



# Metal Organic Frameworks for carbon dioxide Adsorption processes in power production and energy Intensive industries



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# Deliverable Report

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Nature of the Deliverable		
R	Document, report (excluding the periodic and final reports)	X
DEM	Demonstrator, pilot, prototype, plan designs	
DEC	Websites, patents filing, press & media actions, videos, etc.	
OTHER	Software, technical diagram, etc.	

Dissemination Level		
PU	Public, fully open, e.g. web	X
CO	Confidential, restricted under conditions set out in Model Grant Agreement	
CI	Classified, information as referred to in Commission Decision 2001/844/EC	

Quality procedure			
Date	Version	Reviewers	Comments
21/10/2019	V1: Layout for Communication plan	Etienne Gay	
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## 1. PROJECT SUMMARY

This report is part of the deliverables from the project "MOF4AIR" which has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 837975.

Power supply and carbon-intensive industries account for a large share of CO<sub>2</sub> emissions. Shifting towards a low-carbon economy requires cost-effective carbon capture solutions to be developed, tested, and deployed. Current solutions do not offer sufficient performances. Adsorption processes are promising alternatives for capturing CO<sub>2</sub> from power plants and other energy intensive industries as cement, steel, or petrochemical industries. In this regard, Metal Organic Frameworks (MOFs) are a widely studied class of porous adsorbents that offer tremendous potential, owing to their large CO<sub>2</sub> adsorption capacity and high CO<sub>2</sub> affinity. However, the performances of MOF-based carbon capture technologies have not been fully evaluated. MOF4AIR gathers 14 partners from 8 countries to develop and demonstrate the performances of MOF-based CO<sub>2</sub> capture technologies in power plants and energy intensive industries. MOF4AIR aims to foster the uptake of CCS technologies by providing a TRL6-reliable solution matching end users' needs, notably by cutting CCS energy penalty by more than 10%. The solutions developed will be highly replicable thanks to the consideration of a wide range of carbon intensive sectors and clusters, notably through the project's Industrial Cluster Board.

More information on the project can be found at <https://mof4air.eu>.

## 2. OBJECTIVE AND EXECUTIVE SUMMARY

The present Dissemination and Communication Plan (D9.1) introduces the MOF4AIR project dissemination and communication strategy and its implementation plan to be used by the Consortium to ensure the high visibility, accessibility and promotion of the project and its results.

This document will be a reference framework for planning the activities to be done and evaluating the impact of communication and dissemination activities and will be updated and adjusted as the project

progresses. The ultimate success of the MOF4AIR project is strongly dependent on well-coordinated dissemination and exploitation activities so that it can continue after the end of the EU funding.

The main purpose of the MOF4AIR Dissemination and Communication Plan is to ensure that the project research and outcomes are widely disseminated to the appropriate target audiences, at appropriate times along the project lifecycle, *via* appropriate methods, and that those who can contribute to the development, evaluation, uptake and exploitation of the MOF4AIR outcomes can be identified and encouraged to interact with the project on a regular and systematic basis.

The target audiences for MOF4AIR mainly cover the research community, end-users, decision makers and general public. These audiences have been grouped into six (6) different categories, namely:

1. **Research and scientific community:** especially material specialists, producers and CO<sub>2</sub> capture specialists included ones from other H2020 projects, as projects issued from NZE-3 and NZE-5;
2. **Industrials and industrial clusters:** professionals from power plants or other energy intensive industries;
3. **Decision makers:** policy makers, influence actors and public authorities;
4. **Engineering / Commercial;**
5. **Investors:** institutional and private funds interested in power supply and low-carbon economy;
6. **Press & Media.**

Different means and tools will be used to disseminate the technologies and the results of MOF4AIR, reaching the target audience effectively:

- Technical database;
- Scientific publications;
- Organisation of workshops;
- Organisation of webinars and/or seminars;
- Organisation of a final international event;
- Links to existing initiatives.

The communication on the project itself includes various tools, such as:

- Corporate design;
- Website of the project (<https://www.mof4air.eu/>);
- Social web 2.0;
- Short videos
- Emailing and communication campaigns;
- Newsletters, articles and press release;
- Conferences and events.

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## 4. INTRODUCTION

The success of MOF4AIR project is strongly dependent on well-coordinated dissemination and exploitation activities. Therefore, MOF4AIR partners have decided to include a specific work package for this purpose: WP9 “Communication, dissemination and exploitation” led by Euroquality.

Special focus will be put on disseminating the project findings to the research community and the industrial sector, which will be the main beneficiaries of the novel technologies, data and knowledge. Dissemination activities will address raising awareness, as well as fostering the adoption of project results by the different stakeholder groups who can directly benefit from the project.

The Communication and Dissemination Plan defines the identification and classification of the target audience, the dissemination methods and goals, the schedule and complementarity of the activities and the measures to assess the success of the dissemination activities. This document also addresses the confidentiality issues related to dissemination and communication of project information.

In the case of the MOF4AIR project, the main dissemination and communication objectives and goals are the following:

- To identify the main stakeholders relevant for the project;
- To raise awareness of the target audiences, particularly the relevant stakeholders and market segments, about the objectives of the project, its results, its benefits, use and applicability;
- To get the necessary feedback to focus on the innovation needs of the sector;
- To foster collaborations with other stakeholders in the technical, commercial and corporative fields with the aim to share resources, achieve synergies and exchange information and knowledge;
- To seek the support of the general public, authorities, lobbies and policy makers;
- To promote agreements with commercial partners and investors.

The target groups for MOF4AIR cover the whole chain of carbon capture for the industry and power supply: from researchers, energy suppliers to industrial parks and their companies. Communication activities will also reach the wider general public.

The document first describes the overall strategy for dissemination and communication, including the purposes and goals, the key messages, the targeted audience, tools and channels, and the related management. Then, it devotes individual sections to dissemination tools.

## 5. LIST OF PARTNERS

MOF4AIR partners are given in Table 1.

Table 1: MOF4AIR partners

No	Participant organisation English name	Type of organisation	Acronym	Country
1	University of MONS	Research Organisation	UMONS	BE
2	SINTEF AS		SINTEF	NO
3	Centre National De La Recherche Scientifique		CNRS	FR
4	Politecnico di Milano		POLIMI	IT
5	Centre for Renewable Energy Sources And Saving Fondation		CRES	GR
6	SIKEMIA	SME	SIKEMIA	FR
7	MOF Technologies Limited	SME	MOFTECH	UK
8	Korea Research Institute of Chemical Technology	Research Organisation	KRICT	KR
9	ENG TECH Co.	SME	ENGTECH	KR
10	Technology Centre Mongstad	End-user	TCM	NO
11	SOLAMAT MEREX		SOLAMAT	FR
12	Türkiye Petrol Rafinerileri A.Ş. (Tüpraş)		TUPRAS	TR
13	Euroquality	SME	EQY	FR
14	Türkiye Çimento Müstahsilleri Birliği	Cement association	TCMA	TR

## 6. STRATEGY FOR DISSEMINATION AND COMMUNICATION

### 6.1. PURPOSE AND GOALS

The aim of the Communication and Dissemination Plan of the MOF4AIR project is to make sure that all those who can contribute to the development, evaluation, uptake and exploitation of the project outcomes can be identified and encouraged to interact with the Consortium on a regular and systematic basis.

For this purpose, the Communication and Dissemination Plan will ensure that the project research and practical outcomes are widely disseminated to the appropriate target audiences, at appropriate times along the project lifecycle, and particularly at key milestones, *via* appropriate methods and channels.

The Communication and Dissemination Plan will aim to create a follower stakeholder community to whom information on the project and its results will be spread in a second phase. This follower stakeholder community will combine all profiles of the target audience described in part 6.2.

As a reminder:

**Dissemination** stands for the public disclosure of the results of the project. It is an active process of promotion and awareness-raising right from the beginning of a project. It makes research results known to various stakeholder groups (like research peers, industry and other commercial actors,

professional organisations, policymakers) in a targeted way, to enable them to use the results in their own work.

**Communication** means taking strategic and targeted measures for promoting the project/action itself and its results to a multitude of audiences, including the media and the public, and possibly engaging in a two-way exchange. The aim is to reach out to society as a whole and in particular to some specific audiences while demonstrating how EU funding contributes to tackling societal challenges.<sup>1</sup>

## 6.2. TARGET AUDIENCE

The target audiences for MOF4AIR communication and dissemination cover the industry sector and potential users of results including the general public.

The dissemination and communication targets have been grouped into six (6) different categories, namely:

- i. **Research and scientific community:** especially material specialists, producers and CO<sub>2</sub> capture specialists included **ones from other H2020 projects**, as projects issued from NZE-3 and NZE-5;
- ii. **Industrials** (end-users) and industrial clusters, professionals from power plants or other energy intensive industries as cement, steel, iron, chemical or petrochemical industries;
- iii. **Decision makers:** policy makers, influence actors and public authorities;
- iv. **Investors:** institutional and private funds interested in power supply and low-carbon economy;
- v. **Engineering / Commercial:** engineering, procurement and construction companies are one link of the CCUS value chain as they are the providers of the different modules needed for CCUS.
- vi. **Press & Media**

## 6.3. KEY MESSAGES

Power generation and carbon-intensive industries are responsible for a large share of the anthropogenic CO<sub>2</sub> emissions to our atmosphere. Shifting towards a low-carbon economy needs cost-effective novel capture solution (CCS) to be conceived, tested and then deployed. Current solutions either suffer from high energy penalties or simply cannot offer sufficient performances. Adsorption process is widely considered as a promising alternative for capturing and concentrating CO<sub>2</sub> from large sources such as power plants and other energy intensive industries as cement, steel, iron, chemical or petrochemical industries.

In that context, the main key message of the MOF4AIR project is that **MOFs-based carbon capture is fully performant in power plants and energy intensive industries.**

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<sup>1</sup> <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/support/faq;keyword=dissemination%20and%20exploitation>

This key message will be sent to the different target audiences at appropriate precision levels and be supported by other messages. These support key messages will be spread throughout the project implementation and will be the following:

*“MOF4AIR will validate the use of MOFs for carbon capture in power plants and energy intensive industries”*

*“MOF4AIR will increase the cost effectiveness of Carbon Capture, Utilisation and Storage (CCUS) and decrease its energy penalty”*

*“MOF4AIR will fine-tune adsorption processes for high performance MOFs”*

*“MOF4AIR will demonstrate the performance of MOF based carbon adsorption in real operation”*

While communication and disseminating about the project, partners will also mention the following: “This project has received funding from the European Union’s Horizon 2020 research and innovation program under grant agreement no 837975.”

For each target audience this message will be adjusted as detailed in the next sections.

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### 6.3.1. INDUSTRIALS

Communication to industrials from power plants or other energy intensive industries (direct customers of the future MOF4AIR solutions) will detail the value proposition made by MOF4AIR:

**Which problem is solved with carbon capture:**

GHG regulation aims to limit GHG emissions in power plants and other energy intensive industries. Plants have to decrease CO<sub>2</sub> emissions and MOF4AIR solutions will support this. As regulations are likely to become more and more aggressive towards emissions, industrials will become more and more encouraged to use such carbon capture solutions.

**What it takes to be integrated:**

Front investment to buy and install the solution and operational costs. The solutions developed within MOF4AIR will be easily integrated without retrofitting needs.

**Who should be interested in integrating these solutions:**

All CO<sub>2</sub> intensive industries (e.g. cement, steel, limestone, petrochemical and chemical plants, waste incinerator and others industrial CO<sub>2</sub> stationary sources of emissions) and fossil-based power supply. Organisations are interested in integrating these solutions, including those participating in the MOF4AIR Industrial Cluster Board (ICB).

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### 6.3.2. DECISION MAKERS

According to the Paris Agreement (COP21.CMP11), many countries have targets to reduce greenhouse gas emissions coming from power supply and energy intensive industries.

Power supply and carbon-intensive industries (cement, steel, limestone, petrochemical and chemical plants and waste incinerator) account for a large share of CO<sub>2</sub> emissions. Carbon capture, utilisation and storage (CCUS) is one of the main technology solutions that can significantly reduce emissions from these key industrial processes (all of which will remain vital building blocks of modern society) as well as in coal and gas power generation and deliver the deep emissions reductions needed across.

The most mature technology, post combustion CO<sub>2</sub> capture by amine scrubbing, does not offer sufficient performances nowadays. Several technologies at different levels of maturity and performances can be envisaged for capturing the CO<sub>2</sub> (e.g. oxy-fuel combustion, chilled ammonia technology, adsorptive processes, calcium looping, etc.).

Almost all climate plans are integrating CCUS in the equation, however research and innovation are still highly needed in order to make such plans viable. MOF4AIR has the ambition to make CCUS a reality for a more sustainable future.

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#### 6.3.3. ENGINEERING / COMMERCIAL

MOF4AIR will present CCUS as a great market opportunity to engineering, procurement, and construction companies and encourage them to develop solutions for decarbonisation of carbon intensive industries and power production.

Several organisations are interested in integrating these solutions such as those participating in the MOF4AIR Industrial Cluster Board (ICB) and could be potential clients for engineering/commercial companies.

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#### 6.3.4. INVESTORS

Carbon capture solutions will be encouraged by states and investment companies having interest in investing in such solutions.

The economics of carbon capture are being improved dramatically and investors will be able to finance the installation of carbon capture installations and to be paid on avoided ton of CO<sub>2</sub>.

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#### 6.3.5. RESEARCH AND SCIENTIFIC COMMUNITY (INCLUDING OTHER H2020 PROJECTS)

Almost all climate plans are integrating CCUS in the equation, however research and innovation are still highly needed in order to make such plans viable. MOF4AIR partners are willing to push forward research on MOF-based carbon adsorption and more largely on carbon capture.

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#### 6.3.6. PRESS & MEDIA

Power supply and carbon-intensive industries (cement, steel, limestone, petrochemical and chemical plants and waste incinerator) account for a large share of CO<sub>2</sub> emissions. Carbon capture, utilisation and storage (CCUS) is one of the only technology solutions that can significantly reduce emissions from these key industrial processes (all of which will remain vital building blocks of modern society) as well as in coal and gas power generation and deliver the deep emissions reductions needed across.

The most mature carbon capture technologies do not offer sufficient performances nowadays. Almost all climate plans are integrating CCUS in the equation, however research and innovation are still highly needed in order to make such plans viable. MOF4AIR has the ambition to make CCUS a reality for a more sustainable future.

## 6.4. TOOLS AND CHANNELS

The 6 target groups listed in 6.2 will be reached with different tools and channels, for communication and dissemination purposes.

Communication on the project will be done thanks to the following channels:

- Website of the project (<https://www.mof4air.eu/>);
- Social web 2.0;
- Short videos;
- Emailing and communication campaigns;
- Articles and press release;
- Conferences and events;
- Promotion video.

Whereas the dissemination channels will be the following:

- Technical database;
- Scientific publications;
- Conferences and events;
- Organisation of workshops, webinars and/or seminars (scientific, technological, and general interest in the CCUS context);
- Organisation of a final international event;
- Links to existing initiatives.

Communication and dissemination supports are made available by Euroquality:

- A leaflet;
- A project power point presentation;
- A poster for scientific events;
- A kakemono (or roll-up)
- Other supports of communication and dissemination will be made available by Euroquality if needed by partners.

These supports are accessible on the owncloud for partners and Annexe 1 presents some visuals.

## 6.5. MANAGEMENT

Dissemination of project results as well as open access to scientific publications and research data is governed by the procedure described in Article 29 DISSEMINATION OF RESULTS — OPEN ACCESS — VISIBILITY OF EU FUNDING of the EC Grant Agreement (EC-GA).

All Consortium partners are contributors to the dissemination and communication activities under the WP9 “Communication, dissemination and exploitation”, led by Euroquality.

MOF4AIR partners will use their networks as detailed above for the following purposes:

- Identify and inform about dissemination opportunities (e.g. events, publications) other than those described in this document;
- Provide relevant information and documentation to enrich the project website (section 7.1.2 - Deliverable 9.2 - 27);
- Post news and project results in social media (section 7.1.3).

The dissemination of the results of the project should not cause intellectual property issues to MOF4AIR partners. To ensure this, all concerned partners will be notified about the contents of each dissemination action related to their activities. If necessary, partners will have the possibility to refuse dissemination of their own know-how.

As T9.1 leader, Euroquality has prepared this Communication and Dissemination Plan, and will keep track of it throughout the project period. The plan will be updated during the project execution on annual basis to consider the results obtained and the exploitation remarks. This will give the opportunity to focus the dissemination and communication on the most relevant publications, events and stakeholders to achieve an effective and proactive dissemination aligned with the exploitation plan.

Impact tracking will be done for all communication and dissemination activities. The collected information will be compiled and updated in several reports:

- Reports on dissemination and communication activities every 6 months at consortium meetings;
- Reviews at monthly discussions.

For all communication and dissemination activities, impact tracking information will be done following the template provided.

The communication and disseminations activities described in this deliverable will be done on different paces:

During three communication campaigns:

- The first one will occur the first year of the project, in June 2020, with the aim of raising the communities' awareness on the project itself;
- The second one will take place at the midterm of the project. This campaign will be focused on the scientific development and the first results;
- Finally, a third communication campaign will take place at the end of the project, aiming to promote the project results and to foster its market uptake.

These communication campaigns use at least the website of the project and social web 2.0. Emailing, newsletters, short videos, articles and press releases will be integrated depending on the progress of activities. Communication campaigns will reach a large audience with a particular attention for the members of the stakeholder database.

Newsletters, articles, and press releases will be published depending on the progress of the project; while a planning for events and conferences is envisioned in part 8.1.1.

These communication and dissemination actions are gathered in the following Gantt.

## 6.6. PLANNING OF DISSEMINATION AND COMMUNICATION ACTIVITIES

Hereunder is presented the current planning of dissemination and communication activities, to be updated during project (GANTT).

PROJECT STRUCTURING			MONTHS																																															
			Year 1												Year 2												Year 3												Year 4											
Tasks description	Leader		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
WP9	Communication, dissemination and exploitation	EQY	MS9												D9.1																																			
T9.1	Communication and dissemination plan	EQY																																																
T9.2	Creation and management of a website	EQY	D9.2												D9.1																																			
T9.3	Communication and dissemination activities	EQY																																					D9.3											
T9.4	Exploitation plan and roadmap	UMONS																																					D9.4											

Table 2: WP9 deliverables

Deliverable number	Deliverable name	WP n°	Short name	Type	Dissem. Level	Delivery date
D9.1	Dissemination and communication plan	WP9	EQY	R	PU	M12
D9.2	Dedicated website	WP9	EQY	DEC	PU	M6
D9.3	Report on communication and dissemination activities	WP9	EQY	R	CO	M48
D9.4	Report gathering the exploitation plan and the research roadmap	WP9	UMONS	R	CO	M48

## 6.7. GLOBAL OVERVIEW ON TOOLS AND TARGET AUDIENCE

Table 3: Overview on tools and target audience

Target Tools	Scientific Community	Engineering / Commercial	Policy Makers	End-users: industries and clusters	Investors	Press & Media	Examples of Measures
	Dissemination						
Scientific Publications	X	(X)		X			High impact factor peer-reviewed scientific journals
Technical database	X	X		X			Creation of an area on the website where relevant stakeholders can have access to knowledge (public deliverables) and innovation development
Conferences and fairs	X	X	(X)	(X)	(X)	(X)	Examples: ENERGY TIME in Paris (FR) - October EuroMOF2019 in Paris (FR) - October 2019 GHGT-15 (Abu Dhabi) – March 2021 KCCUS Korea - Each year in winter
Workshops			(X)	X	X	(X)	Ideas of topic (might evolve)

							- Alternative CO <sub>2</sub> capture processes versus amines CO <sub>2</sub> absorption/regeneration process - Integration CO <sub>2</sub> capture unit on industrial plan
Seminars / Webinars	X	(X)		(X)			They will target the scientific community to disseminate research and development findings
Members of the consortium	X	X	X	X	X	X	The members will be used as a tool of dissemination and each member will use his own networks and means to disseminate the project results.
<b>Communication</b>							
Websites	X	X	X	X	X	X	Project website, corporate websites, collaboration partners' and EU project partners' will be used.
Press releases, News releases (online)	X	X		(X)	X	X	- Launch of Project start - Realisation of the prototype (or press conference, talk)
Mailing campaign	X	X	X	X	X	X	Targeted on relevant stakeholders and adapted to each category
Social media	(X)	(X)	(X)	X	X	X	To reach influencers (journalists, bloggers, multiplying testimonials...), tweets of and into conferences, LinkedIn posts to advertise on the results, professional social media to reach industrial and commercial stakeholders
Short videos	(X)	(X)	X			X	To explain what means MOF4AIR for the partners and what do they expect from the project
Online Newsletter	X	X		X	X		Project newsletters
Conferences and events	(X)	X		X			Examples: events on sustainable energy and zero carbon economy
Members of the consortium	X	X	X	X	X	X	Already used for dissemination, the partners will also be used for communication purposes.

## 6.8. MONITORING OF ACTIVITIES

The implementation and results of communication and dissemination activities will be monitored thanks to an online tracker [accessible here](#) on a monthly basis. The access to this tracker is given separately to partners.

## 7. COMMUNICATION ACTIVITIES

### 7.1. MEANS AND TOOLS OF COMMUNICATION

For each communication tool (unless for the corporate design), the following parts of the report will detail the Purpose, Target Audience, Communication content material, Schedule and the Impact tracking.

A tracker is available for reporting communication and dissemination activities [online on this link](#).

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### 7.1.1. CORPORATE DESIGN

As part of its communication strategy, MOF4AIR will develop a corporate design which will include a logo and a graphic identity. The corporate design will be available on M6. This crucial initial production will allow the development of the website of the project and further communication material and action.

#### ***MOF4AIR graphic charter***

A graphic charter, composed of the typography, the logo and templates of the project has been produced and is available on the project graphic charter. This document brings together and translates the graphic universe of the project MOF4AIR. It is the fundamental support of all its communication (internal and external). The central element is the logotype, which has to be found on all communication media of the project, it is from this logotype that the visual identity of the project will be built.

The main objective of the graphic chart is to maintain a graphical consistency in all the graphic achievements of the project. Its implementation guarantees a homogeneous visual identity that can be appropriated by the project target audience. The graphic charter thus will allow a control of the image of the MOF4AIR Project.



Figure 1: MOF4AIR logo and allowed declination

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### 7.1.2. WEBSITE OF THE PROJECT

#### ***Purpose***

The website (<https://www.mof4air.eu/>) will be the main communication instrument of MOF4AIR and contain project information for all target groups. As a reference communication tool, the website address will feature in all the communication material of the project. The website will be built in a product-oriented manner in order to foster the interest for potential future clients of the developed MOF-based CO<sub>2</sub> capture technologies.

It aims to create, maintain, and enlarge the follower stakeholder community highlighting materials and technologies used and promoting the results of the project. More generally, it will present the project, the partners, the H2020 Programme, the MOFs, the adsorption processes, and the project results.

Newsletters will be produced throughout the project duration and published on the project website.

Press releases, publications relating to innovation in MOF-based CO<sub>2</sub> capture technologies and articles will also be published during the project.

Finally, events such as conferences, workshops, partnering event, symposia or science and society events relevant to MOF4AIR will be advertised.

A private area will be created, password protected, and dedicated to gather all documents related to the project that are important for all partners to have at disposition (proposal, GANTT chart, grant agreement, deliverables in preparation, deliverables submitted and all documents considered relevant).

Considered as a very important and powerful communication tool, the website will be created with great care, and notably with an attractive design to keep the visitor interested and make them come back.

The website will give partial access to the technical database as described in section 8.1.1.

### ***Target audience***

The website aims the 6 target groups identified by the MOF4AIR project.

The website will be an easy and inexpensive means to reach all stakeholders. They will be able to follow the project results and to increase the impact of the project.

Depending on the target of the news shared on the website, the content of the message will be adjusted accordingly to 6.3.

### ***The content***

The website, as the primary communication tool, will contain a wide range of information related to the project and communication material. It will be composed of different pages: a main page giving a product overview, a contact form, and links to secondary pages, including:

→ **CCUS**: what Carbon Capture, Utilisation and Storage is.

This section will also present its estimated techno-economic impacts, so as to attract the interest of potential partners to be included in the product value chain.

The general structure of the MOF4AIR project contains the following sections:

- **Demonstration site**: (accessible here <https://www.mof4air.eu/demonstration-sites/>);
- **The project**: general information (accessible here <https://www.mof4air.eu/>);
- **News and events** (accessible here <https://www.mof4air.eu/#news-events>);
- **Results** (accessible here <https://www.mof4air.eu/#results>).

In the Results section, the partners will update their progress following the achievement of the project milestones by the partners. In the News and Events section, the partners will inform their followers and stakeholders community of the project progress and share with them the events where MOF4AIR partners will be present.

Information on the H2020 programme will also be visible on the website.

A page on the MOF4AIR solutions can also be added: it would present MOF4AIR as MOF-based CO<sub>2</sub> capture technologies and solutions, how they work, for what purpose and potential impacts.

This section will also present its estimated techno-economic impacts, so as to attract the interest of potential partners to be included in the product value chain.

### Schedule

The website will be regularly updated following the progress of the project. Large updates will be done every 6 months to present the progress of the project (milestones and other achievements or results) as presented on the GANTT.

Other updates will be done following participation in events and other news to share on a monthly basis.

### Impact tracking

The effectiveness of the web site will be periodically analysed by means of the Google Analytics tool. This will inform the project partners of:

- Users count visiting the website;
- Average visit time;
- Languages and locations of visitors;
- Devices used for browsing the website.

Table 4: targets for the website of the project

Indicator	Objective	Strategy to meet the objective
<b>Number of users per month</b>	300	The website address will be present on all communication & dissemination supports and partners will promote it on social medias. The link of the project website will be visible on partners' own websites and other web platforms.
<b>Average duration of visits</b>	>2min	The website will have an attractive design, a clear structure and provide regularly updated content.
<b>No. of visits of the News section</b>	20	Partners will send the newsletter regularly to inform of new contents on the website.

Figure 2 shows the monthly number of users of the website: progress has to be made to reach the targeted 300 users.

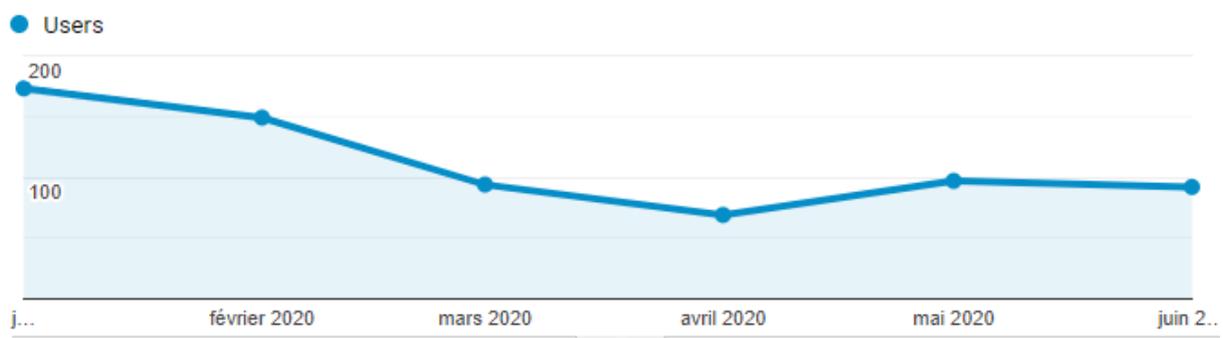


Figure 2: Tracking of the number of users per month

The implementation and results of communication and dissemination activities will be monitored thanks to an online tracker on a monthly basis. The access to this tracker is given separately to partners.

---

### 7.1.3. SOCIAL WEB 2.0

MOF4AIR accounts have been created on 2 main social media: LinkedIn and Twitter. Posts will be made on these social media and shared by partners in order to increase their visibility. Short videos will also be one to introduce the project and the partners.

#### ***Purpose***

Social web applications such as Twitter and LinkedIn will be used to increase the project visibility largely and at relatively low costs. The purpose will also be to make connections with other projects and research groups. These connections are valuable as they increase the exploitation and innovation potential of developments carried out within the project. These social media will be used by 2 manners:

- Thanks to partner's accounts;
- Thanks to MOF4AIR administrative accounts on Twitter and LinkedIn.

#### ***Target audience***

Social web communication activities will target the 6 target groups identified by the MOF4AIR project. Short videos will target especially the general public and policy makers, while giving also some info to the other audiences.

#### ***The content***

The content will not be very deeply scientific but more general. It will invite the reader to see the website and have access to more information there (*e.g.* deliverables).

In the first communication campaign, LinkedIn and Twitter will be used for the following:

- Presentation of partners;
- Presentation of technologies;
- Key messages for target groups.

The videos will also be very general, in order to be easily readable in social networks. They will focus on the partner organisation, their expectation for the project and their implication. They will probably be done in mother language, and complement with English subtitles.

Annexe 12.2 shows some posts made in June 2020.

#### ***Schedule***

Social media is a very cost-efficient means of communication and will be used intensely by partners. Posts on social web will be made during communication campaigns and in regular communication activities, approximately twice a month. Partners aim to reach 1000 accounts per posts as an average and to gain around 300 followers on LinkedIn and 200 on Twitter by the end of the project.



The implementation and results of communication and dissemination activities will be monitored thanks to an online tracker on a monthly basis fed by the statistics displayed on Twitter and LinkedIn. The access to this tracker is given separately to partners.

Using the accounts of partners and those created specifically for the project will enable to reach a large audience at low costs. Table 5 shows some results of these communication activities: more than 22k accounts have been reached in social media related activities.

Table 5: Social media publications made by partners from the project in 2019

#	Purpose of the post	Social Media	Account ID	Partner(s) involved	Date of publication	Main type of audience	Approximate number of people reached	Origin of the audience	Number of sharing
1	Inform about the start of MOF4AIR project	LinkedIn	Etienne Gay	EQY	30/07/2019	Industrials	3614	International	2
2	Inform about the start of MOF4AIR project	LinkedIn	Yannick Lafon	EQY	30/07/2019	Industrials	2703	International	0
3	Inform about the start of MOF4AIR project (MOFTECH's website)	Other	MOF Technologies	MOFTECH	26/07/2019	Industrials		International	
4	Inform about the start of the MOF4AIR project	LinkedIn	MOF Technologies	MOFTECH	26/7/2019	Industrials	944	International	4
5	Inform about the start of the MOF4AIR project	Twitter	MOF Technologies	MOFTECH	26/7/2019	Industrials	2009	International	3
6	Kick off Meeting announcement	LinkedIn	MOF Technologies	MOFTECH	30/7/2019	Industrials	1112	International	3
7	Kick off Meeting announcement	Twitter	MOF Technologies	MOFTECH	30/7/2019	Industrials	2580	International	2
8	Kick off Meeting announcement	LinkedIn	Cagatay Alp Arslan	TCMA	04/08/2019	Industrials	288	International	0
9	Kick off Meeting announcement	LinkedIn	Can Demir, Selcen Başar, Ayşegül Bayat	TUPRAS	30/7/2019	Industrials	9000	International	0

---

#### 7.1.4. E-MAILING CAMPAIGNS AND NEWSLETTERS

##### ***Purpose***

Have a more direct and complete communication with people interested in the project (e.g. wide public registered in the mailing list), or strategic for the project (e.g. members of Industrial Cluster Board).

##### ***Target audience***

All 6 categories of audiences are targeted in communication campaigns.

##### ***The content***

The newsletter will recall the following information:

- Context: What are CCUS and MOF4AIR;
- Objectives;
- Activities ongoing – part that will evolve from an e-newsletter to another;
- Results obtained if any;
- Events in which MOF4AIR partners will participate;
- Partners list.

The website address will systematically appear in the e-newsletter and the receivers will be invited to visit it.

##### ***Schedule***

During three communication campaigns:

- The first one will occur in 2020, with the aim of raising the communities' awareness on the project itself.
- The second one will take place at the midterm of the project. This campaign will be focused on the scientific development and the first results.
- Finally, a third communication campaign will take place at the end of the project, aiming to promote the project results and to foster its market uptake.

##### ***Impact tracking***

The implementation and results of communication and dissemination activities will be monitored thanks to an online tracker on a monthly basis. The access to this tracker is given separately to partners.

---

#### 7.1.5. ARTICLES AND PRESS RELEASE

##### ***Purpose***

Articles and press releases regarding the project activities will be made with the aim to contribute to mentions of the project scopes and results in the media. Articles will be published regularly during the project to inform about the project and to raise awareness. At least 3 press releases (1 per year) will

be published during the project from UMONS, as coordinator. The first one will aim to make stakeholders aware of the project, presenting the objectives, etc. The second will be done in the mid-term of the project, presenting the first results and the expected ones and finally, the last one will be done at the end of the project to present the results and the demonstration.

### ***Target audience***

All 6 categories of audiences are targeted in articles and press release.

### ***The content***

Press releases will be very complete so that they can lead to several articles being produced by magazines and journals. Articles will be published on several sub-topics of the project, for example regarding the transfer of MOF4AIR activities to other sectors. As an example, Annexe 12.3 shows an article published by TCMA.

### ***Schedule***

At least three press releases will be made: in 2020, 2021 and 2022. Articles will be produced more often, following the progress of the project. Table 6 shows some publications and articles made by project partners to inform about the project.



The implementation and results of communication and dissemination activities will be monitored thanks to an online tracker on a monthly basis. The access to this tracker is given separately to partners. Table 6 shows some publications and articles made by project partners to inform about the project.

Table 6: Articles and publications done from the project start to June 2020

#	Title of the article	Title of the journal/magazine/webzine	Partner(s) involved	Date of publication	Main type of audience	Audience of the journal/magazine/webzine (if available)
1	MOF4AIR piloté par la Polytech	LU MONS (paper and online magazine of University of Mons, number 53, special issue 10 years of UMONS)	UMONS	November 2019	Research and scientific community	10000
2	Tüpraş (Online magazine of Tüpraş "RAFİNE" is published on Tüpraş Web Portal on 31.12.2019, which covers general information regarding to MOF4AIR project	Tüpraş (Online magazine of Tüpraş "RAFİNE" is published on Tüpraş Web Portal on 31.12.2019, which covers general information regarding to MOF4AIR project	TUPRAS	31/12/2019	Industrials	5000
3	MOF4AIR Kick-Off Meeting	Cement and Concrete World Magazine	TCMA	July-August 2019	Industrials	
4	MOF4AIR Project	TCMA R&D Institute Laboratories Brochure	TCMA	September 2019	Industrials	
5	MOF4AIR Project website was launched!	TCMA website	TCMA	February 2020	Industrials	
6	The MOF4AIR Project Funded By EU Horizon 2020 Programme, Turkish Cement Manufacturers' Association Takes Place As A Partner	CEMBUREAU website	TCMA	February 2020	Press & Media	
7	How to build a more climate-friendly cement industry?	Arab Union for Cement and Building Materials No.79 March 2020	TCMA	March 2020	Press & Media	Over 800 companies, universities, ministries, chambers and international subscribers.
8	MOF4AIR Project	Tüpraş Annual Report 2019	TUPRAS	March 2020	Press & Media	

---

## 7.1.6. PROMOTION VIDEO

### ***Purpose***

A promotion video is an attractive means of communication that can be used in events, on social media, on the website, in mailing to reach a wide audience and attract people to know more about the project. The video can significantly raise the awareness of viewers and invite them to learn more about CCS, CCUS and carbon adsorption.

### ***Target audience***

The wide public, decision makers as well as press and media will be targeted with this video.

### ***The content***

The video will be 1-2 minutes long. The visuals and music will be developed by a subcontracting company supported by the partners. A text will be included in the video, which will be close to the following one:

#### **Scene 1. Background**

*(if music: dramatic)*

Decades of consumption of fossil fuels for electricity production, residential heating and transportation are at the origin of CO<sub>2</sub> emissions that have made climate change one of the most serious challenges that humanity has to face today. Limiting global warming would require rapid, far-reaching, and unprecedented changes in all aspects of society.

The introduction of renewable energies is part of the solution to hinder climate change but proceeds too slow to cover the global energy needs. As a result, societies are still depending on fossil fuels to cover their energy needs.

For a brighter future, the European commission invests strongly in research directed to find new and better solutions to capture carbon dioxide before it is even emitted into the atmosphere. Capturing CO<sub>2</sub> is the first link in the Carbon Capture, Utilization and Storage of CO<sub>2</sub> chain, which consists in capturing CO<sub>2</sub> to either valorize it in chemicals, minerals or fuels or else store it permanently underground to avoid emissions. Carbon capture can reduce drastically emissions from vital building blocks of our societies such as power plants and heavy industries.

#### **Scene 2: Honor to the European Commission**

*(if music: smooth, with hope...)*

With the Horizon 2020 and upcoming Horizon Europe research programs, the European Commission supports research in a broad field to find new solutions for CO<sub>2</sub> capture concepts based on membranes, solid sorbents, solvents or other techniques, having low cost and environmental footprint.

#### **Scene 3: The MOF4AIR project**

*(if music: 2001 a space odyssey)*

Metal-organic frameworks - MOFs – is a specific class of high surface area porous solids that has shown exceptional potential for selective removal of carbon dioxide from exhaust gases. However, MOFs have

so far not been properly tested at the harsh industrial conditions of real exhaust gases and at the exposure times needed to be used in real CO<sub>2</sub> capture processes.

MOF4AIR is a project funded by the European Commission under the Horizon 2020 program to take MOFs one step further.

Do MOFs withstand real exhaust gases? We will screen a high number of MOFs and choose only the most stable ones for further investigation.

Do well shaped versions of the chosen MOFs withstand prolonged cycling as in real processes?

Are MOF based CO<sub>2</sub> capture technologies cost-competitive and with a lower environmental footprint than existing technology?

We will find out!

Follow us on [www.mof4air.eu](http://www.mof4air.eu) & #MOF4AIR

### **Schedule**

The video will be available in fall 2020.

### **Impact tracking**

The video will be available on Youtube and shared on the website as well as on social media. Partners will easily monitor the number of views. At least 2000 views are expected.

## 8. DISSEMINATION ACTIVITIES

Table 7: Summary dissemination actions

Target audience	Number	Activities implemented	Channels that will be used
Scientific community	100	At least 30 publications on the methodology, approach, solutions proposed and results in relevant journals. Partners will participate to conferences or fairs when it is possible to share the results and solutions of the project. At least 20 universities will be contacted concerning the project and its results and 100 academics will be reached.	i) Forum, conferences, fairs. ii) Scientific publications (in high impact factor peer reviewed journals)
Policy makers and influence actors	20	Recommendations on actions, programs and communication (targets, form and content) will be created and disseminated to PMs. The project will be presented at least 4 times in seminars of international events that include policy makers and at least 4 vulgarisation articles will be published in non-scientific magazines	i) Conferences and seminars ii) Dedicated publications iii) Webinars

Industry and industrial clusters <i>Examples (companies and clusters): Cement industry, energy providers (e.g. coal fired plant), steel industry</i>	50	Networking with successful existing projects, benchmark of existing widespread solutions, contact with companies involved in renewable energy systems, construction area, architects, etc. to share solutions. At least 10 stakeholders per country will be reached.	i) Fairs and market exhibitions ii) Dedicated publications iii) Workshops
Investors	10	Workshops and special content will be elaborated to show the reliability of the solution. Eventual visits to demonstration sites can be imagined. The goal is to reach at least 10 different investing bodies that can foster the development of the solution.	i) Events, meetings ii) Newsletters iii) Specific emails
General public	10000	Consumers will be addressed with the MOF4AIR solution and results through the website contents and newsletter, the social media updates more public-oriented and the public fairs with a direct contact	i) Website and social media ii) Newspapers iii) Public fairs

## 8.1. MEANS AND TOOLS OF DISSEMINATION

Dissemination will be targeting audiences interested in the results of the project. For each dissemination tool (unless for the corporate design), the following parts of the report will detail the Purpose, Target Audience, Communication content material, Schedule, and the Impact tracking.

A tracker is available for reporting communication and dissemination activities [online on this link](#).

---

### 8.1.1. TECHNICAL DATABASE

#### **Purpose**

The Technical database will gather all disclosable information concerning the MOFs and processes investigated during the project. This database will be available on the website. The information will not be very precise to ensure the protection of the IP developed withing the project.

#### **Target audience**

Industrials (e.g. members of the ICB), research and scientific community: Researchers working on carbon capture (material and adsorption process specialists), EPCs and CO<sub>2</sub> intensive industries.

#### **The content**

The families of MOFs studied will be presented, and ranges of performances regarding CO<sub>2</sub>/N<sub>2</sub> adsorption, resistance to contaminants, etc. will be presented. The process studied will be explained (Moving Bed Temperature Swing Adsorption (MBTSA) and Vacuum Pressure Swing Adsorption (VPSA)) and the global systems will be summarised without sharing details.

### **Schedule**

The technical database and its content will be defined at the end of WP2, delayed due to covid-19.

### **Impact tracking**

This database will be on the project website. Number of visitors will be evaluated on the website. At least 300 visitors of the Technical Database are expected.

## 8.1.2. PUBLICATIONS

### **Purpose**

Articles will be published to disseminate about the carbon capture and storage technologies investigated in the project.

### **Target audience**

Research and scientific community, Industrials, Engineering / Commercial

### **The content**

The content of the publications is related with production method, selection and carbon capture capacity of MOFs, regeneration cycle of MOFs.

### **Schedule**

Publication in research papers will be done.

Table 8: planned publications

Newspaper/magazine	Scientific Community	Engineering / Commercial	Policy Makers	End-users: industries and clusters	Investors	Press & Media	Lead partners
Energy Policy; Elsevier	X	X					CRES
Risk Analysis; Wiley Online Library	X	X					CRES
International Journal of Greenhouse Gas Control; Elsevier	X	X					POLIMI, CRES
Renewable and Sustainable Energy Reviews; Elsevier	X	X					CRES
Climate Policy; Taylor & Francis	X	X					CRES
Energy; Elsevier	X	X					CRES
Energies; MDPI	X	X					CRES
Energy Research & Social Science; Elsevier	X	X					CRES
Industrial & Engineering and	X	X					POLIMI

Chemistry Research							
AICHE journal	X	X					POLIMI
LUMONS n°31	X					X	UMONS
Cement and Concrete World	x	x		x	x	x	TCMA

### **Impact tracking**

30 scientific publications are targeted withing MOF4AIR. Audience reached will be assessed and reported on the online tracker.

---

#### 8.1.1. PARTICIPATION TO CONFERENCES AND EVENTS

##### **Purpose**

Participating in events enable to reach targeted audiences (*e.g.* researchers on MOFs, industries, process engineers) and share information about the project to them in person for more impact.

##### **Target audience**

All: research and scientific community, industrials, decision makers, investors, engineering / commercial, press & media.

##### **The content**

The content will be event dependent (*e.g.* MOFs at EUROMOF). Partners will adapt their dissemination strategy to the audience encountered and use appropriate communication material.

## Schedule

The initial planned schedule has been adjusted due to covid-19, as 2020 events have been delayed or will be held online.

Event name	Leading partner (other participating partners)	Date/ period of implementation	Location	Scientific Community	Engineering / Commercial	Policy Makers	End-users: industries and clusters	Investors	Press & Media
ENERGY TIME		October 2019	Paris (FR)						
TCCS-10		June 2019	Trondheim (NO)						
EuroMOF2019	UMONS	October 2019	Paris (FR)	x			x		
EuroMOF 2019 (Industrial Workshop)	MOF Technologies	October 2019	PARIS (FR)	x	x		x		
TCMA Technical Committee Meeting	TCMA	November 2019	Ankara (TR)	X					
<a href="#">Euro-Global Climate Change Conference</a>		September 18-19, 2020	Parsi (FR)						
<a href="#">Climate Change</a>		October 12-13, 2020	Zurich (CH)						
<a href="#">7th Global summit on Climate Change</a>		November 18-19, 2020	Lisbon (PT)						
<a href="#">ICGGICC 2020</a>		November 26-27, 2020	Jerusalem (IL)						
<a href="#">ICGGICC 2020</a>		December 03-04, 2020	Sydney (AU)						
<a href="#">2<sup>nd</sup> Global Congress on Carbon</a>		December 07-08, 2020	Bucharest (RO)						



<a href="#">ICGESP 2020</a>		December 17-18, 2020	Dubai (AE)						
<a href="#">ICGEC 2020</a>		December 28-29, 2020	Paris (FR)						
<a href="#">ICAGGCC 2021</a>		January 11-12, 2021	Singapore (SG)						
<a href="#">ICAGEGW 2021</a>		January 14-15, 2021	Bali (ID)						
<a href="#">ICGET 2021</a>		January 18-19, 2021	Bangkok (TH)						
<a href="#">ICCSLE 2021</a>		February 08-09, 2021	Lisbon (PT)						
<a href="#">ICLECS 2021</a>		February 08-09, 2021	Amsterdam (NL)						
<a href="#">GHGT-15</a>	UMONS	March 15-18, 2021	Abu Dhabi	x	x	(x)	x	x	
<a href="#">9th Conference on Carbon Dioxide as Feedstock for Fuels, Chemistry and Polymers</a>		March 22-24, 2021	Cologne (DE)						
<a href="#">ICAGE 2021</a>		April 29-30, 2021	Jerusalem (IL)						
<a href="#">ICAGEE 2021</a>		May 24-25, 2021	London (UK)						
<a href="#">Carbon Capture, Utilization and Storage (GRS)</a>		May 29-30, 2021	Waterville Valley, NH (US)						
<a href="#">ICATGET 2021</a>		June 15-16, 2021	Toronto (CA)						
<a href="#">ICAPCC 2021</a>		June 28-29, 2021	London (UK)						
<a href="#">3rd Global Congress on Carbon and Carbon-Based Materials</a>		December 13-14, 2021	Istanbul (TR)						
<a href="#">Carbon Management Technology Conference 2021</a>		TBD	Houston TX, (US)						

### ***Impact tracking***

The implementation and results of communication and dissemination activities will be monitored thanks to an online tracker on a monthly basis. The access to this tracker is given separately to partners.

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## 8.1.2. ORGANISATION OF WORKSHOPS, WEBINARS AND SEMINARS

### ***Purpose***

Increase awareness about carbon capture technologies and importance of carbon captures. These means will be the occasion to give more information about carbon capture technologies, MOF and CO<sub>2</sub> utilisation. In the workshops, participants will be invited to work on specific cases regarding carbon capture. In workshops, participants will be more active and more complex topics can be discussed.

### ***Target audience***

Research and scientific community, power plants and energy intensive sectors, especially cement and iron & steel factories, policy makers, EPCs, press will be invited to these events.

### ***The content***

How carbon capture works, what are carbon capture technologies, how do you dimension/integrate a CC unit in an industrial plant?

### ***Schedule***

Four workshops will be organised during the project lifetime:

- UMONS: 1;
- CRES: 1;
- TCMA: 2.

The planning of these workshops is not determined yet, it will be set at the fourth consortium meeting.

At least 4 webinars (or seminars) will be organised, targeting the scientific communities in order to disseminate the R&D findings.

UMONS will organise one seminar gathering members of the Industrial Cluster Board. The organisation of other webinars, seminars and workshops will be discussed at the 4<sup>th</sup> consortium meeting.

At this stage TCMA is envisioning the organisation of seminars with 700-750 attenders in those meetings from different industries in cement production. Seminars and meetings for different CO<sub>2</sub> emitters' industry in Turkey (e.g. Iron&Steel Industry, Sugar Plants, Power Plants) will also be organised. The planning for this will be presented at the fourth consortium meeting.

### ***Impact tracking***

Number of participants (at least 10 per workshop, 20 per webinar/seminar), diversity of countries represented, of sectors and professions. Seminars and workshops will have web retransmissions.

Partners will also participate in some webinars such as the free IAS Webinars from IntAdsSoc on adsorption [available on Youtube](#) and invite their network to do so as well.

---

### 8.1.3. ORGANISATION OF A FINAL INTERNATIONAL EVENT

#### ***Purpose***

The final consortium meeting, held at UMONS, will be the occasion for partners to present all the achievements done in the last 4 years. As a side event, a final conference will be organised to present disclosable information to different stakeholders of targeted industries (including ICB members), researchers, etc. The aim of this conference will also be to set tracks for the next innovations to make on carbon capture.

#### ***Target audience***

Stakeholders of energy intensive industries (including members of the ICB), policy makers, public authorities, investors, press, academic staff from universities.

#### ***The content***

Disclosable results of the project on the materials and processes

#### ***Schedule***

At the last consortium meeting.

#### ***Impact tracking***

Number of participants (at least 20), numbers of followers on the web and social media.

---

### 8.1.4. LINKS TO EXISTING INITIATIVES

#### ***Purpose***

Network with other projects financed under NZE-1-2018 call and other calls related to carbon capture, utilization, and sequestration, adsorption materials, related processes etc. The aim of these activities will be to review the achievements of different projects on a same topic for carbon capture, to exchange good practices, and to network.

#### ***Target audience***

Research and scientific community, Industrials and Engineers / Commercial would be targeted as they can be part of future research and innovation activities funded by the EC or by other frameworks, to take developed technologies to the next level.

#### ***The content***

Mails, meeting at events, sharing of leaflet.

**Schedule**

Discussions will be organised when participating at events

**Impact tracking**

Number of projects with which information regarding MOF4AIR has been exchanged (targeted: 20)

9. ACTIVITIES AFTER THE PROJECT

Activities after the project will be discussed by project partners at the sixth consortium meeting.

10. LIST OF FIGURES

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## 12. ANNEXES

### 12.1. ANNEXE 1: VISUALS OF COMMUNICATION AND DISSEMINATION MATERIAL

## 12.1.1. LEAFLET FOR HAND TO HAND COMMUNICATION AND DISSEMINATION



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 837975 (MOF4AIR).



### Metal Organic Frameworks for carbon dioxide adsorption processes in power production and energy intensive industries

[www.mof4air.eu](http://www.mof4air.eu)

#### IN A FEW WORDS

Carbon capture, utilisation and storage (CCUS) is one of the only technology solutions that can significantly reduce emissions from power supply and carbon-intensive industries.

Metal Organic Frameworks (MOFs) are a widely studied class of porous adsorbents that offer a tremendous potential for carbon capture which has not been fully exploited.

MOF4AIR gathers 14 international partners to develop MOF-based carbon capture technologies and demonstrate them in power plants and energy intensive industries..

#### OBJECTIVES

- Increase the cost effectiveness of CCUS and decrease its energy penalty
- Qualify, validate and demonstrate the most promising MOF materials for carbon adsorption
- Fine-tune two adsorption processes for high performance MOFs: Vacuum Pressure Swing Adsorption and Moving Bed Temperature Swing Adsorption
- Ensure the technology replication in other carbon intensive industries and its sustainability
- Increase stakeholder and public awareness of the challenges, benefits and issues related to carbon capture, transport, use and storage

#### CONCEPT

MOF4AIR will combine high performant MOFs with two efficient carbon adsorption processes:

Vacuum Pressure Swing Adsorption (VPSA) and Moving Bed Temperature Swing Adsorption (MBTSA) while studying the entire CCUS chain.



## ACTIVITIES

- Identification and validation of the best MOFs
- Modelling and techno-economic numerical optimisation
- Lab and real environment validation of shaped materials and separation technologies
- Scale-up and demonstration in industrial environments
- Transferability and replicability to other sectors, ethics and social issues



## DEMONSTRATION AND REPLICATION SITES

### DEMONSTRATION



**TCM (Mongstad, Norway):**  
combined heat and power  
plant and refinery Residue Fluid  
Catalytic Cracking plant (RFCC)



**TUPRAS (Izmit, Turkey):**  
refinery furnace-boiler plant



**SOLAMAT (Marseille, France):**  
waste incineration plant

### REPLICATION



An **Industrial Cluster Board (ICB)** is operating in synergy with the MOF4AIR project to guarantee the replicability and transferability of results.

If you would like more information on the ICB and possibly get part of it, don't hesitate to contact us!

## RESULTS

- Ground-breaking advancement regarding MOFs use for CCUS
- Significant, step-change advances in reductions in energy penalty of carbon capture
- Reduction of the fuel-dependent cost of CO<sub>2</sub> capture
- Construction of 3 demonstrators in of VPSA units using MOFs tailored to industrial application.
- Support the decarbonisation of power plants and carbon intensive industries



contact@mof4air.eu



@MOF4AIR



MOF4AIR-project

Coordinator: Guy De Weireld (UMONS)

## 12.1.2. SCIENTIFIC POSTER FOR EVENTS AND INSTITUTION HALLS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 837973 (MOF4AIR).

# Metal Organic Frameworks for carbon dioxide adsorption processes in power production and energy intensive industries

www.mof4air.eu

### OBJECTIVES

- Increase the cost effectiveness of CCS and decrease its energy penalty
- Qualify and validate the most promising MOF materials for adsorption-based carbon capture
- Fine-tune adsorption processes for high performance MOFs
- Demonstrate the performance of MOF based carbon adsorption in real operation
- Ensure the technology replication in different CO<sub>2</sub> and energy intensive industries and its sustainability
- Increase stakeholder and public awareness of the challenges, benefits and issues related to carbon capture, transport, use and storage

8 countries

11M €

14 partners

48 months  
(07/2019 – 06/2023)

Combine carbon capture processes (VPSA and MBSTA) and innovative highly efficient MOFs in a tailored carbon capture solution to energy intensive industries and their varying composition of off-gases including contaminants

#### OVERALL CONCEPT OF THE PROJECT

MOF4AIR will fine-tune 2 different capture processes that are highly promising for carbon capture in combination with MOFs

**MBSTA**  
(using heating to regenerate the adsorbent)

**VPSA**  
(using vacuum to regenerate the adsorbent)

**Characteristics of MOF(s) selected for demonstration**

- Maximum working capacity above 1 mol.kg<sup>-1</sup> between 1 bar and 0.1/0.15 bar and 298-323 K
- CO<sub>2</sub>/N<sub>2</sub> Selectivity > 30 at 1 bar
- Stable with water, SO<sub>2</sub>, NOx, H<sub>2</sub>S (even in presence of water)
- Heat of adsorption below 50 kJ.mol<sup>-1</sup>

Carbon utilization

CO<sub>2</sub> geological storage

Decarbonisation of industrial processes

Advanced CCUS chain

Process optimization and advanced CCU/CCS chains

- The MOF4AIR consortium considers their performant capture solution as one brick of the global carbon chain
- As compressing CO<sub>2</sub> at high CO<sub>2</sub> purity is needed for transport and utilization or storage and requires the use of energy, MOF4AIR will study the best integration of adsorption process with conventionally used CPU
- In addition to the conventional process optimization of stand-alone VPSA/TSA processes, integrated sorption-CPU process configurations will be compared and systematically optimized from the techno-economic point of view using ad hoc numerical methods for the optimization of flowsheets and adsorption cycles

### DEMONSTRATION

**TCM (Mongstad, Norway):**

- RFCC (Residue Fluid Catalytic Cracker – refinery)
- CHP (Combined Heat and Power – power plant)
- 4 major oil companies: GASSNOVA, EQUINOR, SHELL, TOTAL
- One of the most advanced and the largest post-combustion CO<sub>2</sub> capture pilots

**TUPRAS (Izmit, Turkey):**

- Turkey's largest oil enterprise with 32,5 million m<sup>3</sup> crude processing capacity
- 7<sup>th</sup> largest refinery enterprise in Europe
- Post-combustion flue gases: furnaces, boilers, steam generators, Incinerators, FCC regenerators ...

**SOLAMAT (Marseille, France):**

- Part of Marseille-Fos cluster
- Waste Incinerator
- Pipeline collecting CO<sub>2</sub> from different sources and feeding different applications will be soon set up

### MOF4AIR METHODOLOGY

MOF4AIR consists in parallel developments and TRL upgrades on MOFs and carbon capture processes, leading to a TRL6 demonstration on 3 sites

### MOF4AIR IMPACTS

- MOF4AIR does significant, step-change advances in reductions in energy penalty and thus in the fuel-dependent cost of CO<sub>2</sub> capture, among others by:
  - (i) Producing high performant MOFs;
  - (ii) Proving the performances of the selected capture processes;
  - (iii) Increasing the performances of these CC technologies
- MOF4AIR facilitates the safe and economic integration of CC into industrial clusters - which will lower the barriers to the wider uptake of CCS, in particular for those sectors vulnerable to carbon leakage:
  - (i) Final SPECCA (specific primary energy consumption for CO<sub>2</sub> avoided) for VPSA and MBSTA on all carbon emitting processes studied below 2.5 GJ/N<sub>2</sub>/t<sub>CO2</sub>
  - (ii) Cost of capture for all sectors and sub sectors below 25 €/t<sub>CO2</sub>
  - (iii) Energy penalty below 18%
  - (iv) Incremental cost below 10%
- To prevent CO<sub>2</sub> emissions, MOF4AIR will:
  - (i) include 4 clusters in its Industrial Cluster Board (ICB);
  - (ii) Consider 10+ industrial sectors in the ICB
- MOF4AIR encourages European leadership by: fostering Europe as leader in MOF-based CO<sub>2</sub> adsorption
- MOF4AIR will participate to SDGUN 7 and 13 by:
  - (i) Diminishing CO<sub>2</sub> emissions from power plants and carbon intensive industries by 95%;
  - (ii) Diminishing cost increase from power plants with CCS compared to power plants without CCS by 20%

FOR MORE INFORMATION OR JOIN IT, PLEASE CONTACT US

contact@mof4air.eu | @MOF4AIR | MOF4AIR-project

Coordinator: Prof. Guy De Weiruld (UMONS)

Project Start: 01/07/2019 | Duration: 48 Months

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12.1.3. KAKEMONO FOR EVENTS

 This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 837975 (MOF4AIR)



**MOF4AIR**

**Metal Organic Frameworks for carbon dioxide Adsorption processes in power production and energy Intensive industRies**

[www.mof4air.eu](http://www.mof4air.eu)

MOF4AIR will demonstrate the availability of CO<sub>2</sub> adsorption processes with MOFs in real operating conditions, to reduce energy consumption and environmental impact of CO<sub>2</sub> capture processes, supporting decarbonisation of power plants and carbon intensive industries

  
[contact@mof4air.eu](mailto:contact@mof4air.eu)

  
[@MOF4AIR](https://twitter.com/MOF4AIR)

  
[MOF4AIR-project](https://www.linkedin.com/company/mof4air-project)



## 12.2. ANNEXE 2: SOCIAL MEDIA PUBLICATIONS

### 12.2.1. INTRODUCTION OF MOF4AIR PARTNERS IN SOCIAL MEDIA

#### General information:

- Posts will be published once a day during communication campaign (see planning below);
- Feel free to adjust the text for your organisation, **however, consider the limit of characters for twitter (280)**;
- The text will be similar for Twitter and LinkedIn, an extra text will be added on LinkedIn to invite users to visit our website (see end of document);
- Please send EQY the revised text (if needed) for your organisation by 20/05.

#### Planning:

Day	Topic	Day	Topic
04/06	Consortium teleconference	18/06	TCM
05/06	UMONS	19/06	SOLAMAT
08/06	SINTEF	22/06	TUPRAS
09/06	CNRS	23/06	EQY
10/06	POLIMI	24/06	TCMA
11/06	CRES		
12/06	SIKEMIA		
15/06	MOFTECH		
16/06	KRICT		
17/06	ENGTECH		

#### 12.2.1.1. TWITTER:

##### University of MONS

We begin #MOF4AIR partners' presentation series with our coordinator #UMONS, a Belgian university hosting 10 research Institutes. The Research Institute for Energy brings in #MOF4AIR its expertise in CCUS, design of CO<sub>2</sub> capture processes and gas adsorption. (1/14).

##### SINTEF AS

Today, we present #SINTEF, a Norwegian multidisciplinary research institute contributing to #MOF4AIR with the development of shaping procedures, evaluation of adsorption properties, development of MBTSA process, techno-economic assessment and LCA. (2/14)

### **Centre National De La Recherche Scientifique**

The #CNRS is a French research organisation evaluating and carrying out research for society's benefit. In #MOF4AIR, the CNRS will bring its expertise in synthesis and structural characterization/elucidation of MOFS to find the best candidates for CO<sub>2</sub> capture. (3/14)

### **Politecnico di Milano**

#POLIMI is the largest technical university and Engineering School in Italy. Their Group of Energy Conversion Systems will contribute to #MOF4AIR by optimizing techno-economically the adsorption processes for carbon capture in power plants and industrial processes. (4/14)

### **Centre for Renewable Energy Sources and Saving**

The Centre for Renewable Energy Sources & Saving (#CRES) is a renowned Greek research centre. #MOF4AIR will mainly benefit from their expertise on regulation framework and social acceptance studies during the development MOF-based CO<sub>2</sub> capture. (5/14)

### **SIKEMIA**

Today we introduce @SIKEMIA\_SAS, a French supplier of a large variety of organic ligands and coupling agent which will be instrumental for #MOF4AIR. They will contribute to the design and development of carboxylic and phosphonic acid derivatives for MOFs synthesis. (6/14)

### **MOF Technologies Limited**

It's the turn of #MOFTECH, a Belfast-based SME that will bring to #MOF4AIR its in-depth expertise in the large-scale manufacture of super-absorbent Metal-Organic Frameworks by mechanochemical synthesis; ensuring the sustainability and scalability of the materials used. (7/14)

### **Korea Research Institute of Chemical Technology**

The #KRICT is a South-Korean research laboratory focusing on the development of sustainable and key technologies in materials and chemical engineering. In MOF4AIR, KRICT will take part in the selection, fabrication and refinement of the promising MOFs for demonstration. (8/14)

### **ENGTECH CO LTD**

ENG TECH Co. Ltd. (#ENGTECH) is a Korean SME that will be working alongside the KRICT in the #MOF4AIR project on up-scale production and shaping of adsorbents needed for the demonstration activities of #MOF4AIR. (9/14)

### **Technology Centre Mongstad (TCM)**

The Technology Centre Mongstad (TCM) is the world's largest facility for testing and improving CO<sub>2</sub> capture. #TCM will be crucial for the demonstration activities of #MOF4AIR on gas power plant and refinery, showing the world the great performances of #MOF4AIR. (10/14)

### **Solamat Merex**

#SOLAMAT-MEREX is part of SARP Industries' group that is an European leader for treatment and recovery of hazardous industrial wastes. Within #MOF4AIR, SOLAMAT-MEREX will join the team in process specifications and as a demonstration site in Fos-sur-Mer in France. (11/14)

### **Türkiye Petrol Rafinerileri A.Ş**

#TUPRAS is the largest industrial enterprise of Turkey by revenue and 7<sup>th</sup> largest refining company of Europe. They will contribute to #MOF4AIR leading demonstration preparation and execution, also involving the Tüpraş R&D Center for enhanced process integration. (12/14)

### **Euroquality**

#Euroquality is a service provider specialised in setting-up and managing European innovation projects. In #MOF4AIR, they will bring their experience and expertise to help the partners and ensure smooth and efficient communication, dissemination and project management. (13/14)

### **Türkiye Çimento Müstahsilleri Birliği**

We conclude our presentation with #TCMA! A Turkish non-profit organization and the voice of Turkish cement industry. Their R&D Institute will contribute their expertise to #MOF4AIR for study of replication and transfer of the developed technologies to the Cement sector. (14/14).

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#### 12.2.1.2. LINKEDIN

##### *Addition on LinkedIn*

On LinkedIn, posts will be followed by "To learn more about #MOF4AIR and how our partners are collaborating to demonstrate the performances of MOF-based CO<sub>2</sub> capture technologies in power plants and energy intensive industries, visit our website [mof4air.eu](http://mof4air.eu) !"

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(14/14).

## 12.3. TCMA ARTICLE ON THE APPLICATION OF CARBON CAPTURE IN THE CEMENT INDUSTRY

This article can be found on the [internet here](#).

Nowadays, the cement industry is constantly innovating to help its emission reduction targets and is willing and able to provide policy-makers with advice on how to develop and build a sustainable society. Therefore, a great many R&D institutes have already implemented major efficiency improvements like reducing GHG (greenhouse gases) substantially.

Power supply and carbon-intensive industries (*e.g.* cement, steel and petrochemical industries) account for a large share of CO<sub>2</sub> emissions. Besides the limitation of anthropogenic CO<sub>2</sub> emissions, carbon capture is a key technology that has the potential to decrease carbon emissions in these sectors by giving another afterlife to this CO<sub>2</sub>: utilisation or storage. MOF4AIR is a Horizon 2020 project gathering 14 partners from eight countries, including TCMA R&D Institute as a partner, to develop and demonstrate the performances of Metal Organic Framework (MOF)-based CO<sub>2</sub> capture technologies in power plants and energy intensive industries.

As above mentioned, the TCMA R&D Institute has taken on a role as a partner on 01.07.2019 at “Metal Organic Frameworks for carbon dioxide Adsorption processes in power production and energy Intensive industries (MOF4AIR)”, a project funded by the EU Horizon 2020 Research and Innovation Programme under Grant Agreement No: 837975.

The overall objective of MOF4AIR is to demonstrate the performance of MOF-based CO<sub>2</sub> capture technologies in power plants and energy intensive industries. The project which is led by Mons University with a total budget of approximately € 11.1 million and will last for four years.

The project aims to use the most suitable structure in different adsorption methods and implement CO<sub>2</sub> capture at the pilot scale by synthesizing metal organic framework (MOF) with high selectivity and high CO<sub>2</sub> affinity for CO<sub>2</sub> capture. The overall objective of MOF4AIR Project is to demonstrate the

performance of the metal organic framework (MOF)-based CO<sub>2</sub> capture technologies in three demonstration sites, across Europe which will prove the cost-efficiency and reliability of MOF-based carbon capture in CO<sub>2</sub> intensive sectors: power supply, refineries and waste incineration.

Global CO<sub>2</sub> levels are unfortunately continuing to rise, however the global awareness is also increasing. TCMA's role in this project is to make all the communication and dissemination activities of the MOF4AIR project, as well as the exploitation. TCMA aims to study the solution proposed in the project in the whole industrial system of carbon capture. TCMA has another role to examine the social issues related to capture, transport and storage of CO<sub>2</sub>, establish the replicability and transferability of the developed solutions through an implementation plan and the involvement of an industrial cluster board.

[www.tcma.org.tr](http://www.tcma.org.tr) | [www.mof4air.eu](http://www.mof4air.eu)