Cool Up

Cooling sector

Prospects

Jordan

How fast is the demand for cooling growing and what can be done?

What is the energy and emissions saving potential for Jordan by 2050 if it were to implement a comprehensive sustainable cooling strategy for air conditioning and commercial refrigeration?

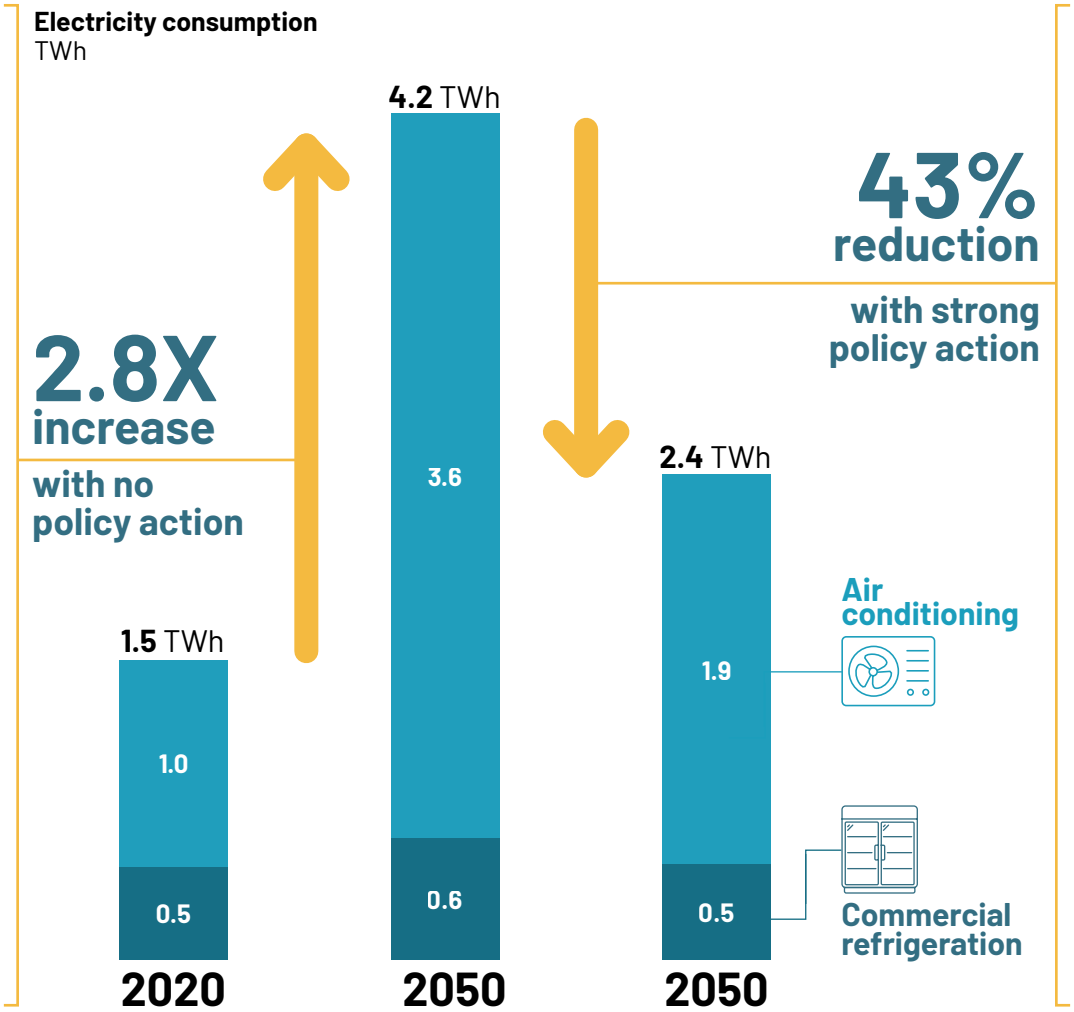
Can Jordan meet the sustainable cooling challenge?

Underlying trends are driving an increased demand for cooling.

- Population growth
- Increasing urbanization
- Economic growth
- Warmer climate

A building boom is expected in Jordan, with an expected 1.8 fold increase in total floor area projected by 2050. Combined with the above factors, this is resulting in projections that the amount of **AC systems will grow nearly 5-fold** from 1 million units in 2020 to approx. 4.5 million units by 2050. Less rapid growth is expected in commercial refrigeration where the number of systems is expected to go from 95 000 to 128 000. Combined, this would result in almost **3-fold increase in electricity demand** for the sector, requiring significant investment in additional electricity generation capacity.

The use of air conditioners is set to rise rapidly, driving up energy use, emissions and costs. Action can be taken to control runaway growth.



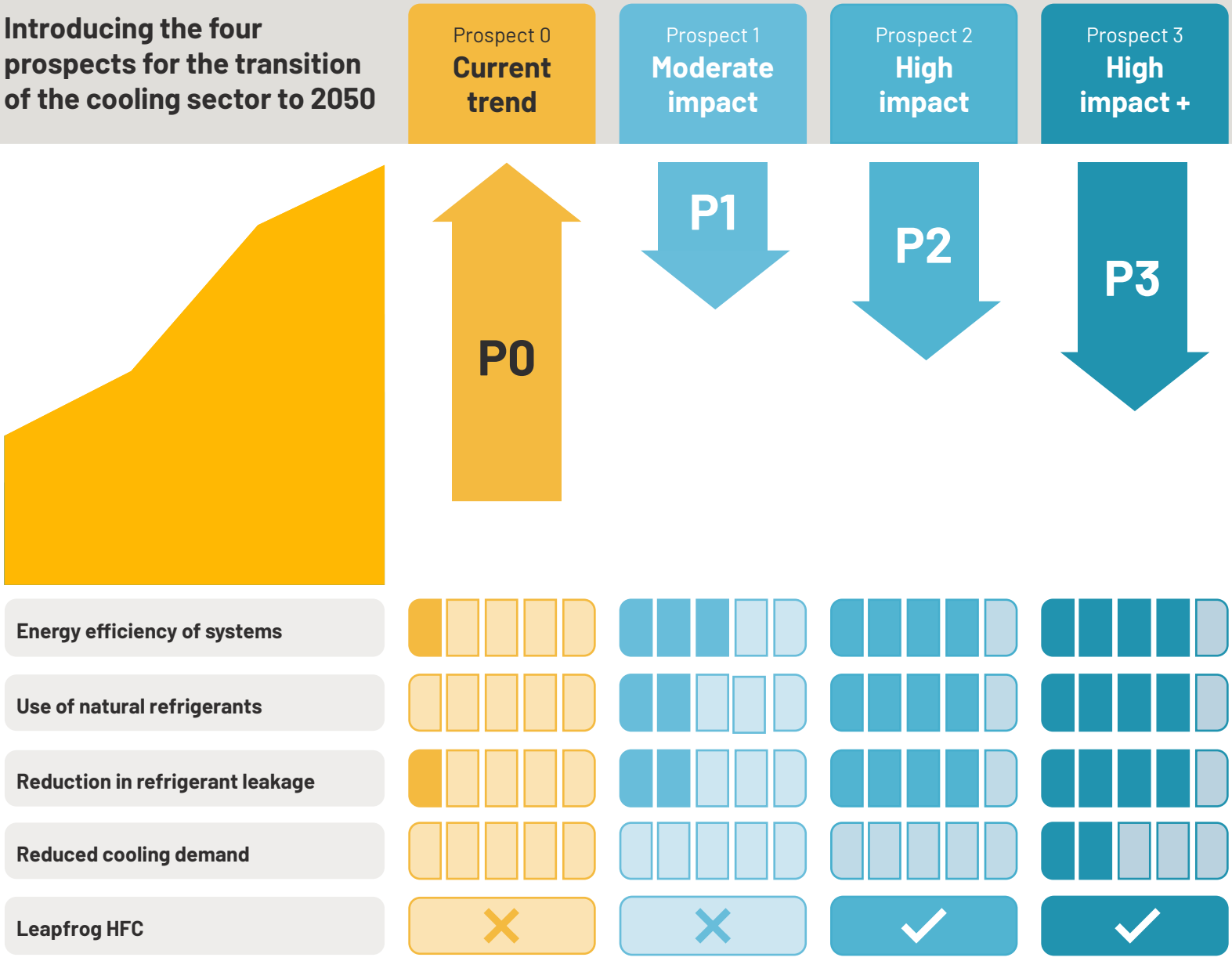
Egypt's success will be determined by use of effective policy.

- Reducing cooling demand
- Boosting energy efficiency
- Utilising natural refrigerants
- Reducing refrigerant leakage

Early action and swift implementation of highly efficient technologies with natural refrigerants is key to achieve reductions and avoid the lock-in effects. Indirect emissions can be tackled by installing more efficient AC and refrigeration equipment, as well as employing passive cooling and building envelope technologies. Direct emissions from refrigerant leakage can be countered with use of natural refrigerants, periodic checks and end of life procedures. Capacity building of certified technicians is key to unlocking these reductions.

Prospects for mitigation actions

Introducing the four prospects for the transition of the cooling sector to 2050



Modelling results for each prospect is given for:

Electricity demand

Provides results on the development of energy demand up to 2050 resulting from the AC and commercial refrigeration sectors.

GHG emissions

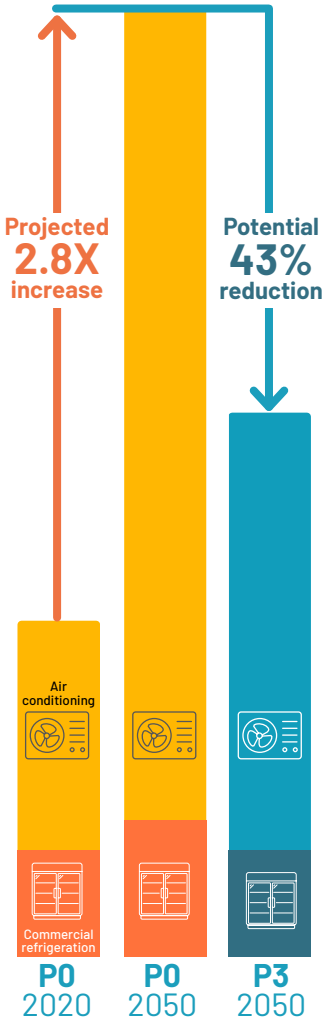
Provides results of the corresponding direct GHG emissions from refrigerant leakage and indirect GHG emissions from energy consumption of AC and commercial refrigeration units.

Economic costs

Provides results on the overall expected investment costs and corresponding annuities discounted over the lifetime of the project up to 2050. Comparison of these costs also provides the expected costs savings of the different prospects compared to the P0 trend.

How much can electricity demand be reduced?

Electricity demand growth comes almost exclusively from growth in the residential AC market



High growth of the RAC market represents both challenges and opportunities

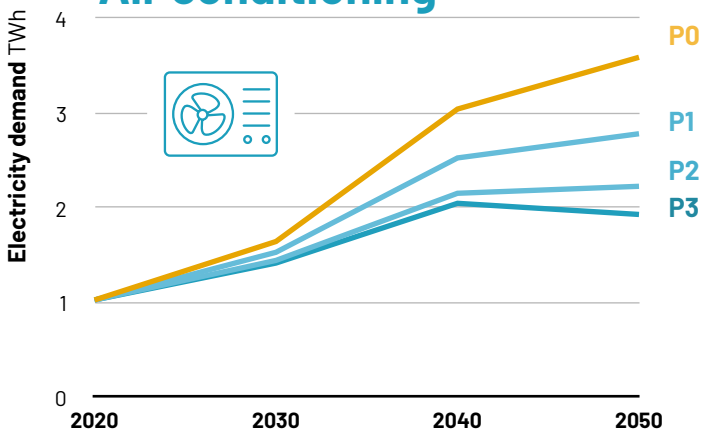
The RAC market in Jordan is growing fast with a **4.5-fold increase** in number of air conditioning systems expected by 2050, primarily from growth in the residential AC market. This growth leads to a strong increase in electricity demand under current conditions. This will require significant investment in additional electricity generation capacity and possibly power grid infrastructure upgrades as well.

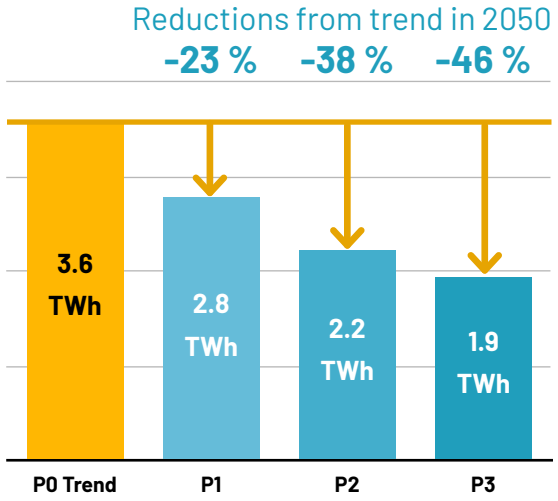
Significant electricity savings are possible by ambitious measures

The potential success of policy measures and regulatory controls will only limit but not stop growth in electricity demand. A potential **2.5 to 5-fold increase** in electricity demand from 2020 is likely depending on the modelled prospect. These mitigation measures can deliver significant **savings of 24–43%**.

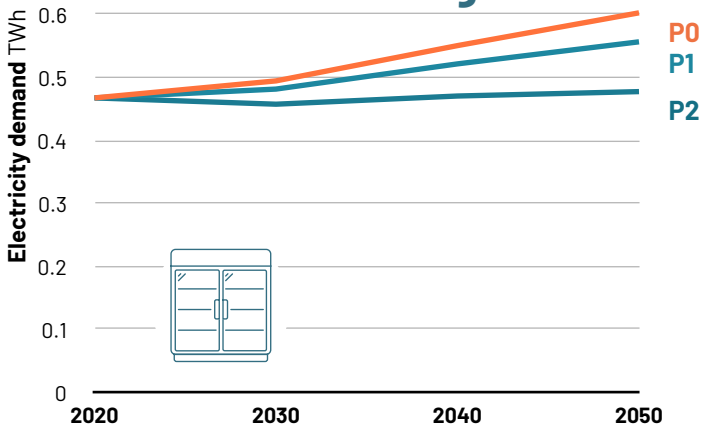
Rapid growth in electricity demand can be limited by policy measures that help install more efficient cooling equipment and build more thermally efficient buildings

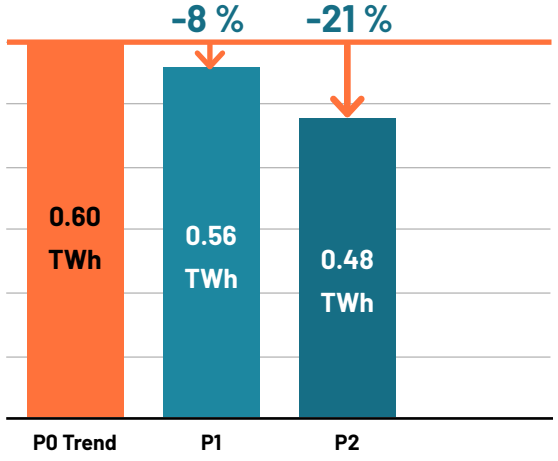
Air conditioning





Commercial refrigeration

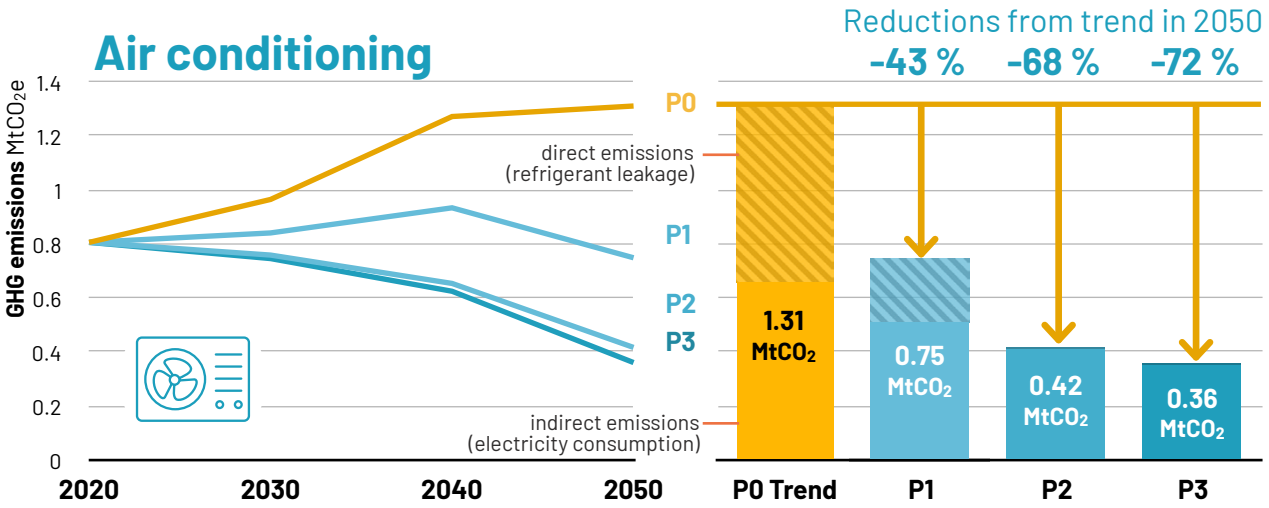




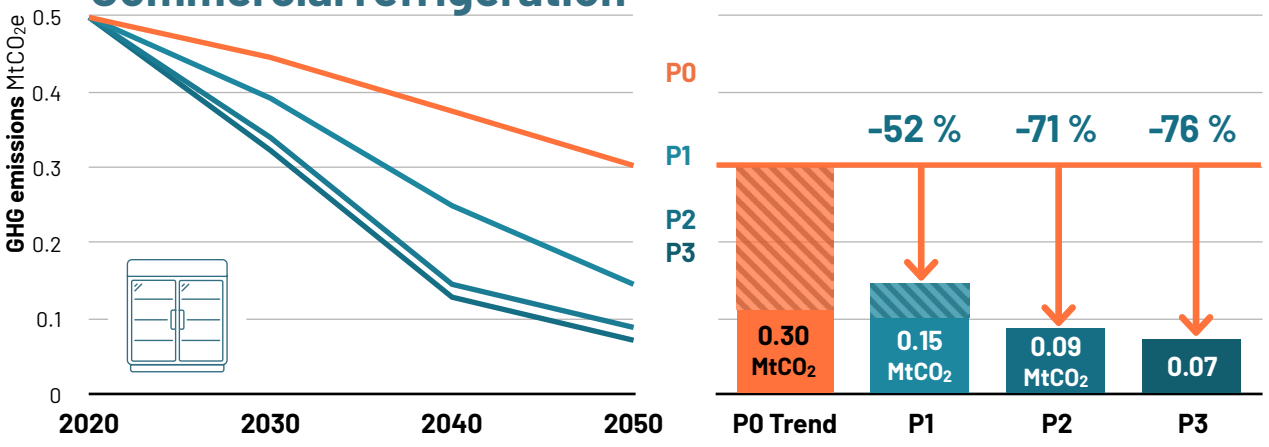
Emissions reductions potential

Early adoption of highly efficient technologies with natural refrigerants is key to avoiding the lock-in effect and stopping growth in direct and indirect GHG emissions

Air conditioning



Commercial refrigeration



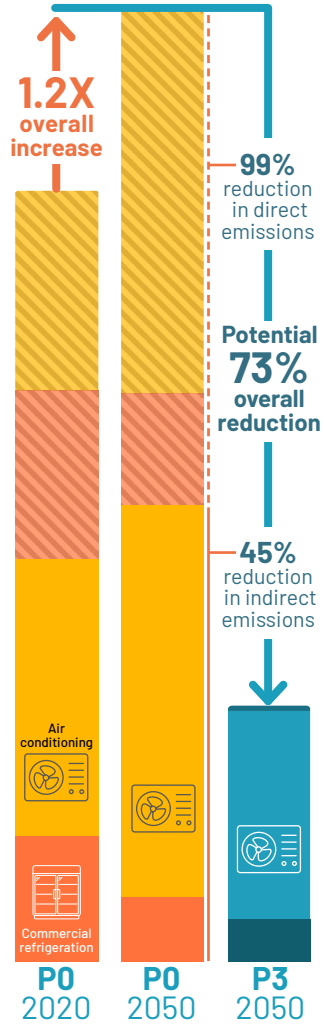
Direct emissions from refrigerant leakage can be virtually eliminated through use of natural refrigerants

Significant emissions reductions are possible

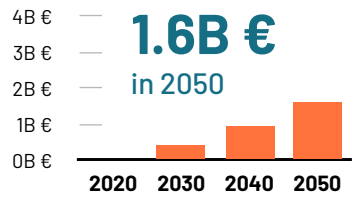
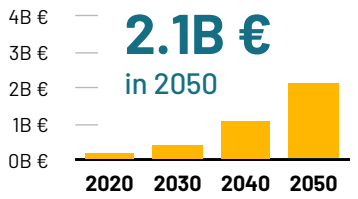
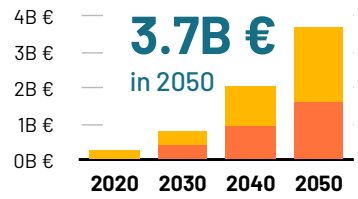
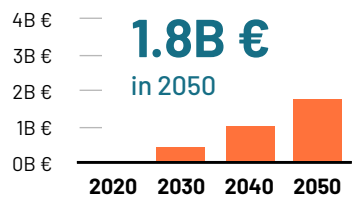
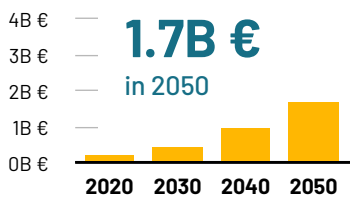
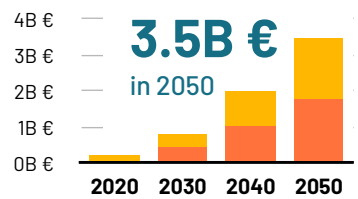
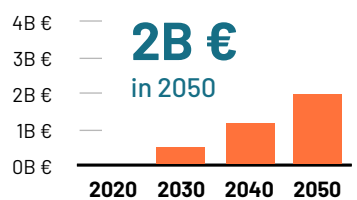
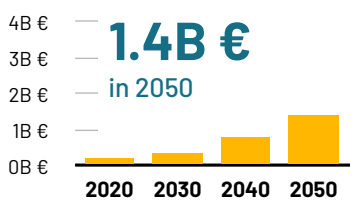
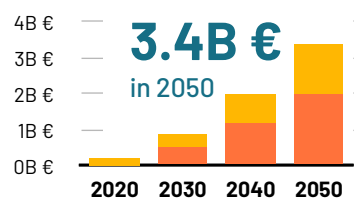
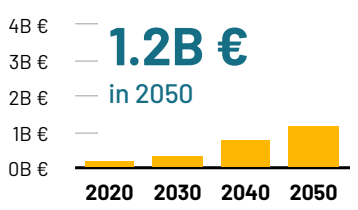
Under current conditions, overall market growth is set to dramatically increase emissions from the cooling sector. This is despite the electricity grid having a declining emissions intensity from adoption of renewables that will lower indirect emissions over time. Direct emissions account for almost 50% of total emissions and there is potential to all but eliminate them.

Early action and swift reductions are key

A fast transformation of the RAC sector towards more efficient technologies and natural refrigerants is key to avoiding the lock-in effects from outdated equipment using standard refrigerants (such as R410A, R134a). This transition will counteract emissions from overall market growth, help achieve the Kigali targets and deliver a range of additional benefits.



Investment and electricity costs

Prospect	Investment costs		Electricity costs		Total costs
	Equipment costs rise rapidly but higher and faster for sustainable cooling The annuities or discounted CAPEX costs required to increase the number of AC systems from 1 M to 4.5 M and refrigeration from 95 k to 128 k by 2050 will reach approx. 1.6B € in 2050 under current trends. Under P1 and P2 these costs will be 13% higher at 1.8B € and 28% higher 2B € respectively due to the higher costs of installing less prevalent higher efficiency, natural refrigerant technologies.		**Significant electricity costs savings are possible with ambitious measures** More cooling results in higher annual electricity costs. These costs are expected to rise to 2.1B € by 2050 under current trends, 10 times higher than 2020 levels. This level of increase can be limited to 6 to 8 times 2020 levels depending on the prospect, a 20-45% saving that more than offsets increased costs for efficient, sustainable cooling technologies.		**Savings outweigh costs, investing in sustainable cooling is financially smart** The overall situation shows that the higher costs of investing in sustainable cooling technologies are more than offset by the lower electricity costs, resulting in substantially lower emissions for a net financial saving. The savings could be even higher depending on electricity costs, which have risen in recent years. The electricity grid also benefits, particularly with avoided costs for peaking plants.
P0 Current trend		+		=	
P1 Moderate impact	 **+13 %** increase from P0	+	 **20 %** saving from P0	=	 **6 %** saving from P0
P2 High impact	 **+28 %** increase from P0	+	 **35 %** saving from P0	=	 **8 %** saving from P0
P3 High impact +			 **45 %** saving from P0		

More information

Full reports

This snapshot is based on the 2023 report entitled:

Cooling sector prospects study Jordan:
Energy and emission saving potential up to 2050 in the refrigeration and air conditioning sector

There are reports in the same series for **Egypt** and **Lebanon**

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