

Clean Energy Ministerial - Hydrogen Initiative (H2I) Work Plan 2021-22

Plane approved in the Advisory Group meeting on 10 Dec, 2020

PREAMBLE

Purpose of this Work Plan

The intention of this document is to provide a comprehensive overview of the CEM Hydrogen Initiative (H2I) and the actions that will be carried out over the next two years. The document also spells out the H2I objective, mission, scope, focus areas, operation and actions for the implementation period 2021-2022.

Objective of H2I

The H2I is a multi-government collaborative initiative that aims to raise international ambition and advance commercial scale clean hydrogen and fuel cell related deployment in the long-term globally, across all sectors of the economy via analysis, policies, programs and projects that would make hydrogen a key enabler in the global clean energy transition. Having most relevant initiatives included in this comprehensive multi year work plan ensures key hydrogen results, advancements and progress can be leveraged within the context of the global coordination and profiled to Energy Ministers in the context of the greater energy transition.

The Mission of the H2I

The Initiative intends to:

- Build strategic partnerships to develop and facilitate global actions on clean hydrogen and fuel cell related deployment across regional, national, and municipal economies;
- Encourage global deployment projects, and empirical analysis to advance understanding of the clean hydrogen and fuel cell technology market, and provides an evidence-base for policy and program development
- Facilitate and inform the development of policies and programs to enable global supply chains for clean hydrogen, based on real-world actions;
- Inform decision making in governments through peer-to-peer dialogues on infrastructure deployment, policy, program and project implementation;
- Encourage the sharing and adoption of approaches that enable clean hydrogen to play a role in the global energy and transportation systems;
- Build new analytical resources that support clean hydrogen and fuel cell deployment across countries; and,

- Engage hydrogen and fuel cell stakeholders and others (e.g., infrastructure, renewable fuel) through consultations and peer-to-peer discussions.

As with all CEM Initiatives, the Hydrogen Initiative would aim to have the following components:

- Aspirational hydrogen objectives/targets;
- Annual work plans, the focus and scope of which evolve over time;
- Working groups, focused on specific themes;
- Campaigns to raise ambition levels;
- Workshops & webinars (both global and regional);
- Targeted programs;
- Analysis and studies;
- Strategic partnerships to develop and implement deployment projects;

THE INTERNATIONAL LANDSCAPE AND THE ROLE OF H2I

The H2I shares the vision of other international initiatives to advance clean hydrogen production and use around the world in the long-term. The H2I's focus is on advancing commercial scale hydrogen and fuel cell related deployment, and complements the work of other international initiatives, such as IEA, Mission Innovation and the International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE). The H2I is also a response to the call to action that the Hydrogen Energy Ministerial (HEM) in Japan issued in September 2018 and is providing a forum to implement the HEM's Global Action Agenda (GAA), released in September 2019.

The H2I offers an opportunity to raise the visibility of international hydrogen activities to energy ministers in the larger context of the clean energy discussions and transition to a low carbon economy. Through high-level Ministerial leadership and the formal yet flexible government-to-government framework offered by the Clean Energy Ministerial (CEM), and building on the strong history of successful collaboration, the CEM-H2I will be a corner stone of public/ private collaboration for commercial scale global deployment of hydrogen as a key enabler for clean energy transition, across all sectors of the economy. Strategic partnerships with private sector stakeholders, such as the Hydrogen Council, will be a starting point in several of the planned actions presented in this work plan.

Participation in CEM initiatives and campaigns is voluntary and non-binding. The CEM H2I is aimed to ensure that hydrogen remains a key element in the broader context of the global clean energy transition dialogue and provides a flexible platform for further collaboration. The H2I will fully leverage actions being taken by other CEM initiatives, recognizing the important contribution they make to the global advancement of hydrogen.

IDENTIFIED THEMATIC FOCUS AREAS FOR H2I (SCOPE)

H2I members have identified a number of focus areas for which actions and outputs to **advance commercial scale clean hydrogen deployment** are of particular importance over the next decade. H2I members will also closely follow the development of other international initiatives' activities to ensure synergies and complementary, meanwhile inviting these initiatives to use the H2I as a platform to

highlight actions and outputs to energy ministers and senior officials from governments around the world. The H2I focus areas are the following:

A. Improved coordination of international hydrogen activities.

Since late 2016, global interest in hydrogen has increased significantly, and there now exists several international fora through which countries are collaborating. These collaborations include RD&D (MI, IEA-TCPs) through to enabling activities such as regulations, codes, standards and safety (IPHE) and policies, programs and projects to enable full commercialization (H2I). To fully understand this approach, and avoid duplicative efforts, ensuring collaborating countries truly benefit from formal engagement, H2I will engage with representatives from other ongoing international initiatives to identify collaboration opportunities and other relevant synergies.

B. Exchange of best practises on policy framework and long-term plan for hydrogen deployment.

There is a need for long term plans, vision and goals in giving direction to technology uptake and to enable effective planning and development of consistent policies. The initiative could act as a platform for sharing of best practices and lessons for development of long term policy frameworks domestically and to enable the development of global targets for hydrogen deployment in the context of the clean energy transition which members could align with. The work in this area could therefore involve improved understanding of hydrogen deployment policies among participating members for their clean energy transition and creating a framework/platform to enable setting global targets for raising ambitions for hydrogen deployment.

C. Support to clean hydrogen production and distribution.

Hydrogen is envisioned as a key enabler in the global clean energy transition. The H2I could help address the various policy issues that are relevant for fast tracking the deployment and roll-out of clean hydrogen production (e.g. renewables, power-to-gas, conventional SMR with CCUS, small modular reactors), as well as large-scale hydrogen export, including policies related to guarantees of origin. Distribution opportunities may also be discussed, including via existing natural gas distribution infrastructure, liquefaction, and/or conversion to liquid organic carriers. Aspects of the global supply chains, including full life-cycle emissions analysis may also be included.

D. Increased use of hydrogen technologies in the transport sector

The H2I with this focus area would aim to develop a comprehensive understanding of best approaches to increase the use of hydrogen technologies in the transport sector, particularly medium and heavy-duty vehicles, rail and marine applications. Work would also entail identifying and fostering international collaboration and undertaking deployment projects.

E. Hydrogen opportunities in the industry sector

The initial focus would be on regional hydrogen opportunities in hard to abate industrial sectors (such as oil and gas, cement, steel, fertilisers). Knowledge products, guidance and partnership development will all be considered.

F. Exchange best practices on sustainable finance along the entire supply chain

The initial focus would be identifying and developing best-practices, and guidance on attracting and de-risking the capital investments required along the entire supply chain to achieve commercial scale hydrogen deployment.

G. Urban energy system as the enabler for hydrogen deployment

In addition to industry, cities would be at the forefront of a significant share of Hydrogen deployment – adequate municipal policies, strategies and planning required to enable urban centers to mainstream hydrogen use for various applications (commercial, transport, heating, etc.). H2I would act as a global forum to enable exchange of ideas, best practices and lessons from across leading cities which are aiming to fast track hydrogen deployment.

H2I OPERATIONS

H2I is led by a ‘Core Team’ composed of the H2I members Canada, European Commission, Japan, the Netherlands and United States.

The decision-making and strategic body of H2I is the ‘Advisory Group’ which is composed of policy-leads from all participating H2I member countries.

The International Energy Agency (IEA) has been selected to be the ‘Coordinator’ for the initiative. Further details on the governance are included in the CEM Hydrogen Initiative Coordination Framework.

The following functions are key for H2I to deliver actions and outputs.

H2I Advisory Group Meetings

H2I members will meet twice per year to review progress and to discuss plans and priorities. Advisory Group meetings should if possible be co-located with other initiatives, such as IPHE and HEM. IEA, as the Coordinator of the H2I, will work closely with the Core Team in the preparations of the Advisory Group meeting.

Working Groups

H2I members may establish global or regional ‘working groups’ linked to the focus areas identified above. The working groups should be composed of H2I members and relevant participants from the private sector. A working group should present a work plan to the Advisory Group upon launching and report on progress at least once a year.

Strategic Deployment Projects

H2I members are encouraged to foster “strategic deployment projects” with industry linked to the focus areas identified above. These projects aim to showcase successful applications of hydrogen and fuel cell technologies in industry, transportation and community. The aim of these projects is to support future policy-making and replication. Project concepts can be brought forward to the Advisory Group for consideration and information at any time. Projects may also be identified and developed as a result of

discussions carried out through the working groups or at other meetings with relevant stakeholders, such as the inaugural H2I meeting in Vancouver in May 2019.

Workshops and Webinars

H2I members are encouraged to organise workshops and webinars on topics linked to the focus areas above (e.g. hydrogen use in industrial ports, and sustainable financing). Members are encouraged to involve industry (e.g. Hydrogen Council) to prepare and participate in the workshops and webinars.

PROPOSED ACTIONS AND OUTPUTS 2021-22

The H2I will during the period 2021-2022 prioritise the following actions with the aim of advancing commercial scale hydrogen production and use.

Activities of the Coordinator

1. Establishing CEM H2I in the international hydrogen landscape

The IEA, as the Coordinator of the H2I, will continue collaborating with other international initiatives to improve the overall coordination of activities in the international hydrogen landscape. That dialogue will involve HEM, IPHE, MI, the Hydrogen and Advance Fuel Cells TCPs, IRENA, WEF and the Hydrogen Council. This task includes ensuring H2I's complementarity to other initiatives and answer how the H2I could work as a platform to help leveraging other initiatives work. In addition, the IEA will participate in diverse international events to present H2I and to disseminate the work and the activities performed in the framework of the initiative. The IEA will report to the Advisory Group regularly on these coordination activities and will identify and propose potential joint activities and collaborations with other international partnerships that can contribute in the delivery of H2I goals.

2. Management of the H2I web

The IEA, as the Coordinator of the H2I, has developed a webpage (online since June 2020) with relevant information on activities undertaken by H2I, events organised under the umbrella of H2I, analysis prepared by the IEA and information of hydrogen deployment in the H2I countries. The IEA will keep the website updated with the support of the H2I members which will provide relevant information about developments in their countries. The IEA will keep the Advisory Group informed about these updates.

3. Launch of Hydrogen Report

The IEA, as the Coordinator of the H2I, will present insights to H2I members on global hydrogen deployment. Initially, it was proposed to present this report on a biannual basis, but given the dynamic situation around hydrogen technologies and the tremendous expectations awoken, the IEA has decided to step up efforts and deliver an annual report. The IEA will release the first report of the series in 2021, and the report will track actual on-the-ground progress with stated government ambitions and with the clean energy transition needs. It will track progress towards deployment targets, real-world investments and technology cost reductions with the objective of help decision-makers in government and industry to fine-tune their strategies to drive investment progress and identify challenges and bottlenecks. H2I members will contribute

towards compiling latest data on global development and deployment, and highlight upcoming projects and joint initiatives. The report will also summarize progress on technological developments and the work of H2I and feature next-steps and key achievements. The IEA will keep the Advisory Group updated on a regular basis.

Working Group 1: Global aspirational goals for hydrogen

The European Commission (EC) with support from the IEA has prepared a survey to track all existing country goals/targets and other approaches to integrate hydrogen in long-term plans. The survey will be shared with all H2I member governments and other governments potentially interested in participating in the working group.

The information gathered will be presented to the Advisory Group in 2021 (date to be confirmed). It will also be used as input by the Coordinator for analytical work about the potential for clean hydrogen production and specific end-use sectors such as transportation and industry. This assessment could be used in the Biannual Hydrogen Report and also be the foundation for a possible first voluntary H2I Campaign (presented below).

Action items

1. Finalisation of the questionnaire: end of December 2020.
2. Circulation of the questionnaire to H2I members and other countries interested in participating: beginning of January 2021.
3. Deadline to submit the data by the participating countries: end of March 2020.
4. Presentation of the findings of the questionnaire in the Advisory board (date to be confirmed).

	2020	2021											
	D	J	F	M	A	M	J	J	A	S	O	N	D
MS1 ⁽¹⁾ : Finalisation of survey													
MS2: Circulation of the survey													
Data gathering													
MS3: Data submission													
Data analysis													
MS4: Presentation of data to H2I AG ⁽²⁾							?						?

⁽¹⁾ MS = Milestone; ⁽²⁾ AG: Advisory Group

Possible first H2I campaign

One (or more) H2I member(s) will lead the development of a CEM Campaign that can contribute in the delivery of the aspirational goals for hydrogen defined in the Global Action Agenda agreed in the Hydrogen Energy Ministerial 2019 in Japan. These goals are aimed to help incentivising and mobilising the private sector and investment community. Participation in the Campaign will not be mandatory and H2I members may select other approaches to integrate hydrogen in their long-term plans. Under the campaign, countries will be encouraged to highlight ongoing and intended actions, including development of national or regional roadmaps and/or strategies. The CEM campaign will be discussed at the first Advisory Group after the presentation of the results of the survey undertaken in the “Global aspirational goals for Hydrogen” working group.

Working Group 2: Global Ports Coalition

The European Commission, with the support of the Fuel Cell and Hydrogen Joint Undertaking (FCH JU) will organise a meeting under CEM focused on the use of hydrogen in ports. The meeting's objective is to sign a Memorandum of Understanding (MoU) with port authorities around the world that are intending to use hydrogen to decarbonize their activities. The first step will be the launch of an expression of interest for the ports to join this coalition through the CEM countries.

Action items

1. Announce the activity: Advisory Group of December 2020
2. Launch of an expression of interest for the ports to join this coalition: end of March 2021
3. First meeting of the coalition and preparation of a Memorandum of Understanding: around June 2021 (aiming to hold the event in CEM12)

	2020	2021											
	D	J	F	M	A	M	J	J	A	S	O	N	D
Reach out to interested members and ports													
MS1: Launch of expression of interest													
Preparation of first meeting of the coalition													
MS2: First meeting and signing of MoU													

Working Group 3: Roundtable on the North-West European region

Netherlands will continue leading the Working Group that has extended its remit from the North Sea to the North-West European region. The countries involved in this working group are collaborating with the objective of developing a new regional hydrogen market. Government representatives and key industrial stakeholders in the region will engage to identify opportunities, tackle barriers and explore policy and regulatory requirements to develop this regional hydrogen market. In July 2020 took place a first online workshop between government representatives to share their views and exchange information about their hydrogen strategies and plans. A second workshop will be organised the first quarter of 2021, where a North-West European Hydrogen Market and Policy report prepared by the IEA and Clingendael International Energy Programme will be presented. This workshop will also be an opportunity to extend the initial conversations from July 2020 and explore collaboration opportunities based on the findings of the market report.

In addition, the members of the working group will consider the organisation of more workshops in the next period of the work plan, focusing on potential finance mechanisms for the deployment of large hydrogen projects and how these funding mechanisms can contribute in the development of the regional hydrogen market. As well, identifying possible regional projects for the development of an Important Projects of Common European Interest (IPCEI) is also of interest. The participants in the working group will seek the collaboration and participation of other H2I members.

Action items

1. Finalisation of the market report performed by the IEA and CIEP: February 2020

2. Workshop for the presentation of the market report and to gather country and industry representatives to discuss the findings: April 2020
3. Other potential workshops under evaluation

	2020	2021											
	D	J	F	M	A	M	J	J	A	S	O	N	D
Developing of market study													
Preparation of the webinar for the launch of the market study													
MS1: Webinar and launch of market study													

Working Group 4: Large-scale hydrogen supply chain

There have been numerous recent announcements of governments and industry working in the development of large scale hydrogen supply chain projects, aiming to produce hydrogen in regions with potential for producing low-cost hydrogen to be shipped and used in areas with large hydrogen demand where hydrogen production would be more costly. This could be the first step for the development of an international hydrogen market. Following these developments, the members of the H2I created this working group as a platform to share knowledge, best practices and experiences with the ultimate goal of developing a new strategic project focussed on large-scale production and transportation of hydrogen.

The Netherlands and Portugal are currently involved in this working group.

Portugal-The Netherlands hydrogen supply project

Portugal and The Netherlands have strengthened their bilateral cooperation in the field of hydrogen and have committed themselves in a MoU. The MoU was signed in September 2020 to affirm their intentions to develop a strategic export-import value chain to ensure production and transport of green hydrogen from Portugal to the Netherlands and its hinterland via the ports of Sines and Rotterdam. The strengthened cooperation aims to contribute to the EU climate goals, by combining competitiveness and sustainability, with political commitment on creating an international hydrogen market with market rules that make hydrogen export a reality. A first step will be taken by joining efforts to develop an Important Project of Common European Interest for hydrogen which includes the collaboration related to the anchor project of Sines and the activities in the Port of Rotterdam.

The members of the working group are considering the organisation of a workshop in the next period of the work plan focusing on projects aiming to develop large scale hydrogen supply chains, such as the current project between Portugal and The Netherlands. The workshop will serve as a platform to share experiences, best practices and lessons learnt in these type of projects. The participants in the working group will seek the collaboration and participation of other H2I members both in this workshop and in a potential future collaboration to prepare a joint position paper defining guiding principles for the development of an international hydrogen market.

Action items

1. Potential workshop about large scale hydrogen supply chains under evaluation (date to be confirmed).

	2020	2021											
	D	J	F	M	A	M	J	J	A	S	O	N	D
Reaching out to H2I member interested in joining the working group													
Preparation of a workshop on supply chain projects	To be decided												
MS1: Workshop on supply chain projects	To be decided												
Conversations for the development of a position paper on international hydrogen trade	To be decided												
MS2: Presentation of the position paper on international hydrogen trade	To be decided												

Working Group 5 – H2 Twin Cities Initiative

The US will lead the development and implementation of the H2 Twin Cities Initiative. This activity will aim to incentivize global partnerships and enhanced collaboration between regions in different countries to accelerate hydrogen deployments and user acceptance in communities. This will be done by increasing awareness and promote best practices and information sharing on the use of hydrogen and fuel cell technologies at scale in specific regions, communities and cities through concrete targeted partnerships.

This activity will be implemented through a collaboration with other relevant partnerships including the International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE). Aligned with the intent of avoiding duplication and leveraging existing partnerships and mechanisms, H2 Twin Cities will leverage the Education & Outreach Working Group (E&O WG) of the IPHE. This will permit dissemination to several thousand stakeholders and an established network.

The first phase of the competition will be launched in 2021 with the idea of having regular annual or biannual phases.

Action items

1. Recruiting collaborators for the initiative among H2I members: end of 2020/beginning of 2021.
2. Define criteria and terms of reference for the competition (date to be confirmed).
3. Launch the competition and call for expression of interest for cities/regions/communities (date to be confirmed).
4. Evaluate proposals (date to be confirmed).
5. Announce winners and kick off the activities in those regions (date to be confirmed).
6. Design future (date to be confirmed).

	2020	2021											
	D	J	F	M	A	M	J	J	A	S	O	N	D
Recruiting collaborators													
Definition of criteria for the competition													
MS1: Launch of the competition													
Proposals evaluation													
Announce winners													

Activity 6 - Methodology for evaluation GHG emissions in hydrogen production

This activity aims to set a direct collaboration between the H2I and the IPHE. The European Commission is currently co-chairing the Hydrogen Production Analysis Task Force (H2PA TF) of the IPHE, which is working on the classification and definition for the varying types of hydrogen. The standards and methodologies developed by the H2PA TF will need to be utilised and tested in real projects to be validated. The H2I and its activities could offer a platform for this utilisation and testing. The European Commission will report regularly to the H2I Advisory Group on the progress of the H2PA TF. As the H2I develops its activities, opportunities for utilising the standards defined by the H2PA TF will be explored.

	2020	2021											
	D	J	F	M	A	M	J	J	A	S	O	N	D
Reporting progress of the H2PA TF to the AG (EC/IEA)													

Strategic Project 1 – Hydrogen in marine

Canada will work with Norway at the national and sub-national levels to determine common regulatory and technical challenges to the deployment of hydrogen in marine applications, including ferries and fishing vessels. The progress on this activity has been delayed due to the impact of Covid-19 pandemic. The participants will work in defining specific actions and areas of focus and progress will be shared with the H2I members in the Advisory Group meetings.

Other projects, actions, webinars and workshops

Member countries can propose ideas and concepts for new projects, webinars, activities and workshops, for consideration at anytime, on and as needed/ required basis, to advance further in the objectives of the Initiative.

Some working groups and strategic projects have been proposed in different Advisory Group meetings in 2019 and 2020 but have not been implemented yet.

Working Group i - Hydrogen to Fuel (No lead and participants identified)

The objective of the working group will be to identify and launch a project focusing on a selected energy intensive industry that is interested to develop a pathway for using clean Hydrogen in the energy transition, and that would support scaling up clean hydrogen production and use across many H2I members. The project proposal will be presented to the Advisory Group for its approval and to foster the participation in the working group of other H2I members.

Working Group ii - Global technical standards (Pending internal approval for Austria to lead. To be set as a collaboration with the IPHE)

The IPHE is currently leading the global discussion on these matters, but it will be essential that H2I is involved, to help identify gaps in standards, which are impeding full-scale commercial deployment, e.g. refuelling protocols for medium and heavy-duty trucks. Austria signalled an interest in participation in an activity looking at refuelling protocols (pending internal approval before committing). Proposed by Austria.

Working Group iii - Hydrogen in mining (Proposed by Canada, under development)

Canada has started conversations with other H2I members interested in the implementation of hydrogen technologies for use in mining applications.

Strategic Project i: Canada-Brazil Bus Deployment (Delayed due to the impact of Covid-19 pandemic)

Canada will continue to work with Brazil, to share knowledge, expertise and technologies, to enable large-scale deployment of hydrogen buses in Brazil. Progress will be tracked, and shared with the broader CEM H2I members.

2021 High-level events of H2I and its partner organisations

Date	Activity	Location
January 2021	Hydrogen Council CEO Event 2021	Digital
April 2021	North Sea Workshop	Digital
May/June	CEM12	Digital
May 2021	World Economic Forum	Singapore
June 2021	H2I Advisory Group meeting	Digital
June 2021	IPHE Steering Committee Meeting and Events	Costa Rica
Q1/Q2 2021	Hydrogen Council Coordination Committee	Digital
October 2021	Hydrogen Energy Ministerial	TBC
December 2021	H2I Advisory Group meeting	TBC
Q3/Q4 2021	Hydrogen Council Coordination Committee	Digital

A detailed and updated calendar of hydrogen related events prepared jointly with all the international hydrogen organisations will be made available through the CEM H2I webpage.