

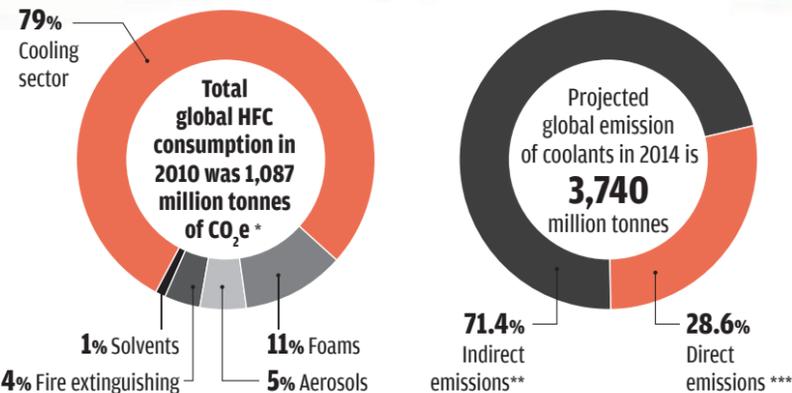
# Ozone conundrum

Refrigeration and air-conditioning industry has switched to ozone-friendly hydrofluorocarbons. But these are super global warming gases and need to be replaced

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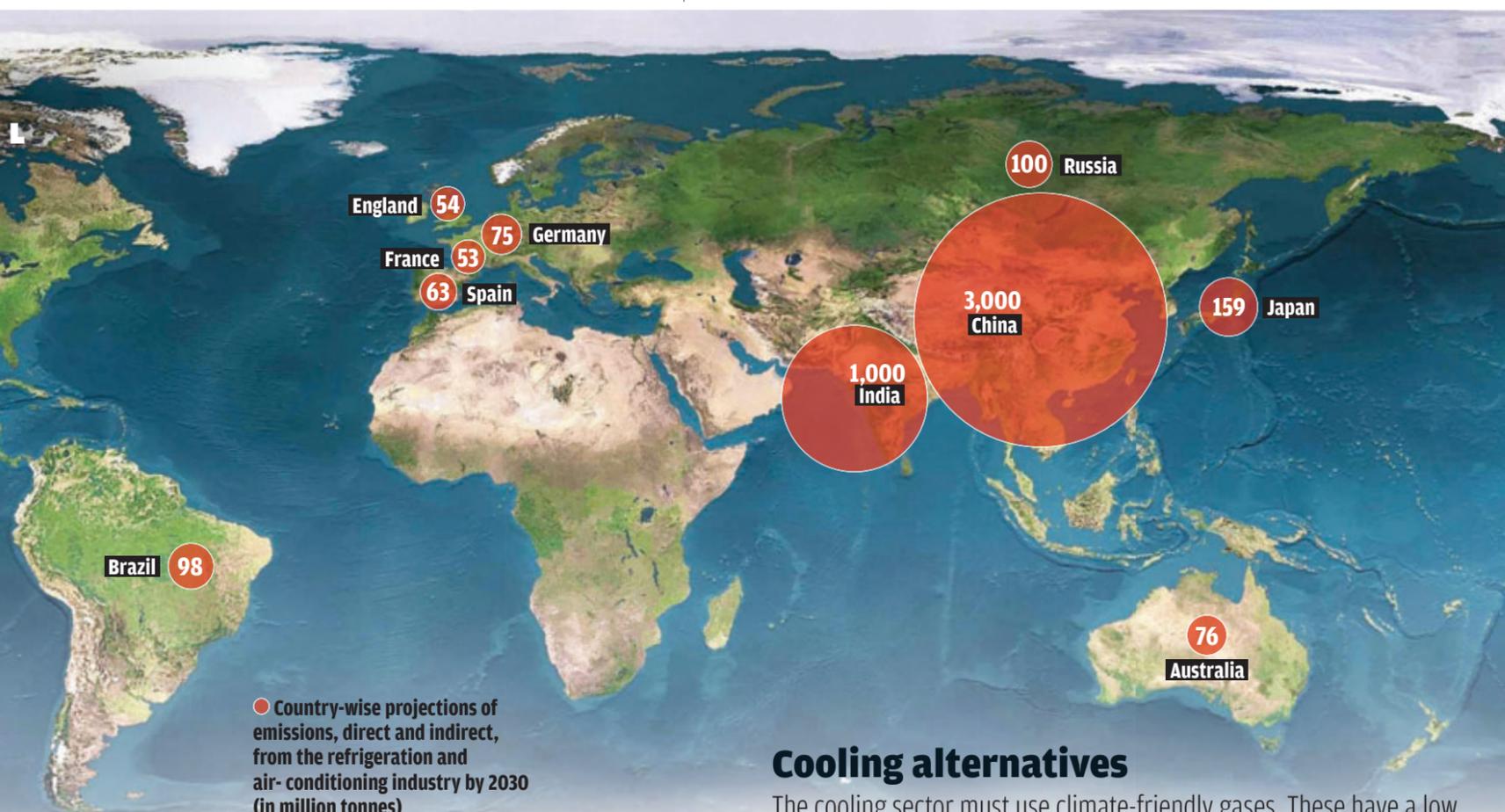
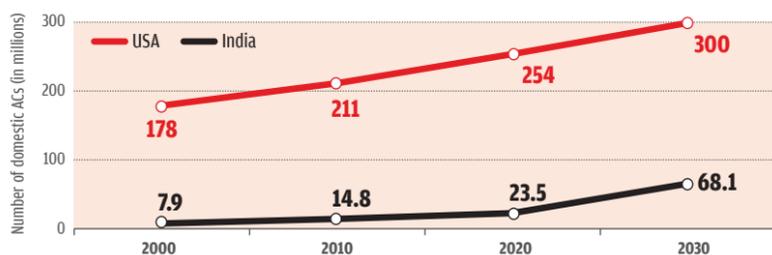
## Global scenario

The impact of one molecule of hydrofluorocarbons (HFCs) on global warming is several thousand times of one molecule of carbon dioxide



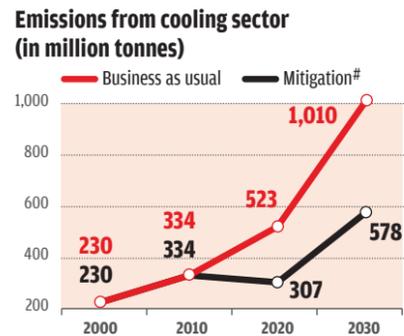
\*A metric measure that expresses the global warming potential of a greenhouse gas (GHG) in terms of the quantity of carbon dioxide (CO<sub>2</sub>) that would lead to the same amount of warming  
\*\* Energy-related CO<sub>2</sub> emissions \*\*\*Emissions from leakages

## The domestic air-conditioning sector is a big consumer of HFCs



● Country-wise projections of emissions, direct and indirect, from the refrigeration and air-conditioning industry by 2030 (in million tonnes)

## How India fares



### # Mitigation strategies

- Using natural refrigerants instead of HFCs
- Minimising leakage
- Recovery and safe disposal of coolants
- Setting industry standards
- Controlling Illegal trade of ozone-depleting substances and substitutes

### Direct and indirect emissions in cooling sector (in million tonnes of CO<sub>2</sub>e in 2014)



## Cooling alternatives

The cooling sector must use climate-friendly gases. These have a low global warming potential (GWP) and do not harm the ozone

### Climate friendly\*

#### Propane (inflammable)

Used for commercial refrigeration and in cars. Large-scale use in residential air-conditioning and heat pumps  
**GWP <5 | Energy efficiency High**

#### Iso-butane (inflammable)

Residential and commercial refrigeration, limited uses in heat pumps  
**GWP <5 | Energy efficiency High**

#### Ammonia (toxic)

Large refrigeration systems, residential heat pumps, chillers  
**GWP <1 | Energy efficiency High**

#### Carbon dioxide

Widely used for commercial refrigeration, chillers and refrigerated trucks. Limited use in cars, heat pumps  
**GWP 1 | Energy efficiency High**

#### Hydrofluorolefin (HFO) blends

Early stages of use in refrigerated trucks, commercial refrigeration, chillers, cars and residential air-conditioning. However, breakdown of HFOs leads to emission of fluorinated compounds, causing pollution  
**GWP <50 | Energy efficiency Low to medium**

\*Natural gases having a low GWP. They do not harm the ozone layer

### Super GHGs\*\*

#### HFC 404A

Used in refrigerated trucks. Limited use in residential air-conditioning, heat pumps and chillers

#### HFC 134a

Widely used in residential air-conditioning, heat pumps, refrigeration, commercial refrigeration, chillers and cars

#### HFC 407C

Widely used in refrigerated trucks

#### HFC 410A

Still being developed for commercial refrigeration. Used in large-scale refrigeration, widely used in air-conditioners, heat pumps, chillers and cars

\*\* Synthetic greenhouse gases (GHG), created and patented by manufacturers. Harmless to the ozone, cause global warming

Source: Green Cooling Initiative, 2014



## Cold facts

■ It is simple mathematics. We can only emit 990 billion tonnes of CO<sub>2</sub> between 2012 and 2100 if we want to keep the rise of global temperature to less than 2 degrees. HFC phase-down and a direct transition to natural refrigerants can help eliminate 5-8 billion tonnes of CO<sub>2</sub>e.

■ Adopting AC technology that is both cost-effective and energy-efficient could save over 192 terawatt-hours per year by 2020—the same amount of energy as produced by 64 medium-sized power plants.

■ Appliances are rated with energy stars based on power efficiency. Energy efficiency of an appliance is improved by 10-30 per cent with the use of low GWP alternatives. Each star rating signifies a reduction in power consumption by around 6-8 per cent. For example, a 1-star refrigerator will consume nearly 750 units (kWh) of electricity a year. That comes to over two units a day. Whereas a 5-star rated refrigerator will consume only a little over 300 units a year, less than one unit a day. Therefore, low GWP alternatives will have climate and energy benefits.



### Leading by innovation

Godrej is the first and only company in India that makes 100 per cent environment

friendly refrigerators with help from GIZ—a German Federal Government enterprise. These refrigerators are 100 per cent free of chlorofluorocarbons, hydrochlorofluorocarbons and HFCs. Godrej is also registered in the Bureau of Energy Efficiency as a participant in the Energy Standards and Labelling Programme. Its split ACs are 5-star rated. It uses naturally available hydrocarbon technology.