



# Drivers of Cooling technology demand and innovation in Asia

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On behalf of:



Federal Ministry  
for the Environment, Nature Conservation  
and Nuclear Safety

of the Federal Republic of Germany



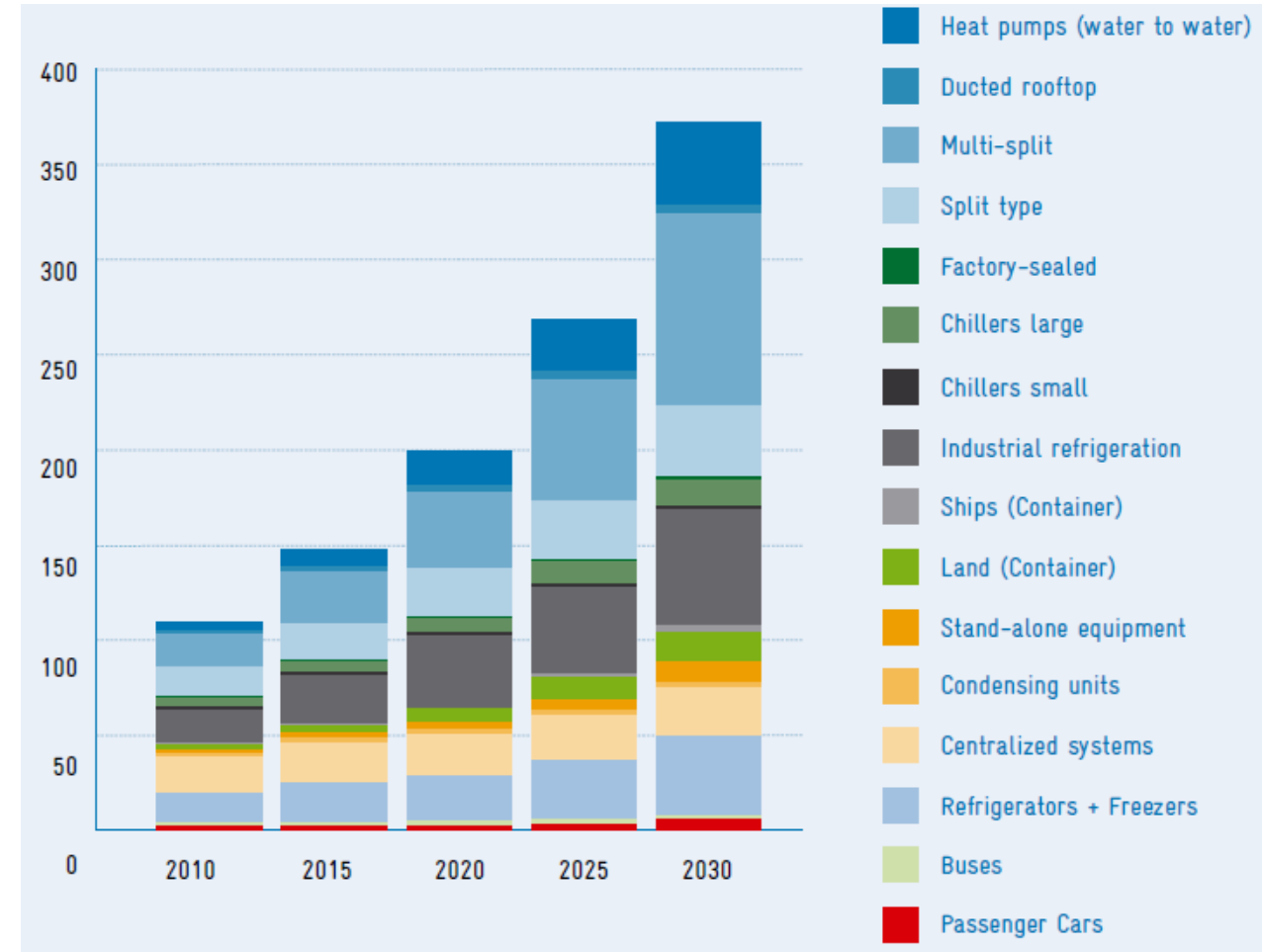
# Content

- **Drivers and impact of refrigeration and AC in Asia**
- Improving energy performance of cooling technology in buildings
- Policy instruments to advance cooling efficiency
- Outlook



## Drivers for cooling

- Increasing population, middle-class and ambient temperatures result in massively increasing cooling demand
- Cooling has become an essential part of reaching and maintaining adequate human living standards.
- Cooling needs strongly coupled with development, especially in countries that experience hot ambient temperatures.
- Key role in achieving many of the Sustainable Development Goals



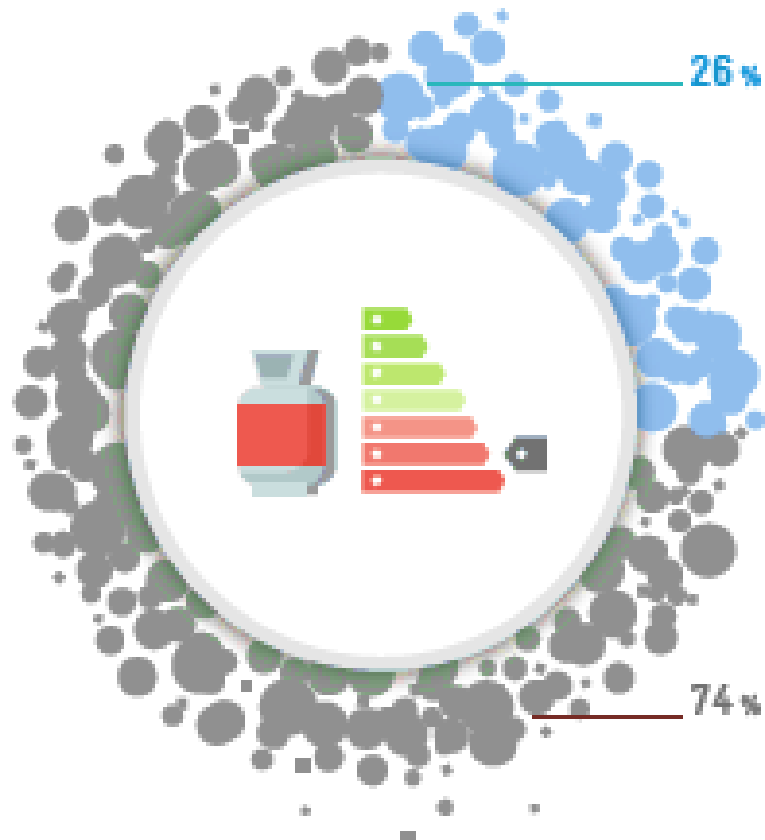
Global market volume in different applications in refrigeration and air conditioning in billion EUR (based on data from Schwarz et al., 2011)



## Climate impact of refrigeration and AC

Business-as-usual in 2030

8,010 Mt CO<sub>2</sub> eq \*



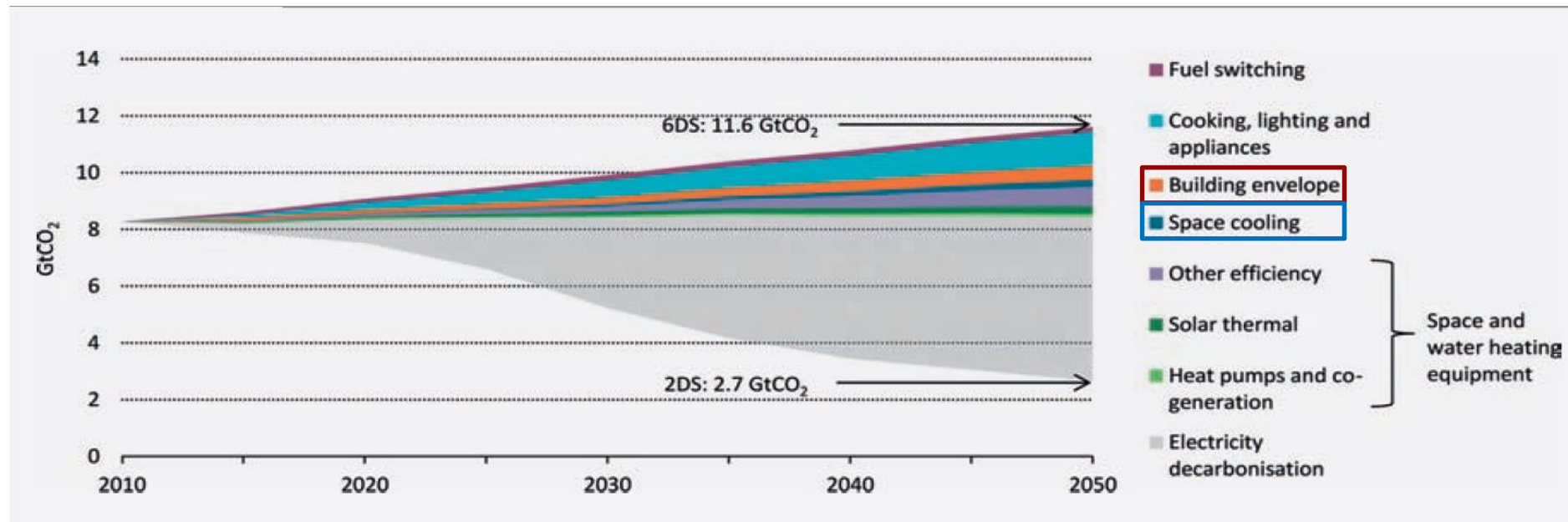
Green cooling in 2030

4,610 Mt CO<sub>2</sub> eq \*





## Cooling manifests major end-user in buildings



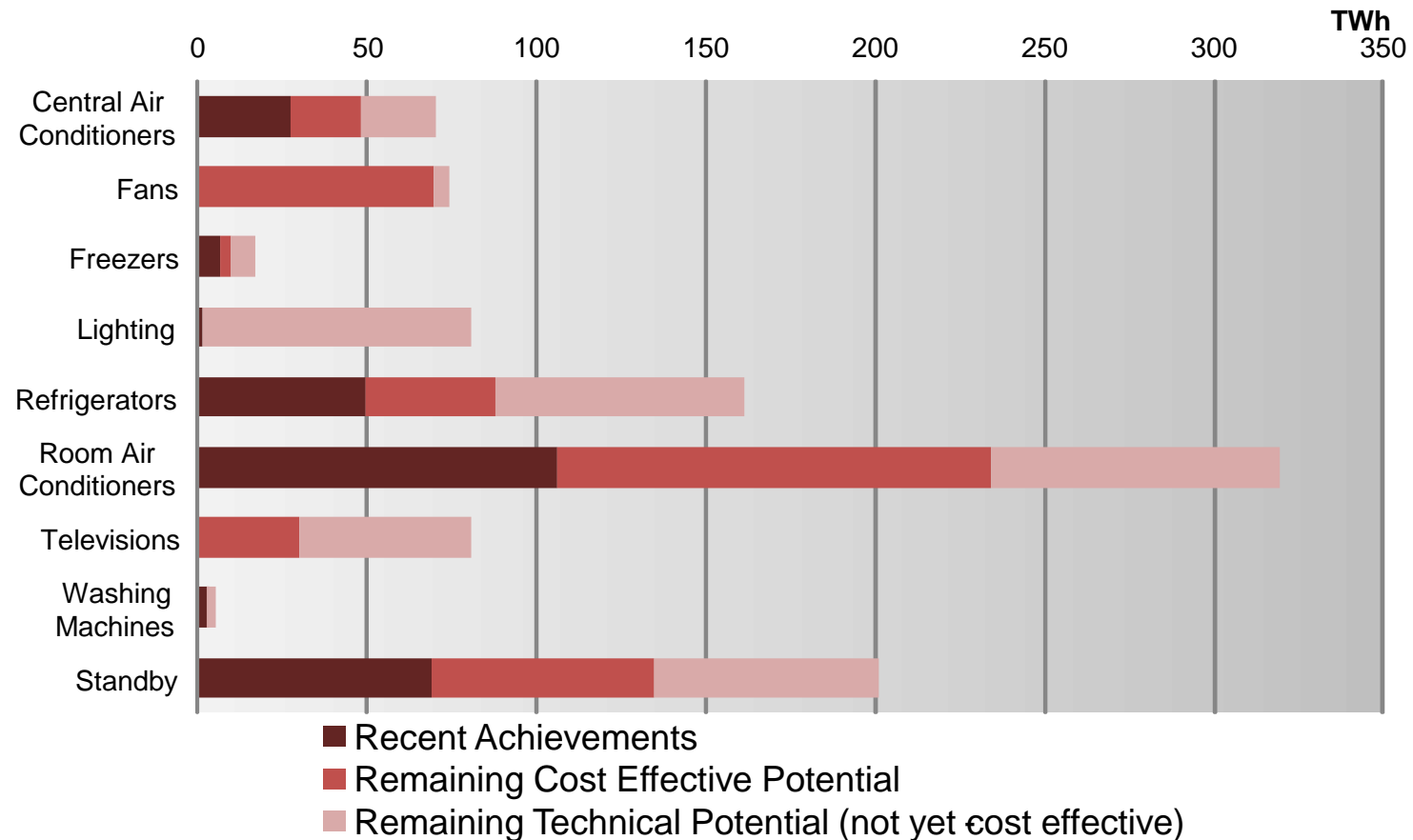
**17%** come from **improvements in the thermal envelopes of buildings** (incl. the enabled downsizing of heating and cooling equipment)

Source: IEA, 2013

**40%** are attributed to the deployment of more **efficient air conditioners** for cooling and solar thermal systems for space and water heating.



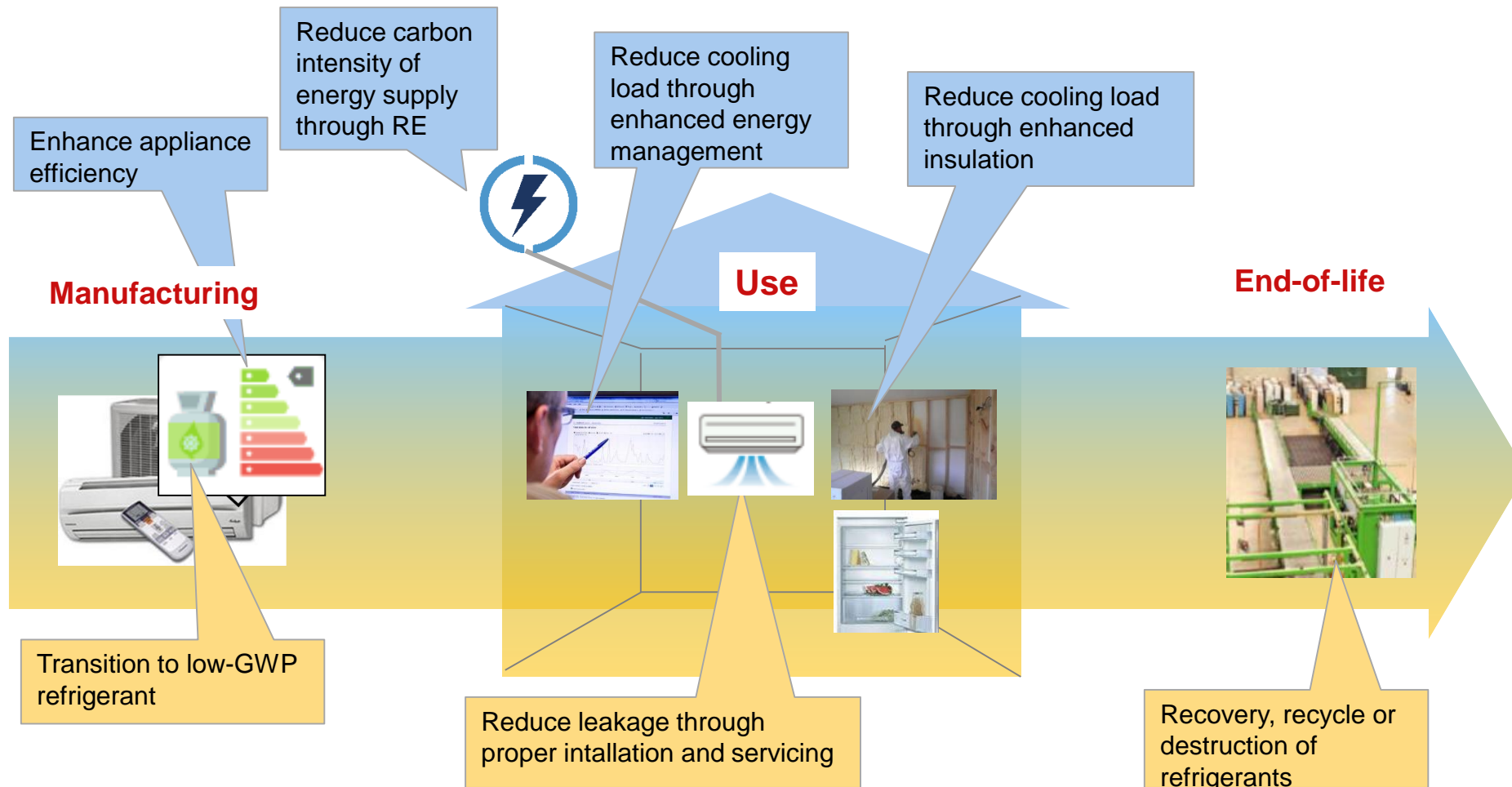
## Energy Savings Potential by Appliance in the Major economies by 2030




Source: LBNL BUENAS



# Maximizing energy efficiency and climate benefits of cooling in buildings



 = Reduction options of direct emissions

 = Reduction options of indirect emissions

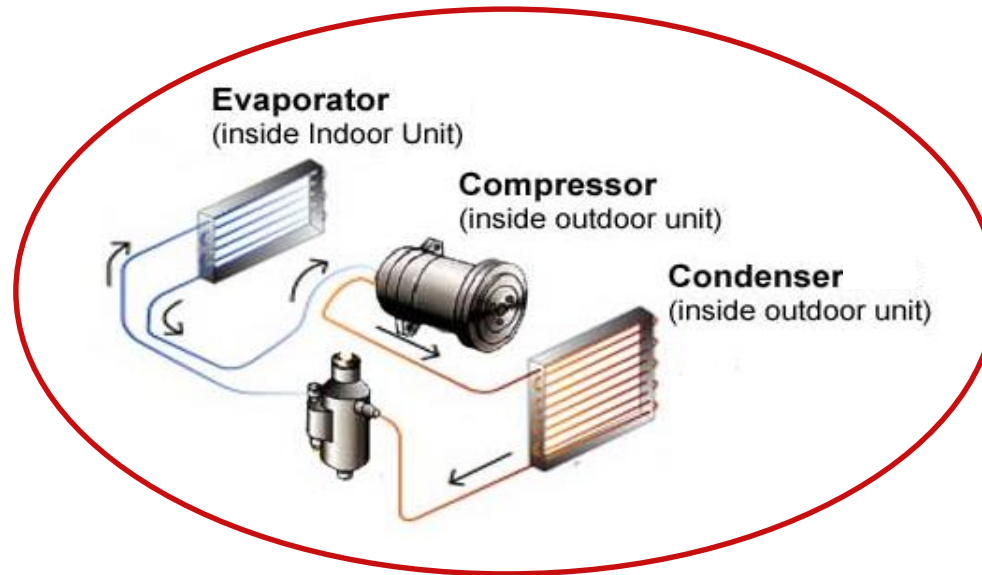
Source: GIZ Proklima 2017



## Drivers for cooling technology innovation

### Regulations

- MEPS and labels
- HCFC / HFC reduction policies



- **Costs** of technology development, production and marketing
- Competitiveness

### Consumer needs

- Increased comfort, little maintenance
- Reduced noise
- Design
- Energy performance ?





## Policy instruments towards efficient and clean cooling technologies

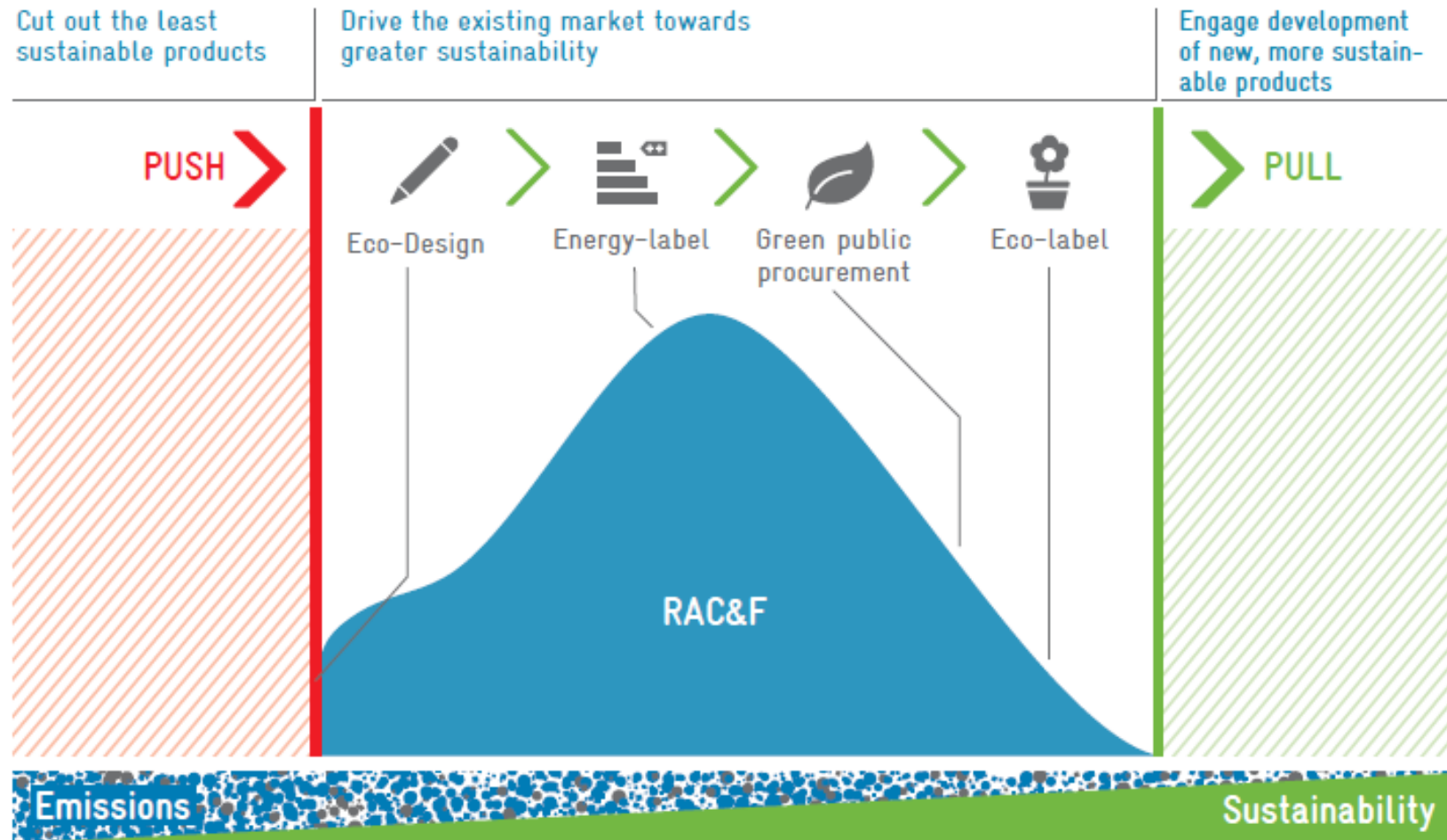


Figure 9: Interventions to increase sustainability of RAC appliances (Source: adopted from European Commission, 2011)



## Outlook

- Growing cooling demand results in massive energy use and related GHG emissions, decoupling essential to achieve climate and development goals
- Current state of technology (esp. efficiency, refrigerants) carries plenty of room for more stringent policies and efficiency standards
- Cooling appliance users need to fully ‘experience’ life cycle cost savings that comes with more efficient cooling appliances
- More stringent and present ‘push and pull’ policy frameworks required to accelerate technology innovation and deployment



# Thank you for your attention!

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GIZ Proklima Project Manager

Have a look at our projects and publications at:

➤ GIZ Proklima

<https://www.giz.de/expertise/html/4809.html>

➤ Green Cooling Initiative

[www.green-cooling-initiative.org](http://www.green-cooling-initiative.org)

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of the Federal Republic of Germany

**green cooling initiative** » PROMOTING GREEN COOLING WORLDWIDE «

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**COUNTRY DATA**  
The refrigeration and air conditioning sectors around the world  
Our world map allows you to explore a wide variety of data: refrigeration and air conditioning appliances in use, unit sales, emissions and emission mitigation potentials in the cooling sectors both today and in the future.  
explore data >

**COOLING SECTORS**  
Global greenhouse gas emissions in 2030  
Global greenhouse gas emissions and percentage contributed by the cooling sector (projections for 2030)  
switch to Table

Category	Percentage
cooling sector	13.1%
others	86.9%
<b>Total</b>	<b>62 Gt*</b>

\*in CO<sub>2</sub> eq

**NETWORK**  
Our network and best practice examples  
Do you want to contribute to making green cooling a worldwide success story? The Green Cooling Initiative is looking for network members and best practice examples.  
Our network includes companies, countries and

**TECHNOLOGY**  
Green cooling - markets and technologies  
Natural refrigerants and high energy efficiency are the prerequisites for environmentally friendly

**ABOUT**  
Green Cooling Initiative  
Refrigeration and air conditioning are responsible for a significant share of the global greenhouse gas emissions. Especially in developing and emerging countries, the demand for cooling equipment is rising. Low levels of efficiency and high leakage rates of refrigerant gases with high global warming potential will increase these emissions drastically.



**Thank you for your attention!**

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