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Doing Cold Smarter

Clean Cooling

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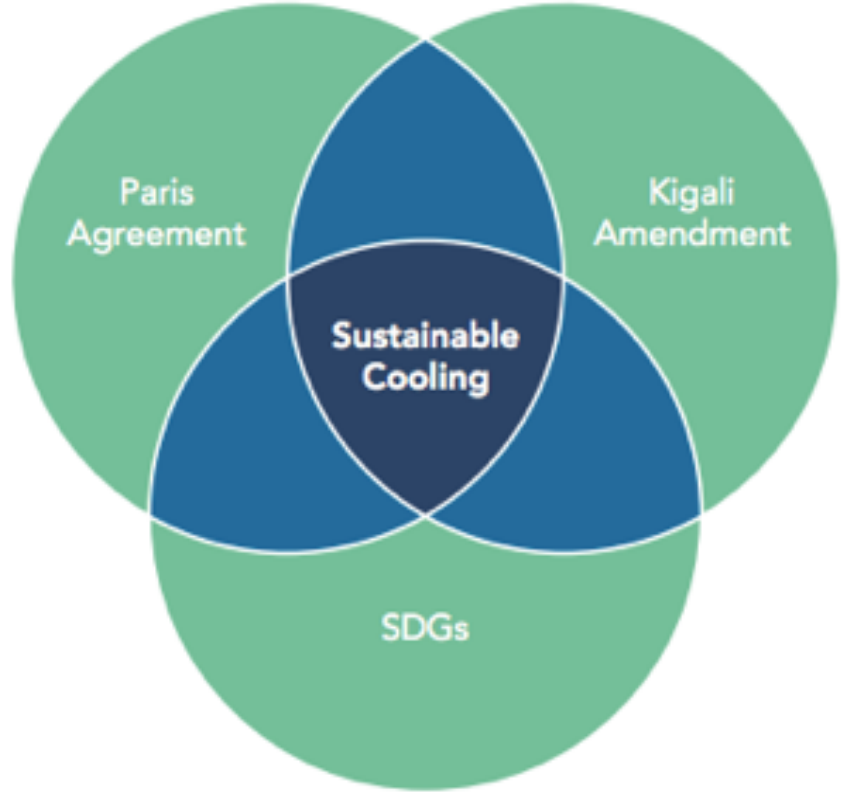
Doing Cold Smarter



"Economic and social development and the environment have to live together; you can no longer have one at the expense of the other. Rather our aim has to be a world where everyone can live well and within the sustainable limits of our planet.

Cold sits at the nexus of this challenge."

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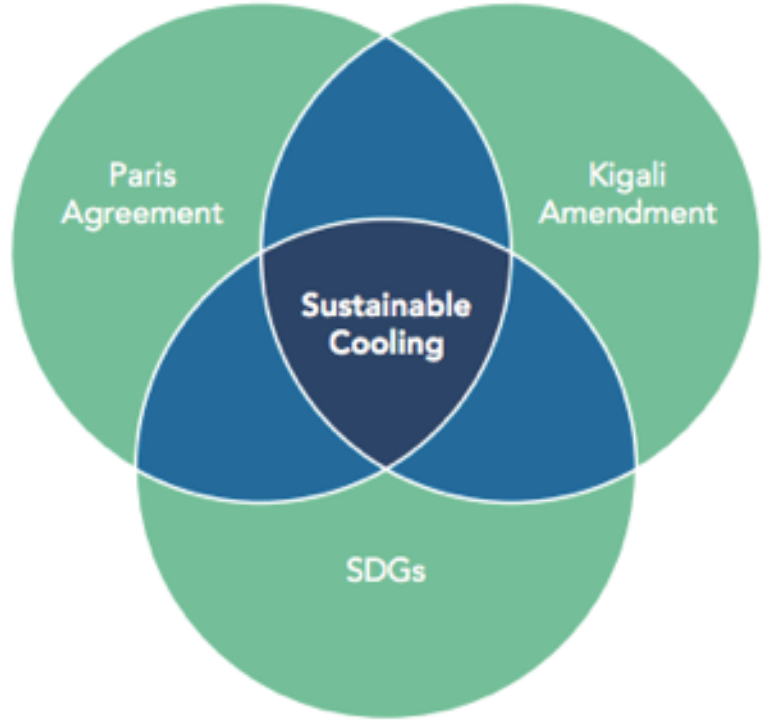
The global Cooling Challenge

- The world is off-track to meet the 1.5°C objective of the Paris agreement.
- The world is also off-track to meet the Sustainable Development Goals and adapt to fast increasing climate heat.



- But how we deliver this new cooling demand will materially impact our ability to mitigate climate change and manage our natural resources?
- There needs to be a paradigm shift towards sustainable cooling, providing affordable access to clean cooling for all with minimal climatic impact.

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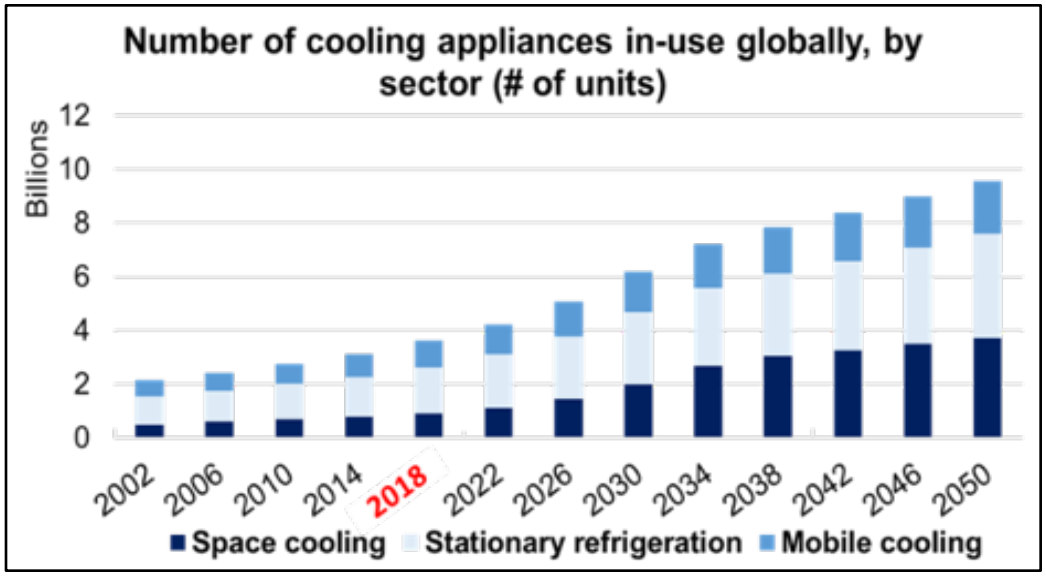
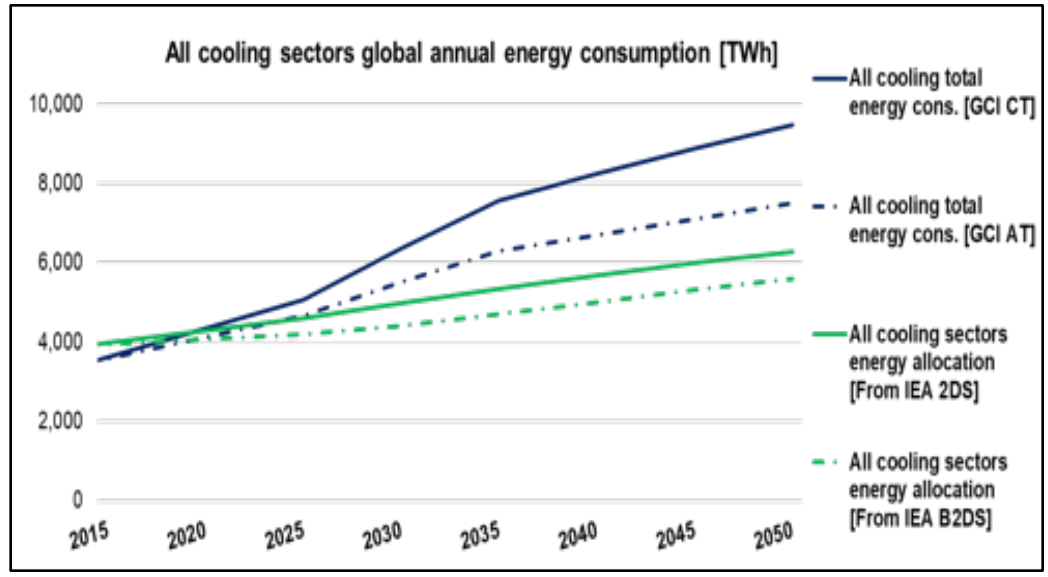
Energy Conundrum of Cooling for All

- **19 pieces of cooling equipment added per second for next 30 years**.
- Energy consumption grows to 9,500 TWh by 2050.
- Exceeds IEA's implied "energy budget" for cooling in its 2°C Scenario by more than 50%.
- Projected that 80% of the RAC market will be located in developing countries by 2030.





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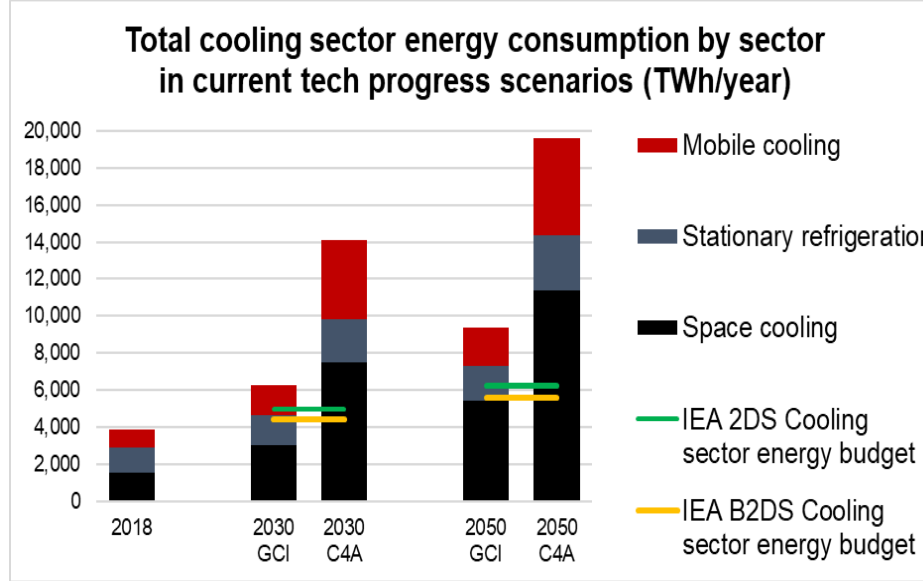
Energy Conundrum of Cooling for All

- 14bn appliances consuming 19,000TWh
- Even with accelerated technology progress projections, energy requirement still is 15,500 TWh.

➢ **68% - 101% of IEA % projected renewables capacity by 2050.**



	Equipment Stock (thousands)			% Change	
	2018	**2050 BAU**	**2050 UA**	**vs 2018**	**vs 2050 BAU**
Kenya	4,790	40,523	167,224	3391%	313%
Ethiopia	7,238	49,173	322,793	4360%	556%
Indonesia	62,159	242,417	553,056	790%	128%
Uzbekistan	6,233	14,459	62,493	903%	332%
Egypt	24,213	73,637	209,601	766%	185%
India	216,155	906,223	2,787,937	1190%	208%
Bangladesh	19,671	88,811	347,531	1667%	291%

BAU: Business as Usual; UA – Universal Access

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Covid-19 – a new, urgent, global Cooling Challenge

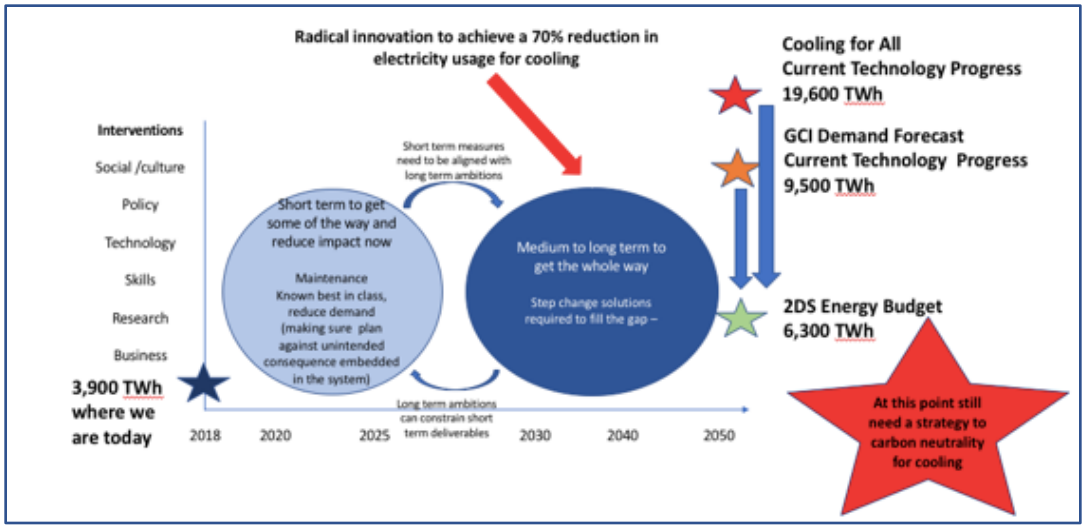
- We need an international effort to prepare the Covid-19 vaccine but also a global effort to develop the appropriate logistics and sustainable medical cold chains needed to be built on top of the existing system.

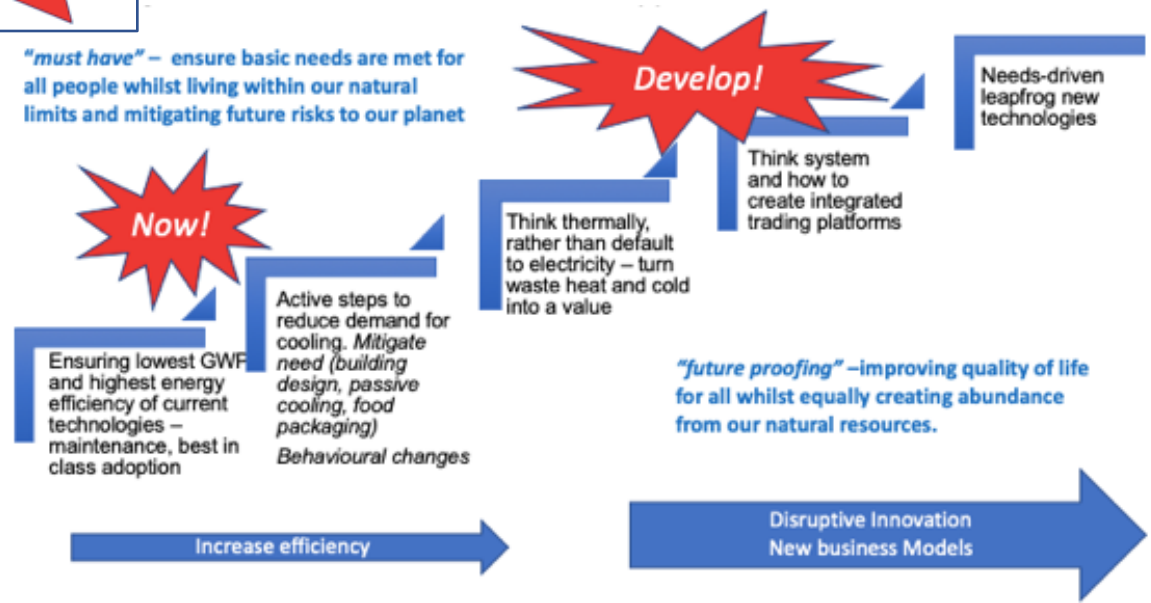
- Universal vaccine access is already a significant challenge, particularly in low-income countries across the global South - primarily due to the lack of robust cold-chains. The WHO estimates that 25% of liquid vaccines are wasted each year.

- Mass vaccination for COVID-19 in the next 12-18 months will require a new approach to assess, re-engineer and build upon available cold-chain logistics assets and systems to deliver the vaccines at a scale and speed never before considered, while still protecting existing immunisation needs and our climate goals

Ladder of interventions

here now interventions are key but energy efficiency and greening electricity alone cannot meet our energy needs





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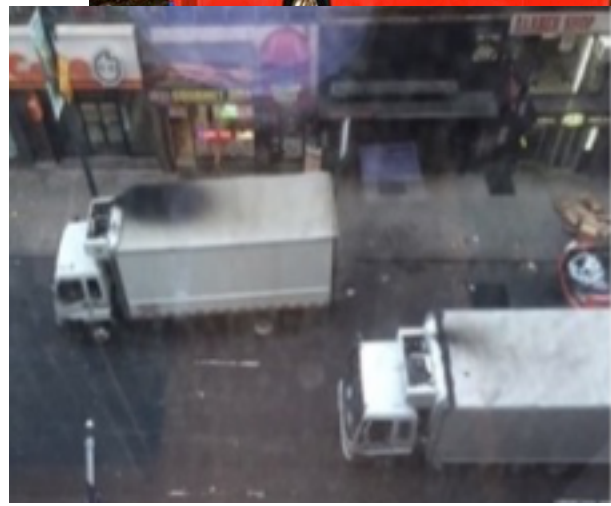
Reset Energy Strategy

The challenge is that when people talk about energy, they often mean electricity, and when they talk about energy storage, they mean batteries.



in short, we have to think thermally

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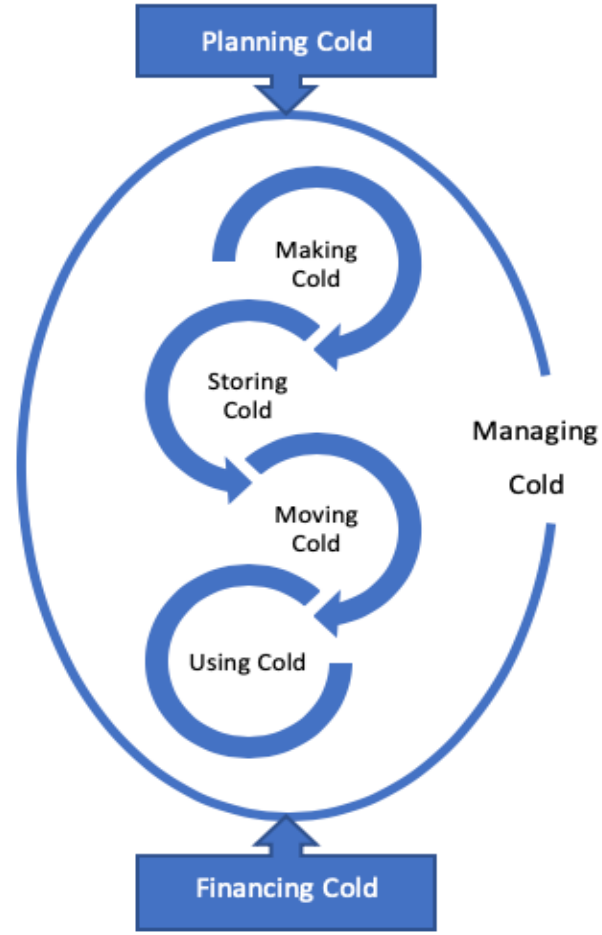
A system approach to cooling

The question is *'what is the service we require, and backcasting how can we provide it in the least damaging way'*, rather than *'how much electricity do I need to generate?'*

- Quantifying "what we are trying to do" to meet the cooling needs for all;
- Prioritising how to mitigate cooling demand and meet it through behaviour change and design;
- Recognising the portfolio of free, natural and energy-waste resources to help meet demand;
- Defining the right mix of energy sources, natural refrigerants, thermal energy storage, cooling technologies, business models, manufacturing, maintenance regimes, end-of-life management and policy interventions – and then to optimally, and safely, integrate all available energy resources through complete system approaches;
- Ensuring that we have an adequate skilled workforce to design, install and maintain Clean Cooling systems;
- In delivering the above, driving inclusive and sustainable industrialisation



THE COOLING FOR ALL NEEDS ASSESSMENT

In order for a country, city or community to ensure that the cooling needs of their population are met, they must first understand what those needs are.

A DEEPER DIVE ACROSS 3 AREAS OF NEED

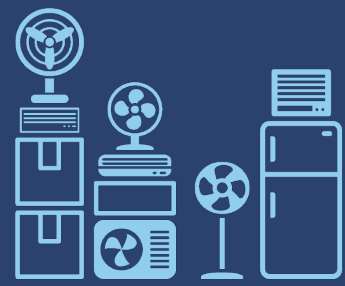
- Human comfort and safety
- Food, nutrition security and agriculture
- Health services

INDICATORS ON HOW TO TRACK PROGRESS

- Using SDGs to benchmarks progress

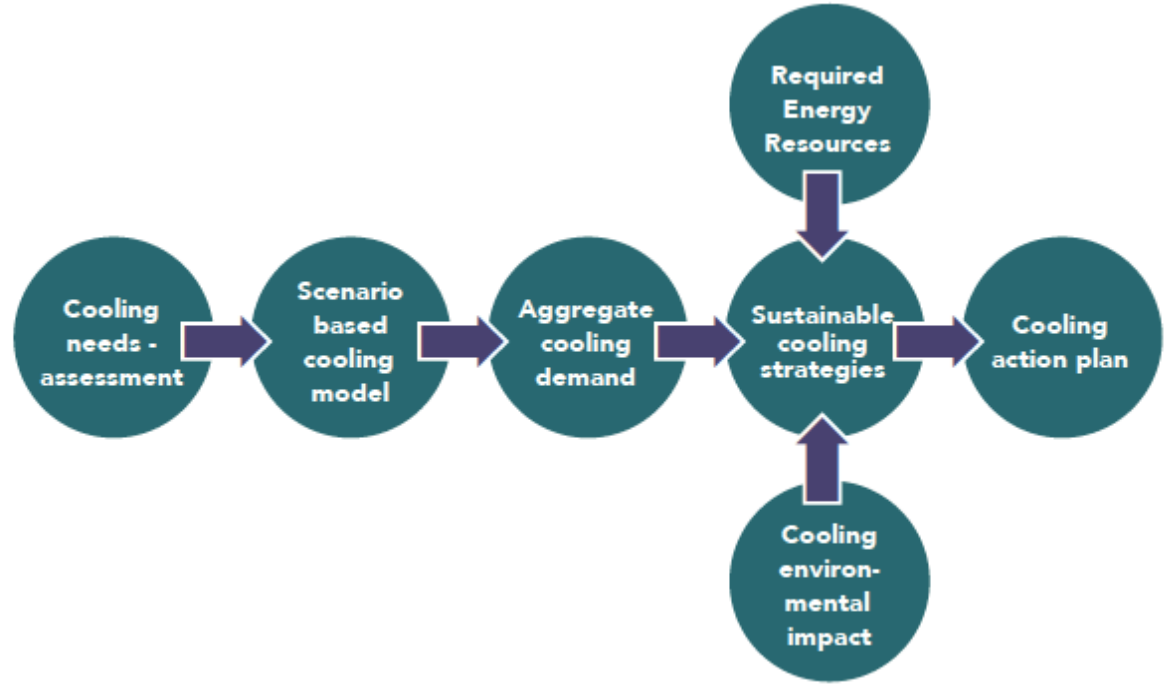
A TOOL TO:

- Establish a baseline for access to cooling
- Measure the full scope of cooling demand
- Understand impact of BaU
- Aggregate policy, technology, and finance options



THE COOLING FOR ALL SOLUTONS TOOL-KIT

- Model Cooling Service Needs, to include impact of temperature increases;
- Assess the extent to which Cooling Service Demand will evolve and be met on current trajectories
- Calculate the economic, social, energy and emissions implications of the current trajectory and cooling services gap;
- Explore a portfolio of behaviour, aggregation, design, operational and technology options to meet the need while minimising costs, energy and emissions from the sector;
- Provide a range of actionable outputs that can be the basis of policy interventions, capacity building and financing instruments;
- Establish a framework for tracking progress towards meeting unmet needs.



Clean Cooling audit and assessment

- Clean Cooling is setting a very high bar when compared with the many incremental improvements being rolled-out

- But given the size of the societal and climate challenges we face, we need to go further, faster. We have to deliver the ambition of
- Clean Cooling.

- To achieve this, we have to properly define and quantify what that means and be able to assess the extent to which new cooling systems meet the challenge.

- These standards will help all stakeholders to properly understand and quantify the true sustainability (financial, social and environmental) of cooling technology, including CO_2e emissions reduction

- The template will be launched later this Summer

to be launched for peer review this summer

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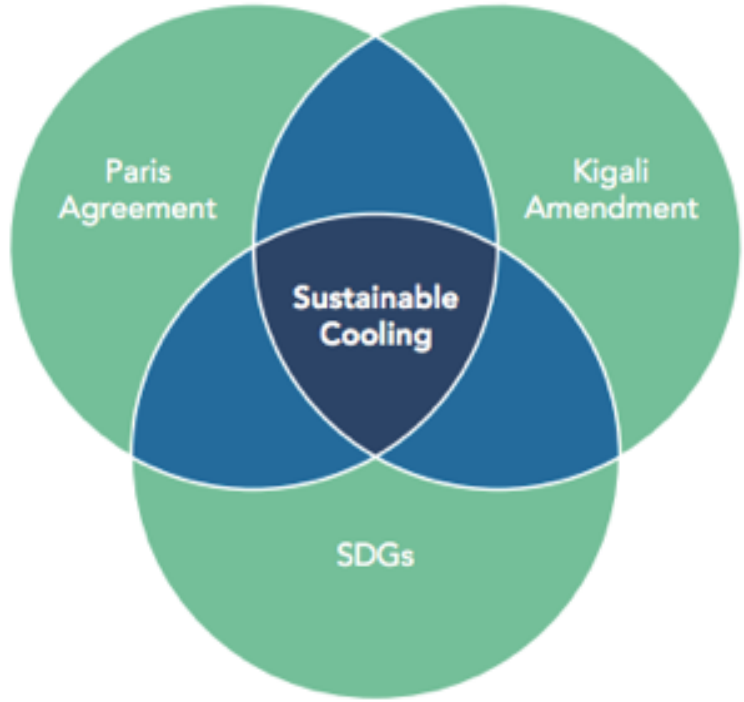
IN CONCLUSION

Clean Cooling provides resilient cooling for all who need it while minimsing environmental damage and climate impact.

It necessarily must be accessible, affordable, financially sustainable, scalable, safe, and reliable to help deliver societal, economic and health goals as defined by the United Nation's Sustainable Development Goals (SDGs).



- Size of the challenge
- System thinking
- Thinking thermally
- Audit and assessment of compliance
- Support for innovation
- Coalition of actors
- Need for leadership

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