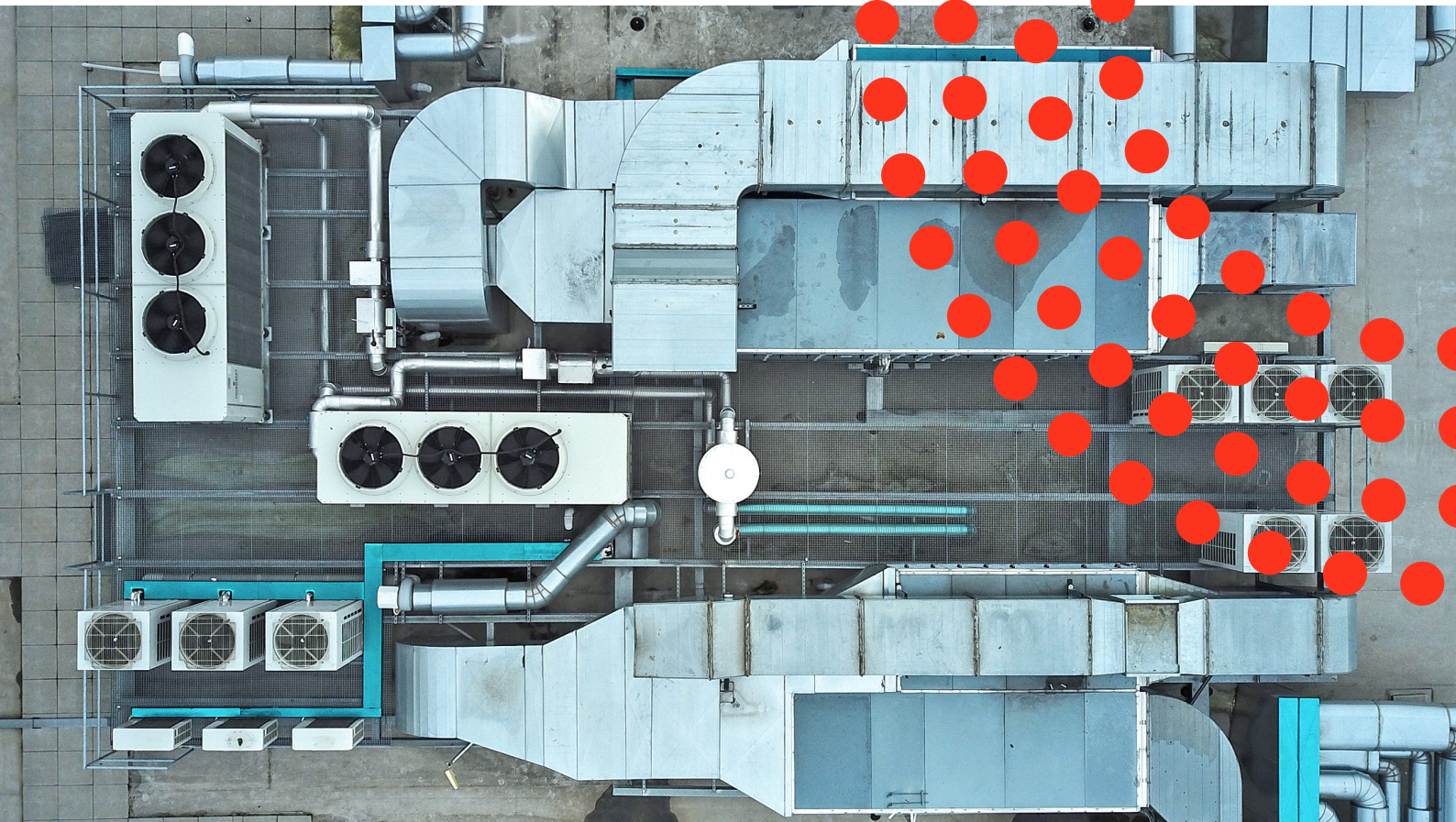


Efficient cooling in a warming world

Why and how businesses
are taking action

September 2020



In partnership with





Introduction

Demand for cooling is rising at an alarming rate.

As the world adapts to climate change impacts and as emerging economies grow and develop, electricity demand for air conditioning worldwide is projected to increase by more than 140% by 2050.¹ Left unchecked, the related greenhouse gas (GHG) emissions could nearly double in comparison to 2016.²

Cooling is the fastest growing consumer of energy in buildings.

This is particularly so in non-residential buildings,³ with significant cost implications for the private sector. Rising temperatures across the globe⁴ mean that companies' cooling systems will need to work harder⁵ and for more days per year.⁶

Time for change

The economic stimulus packages now being rolled out in many countries provide

a key opportunity for businesses to help deliver a green economic recovery after COVID-19. The 2020 EU stimulus funds, for example, are projected to attract more than 1,000 climate-friendly projects,⁷ including energy efficiency improvements.

As companies invest in more efficient heating, ventilation, and air conditioning (HVAC) systems,⁸ their collective purchasing power will help to build market demand for high-efficiency cooling equipment.

Smarter energy use lowers emissions and helps keep energy bills in check.

In its Efficient Cooling Scenario, the International Energy Agency (IEA) estimates the potential for cost savings of up to US\$2.9 trillion across power generation, transmission, and distribution between 2016 and 2050.⁹ By then, cooling-related emissions would be cut to nearly 2016 levels due to efficient air-conditioners alone.

Energy-smart companies

Forward-thinking businesses are poised to lead by example by improving cooling efficiency across offices, factories, retail stores, and hotels.

By improving their energy productivity, companies can boost their competitiveness.

The Climate Group's global EP100 initiative,¹⁰ in partnership with the Alliance to Save Energy, brings together companies committed to doing more with less energy. In the EP100 Cooling Challenge, seven members agreed to identify ways of cooling their operations as efficiently as possible – helping them to reach their energy productivity goals.

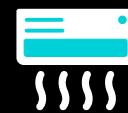
Their actions offer a cooling efficiency beacon for other companies to follow.

Together, they are driving faster decarbonisation of the private sector.

Did you know?



Temperatures in some of the world's most populous cities will **increase** between 2°C and 8°C by 2050¹¹



Air conditioning already accounts for nearly **one tenth** of global electricity demand¹²



The global commercial air-conditioner market is projected to **increase** by more than a third between 2018 and 2026¹³



Range of cooling efficiency measures

Cooling applications in businesses take a wide variety of forms, ranging from high volume/low-speed industrial fans,¹⁴ heat pumps, and indirect evaporative cooling to absorption chillers powered by recovered thermal energy,¹⁵ thermal energy storage, and district cooling.

Energy efficiency measures (EEMs) include equipment upgrades, improved maintenance strategies, and operations adjustments. They vary in complexity and in energy and cost saving potential.

Optimising the operation of chiller plants¹⁶ is an example of a complex EEM that can lower energy consumption by 20–50%.¹⁷ Simpler, low-cost measures can also have a high impact: reducing fan speed and cleaning air filters can reduce energy use by 15%¹⁸ and 20%¹⁹ respectively.

The first step is to take stock of cooling energy consumption and identify opportunities for improvement.

Low-/no- cost measures can typically be carried out quickly and are often pursued first.

They offer immediate, significant savings with minimal effort.

Examples include increasing fan belt tension (to prevent 5–10% losses in power transmission efficiency²⁴), cleaning heat transfer surfaces (to save up to 10% on cooling energy²⁵), and shortening HVAC schedules (to save up to 16% of energy used in an HVAC system²⁶).

Over the last year, EP100 Cooling Challenge participants have identified opportunities for energy savings in a facility.

They committed to adopting EEMs to optimise the contribution of efficient, clean cooling in meeting their energy productivity goals.

Examples of efficiency opportunities and trends in cooling applications



District cooling is on the rise in the Middle East,²⁰ where centralised cooling using environmentally friendly chiller water reaps multiple benefits in fast-growing urban centers



Parts of Europe²¹ are exploring how efficient **heat pumps** (providing both heating and cooling) can be paired with renewable electricity



More stringent energy efficiency standards for **ceiling fans**²² can generate significant energy savings in India, especially in factories²³

Financing efficiency improvements

A variety of financing programmes are available to support cooling efficiency improvements. Financing models include energy savings insurance, revolving funds, and leasing programmes,²⁷ as well as energy efficiency incentives offered by utilities, and energy savings performance contracting arrangements with energy service companies (ESCOs).

As an alternative to traditional financing models for cooling upgrades, the cooling-as-a-service model²⁸ enables customers to pay per unit of cooling they consume through a local district energy provider or a lease of higher performance equipment, rather than investing capital upfront in cooling equipment.

Case Study



Godrej Industries

Factories in Valia, Ambernath, Uppal, and Taloja, India

Godrej Industries – a holding company doing business in consumer goods, real estate, agriculture and gourmet retail – has set its sights on cooling efficiency for the long haul.

Having already made strides in increasing energy efficiency, reducing water use, and incorporating renewable energy, the EP100 Cooling Challenge helped Godrej assess the long-term implications of its cooling loads and create a vision for greater cooling efficiency.

As the company works to achieve carbon neutrality, improving cooling efficiency stands out as a key opportunity to both cut costs and decarbonise.

“

The EP100 Cooling Challenge has helped us be more precise on where we want to be for cooling efficiency in the next 5-10 years.”

Ramnath Vaidyanathan, GM & Head, Godrej Group

EEMs to be implemented by 2022	Projected annual cost savings (US\$)	Projected annual energy savings (MWh/yr)
Upgrading to a more efficient chiller at Valia & Ambernath	20,200	201
Turning off chiller for 24 hours per week	20,200	192
Reducing pressure setpoint for compressor	1,800	17
New venting system	750	7.2
Regularly cleaning cooling towers & fins of air-handling units	720	6.9



Taking positive steps

At its chemical facility in Ambernath, Godrej plans to modify its schedule for flaker operations to enable the facility to turn its chiller off for at least 24 hours each week.

Turning off the equipment could save more than 190 megawatt hours per year (MWh/yr) and reap US\$20,000 in cost savings annually.

Godrej is also investing in measures with a payback period of more than two years. For example, it purchased a new chiller for its chemicals facility in Valia that is significantly more energy efficient and uses a lower global warming potential (GWP) refrigerant.

The new equipment came at a higher upfront cost but will yield US\$14,000 in cost savings annually.

“

The drive for sustainability comes from Mr. Godrej himself.”

Ramnath Vaidyanathan, GM & Head, Godrej Group

Investing in real-time monitoring and controls will further optimise the setpoints of Godrej’s cooling equipment and achieve deeper savings.

Top-level support for sustainability

Support from the top has been critical to Godrej’s sustainability accomplishments.

Management identified cooling efficiency as a key area of opportunity, and then established goals and processes that enabled its facilities to move forward.

Godrej offers incentives to employees – in both the corporate offices and in plants – who achieve their sustainability performance targets.

Case Study



Majid Al Futtaim closed door refrigerators with LED lights

Majid Al Futtaim

Malls and facilities in Egypt, United Arab Emirates, Qatar

Hosting 240 commercial tenants in the Al Giza Desert, Dubai-based holding company Majid Al Futtaim's Dandy Mega Mall spends more than 30% of its energy bill on cooling, primarily for refrigerating produce.

Carrying out the EP100 Cooling Challenge has underscored the potential for cost savings, improved comfort for the mall's 150,000 monthly shoppers, and helped to make progress towards emissions reduction targets.

Cutting carbon

To help achieve its climate goals, the company is implementing two cooling-related strategies: upgrading systems to use both more efficient equipment and lower global warming potential (GWP) refrigerants.

At Mariner Mall in Abu Dhabi, Majid Al Futtaim reduced energy use and costs by more than 9% in 2013 by replacing all chillers with higher efficiency models. Resulting in more than 111 metric tons of CO₂ equivalent (MtCO₂e) reductions annually.

“

Our prime driver in the EP100 Cooling Challenge is to minimise our carbon emissions while maintaining the same level of customer experience across our assets.”

Ibrahim Al-Zu'bi, Chief Sustainability Officer, Majid Al Futtaim

At a facility in Qatar in 2004, Majid Al Futtaim reduced its utility bill by 10% by deploying a chiller management system.

After an ASHRAE Level 1 audit at Dandy Mega Mall, Majid Al Futtaim considered several opportunities to improve the efficiency of the mall's cooling systems and decided to take the following actions:



Install flowmeters for pumps to help maximise their performance. Leveraging the flowmeter data could reduce each pump's energy use by 5%, saving an estimated 3,600 MtCO₂e annually.



Install occupancy sensors for lighting control, reducing the heat load generated by the lighting system leading to cooling energy savings.

While the Egyptian government is targeting a 70% reduction in hydrochlorofluorocarbons (HCFCs) by 2025 using a 2010 baseline, Majid Al Futtaim has set a more ambitious target for itself.

The company plans to phase out most R-22 refrigerants in its facilities by the end of 2020 and use more climate-friendly refrigerant options.

Continued energy management

To maintain momentum on cooling efficiency, Majid Al Futtaim includes cooling targets within its sustainability plan.

Every year, the company conducts audits on its facilities to meet its sustainability goals.

Majid Al Futtaim continually trains its operations and maintenance staff to ensure they have up-to-date efficiency knowledge and skills.

The management recognises that cooling systems can run with lower costs, energy use, and emissions when staff can identify issues and address them.

“

The use of technology is an essential part of our carbon reduction efforts; that's why we continue to ensure that we use the most efficient cooling systems across our operations.”

Ibrahim Al-Zu'bi, Chief Sustainability Officer, Majid Al Futtaim

Case Study



Air conditioning units at Mahindra & Mahindra's plant in Nagpur, India

Mahindra & Mahindra

Farm division plant in Nagpur, India

High cooling costs and corresponding carbon emissions at Mahindra & Mahindra's (M&M's) Nagpur plant made the company's decision to join the EP100 Cooling Challenge easy.

The tractor manufacturing plant was spending about 10% of its electricity bill on cooling, for human comfort and process needs.



ASHRAE site audit at M&M premises

Improving the energy efficiency of cooling equipment has helped M&M bring energy costs down:



Variable frequency drives and other initiatives are already saving over US\$26,000 per year



Acting on a recommendation from an ASHRAE Level 1 Audit this year, the company will save more than 227 MWh of energy and US\$22,000 annually by using an improved heat transfer fluid in its chillers

By improving its cooling systems, M&M is also reducing emissions, improving worker comfort, and minimising dust and bacteria buildup which can be harmful to manufacturing machinery.

Bringing down emissions

M&M has a goal to be carbon neutral by 2040 across its global operations.

The company focuses on energy efficiency as a major lever to reduce carbon intensity.

The tractor manufacturer has already switched to light-emitting diode lighting (LEDs), which has reduced the plant's cooling load since LEDs generate less heat. M&M has also reduced duct and pipe leakages, improved insulation (for pipes, ducts, windows, and walls), and optimised operating hours to reduce excess cooling.

All the cooling efficiency measures at the Nagpur plant are already saving more than 535 MtCO₂e per year.

The next big changes involve retrofitting larger equipment. The Nagpur plant has most recently:



Upgraded 120 air conditioning (AC) units with inverter ACs to reduce their energy use by 8%



Replaced 56 fans with brushless DC fans to save 8.4 MWh of electricity and more than 6 MtCO₂e per year

The upgrades are part of an efficiency drive across 15 facilities that involves replacing 1,000 air-conditioning units with energy efficient inverter ACs.

Fostering a culture of sustainability

M&M's strides towards greater cooling efficiency have been made possible by the company's culture. M&M prioritises sustainability among top-level management and plant staff by setting public climate and energy goals and rewarding those who demonstrate initiative.

The 2040 carbon neutral goal across M&M operations challenges each plant to reduce its carbon intensity by 5% year on year.

To help achieve these emissions cuts annually, each plant has an energy champion that recommends and implements energy savings.

Each plant holds energy conservation meetings every month with team leads, and reviews progress on energy-focused goals for individual staff.

Once a year, the plants host a competition for suggestions on energy efficiency improvements, awarding those with the best ideas. The competition fosters creativity and buy-in towards energy-saving goals at all levels.

Looking ahead

The IEA estimates that improvements in energy efficiency can deliver over 40% of the greenhouse gas emissions reductions needed to meet global climate goals.²⁹

With electricity demand for air conditioning projected to more than double³⁰ over the next 30 years, smarter use of energy in cooling will be vital.

During this, the ‘Climate Decade’,³¹ to help halve GHG emissions by 2030, energy-smart companies have an important role to play in delivering these changes at speed.

As we have seen in this briefing, Godrej Industries, Majid Al Futtaim and Mahindra & Mahindra are three EP100 members leading the way – recognising and acting upon the compelling business case.

By sharing the business and environmental benefits of energy efficient cooling, EP100 members are inspiring more companies to follow their lead. They are scaling-up action across the private sector, and helping to get us on track to reach net zero emissions by 2050.

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Join EP100

To find out more about EP100 and how your company can take advantage of energy efficient cooling:

- visit theclimategroup.org/EP100
- contact Maria Rojas, Senior Campaign Manager, The Climate Group: MRojas@theclimategroup.org

CLIMATE GROUP EP100

About EP100

EP100 is a global initiative by the Climate Group, bringing together a growing group of energy-smart companies committed to doing more with less to improve their energy productivity. Members are driving tech innovation and reducing emissions while making substantial cost savings and improving competitiveness – inspiring others to follow their lead. EP100 is delivered in partnership with the Alliance to Save Energy in association with the World Green Building Council's Net Zero Carbon Buildings Commitment. **#EP100**

CLIMATE GROUP

About the Climate Group

The Climate Group drives climate action. Fast. Our goal is a world of net zero carbon emissions by 2050, with greater prosperity for all. We focus on systems with the highest emissions and where our networks have the greatest opportunity to drive change. We do this by building large and influential networks and holding organisations accountable, turning their commitments into action. We share what we achieve together to show more organisations what they could do. We are an international non-profit organisation, founded in 2004, with offices in London, New Delhi and New York. We are proud to be part of the We Mean Business coalition. Follow us on Twitter **@ClimateGroup**.



About the Alliance to Save Energy

Founded in 1977, the Alliance to Save Energy is a non-profit, bipartisan alliance of business, government, environmental and consumer leaders advocating for enhanced energy productivity to achieve economic growth, a cleaner environment, and greater energy security, affordability and reliability. Our mission is to improve energy productivity by: Leading bipartisan initiatives that drive technological innovation and energy efficiency across all sectors of the economy, through policy advocacy, education, communications, and research; and convening and engaging in diverse public private partnerships, collaborative efforts and strategic alliances to optimize resources.