



SPG DRY COOLING

A LEADER
IN DRY COOLING
TECHNOLOGIES





- SPG Dry Cooling is an innovative global leader in Air Cooled Condensers & Coolers with the largest installed base
- This success has been the result of offering the most extended range of dry cooling solutions, covered by numerous patents
- We are your global partner with the promise of excellence in quality and speed supported by our own manufacturing plants
- SPG Dry Cooling, headquartered in Europe, is member of Paharpur Group, now the worldwide leader in wet and dry cooling

THE POWER FOR YOUR FUTURE

We take great pride in being a leader in this market. Based on hard work and innovation, we hold several patents and have recently launched many new products such as ModuleAir®, Hexacool®, Natural Draft Air Cooled Condenser (NDACC), BoxAir ACC® and W-Style ACC®.

With technology that provides true operating value as our foundation, we continue our commitment to innovate and introduce cutting-edge products and systems.



WHERE THE POWER IS

- Our team of 700+ professionals in design & engineering, manufacturing, project management and construction join the Paharpur global workforce. As one, we form a unique, vertically integrated, full range world leader in process cooling technologies.
- Our engineers and project managers have specific experience to create operating value for power and industrial plants in coal, oil & gas, cogeneration, biomass, solar, and geothermal applications. We systematically innovate and are rapidly expanding our commercial presence with offices all over the world.
- SPG Dry Cooling contributes expertise and equipment to build smarter, more efficient and more resilient power generation facilities.

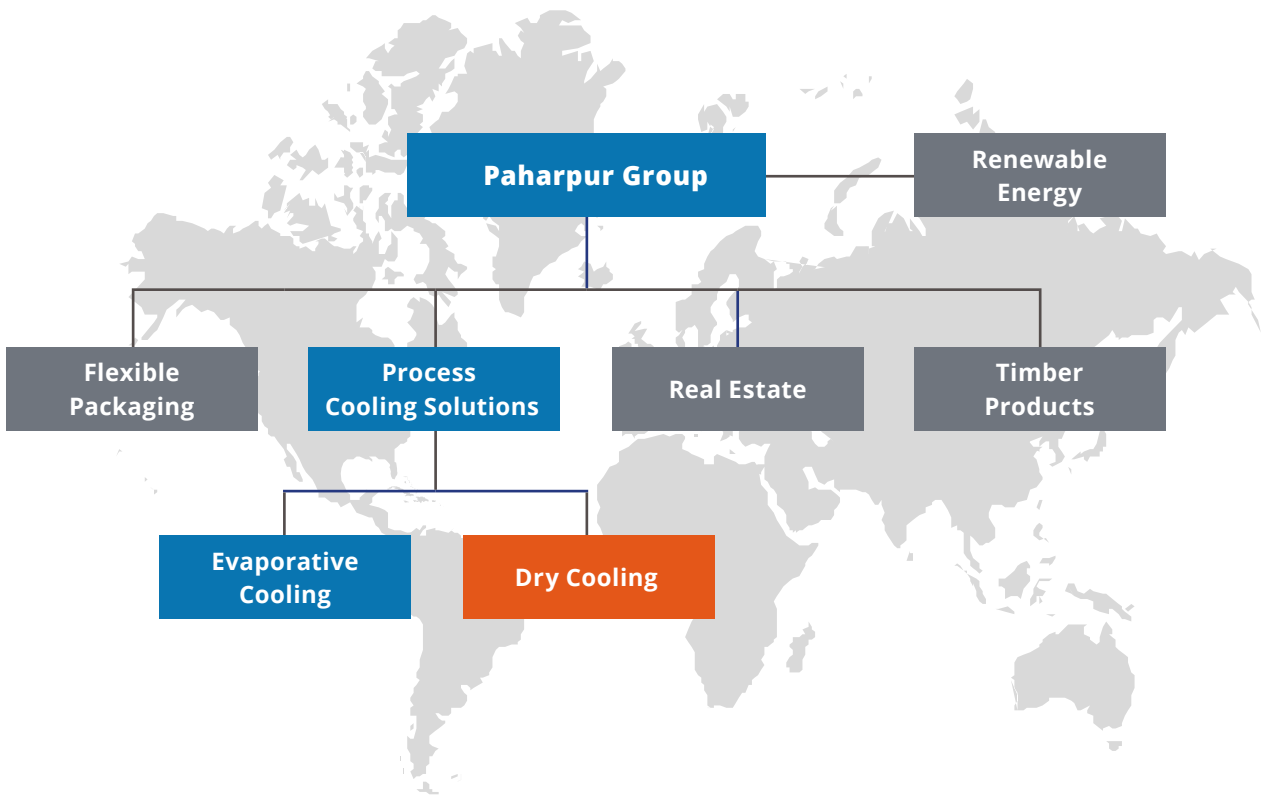
POWER INFRASTRUCTURE

Since 1948, our combined experience and unrivalled installations in wet cooling towers and dry coolers and condensers spans all continents and operates under all climates and conditions.

We're proud to have completed more than 45,000 installations and work every day to be a global partner with the promise of excellence.



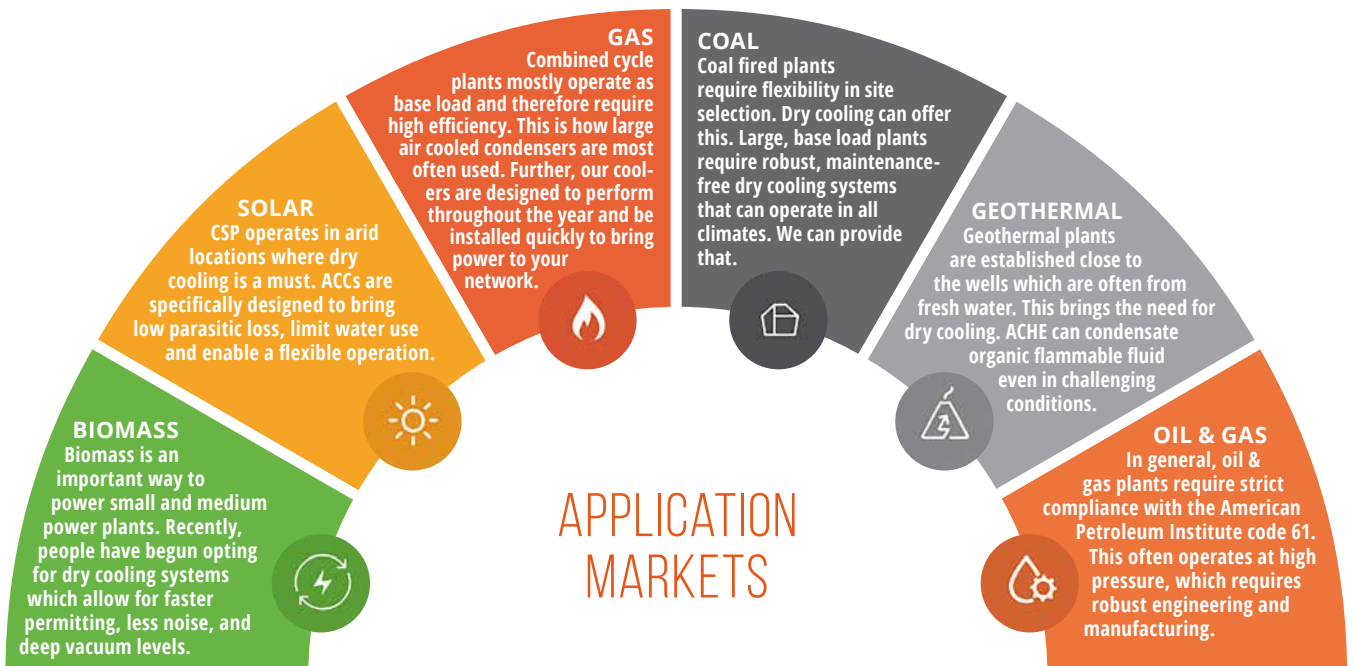
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SPG Dry Cooling is a leading global brand in Air-Cooled Condenser design, manufacturing, construction and services.

More than 1000 SPG Dry Cooling Systems for Combined Cycle, Coal, Natural Draft Condenser, Parallel Condenser System and Solar Power Plants have been installed around the world for a wide range of environmental conditions: coastal and desert climates, industrial and urban locations in both tropical and arctic temperatures.

SPG Dry Cooling, with its fully owned heat exchanger manufacturing plants, maintains a world class reputation of reliability and efficiency in power generation and industrial applications for large and small size plants.



DRY COOLING APPLICATIONS

COMBINED CYCLE POWER PLANTS



Turano Lodigiano Italy
800 MW



Alba Bahrain
820 MW



Goreway Canada
800 MW



Rio Bravo Mexico
3 x 515 MW

CHALLENGES

- Provides increased operating flexibility
- Meet strict environmental goals, including low noise

BENEFITS

- Provides long-term mechanical and thermal integrity
- Reduces plant permitting time and effort

CONCENTRATED SOLAR POWER PLANTS



Hassi R'Mel Algeria
150 MW



Ain Beni Mathar Morocco
470 MW



Ivanpah USA
392 MW



Tonopah USA
125 MW

CHALLENGES

- Provides increased operating flexibility
- Minimizes operation and maintenance cost
- Ideal for hot, arid and dusty environments

BENEFITS

- Minimizes water use of the steam power cycle
- Reduces fan power
- Optimal solution for solar tower applications

BIOMASS, WASTE TO ENERGY, COGENERATION PLANTS



Terras de Santa Maria Portugal
35 MW



Prayon Belgium
15 MW



Widnes UK
20 MW



Olmsted USA
15 MW

CHALLENGES

- Low noise
- Limited plot

BENEFITS

- Reduced height of air-cooled condenser
- Reduced fan power consumption
- Maintains performance in windy conditions

DRY COOLING APPLICATIONS

COAL FIRED POWER PLANTS – AIR-COOLED CONDENSER SYSTEM



Zhenglan China
2 x 600 MW



Wuxiang China
2 x 600 MW



Wygen USA
110 MW



Babelan Indonesia
2 x 140 MW

CHALLENGES

- Large capacity steam condensing for maximum electrical output
- Coal mine areas with dusty and corrosive environment
- Diverse and challenging climates, from hot to freezing conditions with risks of mechanical wear

BENEFITS

- High efficiency thermal cycle with low back pressure and low power consumption for optimal heat rate
- High efficiency finned tubes with excellent cleaning ability for long term availability

COAL FIRED POWER PLANTS – INDIRECT DRY COOLING SYSTEM



Kendal South Africa
6 x 690 MW



Zuoquan China
2 x 660 MW



WuAn China
2 x 300 MW



Qinling China
2 x 600 MW

CHALLENGES

- Diverse and challenging climates, from hot to freezing conditions with risks of mechanical wear
- Base load operation requiring maximum availability and lowest operation costs

BENEFITS

- Low parasitic power requirements
- Robust equipment requiring low maintenance

DIRECT DRY COOLING SYSTEMS

Air Cooled Condenser (ACC)

Directly condenses the steam turbine exhaust flow returning condensate to the boiler without water loss. Steam is directly condensed inside air-cooled finned tubes without using an intermediate surface condenser.

ACCs are used in utility, industrial and renewables markets for large and small size plants. SPG Dry Cooling designs, manufactures and constructs traditional A-Frame ACC, as well as our innovative Hexacool[®], ModuleAir[®], BoxAir ACC[®], W-Style ACC[®] and Natural Draft Condenser using high efficiency SRC[®] finned tubes.

FORCED DRAFT

A-Frame ACC

Traditional A-Frame, with nearly 1,000 installations in the world, is the historical state-of-the-art ACC, suitable for small to large power plants operating under a wide variety of site conditions (low air temperature, high wind, high seismic, low noise). SPG Dry Cooling, A-Frame ACC, with free expansion tube bundles supported by an A-Frame structure, can be mounted on concrete or steel structure.



ModuleAir[®]

ModuleAir is a modular SRC air cooled condenser, featuring factory assembled structural components, duct, and modular heat exchanger bundles. With construction savings of up to 25% versus the conventional A-Frame ACC design, construction time can be reduced by several months for large power plants. ModuleAir can also achieve lower steam turbine back pressure and increase power production at low ambient air temperatures.

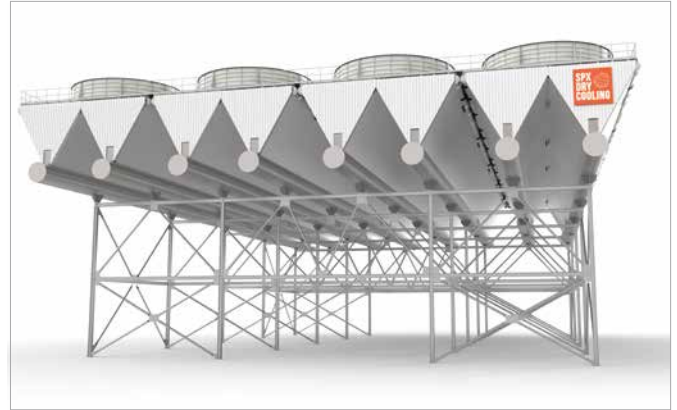


DIRECT DRY COOLING SYSTEMS

INDUCED DRAFT

W-Style ACC®

W-Style ACC is an innovative induced draft ACC. Its unique “W” heat exchanger arrangement dramatically reduces the amount of structural steel and overall ACC height, as compared to traditional forced draft ACC arrangements. Its reduced finned tube length can provide, lower back pressure. W-Style ACC induced draft arrangement reduces sensitivity to gusting winds.



BoxAir ACC®

BoxAir ACC is an innovative induced draft ACC, suitable for small power plants ranging from 1 to 30 MWe. An ACC integrating standard boxes that are easier to erect. The extended standardization enables reduced delivery schedule and high operational reliability. Typical applications are waste incineration plants, biomass, solar and geothermal power plants. BoxAir® can be readily integrated into existing power plants to improve power plant performance.



Hexacool®

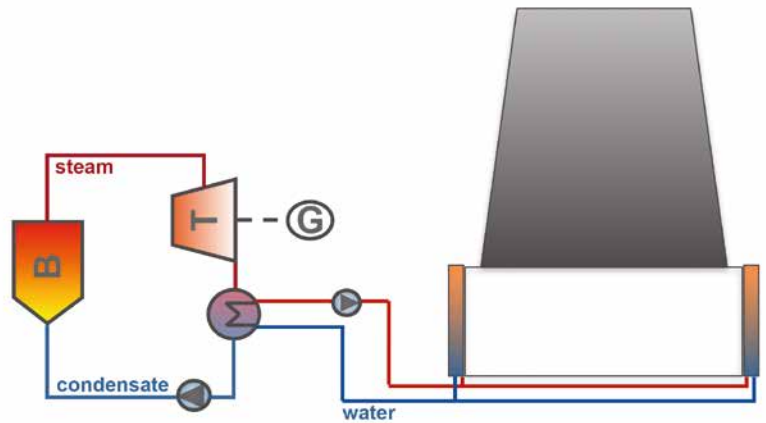
Hexacool is a modular ACC system for power plants, from few megawatts to 50 megawatts. Hexacool induced draft ACC is quick to erect, provides a reduced height, low electrical power consumption and reduced sensitivity to gusting wind.



INDIRECT DRY COOLING SYSTEMS

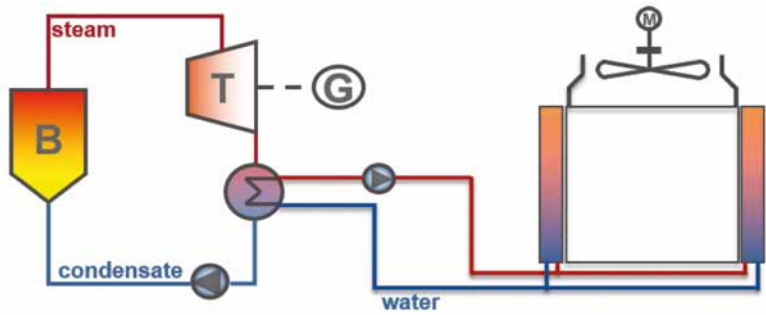
IDCT

Indirect dry condensing system couples an indirect dry cooling tower (IDCT) with a steam surface or jet condenser and is suited for large capacity condensing units. Its tall concrete or steel shell eliminates hot air recirculation. Auxiliary is power minimized as is the number of mechanical components. This translates into reduced maintenance and high availability.



MIDCT

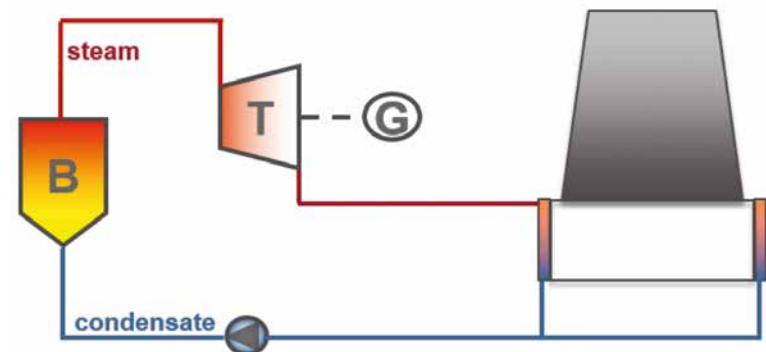
Mechanical Indirect Dry Cooling Tower is particular type of IDCT where the cooling air flow is not the results of the natural draft from a tall concrete or steel tower but is fed from fans driven by electrical motors. M-IDCT are particularly suitable for the Wet to Dry conversion or cooling capacity extension of existing IDCT.



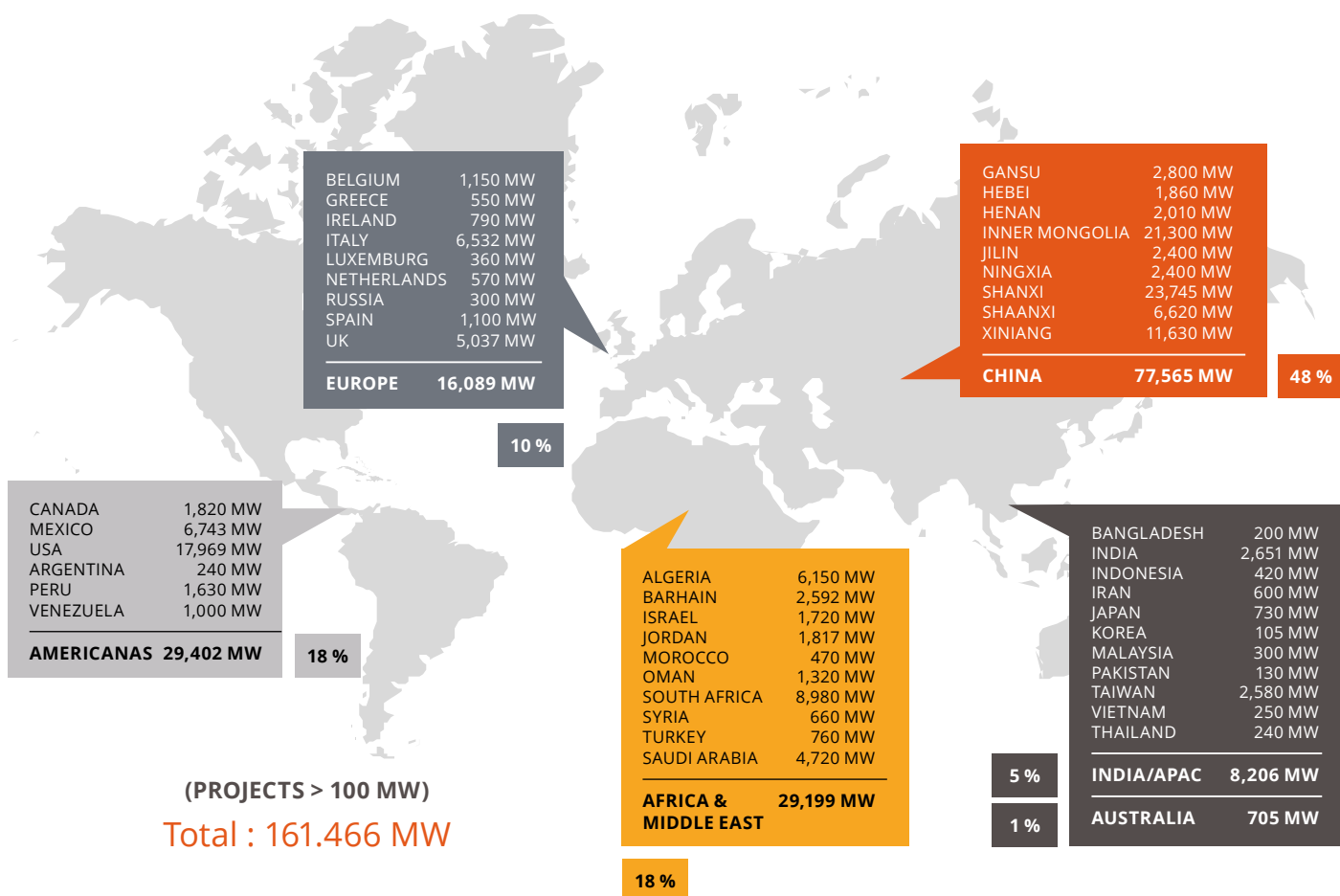
NATURAL DRAFT CONDENSER

NDACC

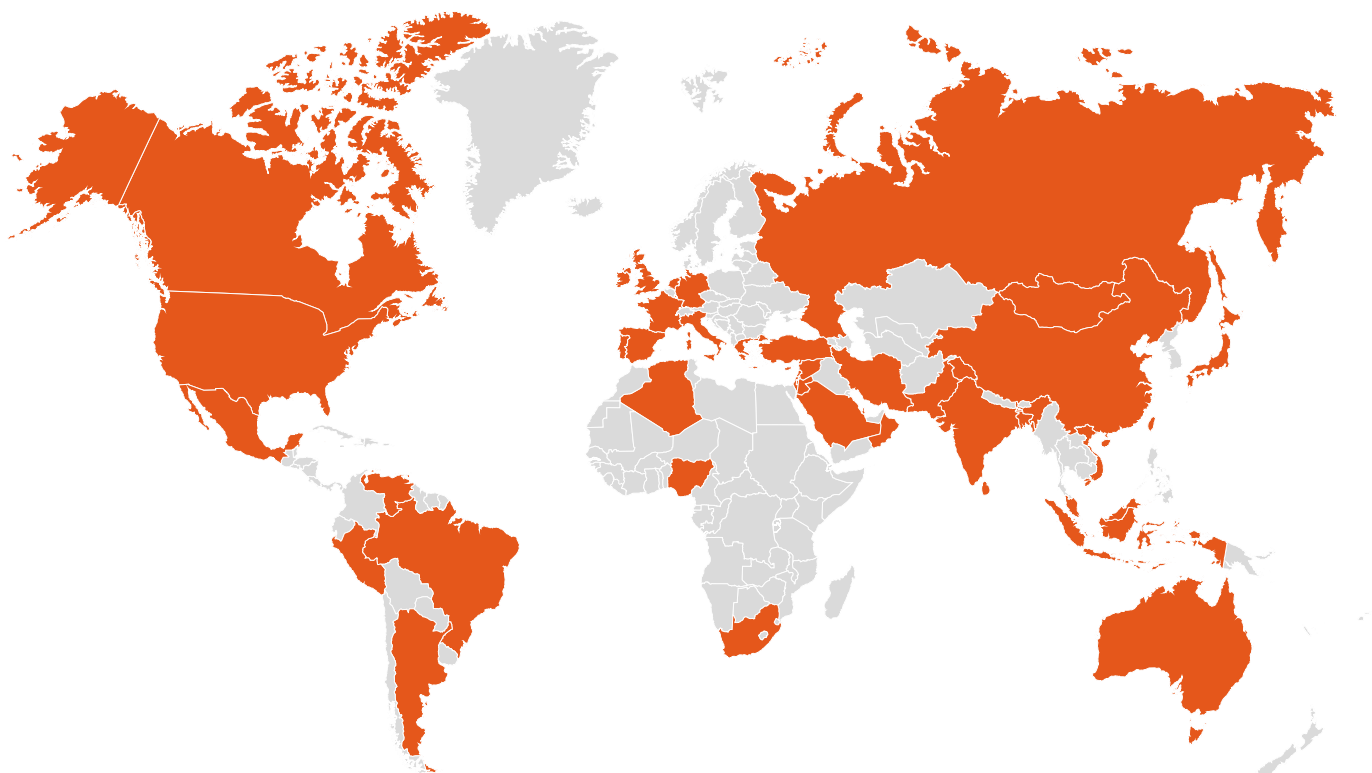
Natural Draft Condenser (NDACC) is an ACC where fans are replaced by natural draft tower, drastically reducing the electrical power consumption of the ACC as well as the number of rotating parts.



GLOBAL MW INSTALLATIONS



COUNTRIES OF INSTALLATIONS



MANUFACTURING PLANT

Our new state of the art manufacturing facility, located in Zhangjiakou, China, is the largest ACC fin tube bundle manufacturing plant in the world. The 100,000 sq.m facility includes office buildings, dedicated workshops, manufacturing and R&D areas. It is wholly owned and operated by SPG Dry Cooling/Paharpur and maintains various Quality and Conformity Certificates, including ISO 9001, ISO 14001, OHSAS18001, ASME, TUV and NB.



“At SPG Dry Cooling, we strive toward excellence in our interactions with you in our cutting-edge technology and advanced communications.”

Andreas Coumnas, President & CEO at SPG Dry Cooling

SERVICE & SUPPORT

To keep your Dry Cooling System at peak performance, SPG Dry Cooling offers technical advice and inspections to assess the actual condition of your cooling system helping you to maintain, restore and improve your cooling assets.



INSPECTIONS



TECHNICAL
ADVICE



SPARE PARTS



MAINTENANCE
SERVICES

Whether you need technical advice on operations or assistance with troubleshooting, we are ready to assist you.

A BUSINESS OF SPG DRY COOLING

Through our business **ACC360 - ENGINEERED SOLUTIONS FOR YOUR COOLING ASSETS**

We offer modification, revamp, relocation, transformation from wet to dry and performance improvement projects.



WWW.ACC-360.COM



ENGINEERED
RETROFIT



WET TO DRY
CONVERSION



PERFORMANCE
IMPROVEMENT



REMOTE
PERFORMANCE
MANAGEMENT

SPG Dry Cooling has installed 1000 systems for combined cycle, coal, natural draft condenser, parallel condenser system and solar power plants around the world in different types of environmental operating conditions.

ACC360 works on any kind of cooling assets, whether originally engineered and constructed by SPG Dry Cooling or by another company.

More information about our patents: <https://spgdrycooling.com/ip-legal/patents/>

A Global Partner with the Promise of Excellence



SPG DRY COOLING GLOBAL NETWORK

SPG Dry Cooling Belgium SRL

Avenue Ariane 5
B-1200 Brussels
Belgium
T +32 (0)2 761 61 11

SPG Dry Cooling Hungary

Mester Street 87
H-1095 Budapest
Hungary
T +36 1 557 5 557

SPG Dry Cooling USA, LLC

7450 West 130th Street, Suite 310
Overland Park, KS 66213
United States
T +1 913 685 0009

Paharpur Cooling Towers Limited

Paharpur House
8/1/B Diamond Harbour Road
Kolkata 700027, India
T +91 33 4013 3000

SPG Dry Cooling Italia SRL

Lungolago di Calcinatè 88
I-21100 Varese
Italy
T +39 0332 150 5948

Paharpur SPG Dry Soğutma Tic. Ltd. Şti.

Sair Esref Bulv. 22/812
35210 Konak, İzmir, Turkey
T +90 (232) 483 07 79

SPG Dry Cooling USA, LLC

1200 US Rt. 22 East, Suite 1
Bridgewater, NJ 08807
United States
T +1 908 450 8008

SPG Dry Cooling Beijing

Room 402, Block B, First Shanghai Center,
No. 39 Liangmaqiao Road,
Chao Yang District, Beijing 100125, China
T +86 10 5676 2158

SPG Dry Cooling Spain

Avenida de Europa 14
28108 Alcobendas, Madrid
Spain
T +34 911 890 518

Paharpur Nigeria FZE

Dangote Industries
Free Zone Development Company
Lekki Coastal Road
Ibeju-Lekki, Lagos, Nigeria
T +41 78 754 17 41

SPG Dry Cooling Mexico

Av. Prolongación Paseo de
la Reforma No. 215,
Oficina 503, 5o. Piso
Col. Paseo de las Lomas
Ciudad de México, 01330
T +52 (55) 5292 8343

SPG Dry Cooling-Paharpur Korea

423, Level 4, NH Capital Building,
27-8, Gukjegeumyung-Ro 8-Gil,
Yeongdeungpo-Gu,
Seoul 07332, Korea
T +82 (0) 6297 5030

Paharpur Europe SA

Via Laveggio, 3
CH-6855 Stabio
Switzerland
T +41 91 980 42 06

SPG Dry Cooling Taiwan

Level 37, No. 7, Section 5
Xinyi Road, Xinyi District
Taipei City, 110
Taiwan
T +886 2 8758 2894

MEMBER OF



info@spgdrycooling.com
www.spgdrycooling.com



**SPG
DRY
COOLING**

HEADQUARTERS

SPG Dry Cooling Belgium SRL

Avenue Ariane 5
B-1200 Brussels, Belgium
T +32 (0) 2 761 61 11
F +32 (0) 2 761 61 86

