



# Clean cooling

'Clean Cooling' is the provision of cooling through efficient and sustainable means that contribute towards achieving society's goals for greenhouse gas emissions reduction, climate change mitigation, natural resource conservation and air quality improvement. Clean cooling necessarily must be accessible, affordable, financially sustainable, scalable, safe and reliable to help deliver our societal, economic and health goals.

## **Delivering 'Clean Cooling'**

'Clean Cooling' starts with what we can do today to reduce demand and deliver incremental efficiency improvements; more effective use of shade and natural ventilation in building design, painting roofs white and putting doors on chillers in supermarkets through to installing best-in-class refrigeration and air-conditioning equipment and using district cooling systems where possible. But though these interventions are important, given the growth in cooling demand, they will not deliver the required reductions in energy usage, emissions and pollution, nor will they adequately increase resource productivity.

Delivering 'Clean Cooling' is, therefore, also about investing in a radical reshaping of cooling provision; addressing technology, operations, financing and consumer behavior in a holistic approach with a system perspective. It involves understanding the multiple cooling needs and the size and location of the free, waste and wrong-time energy resources available to help meet demand, and defining the right mix of novel energy vectors, thermal stores, cooling technologies, business models and policy interventions to optimally integrate those resources through self-organizing systems. In short, thinking thermally.

By pooling demand and fully understanding the portfolio of resources available, a re-mapping of processes and technology to achieve efficiencies is facilitated that would not be possible from a sub-system perspective. Equally, it will enable the new business models to make cooling affordable and accessible to all.

Clean cooling specifically includes clean cold chains - integrated, seamless and resilient networks of refrigerated and temperature-controlled pack houses, cold stores, distribution hubs and vehicles used to maintain the safety, quality and quantity of food produce, while moving it swiftly from point of harvest to point of consumption. Application of clean cooling in cold chains should enhance the income, economic wealth and financial security of farmers, growers and fisherman and improve food quality, safety and value to consumers; achieving this sustainably with minimum environmental and natural resource impact.

The provision of comprehensive clean cooling is a prerequisite for a sustainable future and the sooner we recognise this fully and invest accordingly, the better for a successful outcome for humans in the 21<sup>st</sup> Century.

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