CountOn Cooling

EPEE

Count on Cooling Campaign launch webinar

24th March 2020

Webinar instructions

- All participants are *by default* in mute mode during the time of the webinar
- Only speakers will unmute themselves during their time of presentation and Q&A sessions
- 5 minutes-long Q&A sessions will take place after each presentation
- During these Q&A sessions, participants are kindly requested to submit their questions through the chat to “Panelists & All attendees”
- Andrea Voigt will read these questions to the speakers
- If time doesn’t allow to cover all questions, they will be submitted to speakers after the webinar and we will keep you informed of their response
- Presentations will be shared after the webinar

01.

SETTING THE SCENE – COOLING AT CROSSROADS: JOINING FORCES TO ENABLE CARBON NEUTRALITY

Andrea Voigt, EPEE

Who is EPEE?

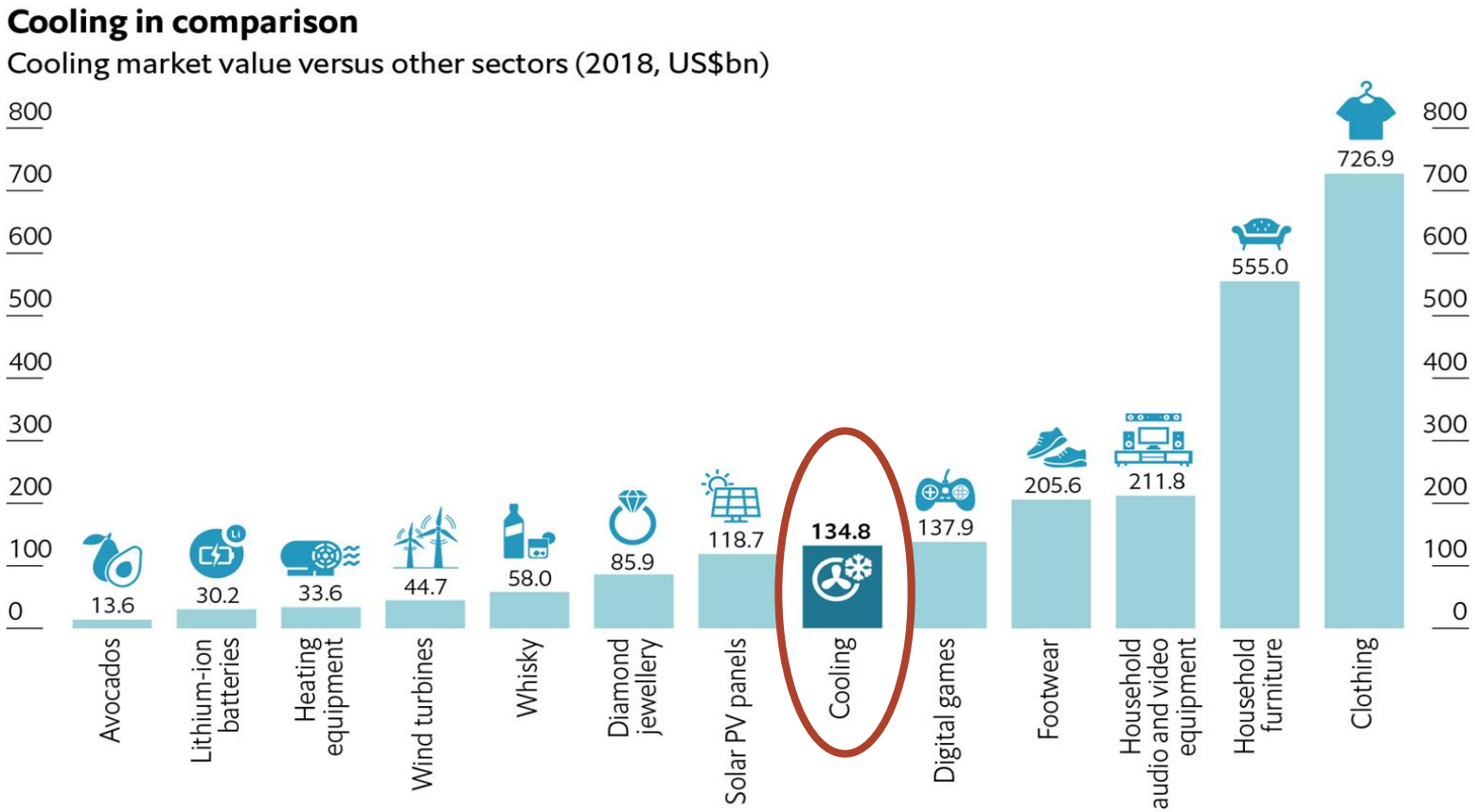
- Founded in 2000
- Headquartered in Brussels
- Currently 50 members from 3 continents
  - **Asia**
  - **Europe**
  - **North America**
- Representing the full value chain of the refrigeration, air-conditioning and heat pump industries

EPEE

The voice of the heating, cooling and refrigeration industry

#CountOnCooling

Cooling is a big industry and demand is set to grow



Source: EIU; Clean Cooling Landscape Assessment; Transparency Market Research; Grand View Research; Alrosa; Newzoo; Power Technology; Allied Market Research

It contributes to many sustainable development goals

Making sustainability cool

How cooling will help achieve priority SDG goals

Food Security
Scaling up fresh and safe food provision and combating waste

Health
Combating heat stress and scaling up vaccines

Education
Boosting student performance and combating fatigue

Employee Productivity
Combating damage to employee well being from uncool conditions, and reducing productivity losses

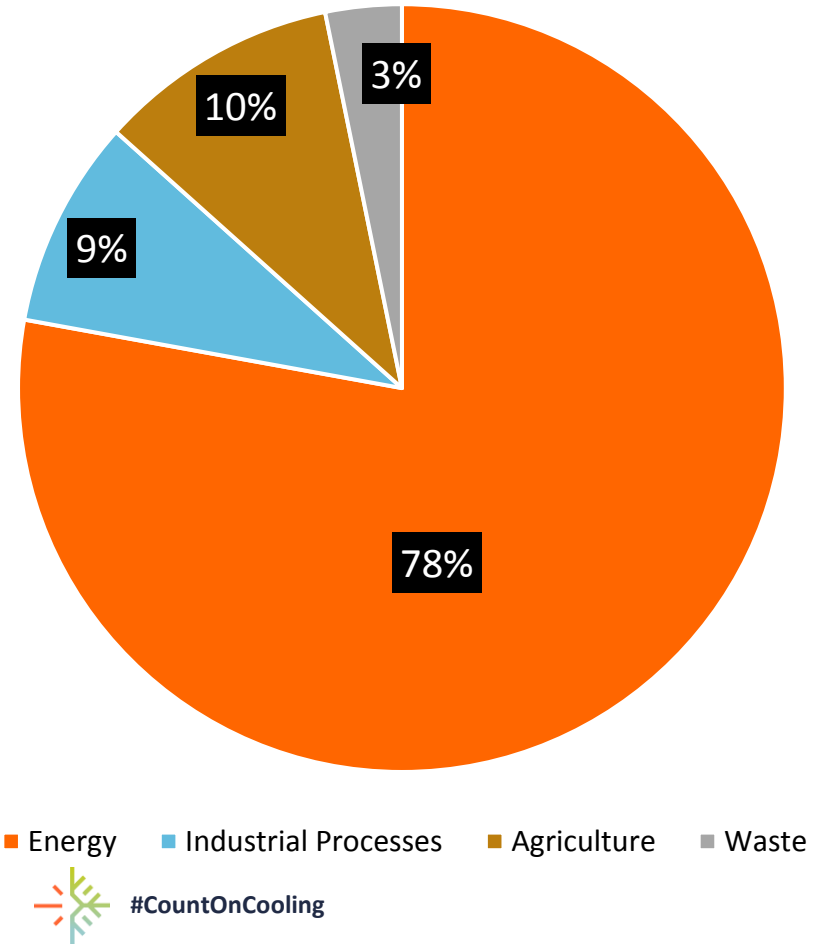
Societal Inequality
Preventing hurt to marginalised citizens: women and the poor

? ...

Source: EIU; UNDP

The challenge

- Most of the EU‘s greenhouse gas emissions (CO2-eq) are related to energy
- To achieve climate neutrality by 2050, addressing energy must be a priority



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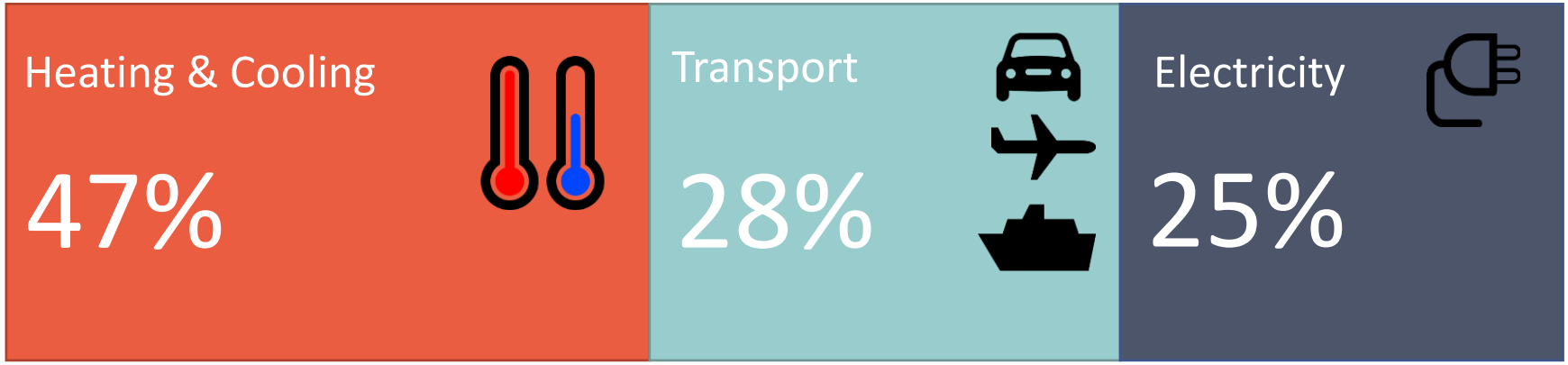
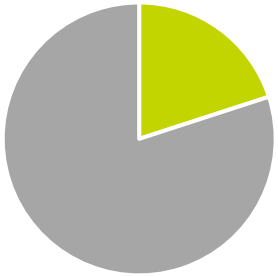
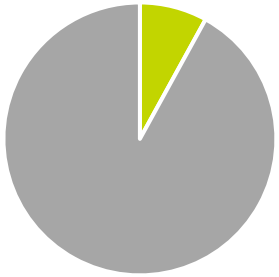
Annual European Union greenhouse gas inventory 1990–2017 and inventory report 2019, EEA

Heating & Cooling represent almost half of the EU‘s final energy consumption (ktoe)

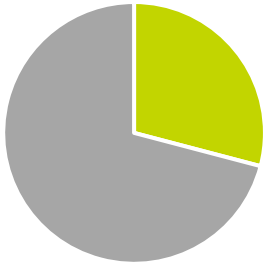




20% share of REN



8% share of REN



32% share of REN

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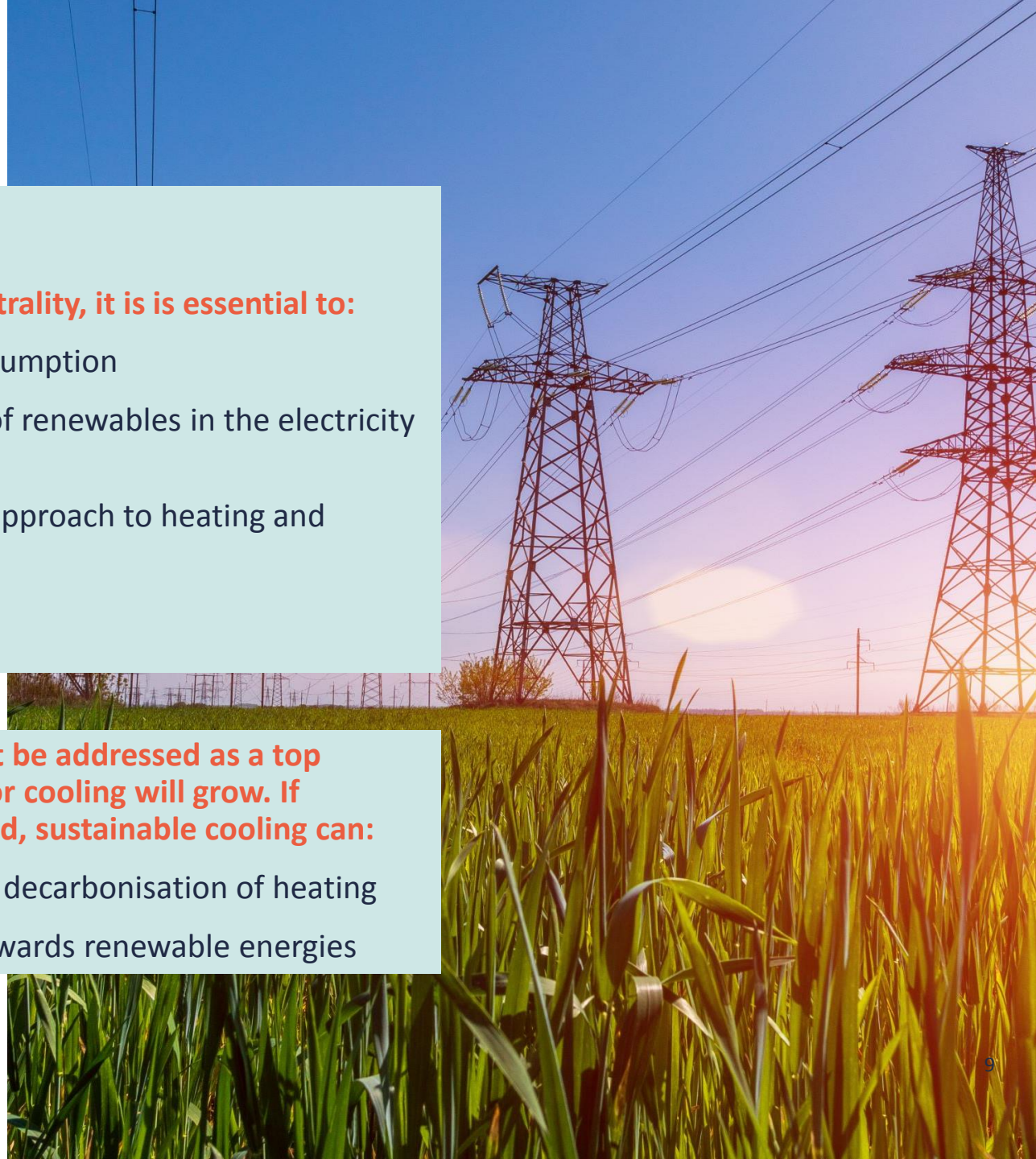
Eurostat, Shares Summary results 2018



To achieve climate neutrality, it is is essential to:

- Reduce energy consumption
- Increase the share of renewables in the electricity mix
- Take an integrated approach to heating and cooling

In the EU, heating must be addressed as a top priority, but demand for cooling will grow. If appropriately addressed, sustainable cooling can:

- Be a catalyst for the decarbonisation of heating
- Support the shift towards renewable energies


There is no European Green Deal without sustainable cooling
CountOnCooling VIDEO

02.

SUSTAINABLE COOLING IN EU POLICIES – A FOCUS ON THE EUROPEAN GREEN DEAL

Hans Van Steen, European Commission, DG ENER

Jutta Paulus, Member of the European Commission

Hans Van Steen, European Commission, DG ENER

The European Green Deal – The vision of the European Commission

Jutta Paulus, Member of the European Parliament

The expectations of the European Parliament

03.

TOWARDS AN INTEGRATED APPROACH TO COOLING: BRINGING ENERGY EFFICIENCY & RENEWABLES TOGETHER

Kevin Lane, International Energy Agency

Roland Roesch, International Renewable Energy Agency

Olivier Biancarelli, Engie & Tractebel

Kevin Lane, International Energy Agency

Sustainable cooling & Energy efficiency

International Energy Agency

Sustainable cooling & Energy efficiency

Dr Kevin Lane

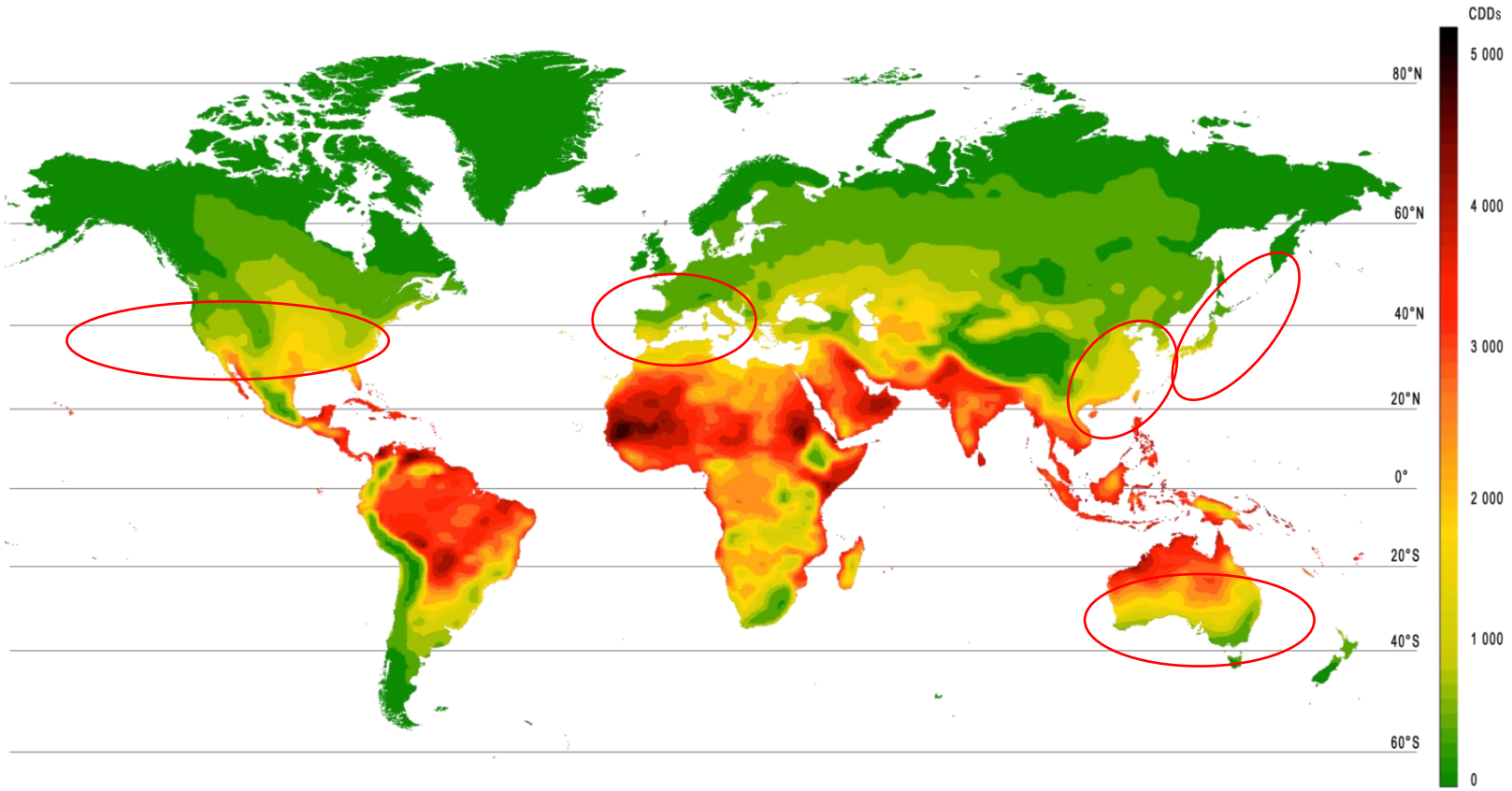
Paris, 24 March 2020

Outline

- Focus on Global stationary air conditioning
- Global potential from energy efficiency
- Policies, MEPS (Ecodesign), information, labelling
- Impact on demand
- Link to heating

Keeping cool is a growing need

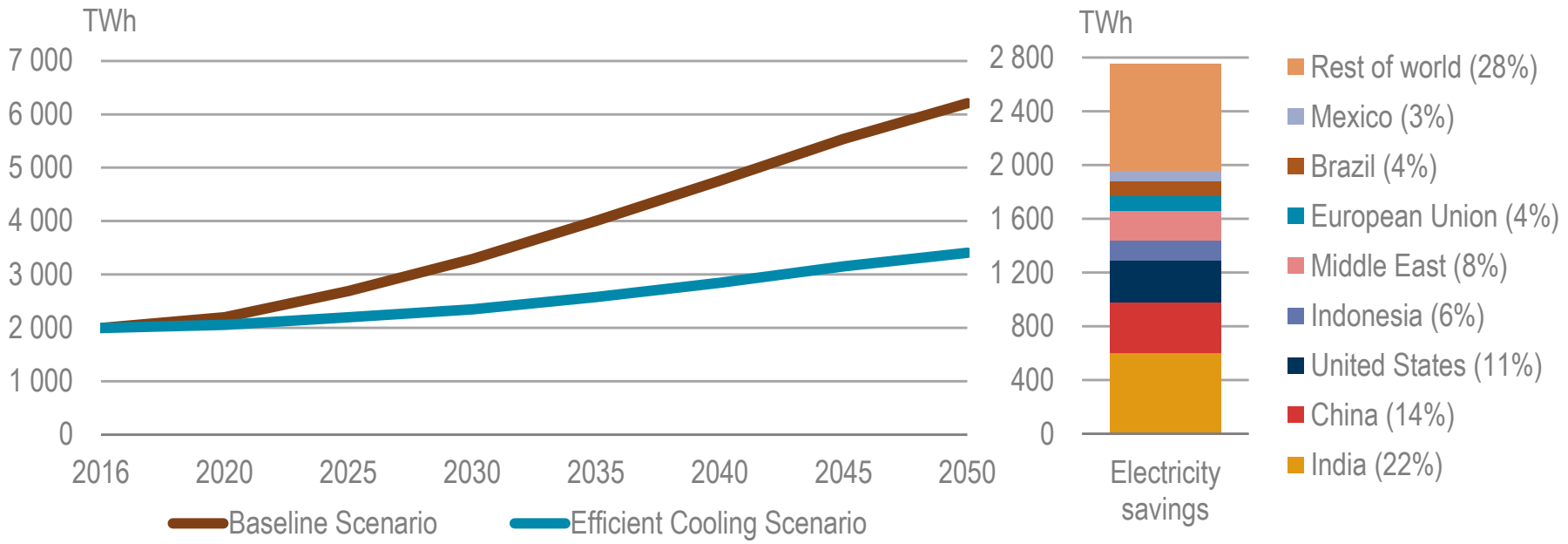
Mean annual cooling degree days (2007-17)



Air conditioning is being driven by increasing expectations of thermal comfort – as well as the need for cooling in buildings to be healthy and productive.

Energy-efficient air conditioning can halve cooling demand growth

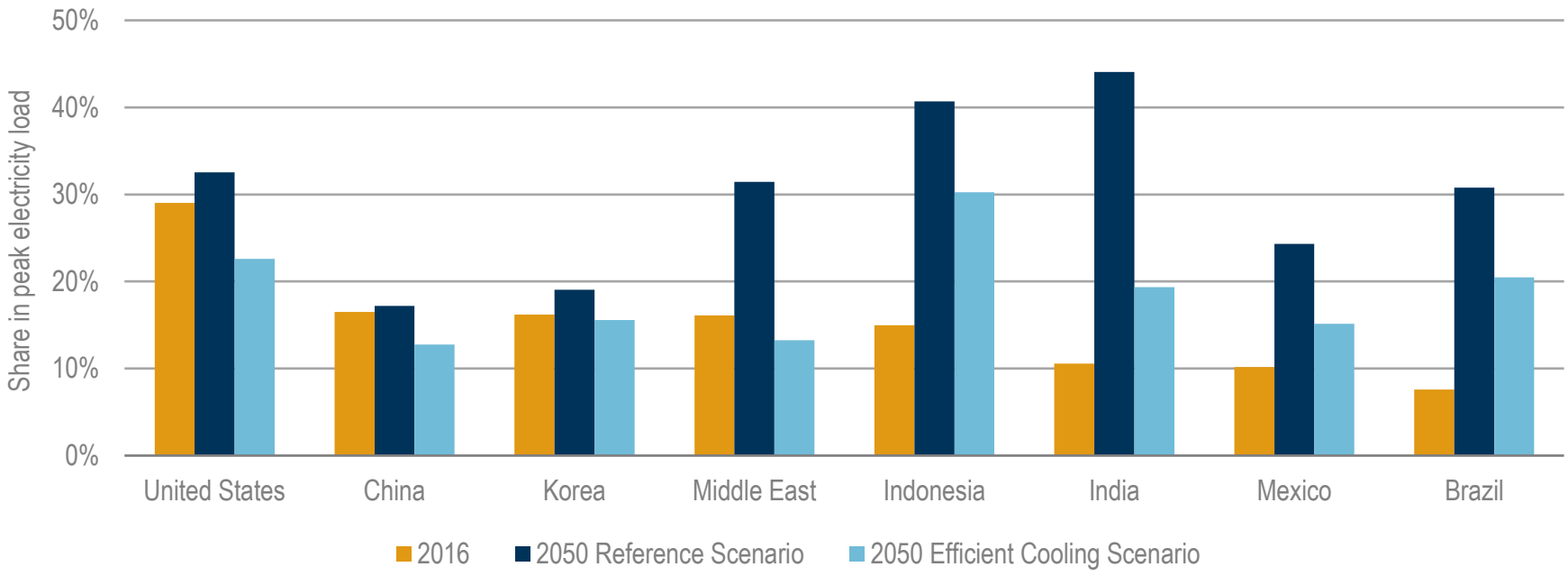
Electricity savings using energy-efficient air conditioning



Energy efficiency can deliver nearly 2 800 TWh of electricity savings in 2050 – equivalent to all the electricity consumed by the European Union in 2016.

Efficient air conditioners can help to dampen the impact on the power system

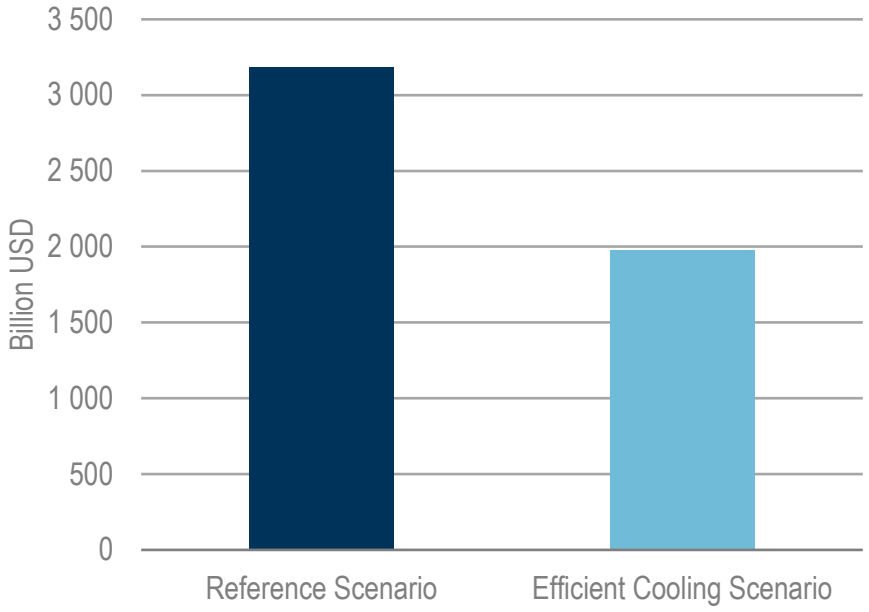
Share of cooling in electricity system peak loads



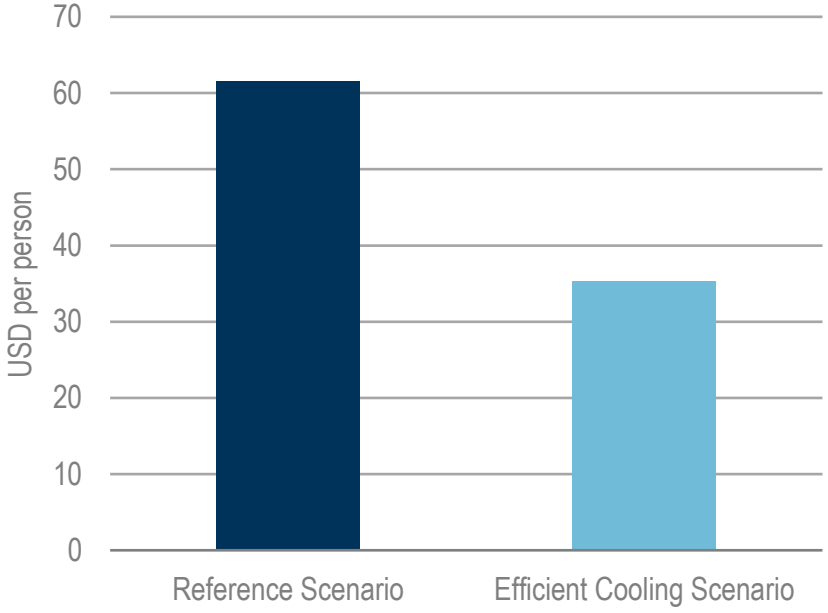
Cooling demand has serious implications for grids.

More efficient ACs can lessen the costs of new power generation

Cumulative investments in power generation for space cooling to 2050



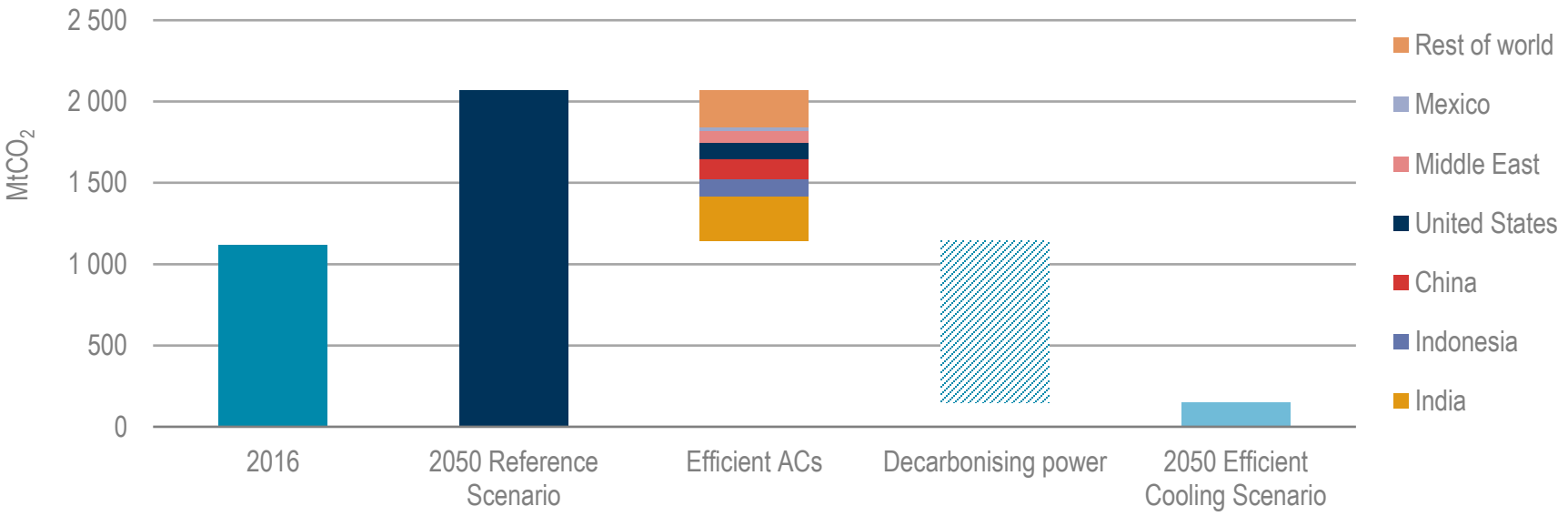
Global average electricity costs per capita for space cooling in 2050



USD 1.2 trillion in power generation investments can be saved globally with more efficient ACs. Average per capita electricity costs for cooling would be almost halved.

More efficient ACs will help cut emissions

Contribution of more efficient space cooling on CO_2 emissions



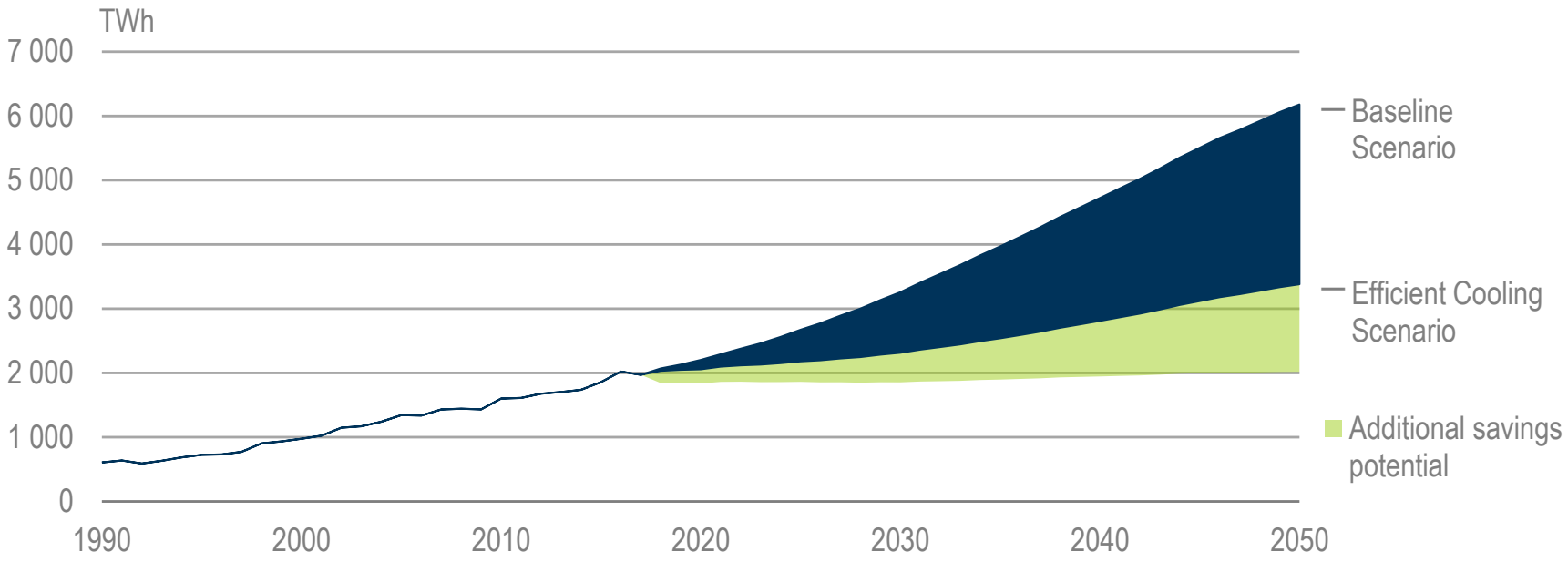
More efficient ACs cut CO_2 emissions from space cooling in half.
Efficiency also helps enable cleaner power – drastically reducing cooling-related emissions.

Building envelope measures can provide cooling comfort

Ancient and modern cooling techniques can be a no- or low-cost energy efficiency measures.

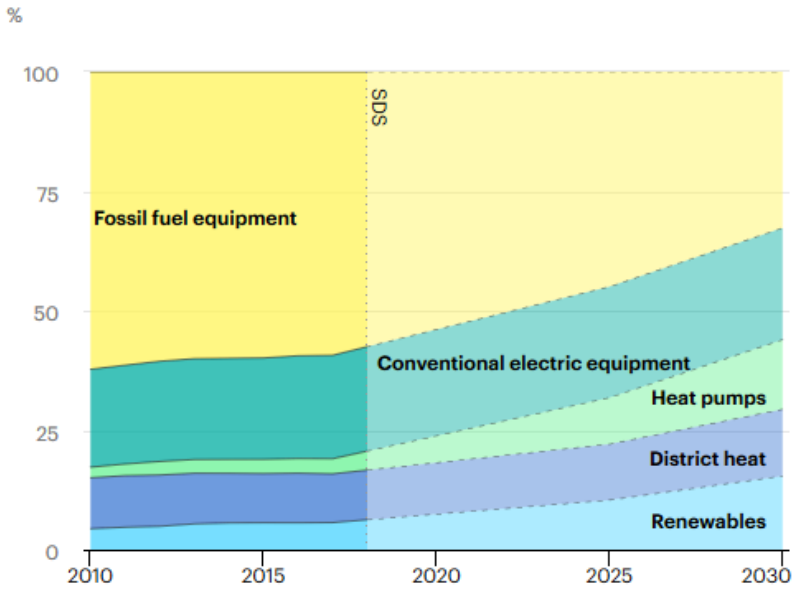
Further savings are possible!

Additional energy savings potential through energy efficiency measures



Additional measures – such as better building design and construction, can keep cooling energy demand stable – while also allowing billions of people better access to keep cool

The link with heating



Renewables · District heat · Heat pumps · Conventional electric equipment · Fossil fuel equipment

- Heat pumps currently meet less than 3% of global heating needs in buildings
- The share of heat pumps and renewable heating needs to reach 25% of new sales by 2030
- Can be coupled with growing cooling needs as reversible units can also provide cooling

Policy action to curb cooling-related energy needs

Capturing the major energy efficiency potential for space cooling in buildings

- Without firm policy interventions, cooling-related energy demand will soar
- Policy action can deliver substantial energy savings quickly by making AC equipment much more efficient
- Priority must be given to mandatory standards and labelling for ACs
- Measures to improve the energy performance of building envelopes would contribute to even bigger energy savings in the longer term
- Integrated solution could deliver broader benefits to the energy system

Energy efficiency can deliver cooling comfort – affordably and sustainably.

Roland Roesch, International Renewable Energy Agency

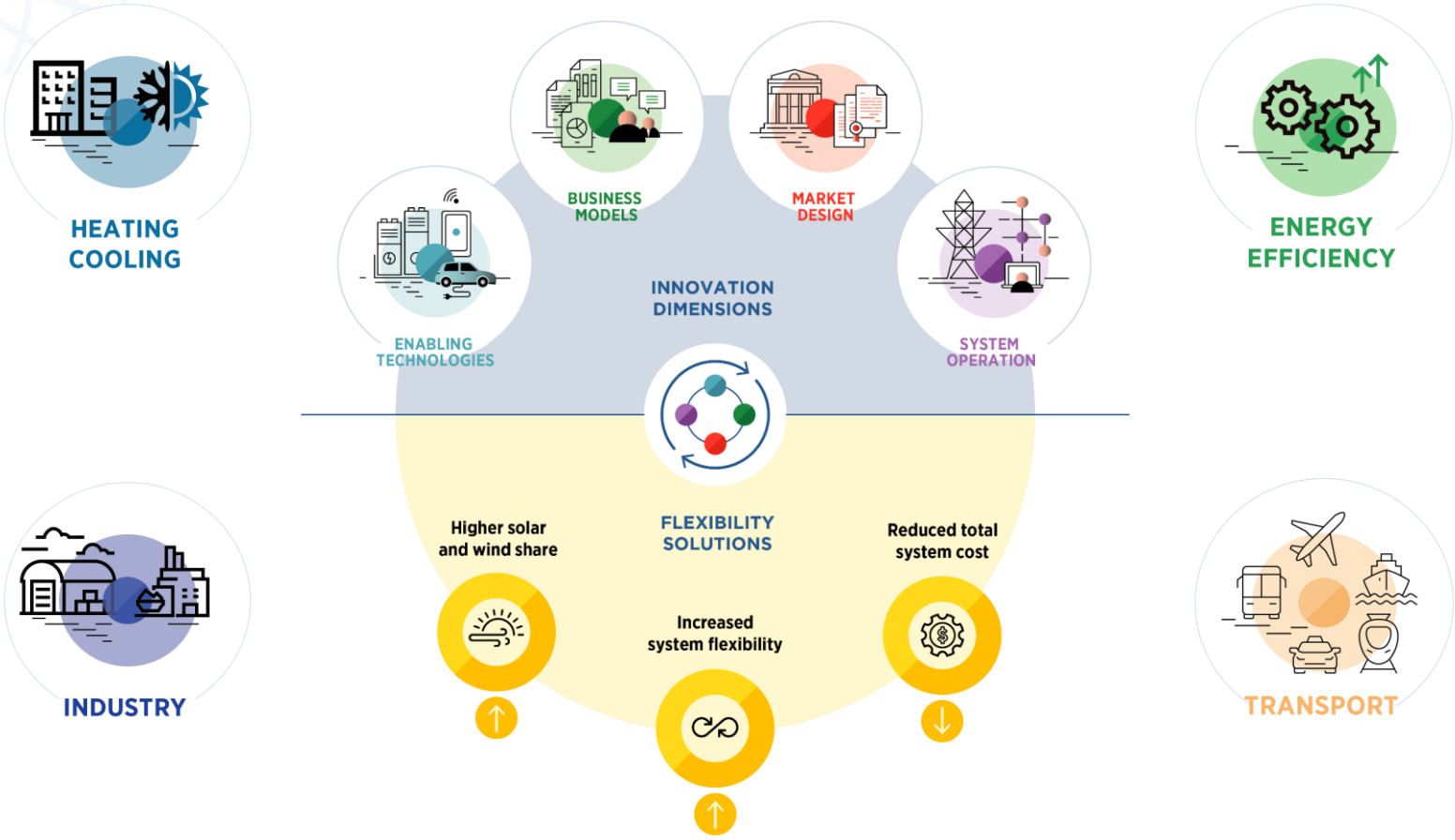
Sustainable cooling & Renewables

SUSTAINABLE COOLING AS AN ENABLER FOR DECARBONISATION
Sustainable Cooling and Renewable Energy

Dr. Roland Roesch
Deputy Director IRENA Innovation and Technology

EPEE Webinar
24th March 2020

Transforming Power and End-Use



Sustainable Cooling – different aspects to consider

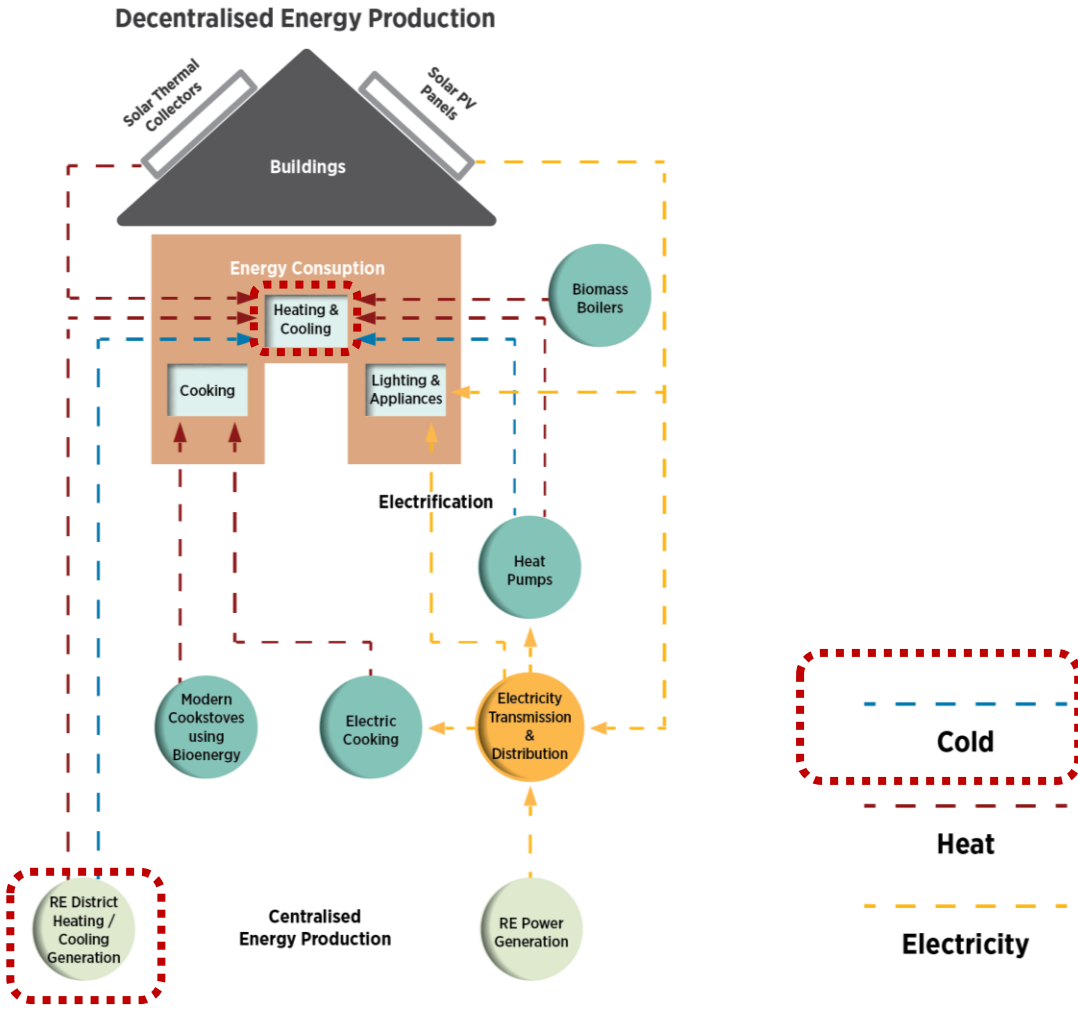
We may need to look at

- A. Technology options and costs – Distributed and Centralised District Systems
- B. Link between cooling & energy efficiency
- C. Role of digitalisation for cooling
- D. Interlink between electric cooling and power systems

Source: IRENA (2019) Innovation Landscape for a Renewable-Power Future

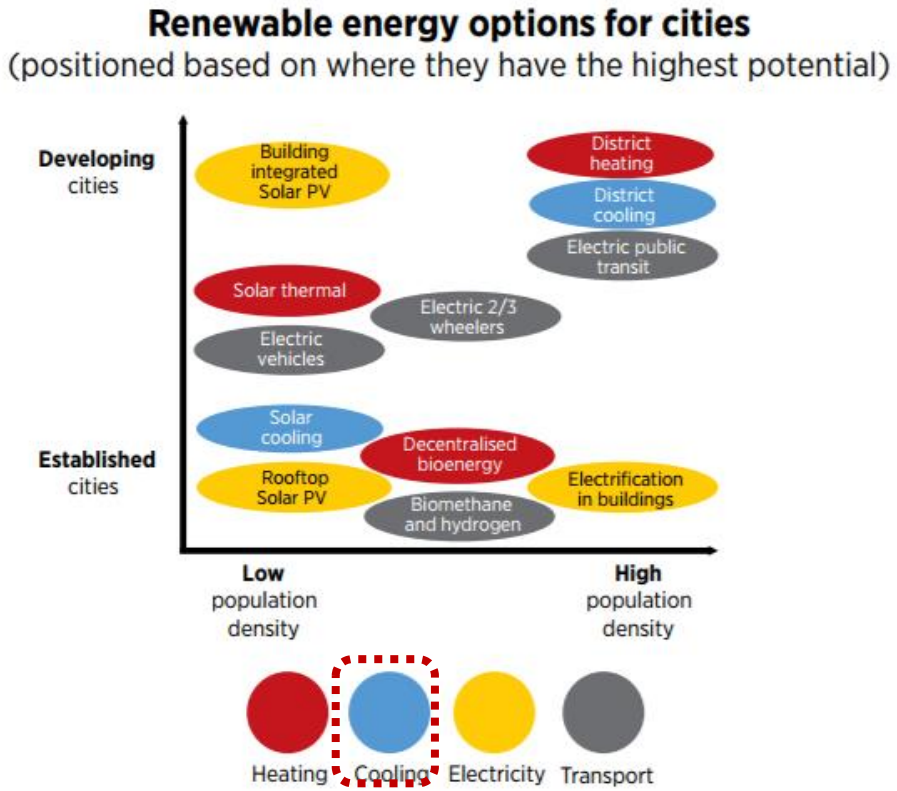
A. Technology options to expand renewables use in urban buildings

- Heating/cooling
  - Electrify heating - Heat pumps
  - Solar water heating and solar cooling
  - Biomass boilers
  - Renewable district heat/cooling
- Replace traditional biomass with modern renewables or electricity for cooking
- Renewable electricity supply
  - Rooftop and building integrated PV
  - Buy renewable electricity from the grid
- Renewables for transportation
  - Electric vehicles
  - Biofuels
  - Modal shift

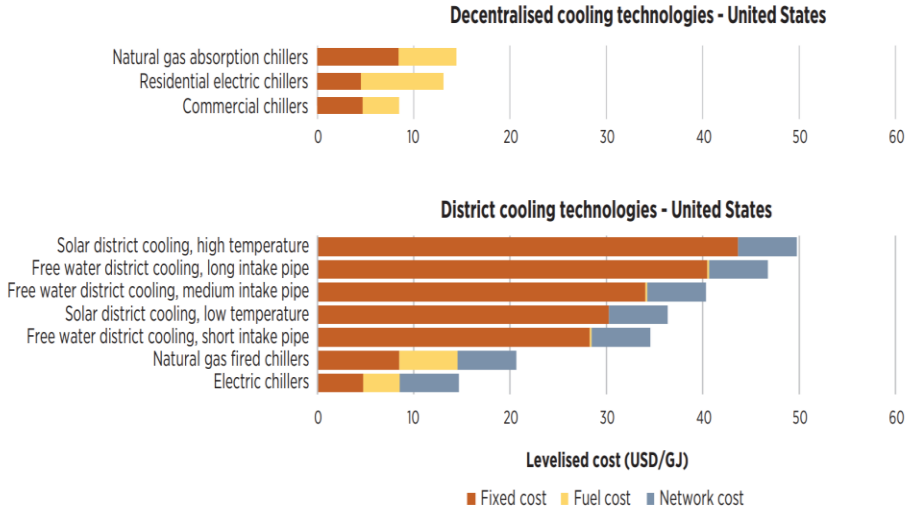


Source: IRENA (2016), Renewable Energy in Cities

A. Technology options for cities



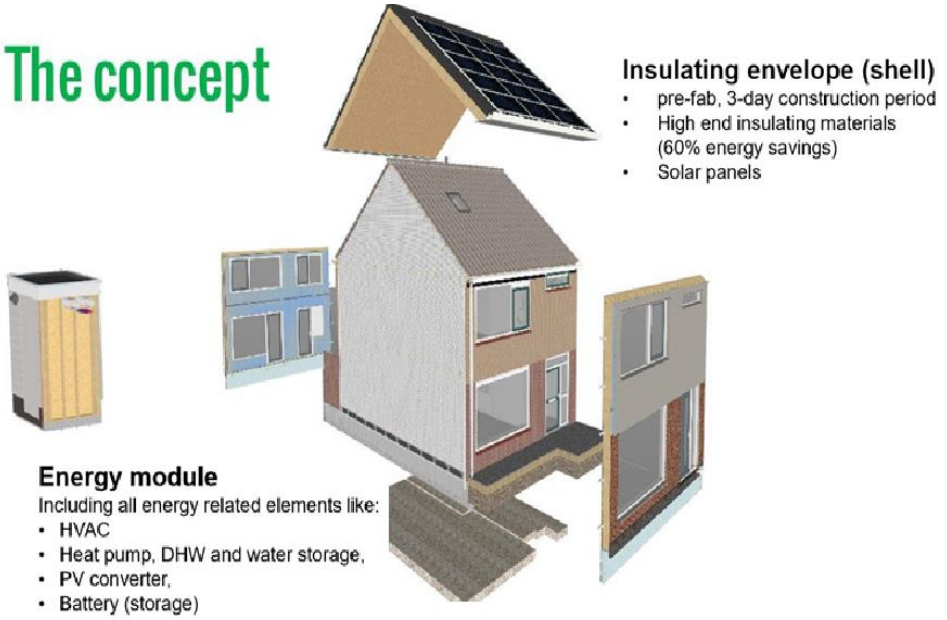
Source: IRENA (2016) Renewable Energy in Cities



B. Energy Efficiency - Energy neutral houses

Nul op de meter ('zero on the meter') is a Dutch national project initiated by the government to renovate already existing houses and apartments industrially so that they are energy neutral.

- It is a holistic systemic deep renovation concept using smart services resulting in energy-neutral housing by reducing energy consumption and maximizing the use of renewable energy.
- The houses are made energy neutral with the use of a heat pump, PV-panels, an air ventilation system with heat recycling, plastic window frames with triple glazing and façade isolation of 30 cm thick.



Source: Stroomversnelling.nl

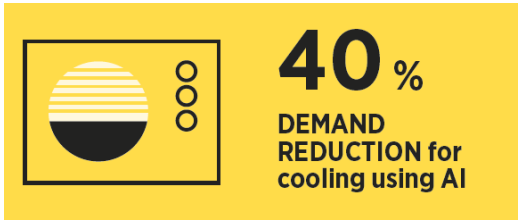
Source: IRENA (2019) Innovation Landscape for a Renewable-Power Future

C. Digitalisation – Optimising cooling

Data Centres

- **A Google data centre using artificial intelligence experienced a 40% reduction in demand used in cooling.**

Google's DeepMind AI reduced the energy used for cooling at one of the company's data centres by 40% (a 15% overall reduction in power usage), using only historical data collected from censors and applying a machine-learning algorithm to predict the future temperature and pressure of the data centre and to optimise efficiency (Evans and Gao, 2016).



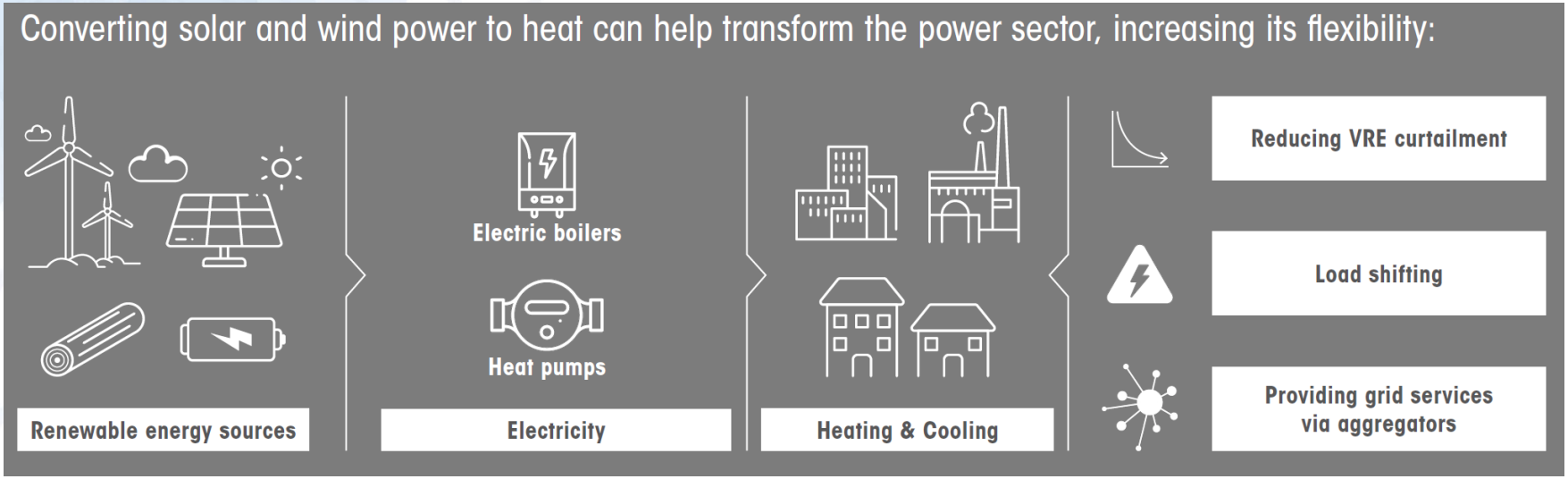
Commercial cooling (e.g. supermakets)

- **Up to 40% savings on utility bill using artificial intelligence for demand-side management.**

BeeBryte, a France- and Singapore-based "software-as-a-service" (SaaS) company, provides cloud-based intelligence software that can monitor real-time load in large commercial and industrial facilities. Using artificial intelligence for weather forecast, occupancy, usage and energy price signals, the software can automatically switch loads such as HVAC systems to battery storage based on time-of-use charges and delivers up to 40% savings in utility bills (BeeBryte, n.d.).

Source: IRENA (2019) Innovation Landscape for a Renewable-Power Future

D. Cooling equipment as a demand response option for more flexible power systems



Source: IRENA (2019) Innovation Landscape for a Renewable-Power Future

Innovation in TES Business Models

Residential Cooling: Ice storage for residence cooling

- Cutting cooling costs by 40%
- 95% reduction of your peak cooling electricity use
- Used in Nantucket Island for 200 residences, USA

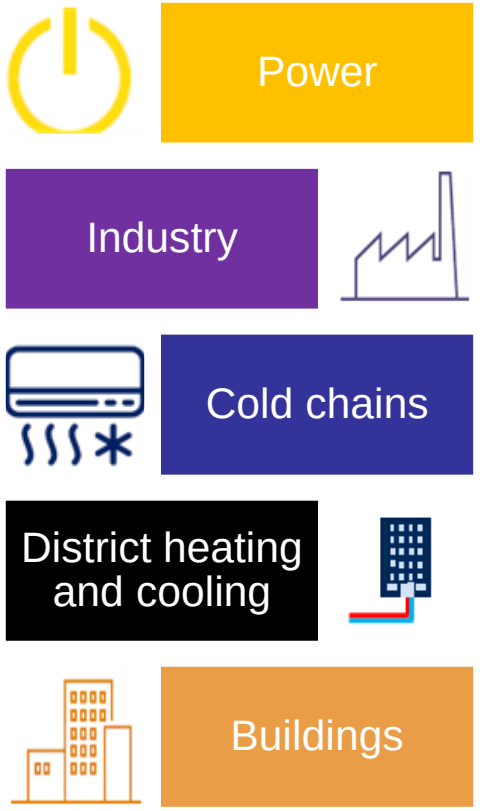
Industry: Food industry solar PV and cold storage

- One of Morocco's largest rooftop solar plant coupled with ice storage
- Flexibility option as energy surplus cant be injected to the grid
- Cooling used during peak hours

Source: Ice energy, PV Tech, Heliocsp, Frauhofer Instiute, Acciona Energy, Power technology

Sustainable cooling and renewable energies in the energy transition

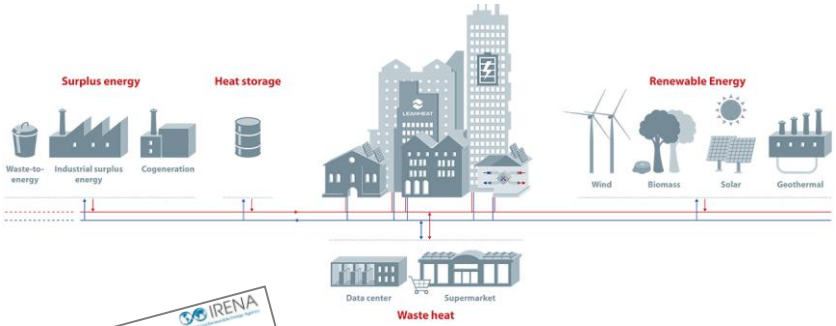
- Globally, energy systems are undergoing a significant **transition driven by decarbonisation.**
- **Integrating a higher share of variable renewables** in the power sector is challenging.
- Decarbonising heat, and ensuring the **growing demand for cooling** is met by low carbon energy, are also key challenges.
- **Electrification** of other end use sectors can help to drive decarbonisation.
- **Decarbonisation solutions** will be required that are sector-specific and geography specific.
- Energy system **flexibility** is needed to deliver integration of renewables across all sectors.
- **Storage is a key technology** for achieving energy system flexibility.



Source: IRENA (forthcoming) Innovation Outlook Thermal Energy Storage

Project Navigator Technical Guidelines for Heating and Cooling systems

- Objective
  - Support the development of renewable energy heating and cooling solutions for cities-related applications including residential, industrial and commercial end-uses
- Scope
  - Small and medium scale projects in the context of urban development that improve the dynamic behavior of thermal systems to match user requirements in terms of supply volume, time of day, resource efficiency.
- RE Technology
  - solar (solar photovoltaics, thermal and concentrated), biomass (cogeneration), biogas, geothermal and heat pumps combined with storage technologies



Focus on bankable project alternatives for each configuration and load requirement with practical details such as energy audit, process integration, technology selection, technical design, cost estimation or financial modelling.

Thank you for your attention

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Sustainable cooling & Infrastructure

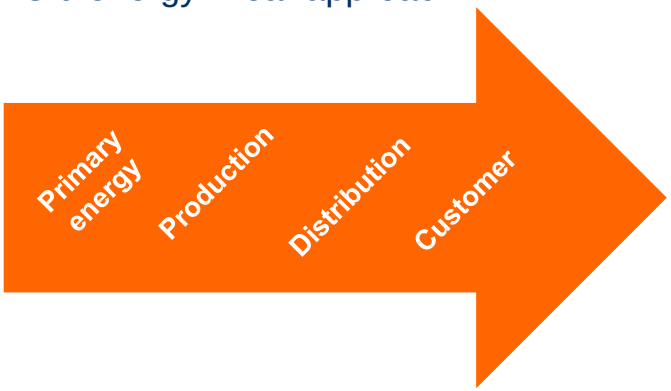
DISTRICT COOLING, AN EFFICIENT SOLUTION FOR THE ZERO CARBON TRANSITION

Olivier Biancarelli - ENGIE Group Executive Vice President
EPEE Webinar, March 24th, 2020

FROM A LINEAR APPROACH TO A SYSTEMIC APPROACH

Before

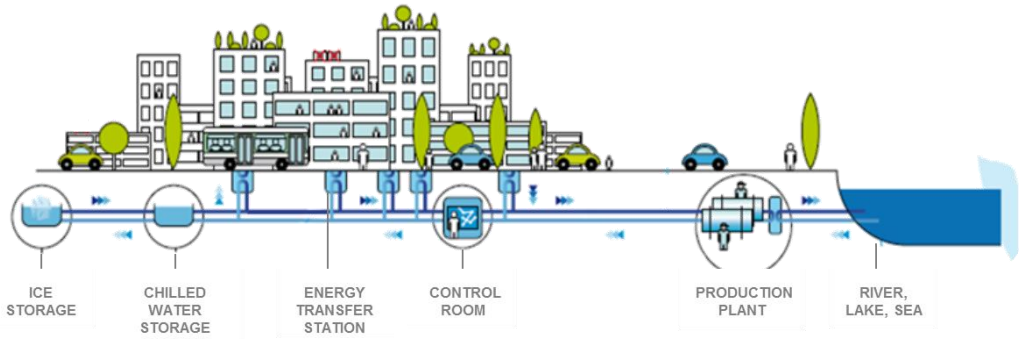
Old energy linear approach

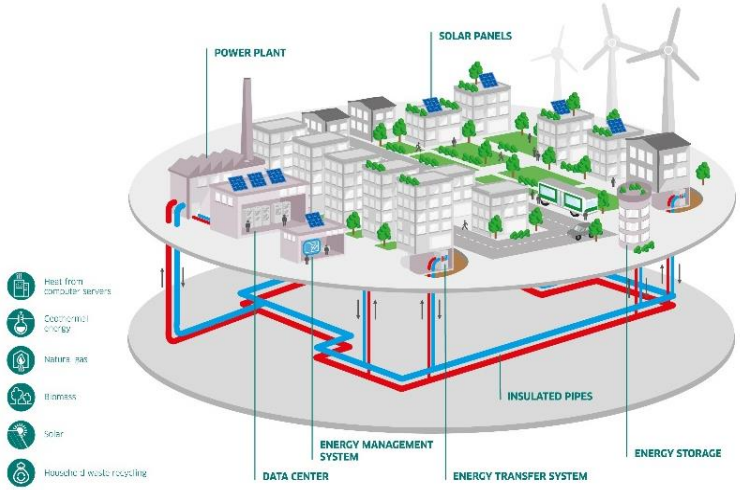


Now

- New complementarity between buildings & cities, individual HVAC & District Cooling/Heating
- New relation with other technology & solutions: energy (renewables, electricity, gas, etc.) infrastructure (public lighting, real estate, mobility, etc.), users (individuals, businesses, SMEs, local authorities, etc.)
- New focus on the outcome (environment, comfort, costs)

DISTRICT COOLING, AN EFFICIENT SOLUTIONS TO DECARBONIZE OUR CITIES(1)





50% improvement in energy efficiency

50% Less CO_2 emissions

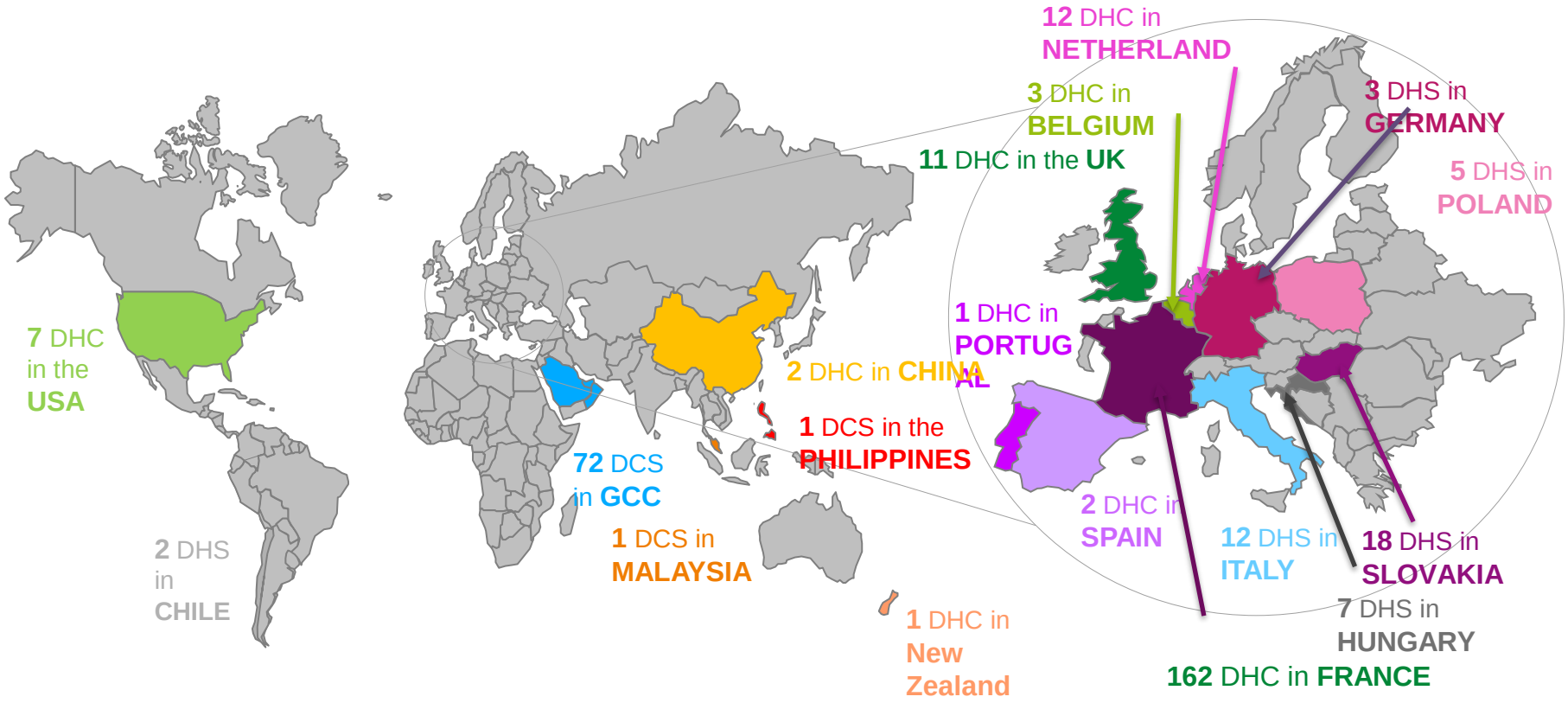
65% Less water consumption

35% Less electricity consumption

80% Less usage of chemicals

(1) Compared to stand-alone, conventional solutions

ENGIE DHC AND DISTRICT COOLING (DCS) REFERENCES AROUND THE WORLD



EMBLEMATIC CONTRACTS AS EXAMPLES OF DIFFERENT BUSINESS MODELS AND CLIENTS NEEDS

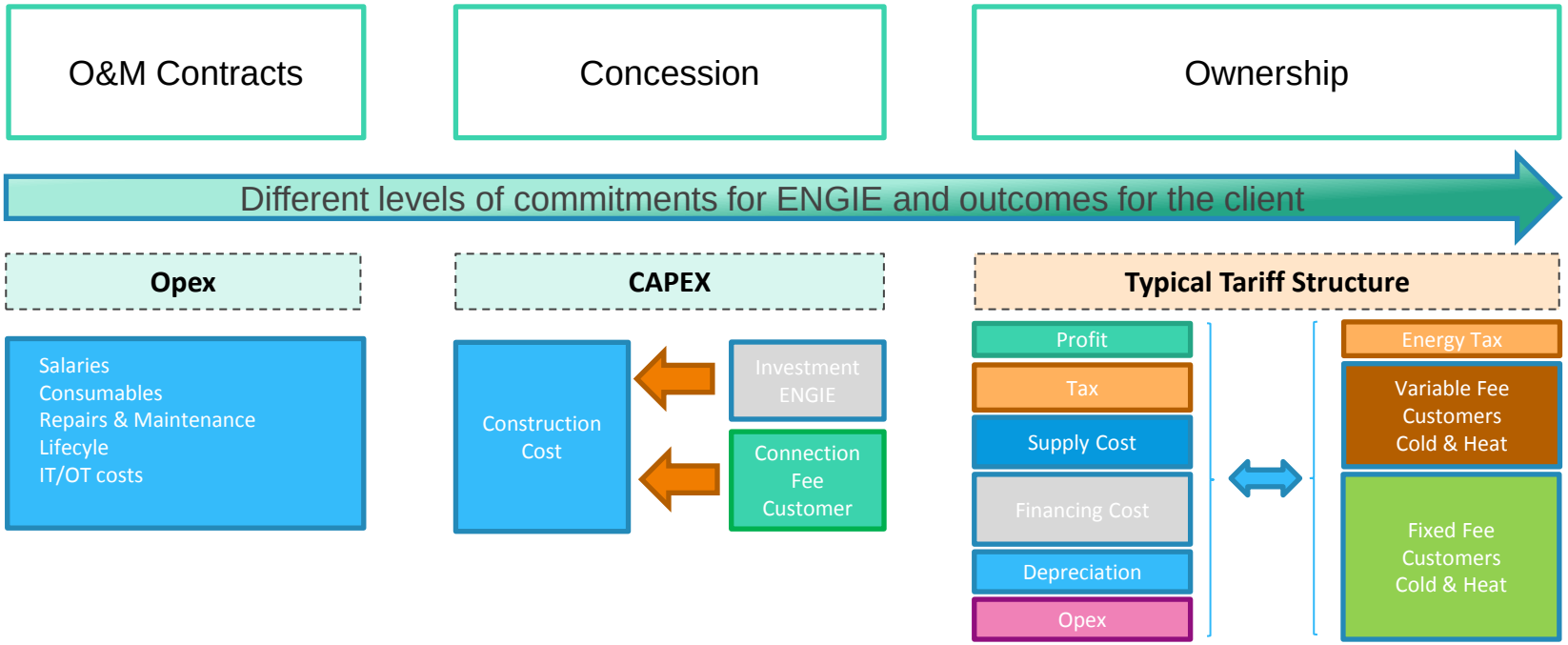
APRIL 2017 - A 50-year concession contract for energy management with the Ohio State University on the road towards carbon neutrality

- Operation and optimization of the university's utility system
- Core of the system: District Heating and Cooling network
- Energy Conservation Management Services: commitment to improve the university's energy efficiency by 25% within 10 years
- Construction of a new Energy Innovation Center

JUNE 2017 - ENGIE acquired a 40% stake in National Central Cooling Company PJSC (Tabreed), co ownership with Mubadala (42%) the state fund of Abu Dhabi

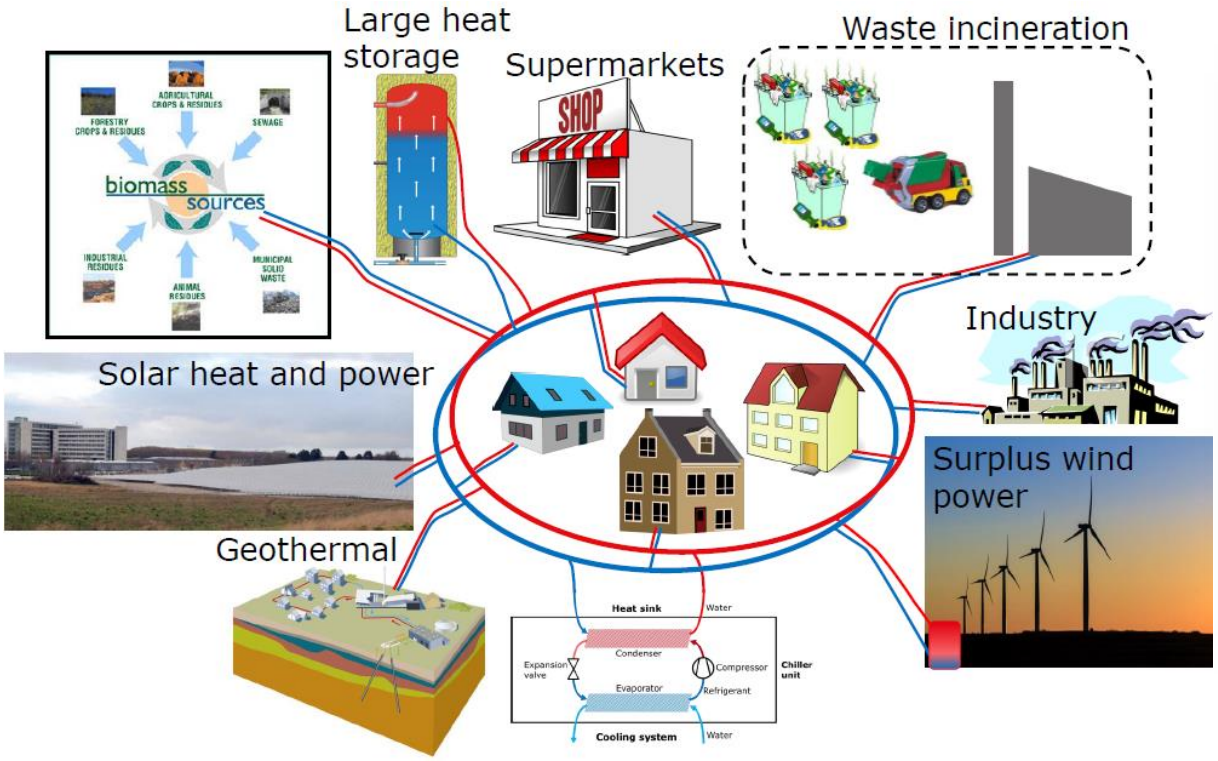
- 80 plants in the GCC that deliver over 1.18 Million refrigeration tons
- Its services have reduced energy consumption in the GCC by more than 2.06 billion kilowatt hours annually,
- Elimination of over 1.23 million tons of carbon dioxide emissions (the equivalent of removing over 268,000 cars from our streets every year)

DIFFERENT BUSINESS MODELS, FOCUSING ON OUTCOMES FOR OUR CLIENTS



source Feedermarket w/o Tabreed
To be updated

THE 4TH GENERATION OF DISTRICT HEATING & COOLING WILL SERVE AS RENEWABLES ENERGY AND INFRASTRUCTURE INTEGRATOR



4th Generation DHC :

- **Decarbonize existing buildings**
- **Heat recovery of waste heat (fatal heat from industries, data centers, waste incineration…)**
- **Key enabler of RES integration as flexibility provider**

THANK YOU

OLIVIER.BIANCARELLI@ENGIE.COM

06.
CONCLUDING REMARKS

Andrea Voigt, EPEE

Sustainable cooling is part of the solution to achieve carbon neutrality:

- It provides essential benefits for society:
  - ➔ Cold chain, health & well-being, productivity
- It can play an important role to reduce energy consumption
- It can facilitate the shift to renewable energies
- It can act as a catalyst to move away from fossil fuels in heating

The cooling industry stands ready:

- Technologies are available, now they need to be deployed

It won‘t be a walk in the park:

- The European Green Deal is a huge challenge
- Implementation & enforcement of EU legislation are key for success
- Framework conditions need to foster the uptake of sustainable cooling
  - ➔ Business models, sustainable finance …

Find out more at: www.countoncooling.eu @CountOnCooling

#CountOnCooling

THANK YOU TO ALL PARTICIPANTS FOR JOINING US TODAY !

See you soon for EPEE's #CountOnCooling flagship event

Follow us on Twitter: @CountOnCooling

CountOn Cooling

EPEE

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