Brookhaven National Laboratory

U.S. DEPARTMENT OF ENERGY

Occupancy Floor Plan
725 Main Data Hall
SDCC Data Center

@BrookhavenLab

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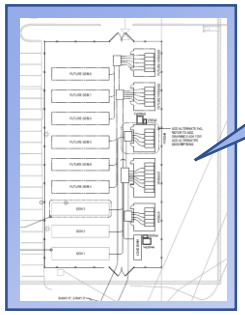
SDCC Data Center Building 725 (Features)

- 50,000 gross sq.ft. – Built in 2021 - $85M cost to build
- Energy efficient with 1.2-1.4 target PUE
- 18,000 sq.ft. IT space for computing/storage
- Power and cooling infrastructure outside of IT rooms
- ~500 physical rack capacity, standard 42U, 19 in racks
- 3.6MW current power available with 9.6MW ultimate build out
- 1.2MW of power and cooling blocks installation- scalable approach
- Robust design with facility water available for liquid (DTC/Immersion) cooling
- ***Funding for fourth (4^{th}) 1.2MW of power, cooling and 3^{rd} (1.7MW) Diesel backup generator approved, ETC Fall 2025***

SDCC Data Center



Generator Yard

Tape Room

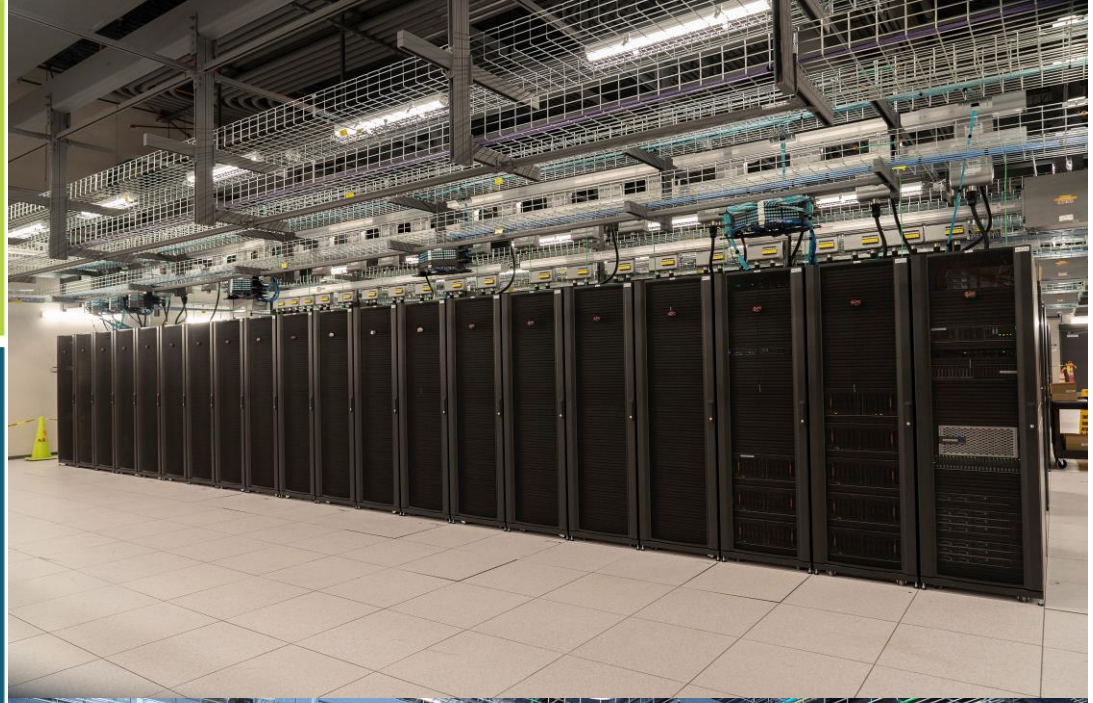
IDF

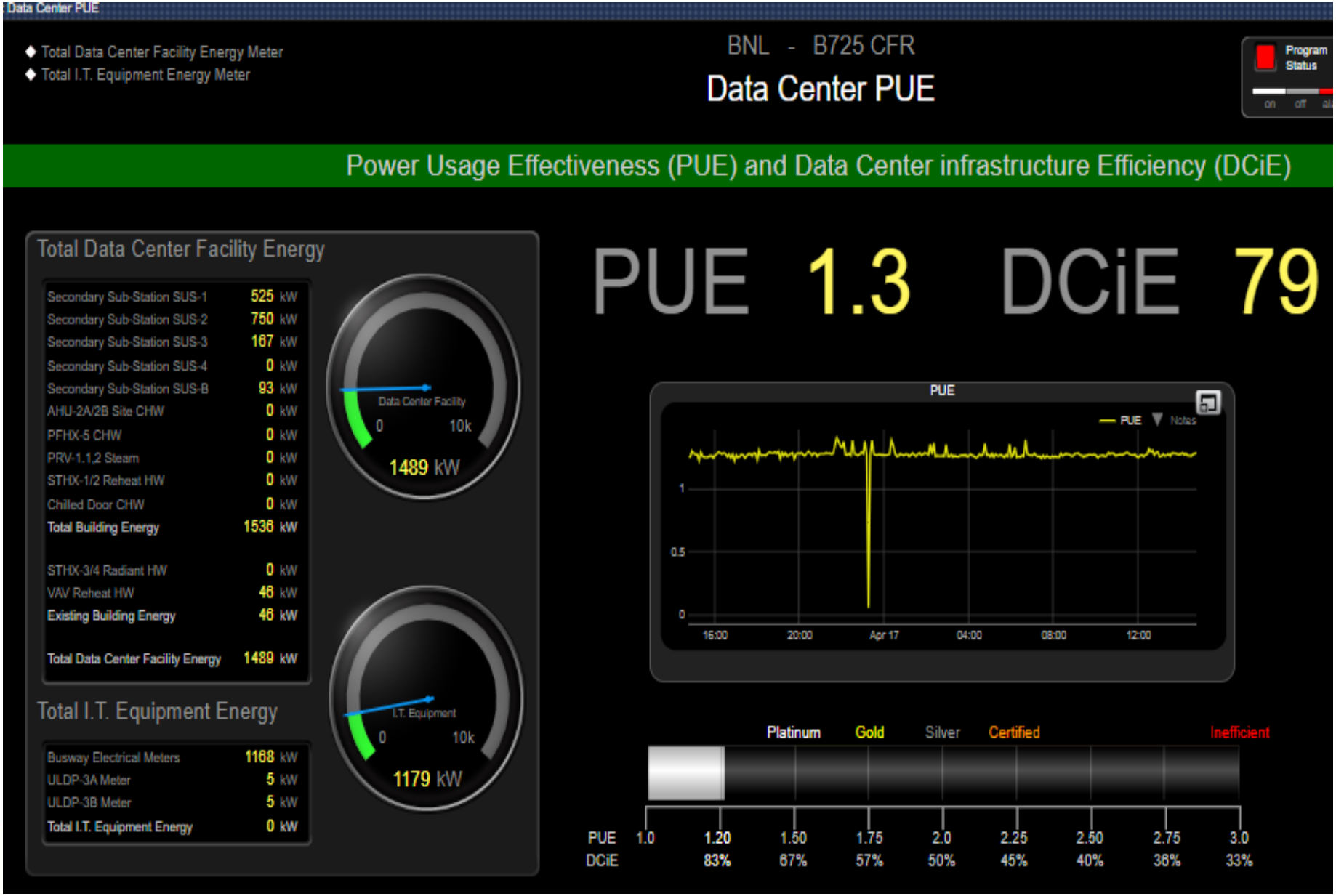
IDF

Network Room

Data Hall

IDF



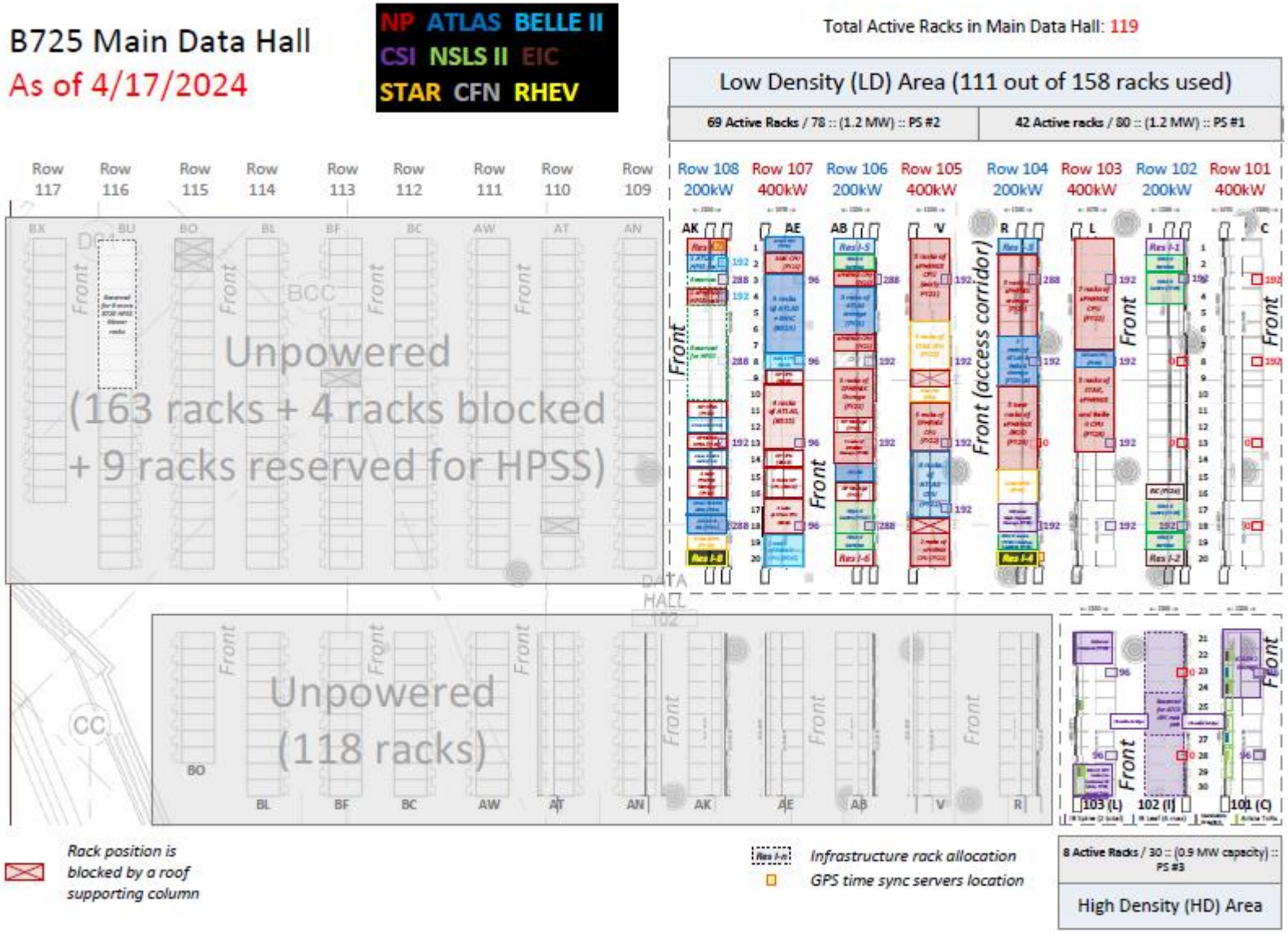

Data Center PUE
Total Data Center Facility Energy Meter
Total I.T. Equipment Energy Meter
BNL - B725 CFR
Data Center PUE
Program Status
on
off
Power Usage Effectiveness (PUE) and Data Center infrastructure Efficiency (DCiE)
Total Data Center Facility Energy
Secondary Sub-Station SUS-1 525 kW
Secondary Sub-Station SUS-2 750 kW
Secondary Sub-Station SUS-3 167 kW
Secondary Sub-Station SUS-4 0 kW
Secondary Sub-Station SUS-B 93 kW
AHU-2A/2B Site CHW 0 kW
PFHX-5 CHW 0 kW
PRV-1,1,2 Steam 0 kW
STHX-1/2 Reheat HW 0 kW
Chilled Door CHW 0 kW
Total Building Energy 1536 kW
STHX-3/4 Radiant HW 0 kW
VAV Reheat HW 46 kW
Existing Building Energy 46 kW
Total Data Center Facility Energy 1489 kW
Data Center Facility
0
10k
1489 kW
Total I.T. Equipment Energy
Busway Electrical Meters 1168 kW
ULDP-3A Meter 5 kW
ULDP-3B Meter 5 kW
Total I.T. Equipment Energy 0 kW
I.T. Equipment
0
10k
1179 kW
PUE 1.3 DCiE 79
PUE
PUE
Notes
1
0.5
0
16:00
20:00
Apr 17
04:00
08:00
12:00
Platinum
Gold
Silver
Certified
Inefficient
PUE 1.0 1.20 1.50 1.75 2.0 2.25 2.50 2.75 3.0
DCiE 83% 67% 57% 50% 45% 40% 36% 33%

725 Main Data Hall

Ultimate Rack Spaces	482, 42U, 19” racks
Total Rack Spaces available (per 3.6MW)	(158) Low Density (30) High Density
Current Rack Deployment	(111) Low Density (8) High Density
Available Rack Spaces	(47) Low Density (22) High Density
IT Power available (UPS/Generator)	3.6MW
Cooling available	3.6MW
Diesel Back up Generator 2x1.7	3.4MW
Current IT Power usage	**1180kW**
MDH	1110kW
Network Lab	50kW
Tape Library	20kW
Data Center PUE (average)	1.3
Total kwh consumed in March 24	696,200

F&O pays for the preventative and break fix maintenance on power, cooling and for the unused data center white space in 725 SDCC Data center.

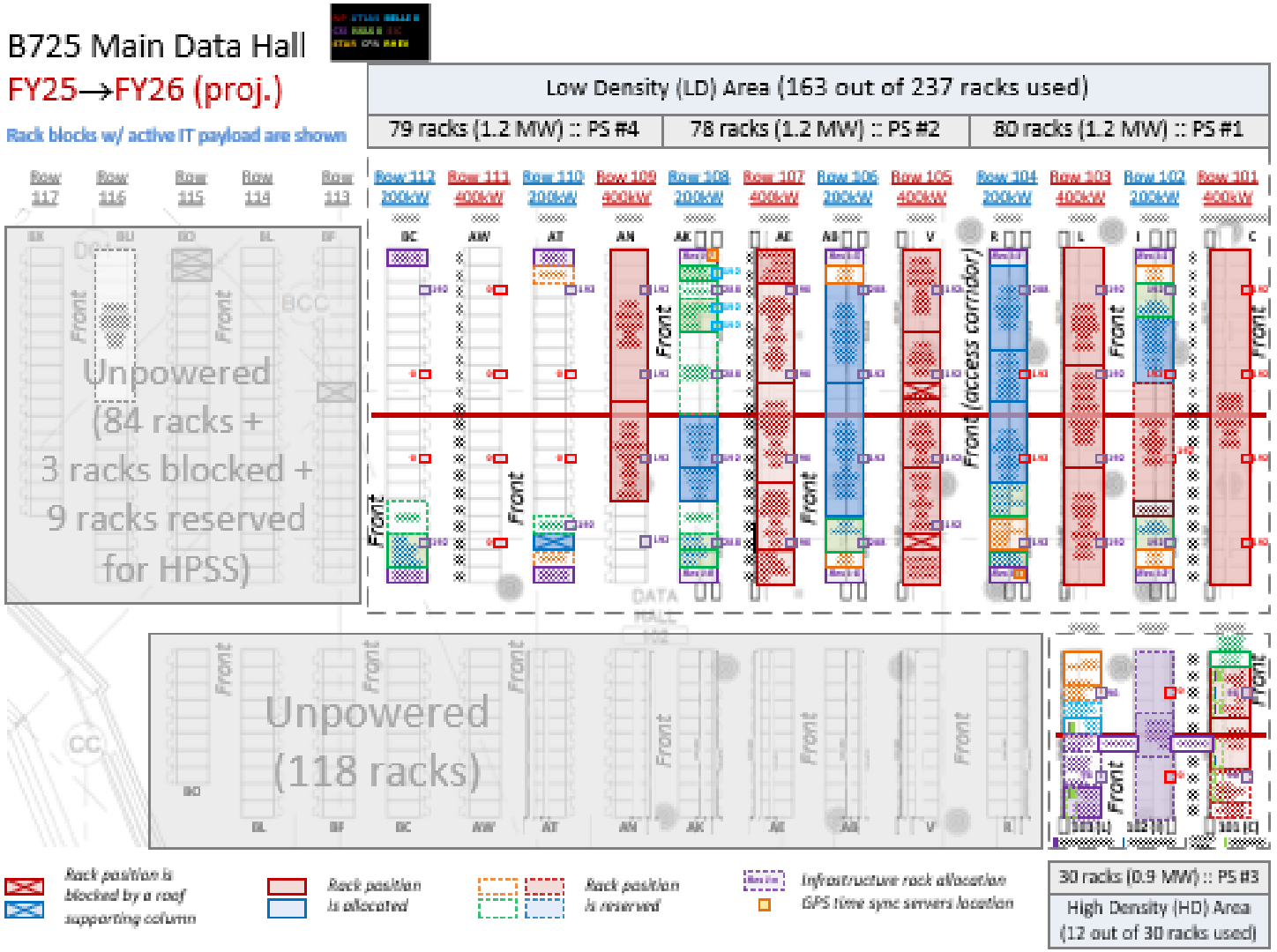
Current rack occupancy by programs in MDH



Power Draw in 725 Data Center since 01/2023

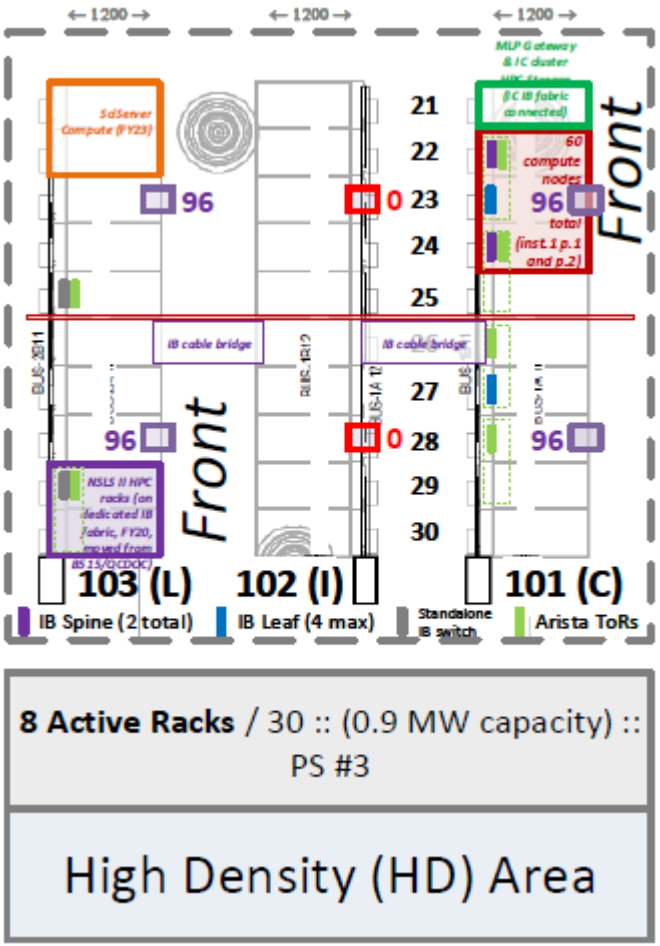
Projected rack occupancy by programs in MDH FY 25-26

(developed in 2021 with the understanding of 4th PS availability in FY-25)



Overview of Power and Cooling in 725 HD area of MDH

- The High Density (HD) area is the south east section of 725 Main Data Hall (MDH).
- Equipped with (3) overhead electric bus bars **ea.** at 300kW 208V/3Ph Power System#3
- Three rows of racks with ten (10) racks at 30kW per rack, 208V/3Ph constitute the HD



HD area power and space utilization (current)

(8) racks installed in the HD area for CSI, NSLS-II, LQCD and CFN

Power

Row 101	(4) racks x 20kW = 80kW	Available power 300kW-80kW	= 220kW
Row 102	No racks	Available power	= 300kW
Row 103	(4) racks x 20kW = 80kW	Available power 300kW-80kW	= 220kW
		Total Power Available in HD area	= 760kW

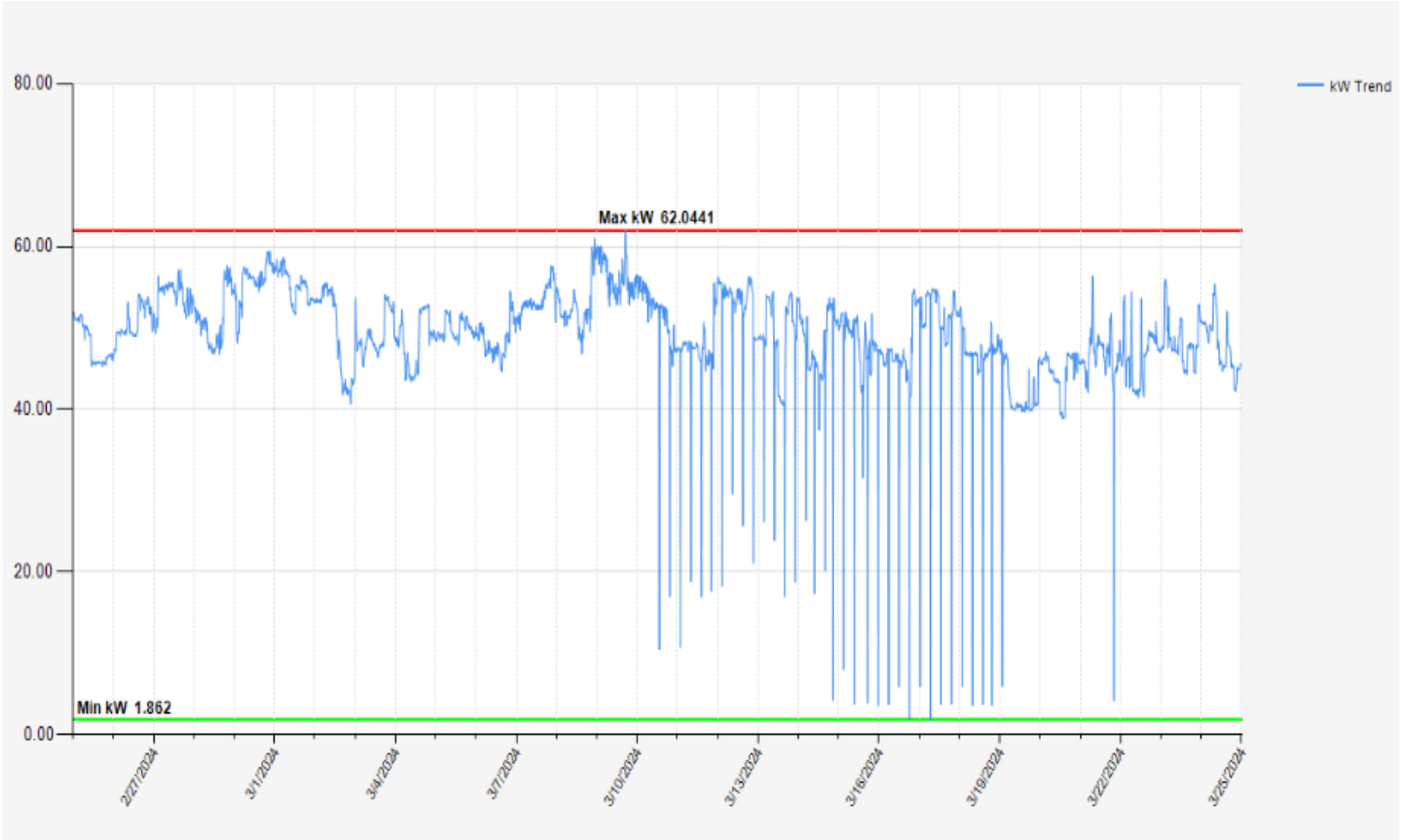
Cooling

Cooling is proportional to power so 760kW of cooling is available in HD area

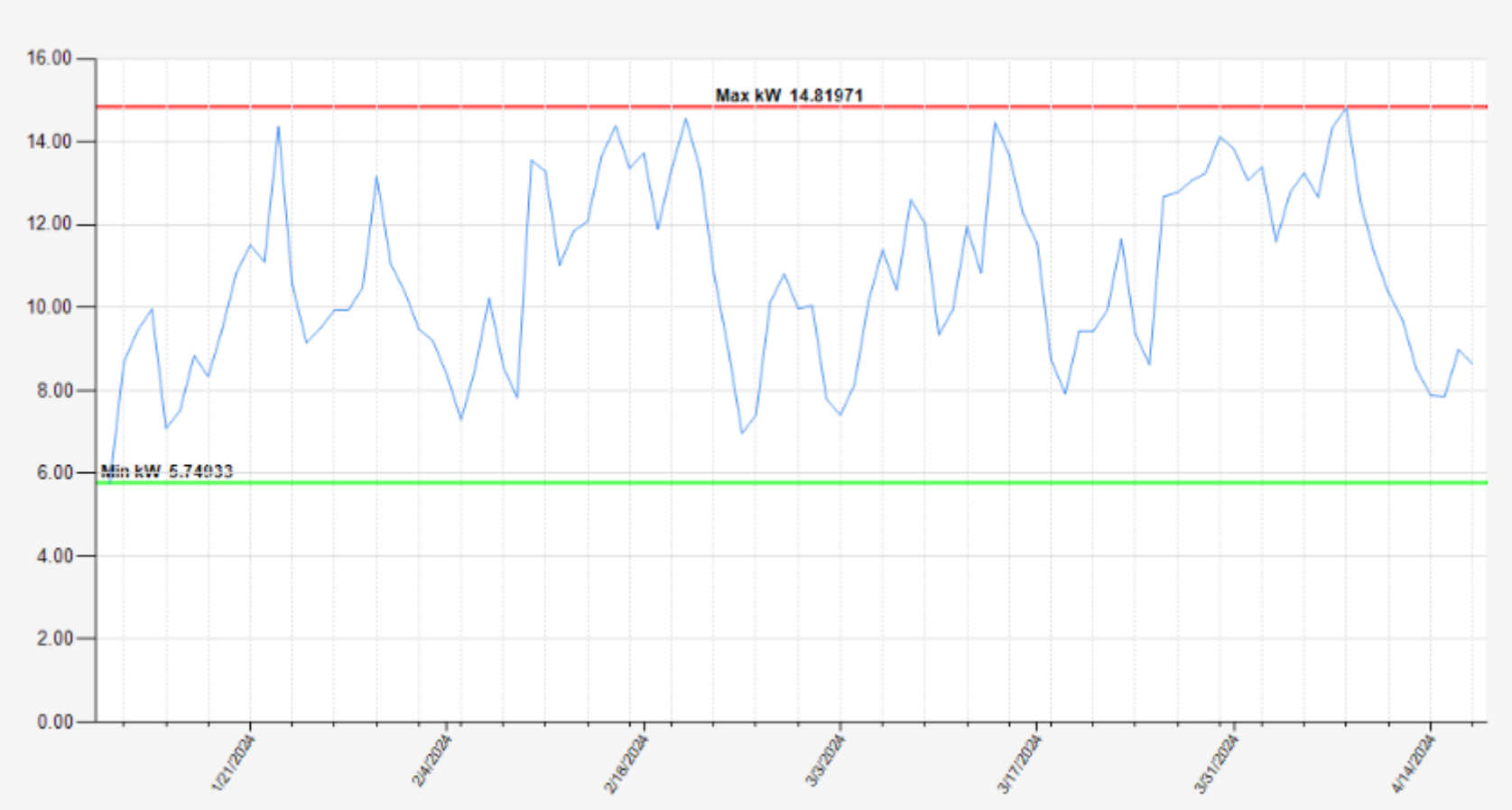
Floor Space

Row 101	(4) racks	Available rack space (10-4)	= 6
Row 102	No racks	Available rack space (10-0)	= 10
Row 103	(4) racks	Available rack space (10-4)	= 6
		Total rack spaces available	= 22

CSI HD (IC Gen-II + Sci Server) 6 racks - 62kW max power draw



NSLS-II HD (2) racks – 15kW max power draw



HD area power and space utilization with ATOS Supercomputer

ATOS super computer deployment for the digital twin setup in HD of 725 poses challenges to the optimum utilization of power and space

(2) liquid cooled racks at (150kw) ea., and 480V/3Ph are bring proposed with one rack to be installed in the initial deployment

The existing 208V/3ph overhead electrical power distribution will need to be modified to 480V/3ph to accommodate this installation

Since the overhead electric busbar can only provide 300kW of power, only two ATOS racks at 150kw each will consume this power leaving the (8) floor spaces vacant or unusable

In addition to the (2) supercomputer racks, (1) management rack at standard voltage 208V/3ph will need to be deployed for the entire ATOS setup to work

Assuming the ATOS equipment is deployed, below is balance of available power and space in the HD section.

Power

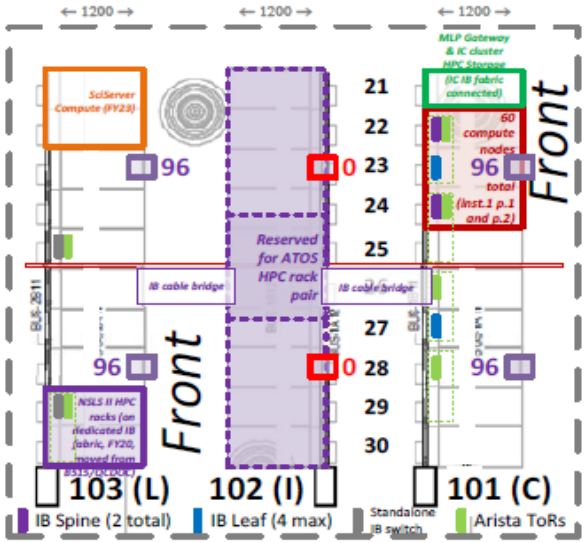
Row 101	(4) racks x 20kW = 80kW	Available power 300kW-80kW = 220kW
Row 102	(2) racks x150kW=150kW	Available power 300kW-150kW = 0kW
Row 103	(5) racks x 20kW = 100kW	Available power 300kW-100kW = 200kW
		Total Power Available in HD area = 420kW

Cooling

Cooling is proportional to power so 420kW of cooling is available in HD area

Floor Space

Row 101	(4) racks	Available rack space (10-4) = 6
Row 102	(2) racks	Available rack space (10-10) = 0
Row 103	(4) racks	Available rack space (10-4) = 6
		Total rack spaces available = 12



8 Active Racks / 30 :: (0.9 MW capacity) :: PS #3

High Density (HD) Area

Request to all 725 Data Center Stakeholders

- ✓ Provide projection of IT hardware rack space and power (best estimate) through FY-26
- ✓ Info needed by 04/26/2024 to develop rack occupancy plan through FY-26
- ✓ Info to be presented to F&O for continued $250K of lab funding to pay for un-used DC space
- ✓ Provide dollar value of the all IT hardware, info needed for FIMS database
- ✓ Contact SDCC Data center Ops teams for any questions pertaining to data center facility, new hardware deployment, migrations, billing or alarms
- ✓ Ops team may be reached at sdcc-datacenteropsteam@bnl.gov

Questions