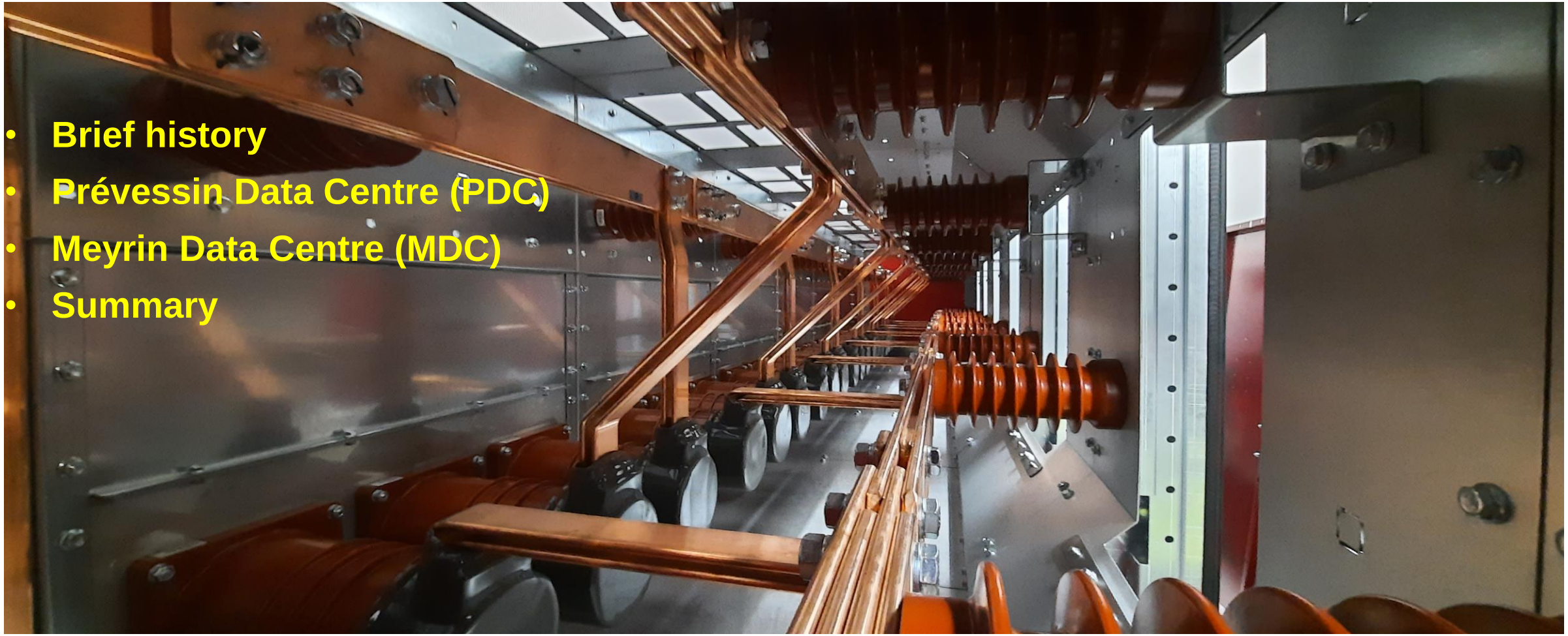

# Towards sustainable data centres at CERN

Dr. Olof Bärring - CERN IT/FCS

14/04/2026 @ ET Industry Computing Workshop 2026

# Outline



- Brief history
- Prévessin Data Centre (PDC)
- Meyrin Data Centre (MDC)
- Summary

# Brief history

**CERN has hosted computers since 1950s**

**1972: first data centre (still in use)**

- **2002: adding new substation**
- **2006: New chillers installation**

**Insufficient for LHC Tier-0 computing**

- **2008 Concept study for new DC - $$$→ no-go**
- **Tender for remote hosting**
- **2012-19: ~1.5 MW hosting in Hungary**
- **2018-24: host 1MW in modular DC**
- **2020: tender for new DC**

**2024: commissioning new DC**



PDC
2.7km
MDC

# Prévessin Data Centre (PDC)

**Tender approach**

- **Turn-key contract for the design, construction and 10-year operation**

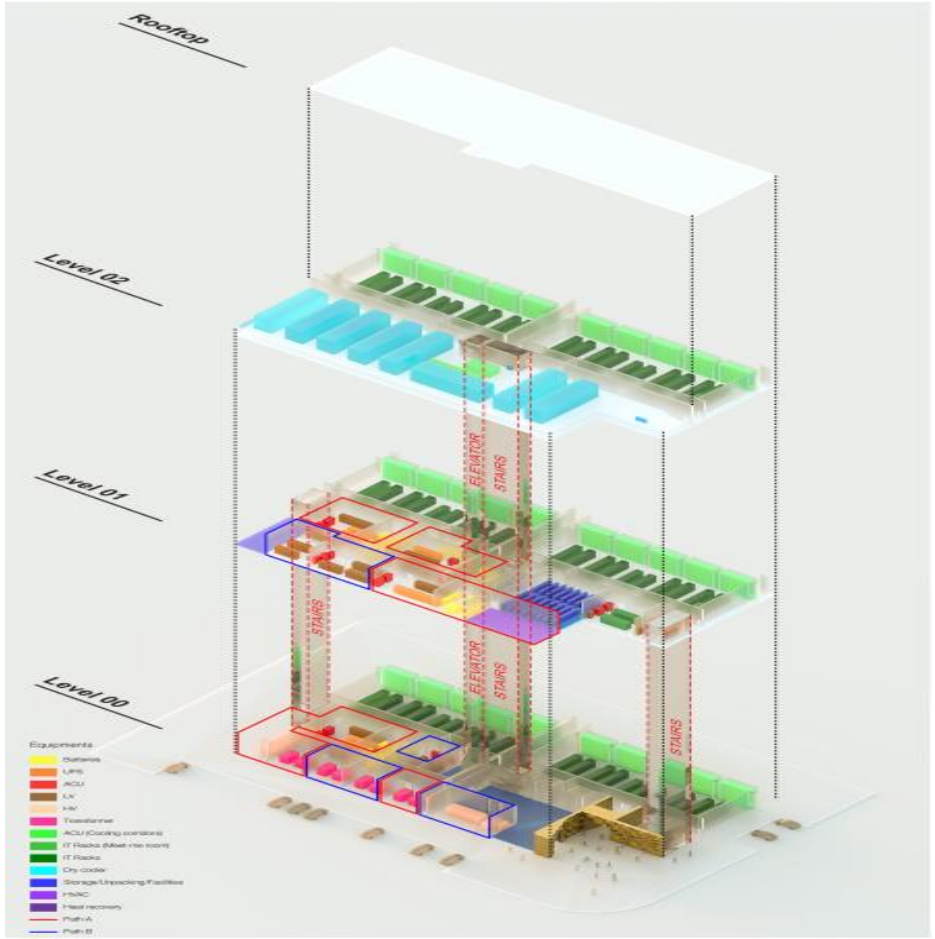
**Functional specification**

- **Max footprint 37 m × 70 m (~2500 m$^2$)**
- **Capacity 4 MW for ITE**
  - Allow upgrade to 12 MW in two stages of 4 MW
- **Rack density: average 20 kW, max 25 kW**
- **Max annualized PUE 1.15**
- **Redundancy**
  - 2N for electrical distribution
  - N+1 for HVAC
- **Heat recovery**

**Options**

- **UPS coverage: 10% or 20% of total power**
- **Rack PDUs**
- **18/0.4 kV transformers**

**Winning offer**



# Prévessin Data Centre (PDC)

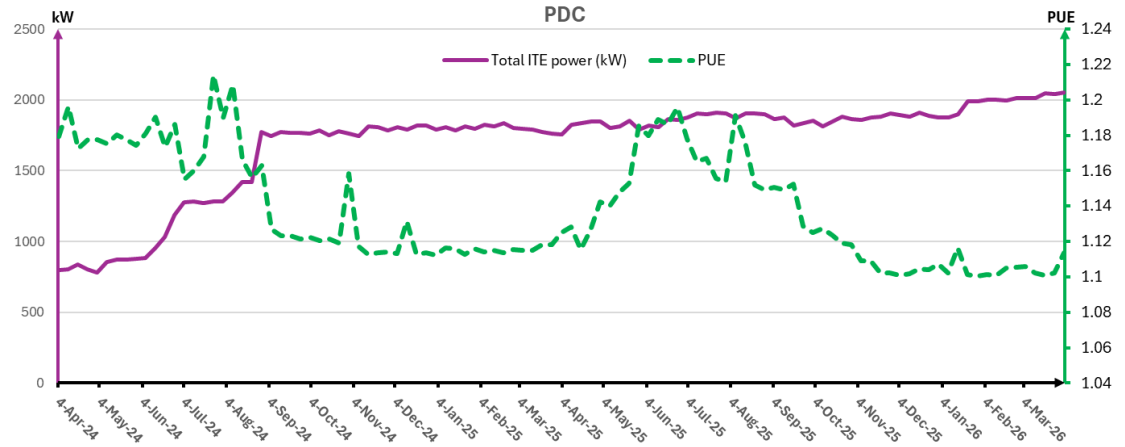
**In use since Feb 2024**

- 4 MW is available in two ITE rooms on top floor
- 20% UPS (0.8 MW) coverage
- Air-cooled: fan-wall + hot-aisle confinement with chimney
- Dry-coolers with adiabatic assist
- Currently ~50% ITE load (2 MW)
- Contractual limits @ >50% load
  - Annualized PUE ≤ 1.15
  - Annualized WUE(*) ≤ 0.379 l/kWh IT

**Expect ramp up to 5-6 MW in 2030 (start of HL-LHC)**

**For HL-LHC the +4 MW upgrade is needed**

- Phase 2 installation planned to start in 2027
- 4 MW will be available in two ITE rooms on middle floor

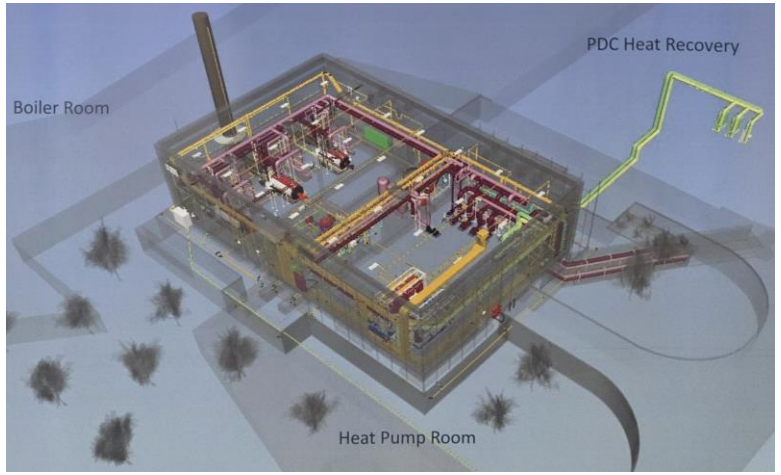


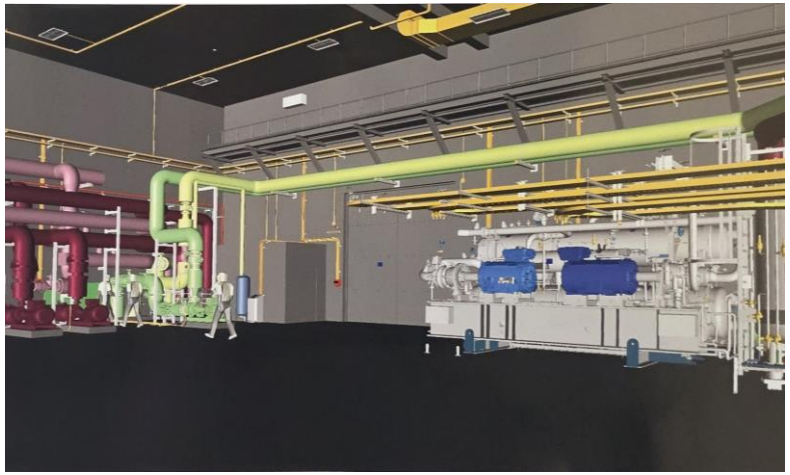

(*) *WUE: Water usage effectiveness*

# Building 776: new sustainable heat plant

**New heat plant**

- **Neighbouring to PDC**
- **Delivery in Q3 2026**
- **Recover 2 MW waste heat**
  - Limited by installed ITE
  - 3 MW heat exchanger
  - Up to 4 MW in phase 2
- **80% of CERN Prévessin campus heating**
- **60% $CO_2$ reduction**



# Meyrin Data Centre (MDC)

**In use since March 1972**

- **Evolved through several ITE generations**
  - Mainframes, supercomputers
  - UNIX workstations
  - Whitebox PC farms
  - Racked Linux servers
- **Current infrastructure**
  - 3.8 MW available / 2.5 MW used
  - 3 IT rooms
    - 1445, 1240 and 187 $m^2$
  - 8 18/0.4 kV transformers:
    - 2× 2 MVA + 6× 3 MVA
  - 5 UPS groups
    - 3×1.2 MVA + 1.6 MVA + 2 MVA
  - 9 chillers:
    - 4×1.5 MW + 2×1 MW+ 3×0.5 MW




# Meyrin Data Centre (MDC)

**Current PUE ~1.45**

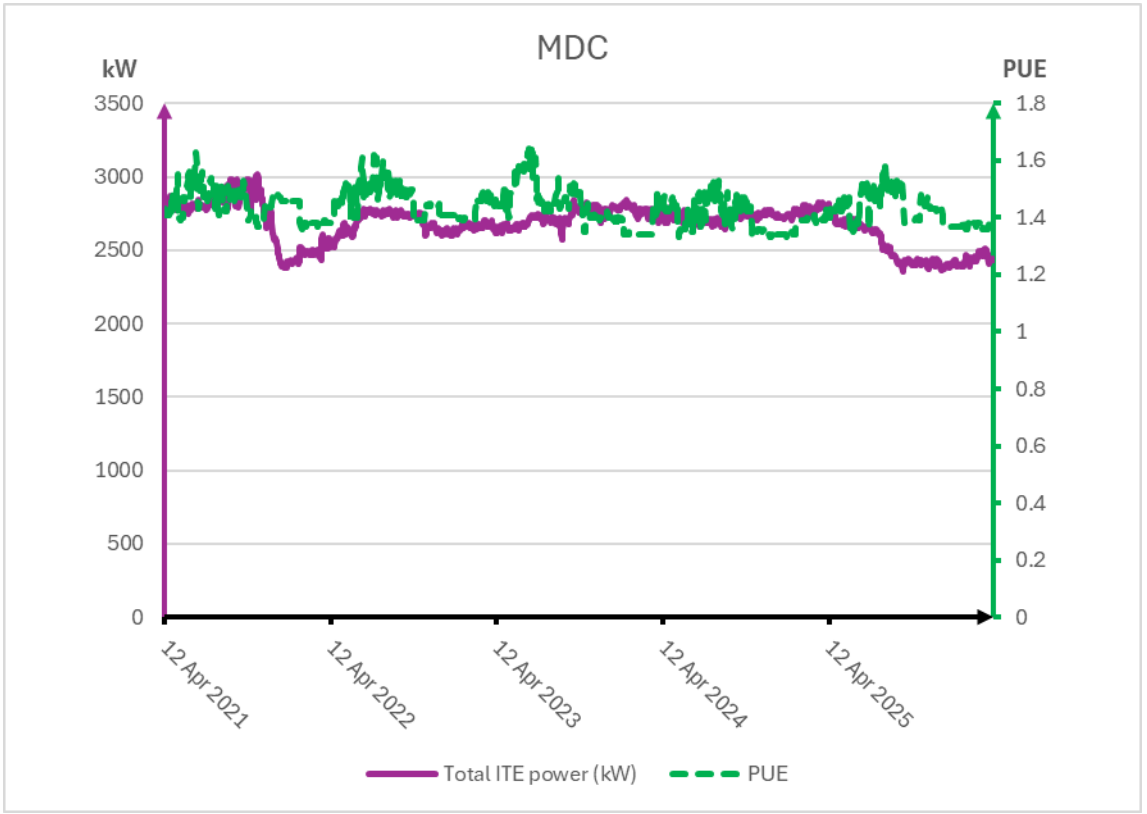
- Mainly due to (aging) mechanical chillers

**Improvements (WIP)**

- This year: started consolidation of UPS systems.
- Reduce number of UPS groups: 5 →3
- Reduce UPS capacity: 7.5 MW → 3.8 MW

**Coming years: replace aging chiller infrastructure**

- Opportunity for consolidation and explore use of free cooling



# Summary

- **CERN's two data centres (MDC and PDC) with combined 7.8 MW hosting capacity**
  - For the PDC two 4 MW upgrade options are available and the first will start in 2027 to cover the needs for HL-LHC
  - MDC is currently limited to 3.8 MW but with high redundancy
- **PDC is a modern and sustainable design**
  - PUE ≤ 1.15
  - WUE (Water usage effectiveness) ≤ 0.379 l/kWh IT
  - ITE waste heat is recovered in a brand-new heating plant
    - Initial 2-3 MW, later (phase 2) 4 MW
    - 80% of the heating for CERN Prévessin campus
    - 60% $CO_2$ reduction