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Proposal Evaluation Form

EUROPEAN COMMISSION

Horizon Europe (HORIZON)

Evaluation Summary Report (Review task) - PATHFINDER - CHALLENGE

Call: HORIZON-EIC-2023-PATHFINDERCHALLENGES-01

Type of action: HORIZON-EIC

Proposal number: 101162196

Proposal acronym: CharCool

Duration (months): 48

Proposal title: Rethinking the future of clean cooling through a revolutionary class of thermally-driven chiller based on a novel bio-based thermochemical material

Activity: HORIZON-EIC-2023-PATHFINDERCHALLENGES-01-01

N.	Proposer name	Country	Total eligible costs	%	Grant Requested	%
1	UNIVERSITA DEGLI STUDI DI PADOVA	IT	797,776.25	20.68%	797,776.25	20.68%
2	TECHNISCHE UNIVERSITEIT DELFT	NL	1,139,262.5	29.53%	1,139,262.5	29.53%
3	UNIVERSITA DEGLI STUDI DI MESSINA	IT	631,106.25	16.36%	631,106.25	16.36%
4	KATHOLIEKE UNIVERSITEIT LEUVEN	BE	597,227.5	15.48%	597,227.5	15.48%
5	UNIVERSIDAD DE LLEIDA	ES	314,375	8.15%	314,375	8.15%
6	SORPTION TECHNOLOGIES SP. Z O.O.	PL	377,606.25	9.79%	377,606.25	9.79%
	Total:		3,857,353.75		3,857,353.75	

Abstract:

In response to set targets for reducing our carbon footprint and securing our energy future in Europe, the CharCool project combines the use of natural energy and nature-based solutions to achieve clean and efficient cooling. CharCool is an innovative and sustainable heat-driven cooling system, where the excess of clean renewable energy or waste heat is stored in a modular thermochemical energy storage system that allows for seasonal storage. CharCool challenges the current vision of cooling industry by proposing a system that is highly flexible and reliable, thanks to its coupling with a high-energy density (200 kWh/m3) and inexpensive mid-/long-term thermochemical material. The CharCool chiller is supplied by a new interchangeable (thus rechargeable) modular thermopile made of biochar obtained from low-cost agricultural by-products, impregnated with environmentally-friendly and easily available inorganic salts. The chiller operates with water as the refrigerant, offering a completely natural and safe alternative to the current electricity-driven and environmentally-harmful cooling solutions. CharCool runs on waste heat (e.g. from data centres) or renewable energy sources (e.g. solar thermal or excess wind through power to heat) within a temperature range of 60-150 °C. This offers the advantage of decoupling the refrigeration system from the electricity grid, thus increasing the penetration of renewable energy. Moreover, mobile and modular thermopiles close the spatial and temporal gap between the heat source and the user cooling demand. CharCool clean and efficient cooling technology will reduce the volumes and cost of the current sorption systems by 40% and 50%, respectively. By investing in CharCool, Europe will assert its global research and innovation leadership while creating quantifiable social and economic impacts. This novel technology will partly address energy poverty and create value for the billion-euro-worth heating and cooling market.

Evaluation Summary Report

Evaluation Result

Total score: 4.60 (Threshold: 0)

Panel comments on proposal

This Evaluation Summary Report contains the final score decided by the Pathfinder Challenges Evaluation Committee. The collation of the comments from individual reports, or extracts from them, have been provided in the rebuttal process. The Evaluation Committee drew its conclusions on the basis of the remote score and the outcome of its consensus discussions taking into consideration the comments from the rebuttal procedure, if any. The comments from the individual evaluators are collated per sub-criterion, so the comments on each sub-criterion reflect the opinions from all three evaluators. While not necessarily subscribing to each and every opinion expressed, the Evaluation Committee finds that the comments from the evaluators provide a fair overall assessment, indicating both essential strengths and weaknesses identified in the proposal.

According to the predefined scoring scale the proposal is excellent.

The Evaluation Committee (EC) agrees with the evaluators that this proposal presents very clear objectives and KPIs that are well aligned with the Challenge. It also agrees that the proposal is novel as it will combine a biochar-salt composite as a thermochemical material with a water-based sorption chiller. The proposed system will convincingly advance sorption cooling technology beyond the state of the art. However, the novelty of some elements, such as the digital twin, is not sufficiently elaborated.

The EC concurs that the methodology is sound and suitable to reach the proposal objectives. The methodology will engage comprehensive numerical techniques, together with the design and fabrication of a lab-scale prototype.

The EC agrees with the evaluators' comments that the proposal in general presents credible pathways with justified KPIs for meeting the ambitions of the Challenge.

The workplan is very well detailed and it is backed up by a high quality consortium, having access to the necessary infrastructure.

The Evaluation Committee received, examined and took into account the additional information provided via the rebuttal procedure. Such information was found to be relevant to the specific issues raised by the evaluators and has been duly taken into account during the discussion of the Evaluation Committee. The proposers explain in a very good level of detail how the project will go beyond the state of the art. The rebuttal provides a convincing explanation how the proposal provides details about stakeholders being targeted.

Criterion 1 - Excellence

Score: **4.50** (Threshold: 4 / 5.00 , Weight: 60.00%)

Criterion 2 - Impact

Score: **4.50** (Threshold: 3.5 / 5.00 , Weight: 20.00%)

Criterion 3 - Quality and efficiency of the implementation

Score: **5.00** (Threshold: 3 / 5.00 , Weight: 20.00%)

Scope of the application

Status: **Yes**

Comments (in case the proposal is out of scope)

Not provided

Exceptional funding

A third country participant/international organisation not listed in the General Annex to the Main Work Programme may exceptionally receive funding if their participation is essential for carrying out the project (for instance due to outstanding expertise, access to unique know-how, access to research infrastructure, access to particular geographical environments, possibility to involve key partners in emerging markets, access to data, etc.). (For more information, see the HE programme guide)

Please list the concerned applicants and requested grant amount and explain the reasons why.

Based on the information provided, the following participants should receive exceptional funding:

Not provided

Based on the information provided, the following participants should NOT receive exceptional funding:

Not provided

Use of human embryonic stem cells (hESC)

Status: **No**

If YES, please state whether the use of hESC is, or is not, in your opinion, necessary to achieve the scientific objectives of the proposal and the reasons why. Alternatively, please state if it cannot be assessed whether the use of hESC is necessary or not, because of a lack of information.
Not provided

Use of human embryos

Status: **No**

If YES, please explain how the human embryos will be used in the project.
Not provided

Activities excluded from funding

Status: **No**

If YES, please explain.
Not provided

Do no significant harm principle

Status: **Yes**

If Partially/No/Cannot be assessed please explain
Not provided

Exclusive focus on civil applications

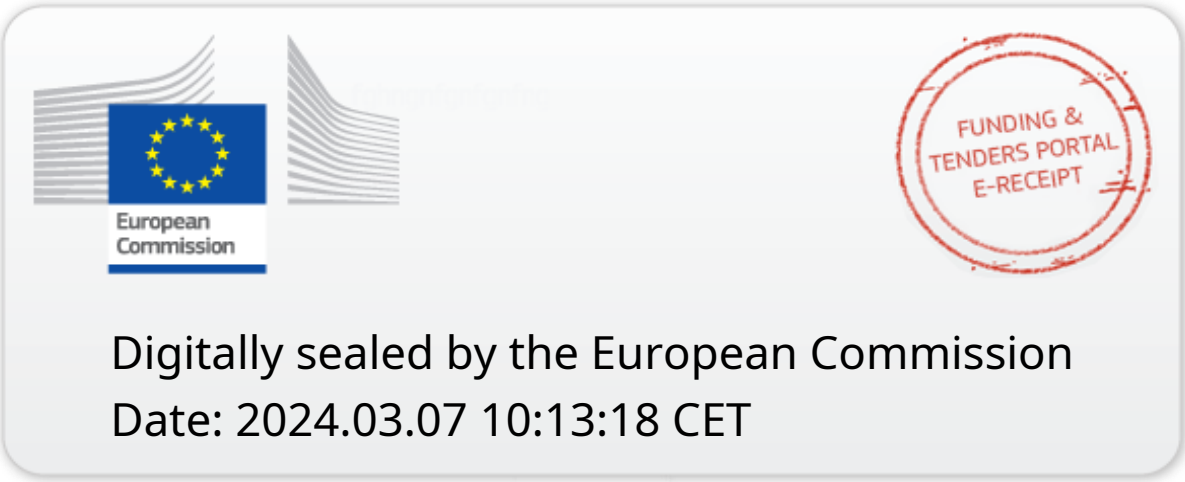
Status: **Yes**

If NO, please explain.
Not provided

Artificial Intelligence

Status: **No**

If YES, the technical robustness of the proposed system must be evaluated under the appropriate criterion.



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