A LEADERSHIP IN DRY COOLING TECHNOLOGIES
THE POWER FOR YOUR FUTURE

As the world grows, so does its need for electricity – and more sustainable energy production.

SPX Dry Cooling helps to meet that demand with a broad range of high-quality, custom-engineered systems and components that can support improving efficiency and reducing the use of natural resources.

WHERE THE POWER IS

• SPX Dry Cooling power plant engineering components and systems are at work in gas, nuclear and coal-fired plants as well as in renewable energy applications, helping to optimize plant performance and reduce emissions.
• SPX Dry Cooling helps new and existing power plants to improve heat exchange efficiency, reduce water consumption and enhance flue gas systems performance.
• SPX Dry Cooling contributes expertise and equipment to build smarter, more efficient and more resilient power generation facilities.

POWER INFRASTRUCTURE

Design, manufacture and service highly engineered systems for gas, coal, solar, geothermal and waste to energy power generation plants.

Primary products:
• Dry and Wet Cooling Systems
• Air cooled Heat Exchangers
SPX Dry Cooling is a leading global brand in Air-Cooled Condenser design, manufacturing, construction and services.

More than 1000 SPX 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.

SPX 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.
### Combined Cycle Power Plants

<table>
<thead>
<tr>
<th>Location</th>
<th>Capacity</th>
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</thead>
<tbody>
<tr>
<td>Turano Lodigiano, Italy</td>
<td>800 MW</td>
</tr>
<tr>
<td>Alba, Bahrain</td>
<td>820 MW</td>
</tr>
<tr>
<td>Goreway, Canada</td>
<td>800 MW</td>
</tr>
<tr>
<td>Rio Bravo, Mexico</td>
<td>3 x 515 MW</td>
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</tbody>
</table>

**Challenges**
- High operating flexibility
- Operating cost
- Diverse and challenging climates, from hot to freezing conditions
- Strict environmental imposition, including low noise

**Benefits**
- Elimination of additional water usage from the condensing power cycle
- Excellent corrosion and freeze resistance
- Long-term mechanical and thermal integrity
- Low fan power consumption
- Flexibility in power plant site selection
- Decreased time required for plant permitting

### Concentrated Solar Power Plants

<table>
<thead>
<tr>
<th>Location</th>
<th>Capacity</th>
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</thead>
<tbody>
<tr>
<td>Hassi R’Mell, Algeria</td>
<td>150 MW</td>
</tr>
<tr>
<td>Ain Beni Mathar, Morocco</td>
<td>470 MW</td>
</tr>
<tr>
<td>Ivanpah, USA</td>
<td>392 MW</td>
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<tr>
<td>Tonopah, USA</td>
<td>125 MW</td>
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</table>

**Challenges**
- High operating flexibility
- Minimize operation and maintenance cost
- Hot, arid and dusty environment with large solar irradiation

**Benefits**
- Elimination of additional water usage from the condensing power cycle
- Long-term mechanical and thermal integrity
- Low fan power consumption
- Specific solution dedicated to solar tower systems

### Biomass, Waste to Energy, Cogeneration Plants

<table>
<thead>
<tr>
<th>Location</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terras de Santa Maria, Portugal</td>
<td>35 MW</td>
</tr>
<tr>
<td>Prayon, Belgium</td>
<td>15 MW</td>
</tr>
<tr>
<td>Alkmaar, Netherlands</td>
<td>28 MW</td>
</tr>
<tr>
<td>Roosendaal, Netherlands</td>
<td>35 MW</td>
</tr>
</tbody>
</table>

**Challenges**
- Low noise
- Limited plot
- Provide cost effective solution – reduce operating cost
- Maximize air-cooled condenser performance

**Benefits**
- Elimination of additional water usage from the condensing power cycle
- Low noise product
- Reduced height of air-cooled condenser
- Reduced power consumption
- Maintain performance in windy conditions
- Low sensitivity to freezing
- Flexibility in power plant site selection
COAL FIRED POWER PLANTS – AIR-COOLED CONDENSER SYSTEM

**CHALLENGES**
- Large capacity steam condensing for maximum electrical output
- Coal mine areas in dusty and corrosive environment
- Diverse and challenging climates, from hot to freezing conditions with risks of mechanical wear
- Base load operation requiring high availability

**BENEFITS**
- High efficiency thermal cycle with low back pressure and low power consumption for maximum heat rate
- High performance finned tubes with excellent cleaning ability for long term availability
- A-Frame supported tube bundles, allowing heat exchanger free thermal expansion for maximum reliability

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**COAL FIRED POWER PLANTS – INDIRECT DRY COOLING SYSTEM**

**CHALLENGES**
- Large capacity steam condensing for maximum electrical output
- Coal mine areas in dusty and corrosive environment
- 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
- Heat transfer performance ensured on the long run
- Robust equipment requiring low maintenance
- Fast and efficient assembly and installation

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**Canada** 1.470 MW  
**Mexico** 4.240 MW  
**USA** 16.489 MW  
**Argentina** 240 MW  
**Peru** 1.630 MW  
**Venezuela** 1.000 MW  
**AMERICANAS** 25.069 MW  

**Belgium** 1.150 MW  
**Greece** 550 MW  
**Ireland** 790 MW  
**Italy** 6.532 MW  
**Luxembourg** 360 MW  
**Netherlands** 570 MW  
**Spain** 1.105 MW  
**UK** 5.037 MW  
**EUROPE** 16.089 MW  

**Africa & MIDDLE EAST** 22.887 MW  
**AfricA** 6.150 MW  
**Barhain** 800 MW  
**Israel** 1.720 MW  
**Jordan** 1.217 MW  
**Morocco** 470 MW  
**South Africa** 8.980 MW  
**Syria** 660 MW  
**Turkey** 760 MW  
**Saudi Arabia** 2.130 MW  

**CHINA** 60.865 MW  
**BANGladesh** 200 MW  
**India** 20.120 MW  
**Indonesia** 420 MW  
**Iran** 600 MW  
**Japan** 330 MW  
**Korea** 165 MW  
**malaysia** 300 MW  
**Pakistan** 130 MW  
**Taiwan** 2.580 MW  
**Vietnam** 250 MW  

**INDIA/APAC** 25.035 MW  

**TOTAL : 150.650 MW (PROJECT > 100 MW)**
DRY COOLING ADVANTAGES

- No need for water availability on site
- Environmental regulations for water saving
- Respect environmental regulations, limiting the temperature increase in rivers, lakes and oceans
- Flexibility in the selection of the power plant site (grid proximity, land cost, fuel source proximity)
- Life expectancy exceeding power plant life
- Reduced operation and maintenance cost
- Shorter lead-time for power plants permits and consequently for start-up

DIRECT DRY COOLING SYSTEMS (ACC)

Air Cooled Condenser (ACC)
Directly condenses the steam turbine exhaust flow and returns condensate to the boiler without water loss. The 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. SPX Dry Cooling designs, manufactures and constructs traditional A-Frame ACC as well as our innovative Hexacool® ModuleAir™, and Natural Draft Condenser using high efficiency SRC® finned tubes.

A-Frame ACC Features
Traditional A-Frame, with near than 1000 installations in the world, is the state-of-the-art ACC, suitable for small to large power plant in a large variety of site condition (low ambient temperature, high wind, high seism, low noise). SPX Dry Cooling, A-Frame ACC, with fee-expansion tube bundles supported by an A-Frame structure, can be mounted on concrete or steel structure.

Hexacool®
Hexacool is a standardized, modular ACC system for small power plants, from few megawatts to several hundred megawatts. Hexacool induced draft ACC is easy to construct, has a reduced height, and low wind sensitivity.

ModuleAir® ACC
ModuleAir is a modular SRC air cooled condenser design, 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.

Natural Draft Condenser
Natural Draft Condenser is an air cooled condenser where fans are replaced by natural draft tower reducing drastically the electrical power consumption of the ACC and rotating parts needed.

INDIRECT DRY COOLING TOWER (IDCT)
Indirect dry condensing system coupling a dry cooling tower with a steam surface or jet condenser and suited for any large capacity condensing units. Thanks to tall concrete shell, Hot air recirculation is avoided, the auxiliary is power reduced, and only a few rotating part are need. This translates into low maintenance and high availability.
<table>
<thead>
<tr>
<th>Application</th>
<th>Project</th>
<th>Products</th>
<th>Country</th>
<th>MW</th>
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* Shanghai Electric – SPX Engineering and Technologies Co. Ltd.