Air$_2$O

Intelligent cooling

an ICT Company

Data Center Cooling

SPECTRUM RANGE

Mission Critical Solutions

INNOVATIVE, EFFICIENT AND SUSTAINABLE COOLING SYSTEMS

Innovative, Efficient and Sustainable Air Cooling Solutions for Mission Critical Environments.

Energy efficient data center cooling.

The Air_2O data center Spectrum product line covers 100% fresh air and 100% recirculation-based systems, utilizing technologies such as: direct or indirect evaporative cooling, economizer, 2 stage indirect/direct evaporative cooling, hybrid cooling, heat pipe, refrigerant and chilled water.

With our expertise to produce solutions of limitless size, we have the capability to design and produce the most practical and efficient cooling solution for your data center project. Air_2O's team of data center specialists provide comprehensive design support to the data center engineer.

Utilizing **DEN**, our unique performance predicting software, we can determine which product in our data center range is optimum for your project by performing a detailed performance analysis considering local weather conditions. Maximizing efficiency is vital moving forward as it is reported that 1% of the world's energy and 2% of all power in the United States is used to cool data centers.

"Air_2O's team of data center specialists provide comprehensive design support to the data center engineer."

Data Center Spectrum Range

The Spectrum range of Air_2O Indirect and Hybrid Coolers have been specifically developed to meet the unique demands of the Data Center and Telecommunications market.

The Air_2O Spectrum range of Indirect evaporative and Hybrid Coolers achieve industry leading efficiencies, meaning cooling can be achieved in many locations around the world without the need or a significantly reduced need for refrigeration/compressor-based cooling.

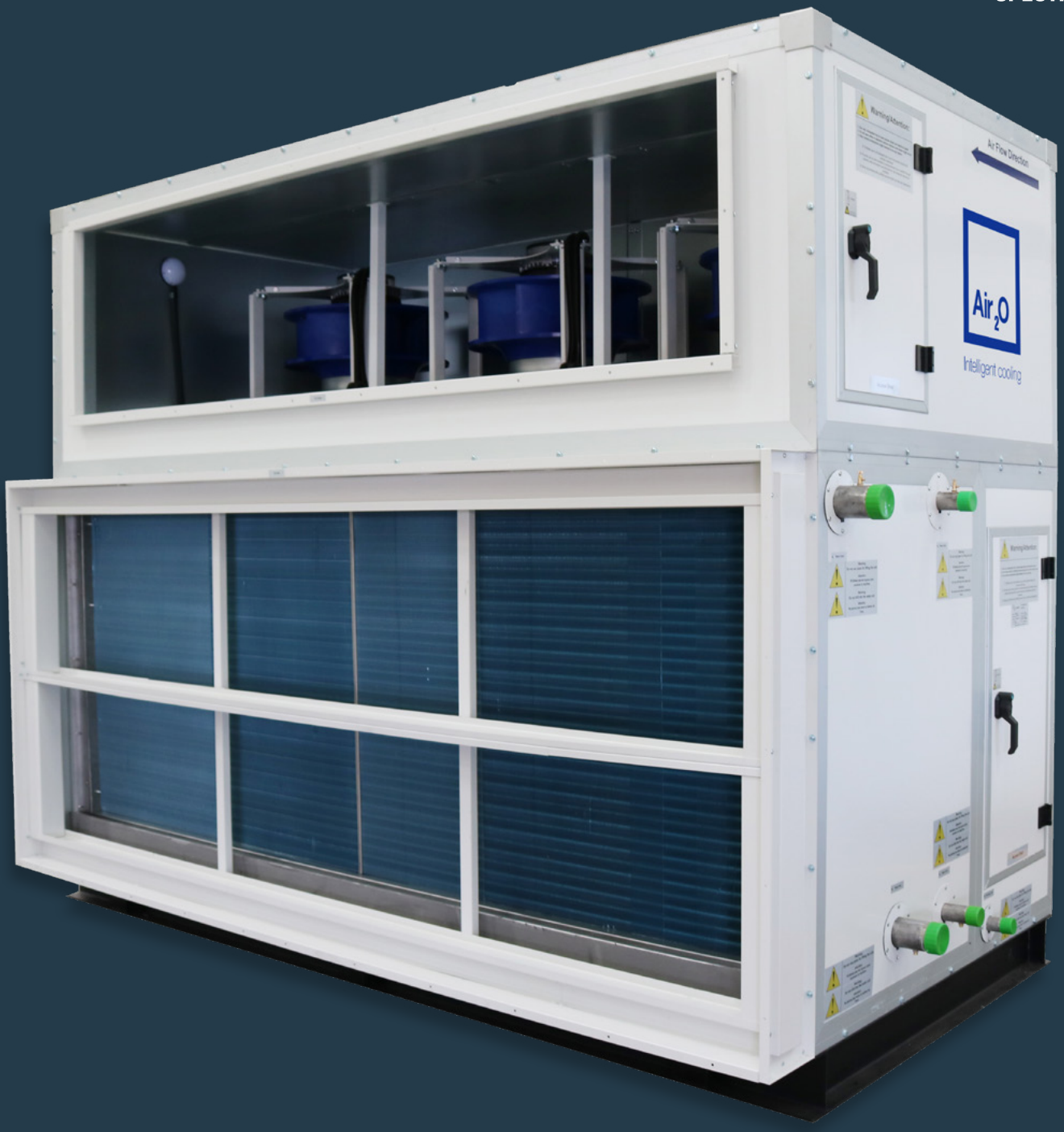
Air_2O can deliver up to 70% energy savings and associated reduction in carbon emissions. Developed in response to ASHRAE broadening the environmental envelope in which modern IT equipment can operate within. Air_2O will provide 100% compliance against the latest ASHRAE standards.

The unique nature of the Spectrum range of Air_2O Indirect and Hybrid Coolers provides industry leading efficiencies and is the most practical and flexible system of its type available. The system can be configured to provide 100% recirculation, 100% fresh air cooling, or a combination of fresh air and recirculation air.

Custom Spectrum Units

Through our custom build ability to produce solutions of limitless size we have the expertise to design and produce the most practical and efficient cooling solution for your project.

SPECTRUM



Mission critical data center cooling.

Features / Benefits

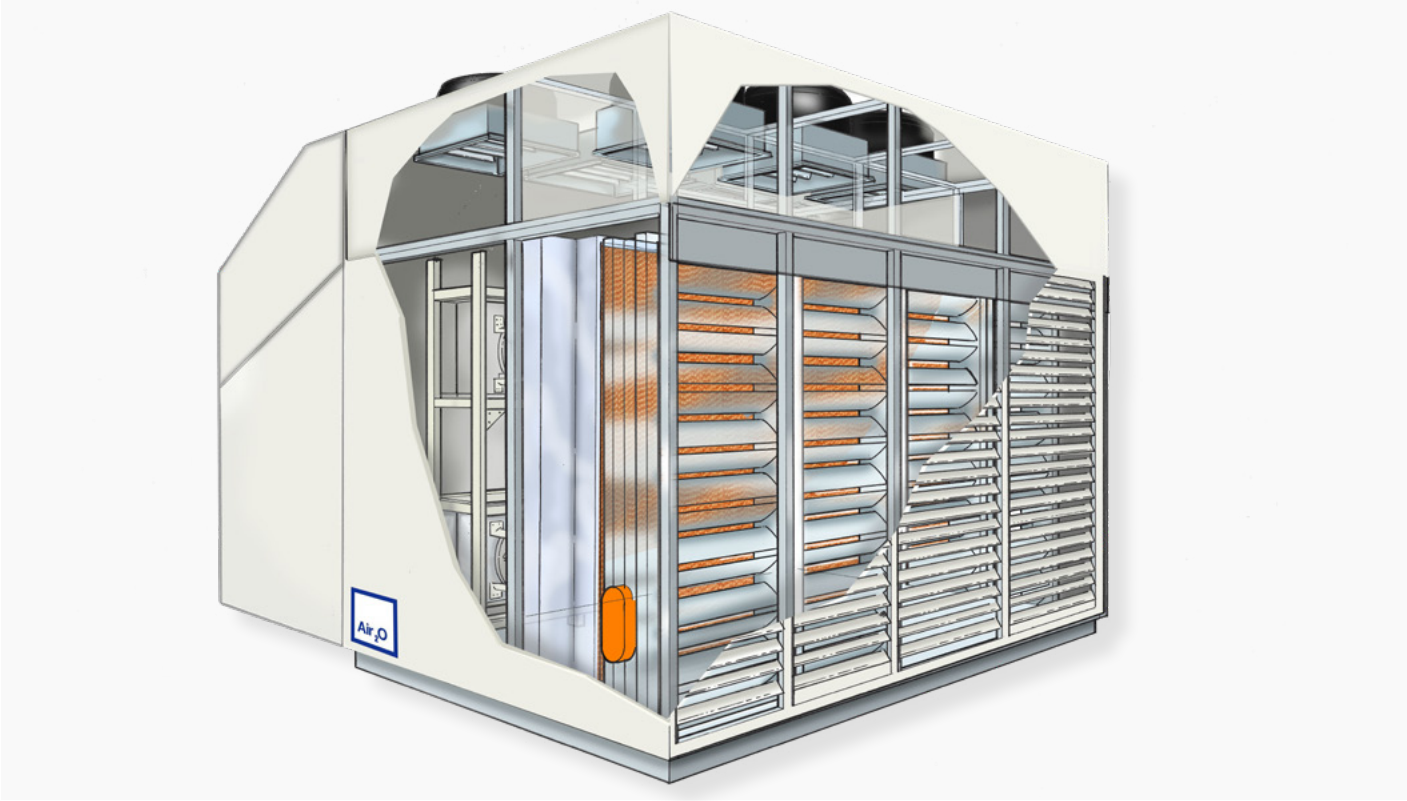
- PUE as low as 1.08
- World Leading Efficiencies
- Extensive Global Experience & Knowledge
- Worldwide Shipping and Deployment
- In-House Design Experience
- Reliability and Redundancy as Standard
- Capability of designing units according to local weather conditions and building codes
- Custom Solutions
- Low Maintenance
- Easy Access
- Full Design Support
- Air_2O increases profitability and supports your sustainable goals

Air_2O Cooling Technology Systems.

Custom AHU Solution

Air_2O's Custom Spectrum Series offers a range of cooling systems providing high efficiency cooling that creates an optimum environment for server performance while lowering your data center PUE.

- Up to 70% less energy than traditional Dx systems
- Zero GWP, CFC'S
- Configurable design
- 2500cfm to 100,000cfm
- Up to 700 kW as a single unit
- Reduced peak operating kilowatt = Increased server capacity
- PUE as low as 1.08
- Reduced capital cost
- Reduced back-up power
- Reduced power consumption

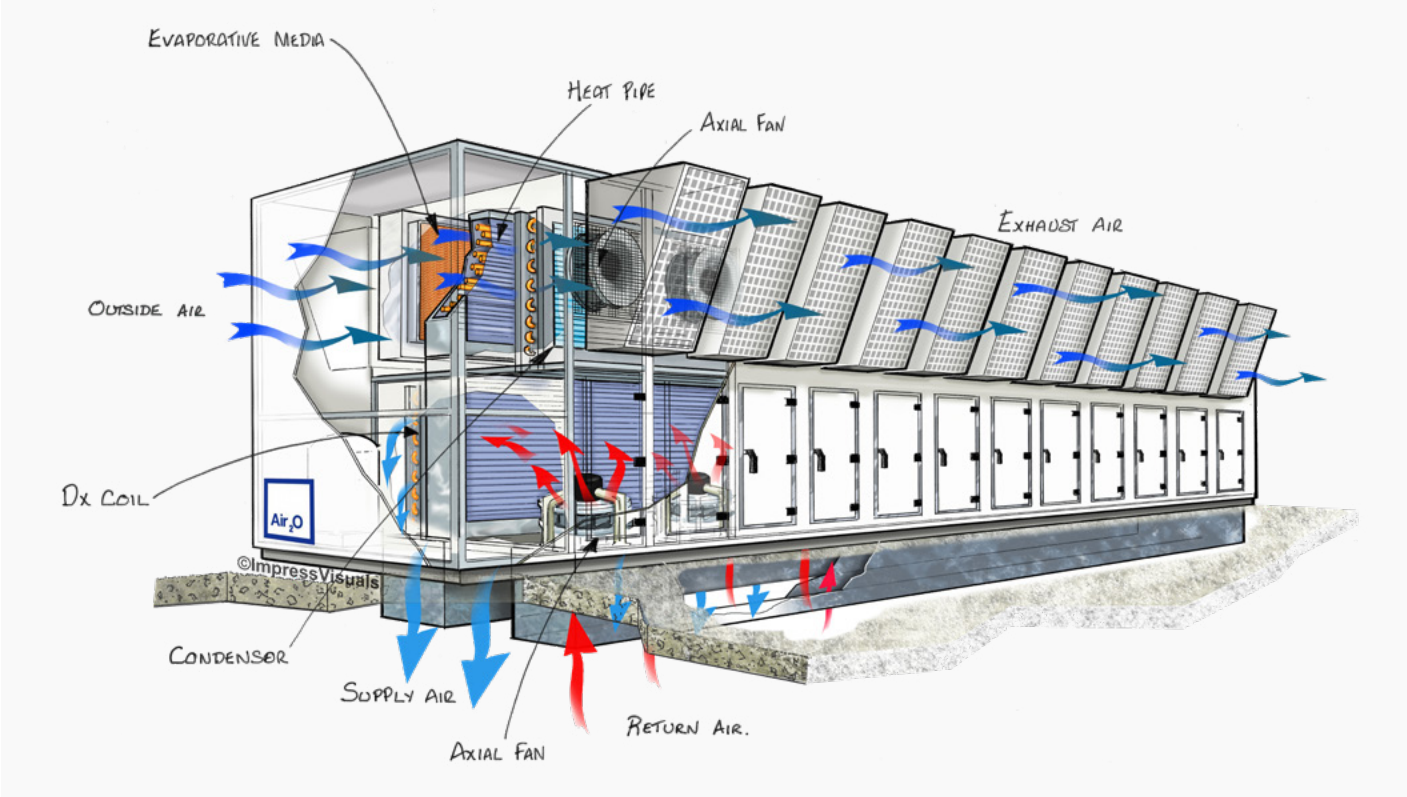


Air$_2$O Mission Critical Cooling Solutions.

Indirect Heat Pipe Cooling

Air$_2$O's Spectrum series offers a range of packaged Indirect Heat Pipe Cooling systems providing high efficiency cooling that creates an optimum environment for server performance while lowering your data center PUE.

- Up to 70% less energy than traditional Dx systems
- Zero GWP, CFC'S
- Configurable design
- 2500cfm to 100,000cfm
- Up to 700 kW as a single unit
- Reduced peak operating kilowatt = Increased server capacity
- PUE as low as 1.1
- 100% recirculated air
- Reduced capital cost
- Reduced back-up power
- Reduced energy consumption

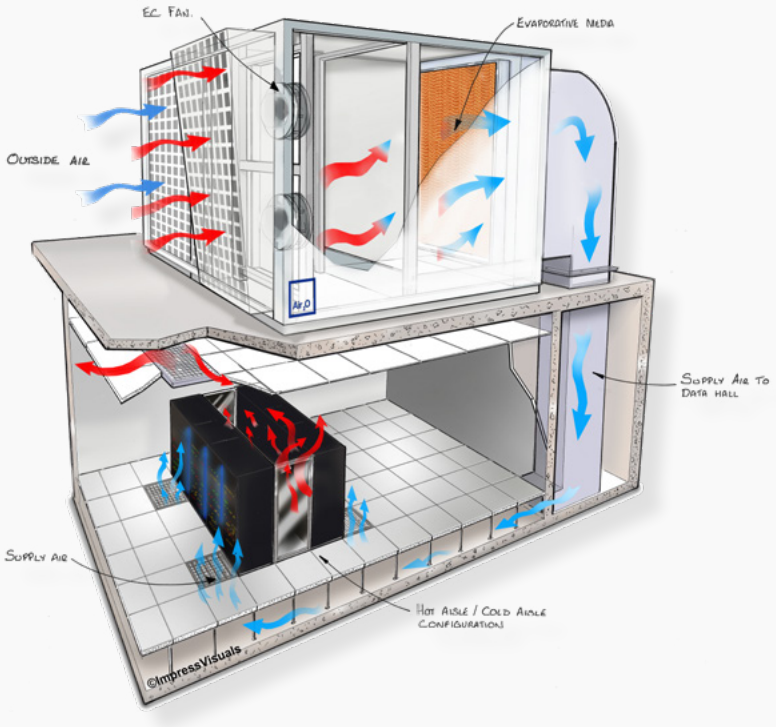


Air_2O Mission Critical Cooling Solutions.

Direct Evaporative Cooling

Air_2O's Spectrum series offers a range of packaged Direct Cooling systems providing high efficiency cooling that creates an optimum environment for server performance while lowering your data center PUE.

- Up to 70% less energy than traditional Dx systems
- Zero GWP, CFC'S
- Configurable design
- 2500cfm to 100,000cfm
- Up to 700 kW as a single unit
- Reduced peak kilowatt demand = Increased server capacity
- PUE as low as 1.08
- 100% fresh air
- Reduced capital cost
- Reduced back-up power
- Reduced energy consumption

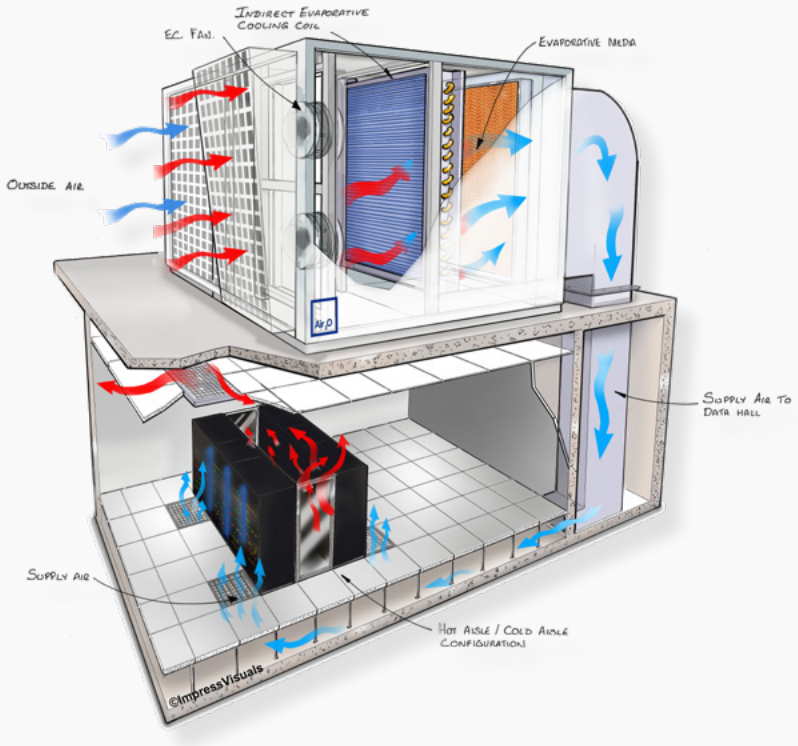


Air_2O Mission Critical Cooling Solutions.

Indirect / Direct Evaporative Cooling

Air_2O's Spectrum series includes IDEC (Indirect-Direct Evaporative Cooling) systems providing high efficiency cooling that creates an optimum environment for server performance while lowering your data center PUE.

- Up to 70% less energy than traditional Dx systems
- Zero GWP, CFC'S
- Configurable design
- 2500cfm to 100,000cfm
- Up to 700 kW as a single unit
- Reduced peak kilowatt demand = increased server capacity
- PUE as low as 1.1
- 100% fresh air
- Reduced capital cost
- Reduced back-up power
- Reduced energy consumption

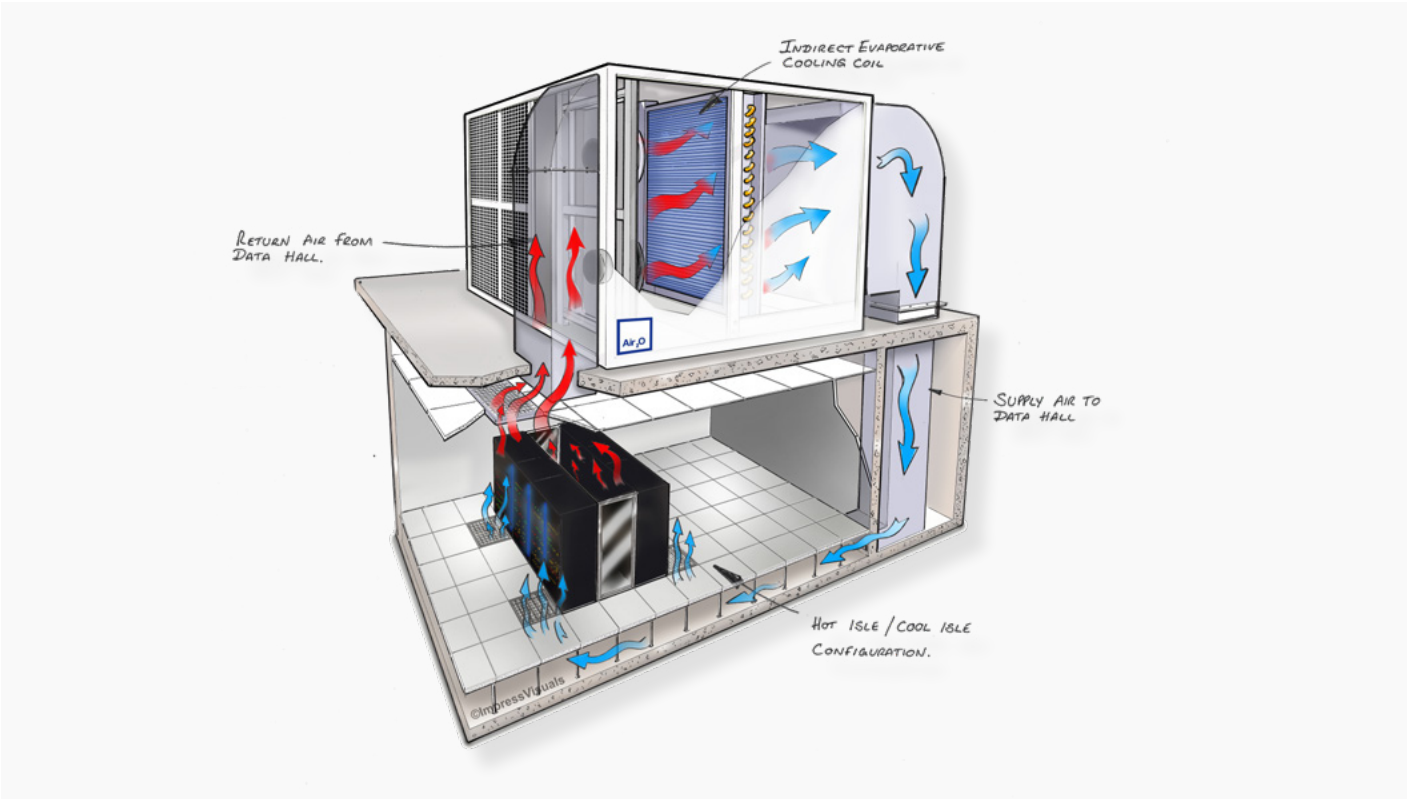


Air$_2$O Mission Critical Cooling Solutions.

Indirect Evaporative Cooling

Air$_2$O's Spectrum series offers a range of Indirect cooling systems providing high efficiency cooling that creates an optimum environment for server performance while lowering your data center PUE.

- Up to 70% less energy than traditional Dx systems
- Zero GWP, CFC'S
- Configurable design
- 2500cfm to 100,000cfm
- Up to 700 kW as a single unit
- Reduced peak kilowatt demand = Increased server capacity
- PUE as low as 1.1
- 100% recirculated air
- Reduced capital cost
- Reduced back-up power
- Reduced energy consumption

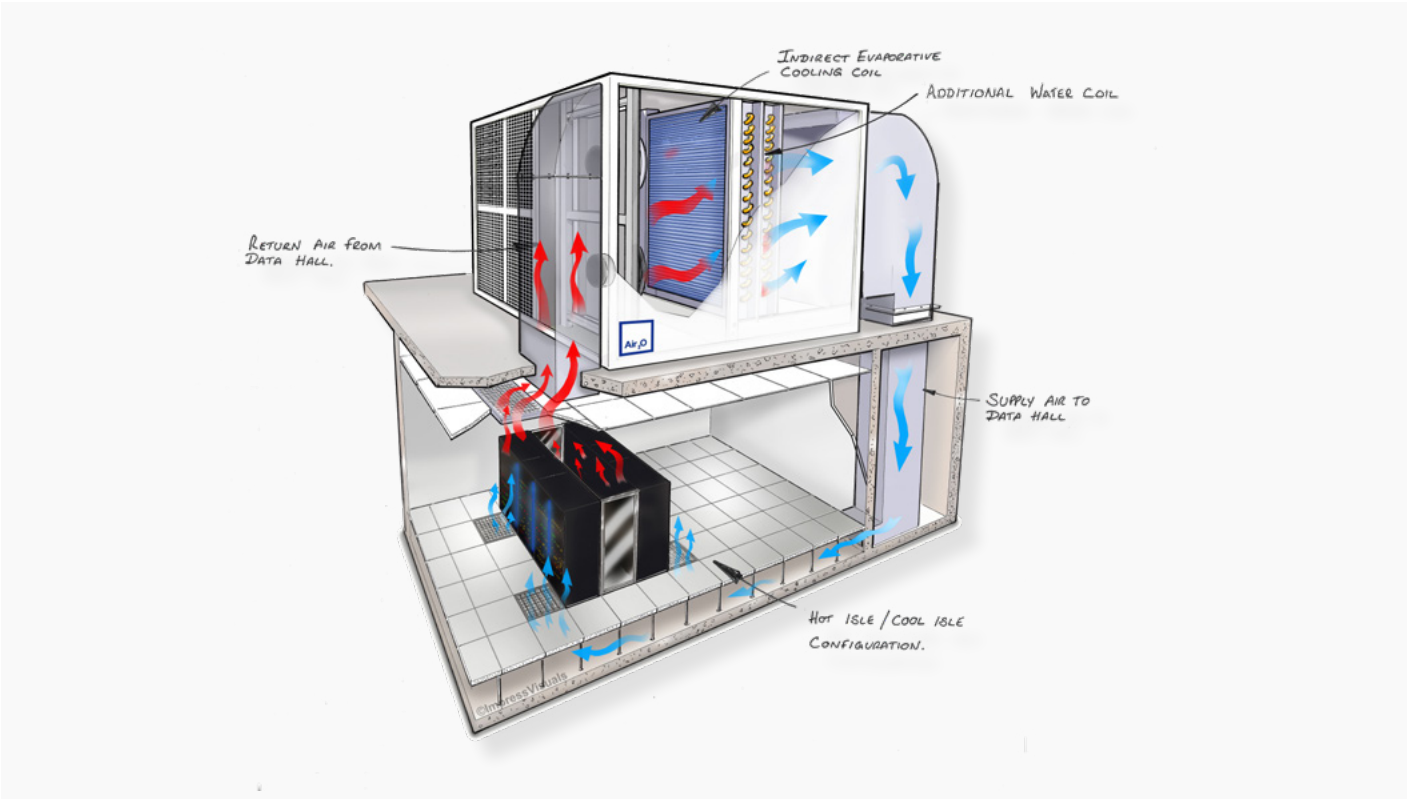


Air_2O Mission Critical Cooling Solutions.

Indirect Evaporative and Chilled Water Cooling

Air_2O's Spectrum series offers a range of packaged Indirect and Chilled Water cooling systems providing high efficiency cooling that creates an optimum environment for server performance while lowering your data center PUE.

- Up to 70% less energy than traditional Dx systems
- Zero GWP, CFC'S
- Configurable design
- 2500cfm to 100,000cfm
- Up to 700 kW as a single unit
- Reduced peak kilowatt demand = Increased server capacity
- PUE as low as 1.1
- 100% recirculated air
- Reduced capital cost
- Reduced back-up power
- Reduced energy consumption



Air_2O Mission Critical Cooling Solutions.

Indirect Evaporative + Hybrid Cooling

Air_2O's Spectrum series offers a range of packaged Indirect + Hybrid Cooling systems providing high efficiency cooling that creates an optimum environment for server performance while lowering your data center PUE.

- Up to 70% less energy than traditional Dx systems
- Zero GWP, CFC'S
- Configurable design
- 2500cfm to 100,000cfm
- Up to 700 kW as a single unit
- Reduced peak kilowatt demand = Increased server capacity
- PUE as low as 1.1
- 100% recirculated air
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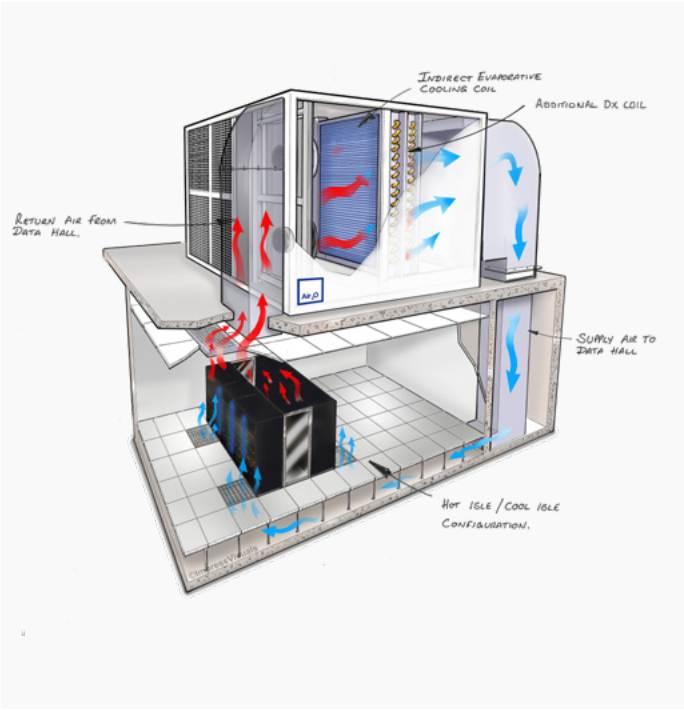
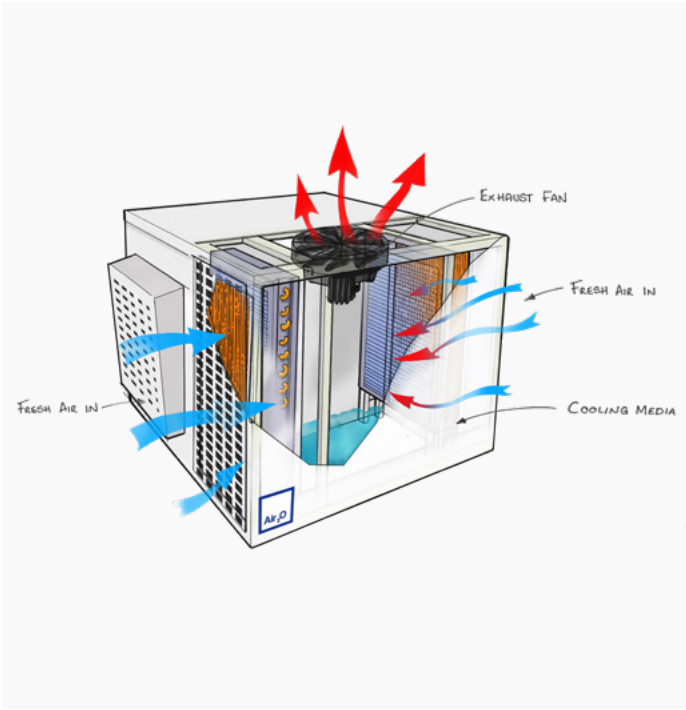




Energy Efficiency and ASHRAE Thermal Guideline for Data Centers

In order to achieve the aggressive PUE targets being set by management, data center managers must adopt innovative cooling solutions that are required to meet these challenges. Air_2O Engineers have an innate understanding of ASHRAE TC9.9 and their thermal guidelines for Data Processing Environments.

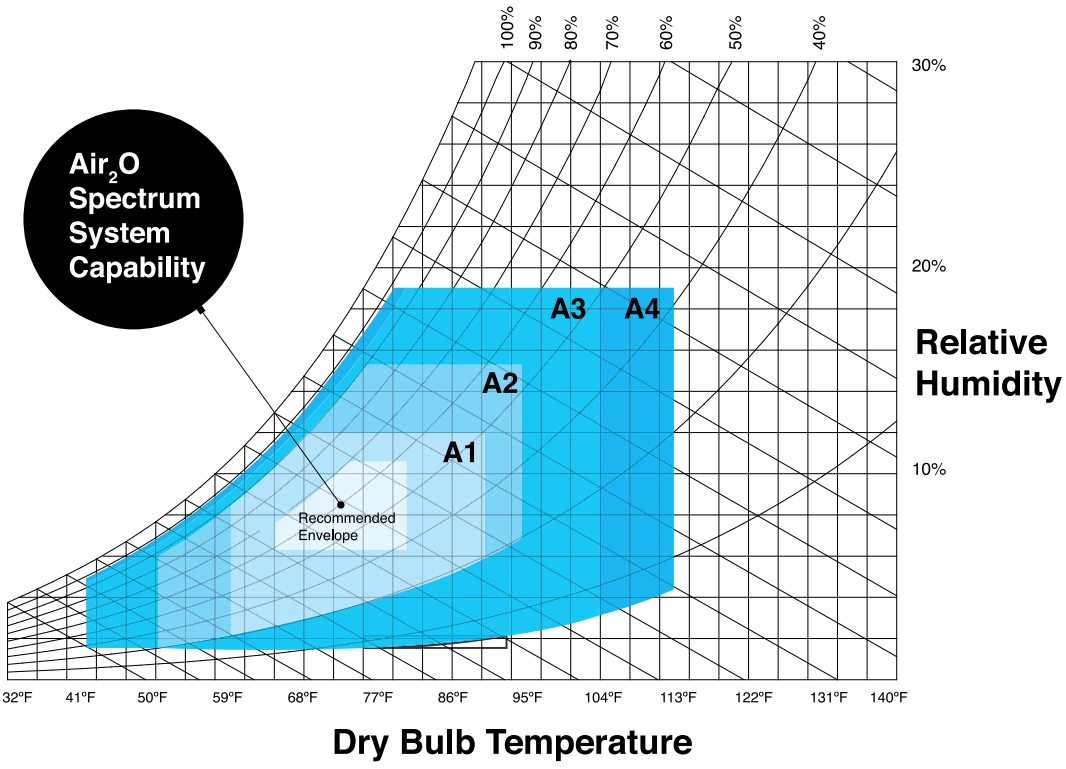
ASHRAE has continued to broaden the environmental envelope in which modern IT equipment can operate.

ASHRAE TC 9.9 2011
Recommended thermal guidelines for data centers.

An inlet temperature of 64.4°F to 80.6°F (18°C to 27°C) with an allowable range of 59°F to 89.6°F (15ºC to 32°C) and a recommended relative humidity (RH) of 60% with an allowable range of 20 - 80%.

Spectrum Units Operate Inside ASHRAE Design Conditions

Psychrometric chart detailing ASHRAE data center server classes A1-A4 and their environmental envelopes.

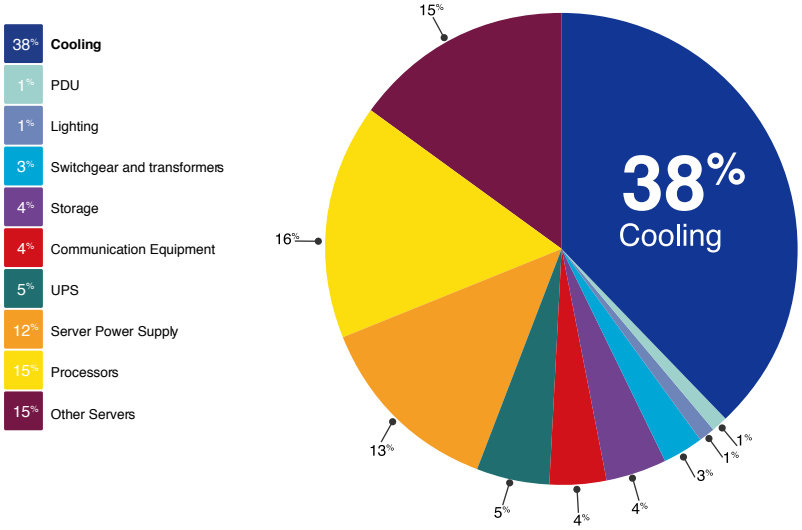


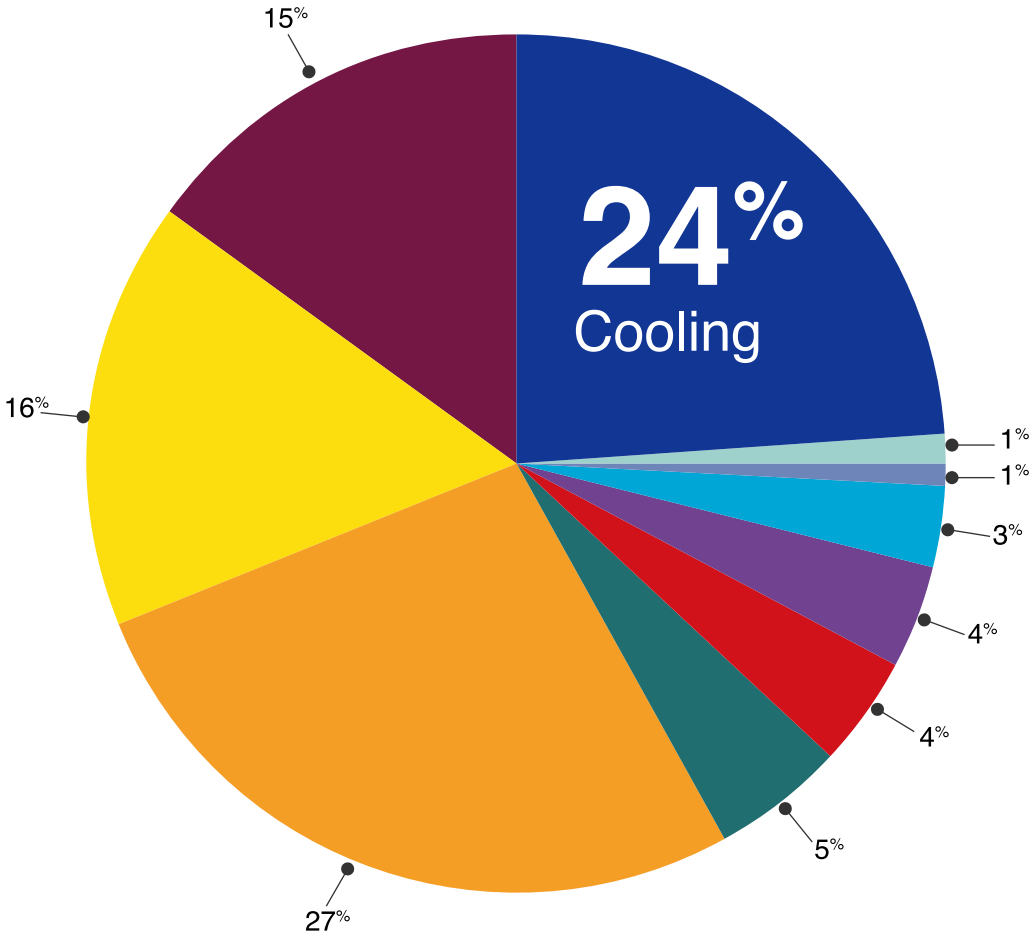
Total Cost Of Ownership Benefit

Air_2O's goal is to reduce or even to eliminate the Direct Expansion circuit from any Spectrum system. This approach will conduct savings of 37%, on the electrical infrastructure allocated to cooling equipment and a significant reduction of the TCO.

Also, it will free electrical power that can be used for the core activity of any Data Center which is data storage rather than being wasted with the traditional cooling systems.

Traditional Solutions





Air_2O Spectrum Solution

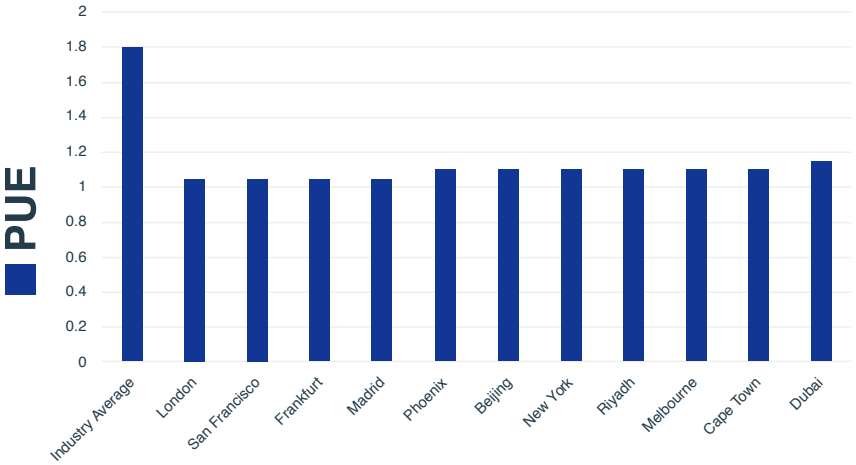
- 24% Cooling
- 1% PDU
- 1% Lighting
- 3% Switchgear and transformers
- 4% Storage
- 4% Communication Equipment
- 5% UPS
- 27% Server Power Supply
- 16% Processors
- 15% Other Servers

Global Performance

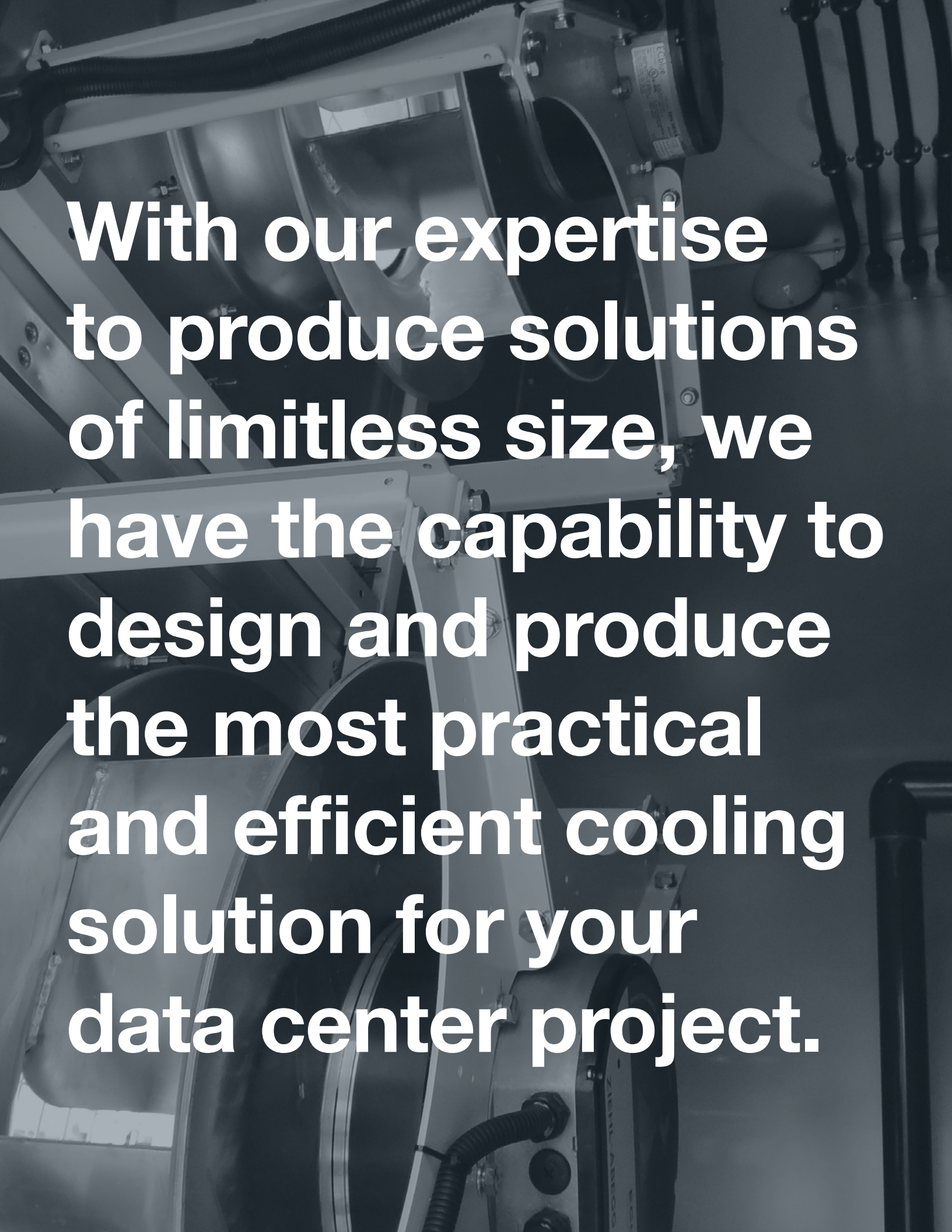
While our engineers can provide multiple solutions including free cooling systems, at the core the of Air_2O standard product range is the highly efficient indirect evaporative cooling operation plus Dx/chilled water support if required. This highly efficient method allows the air within the data center to be recirculated whilst benefiting from the low external ambient wet bulb temperatures thus considerably reducing total energy consumption. Utilizing our own design software known as DEN we are able to input the hourly weather data for any location on earth to accurately predict performance.

Example

Based on a typical 1 MW data center with 25°C supply and 35°C return within the ASHRAE recommended guidelines we can achieve the following results. In many locations around the world we can meet the design conditions with highly efficient Indirect Evaporative cooling. In hotter climates the use of integral chilled water or DX coils may be necessary.

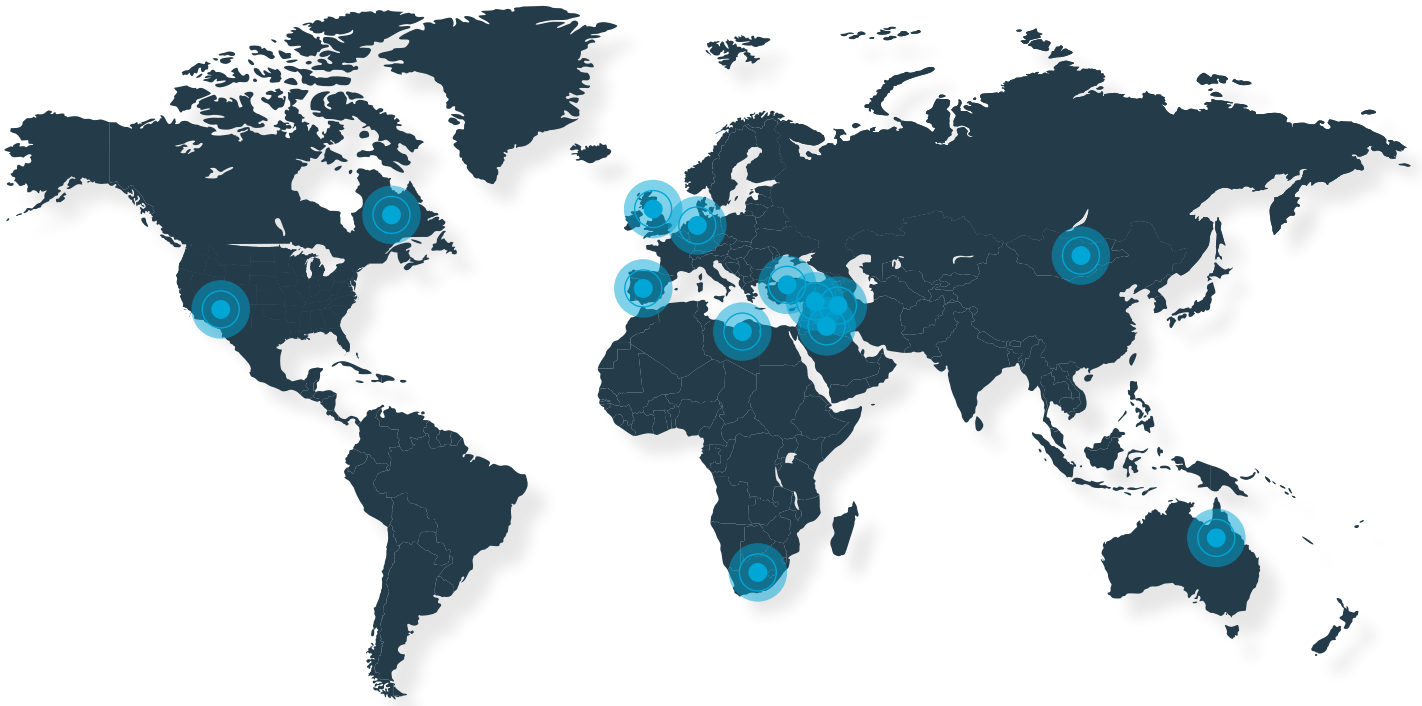


Location	Load	Return Air	Supply Air	% Hrs With No DX/CHW	DX/CHW Support	Average PUE
London	1MW	35°C	25°C	100%	0	1.05
Phoenix	1MW	35°C	25°C	95%	200Kw	1.1
San Francisco	1MW	35°C	25°C	100%	0	1.05
Beijing	1MW	35°C	25°C	89%	770Kw	1.1
New York	1MW	35°C	25°C	98%	200Kw	1.1
Frankfurt	1MW	35°C	25°C	100%	0Kw	1.05
Madrid	1MW	35°C	25°C	100%	0Kw	1.05
Dubai	1MW	35°C	25°C	58%	770Kw	1.15
Riyadh	1MW	35°C	25°C	100%	0Kw	1.1
Melbourne	1MW	35°C	25°C	100%	0Kw	1.1
Cape Town	1MW	35°C	25°C	100%	0Kw	1.1



With our expertise to produce solutions of limitless size, we have the capability to design and produce the most practical and efficient cooling solution for your data center project.

Extensive global reach.



Validated globally our solutions increase profitability and contribute towards sustainable goals. Through our head office in Scottsdale, Arizona and regional offices in Europe and the Middle East, together with our partners around the world we have an extensive global footprint and support capability.

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