Draft Project plan for the CEN Workshop on "Characterization of a hybrid heat pump module”

Requests to participate in the Workshop and/or comments on the project plan are to be submitted by 2022-04-22 to nortiz@une.org

Recipients of this project plan are kindly requested to name all patent rights known to them to be relevant to the Workshop and to make available all supporting documents.

Madrid, 2022-01-12 (Version 1)

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Summary

Two-thirds of industrial energy consumption is related to heating and cooling processes and is becoming a major environmental problem. The integration of renewable thermal energy sources at industrial sites is therefore crucial. In this context, the EU co-financed HyCool project aims to increase the use of solar heat in industrial processes by combining two key components: solar thermal collectors and hybrid adsorption-compression chillers to provide steam, heating, and cooling energy with greater efficiency. One of the Key innovations that allows solar cooling for green and energy-efficient industrial processes is the Hybrid heating pump and the adsorption compression chiller. The hybrid chiller will allow a step forward towards the exploitation of thermally driven cooling systems in industrial applications. It will take advantage of the renewable solar heat source to drive a sorption module, thus increasing the electric efficiency of a vapour compression chiller. The aim of the characterization is to define the cooling power and electricity consumption of the hybrid heat pump in the different ambient and process operating conditions, as well as confirm the reliability under off-design conditions.

1 Status of the project plan

Draft project plan for public commenting (Version 1.0)

This draft project plan is intended to inform the public of a new Workshop. Any interested party can take part in this Workshop and/or comment on this draft project plan. Please send any requests to participate or comments by e-mail to nortiz@une.org.

All those who have applied for participation or have commented on the project plan by the deadline will be invited to the kick-off meeting of the Workshop on 2022-04-29.

2 Workshop proposer and Workshop participants

2.1 Workshop proposer

Person or organisation	Short description and interest in the subject
Name: Andrea Frazzica Organisation: ITAE-CNR	The Institute of Advanced Tecnologies for Energy "N. Giordano" (ITAE) is one Institutes of the Engineering, ICT and Technologies for Energy and Transport Department (DIITET) of Italian National Research Council (CNR). Within the Department, ITAE's strategic mission is mainly aimed at promoting and developing innovative energy processes and technologies with a higher efficiency and a lower environmental impact based on the use of fossil fuels (still available today) and/or renewable energy sources. More specifically, skills are related to the preparation and characterization of catalysts, supports, electrodes, membranes, bed absorbers and so on, essential components of devices for power generation, transformation or storage. These skills, which represent the chemical core of ITAE, are accompanied by added design, and the realization and testing of complete devices typical of the engineering sector of the Institute, which also deals with the design and test of systems and demonstration facilities to be used both in stationary and mobile energy applications

2.2 Other potential participants

This CWA will be developed in a Workshop (temporary body) that is open to any interested party. The participation of other experts would be helpful and is desired. It is recommended that:

- Representatives of research institutes
- Representatives of heating pumps and thermal solar panels manufacturers
- Representatives of test institutes
- Representatives of Academic and research
- Representatives of other related H2020 project partners
- Representatives of related CEN Technical Committees
- Representatives of EC DG Energy

take part in the development of this CWA.

2.3 Participants at the kick-off meeting

The following persons or organisations already showed interest to participating at the kick-off meeting prior to the publication of the draft project plan.

Person	Organisation
Workshop proposer: Andrea Frazzica	Workshop proposer: CNR – ITAE Consiglio Nazionale delle Ricerche (Italy)
Eliza Nowak / Ursula Wittstadt	Fahrenheit GmbH (Germany)
Silvia Jané / Josep Mitats	VEOLIA Serveis Catalunya (Spain)
Uli Jakob	DR JACOB energy research GmbH & Co (Germany)
Marco Calderoni	R2M Solution SRL (Italy)
Florian Grunberger	AUSTRIAN INSTITUTE OF TECHNOLOGY (Austria)
Sergio Velasquez	Comet Technology (Spain)
Marcel Sanz / Eduard Jorba	IDP Ingeniería y Arquitectura Iberia S.L.U (Spain)
Luigi Ranza	CiaoTech S.r.l. (Italy)
Antoni Castells / Akshay Kumbar	ECOTHERM. (Austria)
Gulfem Imaner / Parham Pooyanfar	ECODENGE (Turkey)
Emmanuelle Picolli	EMPA (Switzerland)
Workshop secretariat: Natalia Ortiz de Zárate	Workshop secretariat: UNE, Spanish Association for Standardization

3 Workshop objectives and scope

3.1 Background

Industrial processes are often energy-intensive and the need for their efficient decarbonization is now at the forefront of governmental and corporate policies worldwide. However, solutions for the green transition of the industrial sector should be flexible, widely applicable and reliable.

Two-thirds of industrial energy consumption is related to heating and cooling processes and is becoming a major environmental problem. The integration of renewable thermal energy sources at industrial sites is therefore crucial.

In this context, the EU co-financed HyCool project aims to increase the use of solar heat in industrial processes by combining two key components: solar thermal collectors and hybrid adsorption-compression chillers to provide steam, heating, and cooling energy with greater efficiency.

One of the Key innovations that allows solar cooling for green and energy-efficient industrial processes is the Hybrid heating pump and the adsorption compression chiller. The Hybrid heat pump concept is the combination of a thermal heat pump with an electrical heat pump: the thermal heat pump exploits low-temperature waste heat (i.e. 70-90 °C) that is generally unused or dumped to the ambient. It can also be powered by renewable sources, such as solar heat and biomass. The electrical heat pump can exploit electricity locally produced (i.e. from PV panels or other sources) and thus further increase the share of renewables. The hybridization consists in the configuration of the two heat pumps: they can work in series, in parallel or in cascade by just changing the hydraulic connections. This makes its configuration flexible and easily adaptable to different industrial cases. The hybrid chiller will allow a step forward towards the exploitation of thermally driven cooling systems in industrial applications. It will take advantage of the renewable solar heat source to drive a sorption module, thus increasing the electric efficiency of a vapour compression chiller.

3.2 Scope

The planned CEN Workshop Agreement specifies the experimental characterization of the modular hybrid heat pump under real operating conditions in order to define a performance map of efficiency and heat pump capacity as a function of operating parameters.

The characterization includes tests to be performed and the procedure for calculating critical parameters, such as Energy Efficiency Ratio (EER), cooling power, energy savings against the standard operation of the vapour compression chiller and CO2 emissions savings. With this objective, the testing rig is equipped with high-accuracy sensors and able to supply the temperature levels and power needed to simulate the operation of the system under a wide range of operating conditions, corresponding to the possible scenarios for its application in industries. In order to evaluate the performance of the system, the EER (Energy Efficiency Ratio) of the hybrid solution was calculated and compared to the EER that could be obtained by operating a traditional vapour compression chiller. The cooling power, EER and COP for each condition were combined into a complete performance map. This complete characterization of the hybrid system will help to establish the limit conditions for the applications and identify the best management strategies.

The planned CEN Workshop Agreement is applicable to a vast range of industrial processes and to those industrial companies wishing to:

- turn solar heat and industrial waste heat into useful cooling effect,
- minimize energy consumption,
- reduce operational costs and
- lower CO2 footprint.

3.3 Related activities

The subject of the planned CWA is not at present the subject of a standard. However, there are committees, standards and/or other technical specifications that deal with related subjects and thus need to be taken into account - and involved, where necessary - during this Workshop:

CEN Technical Committees:

- CEN/TC 113 Heat pumps and air conditioning units

- CEN/TC 312 Thermal solar systems and components
- CEN TC 182 Refrigerating systems, safety and environmental requirements
- CEN TC 228 Heating systems and water-based cooling systems in buildings
- CEN/TC 110 Heat exchangers

Related sister Projects:

- ASTEP (2020-2025, H2020): Application of Solar Thermal Energy to Processes
- FRIENDSHIP (2020-2024, H020): Forthcoming Research and Industry for European and National Development of SHIP
- SHIP2FAIR (2020- 2022, H2020): Solar Heat for Industrial Process towards Food and Agro Industries Commitment in Renewables

4 Workshop programme

4.1 General

The WS is expected to publish one single CWA. The CWA will be drawn up in English (language of meetings, minutes, etc.). The CWA will be written in English. The CWA might also be translated into other languages, depending on the demand of CEN Workshop members.

Due to the travel restrictions related to COVID-19, all meetings are intended to be held virtually. In case a physical meeting will be set up (for example in conjunction with the HYCOOL General Assembly or a related conference), the possibility of virtual participation will be granted as well. The program to reach the CEN Workshop Agreement entails the following steps.

The kick-off meeting is planned to take place on 2022-04-29, by teleconference. A draft of the Project Plan for public commenting will be published for 30 days. A total of at least three Workshop meetings (kick-off meeting and Workshop meetings) and web conferences will be held, during which the content of the CWA will be presented, discussed, and approved.

4.2 Workshop schedule

Table 1: Workshop schedule (preliminary)

CEN/CENELEC Workshop	Feb 2022 M01	March 2022 M02	April 2022 M03	May 2022 M04	June 2022 M05	July 2022 M06	August 2022 M07	Sept 2022 M08	Oct 2022 M09	Nov 2022 M10
Initiation										
1. Proposal form submission and TC response										
2. Project plan development										
3. Open commenting period on draft project plan (mandatory)										
Operation										
4. Kick-off meeting		K								
5. CWA(s) development										
6. Open commenting period on draft CWA(s) (optional)										
7. CWA(s) finalised and approved by Workshop participants										
Publication										
8. CWA(s) publication										
Dissemination (see 7)										
Milestones		K		V	V			V A	P	D

B CEN/CENELEC BT meeting deciding on establishment of a CEN/CENELEC Workshop
K Kick-off
V Virtual Workshop meeting
A Adoption of CWA
P Publication of CWA
D Online distribution of CWA

5 Resource planning

UNE will provide the workshop secretariat, subject to formal approval of the Project Plan at the Kick-off meeting. The copyright of the final CEN Workshop Agreement will be at CEN. All costs related to the participation of interested parties in the Workshop's activities have to be borne by themselves. The Workshop will be financed within the framework of the EU-funded research project HYCOOL (Horizon 2020 research and innovation programme under grant agreement Number 792073). The HYCOOL project aims to reach an agreement with CEN CENELEC Management Centre to make the CWA freely downloadable from the CEN Website. The final document will include the following paragraph: "Results incorporated in this CEN Workshop Agreement received funding from the European Union's HORIZON 2020 research and innovation programme under grant agreement number 792073 (HYCOOL)". Registration, as well as participation at the CEN Workshop, described here are free of charge.

6 Workshop structure and rules of cooperation

6.1 Participation in the Workshop

The Workshop will be constituted during the course of the kick-off meeting. By approving this project plan, the interested parties declare their willingness to participate in the Workshop and will be formally named as Workshop participants, with the associated rights and duties. Participants at the kick-off meeting who do not approve the project plan are not given the status of a Workshop participant and are thus excluded from further decisions made during the kick-off meeting and from any other decisions regarding the Workshop.

As a rule, the request to participate in the Workshop is closed once it is constituted. The current Workshop participants shall decide whether any additional members will be accepted or not. Any new participant in the Workshop at a later date is decided on by the participants making up the Workshop at that time.

All Workshop participants who voted for the publication of the CWA or its draft will be named as authors in the European Foreword, including the organisations which they represent. All Workshop participants who voted against the publication of the CWA, or who have abstained, will not be named in the European Foreword.

6.2 Workshop responsibilities

The Workshop Chair is responsible for content management and any decision-making and voting procedures. The Workshop Chair is supported by the Workshop Vice-Chair and the responsible Workshop secretariat, whereby the Workshop secretariat will always remain neutral regarding the content of the CWA(s). Furthermore, the Workshop secretariat shall ensure that CEN-CENELEC's rules of procedure, rules of presentation, and the principles governing the publication of CWA(s) have been observed. Should a Workshop Chair no longer be able to carry out her/his duties, the Workshop secretariat shall initiate the election of a new Workshop Chair. The list below covers the main tasks of the Workshop Chair. It is not intended to be exhaustive.

- Content related contact point for the Workshop
- Presides at Workshop meetings
- Ensures that the development of the CWA respects the principles and content of the adopted project plan
- Manages the consensus building process, decides when the Workshop participants have reached agreement on the final CWA, on the basis of the comments received
- Ensures due information exchange with the Workshop secretariat
- Represents the Workshop and its results to exterior

The Workshop secretariat, provided by a CEN national member, is responsible for organising and leading the kick-off meeting, in consultation with the Workshop proposer. Further Workshop meetings and/or web conferences shall be organised by the Workshop secretariat in consultation with the Workshop Chair. The list below covers the main tasks of the Workshop secretariat. It is not intended to be exhaustive.

- Administrative and organisational contact point for the Workshop
- Ensures that the development of the CWA respects the principles and content of the adopted project plan and of the requirements of the CEN-CENELEC Guide 29
- Formally registers Workshop participants and maintains record of participating organisations and individuals
- Offers infrastructure and manage documents and their distribution through an electronic platform
- Prepares agenda and distribute information on meetings and meeting minutes as well as follow-up actions of the Workshop
- Initiates and manage CWA approval process upon decision by the Workshop Chair

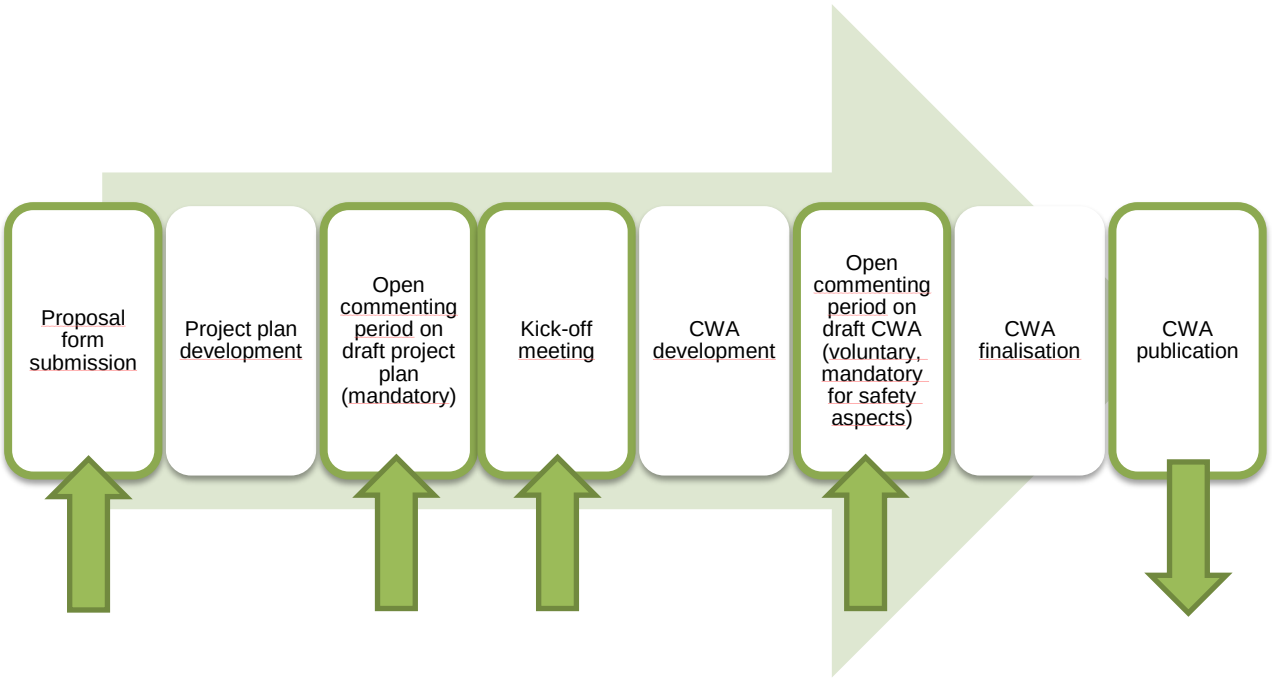
- Interface with CEN-CENELEC Management Centre (CCMC) and Workshop Chair regarding strategic directions, problems arising, and external relationships
- Advises on CEN-CENELEC rules and bring any major problems encountered (if any) in the development of the CWA to the attention of CEN-CENELEC Management Centre (CCMC)
- Administrates the connection with relevant CEN or CENELEC/TCs

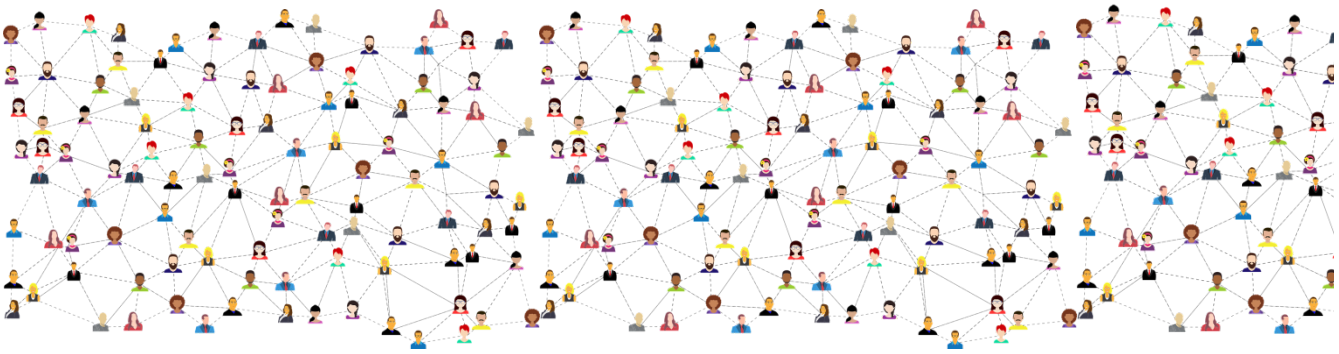
6.3 Decision making process

Each Workshop participant is entitled to vote and has one vote. If an organisation sends several experts to the Workshop, that organisation has only one vote, regardless of how many Workshop participants it sends. Transferring voting rights to other Workshop participants is not permitted. During voting procedures, decisions are passed by simple majority; abstentions do not count.

If Workshop participants cannot be present in the meetings when the CWA or its draft is adopted, an alternative means of including them in the voting procedure shall be used.

7 Dissemination and participation strategy





Proposal form submission

The Workshop proposal will be disseminated to the following relevant stakeholders and bodies for consultation:

- CEN/TC 113 Heat pumps and air conditioning units
- CEN/TC 312 Thermal solar systems and components
- CEN TC 182 Refrigerating systems, safety and environmental requirements
- CEN TC 228 Heating systems and water based cooling systems in buildings
- CEN/TC 110 Heat exchangers

Open commenting period on draft project plan

The project plan will be disseminated to the above relevant stakeholders and bodies for commenting.

In addition to the CCMC website, the project plan and the date of the kick-off meeting will be advertised on UNE website and social media to raise awareness. Interested parties are requested to contribute either through commenting of the project plan (short term) or through Workshop participation (long term).

Open commenting period on draft CWA

The draft CWA will be disseminated to the following relevant stakeholders and bodies for commenting:

- CEN/TC 113 Heat pumps and air conditioning units
- CEN/TC 312 Thermal solar systems and components
- CEN TC 182 Refrigerating systems, safety and environmental requirements
- CEN TC 228 Heating systems and water based cooling systems in buildings
- CEN/TC 110 Heat exchangers

In addition to the CCMC website, the draft CWA will be advertised on UNE website and the HYCOOL website to raise awareness. Interested parties are requested to contribute through commenting of the draft CWA (short term).

H2020 sister projects (ASTEP, FRIENDSHIP, SHIP2FAIR) will also be informed.

CWA publication

The final CWA will be disseminated to the following relevant stakeholders and bodies:

- CEN/TC 113 Heat pumps and air conditioning units
- CEN/TC 312 Thermal solar systems and components
- CEN TC 182 Refrigerating systems, safety and environmental requirements
- CEN TC 228 Heating systems and water based cooling systems in buildings
- CEN/TC 110 Heat exchangers

In addition to the CCMC website, the final CWA will be advertised on the website, social media and newsletters of:

- HYCOOL project: https://hycool-project.eu/
- UNE: www.une.org

8 Contacts

- Workshop Chair:

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- Workshop Vice-Chair:

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- Workshop Secretariat:

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- Workshop proposer

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