



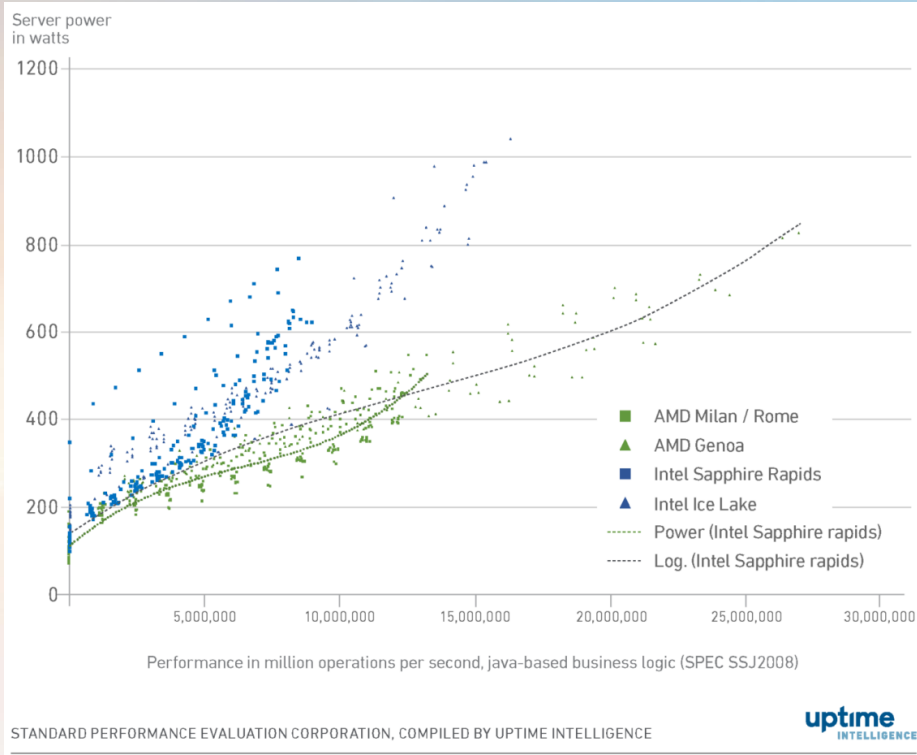
THE DATA CENTER COMPANY

**SUSTAINABILITY  
THROUGH INNOVATIVE  
COOLING SOLUTIONS  
AT DATA CENTERS**



# THE CHIPS & POWER HUNGER GAME...

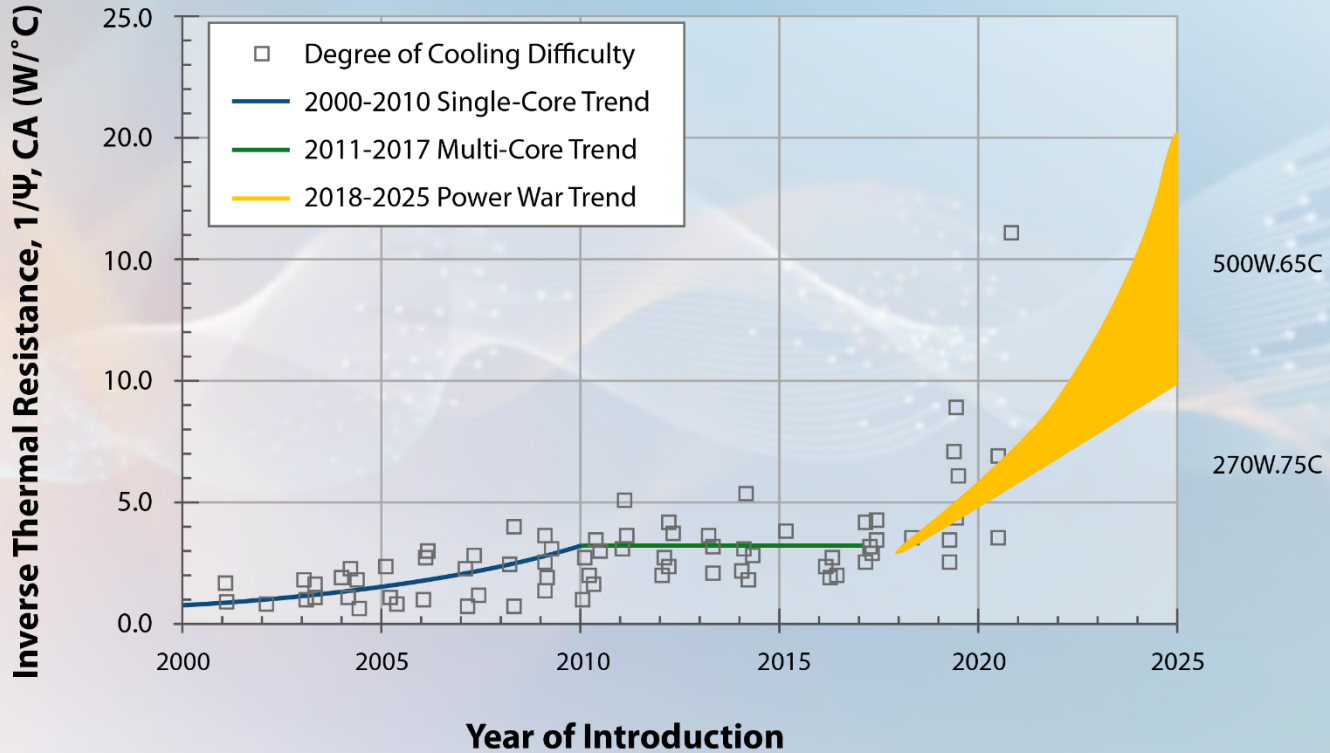
# Servers are getting More Denser & Power Hungry Year on Year



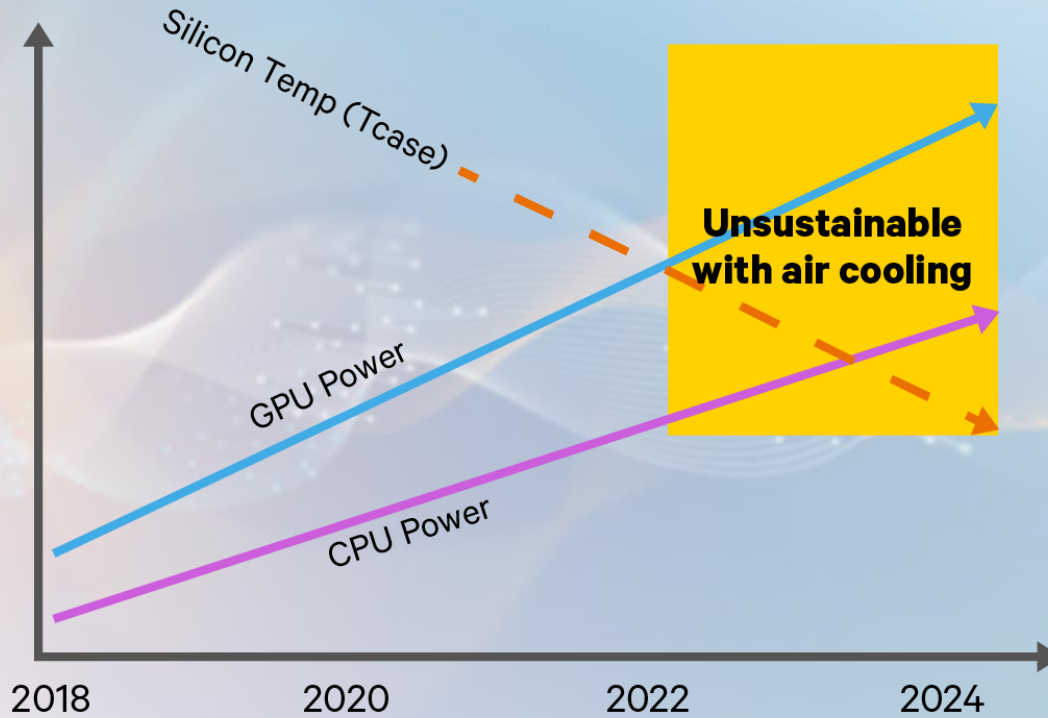
## CPU/ GPU Power Consumption



# Processor Cooling is Getting Challenging








# The Cooling Dilemma





**LET'S COOL THOSE  
HOT CHIPS...**

# Commercial / Market Solutions

SL.	Cooling Technology	Max. Cooling Capacity kW Per Rack	PUE Achieved	Outdoor Heat Exchanger	DELL Technologies	Hewlett Packard Enterprise	NVIDIA	CISCO	SUPERMICRO	Lenovo
1	Perimeter Bottom discharge Cooling 	0kW to 10 kW	1.5 +	Dx Condensers / Chillers	✓	✓	✓	✓	✓	✓
2	In row Cooling 	10kW to 20 kW	1.4 - 1.6	Dx Condensers / Chillers	✓	✓	✓	✓	✓	✓
3	Rear Door Heat Exchanger Cooling 	20kW to 60 kW	1.35 - 1.4	Chillers	✓	✓	✓	✓	✓	✓
4	Direct Contact Liquid Cooling 	30kW to 60 kW	1.2 - 1.25	Dry Cooler / Chiller	✓	✓	About To Release	×	✓	✓
5	Liquid Immersion Cooling 	25kW to 100 kW	1.05	Dry Cooler	✓	×	×	×	✓	×

Note:- Above data is as per Independent market research by Prasa. No official OEM confirmation taken

# Legacy Cooling Solution: Precision Air Conditioning / PAHU

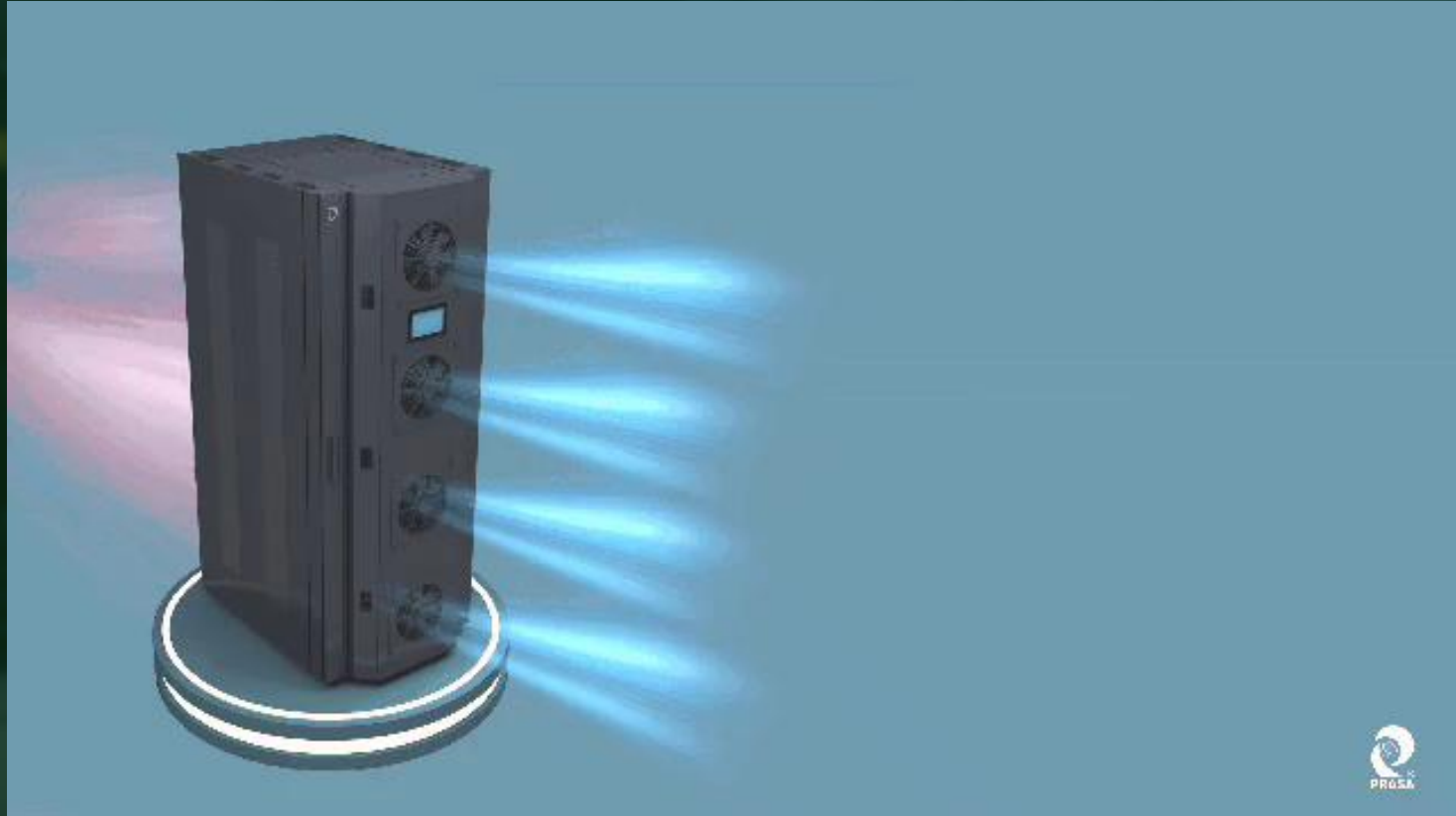




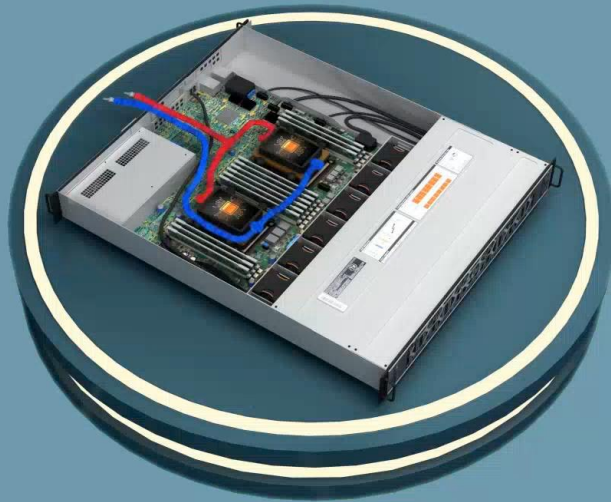
# Legacy Cooling Solution: In-Row Coolers



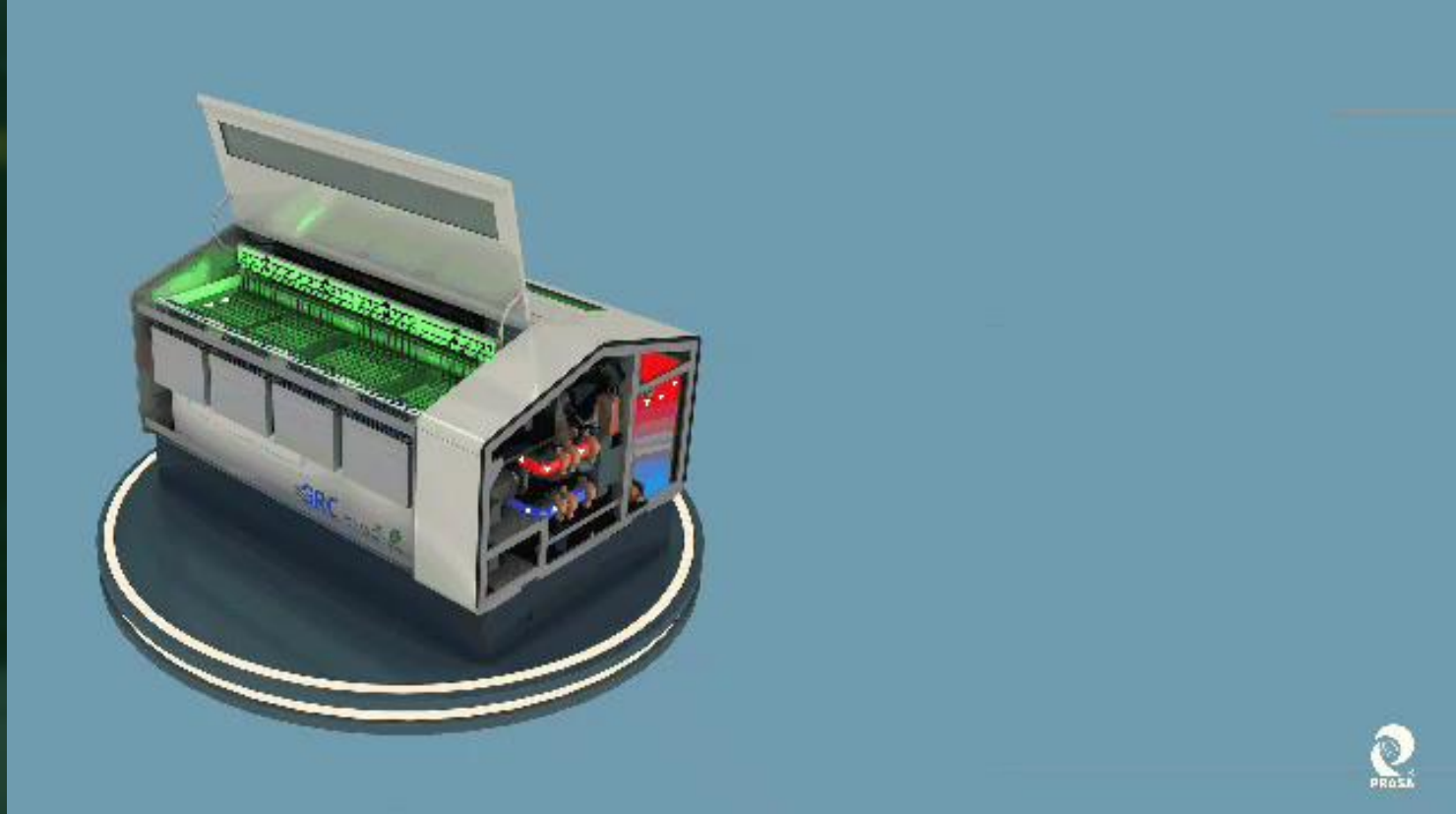
# Greener Cooling Solution: Rear Door Heat Exchanger (RDHx)



# Greener Cooling Solution: Direct Contact Liquid Cooling (DCLC)






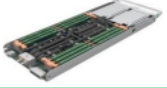
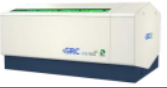
# Greener Cooling Solution: Liquid Immersion Cooling (LIC)





# UNDERSTANDING RDHx & DCLC TECHNOLOGY

# Commercial / Market Solutions

SL.	Cooling Technology	Max. Cooling Capacity kW Per Rack	PUE Achieved	Outdoor Heat Exchanger	DELL Technologies	Hewlett Packard Enterprise	NVIDIA	CISCO	SUPERMICRO	Lenovo
1	Perimeter Bottom discharge Cooling 	0kW to 10 kW	1.5 +	Dx Condensers / Chillers	✓	✓	✓	✓	✓	✓
2	In row Cooling 	10kW to 20 kW	1.4 - 1.6	Dx Condensers / Chillers	✓	✓	✓	✓	✓	✓
3	Rear Door Heat Exchanger Cooling 	20kW to 60 kW	1.35 - 1.4	Chillers	✓	✓	✓	✓	✓	✓
4	Direct Contact Liquid Cooling 	30kW to 60 kW	1.2 - 1.25	Dry Cooler / Chiller	✓	✓	About To Release	x	✓	✓
5	Liquid Immersion Cooling 	25kW to 100 kW	1.05	Dry Cooler	✓	x	x	x	✓	x

Note:- Above data is as per Independent market research by Prasa. No official OEM confirmation taken

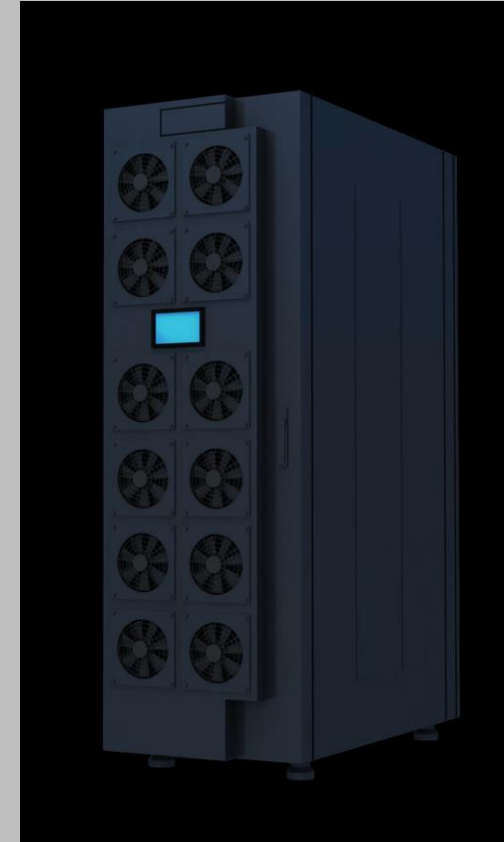


# REAR DOOR HEAT EXCHANGER (RDHx)

# Rear Door Heat Exchanger (RDHx)

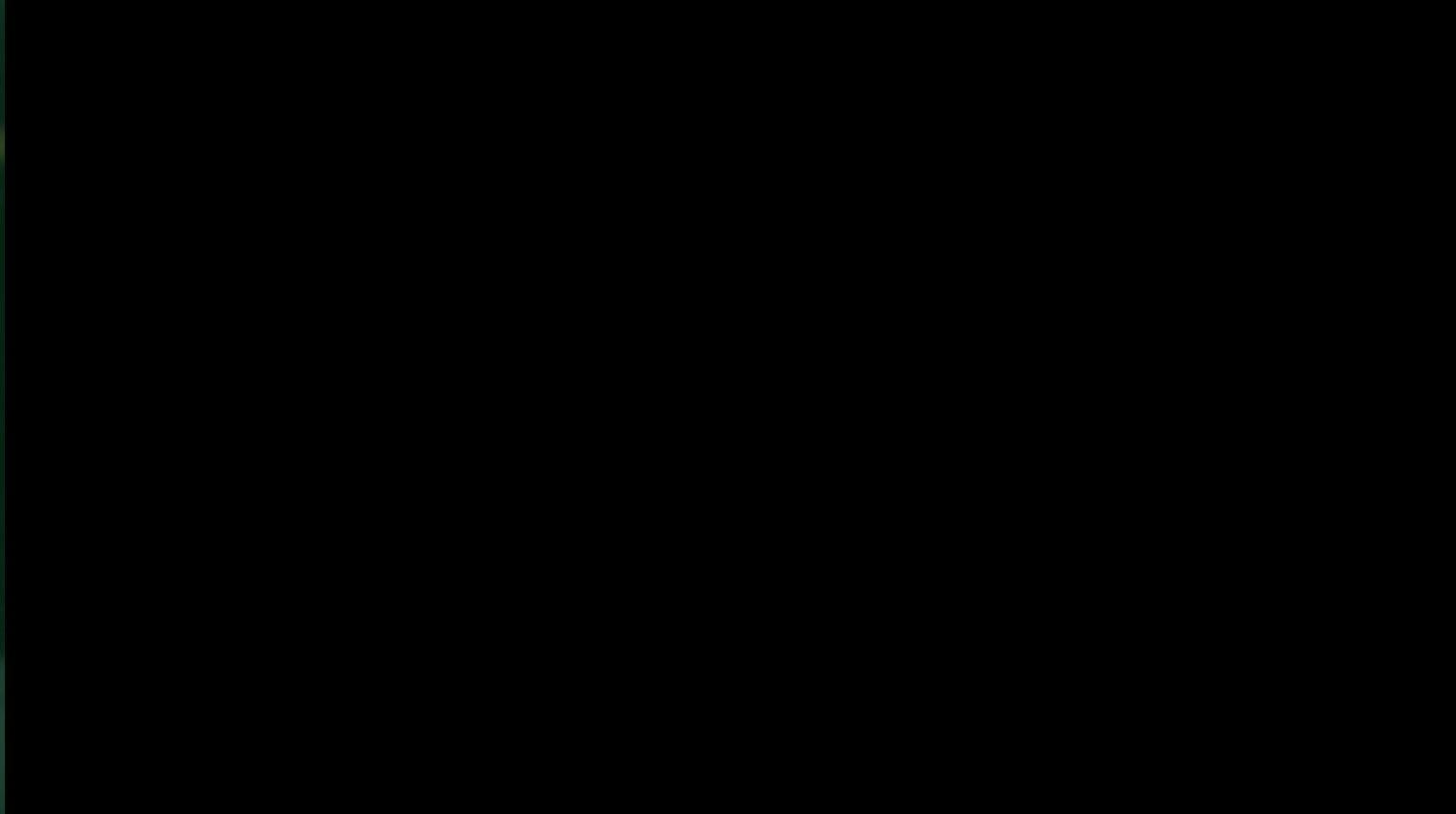
- Chilled Water Based RDHx Solutions are near to source Cooling Solution which extract and cools air at source itself
- Lower Power Consumption as only EC fans and Control modules are used for Door. Centralized Air/Water Cooled Chiller can be installed for providing Chilled Water to the RDHx of required Temp.
- Per Rack Density Can be **~50-55kW Maximum**

Sr. No.	Advantages	Disadvantages
1	Lower Power Consumption	Comparatively Higher CAPEX than Legacy Cooling
2	Less Footprint and at Source Cooling	Product Redundancy
3	High Density Cooling Capacity	Lack of competent SIs





# RDHx in Action...

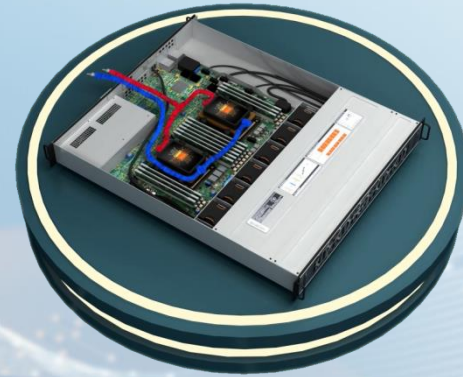




# **DIRECT CONTACT LIQUID COOLING (DCLC)**

# Direct Contact Liquid Cooling

- Direct contact liquid cooling (DCLC) is a type of liquid cooling that involves running a coolant directly over the server components, such as the CPU, GPU, and memory modules.
- This method uses a closed-loop system that circulates the coolant through a pump and a heat exchanger.
- DCLC Comes in 2 Different Technologies
  - Single Phase
  - Two Phase



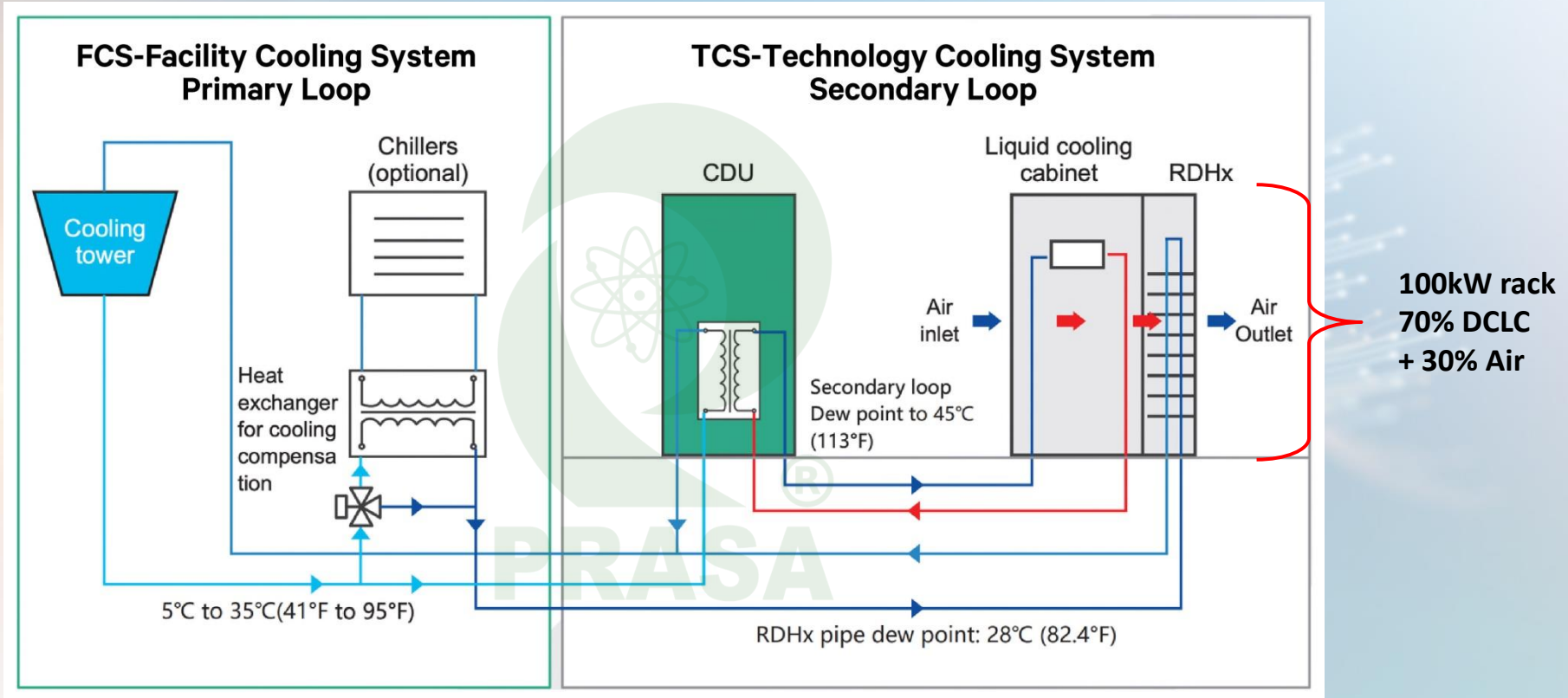
Sr.	Advantages	Disadvantages
1	Lower Power Consumption	Higher CAPEX than Legacy Cooling
2	Only CDU to be Placed in White Space	Dependency on Ambient Temperature
3	High Density Cooling Capacity	Only 70% of total Capacity can be Cooled using DCLC
4	Better PUE as Warm Water Can be Used	Lack of competent SIs



# HOW DOES IT ALL WORKS?

*Right integration a key to success...*

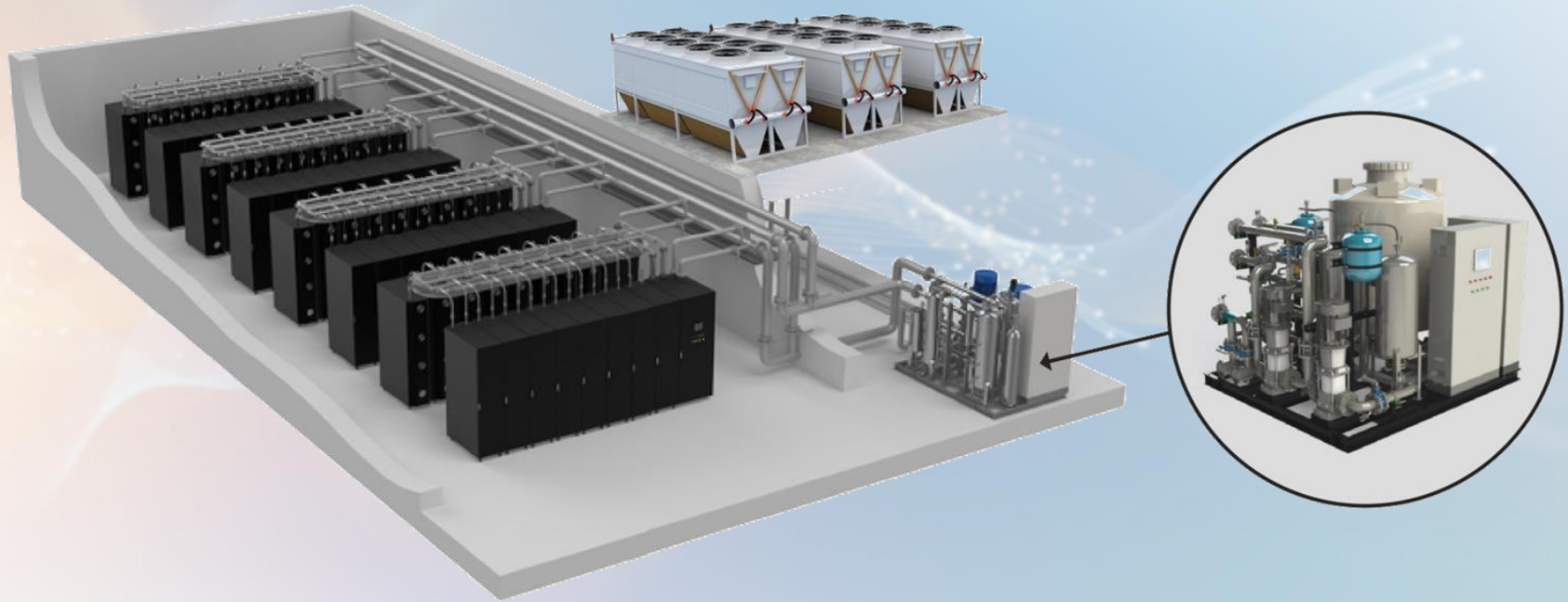
# Schematic for DCLC and RDHx Technologies



# The Product Architecture..



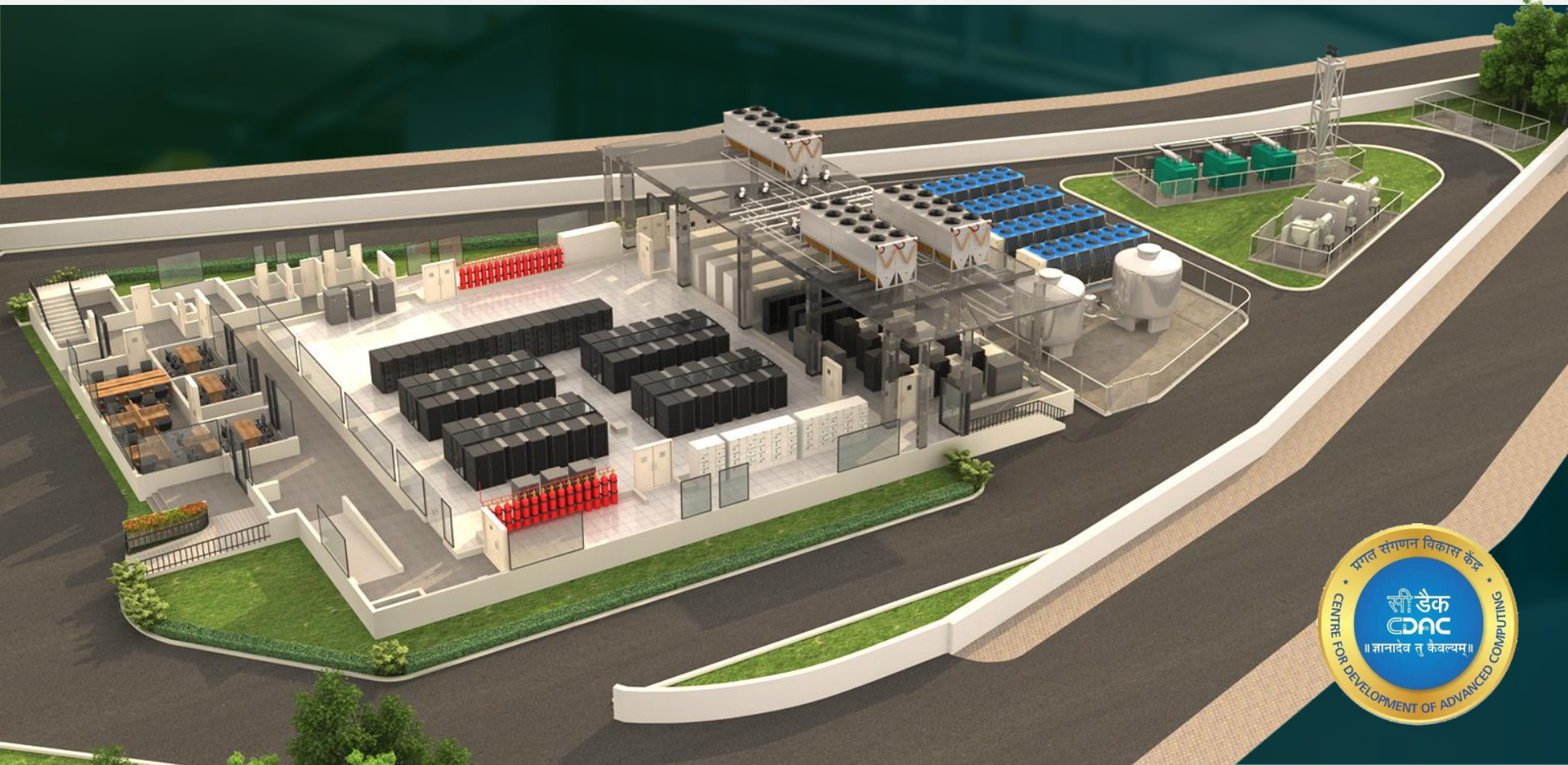
# A 10MW DCLC Floor...





**INNOVATIONS  
DELIVERED IN THE DATA  
CENTER SPACE**





# CDAC : All in One (Four Cooling Technologies)

## Challenges:

- 20PF super computing DC infrastructure as per TIA 942 Tier III guidelines, IT load 2.4MW
- Construction before rainy season
- Per rack load 30kW
- Cooling and piping
- Accommodate 1500UDL DC load and remaining space for office area

## Solution:

### Construction

- DC with 1500UDL
- Design innovations
- Advance alignment for Statutory approvals / Clearances

### Cooling

- Hybrid solution with combination of DCLC, RDHx, IRC and Permitter cooling
- Grooved coupling

### Power

- Efficient UPS system
- Low losses design from SS to campus
- Bus trunking
- Redundant systems

### Integration

- Highly integrated solution on BMS
- Chiller plant Manager
- Revet & BIM from design, deployment

## Business Impact / Customer Benefits:

- Single point for SITC of complete solution
- Support on design innovations & timely accommodation
- Low per MW cost
- Provision for future expansion
- Targeted PUE 1.35



# SPECIALIZED DATA CENTER SOLUTIONS FOR AI DRIVEN GPU SERVERS

- NVIDIA's GPU based servers need specialized power and cooling techniques
- 1 Rack houses 4 NVIDIA DGX Servers = 40.8kW
- Implemented these specialized data center solutions for AI applications



# AI CLUSTERS – GPU BASED EDGE PMDC

## Objective:

- Provide infra to cater to AI application which has high density racks with GPUs
- Need highly engineered solution to take care of power and cooling requirement
- Enable Active IT players/ Server manufacturers to pitch in with complete solution (Active+Passive)
- For Eg : 1 NVIDIA Superpod of 31 GPU Servers @ 10.2kW each inside 1 PMDC

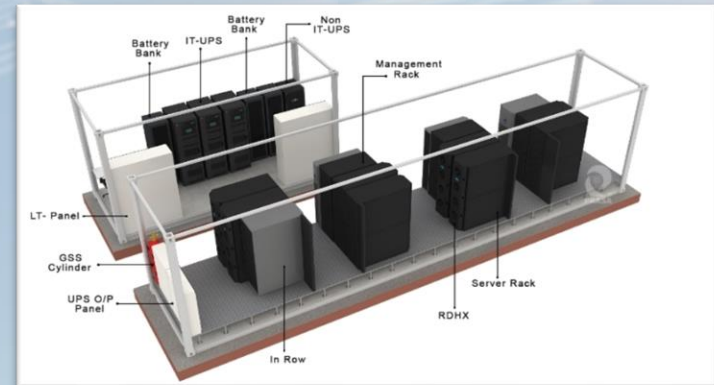
## PRASA PMDC Solution:

PRASA worked closely with leading GPU manufacturing company to design PMDC as

- Pre-fabricated ISO design as 40" container and utility in 20" container
- Per rack load considered as 40kW, total of 8 racks
- 200KVA x 3 UPS (N+1), Li-ION Batteries, 112Tr x 2 Chiller (N+N) and RDHX
- Gas based FSS, FAS, CCTV, ACS, BMS
- PMDC integrated on DCIM for remote holistic view

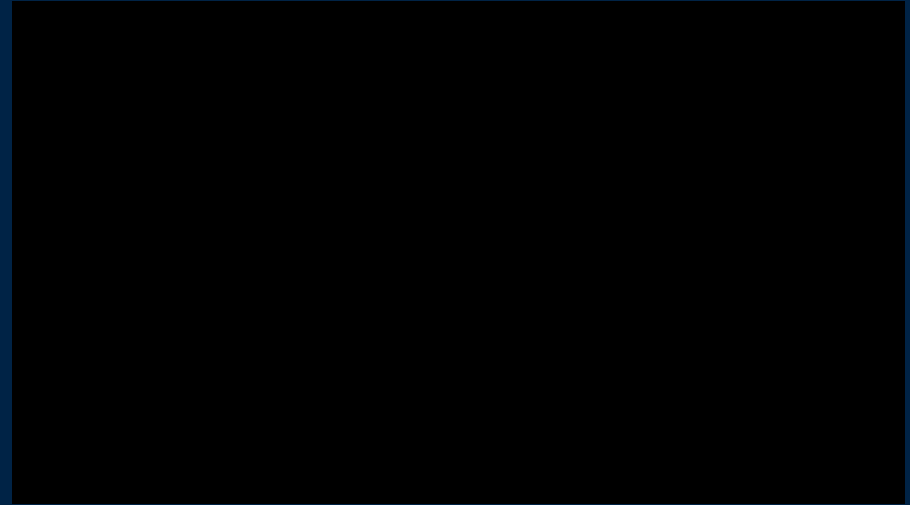
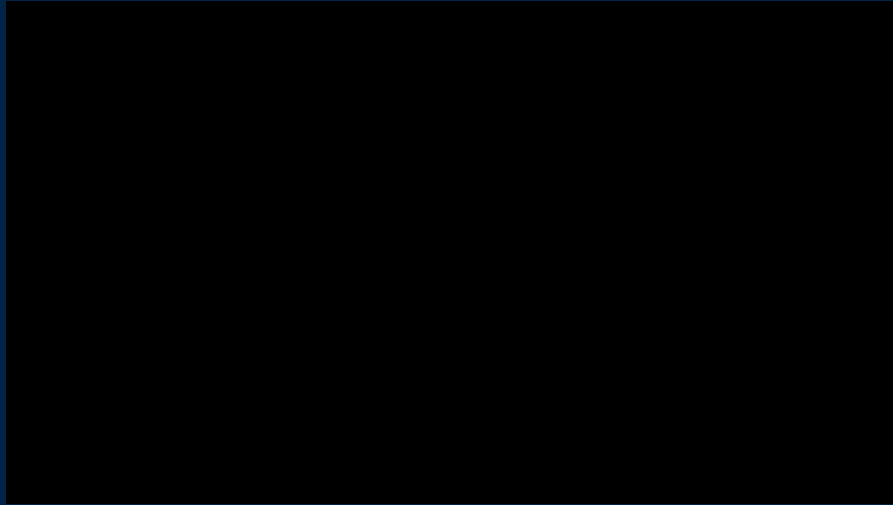
## Customer Benefits:

- AI cluster deployment with IT and Non-IT together
- **Short network cables on Infiniband networks of 400+GBPS, reducing network cable cost**
- No additional space in building to occupy, space saving
- Pre-fab, modular solution ensure saving in time and cost
- SPOC as IT provider
- AI Readiness



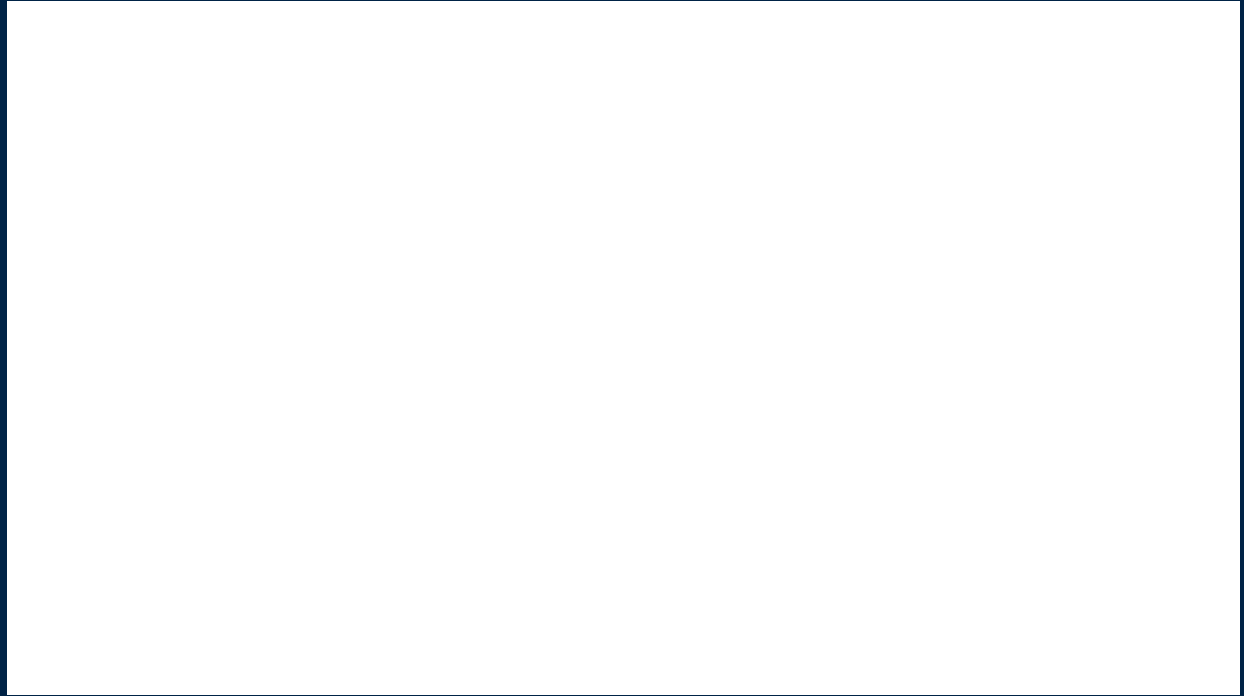
# PREFABRICATED MODULAR EDGE DATA CENTER (PMDC)

- Own manufacturing facility for Pre-Fab Modular EDGE DCs
- Already deployed at multiple locations
- Customizations done for Non-ISO Container based implementation of Edge Data Centers



# SUSTAINABLE LIQUID IMMERSION COOLING DATA CENTERS

- Revolutionary sustainable Cooling technologies
- Can cater to upto 200kW per 52U rack
- Clocking mPUE of <1.05
- First ones to implement in India





**AND.. THIS IS WHAT  
ALL WE DO...**

# COMPANY LEGACY

PRASA has completed 29 successful years in Data center business in 2023 and continuously progressing towards new accomplishments in the data center industry.



**30+**

Years in  
Business



**100+**

Data Centers  
Implemented



**200+**

Professional  
Staff



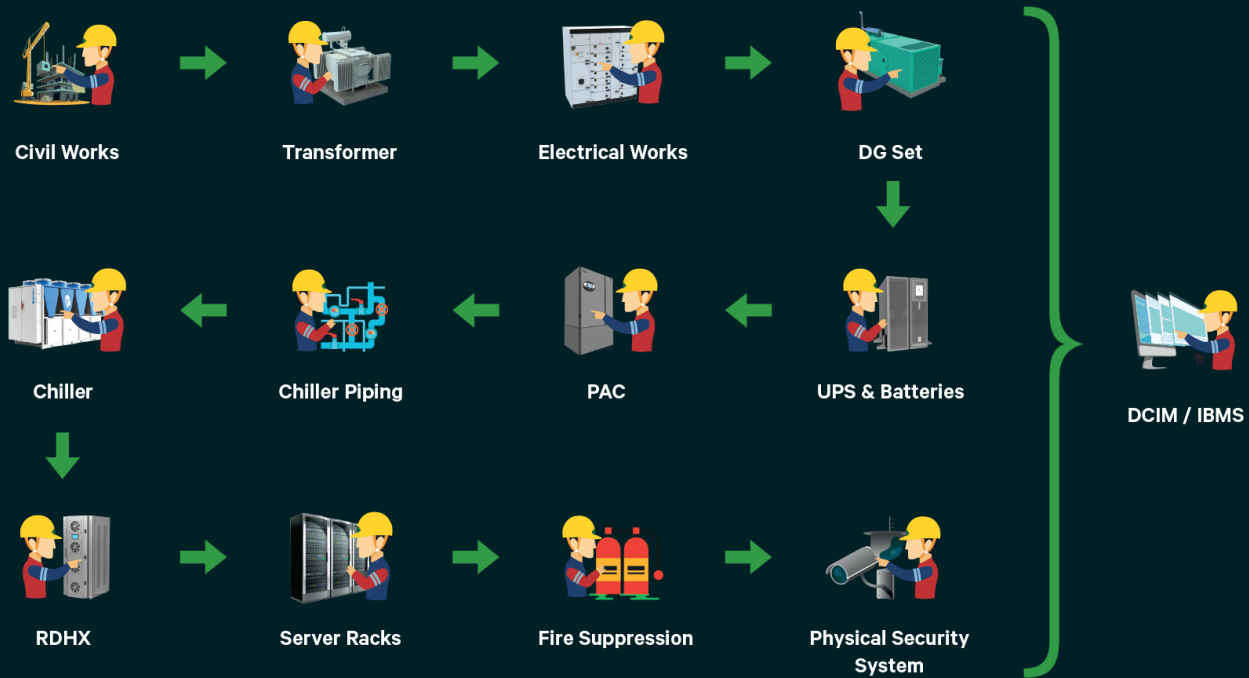
**5000+**

Satisfied  
Clients

- Thought leaders in the data center design & build space
- We've set the bar high – be it technical or the business aspect of a solution
- Certified, In-house experts to deliver right solutions



# END-TO-END DATA CENTER



Plan

Build

Operate

Extend life cycle



THE DATA CENTER COMPANY

## Lets build the Greener Data Centers Together..!!!

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[www.prasa-pl.com](http://www.prasa-pl.com)