 2055-7612, August 2017)
2 - TU/e	Oral presentation	Proof of concept of a fluidized bed membrane reactor for ethanol reforming	HYPOTHESIS XII - 12th HYdrogen - POWER THEoretical and Engineering Solutions International Symposium; Syracuse (IT); 28-30/07/2017
3 - CEA	Oral Presentation	Investigation on a PEM fuel cell for reformat fuel operation in a micro-CHP system using a membrane reformer	MR4PI, 3rd European Workshop on Membrane reactors: Membrane Reactors for Process Intensifications. Verona, 9-10/03/2017
4 - POLIMI	Oral presentation	PEM fuel cells stack protection from CO-poisoning in a m-CHP system with membrane reformer	WHEC 2016 - 21st World Hydrogen Energy Conference 2016; Zaragoza (ES); 13-16/06/2016
4 - POLIMI	Oral presentation	PEMFC operation with reformat gas in a micro-CHP system based on membrane-assisted reformer	EFCF 2017 - 6th European Fuel Cell Forum; Luzern (CH); 4-7/07/2017.
4 - POLIMI	Oral presentation	Off-design operation of a PEM fuel cell integrated into a micro-CHP system with membrane reformer	FDFC 2017 - 7th Fundamentals and Development of Fuel Cells conference; Stuttgart (DE); 31/01-03/02/2017
4 - POLIMI	Oral presentation	Application and system evaluation of membrane reactors with different fuels	MR4PI; 3rd European Workshop on Membrane Reactors; Verona (IT); 09-10/03/2017
4 - POLIMI	Poster	A comprehensive model of fluidized bed membrane reactor for hydrogen production	MR4PI; 3rd European Workshop on Membrane Reactors; Verona (IT); 09-10/03/2017
4 - POLIMI	Poster	Development of a model of membrane reactor for hydrogen production integrated into a m-CHP system with PEM fuel cells	MR4PI; 3rd European Workshop on Membrane Reactors; Verona (IT); 09-10/03/2017
5 - UNISA	Oral presentation	Comparative study of steam and oxidative steam reforming of ethanol over bimetallic catalysts	ANM 2015-1st International Conference on Hydrogen Energy, 20-22 July 2015, Aveiro, PORTUGAL
5 - UNISA	Oral presentation	Oxidative Steam Reforming of ethanol on mesoporous silica supported Pt-Ni/CeO ₂ catalysts	EFC 2015-European Fuel Cell Technology & Applications, 16-18 December 2015, Naples, ITALY.
5 - UNISA	Oral presentation	Preparation and characterization of novel catalysts supported on mesoporous silica for LT-ESR	ICheaP12 International Conference on Chemical & Process Engineering 19-22 May, Milano, ITALY
5 - UNISA	Oral presentation	Hydrogen production by ethanol reforming over Pt-Ni catalysts supported on rare earth oxides	IMCCRE 2016-International-Mexican Congress on Chemical Reaction Engineering, Queretaro 5th to 9th June 2016 MEXICO
5 - UNISA	Oral presentation	Activity and stability of novel silica-based catalysts for hydrogen production via oxidative steam reforming of ethanol	PRES 201619th-Conference on Process Integration, Modelling and Optimization for Energy Saving and Pollution Reduction, 27-31 August 2016, Prague, CZECH REPUBLIC.
5 - UNISA	Oral presentation	Hydrogen production by ethanol reforming on Ni-based catalysts	CCESC 2016-3rd International Symposium on Catalysis for Clean Energy and Sustainable Chemistry, 7-9 September 2016, Madrid, SPAIN.

5 - UNISA	Oral presentation	Bimetallic and Trimetallic catalysts supported on CeO ₂ -SiO ₂ with high coking resistance for ethanol reforming	HYPOTHESIS XII - Hydrogen POWER THEoretical and Engineering Solutions International Symposium; Siracuse (IT); 27-30/06/2017
5 - UNISA	Oral presentation	Oxidative Steam Reforming of ethanol in a fluidized bed over CeO ₂ -SiO ₂ supported catalysts	EFC17-European Fuel Cell Conference & Exhibition 12-15 December 2017, Naples, ITALY.
5 - UNISA	Oral presentation	Hydrogen production by oxidative reforming of ethanol in a fluidized bed reactor using a Pt-Ni/CeO ₂ -SiO ₂ catalyst	EHEC2018-European Hydrogen Energy Conference 14-16 March 2018, Malaga, SPAIN.
5 - UNISA	Poster	Ethanol Steam Reforming on Mesoporous Silica supported Pt-Ni/CeO ₂ catalysts	GIC 2015-XVIII National Congress of Catalysis, 14-17 June 2015, Amantea (CS), ITALY.
6 - UPORTO	Oral presentation	Three-dimensional modeling of liquid water transport and CO poisoning in a PEMFC operating on reformat	WHEC 2016 - 21st World Hydrogen Energy Conference 2016; Zaragoza (ES); 13-16/06/2016
9 - Quantis	Oral presentation	Can membrane reactors contribute to mitigate climate change? The answer through life cycle assessment	MR4PI; 3rd European Workshop on Membrane Reactors; Verona (IT); 09-10/03/2017

2.4. Scientific papers

The production of scientific literature pushed on journal was abundant: a list of all the papers already published is reported in Table 2.

Table 2. List of papers.

Institution	Title	DOI
1 - TECNALIA	Morphology and N ₂ Permeance of Sputtered Pd-Ag Ultra-Thin Film Membranes	10.3390/molecules21020210
1 - TECNALIA	Development of highly permeable ultra-thin Pd-based supported membranes	10.1016/j.cej.2015.11.060
1 - TECNALIA	Preparation and characterization of ceramic supported ultra-thin (~1 μm) Pd-Ag membranes	10.1016/j.memsci.2017.01.011
1 - TECNALIA	Advanced m-CHP fuel cell system based on a novel bio-ethanol fluidized bed membrane reformer	10.1016/j.ijhydene.2017.03.162
1 - TECNALIA	Palladium based membranes and membrane reactors for hydrogen production and purification: An overview of research activities at Tecnalia and TU/e	10.1016/j.ijhydene.2017.03.067
2 - TUE	Direct route from ethanol to pure hydrogen through autothermal reforming in a membrane reactor: Experimental demonstration, reactor modelling and design	10.1016/j.energy.2017.11.031
2 - TUE	Pt–Ni based catalyst for ethanol reforming in a fluidized bed membrane reactor	10.1016/j.ijhydene.2016.08.045
4 - POLIMI	Performances of a m-CHP system based on fluidized bed membrane reactor fed with bio-ethanol and PEM fuel cell	10.1016/j.ijhydene.2016.03.210
4 - POLIMI	Experimental investigation of PEM fuel cells for a m-CHP system with membrane reformer	10.1016/j.ijhydene.2017.08.046
4 - POLIMI	A comprehensive model of a fluidized bed membrane reactor for small-scale hydrogen production	10.1016/j.cep.2018.01.018
4 - POLIMI	Optimization of PEM Fuel Cell Operation with High-purity Hydrogen Produced by a Membrane Reactor	10.1002/fuce.201700119

4 - POLIMI	Achievements of European projects on membrane reactor for hydrogen production	10.1016/j.jclepro.2017.05.122
5 - UNISA	Activity and Stability of Novel Silica-Based Catalysts for Hydrogen Production via Oxidative Steam Reforming of Ethanol	10.3303/CET1652012
5 - UNISA	Oxidative steam reforming of ethanol on mesoporous silica supported Pt-Ni/CeO ₂ catalysts	10.1016/j.ijhydene.2016.05.071
5 - UNISA	Coke-resistant Pt-Ni/CeO ₂ -SiO ₂ Catalysts for Ethanol Reforming	10.3303/CET1757280
5 - UNISA	Influence of catalytic formulation and operative conditions on coke deposition over CeO ₂ -SiO ₂ based catalysts for ethanol reforming	10.3390/en10071030
5 - UNISA	Renewable Hydrogen from Ethanol Reforming over CeO ₂ -SiO ₂ Based Catalysts	10.3390/catal7080226
5 - UNISA	Highly active and stable Pt-Ni/CeO ₂ -SiO ₂ catalysts for ethanol reforming	10.1016/j.jclepro.2017.08.036
5 - UNISA	Enhancing Pt-Ni/CeO ₂ performances for ethanol reforming by catalyst supporting on high surface silica	10.1016/j.cattod.2017.05.034
5 - UNISA	Oxidative steam reforming of ethanol in a fluidized bed over CeO ₂ -SiO ₂ supported catalysts: effect of catalytic formulation	10.1016/j.renene.2018.02.118
6 - UPORTO	Three-dimensional modeling of PEMFC with contaminated anode fuel	10.1016/j.energy.2018.03.162

3. ANNEX



<http://www.fluidcell.eu>

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Acquisition Overview

10 Oct 2016 - 28 Aug 2018

All Users
100.00% Users

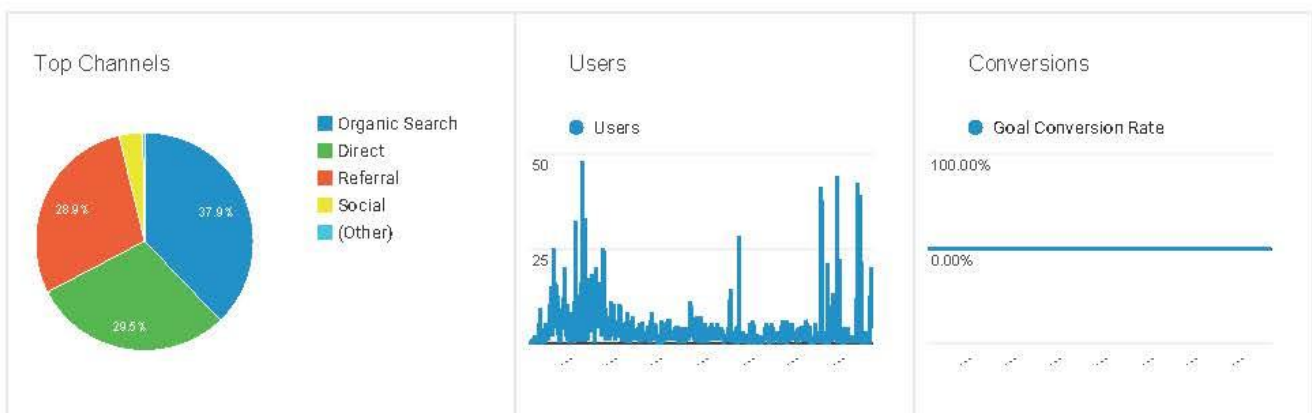
Primary Dimension:

Conversion:

Top Channels

All Goals

[Edit Channel Grouping](#)



	Acquisition			Behaviour			Conversions
	Users	New Users	Sessions	Bounce Rate	Pages/Ses...	Avg. Session Duration	
	1,856	1,864	2,887	52.55%	2.21	00:02:07	<p>Set up a goal. To see outcome metrics, define one or more goals.</p> <p>GET STARTED</p>
1 Organic Search	725			49.81%			
2 Direct	564			53.98%			
3 Referral	553			55.28%			
4 Social	68			46.53%			
5 (Other)	5			100.00%			

To see all 5 Channels click here.



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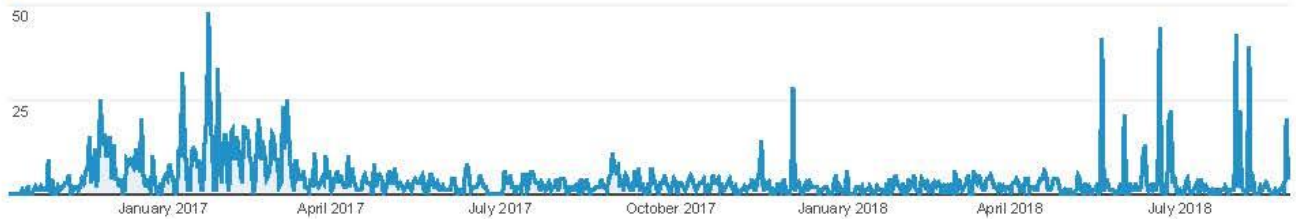
Audience Overview

10 Oct 2016 - 28 Aug 2018

All Users
100.00% Users

Overview

Users



Users

1,856



New Users

1,864



Sessions

2,887



Number of Sessions per User

1.56



Page Views

6,393



Pages/Session

2.21



Avg. Session Duration

00:02:07

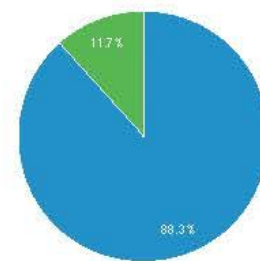


Bounce Rate

52.55%



■ New Visitor ■ Returning Visitor



Language	Users	% Users
1. en-us	604	32.82%
2. fr	282	15.09%
3. it	132	7.06%
4. en-gb	106	5.62%
5. (not set)	100	5.35%
6. it-it	91	4.87%
7. de	70	3.75%
8. es	54	2.89%
9. es-es	53	2.84%
10. de-de	47	2.51%



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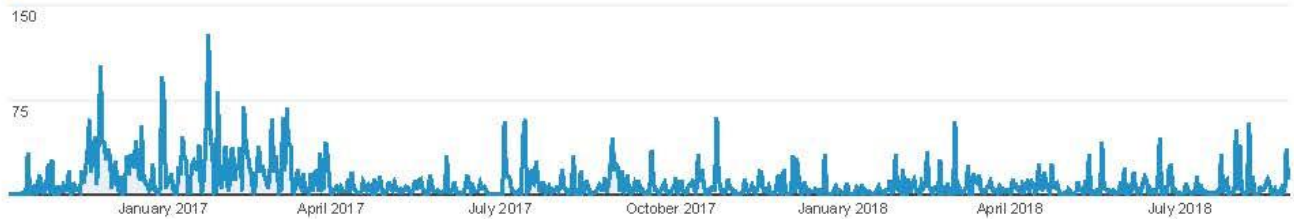
Overview

All Users
100.00% Page Views

10 Oct 2016 - 28 Aug 2018

Overview

Page Views



Page Views

6,393

Unique Page Views

4,906

Avg. Time on Page

00:01:43

Bounce Rate

52.55%

% Exit

44.75%

Page	Page Views	% Page Views
1. /	1,638	25.62%
2. /content/workshops	1,478	23.12%
3. /content/summary	295	4.61%
4. /content/objectives	294	4.60%
5. /content/home	276	4.32%
6. /content/events	267	4.18%
7. /content/dissemination	252	3.94%
8. /partners	212	3.32%
9. /content/communication	171	2.67%
10. /content/presentations	155	2.42%