

# Access to cooling: Importance and challenges

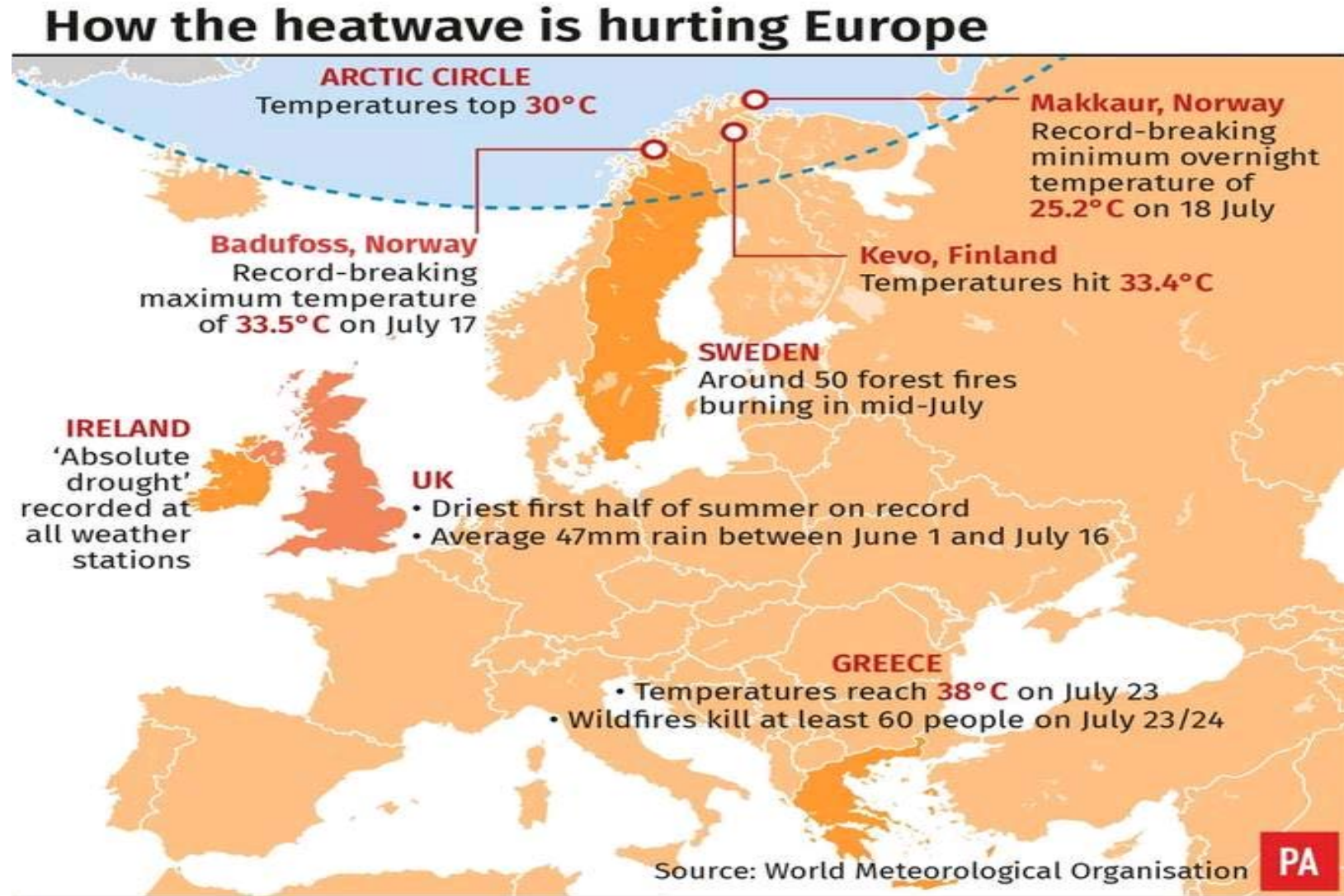
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# Global warming continuing and summer 2018 is another year of record high temperatures

- The greater Northern Hemisphere and Europe itself have been repeatedly scorched by both record and near-record temperatures this summer
- In Denmark, May, June, July average temperature is 3.3 °C warmer than normal
- The Arctic Circle — the realm of polar bears and dwindling sea ice at the top of the world, 32 degrees Celsius in late July



# Lack of access to cooling have severe impacts

- In developing markets, up to 50% of food can be lost post-harvest.
- More than 1 billion people continue to live in extreme poverty; more than 75% of them reside in rural areas, primarily dependent on agricultural production. We cannot address rural poverty without cold chains connecting farmers to market.
- WHO estimates on the health impacts of lack access to cooling:
  - 600 million people – almost 1 in 10 worldwide – fall ill after eating contaminated food and 420,000 die every year.
  - nearly 25% of liquid vaccines are wasted each year primarily because of broken cold chains. An estimated 1.5 million people die each year from vaccine-preventable diseases.
  - Heatwaves already kill an estimated 12,000 people annually across the world.








# Cold Chain and the preservation and global distribution of food



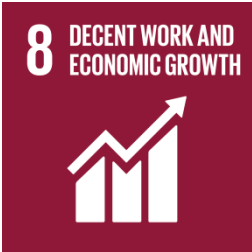
- The Cold Chain is an integrated, seamless and resilient network of refrigerated and temperature-controlled pack houses, cold storage, distribution hubs and vehicles used to maintain the safety, quality and quantity of food, while moving it swiftly from farm gate to consumption centre.
- The cold chain enhances economic wealth, cash flow and security for farmers and improves food quality, safety and value to the customer.
- In Europe more than 75% of our food goes through the cold chain at some point.








# Cooling efficiency and the realization of social and health SDGs

SDGs	Examples of cooling impacts
	<ul style="list-style-type: none"><li>• Cold chains enhance incomes for fishermen and farmers through improved pricing for produce and reduced food waste.</li><li>• Cooling has significant new employment demand from direct jobs around manufacture and maintenance to meet the massive increase in appliances to indirect jobs such as in food processing and preservation</li></ul>
	<ul style="list-style-type: none"><li>• It is estimated that 1.3 bn tonnes of food is lost or wasted each year; about 1/3 of of total food produced for human consumption.</li><li>• Refrigeration enhances food security through extending shelf-life of produce so that less is wasted. In addition, reduced waste increases incomes in farming and fishing communities and leads to more stable food prices.</li></ul>
	<ul style="list-style-type: none"><li>• Access to refrigeration and a robust medical cold chain leads to reduced vaccine and medicine spoilage.</li><li>• Access to refrigeration in the food cold chain reduces food waste and food poisoning.</li><li>• Air conditioning offers protection from temperature extremes.</li></ul>

# Cooling efficiency and the realization of social and health SDGs

SDGs	Examples of cooling impacts
 SDG 4: Quality Education icon showing a red square with the number 4, the text 'QUALITY EDUCATION', and a white icon of an open book and a pencil.	<ul style="list-style-type: none"><li>• Ability to work and thermal comfort are inter-related. Reducing the risk of malnutrition also positively impacts academic performance.</li></ul>
 SDG 5: Gender Equality icon showing a red square with the number 5, the text 'GENDER EQUALITY', and a white icon of a female symbol with an equals sign.	<ul style="list-style-type: none"><li>• Women make up almost half the agricultural workforce in Africa, and around 70% in Kenya, Nigeria and Rwanda. Clean cold chains could benefit women preferentially and help narrow the gender gap.</li></ul>
 SDG 8: Decent Work and Economic Growth icon showing a dark red square with the number 8, the text 'DECENT WORK AND ECONOMIC GROWTH', and a white icon of a bar chart with an upward arrow.	<ul style="list-style-type: none"><li>• Agriculture and fishing are very significant employers. Enhancing the efficiency of these industries by reducing waste, as well as increasing market connectivity will improve profitability.</li><li>• Productivity and thermal comfort are interrelated and by 2050, heat-related work-hour losses in some countries are projected to be as high as 12% — worth billions of US dollars — in the worst-affected regions.</li></ul>

# Cooling efficiency and the realization of social and health SDGs

SDGs	Examples of cooling impacts
 <p>11 SUSTAINABLE CITIES AND COMMUNITIES</p>	<ul style="list-style-type: none"> <li>• Sustainable cooling and design for buildings and transport reduce energy demand and heat island effect.</li> <li>• Food security in cities where very little farming land is available is critically dependent on a cold chain.</li> </ul>
 <p>12 RESPONSIBLE CONSUMPTION AND PRODUCTION</p>	<ul style="list-style-type: none"> <li>• Food and vaccine loss are reduced through proper access to refrigeration and cold chains.</li> </ul>
 <p>14 LIFE BELOW WATER</p>	<ul style="list-style-type: none"> <li>• Wastage of marine products before reaching market increases pressure on fish stocks.</li> </ul>
 <p>15 LIFE ON LAND</p>	<ul style="list-style-type: none"> <li>• Reducing food wastage eases the main driver of deforestation and land degradation.</li> </ul>
 <p>16 PEACE, JUSTICE AND STRONG INSTITUTIONS</p>	<ul style="list-style-type: none"> <li>• Clean cold technologies indirectly help to maintain peace by suppressing potential sources of conflict, e.g. rising food prices (Arab Spring) and urban migration due to rural poverty.</li> </ul>

# Status of access to cooling services and cooling energy efficiency

- Only around 8% of the 2.3 billion people living in hot climate zones have access to air conditioning
- Globally, 135 m ACs were sold in 2016, more than triple the level in 1990. Most sales are increasing, but mainly concentrated in rich countries and a few emerging economies.
- Space cooling is a major contributor to peak load of grid, in some cases over 75% of peak load
- Refrigerators are the most widely owned appliances among households in developed countries. In developing countries, the ownership is still low. They have significant impacts on the energy bills of households, especially as they typically run and consume electricity all the time.



# Different needs for cooling in different groups of people

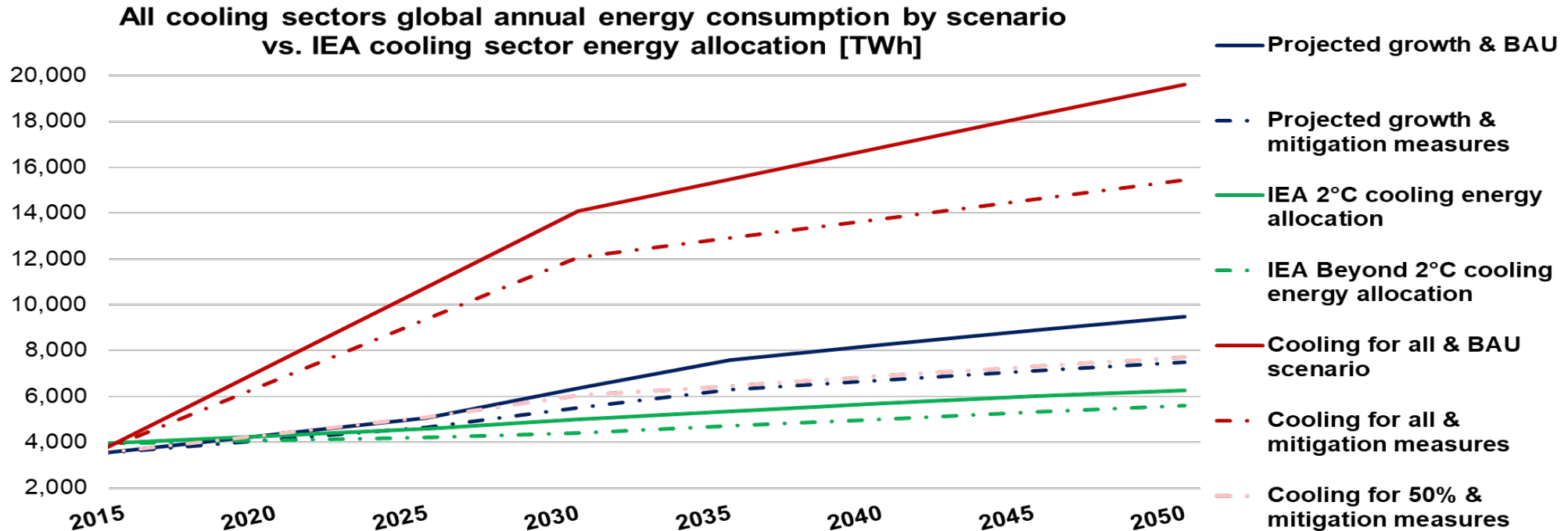
- In the developed world, it is about air-conditioned offices, hotel rooms and apartments; a fridge full of fresh food and convenience meals from all over the world; ice in our drinks.
- In Saudi Arabia, more than 70% of electricity is consumed for air conditioning and cooling.
- The United States consumes more electricity for space cooling than the 1.1bn people in Africa for everything.



# Needs for cooling will grow in a increasingly hot world

- Populations growing, rapid change in demographics, continued urbanisation and climate change will drive increase of cooling demand cooling. By 2050, there could be more than 9.5bn cooling appliances worldwide – more than 2.5 times today's ~3.6bn.
- The WHO forecasts that by 2050, deaths from heat waves could reach 260,000 annually unless governments (primarily cities) adapt to the threat.
- One study suggests that if climate change is not checked, the Gulf will suffer heatwaves beyond the limit of human survival by 2070. The study shows that the hottest days of today would by then be a neardaily occurrence.

# Cooling energy demand



Source: SEforALL "Cooling for All" report

- Even with high efficiency, the cooling energy use could reach 2.46 times the max. sector allocation envisaged by the IEA 2°C scenario.
- Globally, 66.3% of the electricity generation was based on coal, natural gas, and oil in 2015. Especially, coal contributed 39.3% of the global electricity generation.
- Current NDCs makes a 3°C by 2100 very likely , and a world of hotter climate and more frequent heating waves could drive more demand for cooling

# Conclusions

- Cooling for all is critical for poverty reduction, health improvement, and environmental protection.
- Meanwhile, increasing access to air conditioning, refrigeration, and cold chain will cause high energy demand, especially peak demand. This will make it difficult to realise the SDGs on sustainable and affordable clean energy, as well as climate change mitigation
- It is imperative to increase cooling access and minimize the climate and energy footprint of cooling access

