EmiratesGBC Technical Workshops

EmiratesGBC **X** Terrafic Energy

Natural Cooling Technology Using Direct and Indirect Evaporative Cooling

Presented by **Arun Karunaratne,** Head of Business Development and Sales, Terrafic Energy

10th of November 2023

For a better Earth
TERRAFIC ENERGY

COOLING THE PLANET:

REVOLUTIONIZING ENERGY-EFFICIENT CLIMATE CONTROL WITH IDEC SYSTEMS

OXYCOM
natural air conditioning

THE TIME TO CHANGE IS NOW!

The secret of getting ahead
is getting started.

- MARK TWAIN

For a better Earth
TERRAFIC ENERGY

ABOUT US

TERRAFIC ENERGY IS A DUBAI BASED SUSTAINABLE ENGINEERING AND CONSULTING ORGANIZATION, FOCUSING ON TWO HIGH IMPACT SECTORS IN THE UAE - **ENERGY AND WATER** AND ITS SUSTAINABLE GENERATION AND CONSUMPTION.

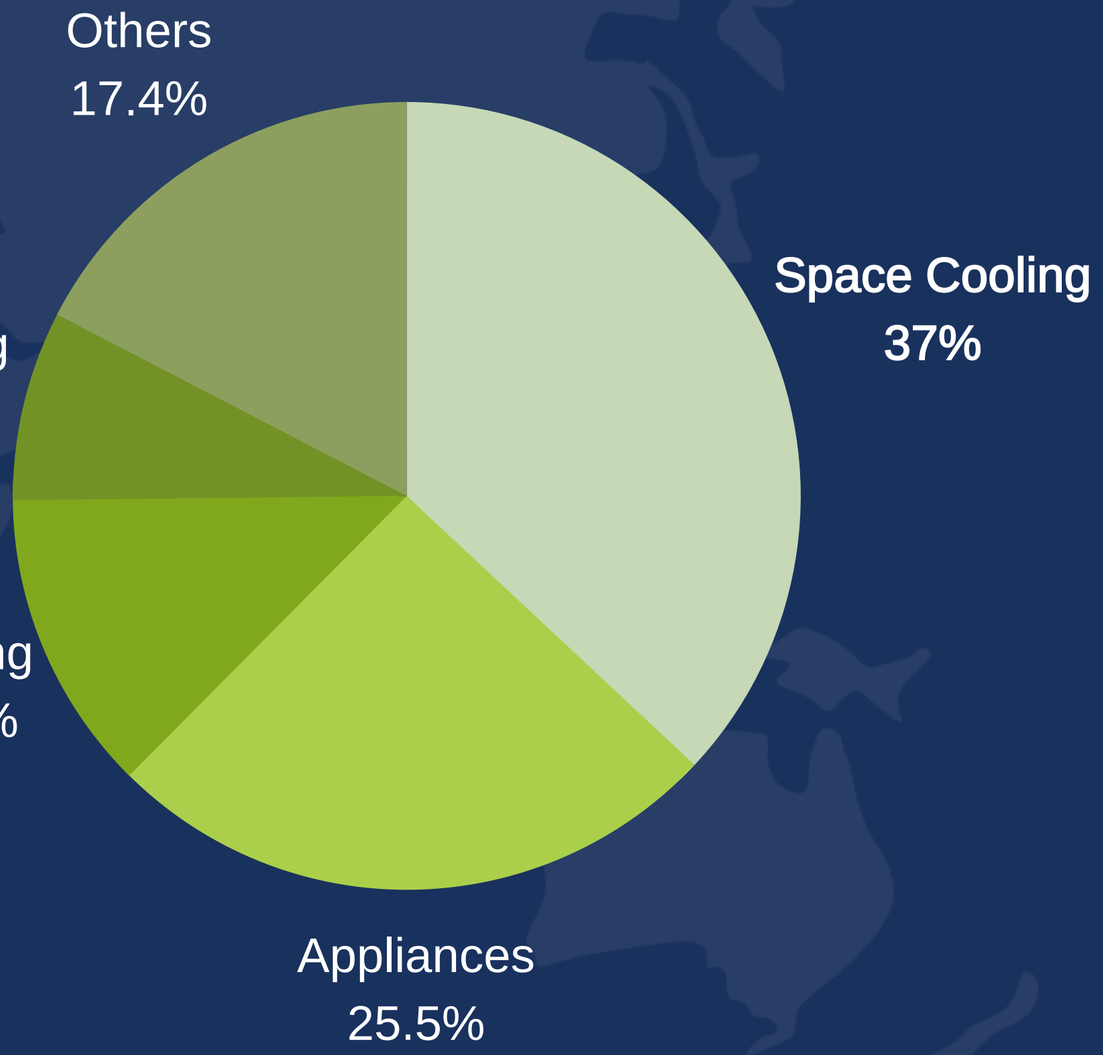
Evaporative cooling systems

Electricity generation with solar PV

Transparent heat-blocking coating for glass

Heat reflective paint for roofs & facade

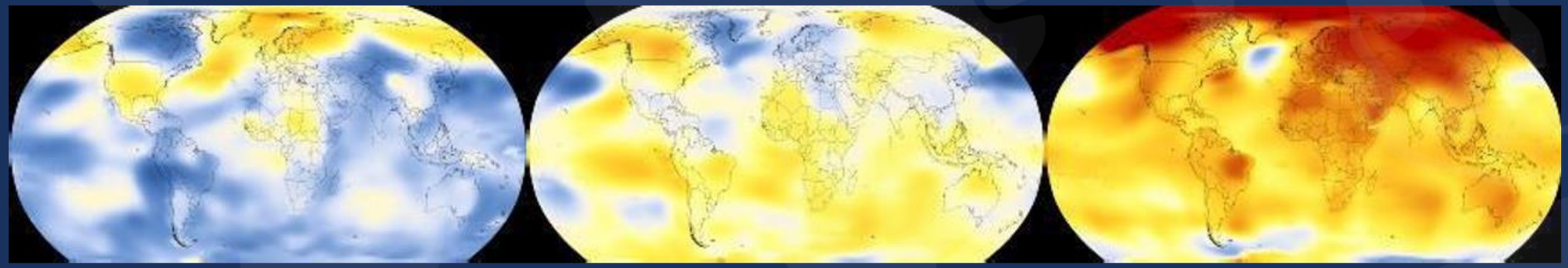
Terrafic Energy solutions!



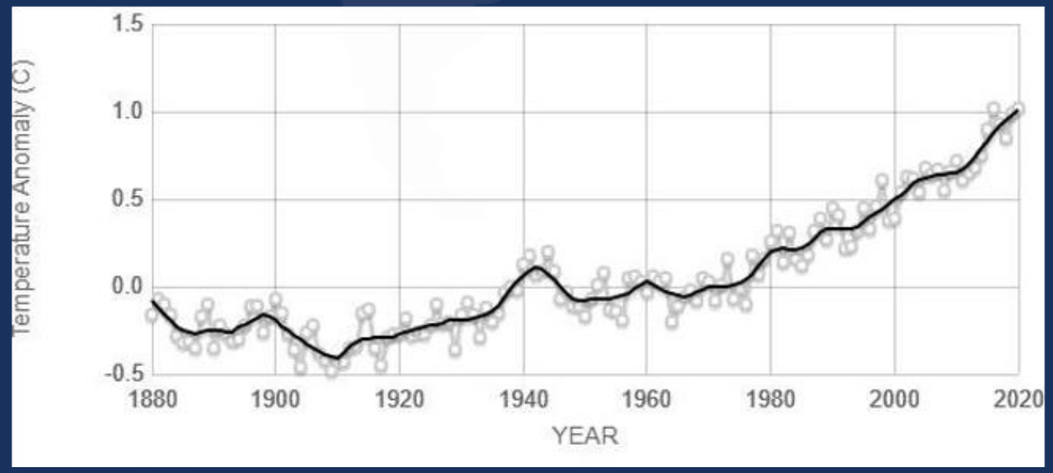
TACKLING THE EVER INCREASING COOLING DEMAND

Global electricity demand growth by use 2018-2050

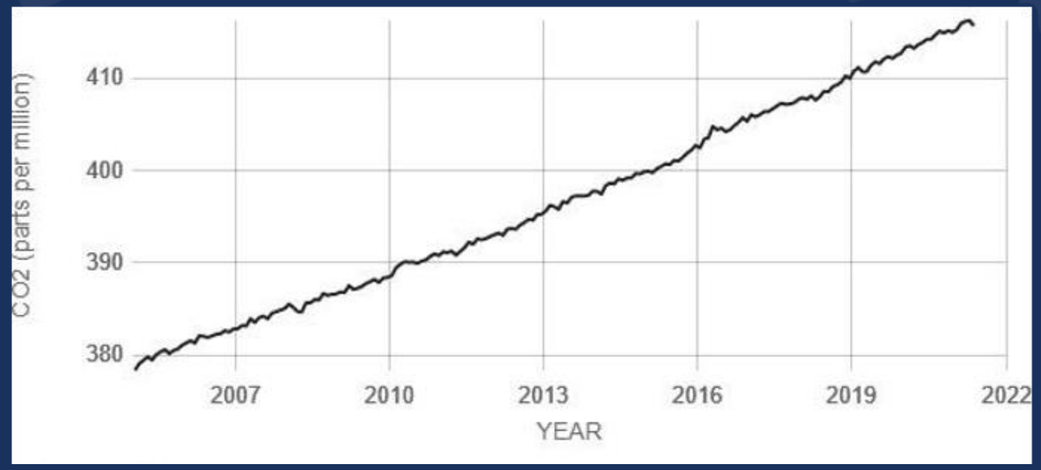
Source : International Energy Agency



2000 2010 2020



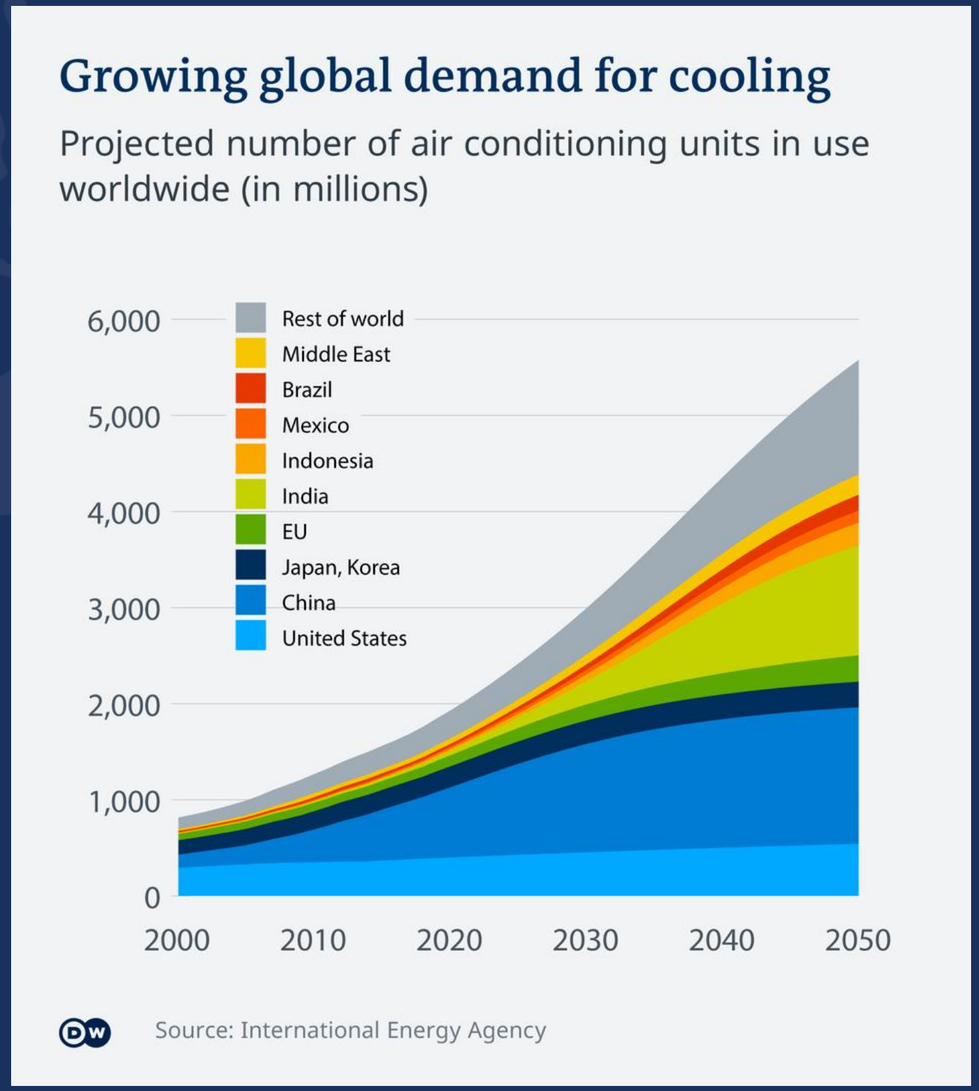
Rise in temperature



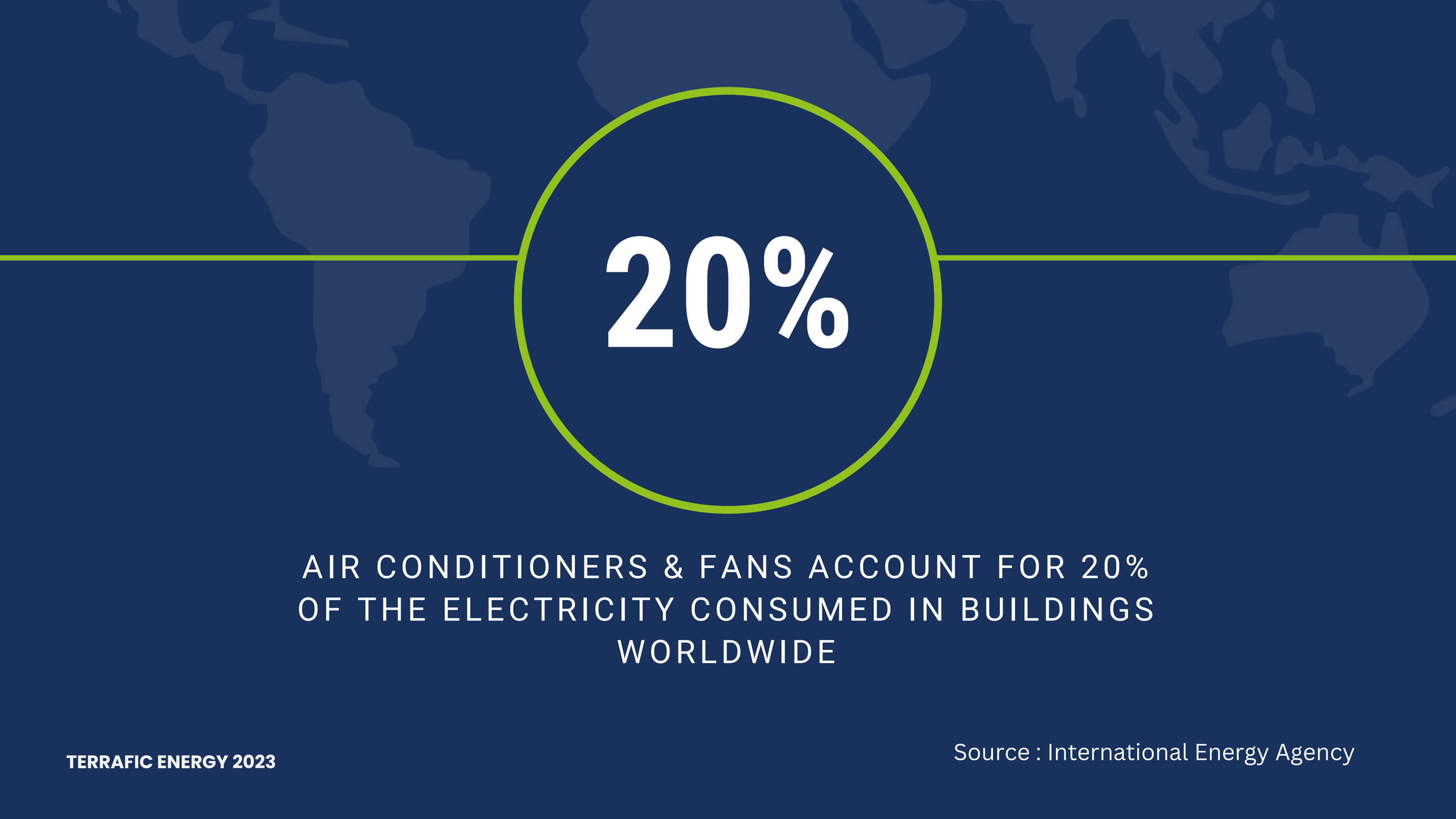
Rise in CO2 Emissions

Source : NASA

Rising global temperatures, accelerated urbanization, and the growing middle class in various regions are all contributing to an insatiable thirst for cooling.



Source : International Energy Agency



AIR CONDITIONERS & FANS ACCOUNT FOR 20% OF THE ELECTRICITY CONSUMED IN BUILDINGS WORLDWIDE

Source : International Energy Agency

460b Tons

ACCORDING TO UNEP, CLIMATE-FRIENDLY COOLING SOLUTIONS COULD AVOID AS MUCH AS 460 BILLION TONNES OF GREENHOUSE GAS EMISSIONS.

Source : UNEP

531M TONS FROM COOLING AIR

599M TONS FROM REMOVING HUMIDITY

820M TONS FROM REFRIGERANT LEAKS , MANUFACTURING AND TRANSPORT

ACCORDING TO RECENT RESEARCH CONDUCTED BY THE NREL AND XEROX PARC

1,950 MILLION TONS OF CARBON DIOXIDE EMISSIONS ARE RELEASED EACH YEAR FROM THE ENERGY USED TO POWER AIR CONDITIONING

Source : NREL

A transition to climate-friendly and energy-efficient cooling, however, would avoid greenhouse gas emissions and allow an increase in cooling access that would contribute substantially to the Sustainable Development Goals (SDGs).

PRIORITIZING ENERGY EFFICIENCY

To confront this impending challenge, a crucial priority is to prioritize energy efficiency in cooling technologies. This entails embracing a multifaceted approach:

1. **Energy-Efficient Systems:** Systems that are designed to deliver the same level of cooling comfort while consuming significantly less energy.

2. **Improved Building Insulation:** Better insulation can prevent cool air from escaping buildings, reducing the workload on cooling systems and further decreasing energy consumption.

3. **Smart Cooling Solutions:** Implementing smart cooling solutions can optimize the operation of cooling systems, ensuring they run at peak efficiency and only when necessary.

TAPPING INTO THE POWER OF EVAPORATIVE COOLING

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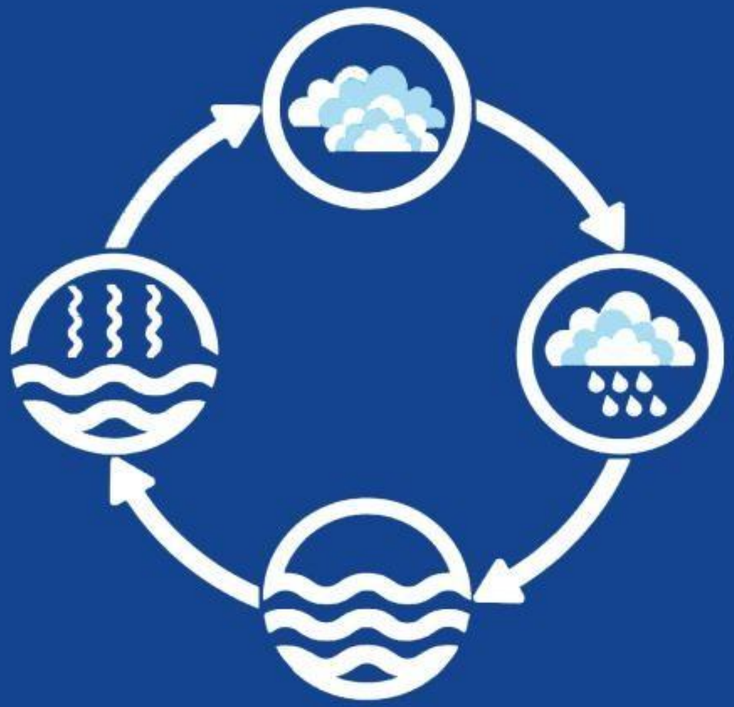
USING WATER AS A REFRIGERANT

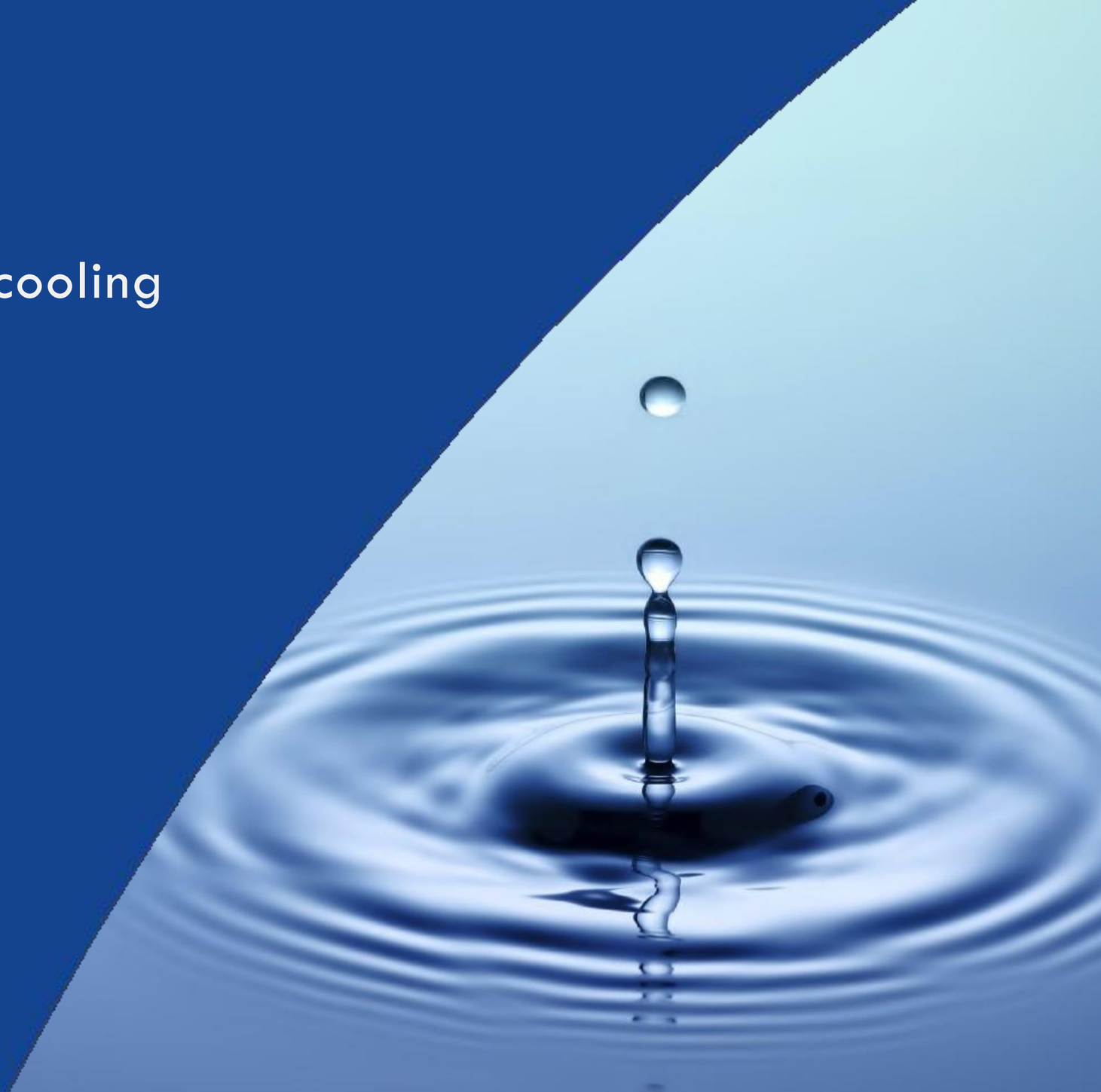
TERRAFIC ENERGY 2023

IntrCooll principle

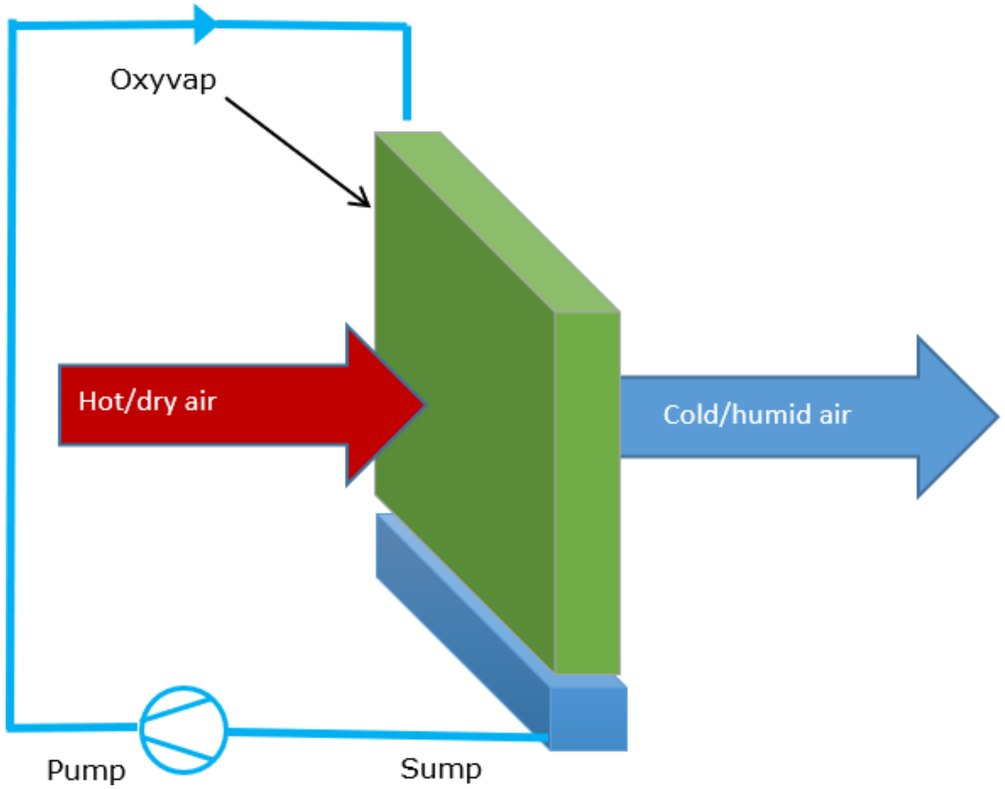
EVAPORATION ENERGY

1 m^3 water results in 695 kW cooling power





Direct adiabatic cooling

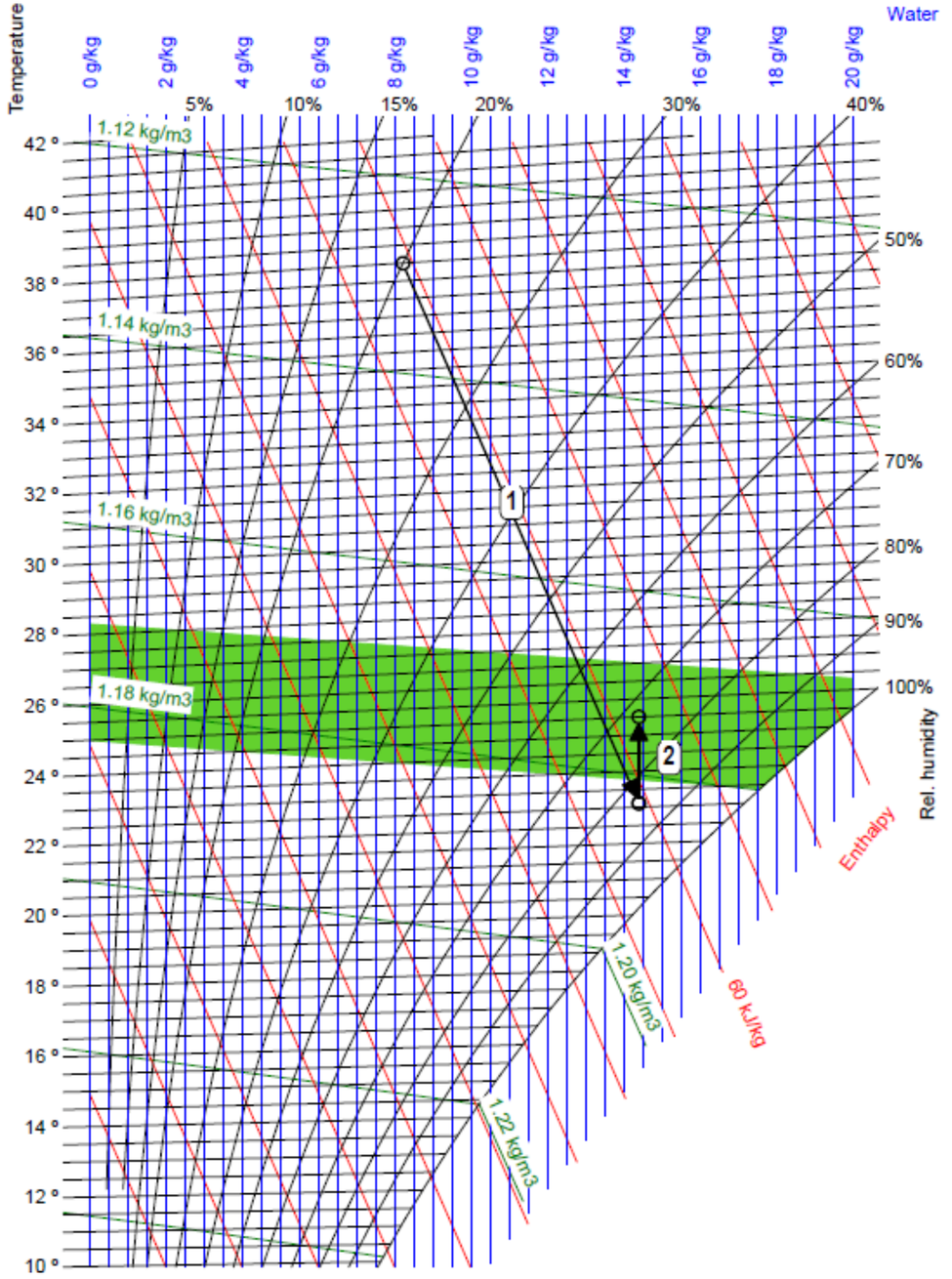


Hx Diagram
Direct adiabatic (conventional)

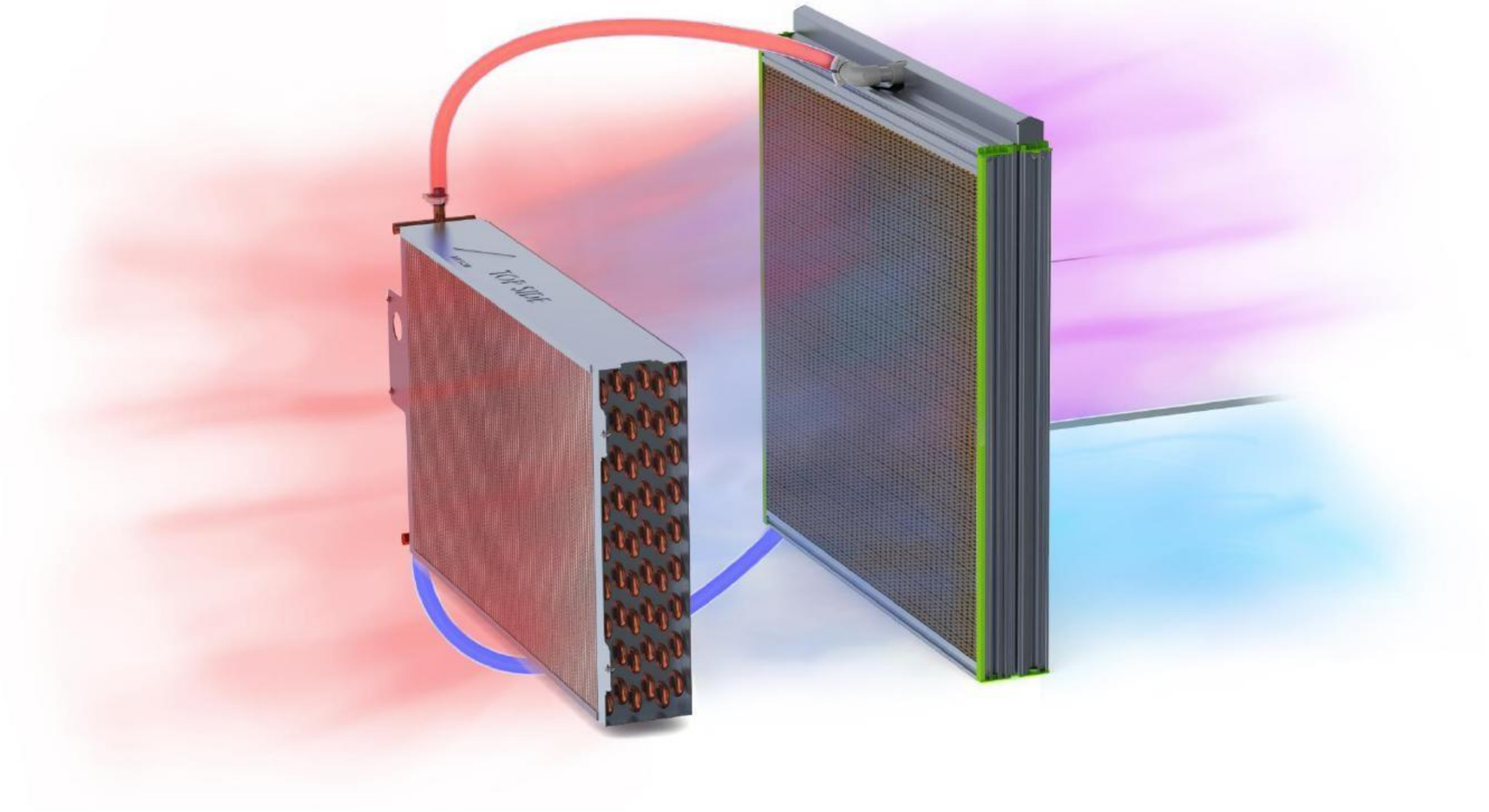
Direct adiabatic

1 = Direct adiabatic cooling process

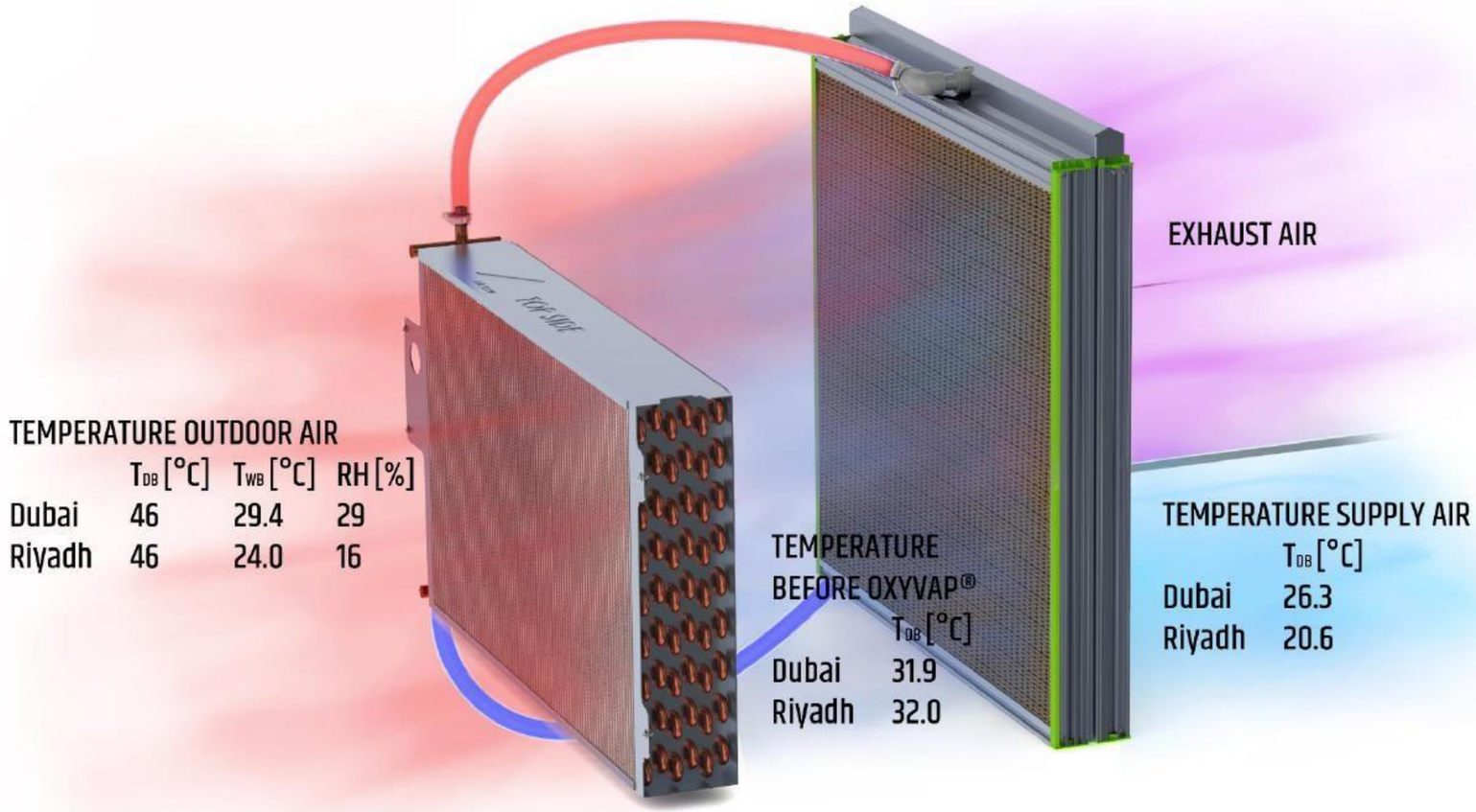
2 = Indoor heating to room temp. setpoint



Indirect/direct adiabatic cooling

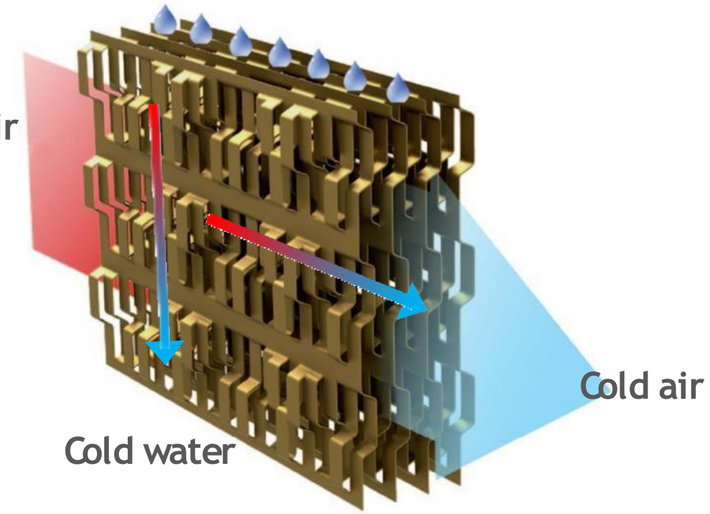


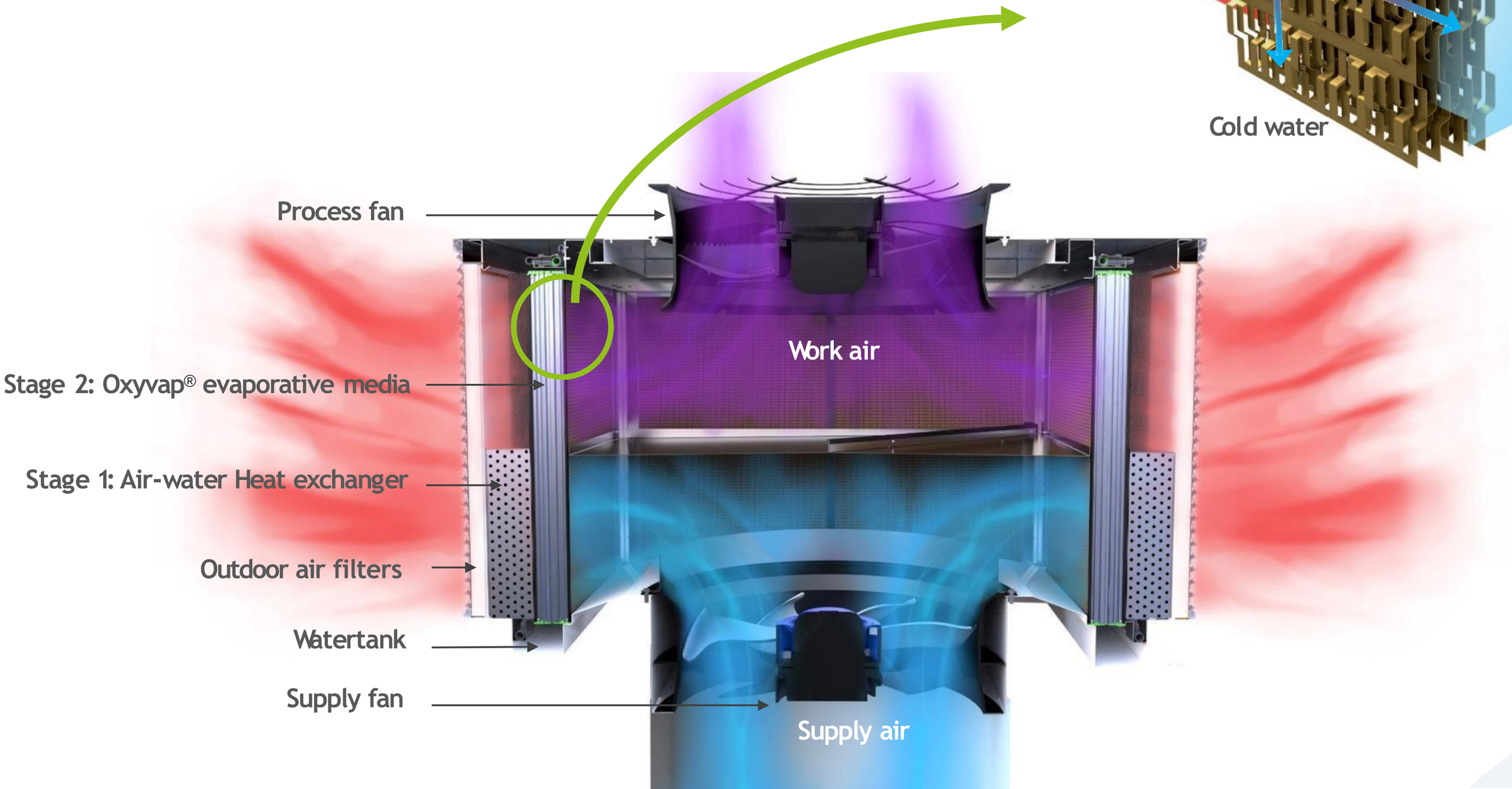
Indirect/direct adiabatic cooling



Indirect/direct adiabatic cooling

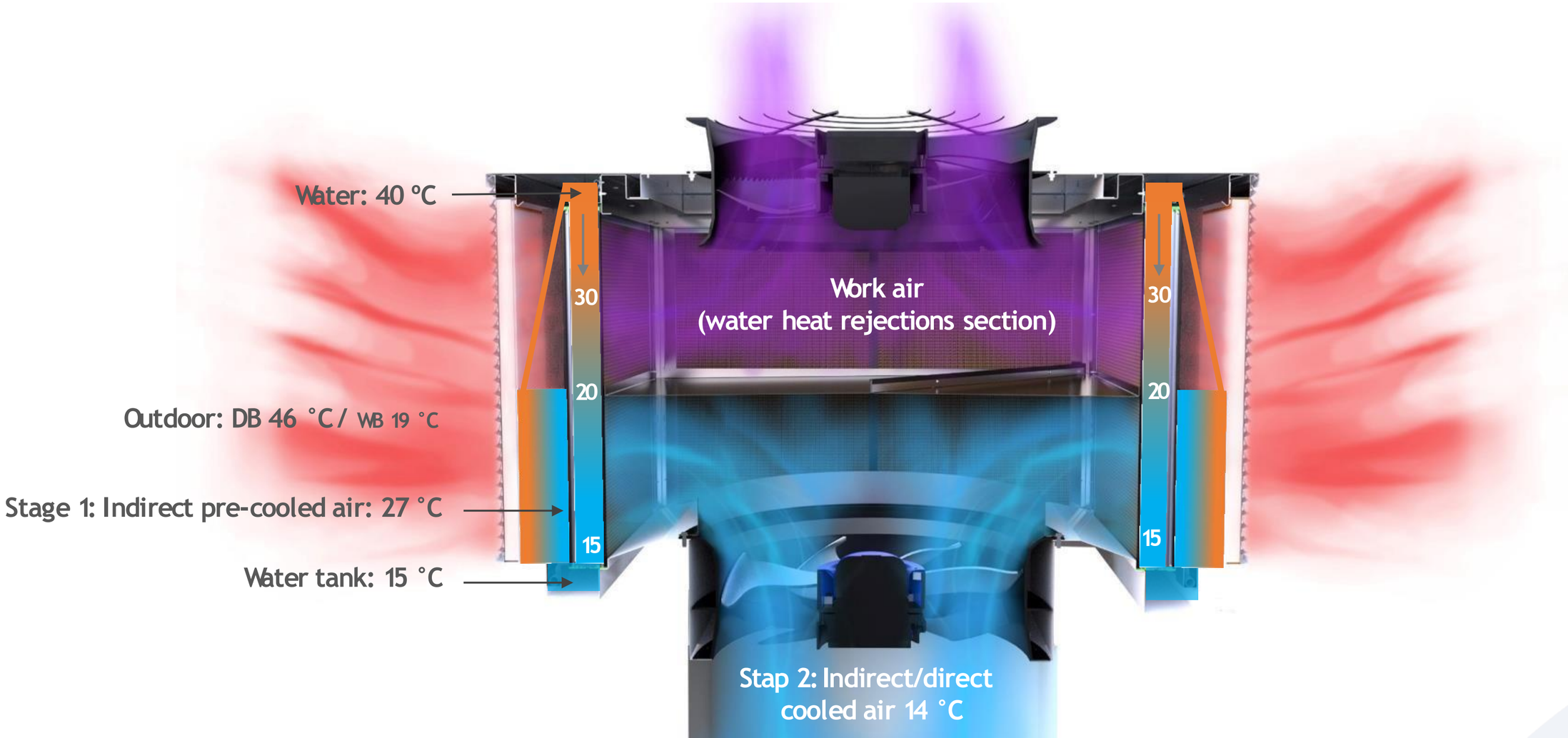
Two-stage adiabatic cooling



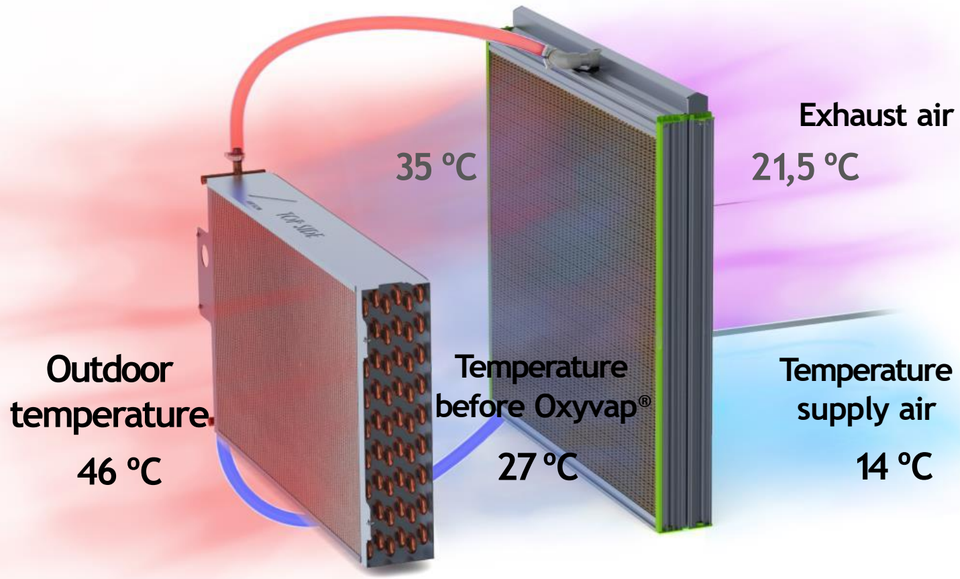


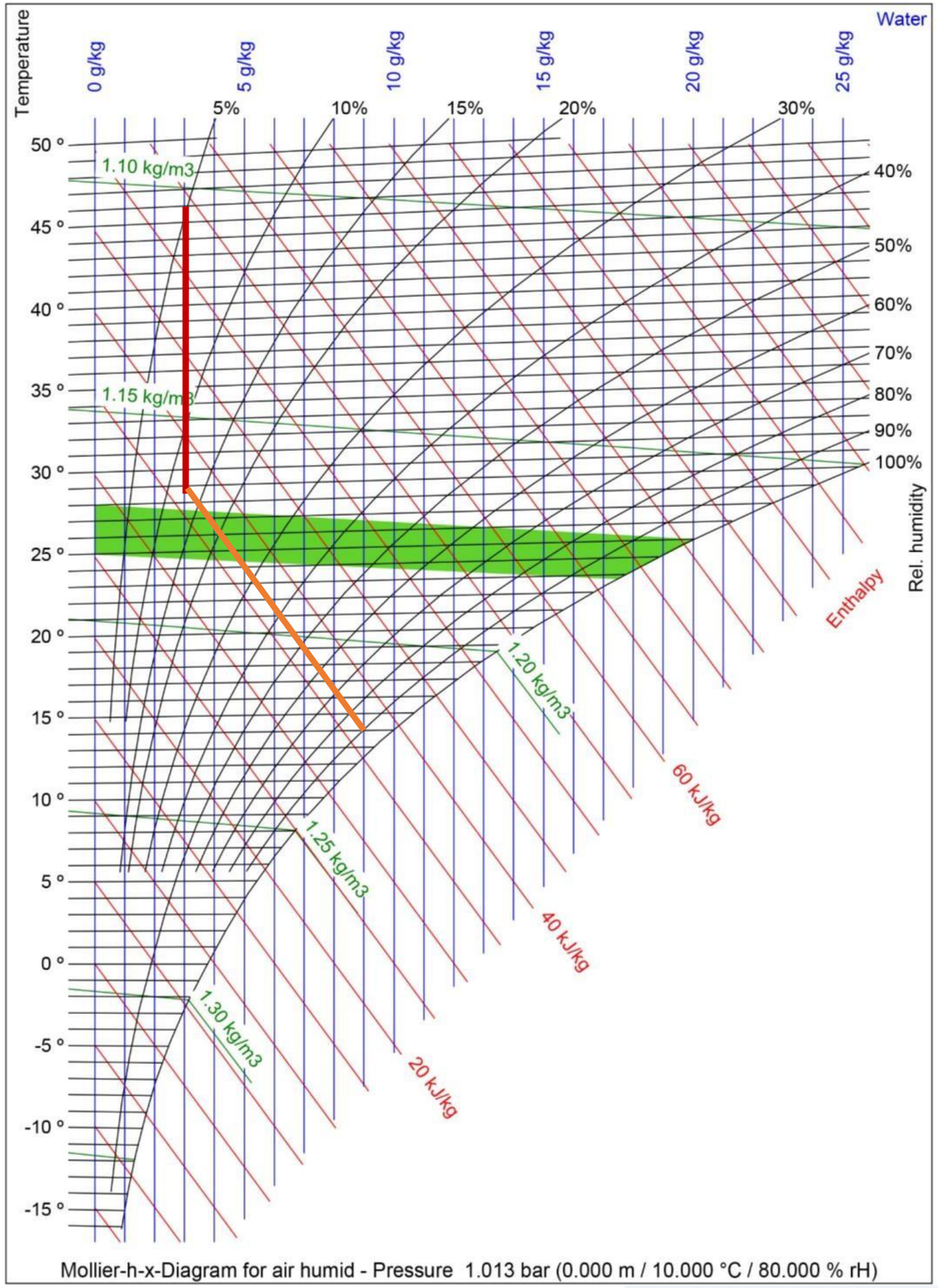
Indirect/direct adiabatic cooling

Two-stage adiabatic cooling



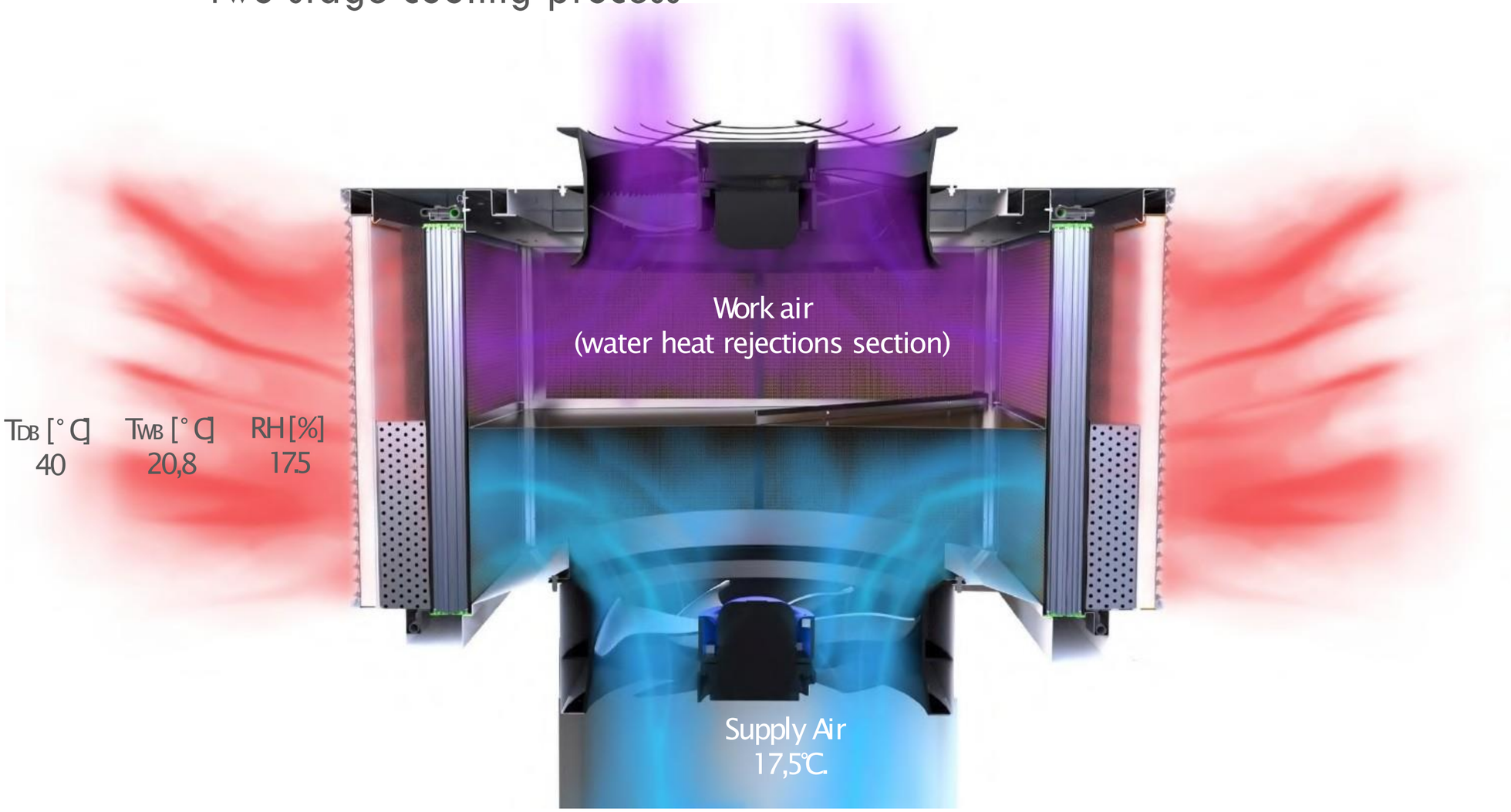
Mollier diagram





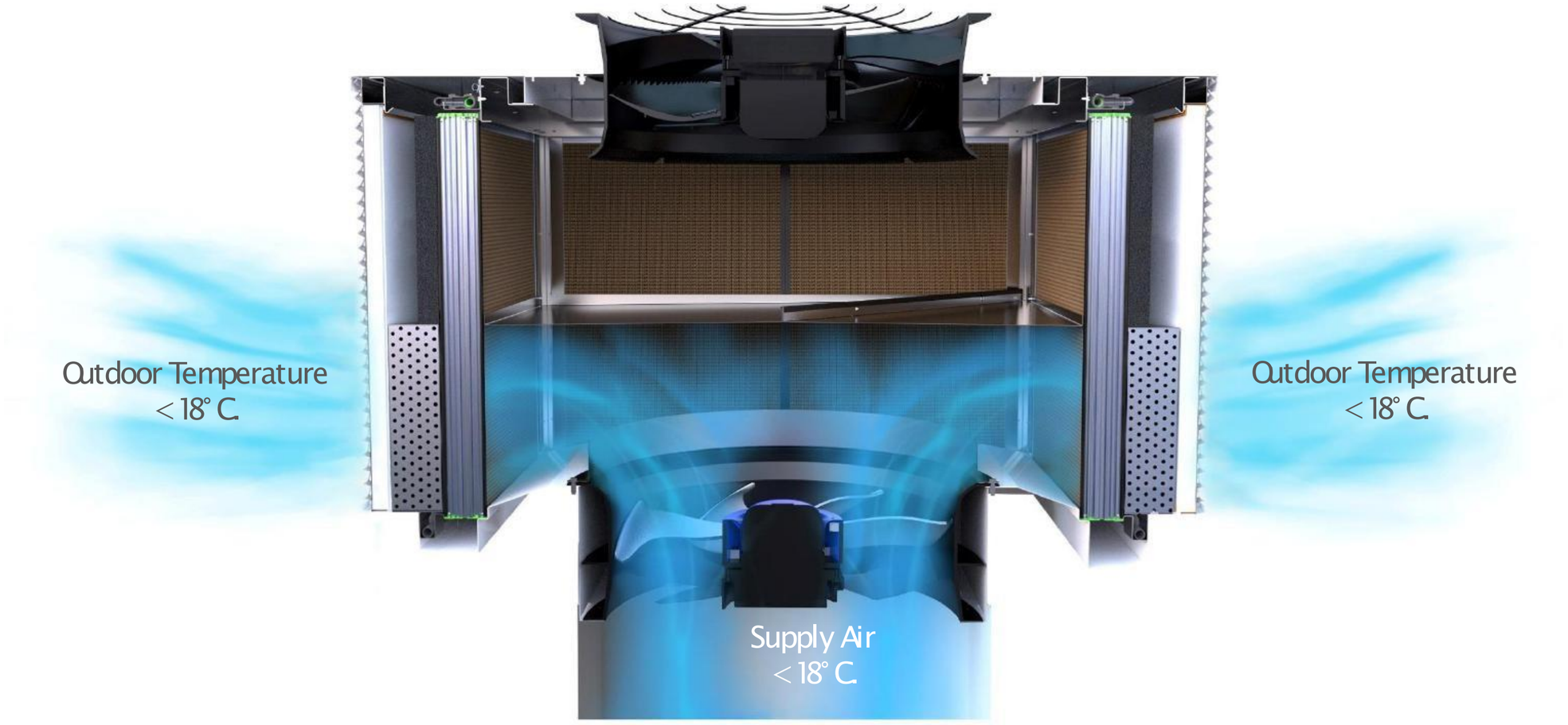
Indirect/direct adiabatic cooling

Two stage cooling process

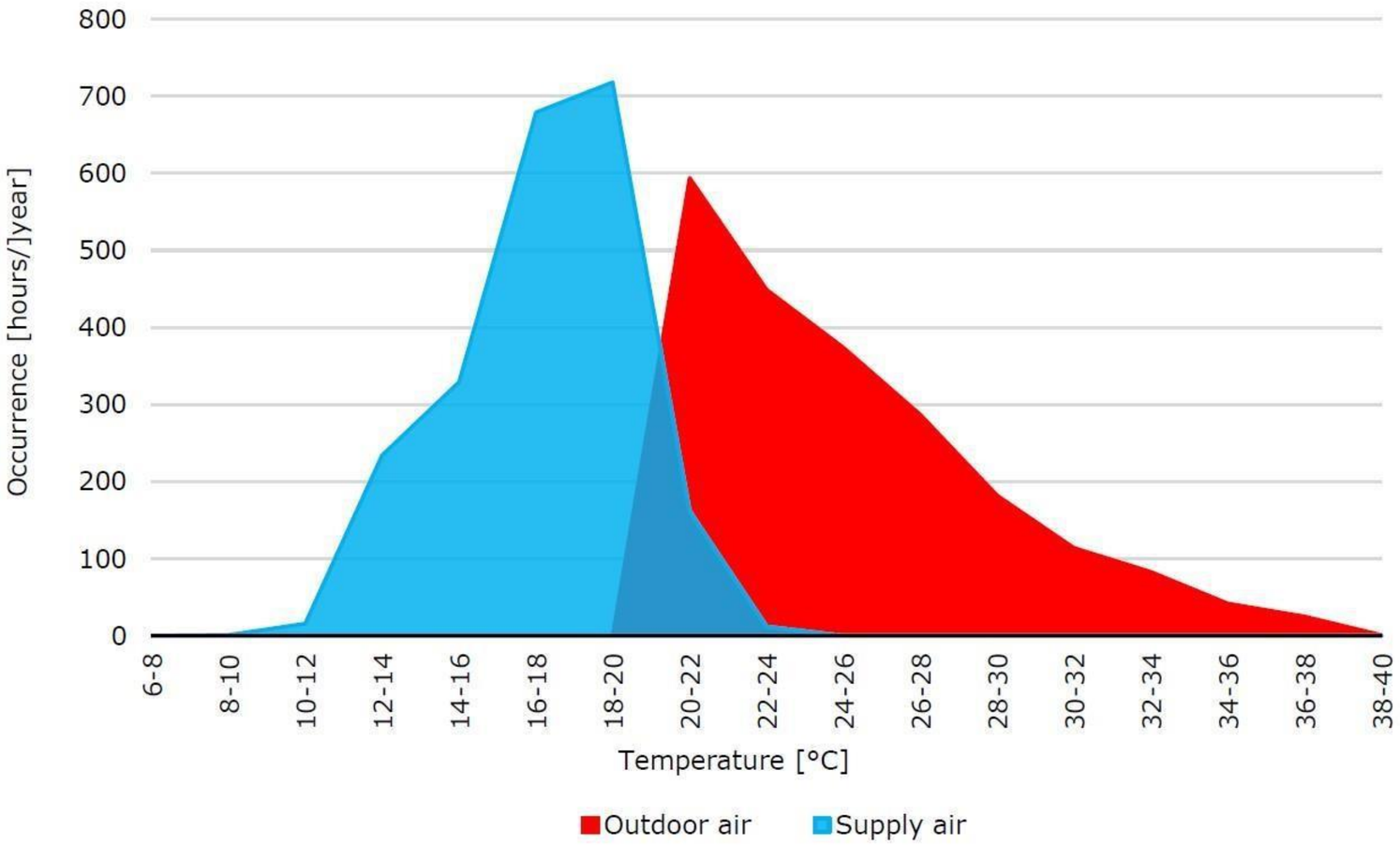


Free Cooling

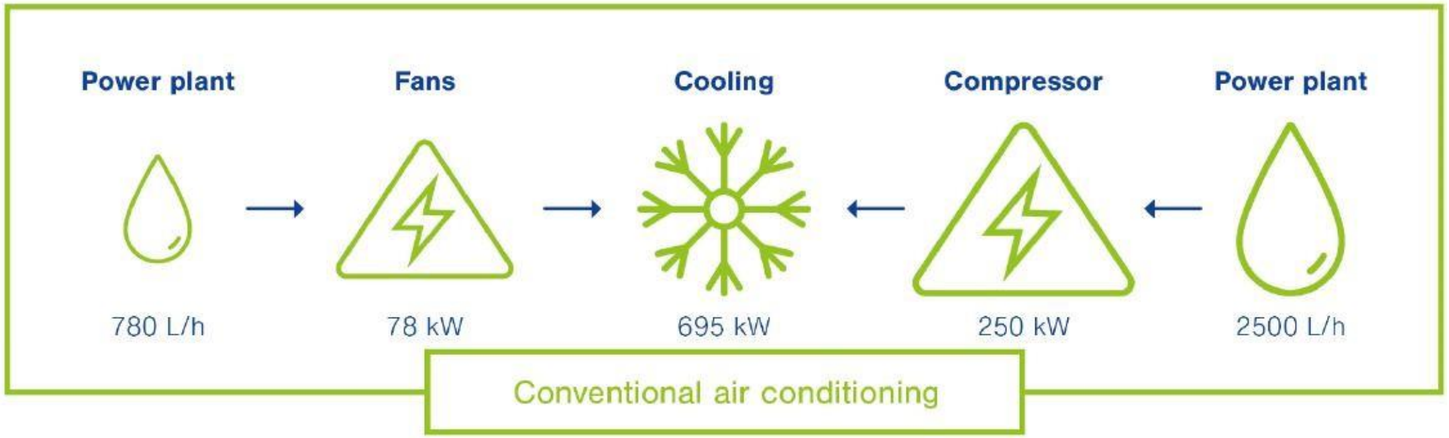
Free cooling and ventilation with outdoor air

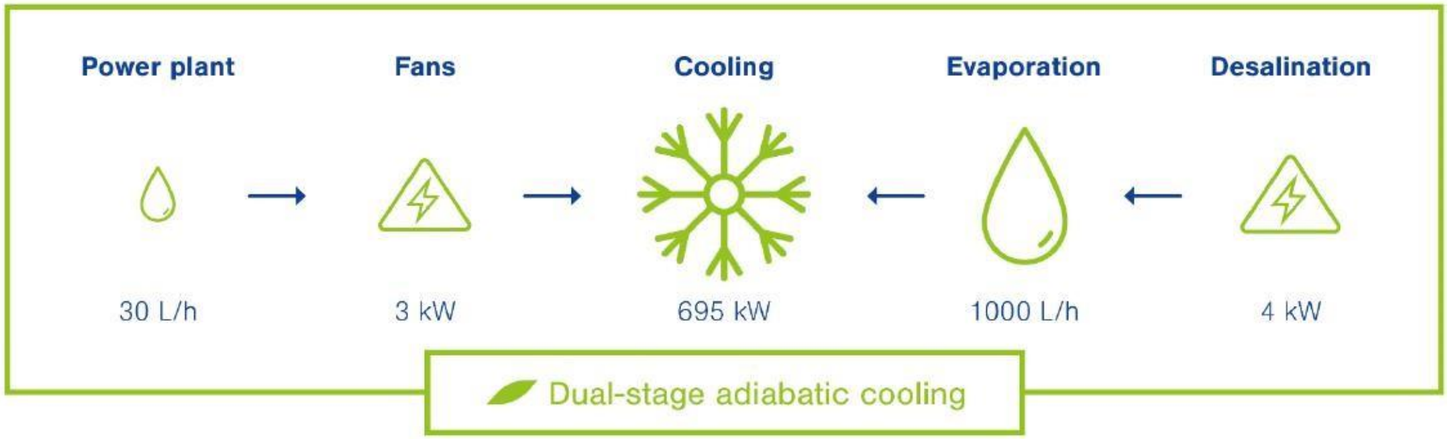


Supply and outdoor temperatures example



Conventional air conditioning vs. dual-stage adiabatic cooling





Why IntrCooll?

What are we good at?

- Cooling
- Ventilation
- Compensate negative pressure
- Heating
- Filtration
- Sustainability

Thinking along and tailored advice!

A satisfied employee!

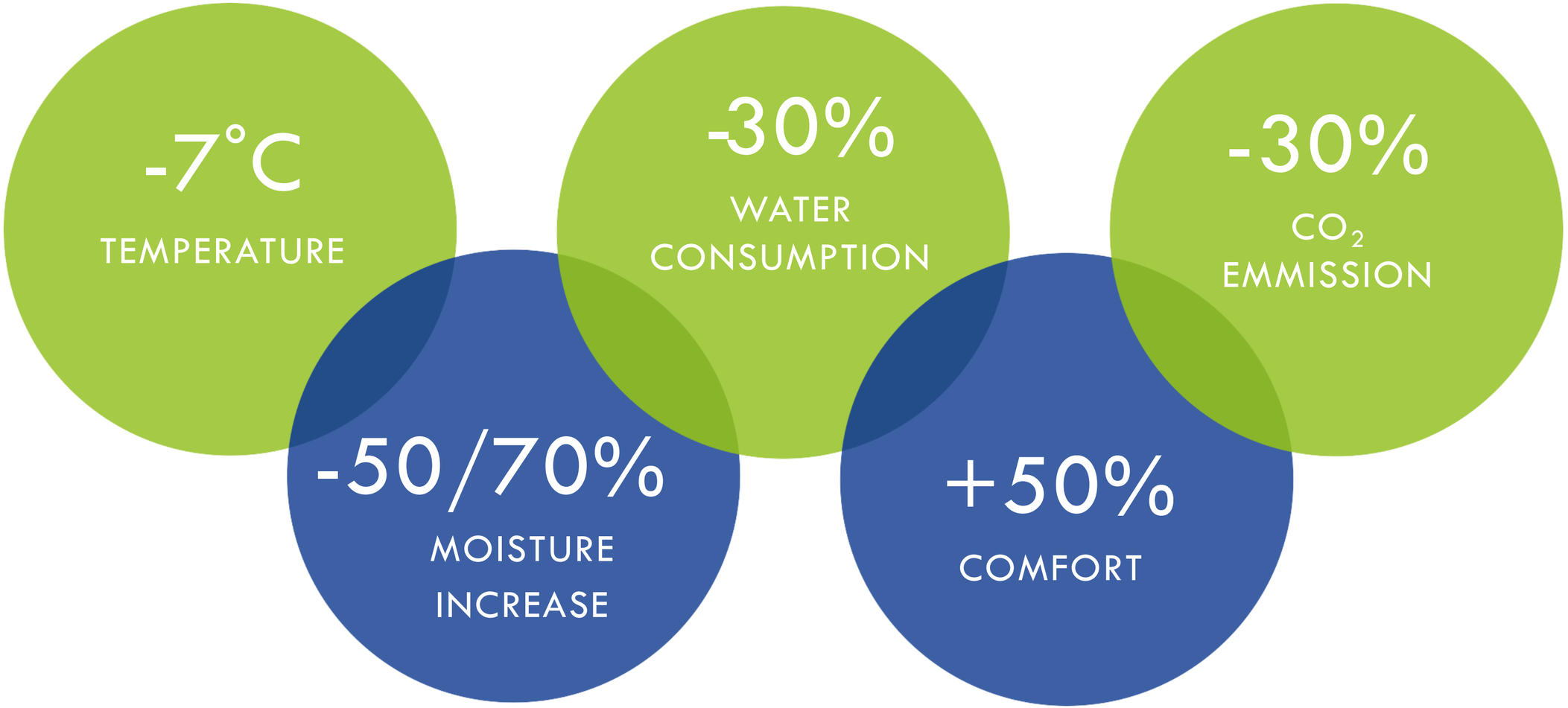
- Healthy working environment
- Comfortable working environment
- A cool environment does not drain your energy
- Improved concentration

A satisfied employer!

- Productivity boost
- Reduced leave of absence
- Attract employees
- Low energy consumption
- Small carbon footprint
- A happy employee!
- Positive image of the Company

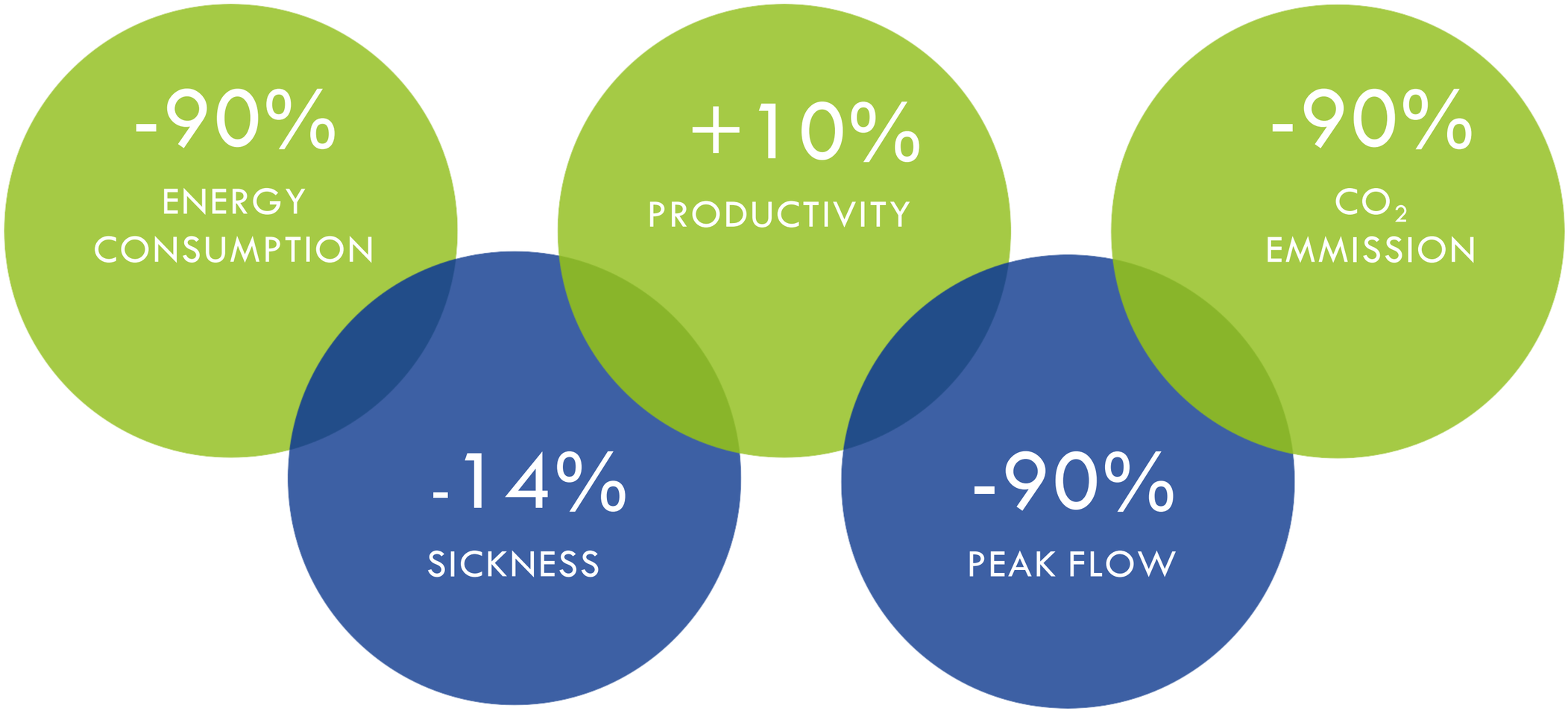
In which we distinguish ourselves

Benefits IntrCooll compared to direct adiabatic cooling systems



In which we distinguish ourselves

Benefits IntrCooll compared to air conditioning



IntrCooll Plus

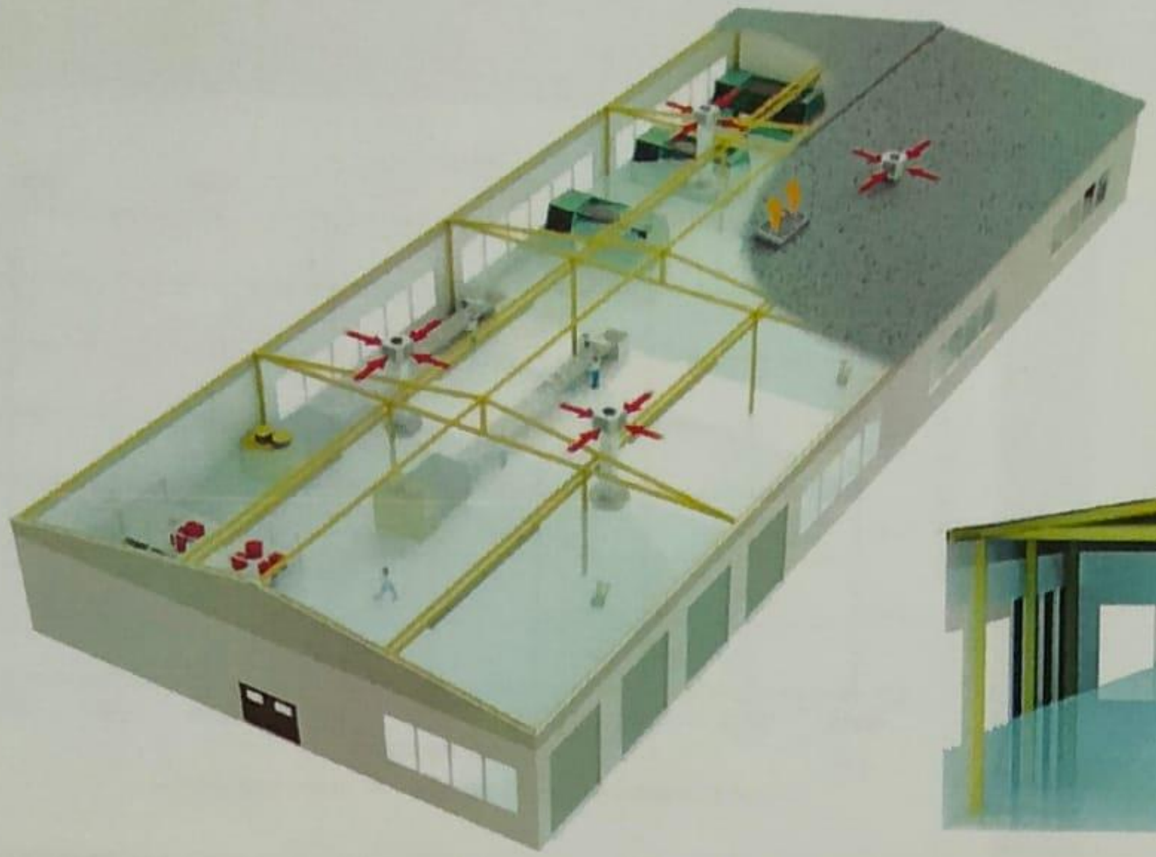
Ventilation, Free Cooling & Indirect/Direct adiabatic cooling

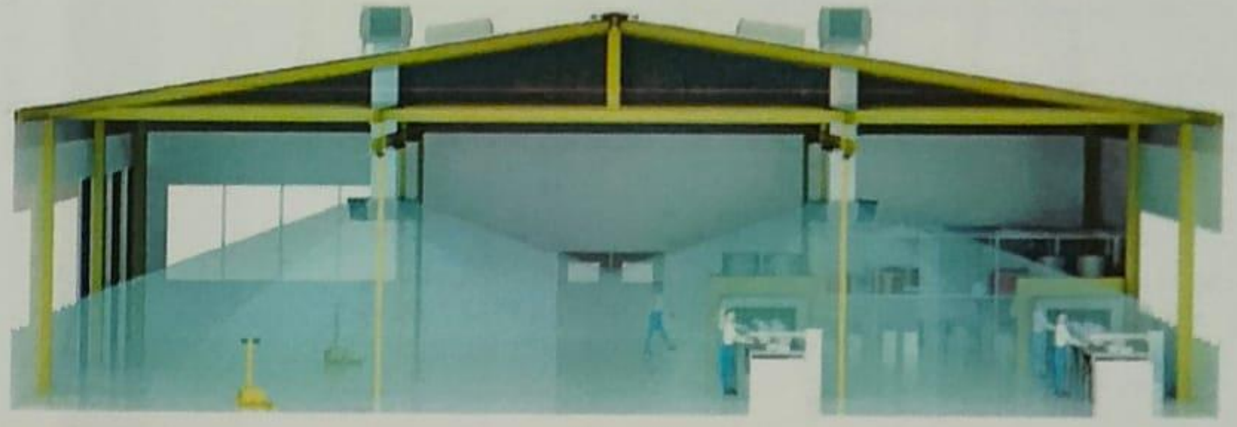
- Wet-bulb efficiency up to 114%
- Maximum airflow: 14000 m³/h @ 160 Pa (incl. F7 filters)
- Power consumption max: 4210 watt*
- Sound pressure level @4 meter:66 dB(A)
- Cooling capacity up to 130 kW
- E.E.R. **: Middle East up to 40 – Europe up to 30
- Wet-weight (excl. accessories): ± 550 kg
- Dimensions:

l= 1961 mm x w= 1961 mm x h= 1460 mm

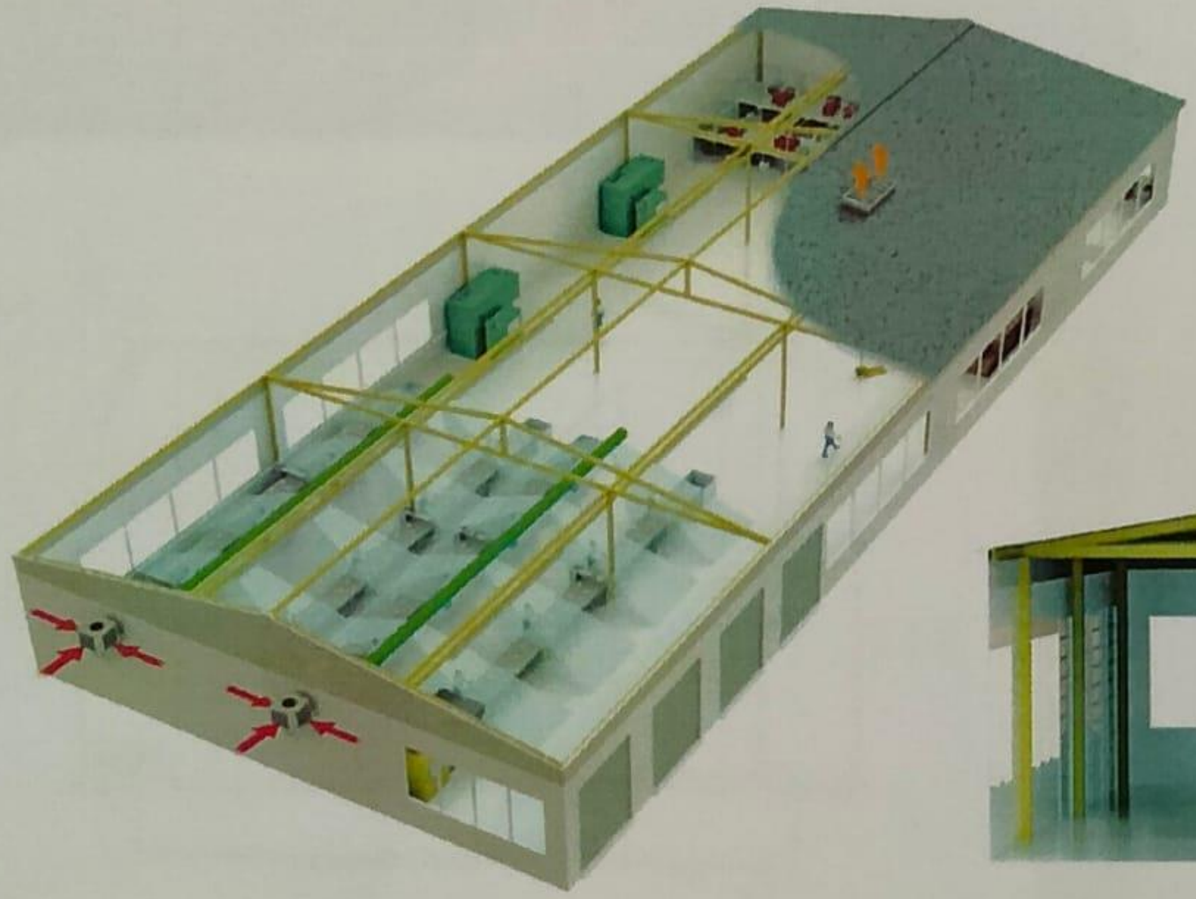
* Maximum at 160 Pa External Static Pressure (ESP) & F7 filters
** Energy Efficiency Ratio

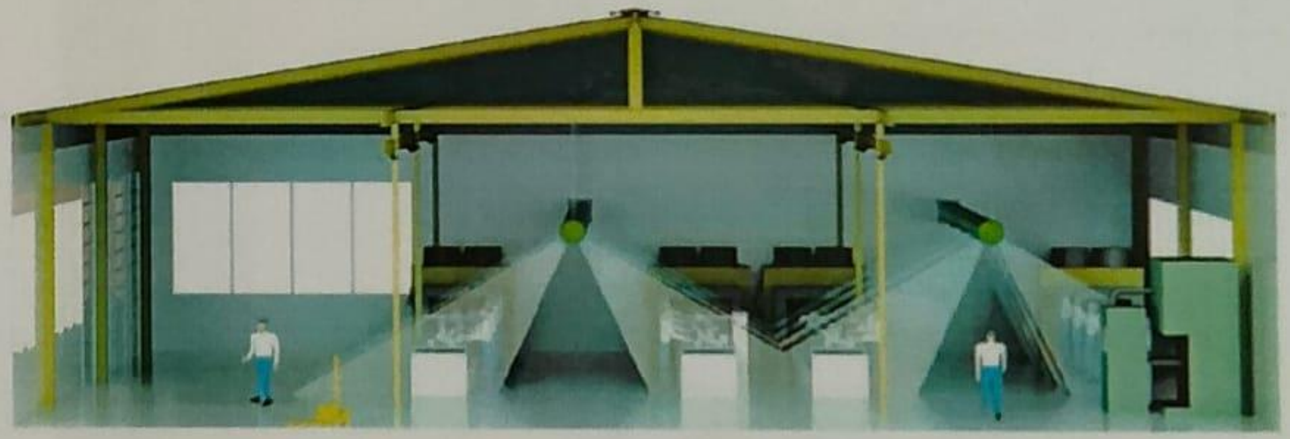
Large Space Cooling



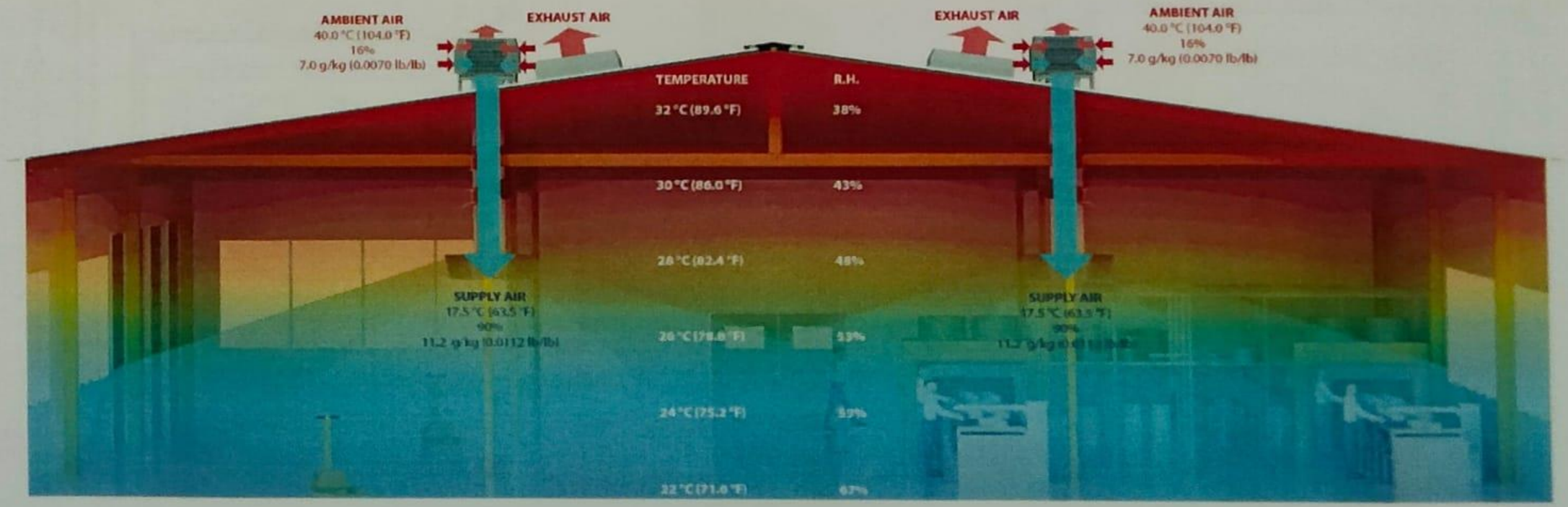


Workspot Cooling





Displacement Cooling



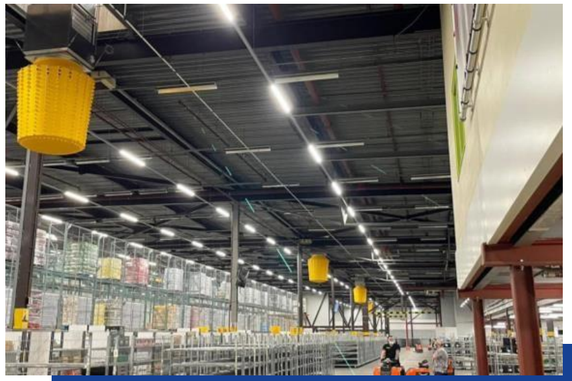
References

e Xtra – Saudi Arabia

Wildkamp – Netherlands

Tasjeel – UAE

Khansaheb – UAE



JUMBO – Netherlands

Motor Oost – Netherlands

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www.terrafic.org

sustainability@terrafic.org

+971 4 3209646