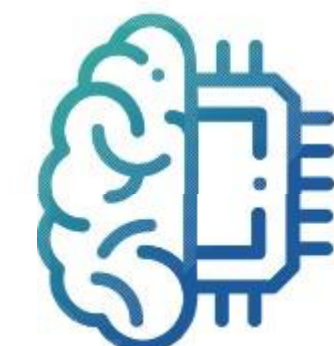


200+ GPUs in one HPC
- available in months

GPU day 2021

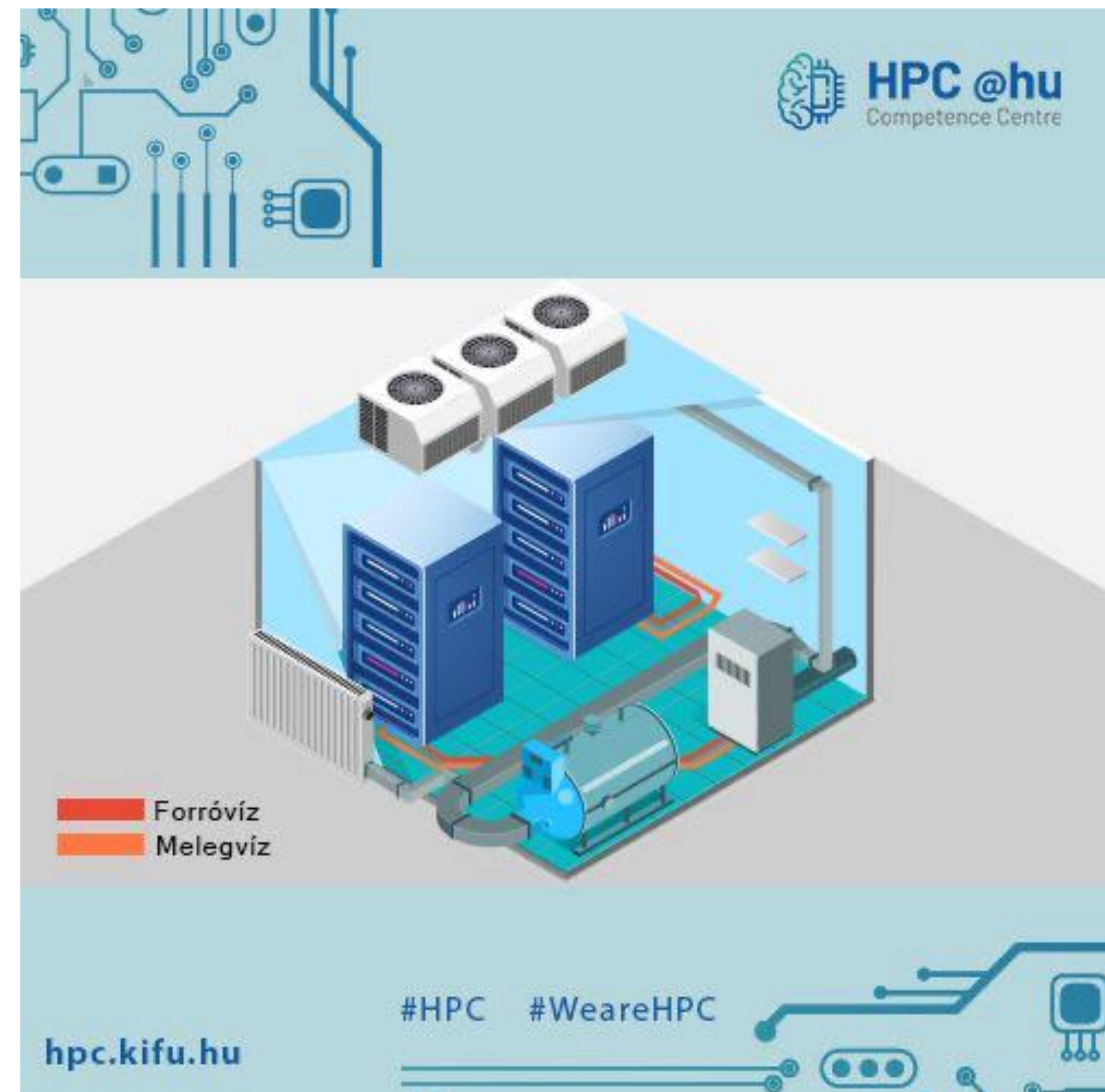
Zoltán Kiss - KIFÜ - Head of HPC Dpt.



HPC @hu
Competence Centre

Contents

-  What's HPC
-  HPC programme
-  History
-  Development project
-  DC Infrastructure
-  HPC Infrastructure
-  Portal System



HPCC

**Costs
Time**

**RDI
Results
Staff
Competitiveness**

Budapest



254 Tflop/s 27 Tflop/s

Miskolc



8 Tflop/s

Debrecen



18 Tflop/s

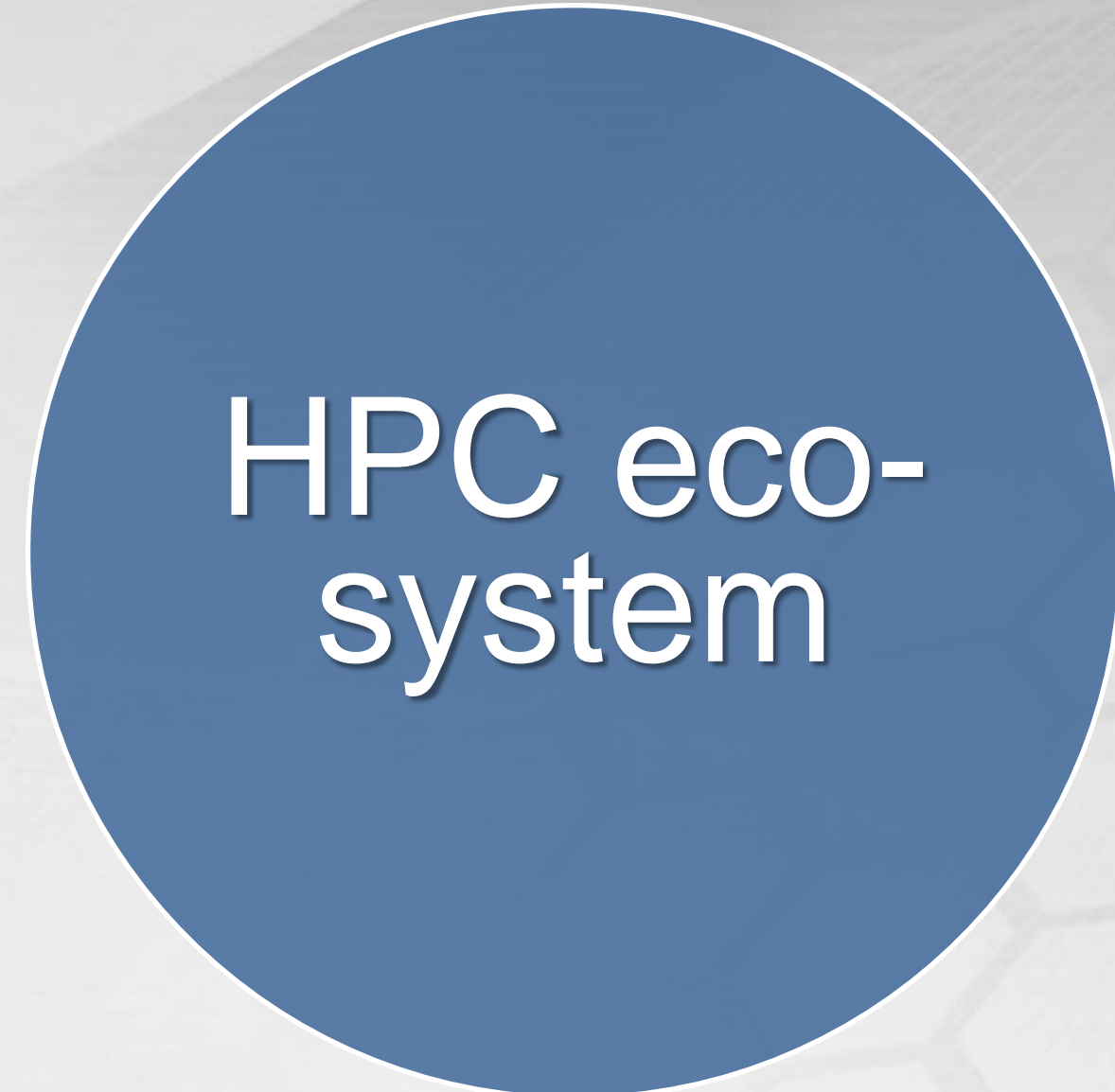
Szeged



20 Tflop/s



Knowledge Transfer



Competence
Center
SME connections



20 years of Hungarian HPC



2001 60
Gflop/s

2009
900
Gflop/s

2011 48
Tflop/s

2015
0.45
Pflop/s

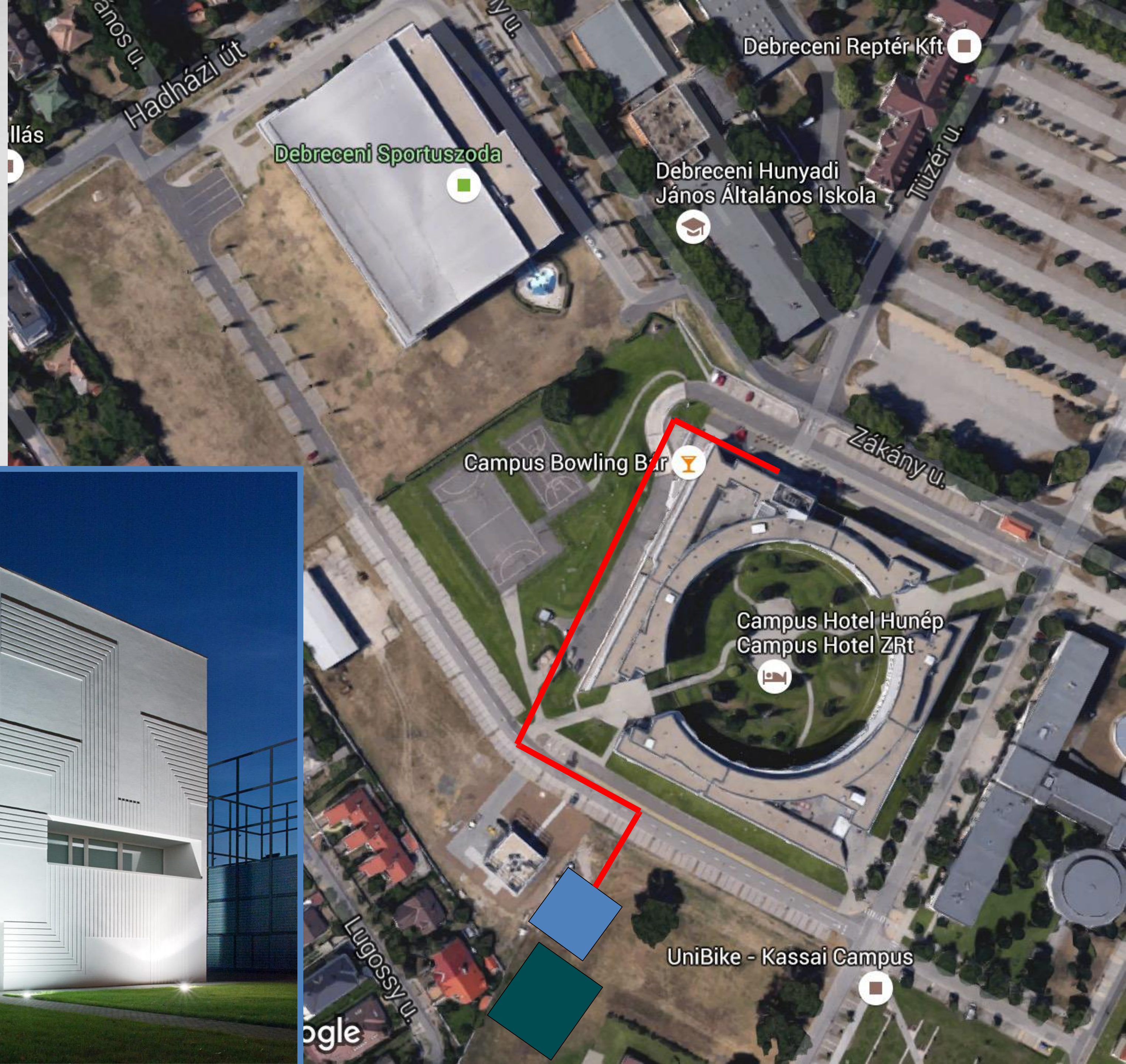
2022
5+
Pflop/s

<https://hpc.kifu.hu/jubileum>







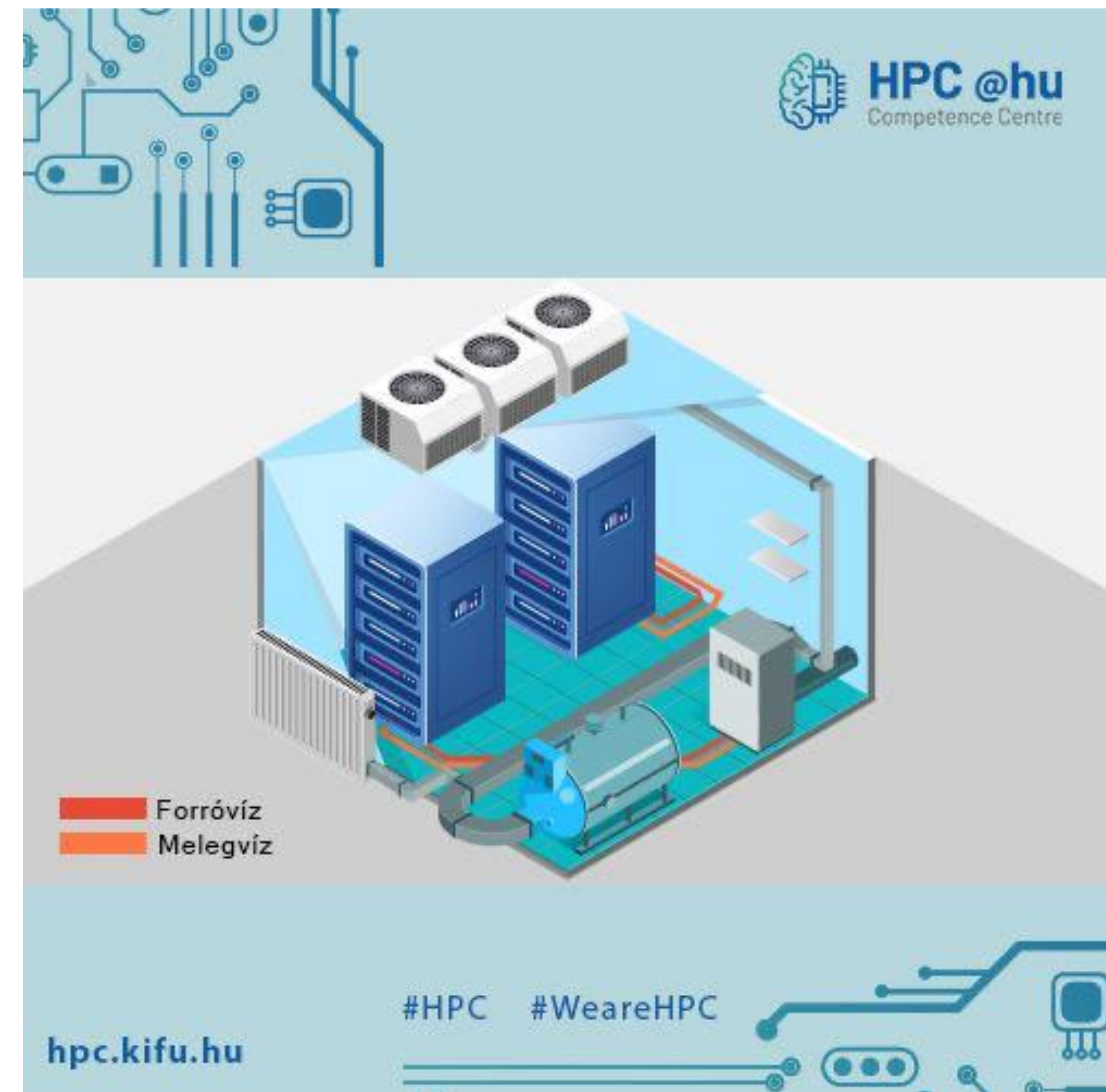
Green DC

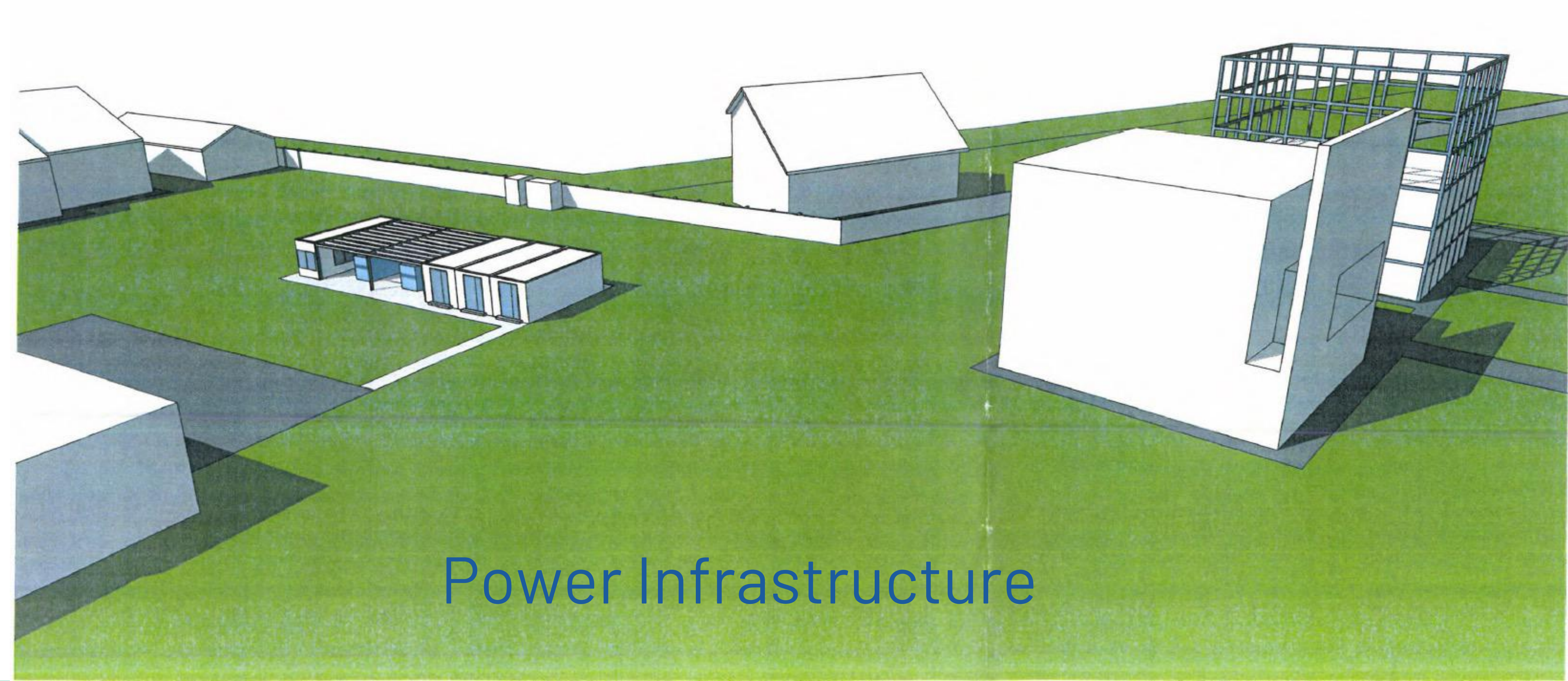
Hot water cooled
90%- Free Cooling
Waste Heat reuse



Under the hood

-  1.3 MW power
-  2 x 1 MW UPS capacity
-  1 x 800 kW Aggregator
-  700 kW warm water cooling
-  300 kW cool water / aircooling
-  2 x 2 x 260 kW warm water chillers
-  3 x 177 kW cold chillers

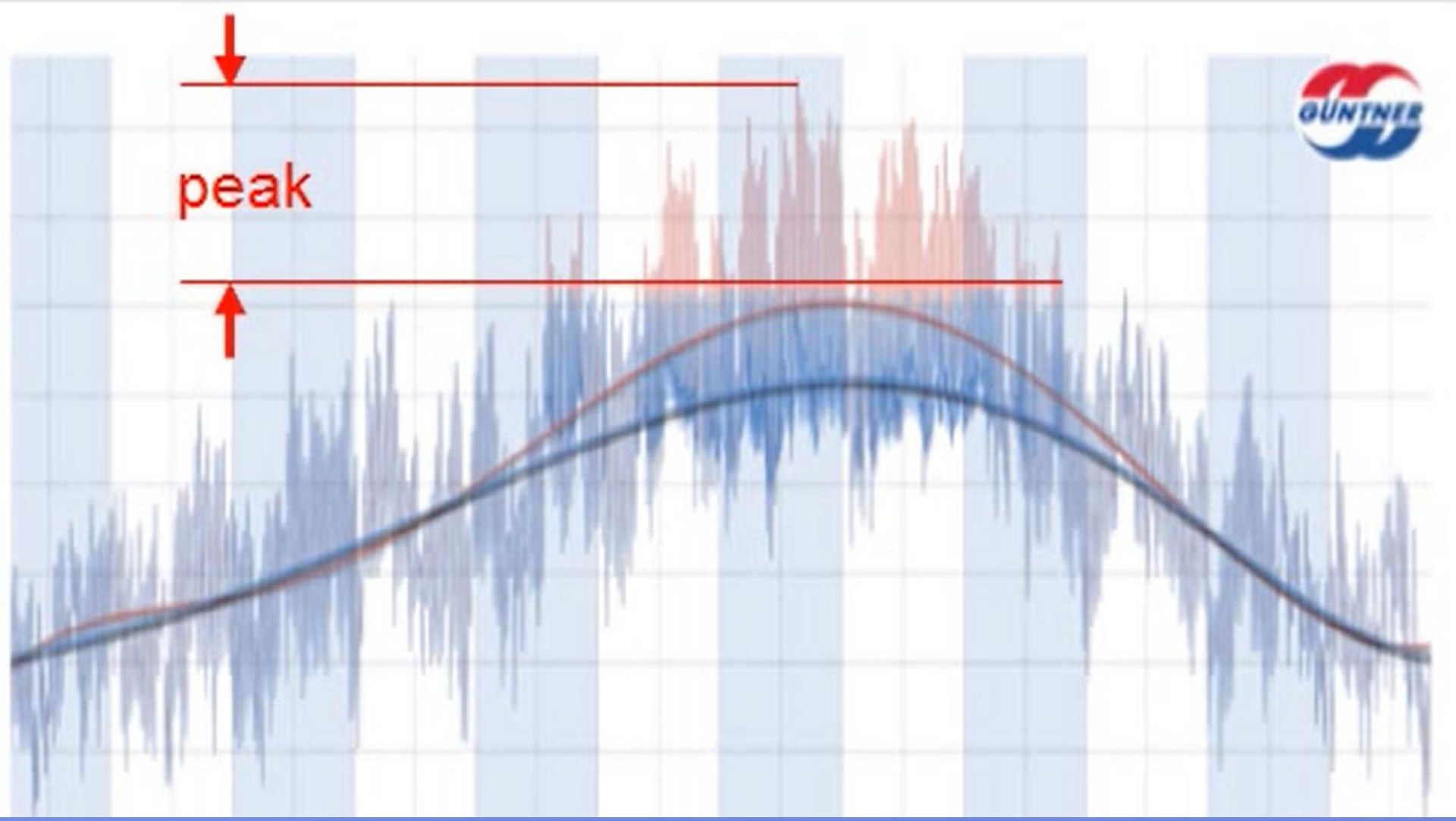




Power Infrastructure



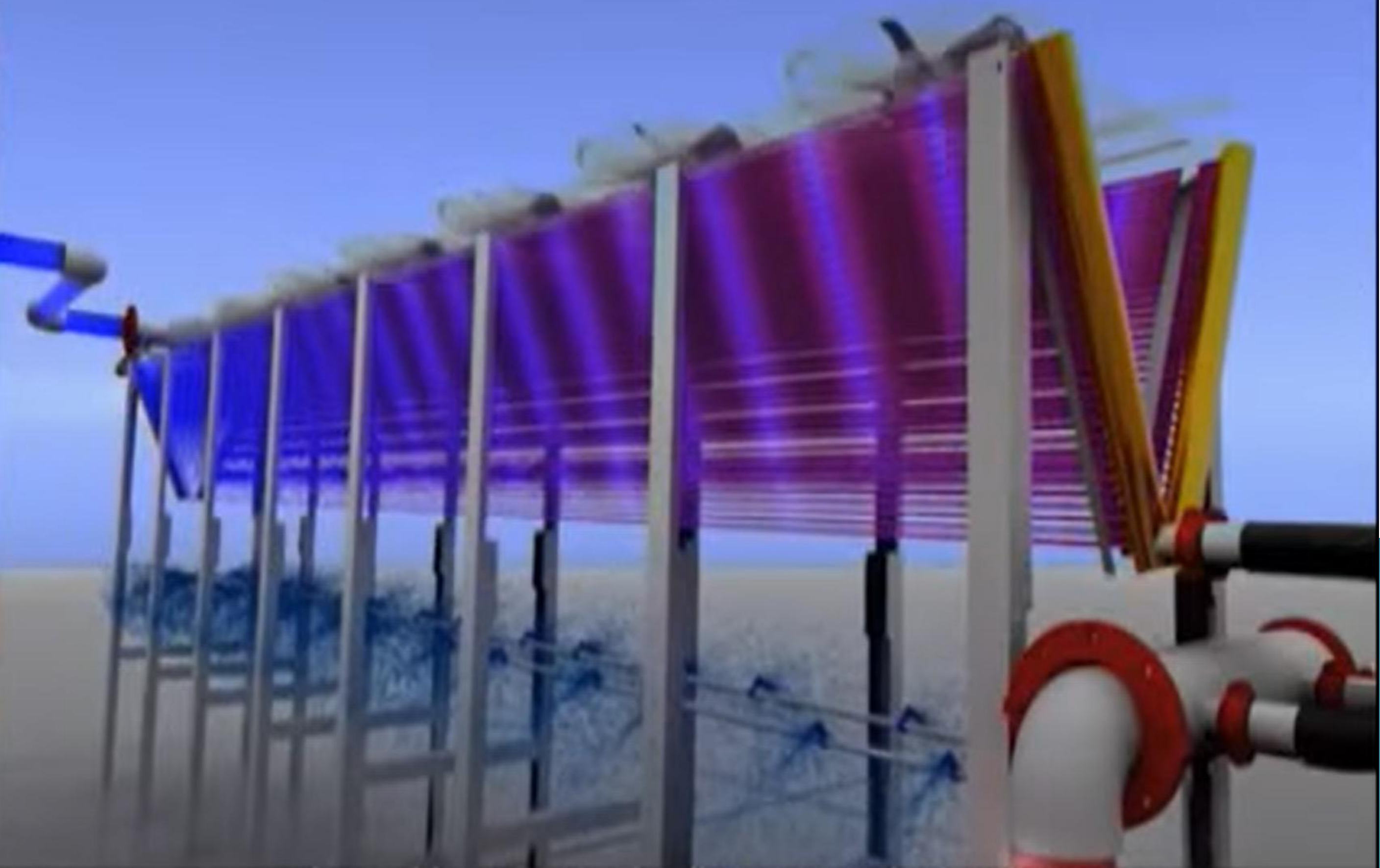
HPC @hu
Competence Centre



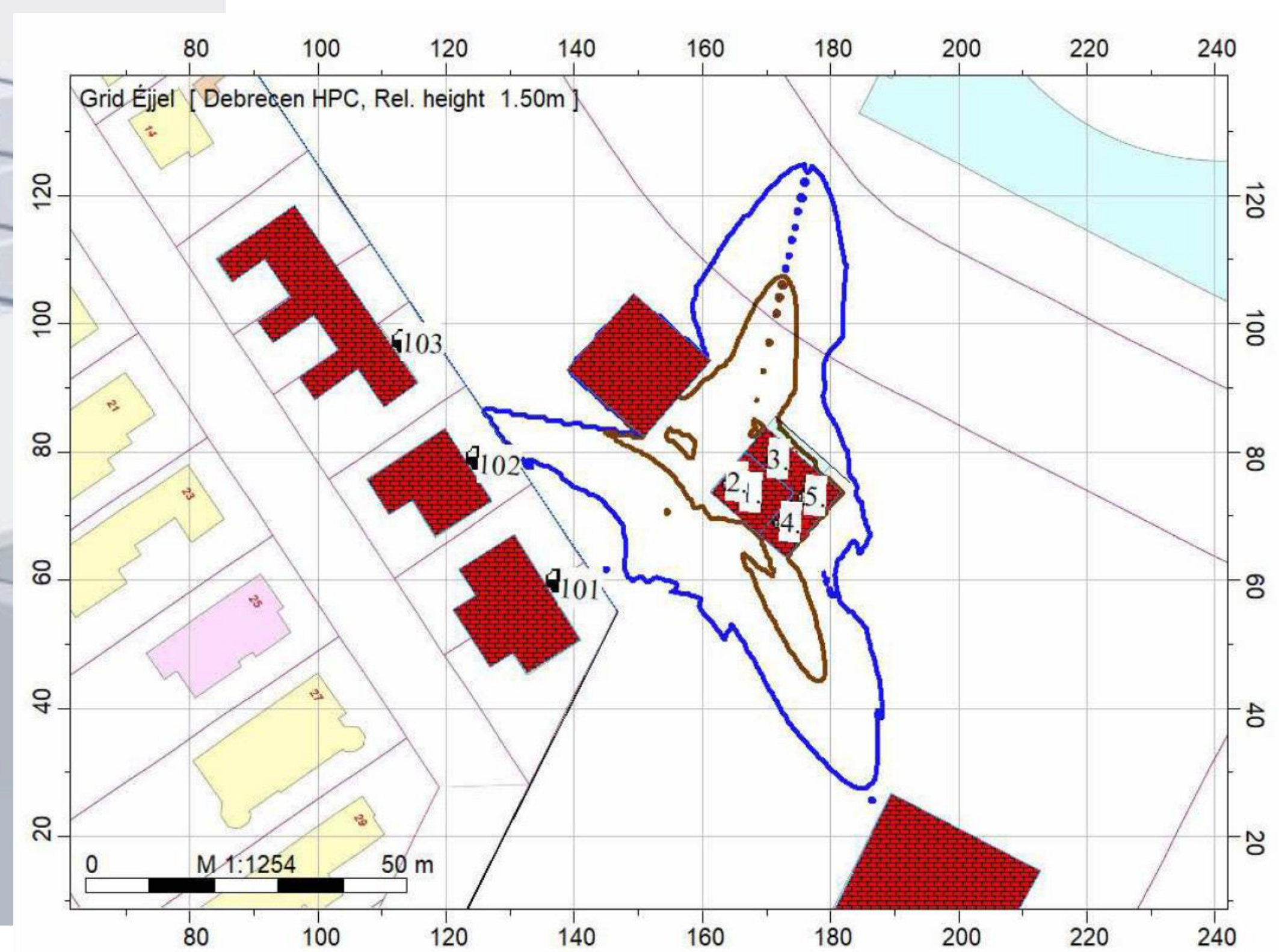
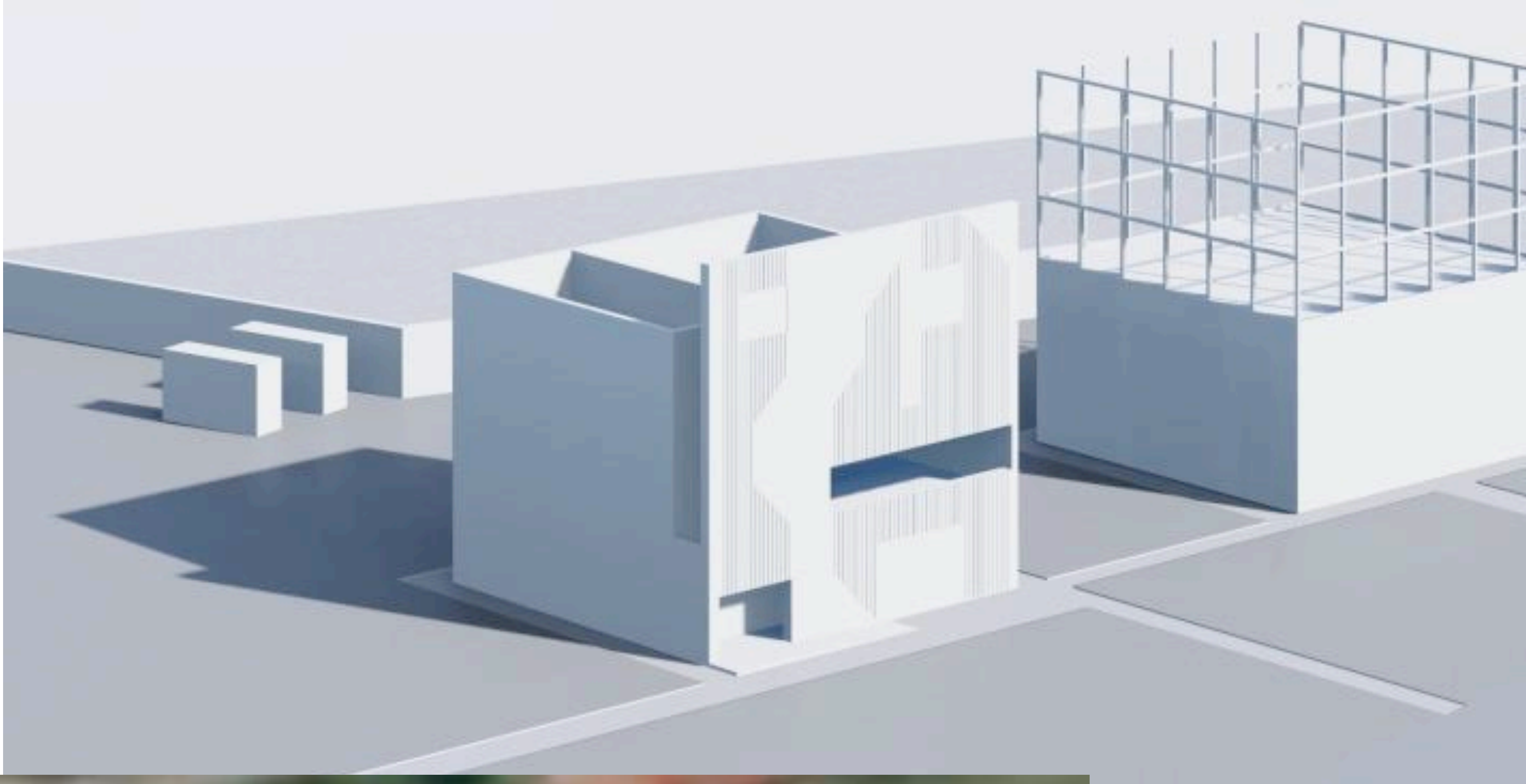
<https://youtu.be/v6MaAjyUx4Q?t=106>



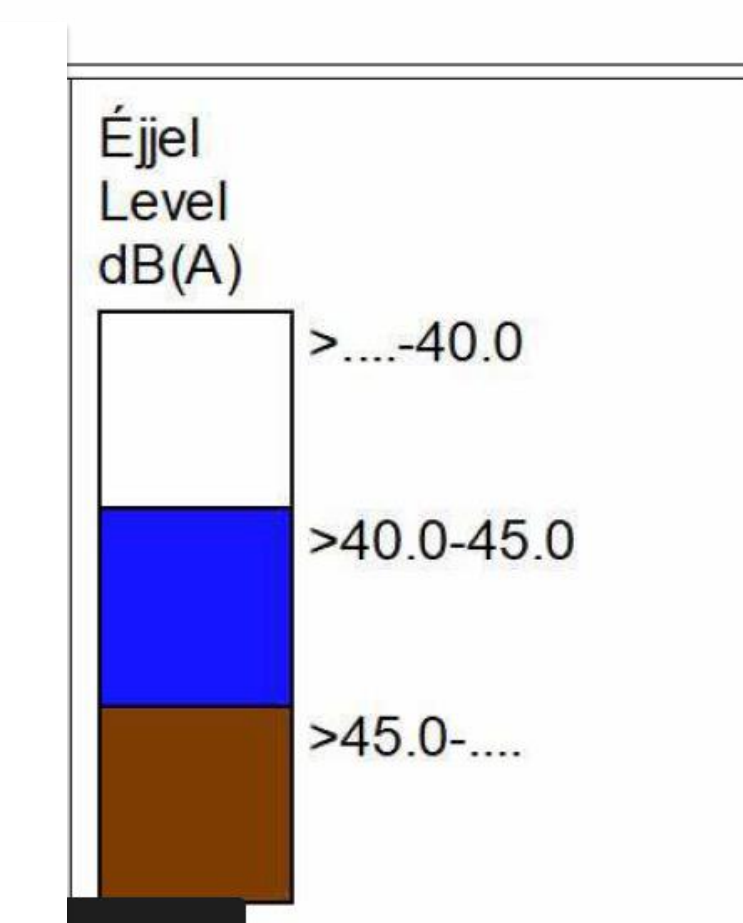
Adiabatic chillers



HPC @hu
Competence Centre

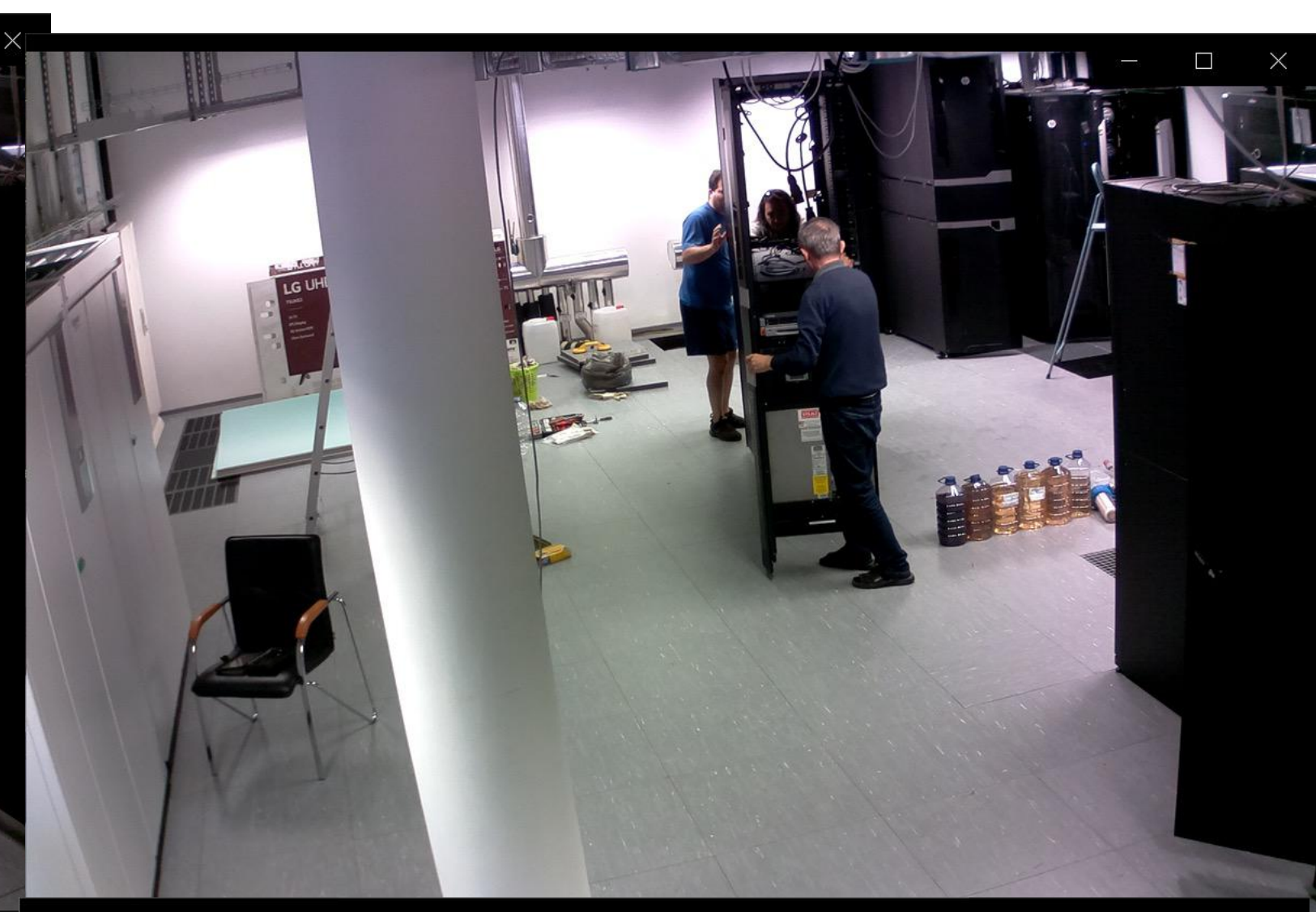
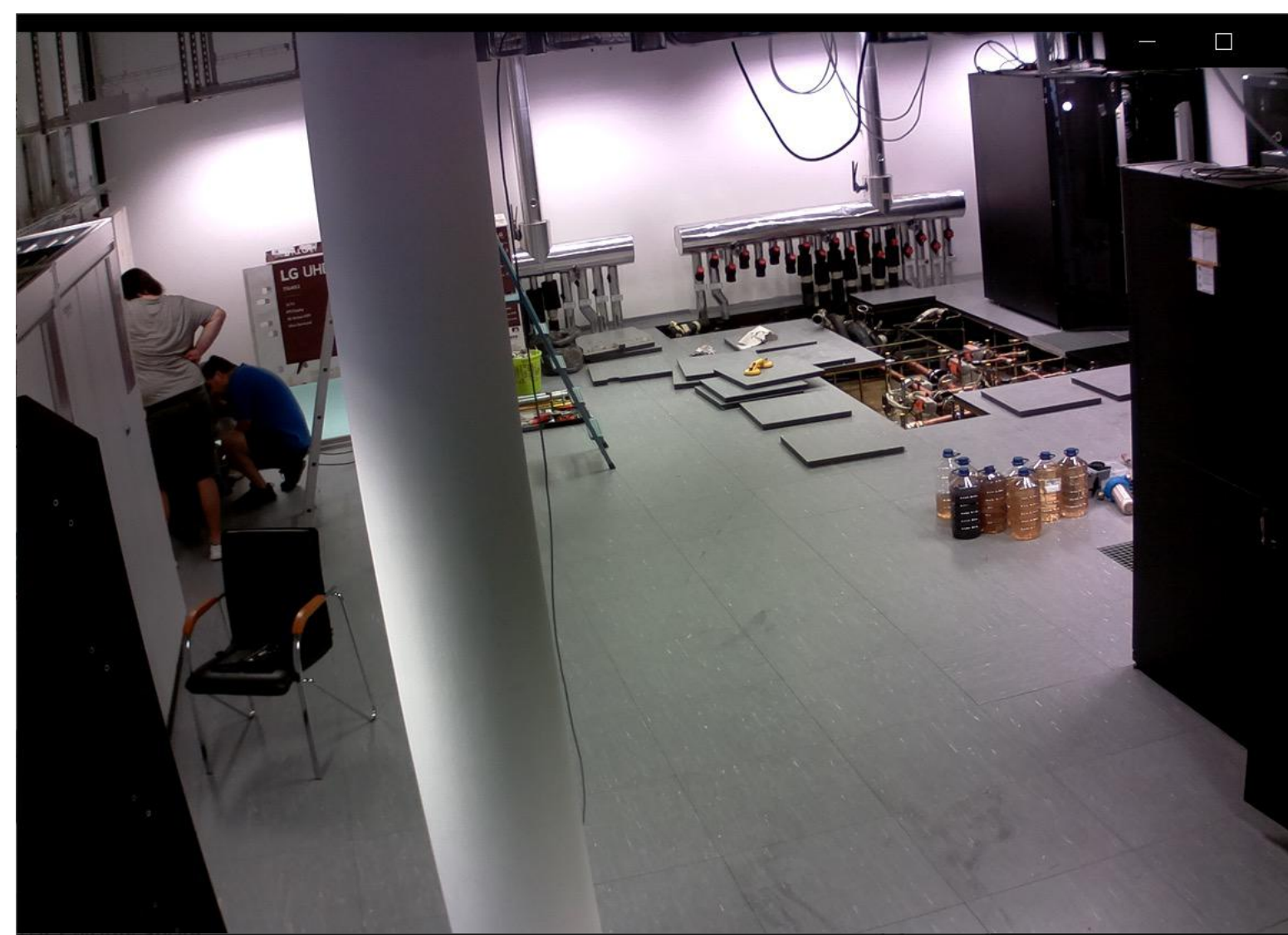


Acoustics



Moving out

-  2020.11 – Cloud, HSM
-  2021.06 – LEO
-  2021.07 – Apollo
-  2021.07 – Racks and Network



Komondor intro



CRAY

CRAY
THE SUPERCOMPUTER COMPANY

1975-2019 - now HPE CRAY product line

1st HPC in the world

Most machines at top500, 28 from top100

High end

'Optimized experience'

CRAY Linux Env/Aries Interconnect/Clusterstor

Weather, etc.

Dense, high performance, big etc.



HPE CRAY EX



**Hewlett Packard
Enterprise**



Apollo – Generic / SGI – High Tech / Cray – High End

‘Unified experience’

CRAY Linux v/ SUSE compatibility

Slingshot eth based IC / Clusterstor storage

All workloads

Dense, high performance, big etc.



START ANYWHERE, GO TO WHEREVER YOU



Nearly 10 TB/sec and > 700 PB capacity*
simulations for quantum computers, nuclear energy systems, fusion reactors, and precision medicines. 2021-2022



> 4 TB/sec and 30PB (All Flash) capacity*
NESAP enhance simulation, data processing, and machine learning applications



2.5 TB/sec and ~ 400 PB capacity*
nuclear stockpile, secondary national security missions, nuclear nonproliferation and counterterrorism



2.5 TB/sec and ~ 100 PB capacity*
LUMI - Large Unified Modern Infrastructure
2023



1 TB/sec and ~ 200 PB capacity*
cancer research, materials science, climate science, and cosmology
2H 2021



1 TB/sec and ~ 1 PB (All Flash) capacity*
IT4I – Astrophysics, Eng., Chemistry, Material Earth Live science
1H 2021



240 GB/sec and ~ 14.5 PB capacity*
2H 2020



All Flash entry point (6U)
Up to **80/50 GB/sec** read/write
and **115 TB** capacity*



Disk entry point (10U):
15 GB/sec and
315 TB capacity*

All Flash base rack: > 1TB/sec and up to 4.5 PB capacity*

- Expansion rack: > 2 TB/sec and 4.6 PB*

Disk base rack: 90 GB/sec and 7.5 PB capacity*

- Expansion rack: 120 GB/sec and 10 PB*

*usable capacity

2022 – 5+ PF HPC

- 20 000+ CPU core, 200+ GPU
- GPU 4+ PF
- CPU 0,7+ PF
- Big Data 9+ TB memory
- MI partition 8 GPU/node
- 2 PB superfast storage + 10 PB tape

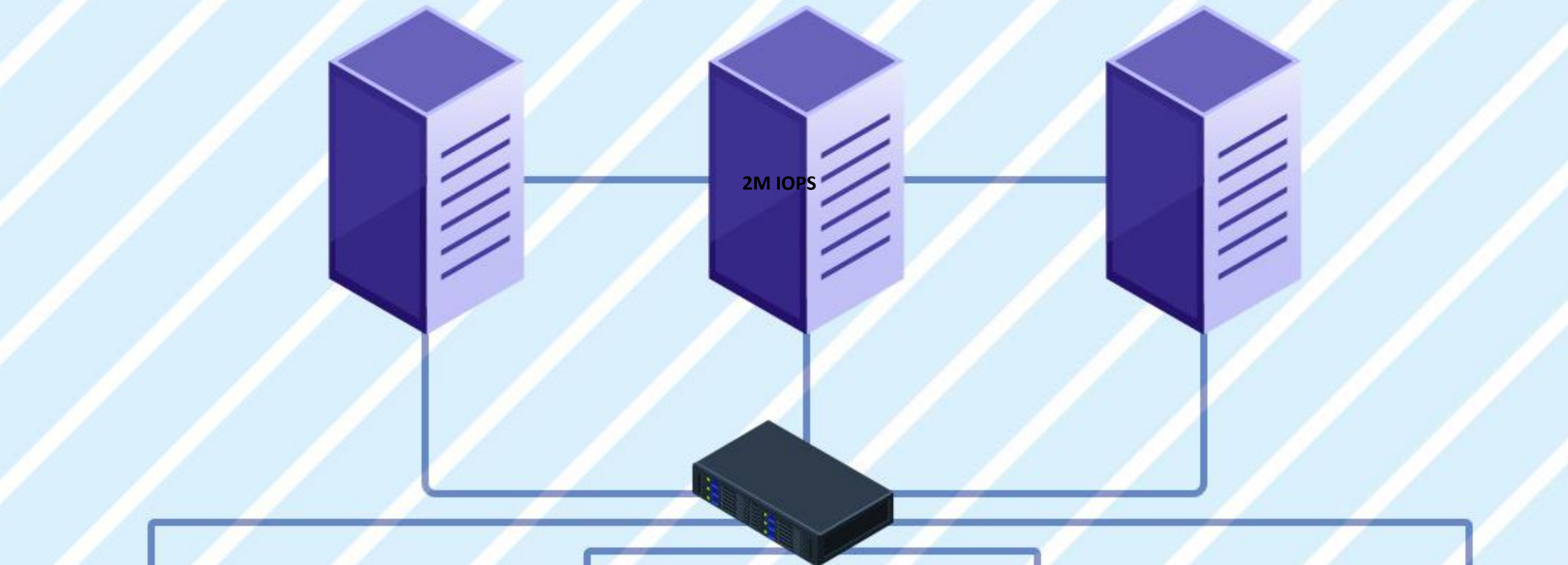
Most powerful research HPC

- Energy efficient DC
- Extreme density
- Award-winning plans
- @ Heart of DE Campus

400 TB ultragyors tárolóegység
(300 Gbyte/s)

1,5 PB gyors tárolóegység
(rövidtávú tárolás)

10 PB hosszútávú archiválás



2M IOPS

200 Gbps Slingshot

CPU only partíció

140 node, egyenként 2 db 64 magos AMD EPYC™ 7763 (Milan) CPU és 256 GB RAM (összesen 17920 core), 200Gb/s Slingshot interconnect
Rmax=0,7 petaflops

Gyorsított (GPU) partíció

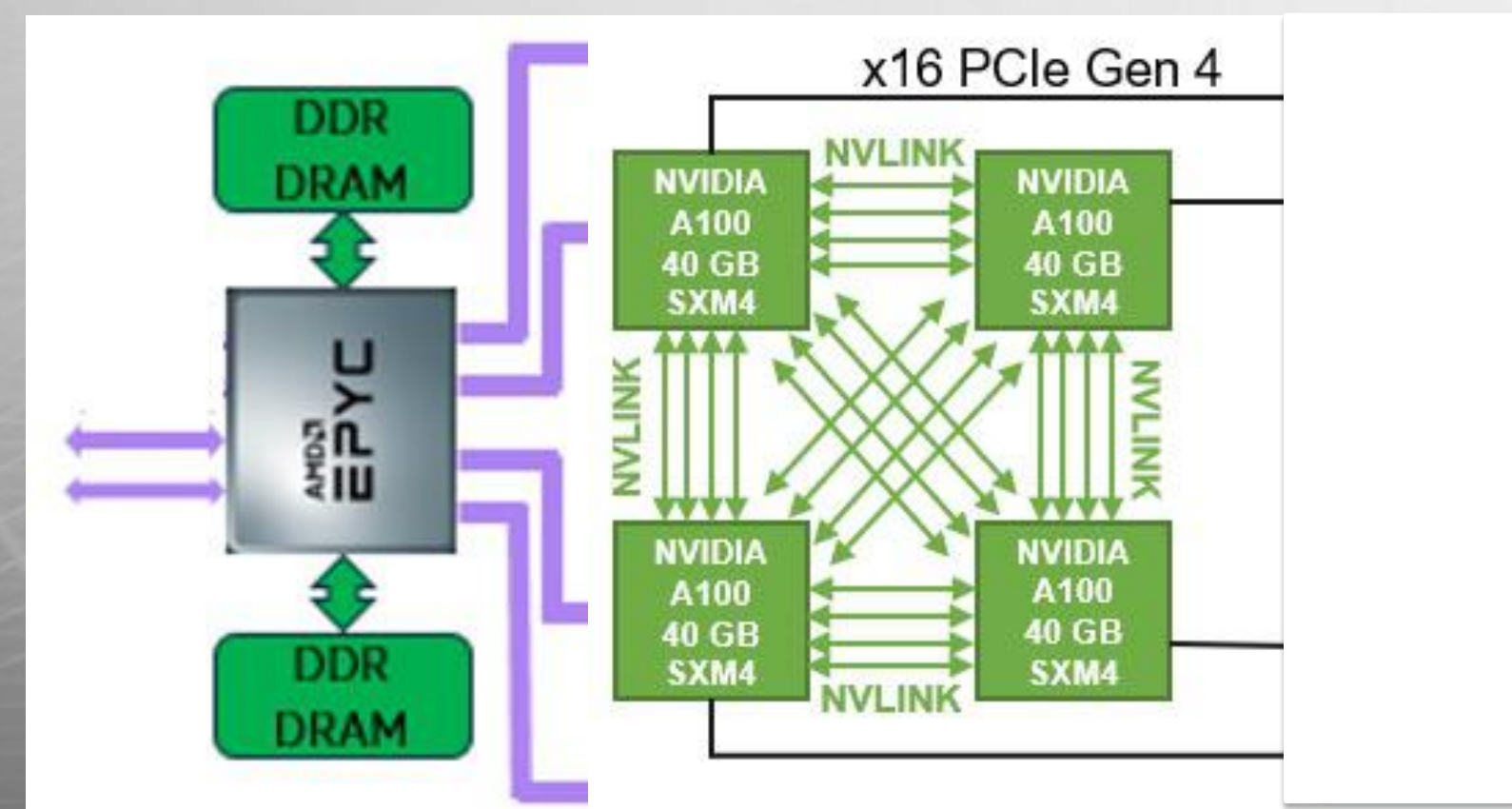
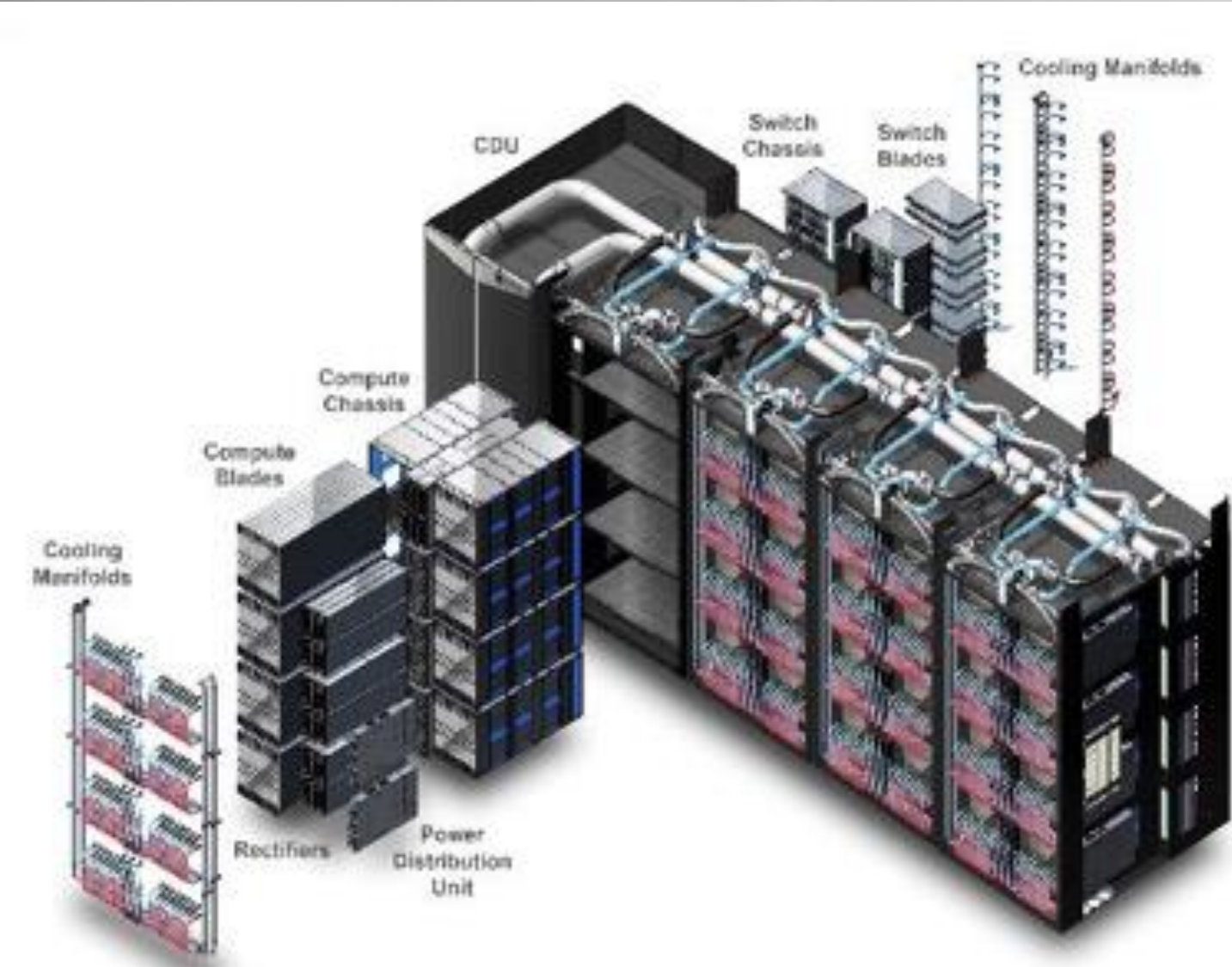
50 node, egyenként 1 db 64 magos AMD EPYC™ 7763 (Milan) CPU és 256 GB RAM és 4 db NVIDIA A100 GPU (összesen 200 db GPU), 2x200Gb/s Slingshot interconnect
Rmax= 4 petaflops

Mesterséges Intelligencia (AI) partíció

2 node (HPE Apollo 6500 Gen10 Plus), egyenként 2 db 64 magos AMD EPYC™ 7763 (Milan) CPU és 512 GB RAM és 8 db NVIDIA A100 GPU (összesen 16 db GPU), 2x200Gb/s Slingshot interconnect

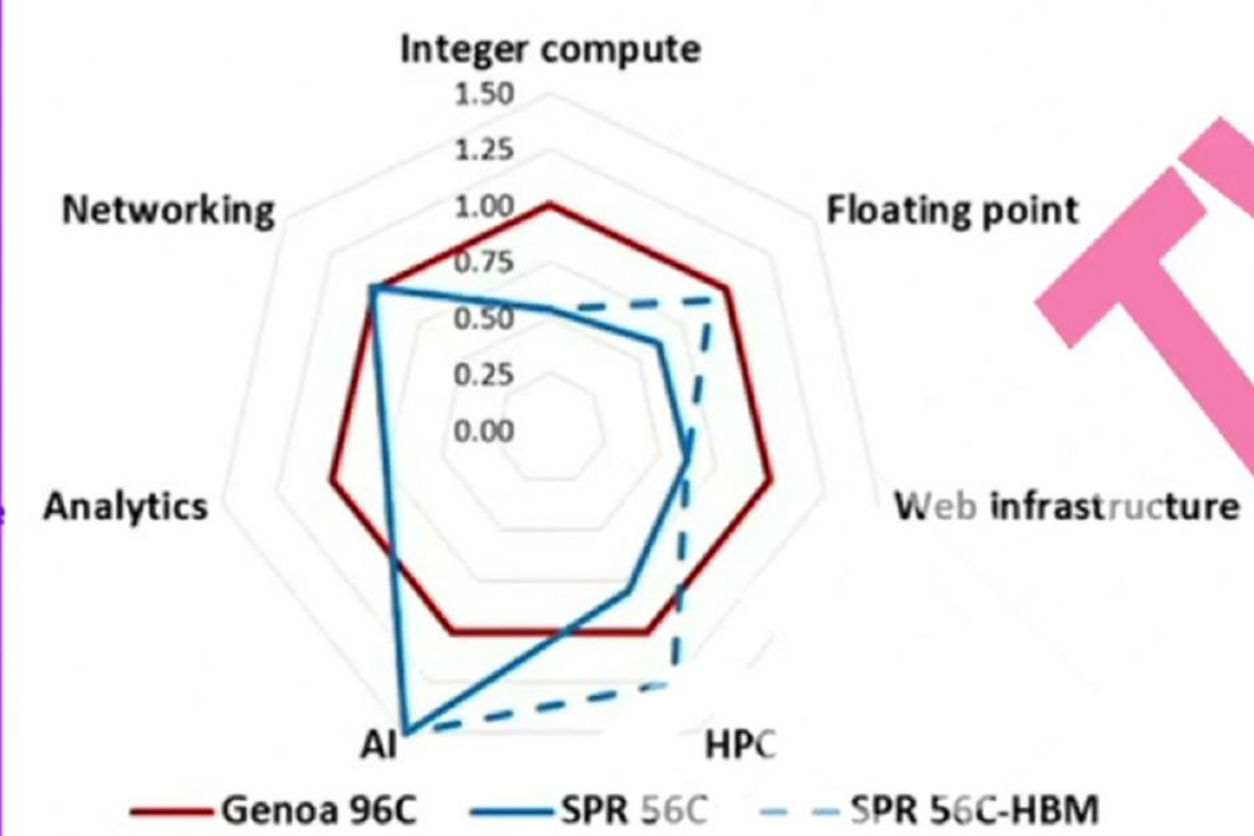
Big Data (Data Analytics) partíció

1 node (SMP/NUMA), 12 db 18 magos Intel® Xeon® Gold 6254 CPU (összesen 216 core) és 9 TB RAM, 2 TB SSD, 2x200Gb/s Slingshot interconnect



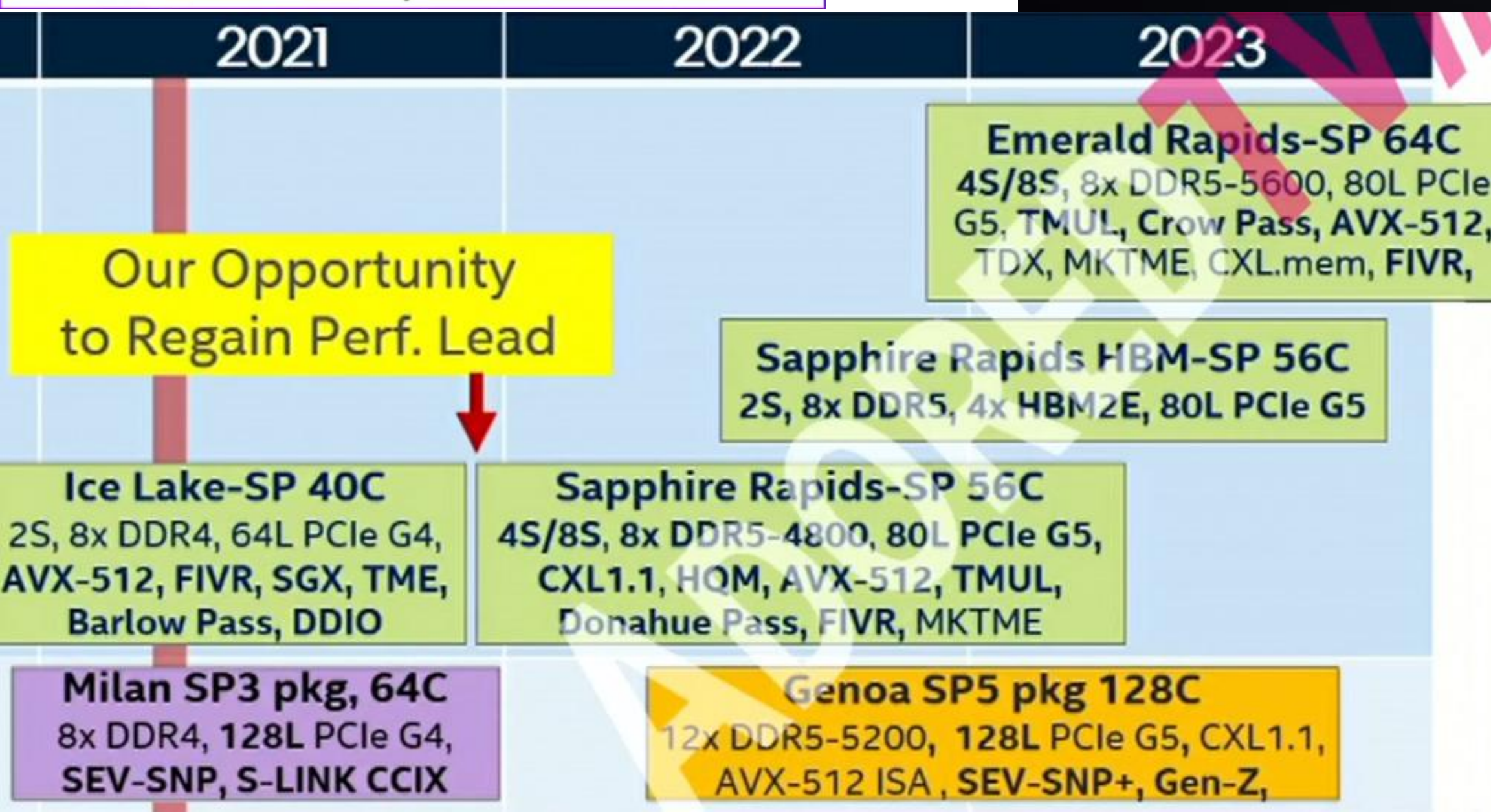
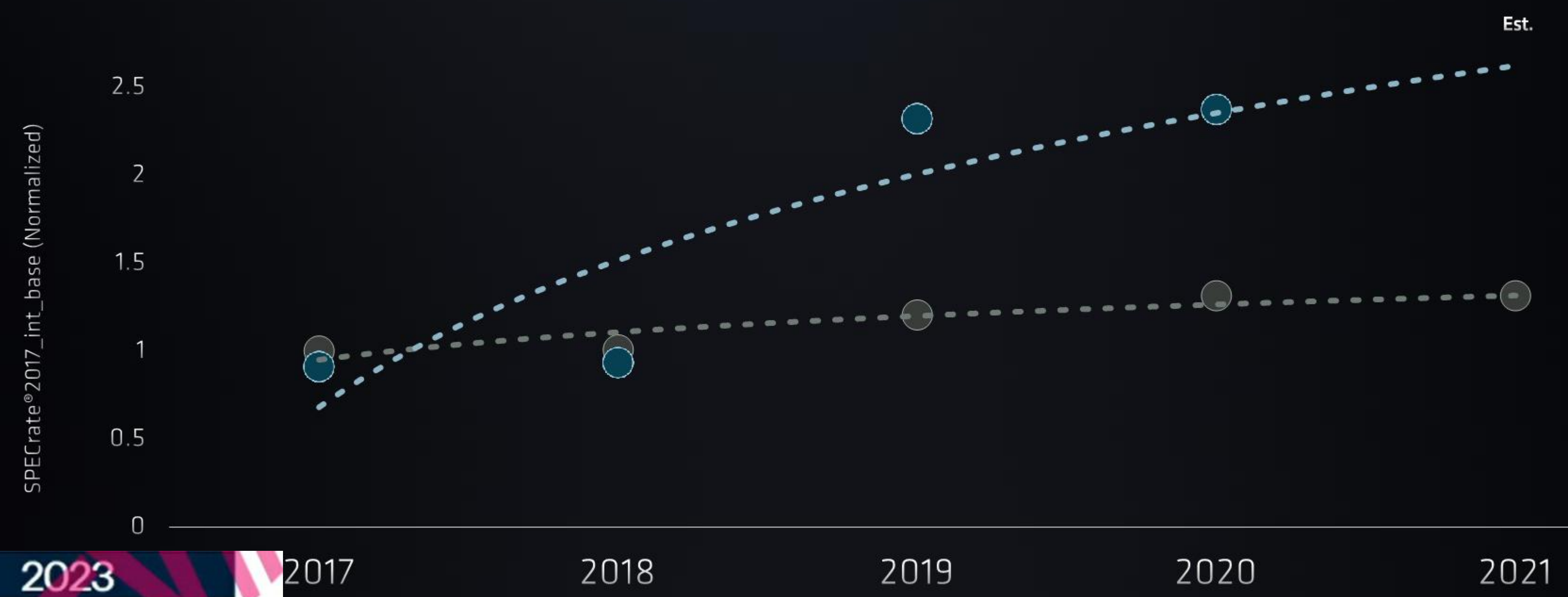
Sapphire Rapids vs Genoa 2H'22

10nm 350W 56C vs. 5nm 350W 96C



- SPR ahead in AI performance, lags in most other categories
- Genoa 128C extends lead
- HBM version improves FP and HPC

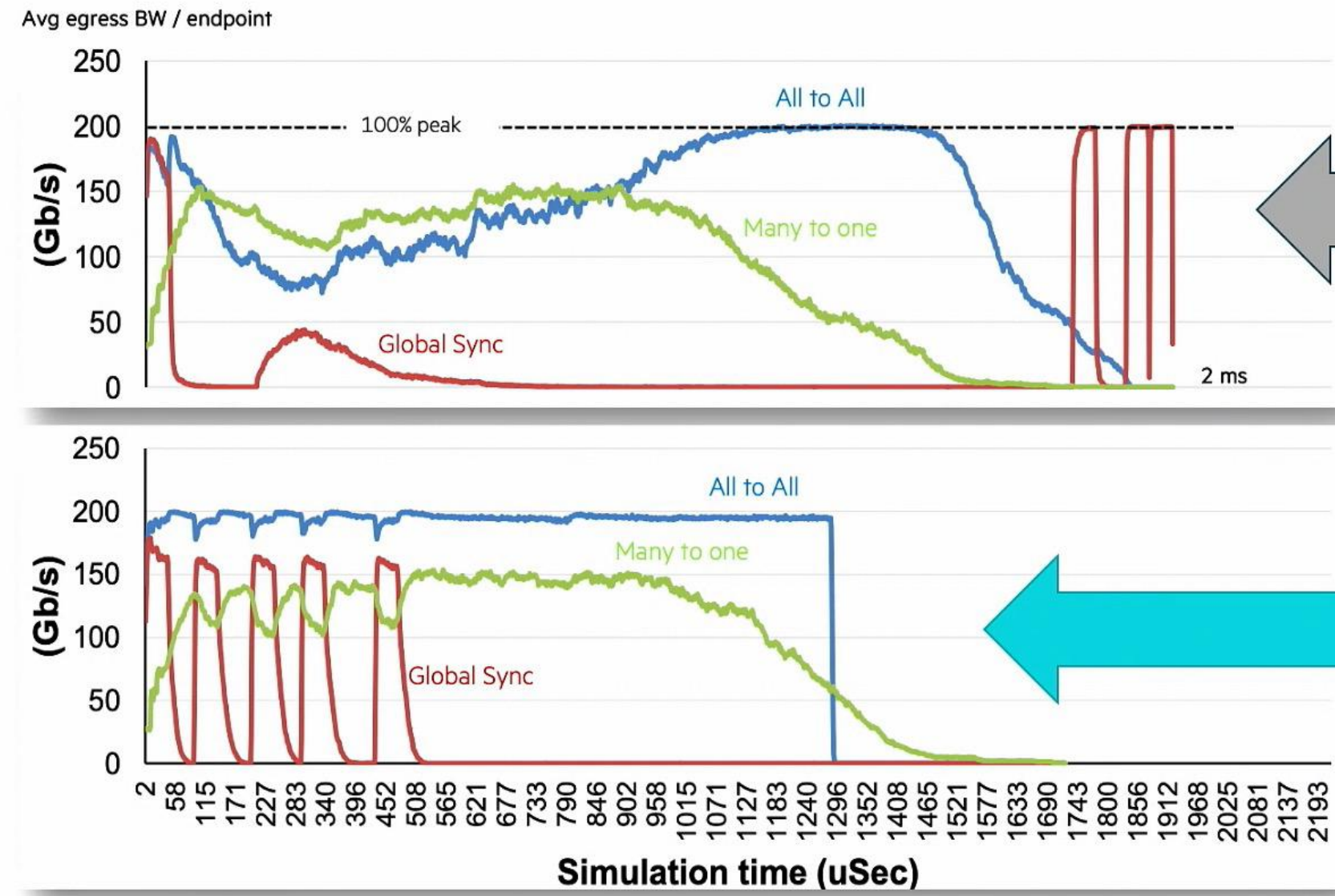
TAKING AN EPYC™ LEAP IN DATACENTER PERFORMANCE



SEE ENDNOTES: MLN-061. SPEC CPU® are registered trademarks of the Standard Performance Evaluation Corporation. See www.spec.org for more information. All scores are the highest published 2P socketed scores through the year indicated. SPEC CPU® data as of 02/20/2021.



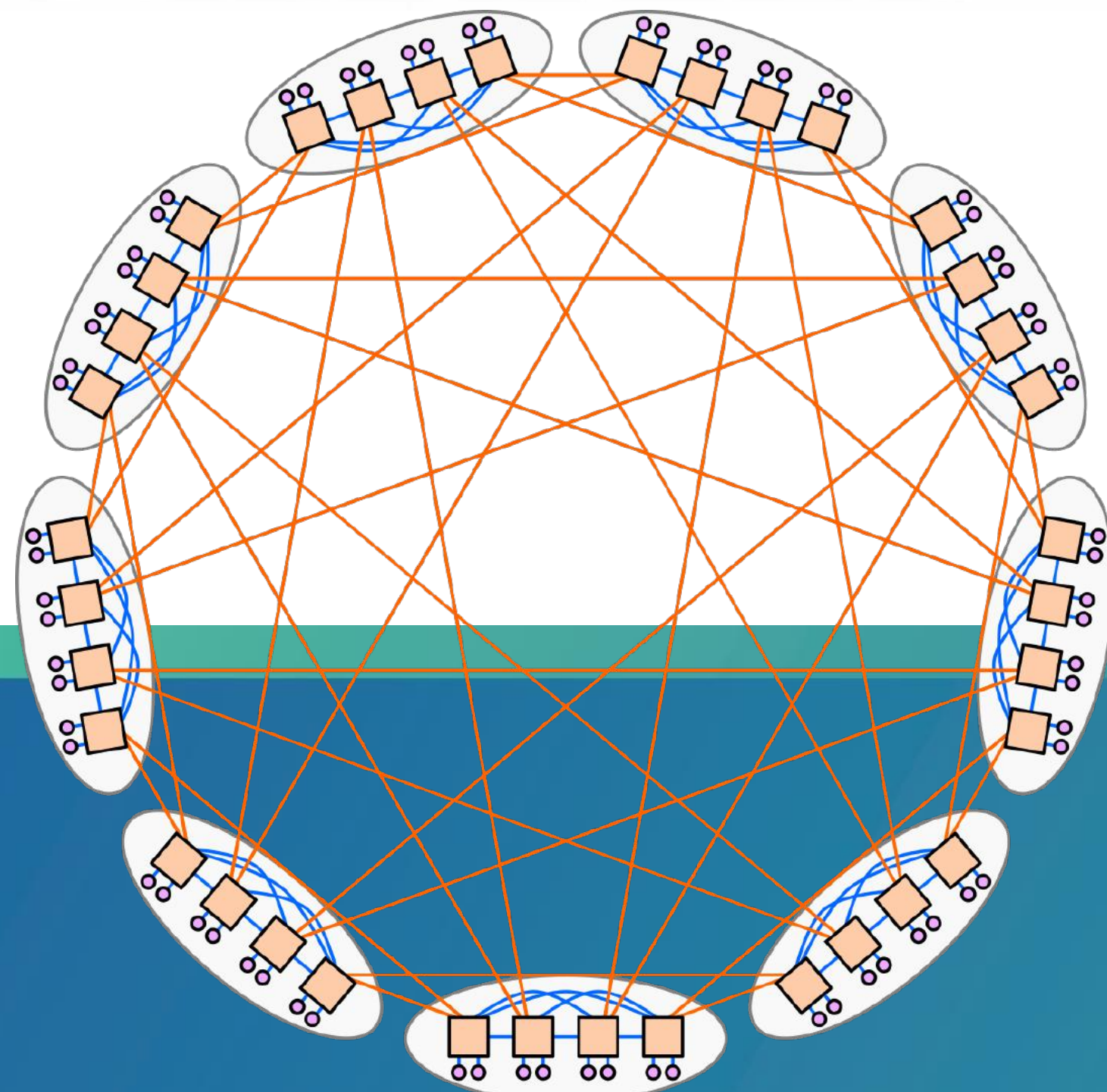
CONGESTION MANAGEMENT PROVIDES PERFORMANCE ISOLATION



Job Interference in today's networks

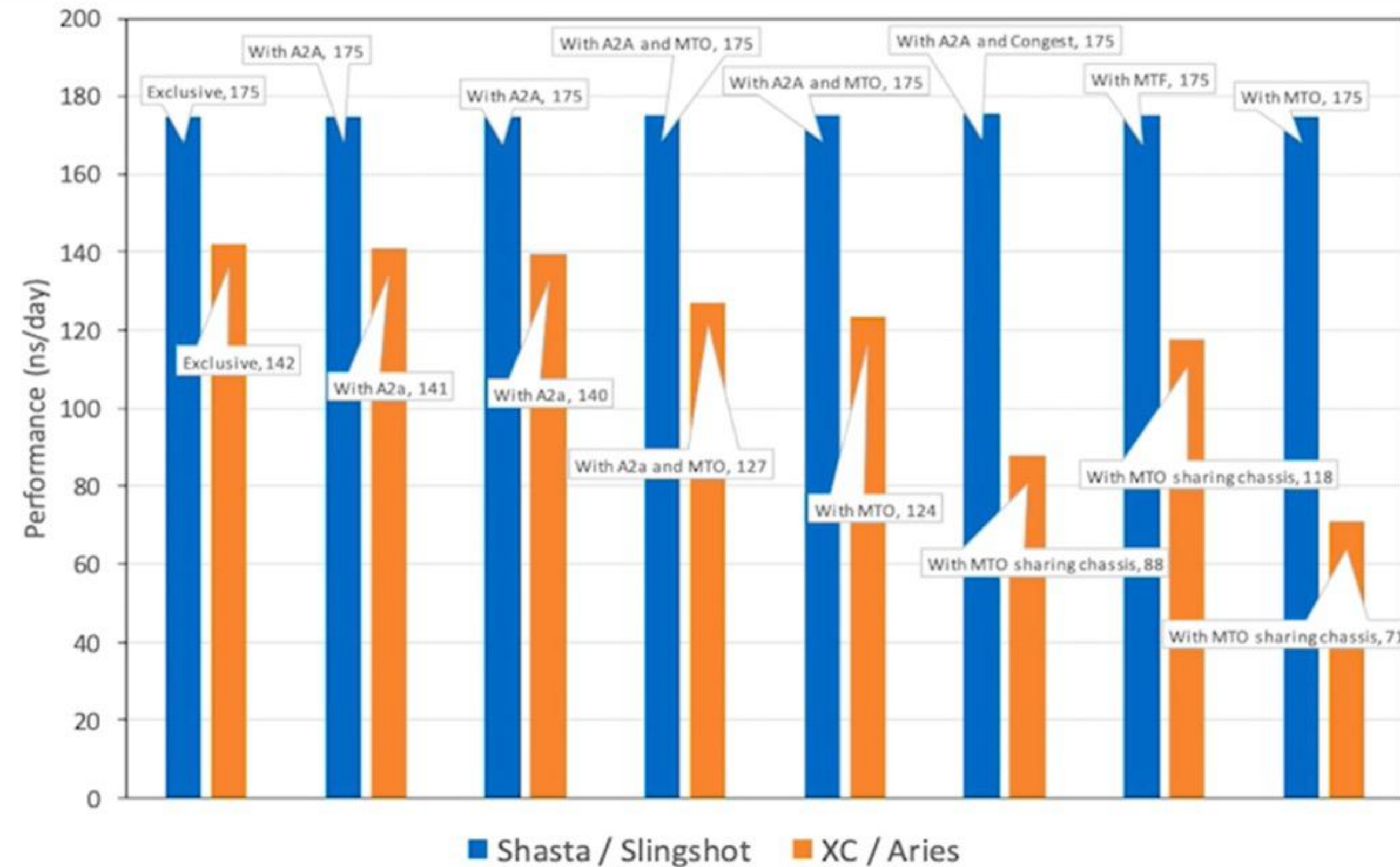
Congesting (green) traffic hurts well-behaved (blue) traffic, and *really* hurts latency-sensitive, synchronized (red) traffic.

With Slingshot Advanced Congestion Management



- The best interconnect for today's (and tomorrow's) HPC and AI systems
 - Delivers high performance even under challenging real-world conditions
 - Native IP software alongside the highest performing HPC and AI codes
 - Standard ethernet connectivity to data center resources
 - Optimized HPC and AI software enabled through HPE Cray Programming Environment
- Today: part of HPE Cray Supercomputers and Cray ClusterStor

GROMACS Variability Study



HPC @hu
Competence Centre

Software

-  Ansys
-  Amber20
-  Amsterdam Density Functional (ADF)
-  CharMM
-  Gaussian 16
-  Terachem
-  Schrödinger
-  MATLAB
-  TotalView



hpc.kifu.hu

#HPC #WeareHPC




HPC @hu
Competence Centre

- Menü
- Saját adatok
- Home
- Hírek
- Projektek
- Felhasználói kézikönyv
- Hibabejelentés
- Intézményi kapcsolattartó
- Projekt Statistlikák
- Projektek
- Projektek kezelése
- Projekt kezelés útmutató
- Havi beszámoló
- Projektek kezelése

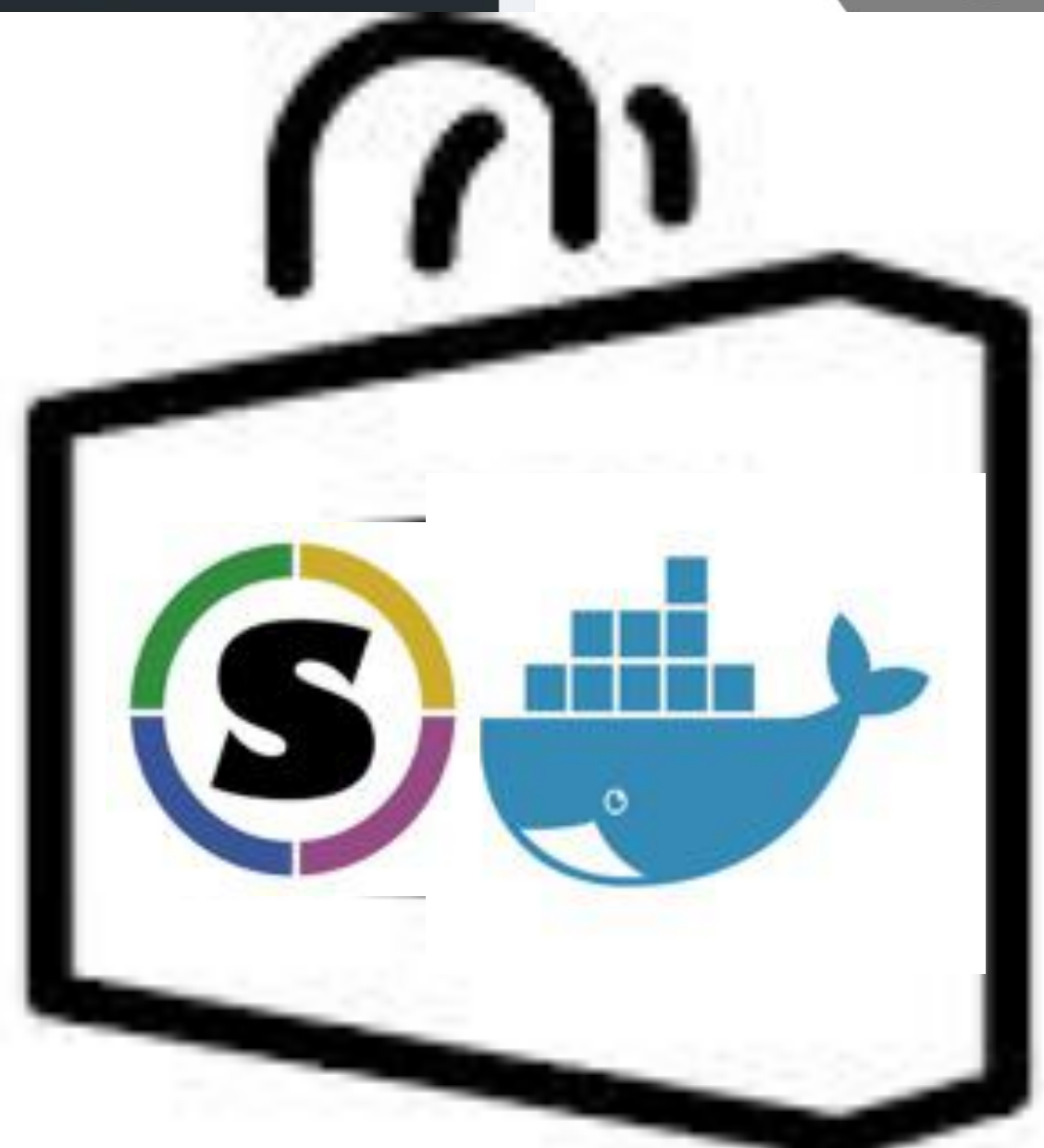

Statisztikák

HPC statuszok

szeged



apollo



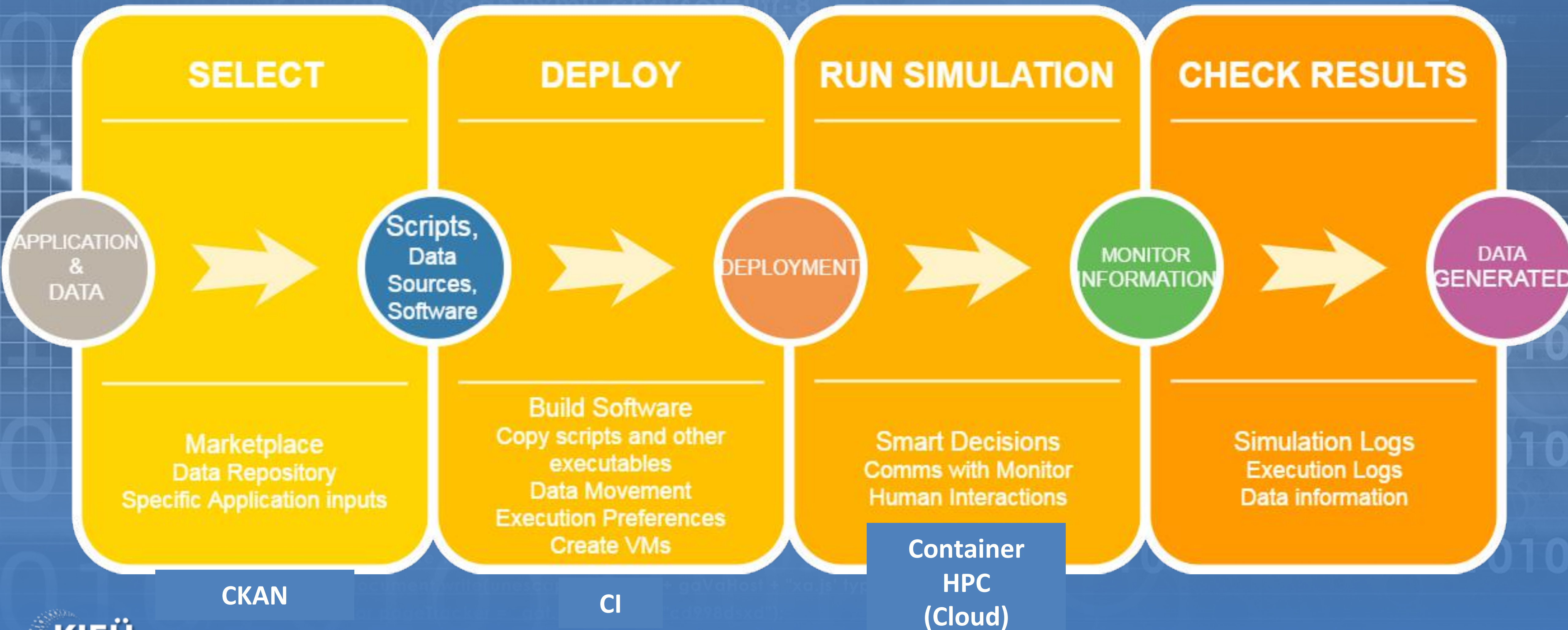
hozzáférési kulcsok megadása



ortal

Deploy workflow - plans

Visualization



Results



70+

tudomány terület



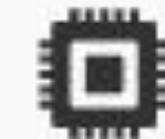
400

projekt



26

intézmény



370000000

CPUh 2020-ban



3740000

futtatott feladat 2020-
ban



900

felhasználó

Modeling Power Outages, Brain networks (Odor G, Hartmann B, Gustavo D, Jeffrey K)

Drug development (HEGELAB)

HPC ECHO

Tudománytól Innovációig

Powered by



<https://conference.kifu.hu/e/hpcuserforum21>



HPC @hu
Kompetencia Központ

#wearehiring

Interdiszciplináris
együttműködési lehetőségek
vizsgálata-HPC User Forum

2021. november 29. 10:00-17:00 #HPC



FELHASZNÁLÓ TÁMOGATÓ SZOLGÁLTATÁSOK

KIEMELT SZOLGÁLTATÁSOK

5. szint



ALKALMAZÁS/
ALGORITMUS
FEJLESZTÉS ÉS
IMPLEMENTÁLÁS

KIMAGASLÓ SZAKÉRTELMET IGÉNYLŐ
FELHASZNÁLÁSI TERÜLET-SPECIFIKUS
TÁMOGATÁST JELENTIK. EZT A HPC
KÖZPONT SPECIALISTÁI BIZTOSÍTJÁK
ESETÉN HUZAMOSABB IDEIG IS
EGYÜTTMŰKÖDVE A FELHASZNÁLÓVAL

4. szint



KONZULTÁCIÓS
SZOLGÁLTATÁS

STANDARD

3. szint



FELHASZNÁLÓ TÁMOGATÁS

A SZUPERSZÁMÍTÓGÉP
HASZNÁLATA SORÁN
FELMERÜLŐ KÉRDÉSEK
MEGVÁLASZOLÁSÁT
MŰSZAKI PROBLÉMÁKAT
BIZTOSÍTJA

ALAPSZINTŰ TÁMOGATÁSOK

2. szint



TECHNIKAI MEGKERESÉSEK

A HPC
FIZIKAI
FUNKCIÓK
ÜGYKEZELÉS
KAPCSOLATOS

1. szint



ÁLTALÁNOS ÜGYKEZELÉS

Thank You!

<https://hpc.kifu.hu>

hpc-cc@kifu.hu

kiss.zoltan@kifu.gov.hu



HPC @hu
Competence Centre