The Next Generation In Data Center Cooling
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In Data Center Cooling

As data center heat densities increase and energy costs rise, conventional airflow cooling technology remains unchanged. It is a decades-old answer to a 21st century problem. OptiCool Technologies is revolutionizing data center cooling with green solutions that support progress, innovation, and the environment.

Unlike airflow cooling, OptiCool provides close-coupled cooling at the heat source, reducing energy usage by up to 90%. This superior refrigerant-based system offers a quantum improvement in cost management, capacity, and efficiency. OptiCool’s patented Cool Door system attaches directly to any third party rack, supporting a variety of heat loads and redundancy configurations.

The cost, complexity, and management of traditional airflow are things of the past. The OptiCool solution will meet your cooling demands now and into the future. With OptiCool’s innovative precision cooling, your data center will be transformed from an energy and space waster into a model of efficiency.
The Cooling Solution That Pays You Back

OptiCool Technologies innovative solutions provide true return on investment. Complete payback of your investment is typically realized in just 3 years or less.

Reduce
• Carbon Footprint: Up to 90%
• Energy Usage: Up to 90%
• Required Floor Space: Up to 60%
• Noise Levels: Down to 53 dBA
• Operating Costs

Increase
• Energy Rebates: Up to 30%
• Rack Densities: Grow from 3kW to 30kW+
• Cooling Efficiency with Superior Heat Capture
• In-Rack Redundancy: Up to N+2

Eliminate
• The Need to Cool the Entire Room
• CFD Airflow Modeling
• Return Air Plenum
• Hot Spots
• Raised Floor
• High Maintenance Costs

Future-Proof Design
• Increased Capacity in a smaller footprint
• Scalability to meet your needs today and into the future
• Modularity offers superior redundancy options and flexibility for future growth
• Space efficiency reclaims valuable floor and ceiling space
• Adaptability greatly reduces expansion and upgrade costs
Conventional Airflow Cooling is complex, costly, and inefficient:

- Raised floor and ceiling air plenums are necessary for proper circulation
- The entire data center requires constant cooling
- Up to 60% more floor space is required
- Continuous room humidification and dehumidification is a necessity
- Large fans, filters, belts, and H₂O pans demand frequent maintenance
- Hot spots are a persistent problem

The OptiCool Solution is simple, cost-effective, and highly efficient:

- Raised floor and ceiling air plenums are eliminated
- Removes heat at the source – no need to cool the entire room
- Increases capacity while decreasing cooling footprint
- Operating expenses are dramatically reduced
- Maintenance costs are nearly eliminated
- Designed to be scalable and modular for future growth

OptiCool Technologies
Sales: 585-347-6142  Service: 585-453-2014  eMail: info@opticooltech.com  Website: opticooltechnologies.com
Advanced Cooling for a Variety of Applications

“Most of our switch rooms across the US were at capacity. Choosing OptiCool was truly a no-brainer. The system allowed us to fit more equipment into existing rooms eliminating capital expenditures related to new buildouts.”

– VP Critical Infrastructure Top Tier Telecom Company

Telecom & Cable

Solve your floor space and growth limitations.

As the industry’s most advanced space and energy saving option, OptiCool eliminates overhead and floorspace constraints, allowing more equipment to fit into any existing location. Plus, it’s the only cooling solution that has the ability to failover to battery backup. Two of the nation’s top telecom and cable giants have already standardized on the OptiCool solutions.

Challenges:
• Overhead duct work or floor space constraints?
• Rack density limitations with conventional cooling?

Return On Investment:
• Reduce required floor space up to 60%.
• Increase rack densities from 3kW to 30kW+.

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Colocation Data Centers
Beat your competition and boost your bottom line.

A colo’s greatest asset is floor space. Its primary expense is energy consumption. More floor space means more paying tenants and improved energy efficiency means higher profits. The OptiCool solution addresses both by potentially doubling your floor space and cutting your energy consumption in half.

Challenges:
• Looking for a competitive edge?
• Need to reduce new build capital costs?
• Does your data center design support modular and scalable cooling for multi-tenant requirements?

Return On Investment:
• Reduce required floor space up to 60%.
• Reduce energy usage by up to 90%.
• Eliminate cost of raised floor.

“...We added 40% more tenants and reduced overhead by over 50%. As a result, we can charge less but still add double digits to our bottom line. Our competition doesn’t stand a chance!”

— CEO, North American Colocation Data Center

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“Although small in size, remote centers are a big deal. The same can be said for OptiCool. They’re the only cooling solution that can maximize floor space and equipment life while saving us nearly 50% in energy costs.”

– Director of Technology Integration, Northeast Hospital System

Edge Computing
The only logical cooling solution for remote data centers.

Putting data in close proximity to the end user is essential for new technologies like autonomous vehicles and distributed AI. Remote IT closets resolve the latency challenges of new technologies – OptiCool’s simplicity, space savings, and reliability resolve the cooling challenges of confined, remote data centers.

Challenges:
• Having trouble cooling IT closets?
• Limited floor and overhead space?
• N+2 in-rack redundancy requirements?

Return On Investment:
• Reduce Required Floor Space up to 60%.
• Reduce Energy Usage by up to 90%.
• Increase In-Rack redundancy 10kW up to N+2.
Advanced Cooling for a Variety of Applications

Data Center Hot Spots
Make the impossible, possible.

Most data center managers report they have between 2 and 3 troublesome hot spots. Eliminating them is virtually impossible with airflow cooling. If a complete data center cooling upgrade is not feasible, OptiCool can complement existing airflow with targeted cooling that efficiently eliminates hot spots. OptiCool’s compact pumps are a redeployable spot solution that handle multiple hot spots and even allow for higher heat density.

Challenges:
• No sustainable solution to your hot spots?
• Issues with increasing rack densities?

Return On Investment:
• Reduce required floor space up to 60%.
• Reduce energy usage by up to 90%.
• Eliminate cost of raised floor.

“I’ve been in this business for 25 years and hot spots have always been a problem. Then we discovered OptiCool. I’ve never seen a solution more simple, logical and effective for heat extraction.”

– Facilities Manager, U.S. Energy Company

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“Hot aisle containment did not have the thermal transfer capabilities required for our high performance computing lab. Chip cooling was never an option so we implemented OptiCool’s refrigerant rear-door and have been extremely pleased with the modularity and performance.”

– Lab Director, Government Research Facility

High Performance Computing

*Experience the most efficient HPC cooling solutions.*

Why suffer through the cost and constraints of chip-based cooling or the complexities and mess of immersion cooling? OptiCool’s compact yet powerful refrigerant pumps are designed specifically to support the super high heat of super-computing. Our high-density line currently supports up to 60kW of heat per rack. Future options will support up to 100kW+ per rack!

**Challenges:**
- Is hot aisle containment limiting your high compute requirements?
- Having trouble with CFD room modeling?
- Chip cooling not an option?

**Return On Investment:**
- Increase Rack Densities: Grow from 3kW to 60kW+.
- Increase Cooling Capacity: 30,000 times more efficient than airflow.
- Eliminate the need to cool the entire room.

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Corporate Data Centers

*Increase profits while reducing your carbon footprint.*

Environmentally conscious companies experience higher customer satisfaction and loyalty. The OptiCool solution helps corporations balance social responsibility with economic growth by maximizing efficient use of resources and significantly reducing carbon footprints and CO₂ emissions.

**Challenges:**

- Having trouble achieving your carbon footprint reduction targets?
- Can't deploy any more equipment into existing space due to increased heat loads?

**Return On Investment:**

- Reduce carbon footprint by up to 90%.
- Increase energy rebates by up to 30%.
- Increase rack densities: Grow from 3kW to 60kW+.
- Reduce required floor space by up to 60%.

“Not only have we significantly reduced our carbon footprint, we also recouped a quarter of a million dollars in rebate incentives from our energy provider.”

— CFO, Large U.S. Financial Institution

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The Proof Is In The Data

While other companies may offer a one-size-fits-all approach, OptiCool offers cooling by design. Regardless of the application, OptiCool customers experience significant return on investment.

IT Closet: 20 kW Application

<table>
<thead>
<tr>
<th>Energy Usage</th>
<th>Reduced By: 0.7 kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Energy Cost</td>
<td>Reduced By: $578</td>
</tr>
<tr>
<td>Annual Carbon (CO₂) Emissions</td>
<td>Reduced By: 66 Tons</td>
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<tr>
<td>Reduction In Energy Usage</td>
<td>46%</td>
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<table>
<thead>
<tr>
<th>Number of Racks</th>
<th>2 Racks</th>
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</thead>
<tbody>
<tr>
<td>Average kW per Rack</td>
<td>3.0 kW</td>
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<tr>
<td>Outdoor Heat Rejection</td>
<td>Chilled Water</td>
</tr>
<tr>
<td>Redundancy</td>
<td>N Design</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Comparative ROI Detail</th>
<th>Conventional</th>
<th>OptiCool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Energy Usage</td>
<td>1.5 kW</td>
<td>0.84 kW</td>
</tr>
<tr>
<td>Annual Energy Cost</td>
<td>$1,314</td>
<td>$736</td>
</tr>
<tr>
<td>Annual Carbon (CO₂) Emissions</td>
<td>150 Tons</td>
<td>84 Tons</td>
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Data Center: 1,260 kW Application

<table>
<thead>
<tr>
<th>Energy Usage</th>
<th>Reduced By: 252.9 kW</th>
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</thead>
<tbody>
<tr>
<td>Annual Energy Cost</td>
<td>Reduced By: $221,540</td>
</tr>
<tr>
<td>Annual Carbon (CO₂) Emissions</td>
<td>Reduced By: 25,290 Tons</td>
</tr>
<tr>
<td>Reduction In Energy Usage</td>
<td>97%</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Number of Racks</th>
<th>85 Racks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average kW per Rack</td>
<td>10.0 kW</td>
</tr>
<tr>
<td>Outdoor Heat Rejection</td>
<td>Chilled Water</td>
</tr>
<tr>
<td>Redundancy</td>
<td>N+1 Design</td>
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</tbody>
</table>

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<tr>
<th>Comparative ROI Detail</th>
<th>Conventional</th>
<th>OptiCool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Energy Usage</td>
<td>260.4 kW</td>
<td>7.5 kW</td>
</tr>
<tr>
<td>Annual Energy Cost</td>
<td>$228,110</td>
<td>$6,570</td>
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<tr>
<td>Annual Carbon (CO₂) Emissions</td>
<td>26,040 Tons</td>
<td>750 Tons</td>
</tr>
</tbody>
</table>

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Solution
Components

R134a Refrigerant
*The Lifeblood of the OptiCool Solution*

Fundamentally, cooling the computer equipment in a data center is about moving heat energy most efficiently. Some data centers use air and some use water, but the OptiCool system uses R134a, a non-toxic, synthetic refrigerant. R134a has superb thermodynamic properties, which make it an ideal medium for moving heat. For a given volume, water can absorb 3,400 times more heat than air. In comparison, R134a can absorb nine times more heat than water making it the lifeblood of OptiCool’s cooling solution.

Refrigerant Distribution Network (RDN)

The RDN is composed of refrigerant-grade copper piping, factory-built refrigerant distribution segments, and flexible stainless-steel hose pairs. Self-sealing quick-connect couplers join the AHX cooling units with the supply and return lines. The quick-connect feature allows for modularity, flexibility, and reduced on-site installation times.

Active Heat Extractor (AHX)

The AHX is the cooling unit installed inside the door. Each consists of an evaporator coil and two fan units. The fan draws hot exhaust through the coil causing the pumped refrigerant to undergo a phase change thereby removing the heat. Each unit consists of two variable-speed fans for efficiency and redundancy. Cooling units can be removed or installed without disruption to service.
Cool Door System (CDS)

The CDS offers a unique modular mounting system which can accommodate up to 3 AHX units per door. The CDS is mounted on the back of the cabinet and removes heat from the exhaust air. The doors are designed to allow full and convenient access to IT equipment. The CDS is lightweight and available in standard cabinet sizes. In addition, many cabinet manufacturers offer “OptiCool Ready” products that use existing mounting points.

For retrofits, OptiCool’s door transition kits provide convenient and seamless integration of the Cool Door System on to all major manufacturer’s cabinets.

Refrigerant Pump System (RPS)

The RPS circulates refrigerant to the Active Heat Extractors. The pump includes a chilled-water heat exchanger to remove heat from the refrigerant. When chilled water is not available, we use outdoor condensers to reject heat. Virgin R-134a refrigerant is circulated at low pressure with no compression so no oils are used. Refrigerant temperature is strictly maintained to prevent condensation. There are multiple pump models to support various power input arrangements and outdoor environmental conditions.
Cool Row System (CRS)
For Horizontal Heat Capture Applications

Use CRS for Horizontal Cooling Applications such as UPS, Cabinet Top Exhaust, Mechanical Rooms, and Hot Aisle Requiring Heat Capture

Features
• 24” or 30” Plenum Width
• Supports 2 or 3 AHX
• Top or Bottom Inlet
• Top of Cabinet or Ceiling mount
• Single or Dual Power

A Comprehensive Solution

Our impressive cooling components are just part of the OptiCool solution. Providing unparalleled service and support are also integral to our mission. Our team is committed to the highest levels of customer success and satisfaction.

Be a part of the next generation in data center cooling. Contact OptiCool today to receive a no-cost Data Center Energy Assessment including a comparative ROI. See how you can reduce energy usage and carbon emissions by up to 90%!