Grant agreement number: 779730

WP3 MSc course design and operations

D8.4 Dissemination midterm report

Due date: 31/04/2019

Lead participant name: UU

List of contributors: UBHAM, ULB, POLITO, TUD, KIT, DTU, UCTP, KPI

Status: F (final, updated)

Dissemination level: PU (public)

Last updated: 09/12/2019

Document History

Issue Date	Version	Changes Made/Comments
16/05/19	1.0	First version
02/10/19	1.1	2nd version
05/11/19	1.2	3rd version
09/12/19	1.3	4th version
20/07/2021	1.5	EU funding statement update, document dissem. level corrected

Disclaimer and Acknowledgment:
This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement No 779730. This Joint Undertaking receives support from the European Union's Horizon 2020 research and innovation programme, Hydrogen Europe and Hydrogen Europe research.
Any opinions expressed in this report are solely those of the authors and neither of the FCH 2 JU, nor the European Commission or its representatives.

Table of Contents

Abstract

This dissemination midterm report reports represents the list of various activities the consortium was engaged during the first 18 month of the project-life. The activities are related to the promotion, advertising and dissemination of the TeacHy project results. Dissemination pathways have been highlighted in D8.2 “Dissemination and marketing strategy report” in order to effectively promote and engage with fuel cell and hydrogen (FCH) stakeholders. The dissemination channels included: e-learning platform, associate network, conference presentations, project website and social media.

1 Dissemination activities and marketing strategies

Different types of dissemination activities are existing i.e.:

Dissemination activities:

- media coverage
- press release
- research summary document
- flyers, posters, brochures and research briefs
- policy briefs
- study newsletters
- community agency publications and websites and list-serves
- local events, seminars, conferences, community meetings
- letter of thanks to study participants

Marketing Strategies:

- social media
- video tutorials
- blogging
- search engine optimization
- leverage influencers
- lead magnet
- Facebook ads with re-targeting
- affiliate program
- email marketing

Within the project the activities such as local events, seminars, conferences, community meetings, publications and newsletters are the ones that were planned and released as per table below.

Table 1 List of dissemination activities since for the half of the project.

Date	Name and place	Author	No. Of attendees	Description
21-23/05/18	Moderné TRENDY v anorganických technologiách 2018 (Modern trends in inorganic technology 2018) (Banska Stiavnica, SK)	Martin Paidar	48	Poster presentation about prepared specialised course to FCH on conference attracting mainly members of faculties from Slovak republic and Czech republic focusing on chemical technology.
13-15/06/18	Hydrogen Days 2018 (Prague)	Martin Paidar	80	Poster presentation about participation in TeacHy and its impact to FCH education on UCTP Conference focusing specifically on hydrogen technologies with longest tradition in Central and Eastern Europe.
16-21/09/18	Joint European Summer School (Athens)	Robert Steinberger-Wilckens	60	The series of summer schools with primarily targets an audience of university students (Masters and doctoral studies levels), and post-doctoral researchers.
13/11/2018	1st Gathering meeting at ULB-ATM (Brussels)	TeacHy Consortium	40	The presentations covered the developments of the project during the first year, technical topics from industry on hydrogen applications and related matters
03-04/06/19	NET-Tools 1st Educational School (Sofia)	TeacHy Consortium	20	The purpose is a practical experience aiming to explore the developed NET-Tools e-platform for developing and providing e-learning materials and e-tools related to fuel cells and hydrogen technologies to the respective FCH community but also particular groups.
27-29/03/19	Hydrogen Days (Prague)	Bouzek Karel Martin Paidar	120	Poster presentation about TeacHy course structure and UCTP participation. Conference focusing specifically on hydrogen technologies with longest tradition in Central and Eastern Europe.
22/11/19	2nd Gathering meeting at ULB (Brussels)	TeacHy Consortium	25	The presentations covered the developments of the project during the first year, technical topics from industry on hydrogen applications and related matters

The marketing strategy will include Facebook's Ad Targeting option to attract the audience to the project web news and MSc course start.

2 Website and newsletter updates

2.1 Website

This project website was developed and maintained during the project by UU. The website www.teachy.eu constitutes an actual deliverable D8.1: "Website construction" and have all relevant information about the structure as per the description of work (DoA). It is hosted externally at www.123-reg.co.uk. The TeacHy homepage was publicly available in month 1 of the project. All newsletters and forthcoming events and courses are available at the respective section of the main page under tabs "Newsletters", "Events" and "Courses" as can be seen from Figure 1. The total number of visitor's clicks on the website as shown in counter below is 3923. The new tab was created with the link to collaboration project. The main collaboration platform for dissemination and marketing activities if the partnership with NET-Tools project. The teaching materials of European project HyResponse has been already implemented and ready for the students on the e-Learning of NET-Tools.

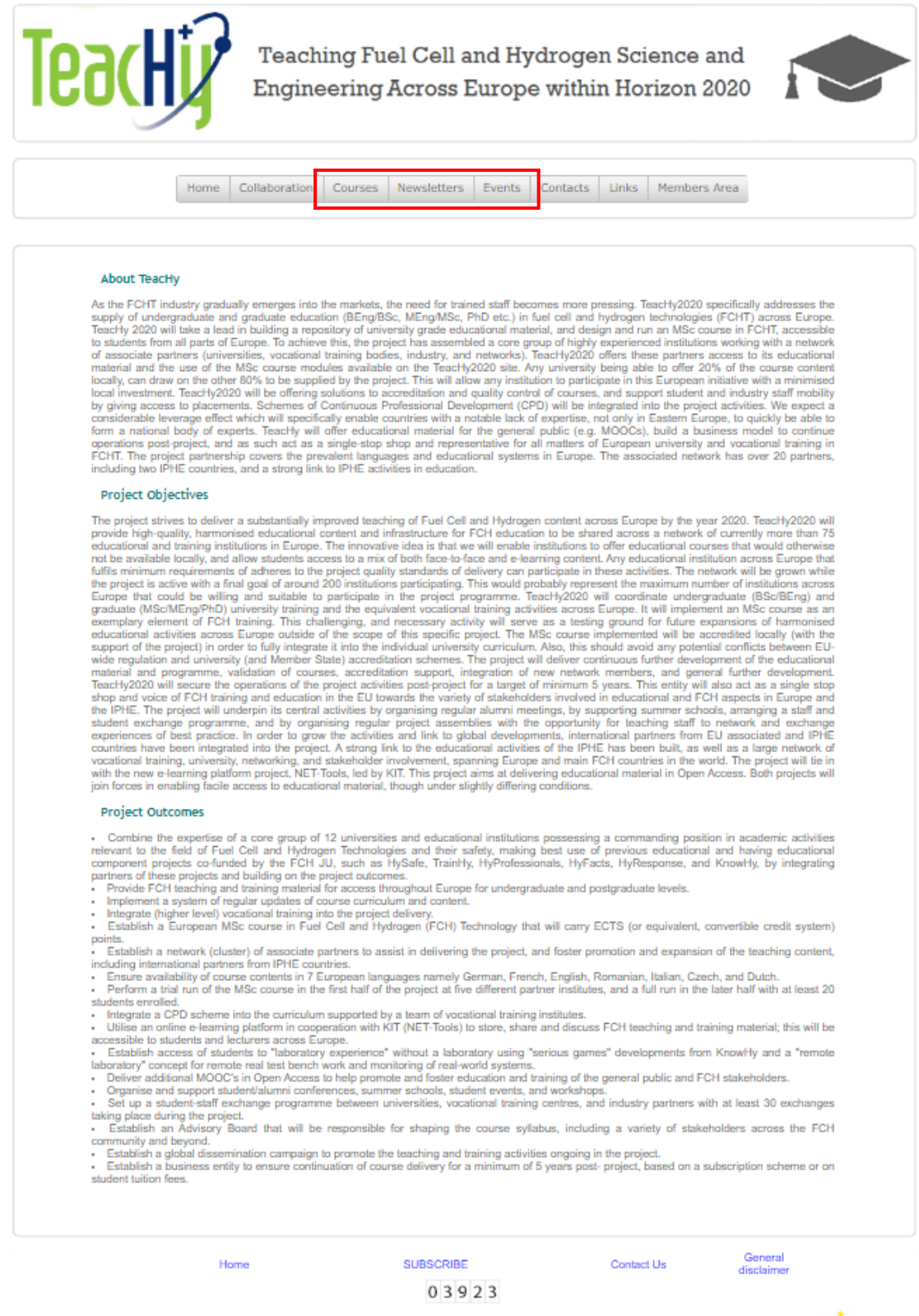


Figure 1. Screenshot of the website homepage.

2.2 Newsletter

The Newsletter is the part of the communication strategy of the project. There three release of the newsletter have been prepared and delivered during the 18 month the project. The content of the all newsletters was agreed in the internal network and shared between the partners before the release. The Newsletter was elaborated starting from the inputs of all partners. The structure was designed using the online platform *mailchimp*. The mailing list was updated with new contacts starting from the beginning of the project with intensive dissemination activity. The content of the Newsletters is mainly focused on the updates and the progress of the project. Learning modules, teaching content, construction of MSc course, remote lab, e-learning platform etc.
The copy of all newsletters is reported in the following paragraph while in ANNEX 1: are reported the main statistics available thanks to the *mailchimp* platform.
The newsletter was also shared via social networks Twitter, LinkedIn and Facebook and also on the project website.

2.2.1 Newsletter 1

Access link to the Newsletter 1: https://mailchi.mp/b1866ca11234/teachy2020-newsletter-1

NEWSLETTER #1

Teaching Fuel Cell and Hydrogen Science and Engineering Across Europe within Horizon 2020

Dear Reader,

It is our great pleasure to introduce you to the development of the educational platform **TeacHy2020** which addresses the supply of undergraduate and graduate education (BEng/BSc, MEng/MSc, PhD etc.) in fuel cell and hydrogen technologies (FCHT) across Europe.

The TeacHy2020 project organised the kick-off meeting in Brussels on 21st November

The main objective of the project is to deliver a substantially improved teaching of Fuel Cell and Hydrogen content across Europe by the year 2020.

TeacHy2020 will take a lead in building a repository of university grade educational material, as well as

design and run an MSc course on FCHT, accessible to students across Europe. To achieve this, the project has assembled a core group of highly experienced institutions working with a network of associate partners (universities, vocational training bodies and industry).
The project partnership covers the prevalent languages and educational systems in Europe. The associated network has over 20 partners, including two IPHE countries, and a strong link to IPHE activities in education.

One main project outcome will be to build and run a 1 year MSc course during the project, accessible to master's students across Europe. Schemes of Continuous Professional Development (CPD) will be integrated into the project activities. In particular, the PgCert in Professional Development (Hydrogen Safety) will be established and started in September 2018.

In addition to collecting the teaching and training material, on an electronic platform, and composing the 1 year specialisation MSc course, TeacHy2020 also aims to use the electronic platform to become a single-stop shop repository for accessing FCHT information by a wider range of target groups, including, the general public and professionals, that can benefit from the resources and initiatives of the project.

The TeacHy2020 content offered by e-learning formats will be integrated onto the NET-Tools platform. In collaboration with NET-Tools a specific section will be deployed on the server reserved for TeacHy2020 learning management system for hosting the content.

Forthcoming events and courses:

- Joint European Summer School on FCH Technology (September 2018)
- Online course PgCert in Professional Development (Hydrogen Safety) (September 2018)
- MSc course trial run (October 2018)

Want to keep up with the latest news and updates from TeacHy2020?
FOLLOW US ON SOCIAL MEDIA!

TeacHy project is a Coordination and Support Action funded by Fuel Cells and Hydrogen 2 Joint Undertaking and supported by the European Commission under the Horizon 2020 Programme. Project reference: 779730.

2.2.2 Newsletter 2

Access link to the Newsletter 1: https://mailchi.mp/d0284a269f00/teachy2020-newsletter-2

NEWSLETTER #2

Teaching Fuel Cell and Hydrogen Science and Engineering Across Europe within Horizon 2020

Dear Reader,

It is our great pleasure to introduce you to our 2nd newsletter where you will learn more about the development and the progress of the project and educational platform know as **TeacHy2020**.

Project progress

During the last few months several project meetings were held in different locations Delft, Birmingham and Copenhagen as well as partners participated in number of online teleconference meetings where met and discussed the project's progress, outcomes and further roadmap.The brief outline and condensed information is presented below.

Project meeting, photo from the lab tour at the University of Birmingham 15 March 2018.

Teaching and module content

The individual modules in the TeacHy master course are starting to take shape. The Master course will be divided into two parts. The first part includes mandatory modules, the second part consist of a number of

advanced modules that allows for more specialisation within the field of fuel cells and hydrogen (FCH). Part 1 - Curriculum covers among others the following topics:

- Basic sciences with a focus on FCH (thermodynamics, kinetics, chemistry, electrochemistry)
- Introductory modules to hydrogen, electrolysers, fuel cells and fuel cell modelling
- Hydrogen safety

Part 2 - Curriculum covers a range of elected modules that builds on knowledge from the first part, and allows for specialisation within a certain field of HFC. Topics are:

- Specific modules for individual fuel cell technologies and systems (high temperature and low temperature)
- Advanced modules with defect chemistry, modelling, characterisation, catalysis, polymer chemistry, degradation and life time testing
- Modules on specific systems for hydrogen technologies. Energy systems and storage, fuel quality and fuel cell electric vehicles
- Modules on societal impact and markets for FCH technology

The specific content of the individual modules are in the process of being formulated so that the first test course can be run in the autumn of 2018.

Construction of the MSc Course

The prepared process plan and the developed module contents will be used to construct the MSc course. This MSc course will be designed to run over the course of one year, initially, trialled in a sub-group of partner institutions, in English or in a language native to the target group. The course is planned to be ready by September 2018 in order to start the trial run in October 2018. The teachers will also be expected to obtain useful feedback from the students using appropriately designed surveys during and at the end of the course for quality control purposes.

In the third year of the project, a full one year MSc course run will be performed on the same target group across the entire core network cluster ensuring that a minimum of 20 students are enrolled.

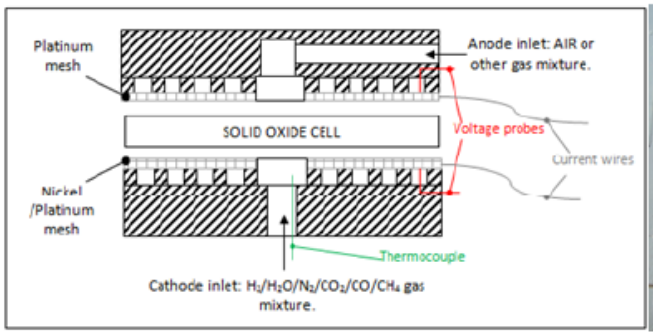
The course will be developed in a structured and organised form. The material will include output from the previous educational EU projects, lecture slides, hand-outs, and scripts from modules run at the various universities. It will also include online material, software used to deliver simulations or serious games, videos, and any other methodologies, materials, or description of equipment used in undergraduate and postgraduate university training.

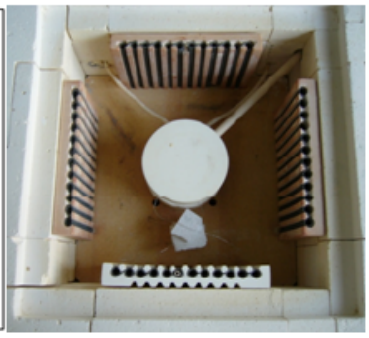
The material will be reviewed, catalogued, and structured into a repository, according to the learning objectives for the module topics.

Development of 'remote lab' concept

POLITO will develop a methodology with which students at universities that do not offer FCH lab work or courses can gain access to laboratory equipment. At POLITO's labs one bench will be connected remotely for remote tests, using web-casting technologies.

A test station for the analysis of circular and square planar SOFC/SOEC has the capability to characterise different size cells (up to 11x11 cm^2) and provide gaseous and liquid fuel feeds. The rig is equipped with an electronic load and an impedance analyser in the range of 1 mHz up to 300 kHz. On-line gas analysis is provided by means of a mass spectrometer.





Local staff has to prepare the test bench (as an example: installing the electrochemical cells in the test bench). This will require an agreement on the time of execution of the test by a remote user. One group of students can use test bench at a time.

During the test, local supervision will be provided by POLITO's staff. The remote interface will ensure that all test parameters, and in particular critical ones (e.g., temperature, current) will be set within safety ranges for the equipment and users.

JESS and student meetings

The annual Joint European Summer School (JESS) on Fuel Cell, Electrolyser and Battery technology has been running in its current format in Greece since 2013. JESS primarily targets an audience of university students (MSc and PhD level) and post-doctoral researchers. Many professionals wish to review these technologies and learn about them, for instance, to boost their knowledge for a newly acquired position or collect credits for a Continuous Professional Development (CPD) scheme. As part of the TeacHy project, workshops will be organised at JESS to further promote and enhance the teaching and training of the TeacHy students.

Similar to the Centre for Doctoral Training (CDT) in Fuel Cells and their Fuels at the University of Birmingham, student meetings will be organised to establish a platform for interaction and networking within the same and different cohorts. These events will serve as platforms for student-led seminars hosted by senior students for the purpose of peer teaching.

Establishment of Continuing Professional Development (CPD) scheme and vocational

TU Delft is leading the activities for integration and implementation of a CPD scheme. The target is that professionals will get CPD credits through the completion of modified modules for different levels that are also adequate for informing professionals in industry, administrations etc. It enhances professional's career prospects in the rapidly growing FCH job market.
The module content provided by the TeacHy project, will be aligned with CPD programmes from various EU Member States. For this purpose, a survey for understanding the conditions of CPD courses in European countries is ongoing. Once the CPD strategy is in place, modules will be registered with appropriate institutes capable of providing accreditation to the programme.

e-learning platform

TeacHy includes a technical section to provide all developed modules and lectures to FCH themes via LMS (Learning Management System) as a completed Master course not only to the students and lecturers, but also to the general public, stakeholders and politicians. The LMS will be installed under an Open Access platform, to provide the course content and additional learning materials as a Massive Open Online Course (MOOC). The LMS will be used to manage all online e-learning content, in addition to MOOCs. These MOOCs will be the 'outside view' of the project. It is planned to host the TeacHy online course material on edX, which serves and operates numerous high quality online courses for several universities. Another ongoing EU funded project known as the NET-Tools will take care of the technical aspects for e-learning while TeacHy develops the course curricula, guidelines and learning materials. There remains great scope for collaboration between the TeacHy and Net-Tool projects showing common objectives in e-learning and online education. In parallel to the technical arrangements of the LMS it is important to develop guidelines and further instructions (e.g. IPR) with the help of the project partners to sustain the platform beyond both projects. Once all content is integrated onto the LMS, continuous maintenance and a trial run will be performed to secure the functionality of the platform.

Forthcoming events and courses:

- Hydrogen Days 2018 (June 13-15, 2018 , Prague, Czech Republic)
- Joint European Summer School on FCH Technology (September 2018)
- Online course PgCert in Professional Development (Hydrogen Safety) (September 2018)
  - Module 1: Principles of Hydrogen Safety
  - Module 2: Hydrogen safety technologies
- MSc course trial run (October 2018)
- The Annual Project Gathering, Université libre de Bruxelles (13 November 2018)
- JU FCH Review days, Bruxelles (14-16 November 2018)
- International School Progress in Hydrogen Safety (11-15 March 2019, Belfast, UK)

Want to keep up with the latest news and updates from TeacHy2020?
FOLLOW US ON SOCIAL MEDIA!

Partners

TeacHy project is a Coordination and Support Action funded by Fuel Cells and Hydrogen 2 Joint Undertaking and supported by the European Commission under the Horizon 2020 Programme. Project reference: 779730.

2.2.3 Newsletter 3

Access link to the Newsletter 3: https://mailchi.mp/57b385d44f42/teachy2020-newsletter-3

NEWSLETTER #3

Teaching Fuel Cell and Hydrogen Science and Engineering Across Europe within Horizon 2020

Dear Reader,

We are moving forward and it is the time for our 3rd newsletter where you will learn more about the development and the progress of the project and educational platform **TeacHy2020**.

Project progress

The TeacHy Consortium and ULB-ATM organised the 1st TeacHy Gathering Event on the 13th of November 2018 in Brussels at the ULB Campus La Plaine.

The event gathered more than 40 delegates and representatives from various organisations: the TIME network, academics, the FCH JU staff, invited industry delegates and others. The presentations covered the developments of the project during the first year, technical topics from industry on hydrogen applications and related matters.

Vocational training interface strategy and contents

A clear trend is visible that the demand of engineers for fuel cell and hydrogen (FCH) industry is increasing (for

multiple types of fuel cells and applications). This directs us towards the need for training opportunities. Several tens of thousands of students and engineers might have to be trained in the coming years. The industry recognises this and a large fraction indicated that "vocational training" is the most suitable form of training that is required to be developed.

The courses designed for vocational training could use the same curriculum and repository from the TeacHy project but with a slightly differently tuned focus and selection than chosen for an academic course. This supports the development of fuel cell education curricula that include general education courses, specialised science and engineering courses with less complex theoretical contents as well as less detailed contents on modelling and analysis.

It is essential to develop and implement an e-learning platform freely accessible to provide training materials as modules (pdf files, videos…). The e-learning platform provides the opportunity for stakeholder to readily access our courses that cover the- most crucial issues of fuel cell and hydrogen technology. Online training courses, webcasts and webinars are all tools that should be used to reach students and engineers in sectors who could benefit from learning about hydrogen and fuel cells. These sectors can include energy service companies, utilities, venture capitalist firms, insurance and underwriter industries, state government workforce development agencies, government officials, first responders, and local public and community outreach.

A list of vocational training contents has been suggested which is likely to be of interest to engineers seeking to operate in the FCH industry. The topics have been chosen based on reports, presenting which fuel cell and hydrogen technologies will enter the market within 2020-2050. The training contents has been also defined based on those technologies that will have the most significant impact on the job market for students and engineers.

Trial Run in Grenoble INP

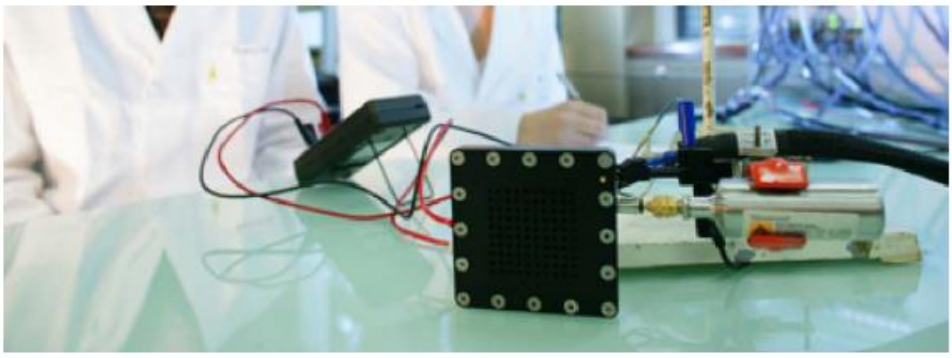
Grenoble INP, Institute of engineering Univ. Grenoble Alpes, is the largest French group for training engineers (5000 students). A Master's degree is already accredited *(Phelma-EPEE, Master SGM-EIP)* addressing the themes of Electrochemistry and Chemical engineering. As part of the project, we proposed a trial run. Eight students involved in EPEE Master's degree (Electrochemistry and Processes for Energy and Environment, table 1.) are following a

First year of master				Second year of master			
Fall(S7)	ECTS	Spring(S8)	ECTS	Fall(S9)	ECTS	Spring (S10)	ECTS
Methods for Engineers	12	Methods and project	6	Electrochemistry for Energy and Hydrogen	8	Master thesis project	30
Basis Chemical engineering	6	Advanced Chemical engineering	6	Electrochemical engineering	6		
Basis Electrochemistry	6	Advanced Electrochemistry	6	FCHT	16		
		Materials	6				
Languages and Professionalizing Formation	6	Languages and Professionalizing Formation	6				

Syllabus of Master EPEE (Electrochemistry and Processes for Energy and Environment) with semester S9 specialising in Fuel Cells and Hydrogen Technologies.

In the FCHT module, 12 ECTS points are dedicated to a module developed in the TeacHy programme (e-Learning module on Principles of Hydrogen Safety developed at Ulster University). 4 ECTS points concern lab practicals on electrochemistry materials for energy, electrochemical hydrogen compression and purification as well as teaching materials for electrochemistry.

We will be able to benefit from feedback on these modules and their expectations on a blended learning training programme.



Lab practical on fuel cells.

e-Learning module: Principles of Hydrogen Safety at Ulster

Within the time frame of the project the mandatory module "Principles of Hydrogen Safety" was developed at Ulster University for the MSc course. This module is delivered fully online or face-to-face as a block-release and focuses on the fundamentals of hydrogen safety science and engineering. It combines a variety of disciplines in an engineering framework 'Principles of Hydrogen Safety' that includes but not limited to relevant regulation, codes and standards. Insight into these principles is developed to enable the student to understand the origin and phenomenology of hydrogen safety problems involving unscheduled releases and dispersion of expanded and under-expanded jets, ignition mechanisms, microflames, hydrogen jet fires and associated hazard distances, etc. The case studies are part of the module to reinforce the best practice in hydrogen safety. The teaching and learning is underpinned by the use of contemporary tools from online NET-Tools e-Laboratory of hydrogen safety.

The list of lectures to be covered during the 12 week module:

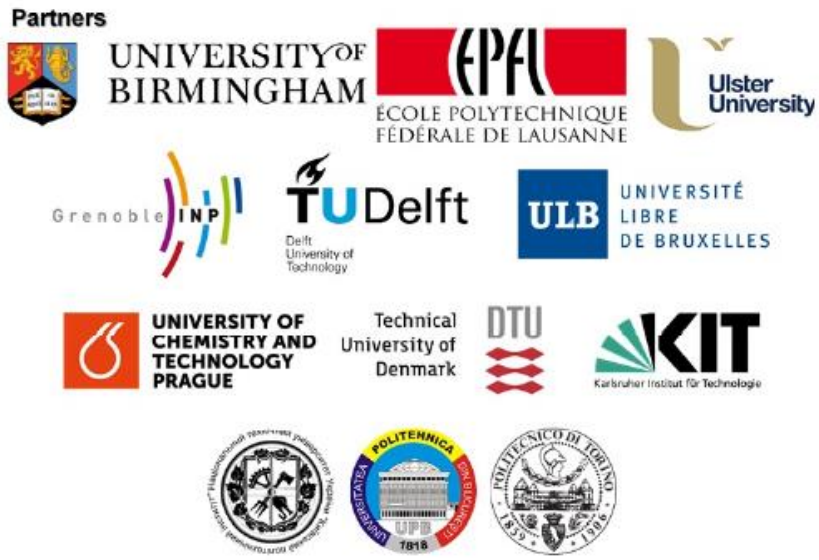
1. Introduction to hydrogen safety
2. Hydrogen properties and hazards, comparison with other fuels
3. Regulations, Codes and Standards (RCS) and hydrogen safety engineering
4. Unignited releases
5. Ignition of hydrogen mixtures
6. Microflames
7. Jet fires - Part 1
8. Jet fires - Part 2
9. Hydrogen permeation
10. Compatibility of metallic materials with hydrogen
11. Materials for hydrogen technologies
12. Case studies

These lectures are designed to be delivered sequentially in the order shown above. At the end of each lecture there is a short multiple-choice quiz aimed at helping students to assess their level of understanding of the content in each lecture. However, in order to progress to the next lecture, he/she needs to achieve a score of 80% or above. It is envisaged that one lecture is completed per week. Provided discussion boards are dedicated for each lecture for students to raise any questions during the course of study.
Apart from 12 lectures, there will be 2 coursework assignments released in the middle and at the end of the module.

Forthcoming events and courses:

- International School Progress in Hydrogen Safety (11-15 March 2019, Belfast, UK)
- Online course PgCert in Professional Development (Hydrogen Safety)
  - Module 1: Principles of Hydrogen Safety (Semester 1)
  - Module 2: Hydrogen safety technologies (Semester 2)

Want to keep up with the latest news and updates from TeacHy2020?
FOLLOW US ON SOCIAL MEDIA!



TeacHy project is a Coordination and Support Action funded by Fuel Cells and Hydrogen 2 Joint Undertaking and supported by the European Commission under the Horizon 2020 Programme. Project reference: 779730.

2.3 Twitter

The twitter account https://twitter.com/TeacHy2020 has been created at the beginning of the project. All newsletters and relevant news were twitted. At the moment of report writing there are 77 followers of the channel as can be seen from the Figure 2. The followers are collected mainly from the newsletter and the website.

Figure 2. Twitter account screenshot.

2.4 Newsletter conclusions

The newsletters were regularly issued. In Table 1 are reported the first three newsletter statistics and compared to key performance indicators (KPI). Successful deliveries were improved, mainly due to the increased number of subscriptions. Compared to the previous newsletters, number of "Open" and of "Clicks" are increased.

Table 2. Newsletter KPIs.

KPI	Newsletter 1	Newsletter 2	Newsletter 3
Sent emails	358	377	1196
Successful deliveries	272	345	1081
Open	147	237	446
Clicks per unique opens %	8.3	9.7	4.4

3 Dissemination amongst FCH community and stakeholders

Dissemination among the academic institutions and industry in Europe has happen by means of newsletters and dedicated publications tailored to the needs of the education and training community via the activity within the LinkedIn group https://www.linkedin.com/groups/12091159/ of the project.

3.1 1st Gathering meeting

The TeacHy Consortium and ULB-ATM organised the 1st TeacHy Gathering Event on the 13th of November 2018 in Brussels at the ULB Campus La Plaine.

The event gathered more than 40 delegates and representatives from various organisations: the TIME network, academics, the FCH JU staff, invited industry delegates and others. The presentations covered the developments of the project during the first year, technical topics from industry on hydrogen applications and related matters.

3.2 JESS 2018

The Joint European Summer School JESS 2018 held in Athens, Greece from 17- 21 September 2018.The advanced classes week offered the Modelling Master Class, and modules on Fuel Cell Vehicles, Business Development and Innovation, and Hydrogen Safety for more advanced students. The two weeks are conducted independently of each other and students were able choose the courses most appropriate to their studies.

3.3 Hydrogen Days

The 10th anniversary edition of the Hydrogen Days conference was organized in March 27th to 29th 2019 by Czech Hydrogen Technology Platform in collaboration with UCT Prague. This event is specific in several ways. At first, it is the conference focusing specifically on hydrogen technologies with longest tradition in Central and Eastern Europa. At second, it combines a scientific forum with dissemination event on recent advances in research and deployment of hydrogen technologies targeted not only on the specialists, but also on public administration, media and interested public. At third, it aims to offer exchange and coordination of activities for the hydrogen specialists originating from the Central and Eastern Europa facing similar problems and issues in implementing these technologies in their home countries. Last, but not least, it intends to build a bridge between Western and Eastern part of Europa. To this target corresponds not only the above-mentioned motto of the conference, but also its program and list of participants. For very important we hold traditional support from the side of FCH JU represented at the event by Carlos Navas. For the attendees, however, was also important presentation of currently ongoing selected demonstration and implementation activities supported either by FCH JU, but also by national or private funds. The true international character of the event is shown in Figure 3.

Figure 3. Hydrogen Days conference statistics.

3.4 Scientific and Technical Council of Naftogaz of Ukraine

On October 31, 2019, the National Joint Stock Company Naftogaz of Ukraine hosted an extended meeting of the Scientific and Technical Council on the organization of the “The Energy Centre for the Future”. The event hosted 76 participants from main governmental and industrial institutions and organisations.

The main topics of the council were:

- Fuel Cells: the basis of hydrogen energetics
- Achievements of hydrogen energy and fuel-cell technologies, integration of Ukraine into European renewable energy development programs.
- Introduction to hydrogen safety, e-Laboratory and Education.
- Hydrogen Energy - Challenges and Business Opportunities for the Naftogaz Group.
- The development of science in hydrogen energy in the world and Ukraine

Figure 4. Photos of delegates and speakers.

3.5 2nd Gathering meeting

On the 22nd of November the 2nd Gathering meeting was organised by ULB at Fondation Universitaire. The event gathered more around 25 delegates and representatives from various organisations. The presentations covered the developments of the project during the second year and further steps.

4 Disseminate amongst general public

Dissemination efforts have been made to target the general public over social media such as setting up a Facebook group https://www.facebook.com/TeacHy2020 for the project, giving regular progress updates on the TeacHy project website and inside the group to provide easy access to the information. The screenshot of the page can be seen in Figure 5. So far there are 127 followers of the page.

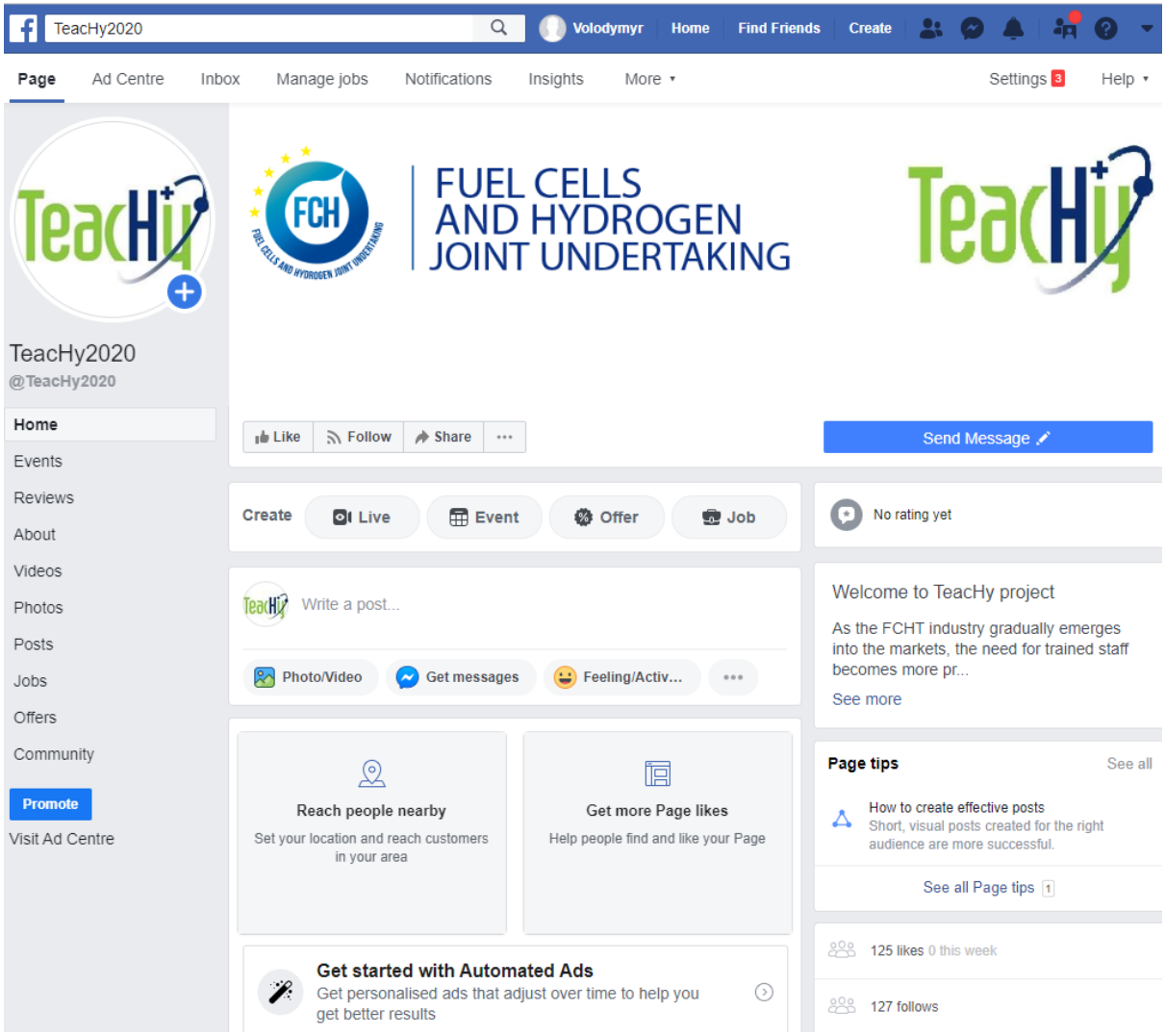


Figure 5. Facebook page screenshot.

Since October the revised strategy were introduced to target the potential audience of the TeacHy project. The audience included the following list of demographic categories, interests and/or behaviour:

- Demographics > Work > Employers > Safety Officer
  - **Safety Officer**
- Demographics > Work > Job titles > Health and Safety Executive
  - **Health and Safety Executive**
- Demographics > Work > Job titles > Safety Advisor
  - **Safety Advisor**
- Demographics > Work > Job titles > Safety engineer
  - **Safety engineer**
- Demographics > Work > Job titles > Safety Representative
  - **Safety Representative**
- Interests > Additional interests > Fuel cell
  - **Fuel cell**
- Interests > Additional interests > Fuel economy in automobiles
  - **Fuel economy in automobiles**
- Interests > Additional interests > Hydrogen

- **Hydrogen**
- Interests > Additional interests > Hydrogen fuel
  - **Hydrogen fuel**
- Interests > Additional interests > Hydrogen vehicle
  - **Hydrogen vehicle**
- Interests > Additional interests > International student
  - **International student**
- Interests > Additional interests > Renewable energy
  - **Renewable energy**
- Interests > Additional interests > Safety
  - **Safety**
- Interests > Additional interests > Safety engineering
  - **Safety engineering**
- Interests > Additional interests > Student
  - **Student**
- Interests > Additional interests > Sustainable energy
  - **Sustainable energy**
- Interests > Hobbies and activities > Vehicles
  - **Electric vehicles**

Three campaigns were started to attract the interest for the upcoming MSc course and traffic for the website, the example can be seen in Figure 6.

Figure 6. MSc course advert campaign.

Over the campaign lifetime it reached 8,220 people as shown in Figure 7 (top) with involvement of 48% of women and 52% men. Most of involvement were via Facebook just above 647 people and the rest were split between Instagram 159 and audience network 103 which is off-Facebook, in-app advertising network for mobile apps. It shows that advertising on Facebook's audience network can reach up to 11% percent more people than on Facebook alone see Figure 7 (bottom).

Campaign name		Results	Reach
Traffic2 Edit Duplicate View Charts	Using ad se...	40 Link Clicks	7,066
Traffic Test		4 Link Clicks	906
Test #1		26 Post Enga...	250
Results from 3 campaigns		—	8,220 People

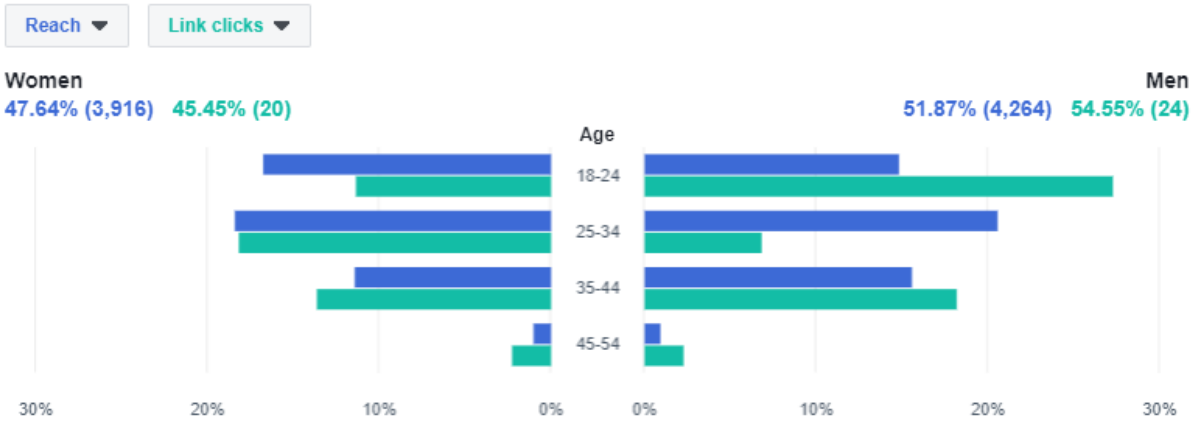


Figure 7. Campaign statistics (top), age and gender (bottom).

ANNEX 1: Newsletter 1-3 statistics:

TeacHy2020 | Newsletter #1

Sent
Wed, Mar 14, 2018 12:43

TeacHy2020 | Newsletter #1 **Sent** 3/14/18 12:43

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TeacHy2020 | Newsletter #1 **Sent** 3/14/18 12:43

Overview

358 Recipients

List: TeacHy

Delivered: Wed, Mar 14, 2018 12:43

Subject: TeacHy2020 | Newsletter #1

0	$0.00	$0.00
Orders	Average order revenue	Total revenue

Open rate 26.5%

List average **22.6%**

Industry average () **0.0%**

Click rate 2.2%

List average **2.1%**

Industry average () **0.0%**

72	6	86	0
Opened	Clicked	Bounced	Unsubscribed

Successful deliveries	**272** 76.0%	Clicks per unique opens	**8.3%**
Total opens	**147**	Total clicks	**800.0**
Last opened	8/1/18 13:05	Last clicked	3/19/18 11:29
Forwarded	**0**	Abuse reports	**0**

TeacHy2020 | Newsletter #1 **Sent** 3/14/18 12:43

Opens by location

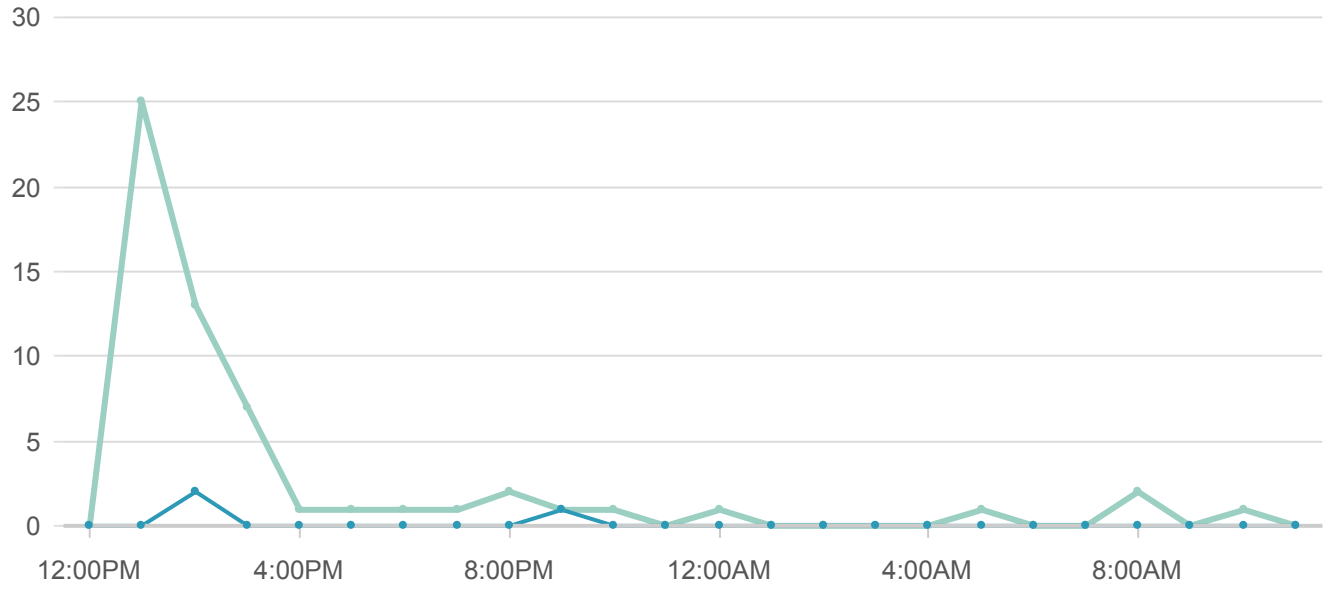
Country	Opens	Percent
Germany	35	25.2%
	35	25.2%
USA	21	15.1%
Netherlands	13	9.4%
Portugal	6	4.3%
Italy	6	4.3%
France	4	2.9%
Canada	3	2.2%
Russia	3	2.2%
Sweden	3	2.2%

TeacHy2020 | Newsletter #1 **Sent** 3/14/18 12:43

Subscriber activity

24-hour performance

Opens Clicks



Top links clicked

https://www.h2fc-net.eu/	**4**
http://teachy.eu	**3**
https://www.linkedin.com/groups/12091159	**1**
https://twitter.com/TeacHy2020	**0**
https://teachy.us17.list-manage.com/unsubscribe?u=d294b744c7615652b8aac9825&id=b9cd7e4171	**0**

Subscribers with most opens

v.shentsov@ulster.ac.uk	**6**

v.molkov@ulster.ac.uk	**23**
g.bandlamudi@zbt-duisburg.de	**5**
peter.wilde@bmw.de	**11**
jan.der.kinderen@hygear.nl	**7**

TeacHy2020 | Newsletter #1 **Sent** 3/14/18 12:43

Click performance

URL	Total	Unique
https://www.h2fc-net.eu/	4 **(50%)**	4 **(57%)**
http://teachy.eu	3 **(38%)**	2 **(29%)**
https://www.linkedin.com/groups/12091159	1 **(13%)**	1 **(14%)**
https://twitter.com/TeacHy2020	0 **(0%)**	0 **(0%)**
https://teachy.us17.list-manage.com/unsubscribe?...	0 **(0%)**	0 **(0%)**
https://www.facebook.com/TeacHy2020/	0 **(0%)**	0 **(0%)**

TeacHy2020 | Newsletter #1 **Sent** 3/14/18 12:43

Social stats

No Facebook activity yet
Learn how to add a like button to your next campaign.

Campaign URL activity - 31 clicks

No geographic clicks have been registered yet

Top 10 referrers

Referrer	Clicks	First click	Last click
https://mailchi.mp/	2	3/31/18 13:07	3/31/18 13:08

TeacHy2020 | Newsletter #1 **Sent** 3/14/18 12:43

Advanced reports

Email domain performance

Domain	Email	Bounces	Opens	Clicks	Unsubs
airliquide....	8 (**2%**)	3 (**38%**)	3 (**60%**)	0 (**0%**)	0 (**0%**)
viessman...	6 (**2%**)	1 (**17%**)	4 (**80%**)	0 (**0%**)	0 (**0%**)
ec.europa...	5 (**1%**)	1 (**20%**)	1 (**25%**)	1 (**25%**)	0 (**0%**)
elcore.com	5 (**1%**)	2 (**40%**)	0 (**0%**)	0 (**0%**)	0 (**0%**)
rolls-royce.com	4 (**1%**)	0 (**0%**)	0 (**0%**)	0 (**0%**)	0 (**0%**)
Other	330 (**92%**)	79 (**24%**)	64 (**25%**)	5 (**2%**)	0 (**0%**)

TeacHy2020 | Newsletter #2

Sent
Mon, Jun 11, 2018 13:12

TeacHy2020 | Newsletter #2 **Sent** 6/11/18 13:12

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TeacHy2020 | Newsletter #2 **Sent** 6/11/18 13:12

Overview

377 Recipients

List: TeacHy **Delivered:** Mon, Jun 11, 2018 13:12

Subject: TeacHy2020 | Newsletter #2

0	$0.00	$0.00
Orders	Average order revenue	Total revenue

Open rate 27.0%

List average **22.6%**

Industry average () **0.0%**

Click rate 2.6%

List average **2.1%**

Industry average () **0.0%**

93	9	32	5
Opened	Clicked	Bounced	Unsubscribed

Successful deliveries	**345** 91.5%	Clicks per unique opens	**9.7%**
Total opens	**237**	Total clicks	**1,500.0**
Last opened	1/22/19 20:09	Last clicked	8/20/18 6:58
Forwarded	**0**	Abuse reports	**0**

TeacHy2020 | Newsletter #2 **Sent** 6/11/18 13:12

Opens by location

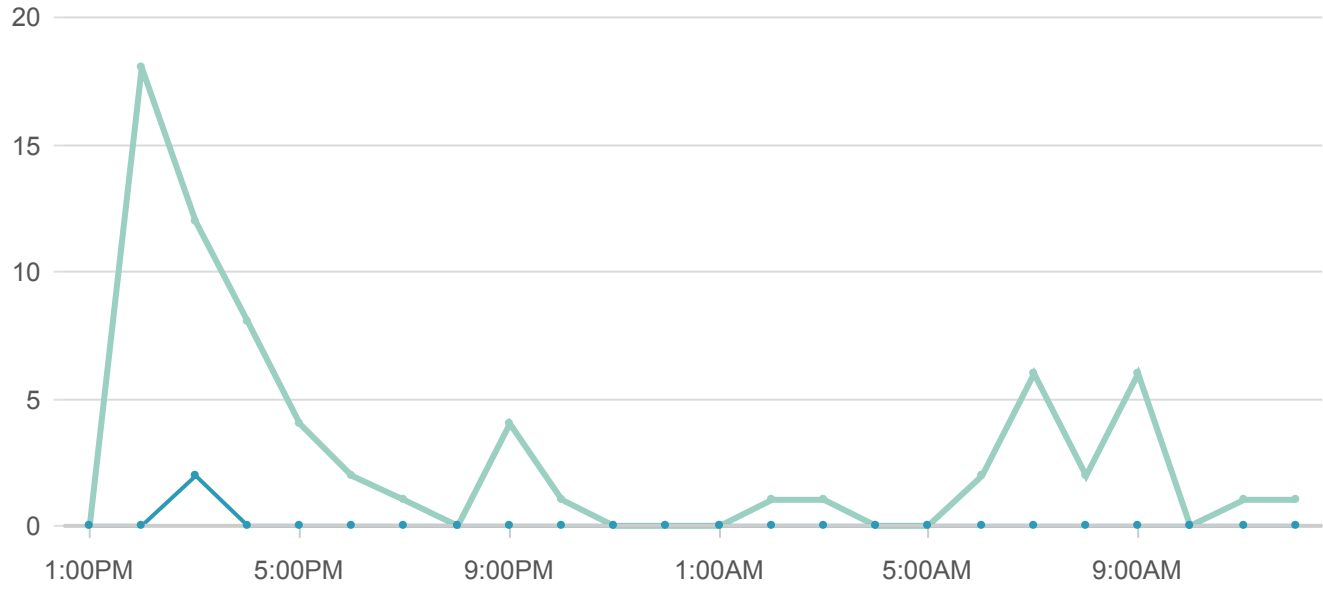
Country	Opens	Percent
USA	37	17.6%
	34	16.2%
Germany	33	15.7%
Belgium	13	6.2%
Netherlands	13	6.2%
Spain	12	5.7%
Norway	10	4.8%
France	9	4.3%
Italy	8	3.8%
Portugal	7	3.3%

TeacHy2020 | Newsletter #2 **Sent** 6/11/18 13:12

Subscriber activity

24-hour performance

Opens Clicks



Top links clicked

https://www.ulster.ac.uk/courses/201819/principles-of-hydrogen-safety-16687	**7**
http://www.jess-summerschool.eu/	**4**
http://www.hydrogendays.cz/2018/	**3**
https://www.ulster.ac.uk/courses/201819/hydrogen-safety-technologies-16688	**1**
https://www.ulster.ac.uk/conference/progress-in-hydrogen-safety	**0**

Subscribers with most opens

michiel.geurds@alliander.com	**9**

j.caspar@mvv.de	**10**
davide.beretta@eifer.org	**7**
raigo@ntbene.ee	**7**
n.a.al-mufachi@bham.ac.uk	**22**

TeacHy2020 | Newsletter #2 **Sent** 6/11/18 13:12

Click performance

URL	Total	Unique
https://www.ulster.ac.uk/courses/201819/principle...	7 **(47%)**	6 **(50%)**
http://www.jess-summerschool.eu/	4 **(27%)**	2 **(17%)**
http://www.hydrogendays.cz/2018/	3 **(20%)**	3 **(25%)**
https://www.ulster.ac.uk/courses/201819/hydroge...	1 **(7%)**	1 **(8%)**
https://www.ulster.ac.uk/conference/progress-in-...	0 **(0%)**	0 **(0%)**
https://www.linkedin.com/groups/12091159	0 **(0%)**	0 **(0%)**
https://twitter.com/TeacHy2020	0 **(0%)**	0 **(0%)**
http://www.fch.europa.eu/event/fch-ju-stakeholde...	0 **(0%)**	0 **(0%)**
https://teachy.us17.list-manage.com/unsubscribe?...	0 **(0%)**	0 **(0%)**
http://teachy.eu	0 **(0%)**	0 **(0%)**
https://www.facebook.com/TeacHy2020/	0 **(0%)**	0 **(0%)**

TeacHy2020 | Newsletter #2 **Sent** 6/11/18 13:12

Social stats

No Facebook activity yet
Learn how to add a like button to your next campaign.

Campaign URL activity - 17 clicks

No geographic clicks have been registered yet

No campaign URL activity to report yet.

TeacHy2020 | Newsletter #2 **Sent** 6/11/18 13:12

Advanced reports

Email domain performance

Domain	Email	Bounces	Opens	Clicks	Unsubs
gmail.com	11 (**3%**)	0 (**0%**)	8 (**73%**)	1 (**9%**)	1 (**9%**)
airliquide....	6 (**2%**)	0 (**0%**)	6 (**100%**)	1 (**17%**)	0 (**0%**)
cea.fr	5 (**1%**)	0 (**0%**)	0 (**0%**)	0 (**0%**)	0 (**0%**)
viessman...	5 (**1%**)	0 (**0%**)	4 (**80%**)	0 (**0%**)	0 (**0%**)
eon-ruhrgas.c...	4 (**1%**)	0 (**0%**)	0 (**0%**)	0 (**0%**)	0 (**0%**)
Other	346 (**92%**)	32 (**9%**)	75 (**24%**)	7 (**2%**)	4 (**1%**)

TeacHy2020 | Newsletter #3

Sent
Fri, Nov 23, 2018 12:13

TeacHy2020 | Newsletter #3 **Sent** 11/23/18 12:13

Table of contents

TeacHy2020 | Newsletter #3 **Sent** 11/23/18 12:13

Overview

1,196 Recipients

List: Hands-on DB 1500

Delivered: Fri, Nov 23, 2018 12:13

Subject: TeacHy2020 | Newsletter #3

0	$0.00	$0.00
Orders	Average order revenue	Total revenue

Open rate 20.8%

Click rate 0.9%

List average	**16.9%**	List average	**0.9%**
Industry average ()	**0.0%**	Industry average ()	**0.0%**

225	10	115	7
Opened	Clicked	Bounced	Unsubscribed

Successful deliveries	**1,081** 90.4%	Clicks per unique opens	**4.4%**
Total opens	**446**	Total clicks	**2,200.0**
Last opened	2/28/19 21:31	Last clicked	12/3/18 12:28
Forwarded	**0**	Abuse reports	**0**

TeacHy2020 | Newsletter #3 **Sent** 11/23/18 12:13

Opens by location

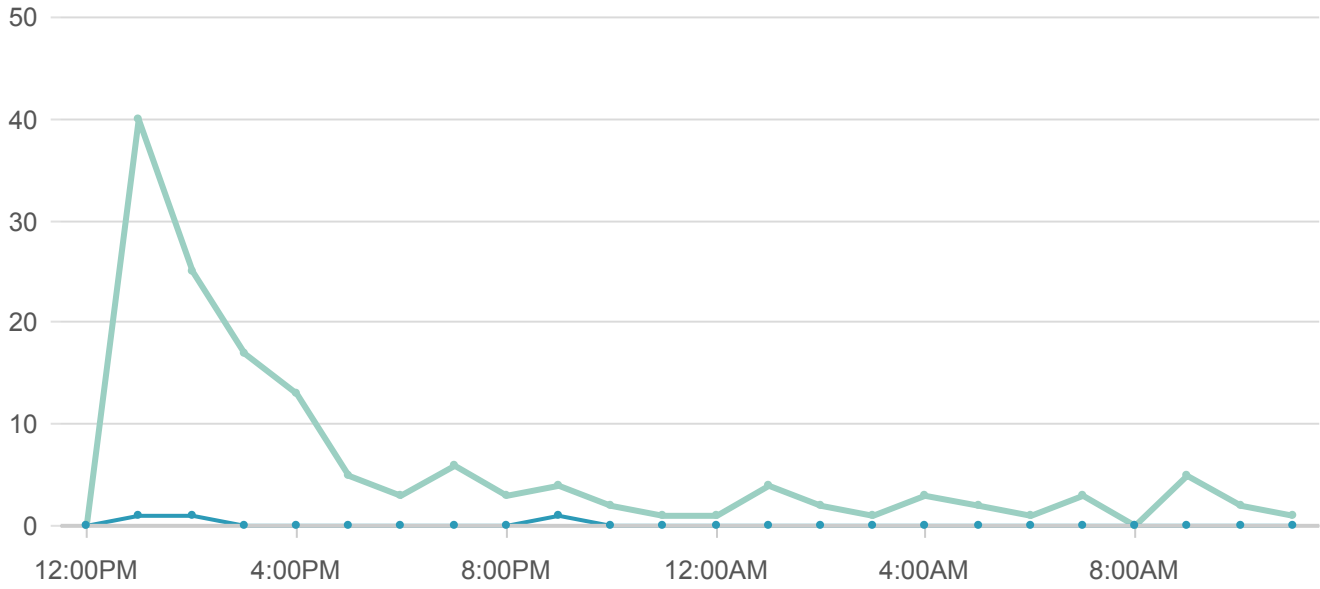
Country	Opens	Percent
USA	105	25.5%
	89	21.6%
Russia	41	10.0%
Hong Kong	29	7.0%
Italy	23	5.6%
France	23	5.6%
Germany	13	3.2%
Australia	12	2.9%
Spain	10	2.4%
Belgium	9	2.2%

TeacHy2020 | Newsletter #3 **Sent** 11/23/18 12:13

Subscriber activity

24-hour performance

Opens Clicks



Top links clicked

https://www.ulster.ac.uk/courses/201819/principles-of-hydrogen-safety-16687	**10**
https://www.ulster.ac.uk/courses/201819/hydrogen-safety-technologies-16688	**3**
https://www.ulster.ac.uk/conference/progress-in-hydrogen-safety	**3**
https://www.facebook.com/TeacHy2020/	**2**
https://teachy.us17.list-manage.com/unsubscribe?u=d294b744c7615652b8aac9825&id=b9cd7e4171	**1**

Subscribers with most opens

amelia.montone@enea.it	**7**

beles@ipta.demokritos.gr	**7**
ceo@investni.com	**77**
anelson@mmiengineering.com	**11**
bewkchow@polyu.edu.hk	**28**

TeacHy2020 | Newsletter #3 **Sent** 11/23/18 12:13

Click performance

URL	Total	Unique
https://www.ulster.ac.uk/courses/201819/principle...	10 **(45%)**	7 **(37%)**
https://www.ulster.ac.uk/courses/201819/hydroge...	3 **(14%)**	3 **(16%)**
https://www.ulster.ac.uk/conference/progress-in-...	3 **(14%)**	3 **(16%)**
https://www.facebook.com/TeacHy2020/	2 **(9%)**	2 **(11%)**
https://teachy.us17.list-manage.com/unsubscribe?...	1 **(5%)**	1 **(5%)**
https://twitter.com/TeacHy2020	1 **(5%)**	1 **(5%)**
http://teachy.eu	1 **(5%)**	1 **(5%)**
https://www.linkedin.com/groups/12091159	1 **(5%)**	1 **(5%)**

TeacHy2020 | Newsletter #3 **Sent** 11/23/18 12:13

Social stats

No Facebook activity yet
Learn how to add a like button to your next campaign.

Campaign URL activity - 52 clicks

No geographic clicks have been registered yet

Top 10 referrers

Referrer	Clicks	First click	Last click
http://www.teachy...	16	11/23/18 12:15	5/14/19 9:31
https://www.linke...	7	11/23/18 12:59	12/14/18 7:41
http://www.teachy... teachy.php	4	11/27/18 17:00	5/2/19 15:36
https://www.faceb...	3	11/23/18 13:02	1/28/19 22:03
https://www.linke...	3	11/23/18 16:55	1/10/19 18:22
http://www.teachy...	3	2/4/19 14:03	3/21/19 13:20
android-app://com.linkedi...	2	11/23/18 14:34	12/1/18 9:43
http://teachy.eu/n...	2	11/26/18 14:00	12/3/18 16:28
https://l.facebook....	2	11/23/18 13:14	5/15/19 20:50
http://www.teachy...	2	11/23/18 13:03	1/18/19 12:06

TeacHy2020 | Newsletter #3 **Sent** 11/23/18 12:13

Advanced reports

Email domain performance

Domain	Email	Bounces	Opens	Clicks	Unsubs
gmail.com	57 (**5%**)	0 (**0%**)	23 (**40%**)	0 (**0%**)	2 (**4%**)
yahoo.com	22 (**2%**)	1 (**5%**)	4 (**19%**)	0 (**0%**)	0 (**0%**)
mail.ru	19 (**2%**)	0 (**0%**)	13 (**68%**)	0 (**0%**)	0 (**0%**)
hotmail.c...	19 (**2%**)	0 (**0%**)	12 (**63%**)	0 (**0%**)	0 (**0%**)
airliquide....	13 (**1%**)	0 (**0%**)	12 (**92%**)	0 (**0%**)	1 (**8%**)
Other	1066 (**89%**)	114 (**11%**)	161 (**17%**)	10 (**1%**)	4 (**0%**)