

Scoping Report

Cooling for All

*Identifying sustainable, affordable and
efficient cooling pathways
Executive Summary*

March 2018

KIGALI
COOLING EFFICIENCY PROGRAM



EXECUTIVE SUMMARY

The ratification of the Kigali Amendment represents a turning point in the global conversation about the need to provide sustainable cooling for all. The commitment to phase down hydrofluorocarbons by over 80% by 2030 comes at the same moment when hundreds of millions enter a global middle class, and begin to demand cooling solutions that presently use HFC's intensively. Right now, cooling related equipment, like refrigerators and air conditioners, produces an estimated 10% of the world's CO₂-e emissions¹, with approximately a quarter of this footprint is due to leakage of high global warming potential (GWP) refrigerant greenhouse gases like HFC's. With global air conditioning demand alone projected to grow 33-fold by 2100, cooling demands risk further climate change impacts, higher emissions, and a failure to reach the goals of the Kigali Amendment.

We understand the issues. Most of the demand growth for air conditioning will be in developing countries, with as much as a quarter of the growing demand directly attributable to climate change.ⁱ At the same time, urbanization combined with population growth, is adding an estimated 2.5 billion more people to the world's cities by 2050, with close to 90% of this increase concentrated in Asia and Africa. The world's slum population of over a billion residents is likely to continue to rise, and more than a billion people globally still lack access to electricity. Combined, these forces mean global demand for cooling is expected to boom.

Given these trends, we urgently need to find new ways to provide sustainable cooling to a growing and more affluent world population in a warmer world, which go beyond making current energy-intensive cooling devices far more energy efficient. In short, we need to rethink the future of cooling by focusing foremost on the services cooling needs to provide and subsequently craft an ambitious, compelling and inspirational roadmap to get there. This roadmap will need to satisfy both the Paris Agreement and universal energy access targets – including cooling for all - under the Sustainable Development Goals, which can bring much needed prosperity and enhanced quality of life to billions in developing and emerging countries.

Yet, very little data exists on the lack of global access to cooling. We do know, however, that the sustainable cooling access gap includes a significant population with rising incomes who may be locked in to unsustainable cooling systems if presented with no better options. It also includes those who are unlikely to gain much needed access to cooling if we don't take action, as global temperatures reach record highs of up to 54°C degrees.

This report outlines levels of cooling access across key sectors that include buildings, urban environments, data centers and cold chains, which are critical for preserving both medical and food supplies, and identifies how populations lacking cooling access stand to be affected.

In Sub-Saharan Africa for example, 59% of the urban population lives in slums and are the first to be impacted by heat waves. The World Health Organization also recently forecast that by 2050, global deaths from heat waves could reach a staggering 260,000 annually, unless cities adapt to the threat. Our

¹ CO₂-e emissions refer to any given mixture and amount of greenhouse gases, expressed in the number of CO₂ amounts, that would have the same global warming potential (GWP) when measured over a specified timescale.

investigations suggest that new solutions could help to reduce the risk associated with a lack of cooling for around 5-600 million lives at highest risk.

Every year, 1.3 billion tons of food is lost or wasted, with countries like India only being 59% food self-sufficient by 2030 under current trends. This report shows that over 400 million tons of food is lost due to a lack of cold chain access, and that India could feed an additional 40 million people every year through cold chain improvements. A further two million people die preventable deaths every year due to ineffective distribution of vaccines, in which cold chains – or a lack thereof – play a major role.

Rather than merely describing the problem, this report outlines a novel approach for structuring a global dialogue around enhanced cooling access. It introduces access to cooling Tiers, including a framework for identifying and addressing different levels of cooling access (gaps). We define Tier 0 as those people at highest risk from a warming world and whose health and productivity could be critically impaired; Tier 1 as those whose health and productivity are significantly impaired; Tier 2 as those whose health and productivity might partially impaired; and, Tier 3 as those that are in a (financial) position to make choices on how to address cooling.

Having looked at data from over 200 countries and territories we have developed a list of 25-30 high impact countries with significant populations at risk in each category: buildings and urban environments, food loss, and cold chains. While the data is imperfect and relies on assumptions, incidences of countries in each grouping have allowed us to establish a shortlist of countries that require much further attention and which would appear to be the most urgent countries in need of cooling access action plans. They are: India, Nigeria, Philippines, Guinea, Benin, and Guinea-Bissau. It also identifies serious multi-sector risks in highly populous countries such as Brazil, Pakistan, and Indonesia.

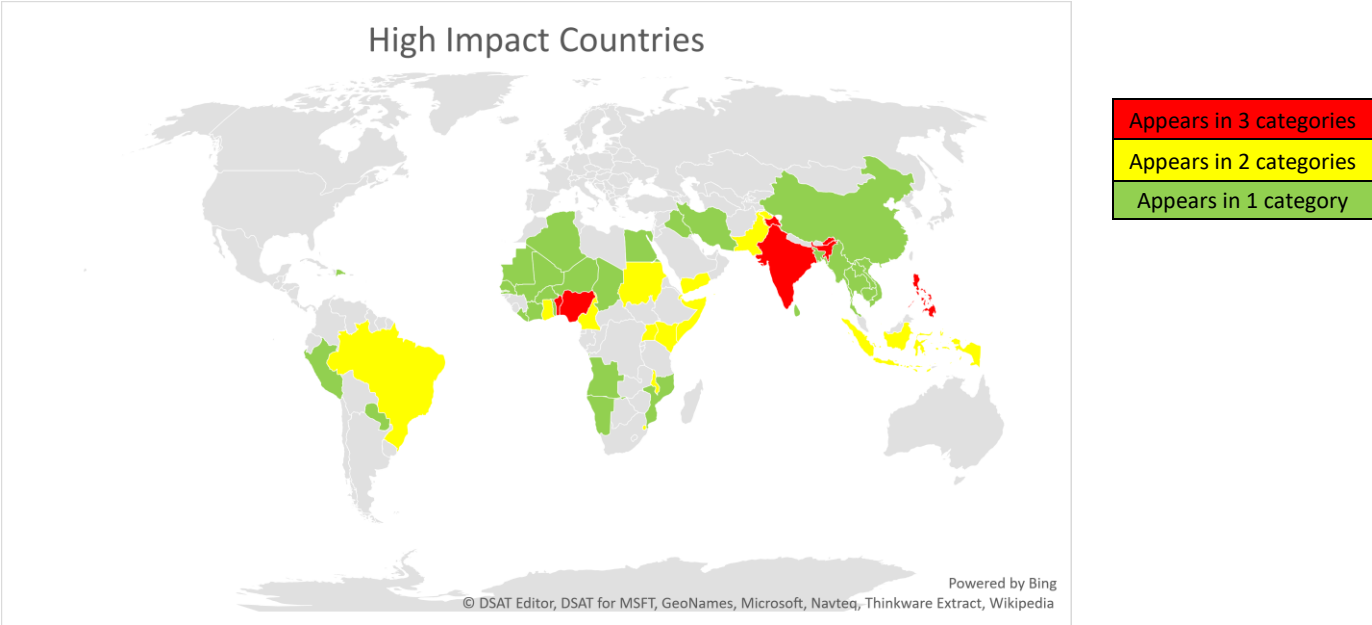


Figure 1: Map of High Impact Countries by Incidence of Risk

The report also introduces the concept of a Cooling Access Dividend, which is intended to measure the economic, social and environmental benefits of cooling services provided by different levels of cooling

access (similar to Tiers used under the Sustainable Development Goals). In Orangi Town, Pakistan, one of the world's largest slums, identifying the key barriers and using targeted interventions can help lift 1.8 million inhabitants from Tier 1 to Tier 3. Upgrades that enhance the passive cooling ability of slum dwellings, in combination with incentives to move people from illegal to legal electricity connecting and rebate programs for efficient fans move inhabitants from Tier 1 to Tier 3 through positive health and productivity, reduced household energy and cooling expenditures, and lower carbon emissions.

The report also discusses how we can start addressing cooling access gaps with systematic approaches, including sectoral pathways and strategies for tackling barriers that are currently preventing people from gaining cooling access. These pathways address rapidly surging near-term cooling demand and the need to quickly expand cooling access for those at the "Base of the Pyramid",², while simultaneously working towards longer term transformational changes in how global decision-makers approach and address cooling demands.

Finally, the report provides key initial guidance on how different groupings of solutions for enhancing sustainable cooling access in buildings, urban environments, and cold chains can be applied to elevate people from Tier 0 cooling access up to higher Tiers. It provides early thoughts on program design and decision-making criteria for selecting a package of suitable measures, as well as an initial set of recommendations for elevating public and political attention on the cooling access issue.

Despite the strong political momentum behind the ratification of the Kigali Amendment, access to cooling has not yet captured the political imagination, and the economic and social costs of not ensuring sustainable and affordable cooling access for all are poorly understood, conveyed and communicated. This creates the risk of locking countries into costly high-carbon, energy inefficient cooling pathways, as well depriving many from essential cooling needs. Meanwhile, the timelines for action are both short and urgent, and require an increased and constant galvanizing of multiple actors in coalition to spur action at speed and scale.

Together, this report and its annexes provides, we believe, the first comprehensive and structured accounting and analysis showcasing the extent of the cooling access challenge and why tackling it is a profoundly important development and environmental priority.

² Referring to the approx. 2.7 billion people, who live on less than \$2.50 a day

As we move from the preparation of this Scoping Report to the development of a Final Report to be published at the High Level Political Forum in July 2018, it is key that we build awareness around the report's key themes over the coming months, while continuing to build the evidence base to support our messages. These include the following:

- The ratification of the Kigali Amendment represents a turning point in the global conversation about the need to provide sustainable cooling for all;
- Countries will be phasing out HFC's at a time when demand for air conditioning and refrigeration is booming in emerging economies and the developing world. This means the time for action is now.
- Access to cooling is essential to achieve nearly all SDGs, and a failure to act could lock in a high carbon future. Business as usual is neither sustainable nor credible;
- With global cooling demand rapidly on the rise, we need to rethink how to provide sustainable cooling services to a growing and urbanizing world population, increasingly living in hot climates;
- Access to cooling is about many more things than simply cooling technology. Although the technology is increasingly available, insufficient effort is being spent on how to create a fertile enabling environment that allows solutions to scale;
- To ensure sustainable access to cooling, we must both act now and do the groundwork for a long-term shift. Right now, we urgently need to:
 - Rapidly expand access to cooling for those at the Base of the Pyramid such that they can reap the economic and health benefits of access; and
 - Make current, dominant cooling technologies like air conditioners radically more energy efficient. This allows countries to meet their Paris targets and avoid costly investments that lock in a high carbon future
- To make sustainable Cooling for All real in the long term, we must also immediately change the way we think about cooling and shift to a thermally driven, systems approach that focuses on the positive outcomes of cooling as our guiding principle.

ⁱ IPCC (2014). Fifth Assessment Report – Working Group II. Available at http://hcl.harvard.edu/collections/ipcc/docs/AR5_WG2_n_SREX_chapters_and_review/ii_SREX/c_Final_draft_SREX/SREX-FGDall.pdf