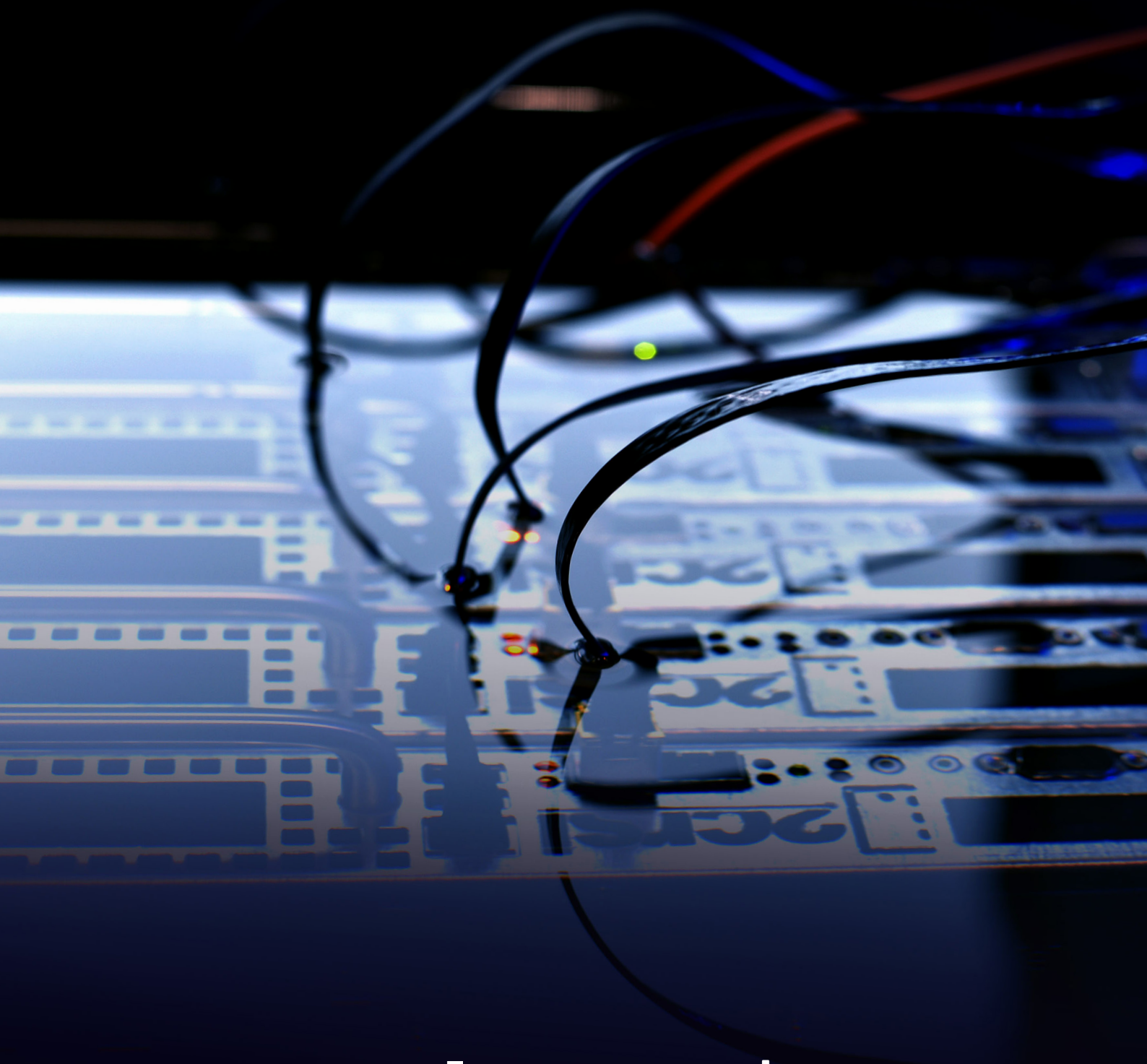
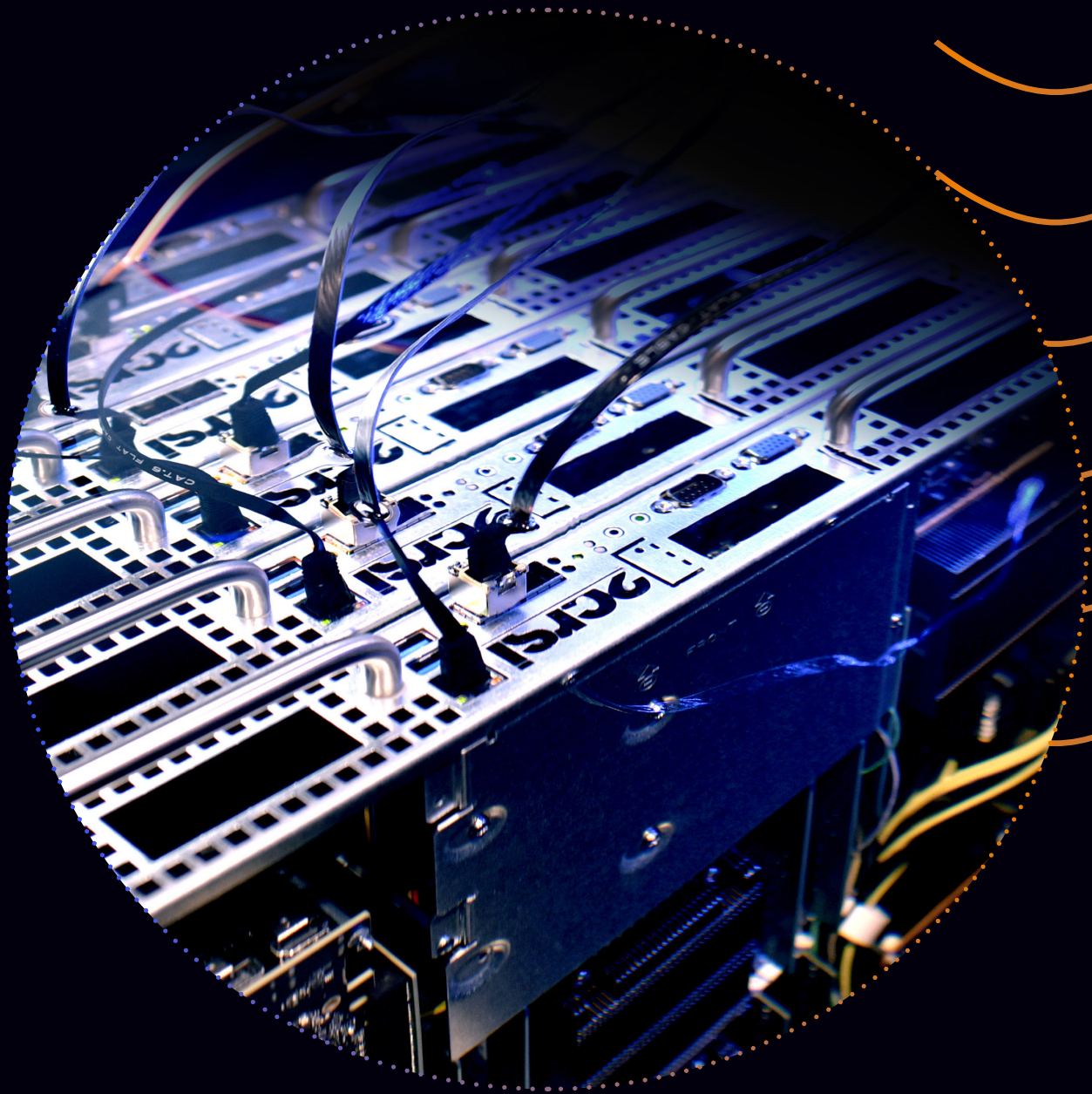


2crsi submer

IMMERSION COOLING SOLUTIONS



How does immersion cooling work?

Cooled by submer

2CRSi partners with Submer

Submer Technologies is a European deep tech company, which develops and manufactures hyper-efficient and eco-friendly immersion cooling systems for new-age data centers.

2CRSi and Submer met for the first time in March 2018, at the Cloudfest show, and in September 2018 started a productive and enriching alliance.

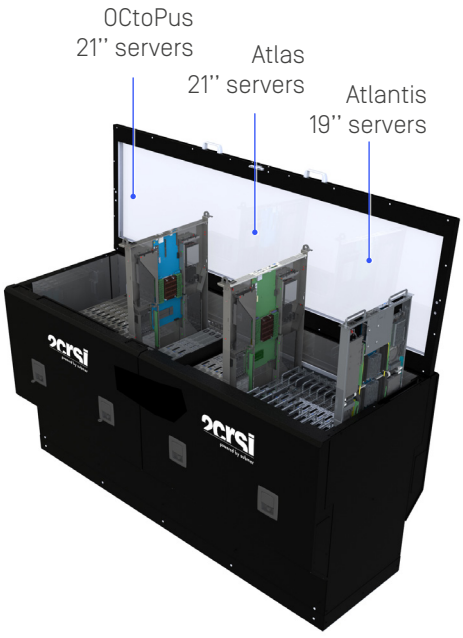
Subsequently, the collaboration got reinforced by the creation of the OCtoPus 21'' range servers which was complemented by the creation of compatible tanks built by Submer (which systems already offered trays suitable for 2CRSi 19'' servers).

Design principles

The immersion cooling technology consists in completely immersing a server into a safe and dielectric liquid*.

Through this process, all the heat generated via the hardware is absorbed by the liquid. This dielectric fluid is able to **capture 1500 times more heat** than air, for the same volume.

The chosen liquid has a flash point which is above 150°C (302°F) and a high stability to prevent any risk of evaporation, overpressure or flammability. The physical-chemical properties of the SmartCoolant, allow higher heat transfer performance than air. The SmartCoolant liquid used by Submer in our Immersion Cooling solutions is a dielectric, synthetic, proprietary fluid, 100% non-hazardous for people or the environment and readily biodegradable according to OECD 301F norm.



SmartPodXL by Submer,
with 3 ranges of servers by 2CRSi
(OCtoPus, Atlas and Atlantis)

Why you should adopt immersion cooling

How do Data Centers manage fatal heat and power usage effectiveness issues today?

Data Centers are specific buildings containing a large quantity of servers, storage racks, network and telecommunications equipments, all producing important amount of heat. Constantly cooling this infrastructure to maintain a stable temperature requires a lot of energy.

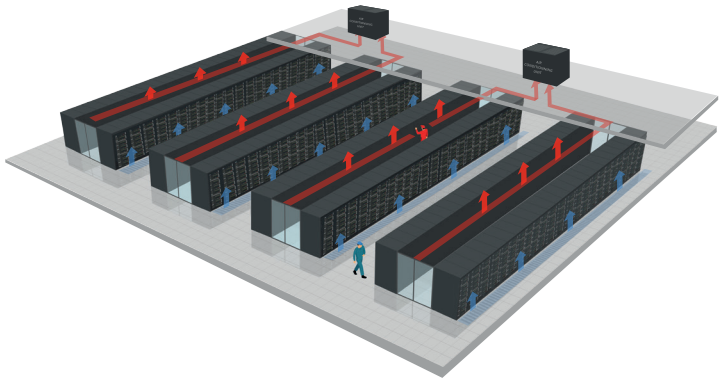
For as long as computing has taken place, there has been the challenge regarding how to efficiently and safely cool systems and Data Centers.

Today, Data Centers account for about 4% of the world's energy consumption and could represent up to 10% in the coming years.

Estimated worldwide Data Center power consumption for 2012 as about 382 billion kWh. Global Data Centers used roughly 416 TWh in 2016. USA Data Centers consumption was 90 billion kWh.

In Europe, according to the European Commission (EC), the energy consumption of Data Centers in 2013 represented 56 billion kWh. The EC estimates that this number reaches 104 billion kWh in 2020.

"Today, the chillers used to cool conventional Data Centers represent between 35% and 40% of the Data Center's electrical power consumption."



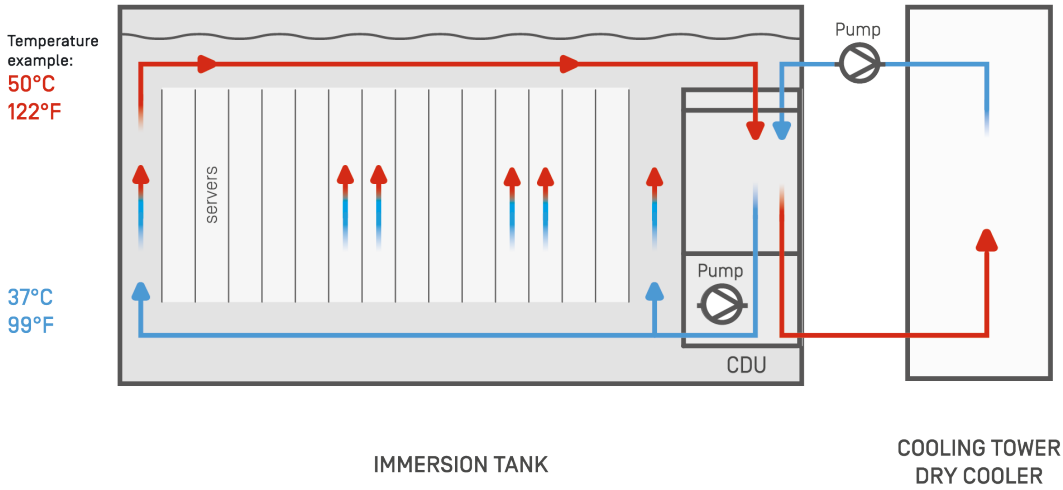
TRADITIONAL DATA CENTER CONFIGURATION
Hot and cold aisle configuration.
Arrows show flow of hot and cold air.
Cold air enters from raised floor.
Hot air is drawn into air conditioners.

Simple and efficient

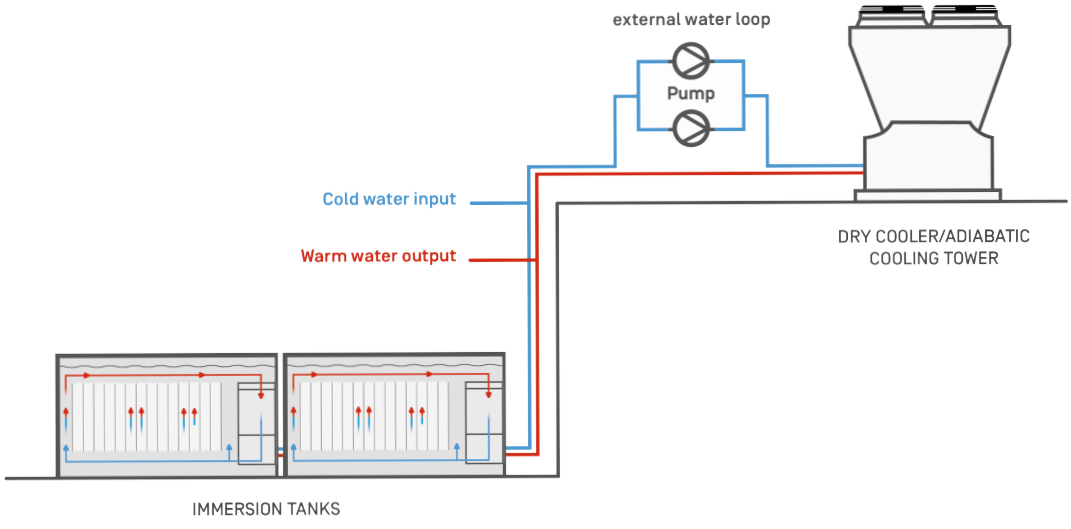
In our single-phase immersion tanks, the heat captured by the liquid from the servers circulates through a pump to a heat exchanger going to a secondary water system.

With immersion cooling, fans have to be removed or deactivated, reducing energy consumption. The heat captured by the network of water pipes can be either reused for heating or evacuated into the air by a dry cooler.

IMMERSION TANK DESIGN PRINCIPLE



IMMERSION COOLING INFRASTRUCTURE EXAMPLE WITHOUT HEAT REUSE



Key Benefits of Data Center cooled by immersion

Unrivaled Total Cost of Ownership (TCO) compared to a traditional Data Center:

Up to **95% of cooling costs** correspond to about 50% of the electricity consumption

Up **to 30% TCO saving**

Up to **85% reduction of physical space**

Up to **39% reduction of carbon emissions**

Up to **91% reduction of water consumption**

Reduction of IT Hardware failure rate

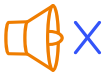
Improvement in IT hardware life-span by 20%

Meeting sustainable and ergonomic needs

The lifetime of immersed components is higher than with an traditional air-cooled solution.
A reduced failure rate allows to dramatically reduce replacement costs. Also, thanks to the temperature homogeneity ensured by the dielectric fluid, components are not stressed by sudden temperature changes.

Homogeneous cooling

In a conventional air-cooled Data Center, ambient noise can exceed 90 decibels, leading to poor difficult working conditions... As immersion cooling functions without fans, noise pollution is avoided, contributing to better working conditions.



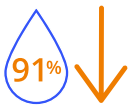
Noiseless

Carbon Neutrality

2CRSi's immersion cooling technology results in an annual reduction in carbon emissions by up to **39%** * per year, providing similar capacity than a traditional DC. Water consumption can also be reduced by up to **91%** * thanks to immersion.

**Comparison tables of carbon emissions and water consumption between two Data Centers (air cooled IT and immersion IT) can be found in the following pages.*

Up to 39% reduction of carbon emissions



Up to 91% reduction of water consumption

Cool down your investment

Our IT cost effective response to your needs :

-30% CAPEX

Traditional Data Centers require very complex air cooling systems. With Immersion Cooling Technology, there is no need for the installation of refrigerated cabinets, false raised floors, corridors etc. As a result, CAPEX can be reduced by **up to 30% ***.

-40% OPEX

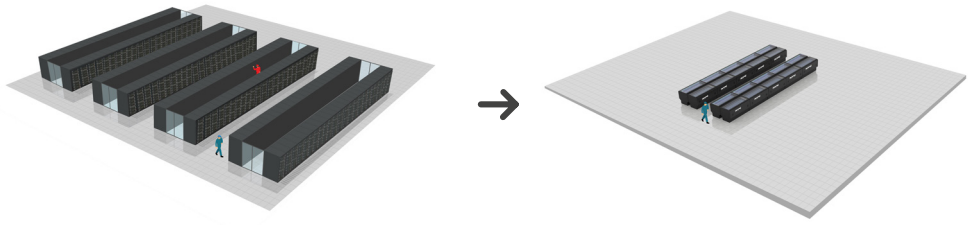
Data Center with Immersion Cooling Technology can reduce power consumption operating costs by **up to 40%** *.

OPTIMIZED FLOOR SPACE

By eliminating essential equipment required for traditional air cooled Data Centers, immersion cooling makes it possible to optimize floor space usage. Our technology allows for greater density for the same number of servers per m^2 (see below).

(*) Estimation, based on use cases.

Floor space and electricity consumption comparison between air-cooling and immersion

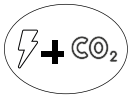


1000 M²:
200 Traditional racks
Rack power : 5 kW on a total of 1 MW Data Center

90 M²:
20 SmartPodXL
Tank power: 50 kW on a total of 1 MW Data Center
Notice : Dedicated ACU is no longer required.

Deep Dive

Comparison of the carbon footprint of two Data Centers



In a increasingly digitalized world, carbon emissions are mainly driven by the extraction of raw materials and their transformation into electronic components, as well as by electrical production of electricity.

In FRANCE: 1 kWh of electricity = 0.104 kg of CO^2
(less carbon emissions due to nuclear plants)
In USA: 1 kWh of electricity = 0.454 kg of CO^2

CUE

Carbon usage effectiveness (CUE) is a metric that determines the amount of carbon gas emitted by a Data Center on a daily basis. This metric was developed by the non-profit consortium, The Green Grid. It is calculated by dividing the total carbon dioxide emissions equivalents (CO^2) of the facility's energy consumption by the total IT energy consumption.

		Data Center A **Air Cooling** Efficient and traditional IT	**Data Center B** **Immersion Cooling**
	Capacity	12 000 servers	
	Average Power Consumption (per server)	350 W	280 W*
	Total IT Power Consumption	4.2 MW	3.36 MW
	Cooling Overhead	30%	2%
	Electrical Overhead	6%	1%
	Effective PUE (Power Usage Effectiveness)	1.36	1.03
	Total Facility Power	5.7 MW	3.5 MW
	Energy Consumption per year	50 Million kWh	30.3 Million kWh
CO_2	**USA Carbon emissions per year**	**22.7 Million kgCO^2**	**13.8 Million kgCO^2**
CO_2	**FRANCE Carbon emissions per year**	**5.2 Million kgCO^2**	**3.2 Million kgCO^2**
CUE	**USA Effective CUE**	0.62 kg CO^2/Kwh	0.47 kg CO^2/Kwh
CUE	**FRANCE Effective CUE**	0.14 kg CO^2/Kwh	0.12 kg CO^2/Kwh

(*) Reduction due to fans removal

Reduction of the carbon emissions by up to 39% thanks to immersion

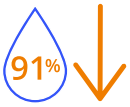
Comparison of the water consumption of two Data Centers

To reduce water consumption in Data Centers, a measurement system called WUE (Water Use Efficiency) allows measuring water and energy consumption in Data Centers. WUE is calculated by dividing Data Centers annual Energy source and Site water usages (in Liters) by Total IT Power Consumption.

Notice : WUE is a metric defined by the Green Grid.

		Data Center A **Air Cooling** Efficient and traditional IT	**Data Center B** **Immersion Cooling**
	Total IT Power Consumption	4.2 MW	3.36 MW
	Total Facility Power	5.7 MW	3.5 MW
	Daily site water usage*	507 300 L	43 750 L
	Energy source water per year	94.07 Million L	57 Million L
	Site Water Usage per year	**185.16 Million L**	**15.97 Million L**
WUE	**Site WUE**	7.59 L/kWh	2.48 L/kWh

**Based on James Hamilton's estimate*

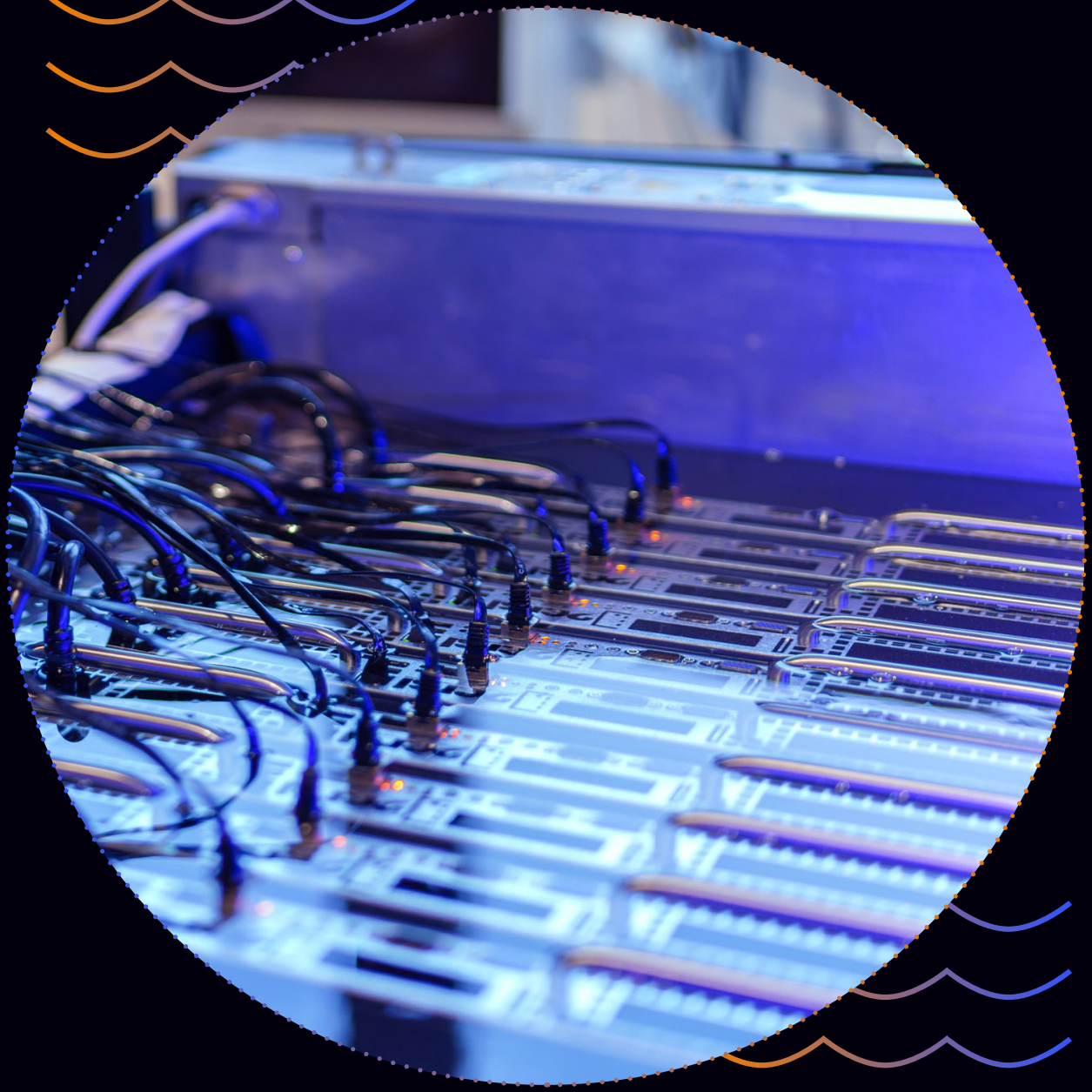


Reduction of water consumption by up to 91% is enabled by immersion

Cooling Solutions Bundles

Immersion compatible servers by 2crsi

SmartPods by submer



Immersed compatible servers

OCtoPus 1.4

21'' server
One node and four GPUs

- Inspired by OCP specifications
- Best TCO for large installations
- Stronger performance
- Higher flexibility
- Improved MTBF
- Easy handling
- No PSU

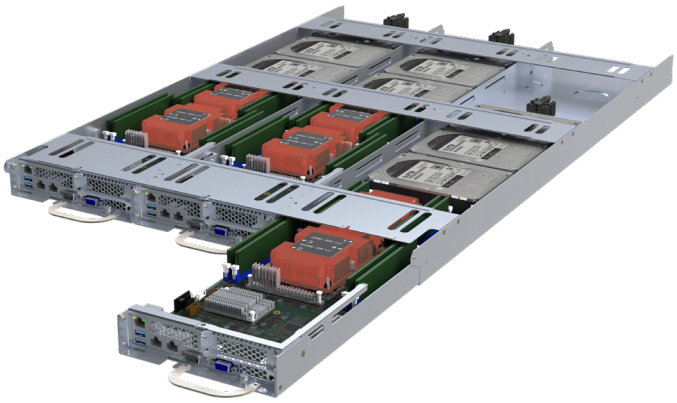
Servers	
Form factor	21'' One node and four GPUs
Number of servers per SmartPodXL	36
GPUs	
GPUs type	NVIDIA 3070
Number of GPUs per SmartPodXL	144
GPUs compatibility	NVIDIA / AMD
Power consumption	
Total IT Power Consumption	40 kW
Total SmartPodXL Consumption	850 W *
PUE	**1.03**

For a capacity of 50 kW.

OCtoPus 3SP

21'' server
1 OpenU three nodes

- Stronger performance
- Higher flexibility
- Easy maintenance
- High power efficiency
- No PSU



Servers	
Form factor	21'' Three nodes per shelf
Number of servers per SmartPodXL	108
Processors	
Processors type	2x 2nd Intel® Xeon® Scalable Processors per node (26 cores per CPU)
Total number of cores	5 616 cores
Processors compatibility	Intel® Xeon® Ice Lake / 3rd Gen AMD EPYC™ Processors
Power consumption	
Total IT Power Consumption	48 kW
Total SmartPodXL Consumption	850 W *
PUE	**1.03**

For a capacity of 50 kW.

SmartPods

SmartPodXL

Immersion cooling made practical

The SmartPodXL have a cooling capacity of **50 kW**. This dissipation is made possible thanks to the CDU (Cooling Distribution Unit) exchangers, which are directly integrated in each tank.

SmartPodXL

SmartCoolant

Submer's In-House Developed Synthetic Fluid / Highest-quality on the market

Highest Quality & Economic

- Fully Compatible with IT components
- Non-Corrosive
- Non-Oxidative
- Lifespan: 15 years

Protect your IT investment

- Barrier against dust & moisture
- Thermal uniformity
- Sealed environment
- No moving parts

Safe for humans & the environment

- Non-toxic
- Certified Biodegradable

SmartPodXL statement of line*

IT Hardware capacity	44U / 42 OU
Dimensions	228(L) x 90(W) x 119(H) cm
Weight (Empty)	671 kg / 1,476 lbs
SmartCoolant capacity	1 186 l / 313 gal
Total weight (Full of SmartCoolant)	1 691 kg / 3,728 lbs
Typical SmartCoolant/Temperature setpoint	40°C-60°C /104°F-140°F

The CDU (Cooling Distribution Unit)*

Heat dissipation capacity	50 kW
Max power consumption	750 W
Mechanical Power Usage Effectiveness	1,015
Redundancy	2N / Tier III
Power supply	380-400V 50Hz / 208-230V 60Hz
Power supply connection	Industrial connector three phase 3P+E +N 32A IEC60309 / plug L2120 20A NEMA
Water supply connection	G 1 1/4" BSPP female , NPT male
Monitoring	+ 20 real-time metrics over public REST API / DCIM compatible

Deployment Requirements*

Water supply in let temperature	Recommended less or equal to 32°C **/** 89°F Inhibitors and/or softners : depending on Icing and Water quality conditions
Water flow rate	9 to 11 m3/h **/** 2,378 to 2,906 gal/hr
Warm water outlet temperature	Expected 37°C **/** 99°F
Floor load capacity	900 kg/m² **/** 1980 lbs/ft² (IT Hardware not considered)
Fire Supression System	Standard air-cooled Data Center tire suppression system
Temperature	-20°C to 55°C **/** -4°F to 131°F

(*) All these informations are relative to the SmartPod 4.1 version.

About us

The objective behind the partnership between Submer & 2CRSi is to pool our respective strengths in order to create a first class added value for the end user. The immersion technology is brought by Submer and its unique expertise. 2CRSi completes the offer with its enhanced know-how in high performance servers manufacturing, optimized through and through to be cooled by immersion. Together we are better and stronger to deliver value to our customers.

2CRSi is a French global Tech group, listed on Euronext Paris (ticker: 2CRSI.PA) and active in the IT & Computer Hardware industry. As a world class player in high performance and high efficiency server technology, the 2CRSi Group develops, manufactures, and distributes end-to-end energy-efficient computing solutions. Through our different companies and brands, we deliver a broad range of IT solutions and services for a variety of markets, including cloud computing, datacenters, enterprise IT, big data, HPC, artificial intelligence, 5G , IoT, rugged PCs or embedded and edge computing.

From 25 global locations and production sites in France (global HQ), Germany, Belgium, the Netherlands, the United Kingdom, the United States, the United Arab Emirates, Singapore, India, and Australia, our 350+ team members deliver in 50 countries, tailor-made solutions for companies from multiple sectors and industries including aerospace, defense, security, oil & gas, healthcare, scientific research, education, telecommunications, automotive, banking, trading & finance, media & entertainment or web services.

As a proud player of the European Digital Sovereignty, 2CRSi was selected in 2021 by the European Commission to design and manufacture 100% european pilot systems based on RISC-V accelerators as a first step towards the realisation of a future operational european exascale systems.

The 2CRSi Group operates 6 complementary and global companies offering hardware solutions (2CRSi and Tranquil), datacenter housing & cloud services (Green Computing), IT consultancy & solution provider (Bios IT) and IT distribution networks / marketplace (Boston and Escape Technology).

submer

We enable next generation cooling and automation for data & energy-intense environments by integrating our pristine, highly-efficient & sustainable technologies. Solving the challenges of today and powering the use cases of the future

We support organizations to make progress on environmental sustainability goals, reduce their company's carbon footprint and whilst making progress on broader business objectives of improving profitability and operational efficiency.

We'll strive every minute to add value to your business. Our main goal is to understand how we can support you, invest in your company journey and look for opportunities to make your infrastructure and IT investment a great success.

Your Submer experience will be around innovation, efficiency and being sustainable with great financial growth.

We believe a better world is possible by leveraging cleaner technologies that on top deliver unprecedented TCO metrics. And we also "walk the talk"! So, for each SmartPod you buy we´ll make sure 2 trees will be planted to fight deforestation.

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