

# Global Cooling Prize



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## Develop a breakthrough residential cooling technology to provide cooling for all, without warming the planet

The Global Cooling Prize aims to spur the development of a cooling technology that has 5X less climate impact than standard technology in operation today (considering both energy and refrigerant impacts) and no more than 2X the cost of the standard AC unit on the market at assessed industrial scale

The competition will run for two years and distribute \$3 million in prize money

Apply today at [GlobalCoolingPrize.org/Apply](http://GlobalCoolingPrize.org/Apply)

Application deadline is June 30, 2019

For more information visit [GlobalCoolingPrize.org](http://GlobalCoolingPrize.org)

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## About the Global Cooling Prize

The Global Cooling Prize is rallying a global coalition of leaders to solve the critical climate threat that comes from growing demand for residential air conditioning. By harnessing the power of innovation, we can provide cooling solutions that enhance people's lives without contributing to runaway climate change. This groundbreaking competition is designed to incentivize the development of a residential cooling solution that will have at least five times (5x) less climate impact than today's standard AC units. This technology could prevent up to 100 gigatons (GT) of CO<sub>2</sub>-equivalent (CO<sub>2</sub>e) emissions by 2050, and put the world on a pathway to mitigate up to 0.5°C of global warming by 2100, all while enhancing living standards for people in developing countries.

## The Problem

The planet is getting hotter. Already, 30 percent of the world's population is exposed to potentially dangerous heat conditions; by 2100, up to three-quarters of the population could be at risk. Affordable cooling is increasingly becoming a global necessity, supporting higher productivity, positive health outcomes, and accelerated economic development.

If the global demand for cooling continues to increase on a business-as-usual trajectory, the number of room air-conditioning (RAC) units in service is estimated to increase from 1.2 billion units today to 4.5 billion units by 2050. Developing countries will see a fivefold increase in RAC demand over this same period.

The resultant increase in power demand would place a massive new burden on electricity grids that are already straining at their limits (air conditioning already accounts for 40–60 percent of peak electricity consumption in many major cities).

Under a business-as-usual scenario, by 2050, these air conditioners would require an estimated 2,000 gigawatts (GW) of new electrical generation capacity annually, estimated to be at least 5,400 terawatt hours (TWh) by 2050, which is approximately equivalent to the current annual electricity consumption of the US, Japan, and Germany combined.

The energy consumption associated with mechanical cooling combined with the atmospheric impact of the refrigerants utilized by these systems represents one of the single largest end-use risks to the climate. RACs alone will add about 132 GT of CO<sub>2</sub>e emissions, cumulatively, between now and 2050, making it nearly impossible to keep global warming to less than two degrees above pre-industrial levels—the Paris Agreement goal.

International initiatives, like those centered on the Kigali Amendment to the Montreal Protocol, have made significant headway in addressing this challenge. The Kigali effort aims to phase out the use of hydrofluorocarbon-based refrigerants, and the United Nations Environment Programme has called it “the single largest real contribution the world has made so far” to meeting the Paris Agreement goals. Although critically important, this is far from sufficient to address the full consequences of cooling demand growth; refrigerants account for just over one-fifth of RAC-related emissions (the rest are attributable to electricity consumption).

## The Solution

It is clear that the world needs a breakthrough RAC technology, one that meets the world's booming demand for cooling without contributing to runaway climate change. To deliver this, a growing global coalition has launched the Global Cooling Prize, a global competition to spur development of a radically more energy-efficient cooling technology.

The prize was initiated by Rocky Mountain Institute (RMI); the Department of Science & Technology (DST), Government of India; and Mission Innovation, and will be administered by RMI, Conservation X Labs, the Alliance for an Energy Efficient Economy (AEEE), and CEPT University.

The prize will attract talent from across sectors and around the world to design a cooling solution for a typical tropical or subtropical home that will have at least 5x less climate impact. This will be achieved through a combination of dramatically reduced consumption of grid-supplied electricity and use of lower global-warming-potential refrigerant per unit of cooling than a typical RAC unit being sold in the market today. The winning solution will also need to operate within predefined constraints on refrigerant characteristics, materials, water consumption, full-load power consumption, and maintenance requirements. It will also need to be affordable to typical consumers, costing no more than twice the retail price of today's standard units at assessed industrial scale (the incremental cost has a payback period of less than three years).

The Global Cooling Prize was launched in November 2018 and will run for a period of two years. At least \$2 million in intermediate prize money will be awarded to support the development of prototypes by shortlisted teams. These prototypes will be tested for performance in both laboratory and real-world conditions in a heat-stressed city in India. The ultimate winner will be awarded at least \$1 million to support the commercialization and scaling of their innovative technology.

A global coalition of partners will drive the incubation, commercialization, and ultimately mass adoption of the breakthrough technology, starting in India and expanding to other countries with high RAC growth projections such as China, Brazil, and Indonesia. In India, we have begun to establish a coalition of policymakers, manufacturers, financiers, and major buyers to line up potential investments, influence standards,

and secure advance market commitments, effectively priming the market for the breakthrough technology.

## The Prize's Potential

### Leapfrogging existing technologies and incremental improvements

Prizes often represent the best way to bridge the wide gap between commercially available technologies and realizable potential. They democratize innovation, encourage new ideas, and disrupt markets using the psychology of “gamification” to attract entrants.

The global air-conditioning industry represents a prime target for this kind of innovation prize. It is highly consolidated, comprising fewer than 500 companies, with an even smaller number dominating the major channels to market.

As a result, emerging or alternative technologies find it virtually impossible to access the market at scale, whereas incumbents have little incentive to invest in the research and development required for a 5x better solution. Most RAC manufacturers have invested only in incremental efficiency gains sufficient to keep pace with policy mandates and evolving market demands, rather than innovating to develop future-ready cooling solutions.

This has resulted in a major gap between existing cooling technologies and the theoretical potential of cooling efficiency. The most advanced commercially available RACs have achieved only 14 percent of maximum theoretical efficiency, with the most commonly available units operating at 6–8 percent efficiency. By contrast, technologies like LEDs or solar photovoltaics have respectively achieved efficiencies of up to 89 percent and 53 percent of their theoretical maximums.

## The Prize

The Global Cooling Prize will have a profound impact on the future of air-conditioning technology in India and beyond, creating a strong ripple effect across industry:

- It will shine a spotlight on promising technologies and help to build and reward a culture of innovation-galvanizing innovators, engineers, and corporations around the world to focus on the need to design superefficient climate-friendly cooling solutions.
- This high-profile demonstration will validate what is technically possible, and provide insights as to what can be realistically scaled.

- This demonstration and subsequent economic analysis is likely to spur greater international awareness around the issue of cooling and climate.

- The competition is expected to instill government confidence to move beyond incremental energy improvements and adopt much more aggressive efficiency codes.

- The whole system benefits, including savings in utility retail rate subsidies, and avoided grid infrastructure can be used to support early movers.

- Once the technology is established, government signals can help catalyze the rapid industrialization required to drive down technology costs.

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