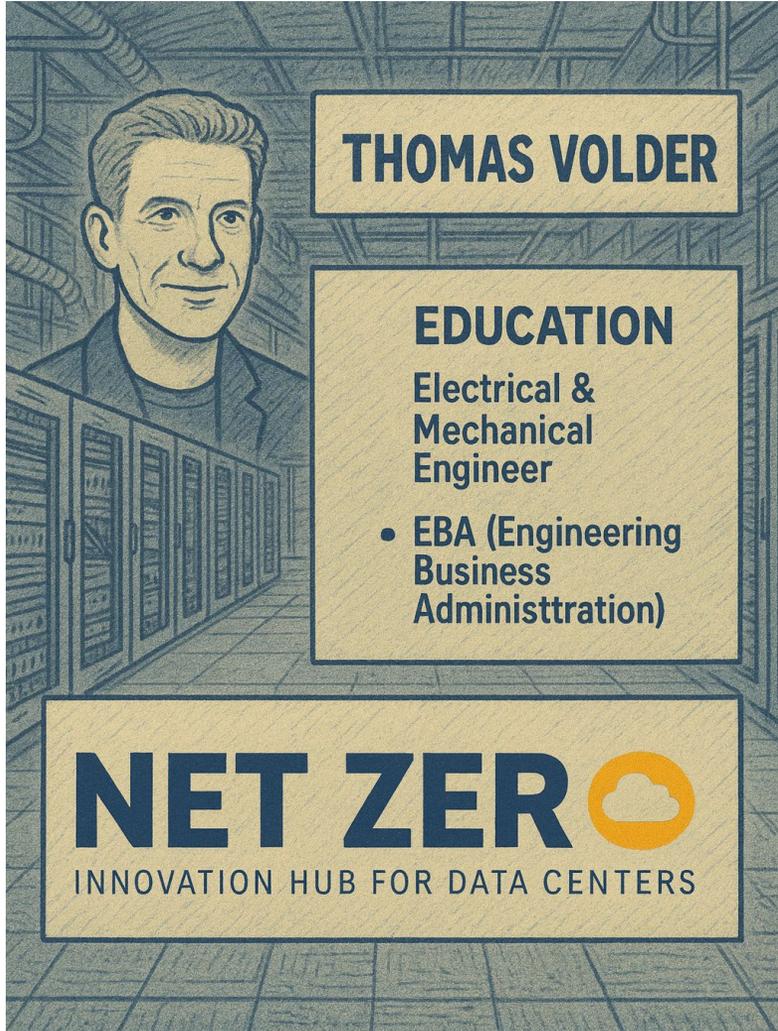




Net Zero Innovation Hub for Data Centers

December 4, 2025



A business card for Thomas Volder, featuring a blue-toned illustration of a server room. The card contains the following text:

THOMAS VOLDER

EDUCATION
Electrical & Mechanical Engineer

- EBA (Engineering Business Administration)

NET ZERO 
INNOVATION HUB FOR DATA CENTERS

Let's  Connect



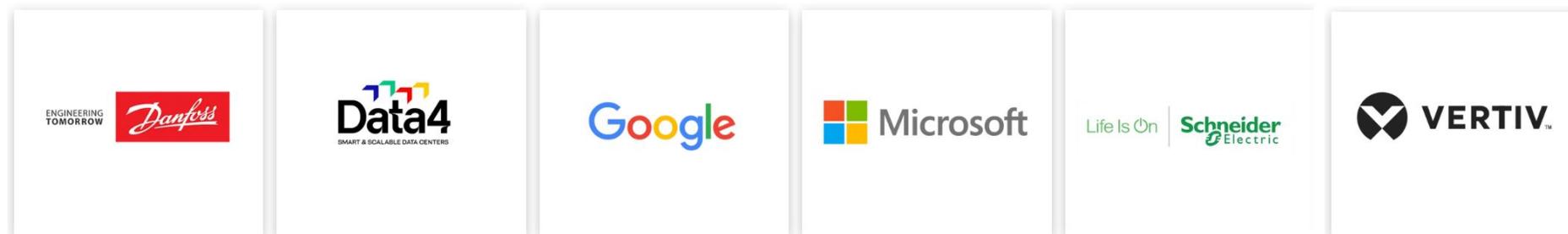
Thomas Volder
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NET ZERO

INNOVATION HUB FOR DATA CENTERS

Cross-sector collaboration on innovative, ready-to-market solutions for the European data center industry

Founding Partners



WWW.NETZERODATACENTERS.COM

NET ZERO

INNOVATION HUB FOR DATA CENTERS

- *Be the collaborative place to execute projects which **de-risk innovations and accelerate their GW-scale deployment.***



Executive members



Hub members

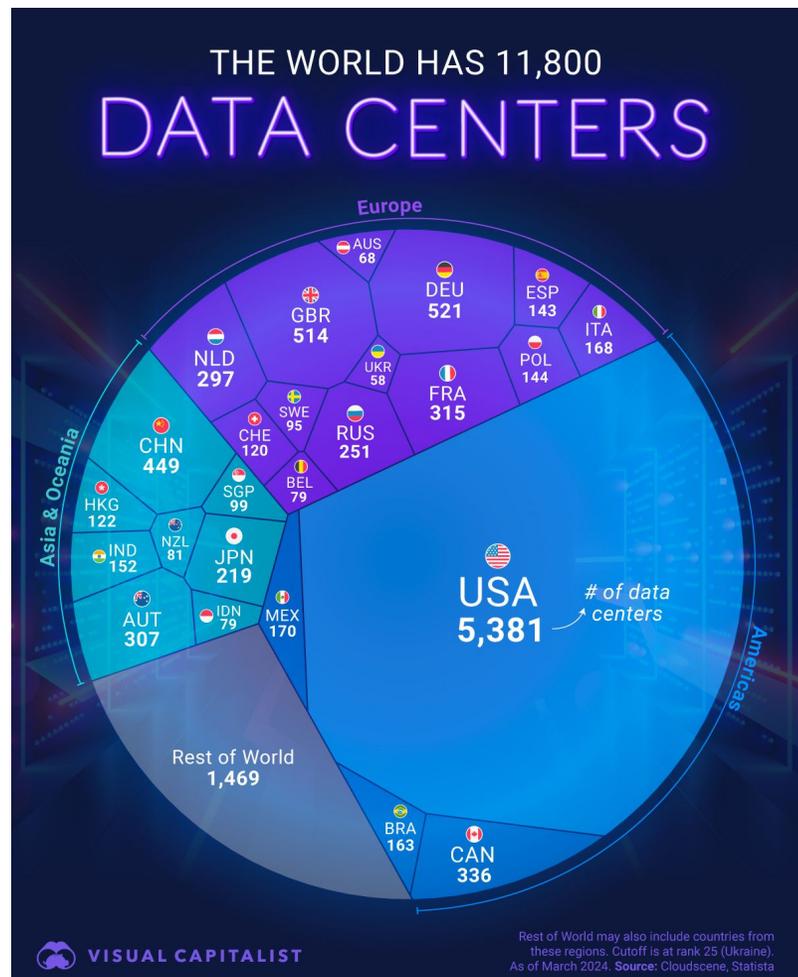


Research Partners



Europe position in Data Center infrastructure

number



Power consumption

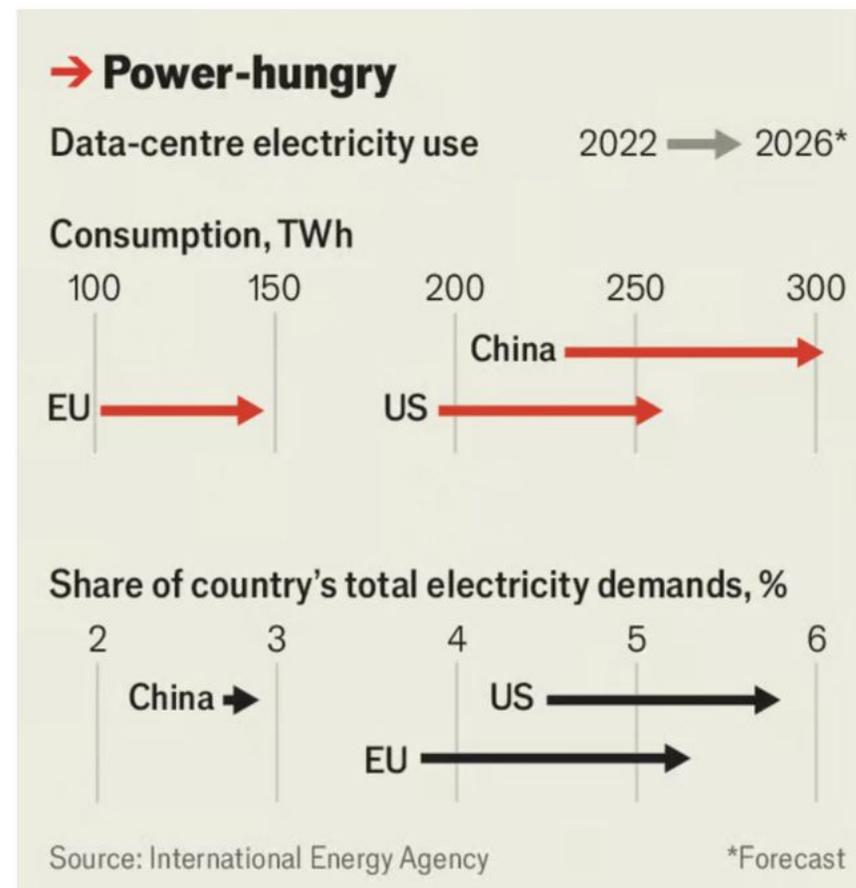
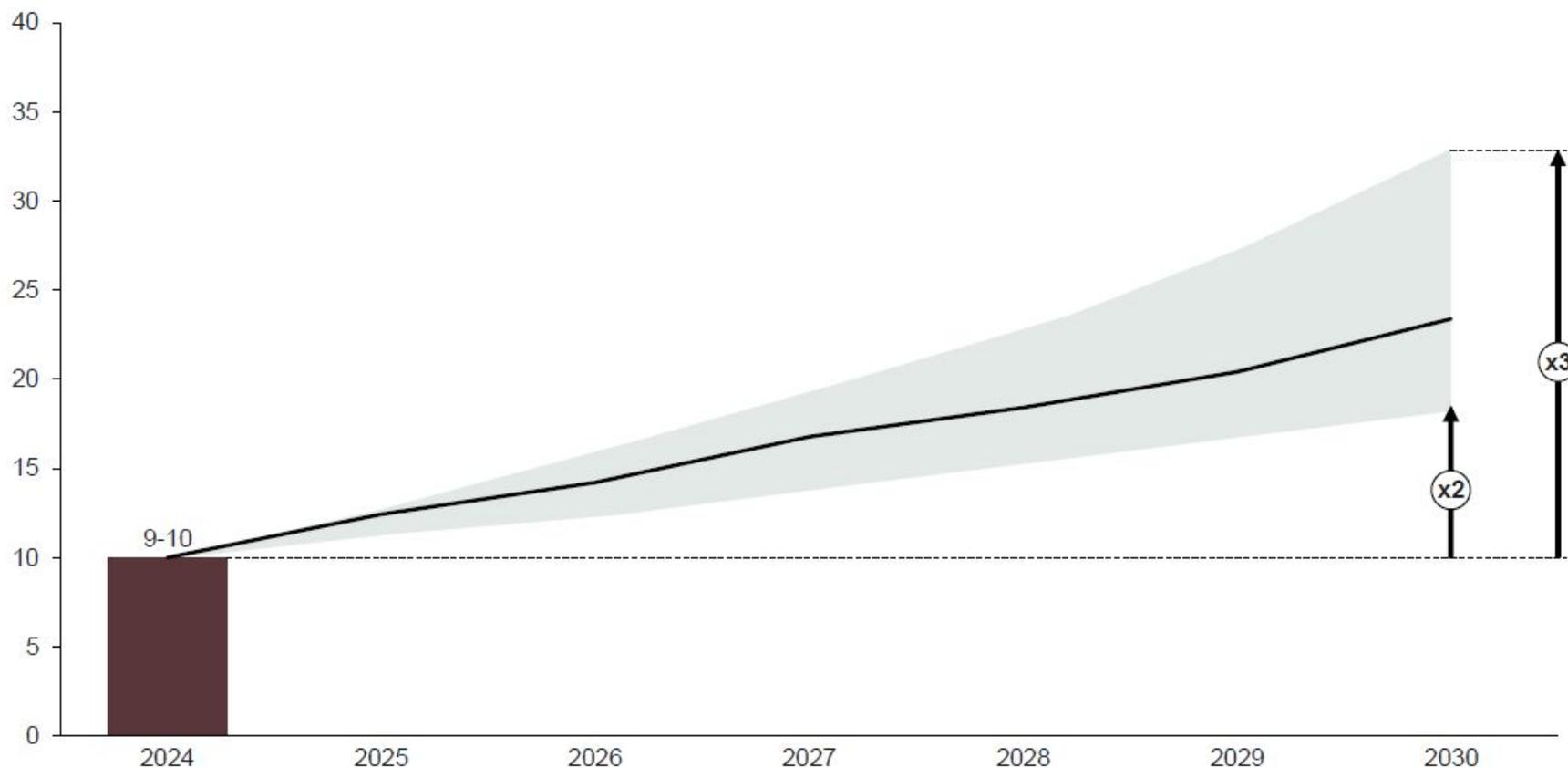


CHART: THE ECONOMIST

European Data centre capacity needs to increase significantly to ensure competitiveness and meet future needs – especially those arising from AI

Installed IT capacity in Data centres in Europe

GW



- Analysts expect Europe's data centre capacity to double or even triple by 2030 to meet future demand, with 25-30% of capacity allocated to AI compared to less than 5% today.
- According to the European Commission, however, projections indicate a gap between available capacity and what is needed, especially to meet AI-driven demands.
- In addition, Europe's data centre industry is expected to fall behind the United States and China by 2030.
- The expansion of data centre capacity in Europe also contributes to digital sovereignty, i.e. a digital ecosystem of control, choice and security in Europe.
- If Europe fails to scale up data centre capacity to meet demand, its companies risk falling behind regions where capacity is expanding significantly, which could hinder innovation, economic growth and job creation.

DATA CENTERS: THE FACTORS OF THE DIGITAL AGE

EVERYTHING RUNS ON
DATA
AND DATA RUNS ON
ENERGY



FROM ENERGY CONSUMER
TO SYSTEM PLAYERS

The paradox:

- Driving digital progress
- Increasing energy pressure

- Grid flexibility
- Energy storage
- Heat re-use
- Integration with energy system

Request For Innovation:
Net Zero Data Center
Back-up Power Solutions

2-DATA CENTERS: THE FACTORS OF THE DIGITAL AGE - RFI

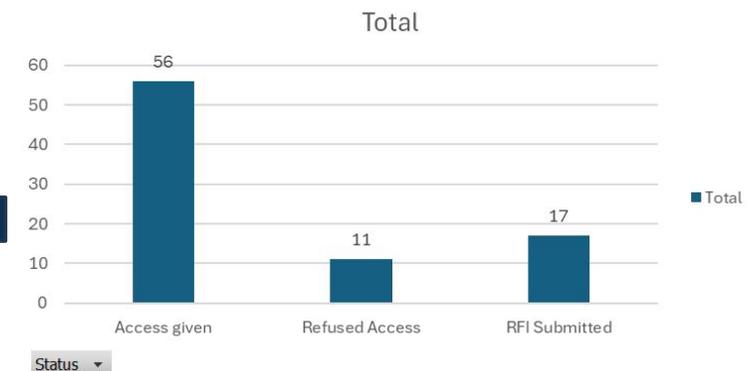


- Proposals received (26)
- Evaluation team ready
- Public funding for phase 1 demonstration secured
- Net Zero Innovation Pilot site for demonstration available
- Other potential sites?

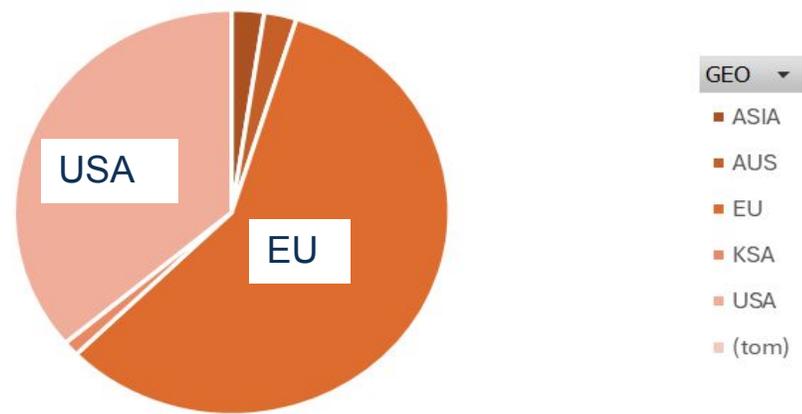
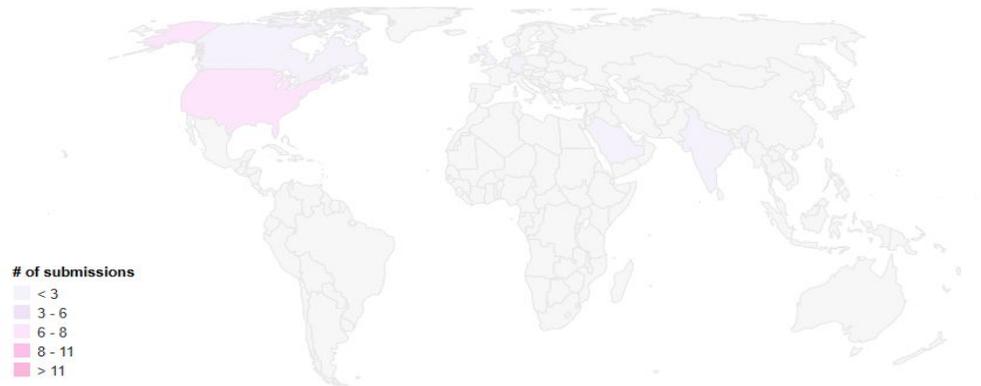


Overview of received proposals

Company	Solution	Fuel
MAN Energy solution	GE x Battery	Choose Fuel type
Bloom Energy	PEMFC (Proton Exchange Membrane Fuel...	Choose Fuel type
Tiamt	CAES (Compressed Air Energy Storage)	Choose Fuel type
OPmobility	PEMFC (Proton Exchange Membrane Fuel...	Choose Fuel type
Wilo	PEMFC (Proton Exchange Membrane Fuel...	Choose Fuel type
steamology	ICE (Internal Combustion Engine)	Choose Fuel type



SUBMISSIONS BY COUNTRY



Country	Percentage
us United States	50.00%
de Germany	14.29%
ca Canada	7.14%
sa Saudi Arabia	7.14%
Others	21.43%

2-DATA CENTERS: THE FACTORS OF THE DIGITAL AGE - RFI

FIRST GROUP OF SELECTED COMPANY

READY-TO-SCALE SOLUTIONS	Fuel	Generator
	Hydrogen	ICE

NEXT GENERATION SOLUTIONS	Fuel	Generator
	Hydrogen	Fuel Cells

NEXT GENERATION SOLUTIONS	Fuel	Generator
	Aluminum	Battery

PLANNED TESTING

MW-Scale test
100% H2

Sub-MW-Scale test

Sub-MW-Scale test

PROVIDER

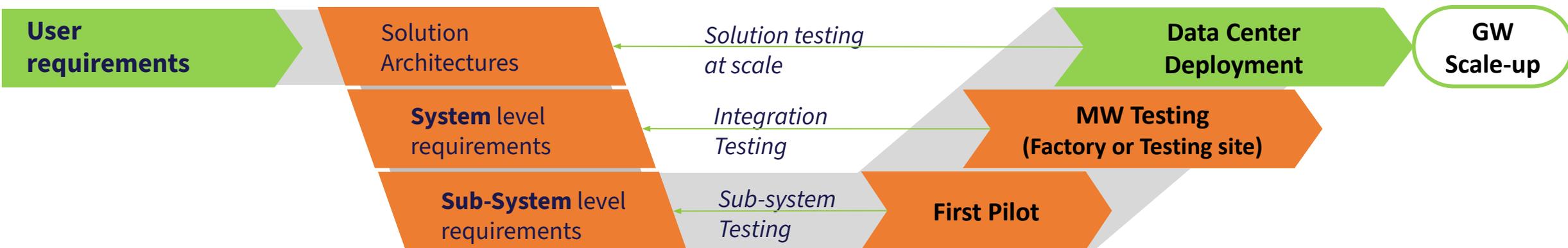
JENBACHER
INNIO

Open

 **PHINERGY**

Path-to-Scale

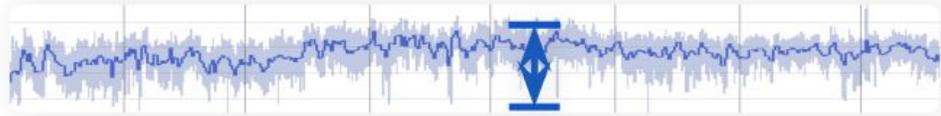
Path to GW-Scale follows a system engineering approach



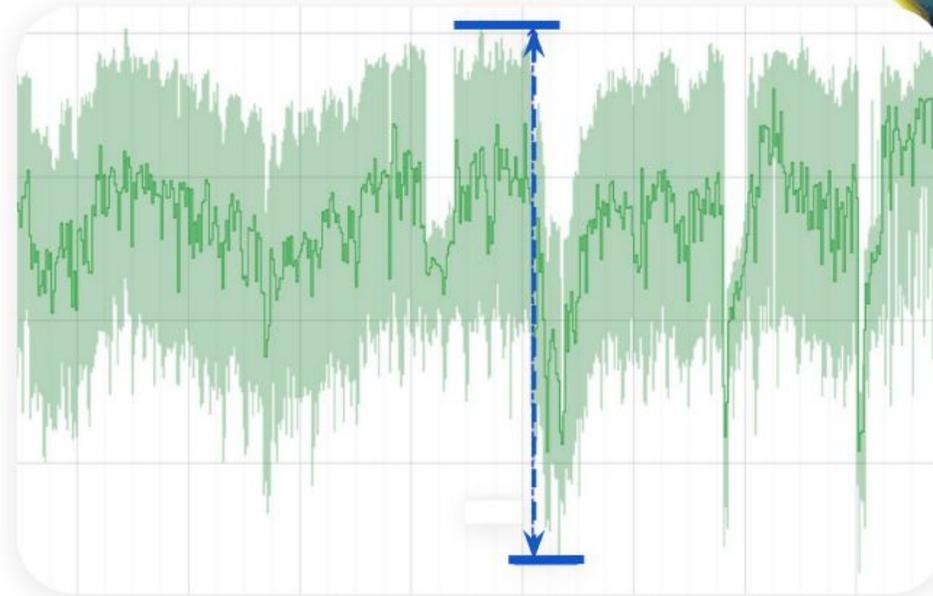


Compute vs AI Patterns

Non-AI Workloads



AI Workloads



AI is **synchronous**, creating **Quality & Reliability** challenges from chip to grid

Testing profiles - Examples

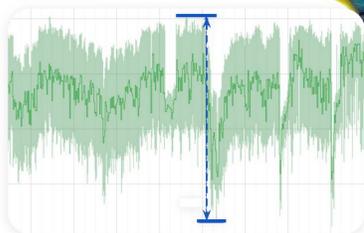
Google Cloud

Compute vs AI Patterns

Non-AI Workloads



AI Workloads



Madhu Iyengar
Principal Engineer, Google

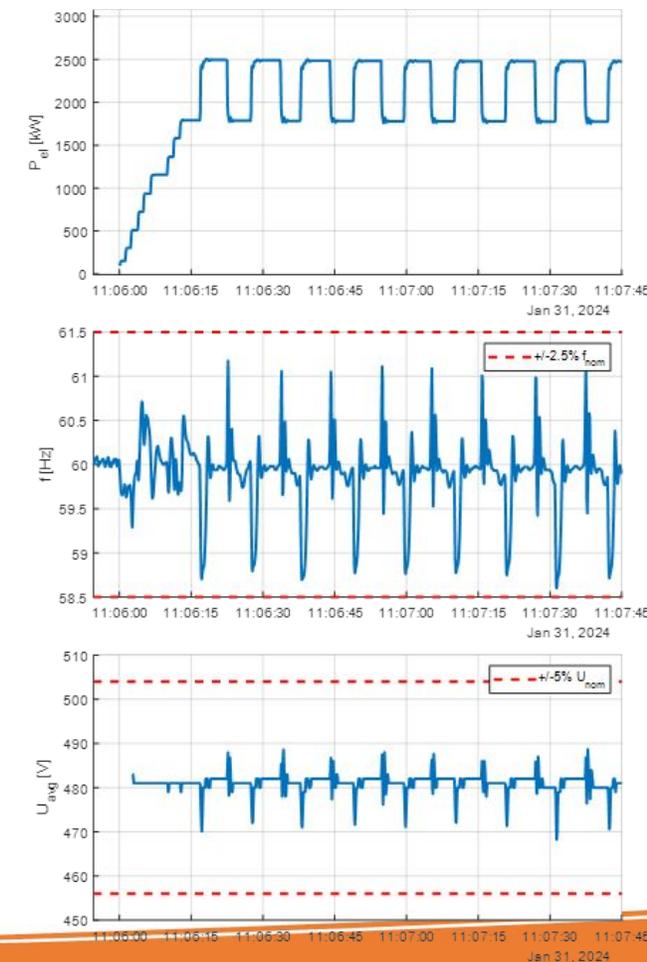
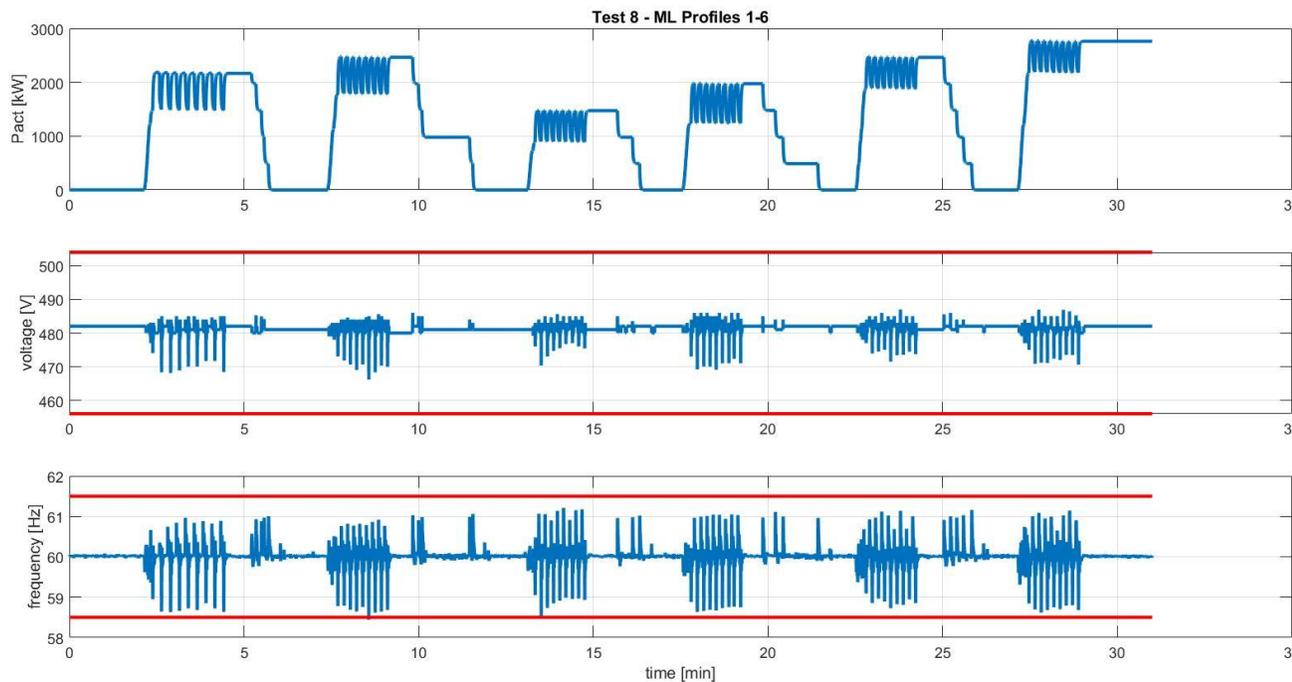
“Standard testing” Worth case scenario

Positive testing means that we are okay so sign off of on max start time, max frequency deviation and max voltage deviation during load changes.

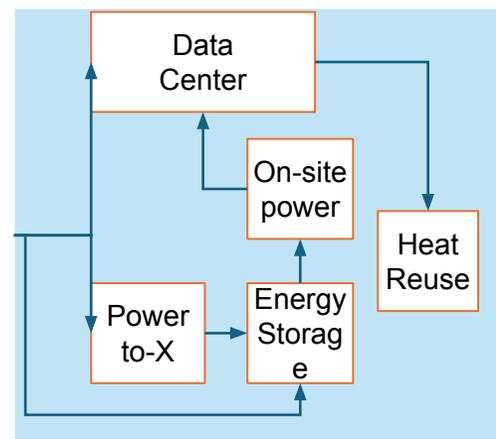
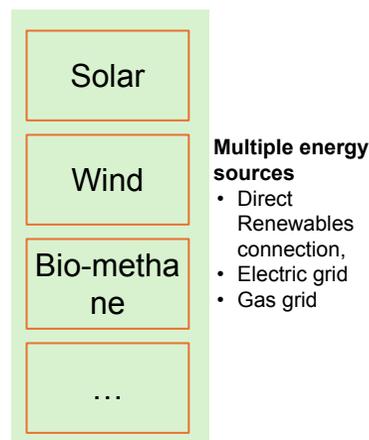
Example: first load acceptance 20 seconds after engine start and reaching full load in additional 40 seconds. Max allowed frequency deviation of 5% and max voltage deviation of 10% for 25% load addition steps.

Advanced testing profiles (examples)

AI is **synchronous**, creating **Quality & Reliability** challenges from chip to grid

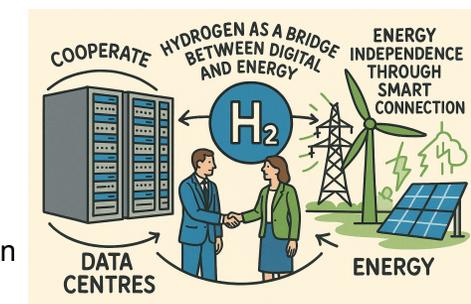


Net Zero Digital Energy Hubs



HUB Exports,

- Clean, dispatchable power to the grid,
- Grid Services, flexibility
- Clean Gases, Hydrogen
- Renewable Heat



Data Centers Benefit:

- Competitive, Clean Energy Input
- 99,999+ Reliability, Resilience
- 24/7 CFE
- Connection Acceleration

Energy Systems Benefits :

- Grid infrastructure savings through shared investments
- Accelerated renewable penetration

Investors and Developers benefits:

- Attractive returns on 24/7 CFE power for data centers
- De-risked off-take for power, hydrogen, grid services

HYDROGEN IN DATA CENTERS – ENERGY ECOSYSTEMS

HYDROGEN ECOSYSTEM

PROMISE & BARRIERS

Access & supply

Hydrogen availability is still limited

Price

Green hydrogen remains several times more expensive than fossil fuels

Security of delivery

Uninterrupted energy supply is critical

Transportation & storage

Infrastructure is still immature and security risk remain

Certification

Need for verified green hydrogen, not just low-carbon claims

FROM PARALLEL PATHS TO A SHARED ENERGY ECOSYSTEM

Co-location

Build hydrogen production near data centre clusters

Joint infrastructure

Shared storage, transport systems and connection to the grid

Strategic partnerships

Between data centre operators and energy providers

Market innovation

Long-term offtake agreements for green hydrogen

Grid Interaction

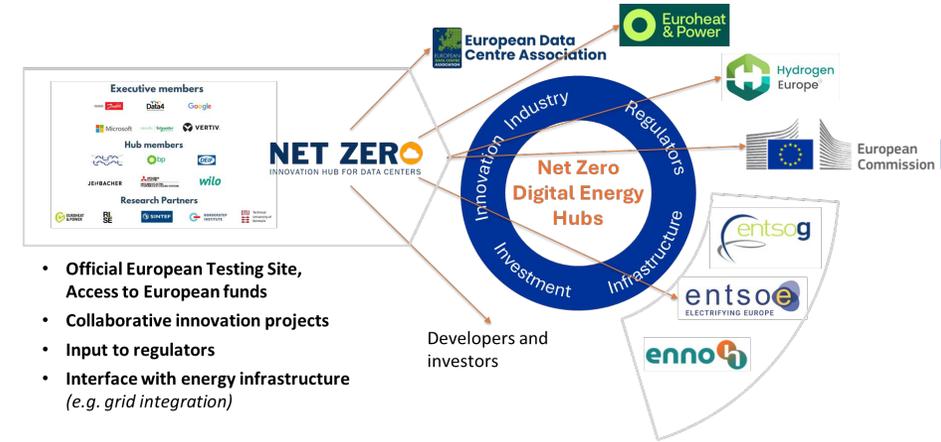


DC Flex (USA)

..... The initiative aims to deploy five to ten large-scale flexibility hubs, each a living laboratory demonstrating innovative strategies for integrating data centers with the grid under various conditions to facilitate widespread adoption and replication.

DC flex in Europe:

....Google, Meta, NVIDIA, as founding members—now France-based RTE and Schneider Electric, Amsterdam-based ING, and PPC Group, based in Athens, Greece.



<p>NZIH is part of the AI Testing and Experimentation Facilities (TEF) under the Digital Europe Programme and will start testing in 2025.</p> <p>€1m Budget</p>	<p>BRINGING RESPONSIBLE AI TO EUROPE AND THE WORLD</p>
<p>NZIH is supporting partner of the European Project Begonia, which develops Operational Digital Platforms (ODPs) that transcend national boundaries for data center flexibility</p> <p>€10-15m Budget</p>	<p>USE CASE 2: Digitalisation of energy storage and reuse in Data Centers</p>

Thank You!



*Tomorrow's data centres will not only power the internet
— they will power the green transition itself.*



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