

Oil Immersion Cooling

Case Studies of Two Oil and Gas Data Centers

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The CarnotJet™ System



Any OEM Server



CarnotJet™ 42U Rack

Vertically mounted OEM server

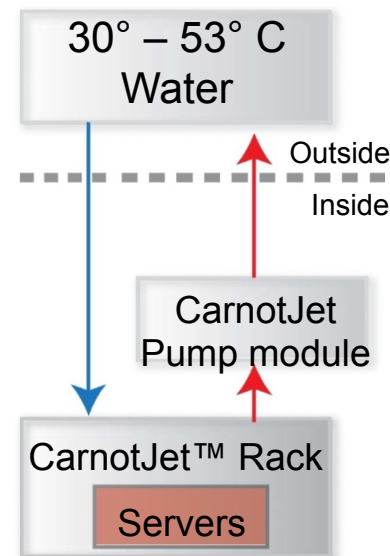
Ethernet cable guides

Power cable guides

PDU Mount

Liquid fill line

Heat Flow



Install any standard OEM rack server

- » Any brand
- » CPU and GPU compatible
- » Fiber compatible

Submerge into ElectroSafe™ coolant

- » Captures 100% of heat
- » Requires no air cooling

Intelligent control system

- » Heat expelled outside
- » Alerts/monitoring software



Disclaimer

Information about installations are restricted under NDA. The format of this presentation is a quote by a customer, followed by GRC's explanation of why this particular benefit is possible. GRC explanations use generic data.



CASE STUDY: CGG

Date first publicized: 2012

Size of installation: confidential (but growing)

Power Savings



“What we are seeing is a significant saving in terms of electricity. I would say it’s not impossible to go up to a factor of two [power allocated to servers in a given data center]”

– Laurent Clerc, VP of Information Technology



Power Savings Example

Typical Installation Savings

	Air	Free Cooling	GRC	
Servers	1000	1050	850	Watts
Cooling and Power Overhead	70%	25%	9%	%
PUE	1.70	1.25	1.09	-
Total Power	1700	1313	927	Watts
Savings w/ GRC	46%	29%		

mPUE < 1.03, any climate

Retrofit Savings



“We saturated the power envelope of this room by putting twice as many systems as we would normally have, if it had a normal way of cooling systems.”

– Laurent Clerc, VP of Information Technology



Example Power Infrastructure

Average Power

	Conventional	Highly Efficient Air	GRC
Server Power	1 MW	1 MW	.85 MW
Air handler / GRC	.2 MW	.1 MW	.04 MW
“Other”	.5 MW	.25 MW	.09 MW
Total	1.7 MW	1.35 MW	.98 MW

Equipment sizing (since peak is higher than average)

Battery Backup	1.0MW	1.0 MW	.85MW
Room Power distribution	1.2MW	1.1 MW	.85MW
Generator	1.9MW	1.45MW	1.02MW

How to Nearly Double Your Data Center Server Capacity



Retrofit with GRC

Servers take $\frac{1}{2}$ the floor space

Reallocate MEP power to servers (add battery backup if necessary)

Add 80% more servers into the same data center

Operational Concerns



“Today there is not really much difference between managing this room [with the CarnotJet” and managing another traditional air based computer.... there’s no noise, almost no noise, the temperature is very reasonable, there’s no air draft, ... makes for a much nicer environment overall

– Laurent Clerc, VP of Information Technology



Unmatched efficiency.

Unmatched capital savings.

Unmatched simplicity.

For those serious about reducing data center cost.

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