NOTIFICATION OF CLARIFICATIONS AND UPDATES TO GLOBAL COOLING PRIZE

Effective from: July 01, 2019

The Global Cooling Prize coalition would like to issue the following clarifications and updates with regards to the prize criteria and submission of the Detailed Technical Application. These clarifications and updates are being issued in response to questions raised by participants over this last week and after assessing the latest market availability for the baseline room air conditioner (RAC) in anticipation of our purchase of identical units for baseline unit testing.

This notification document is effective immediately and can also be found under the "Application Forms" section of your registered account portal.

We will update the information on our prize website (https://globalcoolingprize.org/), along with frequently asked questions, prize criteria tool and all the relevant documents by the end of next week.

Please note that participants are **not required** to re-submit their Intent to Apply form. All the participants who have already submitted the Detailed Technical Application will be given access to their applications to make any updates and resubmit before the deadline of August 31, 2019 11:59 PM GMT.

UPDATES: All the participants are hereby notified of the update to the Prize technical criteria

1. **Updates to the baseline RAC unit specifications, baseline refrigerant GWP value, scalability and affordability criteria threshold for the prize**

   Language at present in Detailed Technical Application / Prize criteria

   The **baseline AC unit definition** stated on the Prize Criteria page of the website is as follows:
   "The baseline room air conditioner unit selected is a 1.5 TR (5.3 kW) fixed-speed, mini-split type unit with an Energy Efficiency Ratio (EER) of 3.5 W/W and using R410A refrigerant with a global warming potential (GWP) of 2,088. The baseline unit's electricity consumption is based on RMI's energy model, simulating a 90 sq. meter apartment with south and east exposure, in New Delhi, India and is determined to be 2,969 kWh/year."

   "Rationale: The baseline unit was intended to be the most common, average efficiency room air-conditioning units being sold in the Indian market in the year 2018 which aligns closely with the most popular units sold in other markets. Fixed-speed air-conditioning

units accounted for a majority of the residential room air-conditioner market in India in 2018. After reviewing research reports and manufacturer's websites, we believe a fixed-speed EER 3.5 W/W, R410A mini split unit is most representative of new units being sold in 2018."

In the detailed technical application, we had made a note on refrigerant GWP stating:
"The global warming potential (GWP) of the baseline R410A refrigerant will be reassessed during evaluation of the applications based on the most recent Intergovernmental Panel on Climate Change (IPCC) report."

The **criteria on volumetric size** for the competition as stated in detailed technical criteria is as follows:
"The total volumetric size of the cooling solution should not be more than two times the volumetric size of the baseline unit i.e. the total volumetric size should not exceed 0.42 cubic meters. The total volumetric size must include any dedicated renewable power generation resources and any external components that make up the proposed solution."

"Rationale: The cooling solution should be of a reasonable size such that it can be easily transported and installed in most buildings. In order to ensure a viable solution that is widely applicable, total volumetric size is limited to twice the size of a typical AC unit, i.e. less than 0.42 cubic meters, for this competition and is determined based on the combined volume of the indoor unit and outdoor unit of a typical 1.5 TR mini-split fixed speed air conditioner."

The **criteria on affordability** for the competition as stated in detailed technical criteria is as follows:
"Installed cost to consumers must not be more than 2X that of the baseline AC unit when manufactured at a scale of 100,000 units…." The baseline AC unit's cost to the consumer provided below for year 2017-18 acts as a reference for the purpose of helping the participants to determine the target cost of their prototype. The baseline unit's cost will be finalized by the technical review committee with reference to the previous full year's average cost of a 1.5 TR fixed speed 3-star split air conditioner offered by the market player with highest share."

"Rationale: We studied the 2017 India room air conditioner market report and determined the average cost of 1.5 TR (5.3 kW) fixed speed 3-star split air conditioner offered by the market player with highest share. Based on the research, the cost is determined to be Rs. 35,600 ($546 based on 2017 average USD to INR currency exchange rate) based on the average real price offered in the market in 2017-18."

In the detailed technical application, the explanation of the Affordability Criteria section includes the language as stated below:

"The installed cost of your proposed cooling solution (excluding standard installation labor costs comparable to the baseline unit and any taxes) to the consumer, when manufactured on a scale of 100,000 units in a year, must not be more than twice the installed cost of the baseline AC unit to the consumer. Based on the baseline cost of US $546, the proposed cooling solution's installed cost to consumer, when scaled at 100,000 units per year, must be no more than US $1,092. Please note that during evaluation of the applications, the Technical Review Committee will reassess the current baseline cost of US $546 (which is for the year 2017) against the full year's average cost for the year 2018 offered by the market player with the highest share in India and changes (if any) to the baseline cost will be made accordingly. Accordingly, the two times (2X) cost limit of US $1,092 may be modified and considered as the new threshold of the Affordability Criteria for all the applications."

Clarification / update to participants

We are updating the baseline RAC unit specifications and providing details on the actual baseline unit to be tested. The reason for this update is that the baseline RAC unit identified earlier is no longer being produced in the market. Our rationale from the very beginning has been that the baseline AC unit should be reflective and representative of the most commonly sold RAC by the industry leader with the highest market share, thus making this change necessary.

To ensure that we are being consistent in comparing all the cooling solutions with the same baseline AC unit across all stages of the prize, the following prize criteria have been revised to reflect this update:

- Baseline AC unit model: Voltas SAC 183 JZJ

- Climate Impact criteria: The baseline refrigerant has been updated to reflect the refrigerant available within a 1.5 TR EER 3.5W/W fixed-speed mini-split RAC produced by the manufacturer with the largest RAC market share in India. The **refrigerant used by the baseline unit is R22 and its GWP value in accordance with the IPCC AR5 report will be considered as 1760** and;

- Scalability criteria: Volumetric size limit under the scalability criteria is updated. The new baseline unit's dimensions limits the volumetric size of the proposed cooling solution to be less than **0.52 cubic meters**.

- Affordability criteria: The baseline AC unit's installed cost to consumer (excluding standard installation labor costs comparable to the baseline unit and any taxes) is

updated from Rs. 35,600 ($546, based on 2017 average USD to INR currency exchange rate) to Rs. 36,515 ($534, based on 2018 average USD to INR currency exchange rate) based on the actual cost of the baseline AC unit procured for testing purposes. In line with this update, **based on the new baseline cost of US $534**, **the proposed cooling solution's installed cost to consumer, when scaled at 100,000 units per year, must be no more than US $1,068** (excluding standard installation labor costs comparable to the baseline unit and any taxes)**.**

CLARIFICATIONS: All the participants are hereby notified of the following three (03) clarifications.

1. **Clarification on requirement to meet the Operation Criteria of the prize for the Detailed Technical Application**

Language at present in Detailed Technical Application

The Operation Criteria requirement in relation to maintaining the indoor conditions below 27°C DBT and 60% RH is stated in the Detailed Technical Application as follows:
"Your cooling solution should have a design cooling capacity of 1.5 TR when tested at outdoor conditions of 35°C dry bulb temperature (DBT) and 24°C wet bulb temperature (WBT) and should be able to meet the simulated hourly sensible and latent cooling load (provided for a typical apartment) when operating in New Delhi, India over the entire year. The solution should also be able to maintain indoor conditions below 27°C DBT and 60% RH over the entire year when meeting simulated hourly sensible and latent cooling load (provided for a typical apartment) when operating in New Delhi, India."

The evaluation method of the Operation Criteria is stated in the Detailed Technical Application as follows:
"The evaluation of the operation criteria will be carried out based on the information provided by the participant on cooling capacity of their proposed solution under varying outdoor conditions when operating in the climatic conditions of New Delhi, India. The evaluation will also include an assessment of the ability of their proposed cooling solution to maintain the indoor conditions below 27°C DBT and 60% RH when meeting the simulated hourly sensible and latent cooling load of a typical apartment in New Delhi, India provided as part of this application."

Clarification / update to participants

The Detailed Technical Application provides simulated hourly sensible and latent cooling loads for a typical apartment of 90 square meters in climate condition of New Delhi, India

over the entire year. Presently, it is expected that the cooling solutions should be able to meet these cooling load profiles and maintain the desired indoor conditions for temperature and RH at all times. In consideration of the operation constraints of a high ambient baseline AC unit for outdoor air temperatures below 20°C DBT, we would clarify that the proposed solutions should be optimized to be meeting the sensible and latent cooling load profiles and maintain the indoor conditions below 27°C DBT and 60% RH for all the times when the outdoor air temperature is above 20°C only. There will be no penalty for not maintaining the indoor conditions below 27°C DBT and 60% RH when the outdoor air temperatures are below 20°C DBT. We will not measure any aspects of a cooling solutions performance for the period when the outdoor air temperature is below 20°C DBT regardless of whether the solution continues to operate or not.

2. Clarification on unmet hours related to meeting the Operation Criteria for the Detailed Technical Application

Language at present in Detailed Technical Application

The unmet hours allowance for the lab and field test stated within the testing protocol of the prize is as follows:
"In addition to the number of hours that the baseline unit does not achieve the desired indoor conditions of below 27°C DBT and 60% RH, an additional allowance of 3.4% hours of the test period will be provided recognizing that the ramp up period and precision of operation of prototypes is likely to be less than that of the established baseline unit."

The evaluation method of the operation criteria stated in the detailed technical application is noted below:
"The evaluation of the operation criteria will be carried out based on the information provided by the participant on cooling capacity of their proposed solution under varying outdoor conditions when operating in the climatic conditions of New Delhi, India. The evaluation will also include an assessment of the ability of their proposed cooling solution to maintain the indoor conditions below 27°C DBT and 60% RH when meeting the simulated hourly sensible and latent cooling load of a typical apartment in New Delhi, India provided as part of this application. Please note that during testing evaluations, the prototype of the shortlisted finalists will be tested under varying outdoor conditions as specified in the Testing Protocol and allowed an unmet hours allowance of 3.4% hours of the test period in addition to the number of hours that the baseline unit does not meet the desired indoor conditions."

Clarification / update to participants

The cooling solutions will be eligible for an unmet hours allowance during the detailed technical application phase identical to the testing phase. All participating solutions are allowed an unmet hours allowance of 3.4% of the annual hours; the unmet hours will only be measured when the outdoor temperature is above 20°C DBT.

3. Clarification on maximum allowable charge for flammable refrigerant

Criteria language at present

The criteria in relation to flammable refrigerants is stated within the detailed technical criteria as follows:
"The proposed solution should be capable of meeting test market regulations, or in their absence, international guidelines IEC 60335-2-40 (2018 or the latest amended version) or ISO 5149:2014 pertaining to safety and environment performance of systems using flammable refrigerants. It is preferred that the compliance to these standards is met to ensure safe operation, however, the participating team will not be disqualified in case of non-compliance with these standards."

Clarification / update to participants

For the purpose of evaluating the ability of a solution to meet the stated international guideline IEC 60335-2-40, participants can assume the room size for the test scenarios to be 25 square meter. This aligns with the sizing of the internal chamber that will be used for the lab simulated year-round performance test at CEPT University, India. Also, for the field test, this room size will be materially similar to that of the master bedroom or living room where the prototypes of finalist technologies will be installed in the apartment units. Please note that the apartment units selected for the field test will have multiple rooms for a total area of approximately 90 square meters. Apartment units for the field test have not yet been selected; we will share the final sizing, floor plans and details with all participants as soon as the apartments are secured.