



COOLING  
ENVIRONMENTS

# Cooling Environments

Introduction to Cooling Environments

May 24th, 2022

Connect. Collaborate. Accelerate.



**OPEN**  
Compute  
Project®

# Open Compute Project spearheading liquid cooling

Largest cross-industry collaboration facilitating change



COOLING  
ENVIRONMENTS

## Cooling Environments Project:

Enable global adoption of liquid cooling for datacentre equipment

### Cooling Environments

PL: Don Mitchell & Sean Sivapalan

#### Door Heat Exchangers

Lead: John Fernandes  
(Meta Platforms Inc.)

#### Cold Plate

Lead: Jordan Johnson  
(Intel)

#### Immersion

Leads: Rolf Brink  
(Asperitas) & John Bean  
(GRC)

#### ACF

John Menoche (Vertiv) &  
John Gross (J.M. Gross  
Engineering)

#### Heat Reuse

Cosimo Pecchioli (Alfa  
Laval) & Jaime Comella  
(Cloud & Heat)

### Project focus:

- Standardization and definition of critical interfaces
- Standardization of operational parameters
- Standardization of environmental conditions



**OPEN**  
Compute Project®

Connect. Collaborate. Accelerate.





# Agenda

May 24th, 2022



COOLING  
ENVIRONMENTS

| Time/Duration (PST) | Presenter (Company)                        | Topic  |
|---------------------|--|--|
| 8:30 - 9:30 AM      | All PL                                     | Intro to Cooling Environments<br>Agenda Review   |
| 9:30 - 10:00 AM     | John Gross                                 | ACF - Reference design example review  |
| 10:00 - 10:30 AM    | John Menoche                               | ACF - Pipe connections white paper review  |
| 10:30 - 11:00 AM    | Jaime Comella                              | Heat Reuse - Intro to Heat Reuse sub project. (launched 1/22). Heat host use case highlights for ITE heat. |
| 11:00 - 11:30 AM    | Juan Carlos Cacho<br>Alonso, Jabari George | Door HX - White paper on Door HX applications and facility impact  |
| 11:30 - 11:45 AM    | Ken Kiernan, John<br>Fernandes             | Door HX - Specification for Open Rack V3   |

Connect. Collaborate. Accelerate.



# Agenda

May 25th, 2022



COOLING  
ENVIRONMENTS

| Time/Duration (PST) | Presenter (Company)                                   | Topic   |
|---------------------|---|---|
| 8:30 - 9:00 AM      | Punith Veerlinga Shivaprasad (Shell)                  | Immersion - Final version materials compatibility                                 |
| 9:00 - 9:15 AM      | Jessica Gullbrand                                     | IC Strategic Initiative Discussion - Liquid Cooling in Edge Deployments           |
| 9:15 - 9:45 AM      | John Bean/Rolf Brink                                  | Sustainability workshop for Immersion (dielectric fluids and impact of immersion) |
| 9:45 - 10:00 AM     | Noman Mithani (Meta)/ Rajesh Kasukurthy (Meta)        | Large Dripless Interoperable Quick Connector                                      |
| 10:00 - 10:15 AM    | Cam Turner (CoolIT)<br>Ashwin Siddarth (Motivair)     | Cold Plate requirements Rev 2   |
| 10:15 - 10:30 AM    | Glenn Charest (Meta)<br>Nick Goenner (SafeWay)        | ORv3 Blind Mate Liquid Cooling Interfaces Update                                  |
| 10:30 - 11:00 PM    | Nalco (Jim Dillon, Craig Myers, Paul Desh, Philip Yu) | Failures in Water Cooled Components in Liquid Cooling Applications                |
| 11:00 - 11:30 AM    | Mick Jones  | Hardware Management Overview  |
| 11:30 - 12:15 PM    | Cooling Environments Project Leads                    | Liquid Cooling Hurdles - Kickoff Workshop<br>Kick off and Call To Action          |

Connect. Collaborate. Accelerate.

# Subproject Immersion



## Requirements and qualification

- [Immersion Requirements \(2019, 2022 rev2\)](#)

## Whitepapers

- [Design guidelines for Immersion-Cooled IT Equipment \(Immersion\)](#)
- [Coming up: Material/fluid compatibility](#)

## Specifications

- [Open Cassette \(Immersion\)](#)
- [Fan Sim \(Immersion\)](#)

## Current community discussions

- [Material/fluid compatibility \(Immersion\)](#):  
Goal: Provide references and standards for OEMs regarding material compatibility  
Project lead: 3M and Shell
- [Power Distribution in Immersion](#)  
Goal: Define methods of dealing with power distribution within fluid environments
- [Hardware Management](#):  
Goal: Create a harmonized Redfish Schema for all liquid cooling technologies

# Subproject Door HX



## Requirements and qualification

- [Requirements for Open Rack v2 & v3 \(2021\)](#)
- [Coming up: Requirements checklist rev.1](#)

## Whitepapers

- [Coming up: Evaluating limits of Door HX solutions in different applications](#)

## Specifications

- [Coming up: Reservoir and pumping unit rev.1](#)

## Current community discussions

- [Requirements checklist rev.1:](#)  
Goals: Check compliance of Door HX solution contributions to requirements doc; standardized boundary conditions for cooling performance; guidance on generating BIM content
- [Evaluating limits of Door HX solutions in different applications](#)  
Goals: Challenge conventional assumptions; highlight impact of Door HX design on applications, facility types, etc.
- [Specification for Open Rack v3:](#)  
Goal: Define a solution specific to capability/feature set of ORv3 and compliant with existing ACS efforts

# Subproject ACF



COOLING  
ENVIRONMENTS

## Whitepapers

- [Guidelines for Connection of Advanced Cooling Solutions \(ACS\) to Data Center Facility Water Systems](#)
- [Data Center Liquid Distribution Guidance & Reference Designs](#)

## Specifications

- [Coming up: Reservoir and pumping unit rev.1](#)





# Subproject Cold Plate



## Requirements and qualification

- *Coming up: Cold Plate Requirements, Rev. 2*

## Whitepapers

- *Guidelines for Fluid Serviceability and Maintenance for inhibited propylene glycol in liquid cooled data center (secondary loop)*
- *Guidelines for Fluid Serviceability and Maintenance for treated water in liquid cooled data center (secondary loop)*

## Specifications

- *Coming up: Universal Quick Disconnect Specification, Rev 2*

## Current community discussions

- *Cold Plate Requirements, Rev 2 :*  
Goals: Cooling component selection, Going from single rack to multiple rack to facility, considerations for RDHx combined with cold plate systems.
- *Develop guidance on materials compatibility testing*  
Goals: Guide data center operators on system long term testing of cold-plate based loops.
- *Opportunities to consider automation and inline monitoring of fluid parameters*  
Goals: To evaluate and provide guidance on fluid parameters (corrosion inhibitor levels, biocide, pH) that can be monitored and then corrected without human intervention. Minimize data center downtime.



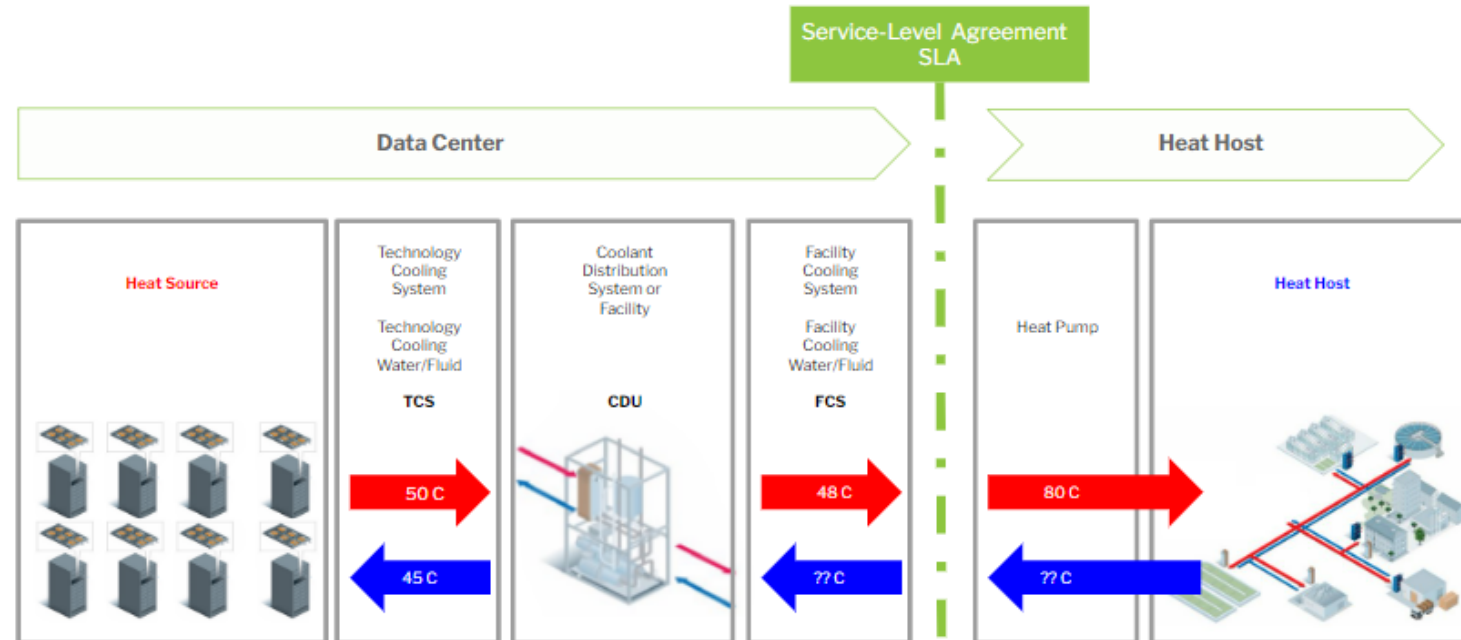
# Subproject Heat Re-Use



COOLING  
ENVIRONMENTS

## Current community discussions

- *Technical:* How to capture, handle, deliver and measure the heat
- *Regulatory:* Are there financial incentives? Are there regulations that facilitate/mandate heat reuse?
- *Practical:* Who are the stakeholders? Are the goals aligned?



# Call To Action – Overcoming Hurdles to Liquid Cooling



COOLING  
ENVIRONMENTS

*#DontFearLiquidCooling*

**#PlanForIT**



Cooling Environments

<https://www.opencompute.org/projects/cooling-environments>