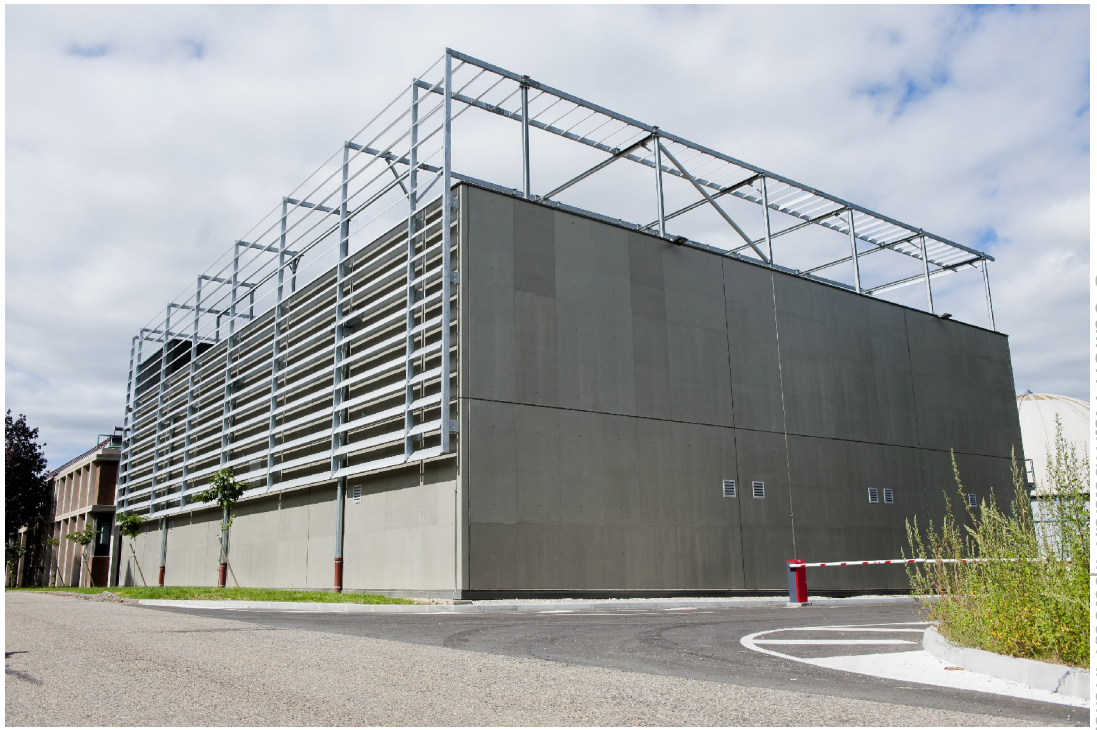
CC-IN2P3 new computing room

CC-IN2P3/CNRS
Xavier Canehan

New building

- 3 floors of 850 m²
- Already following upgrade planning
- **Previous room kept in production**



© Julien Rambaud/Alpaca/Andia

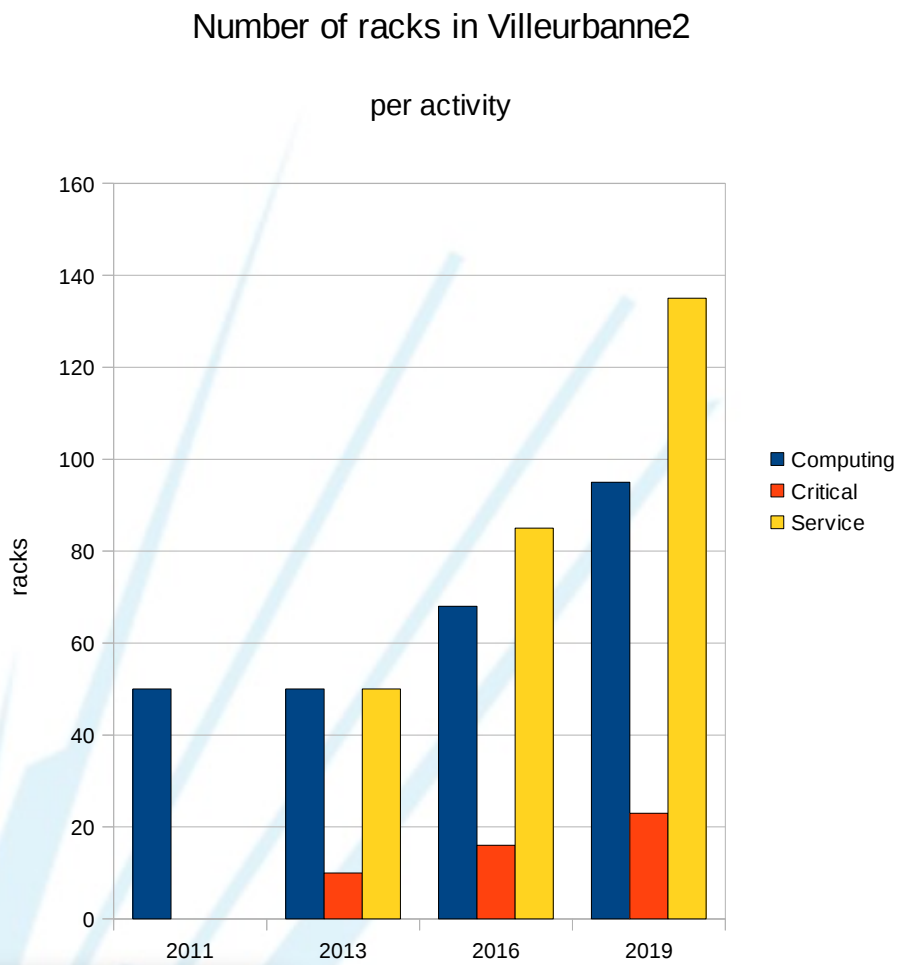
Building process

- Delays **at start** (land procurement)
- Call for tender for a **joint** operation: **conception & building**
- Building process at good pace
- First phase hosting computing nodes
  - Return of 5 racks hosted at CINES
  - Internal migration of 16 racks
  - New production hardware
- **In production** on the 24th of May

Modern computing room

- Scalability → 2019
- Modularity from building to rack
- Reliability with multi-tiering infrastructure
- Energy efficiency for cooling and IT
- Cost efficiency: using public resources at the best
- Monitoring cooling unit, PDU, PUE
- On a « green » campus

Scalability – Racks



- Hot aisle confined systems
- 2019: 6 blocks * 40 IT racks

240 racks

- Data treatment at first
  → minimum redundancy
- Critical services after power upgrade

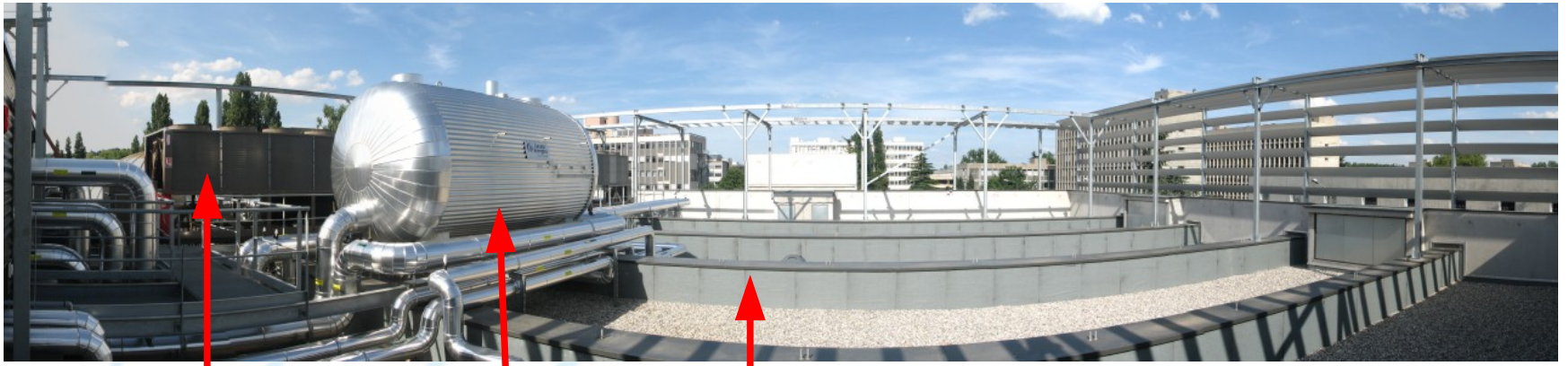
Scalability – Power distribution

- 1/3rd of UPS floor space equipped
- New building hosts all power line arrivals
  - 3 MW today, 6 MW in 2015, 9 MW in 2019
  - → 6 MW for new building in 2019, 3.6 MW for IT
- No power generator but 2 HV distinct lines (2012) with reservation

1st phase: 1 UPS chain
2*500kVA, 15 min autonomy

Failover without interruption to main power line (2MW)

Scalability – Chillers & Water Tank



Structure suited for heavy weight

23 m³ of chilled water

Combined chillers and silent heat exchangers (2 * 800 kW)

→ 20 minutes delay in case of double chiller failure

Computing room – cooling efficiency

- Cooling closer to heat production
  - Hot aisle confined system
  - 20 kW InRow cooling units
  - 1 unit for 1 IT rack
- Units working by group, ~280 kW last summer

compared to ~410 kW total power used

24 racks set up in April

full production in May

© Julien Rambaud/Alpaca/Andia

No raised floor

- Chilled water pipes above racks
- Industrial power distribution
- 32A tri-phased PDU

  → Cutting price on 40 sockets, new PDU design

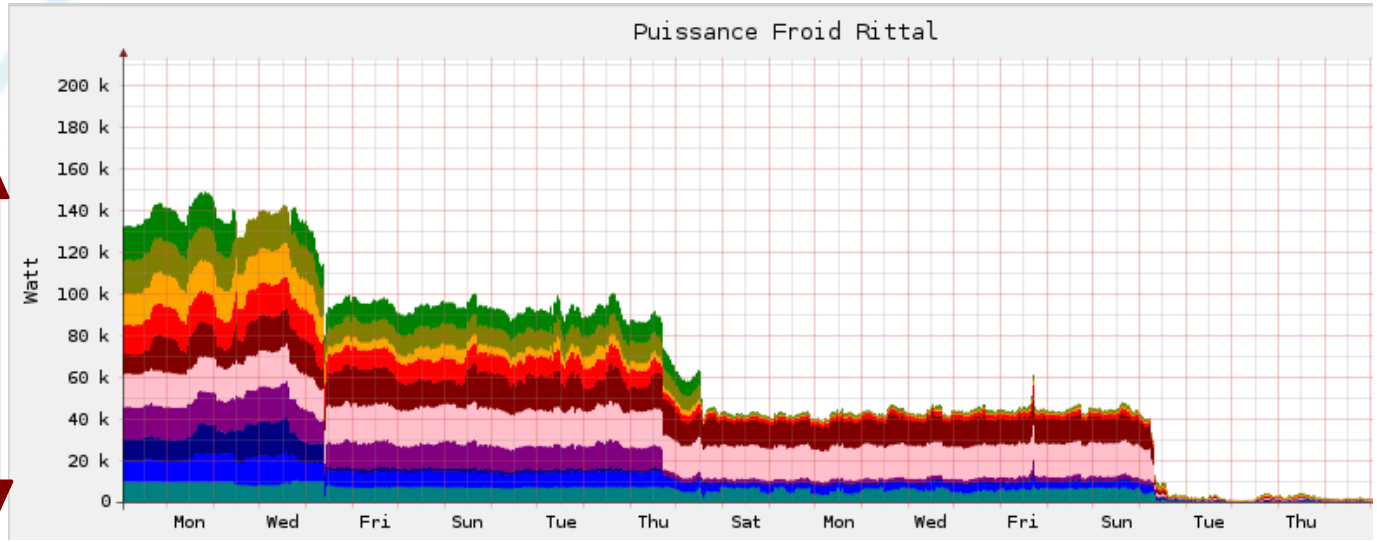
- cooling and power ease of plugging

Computing node migration

- **OGE migration minimized impact**
- 9 racks of PowerEdge 1950 used for **stress test**
- On the 24th of May, after 2 day work (21 people)
  - **3 racks** of PowerEdge 1950
  - **5 racks** of PowerEdge M1000 chassis (M610 blades)
  - **2 racks** of PowerEdge C6100, and installed **3 new racks**

→ **7.5 tons** of hardware moved to new room

150 kW allow return to comfort zone in previous room



Monitor and Control

- **Every equipment is meant to be monitored**, from Cooling Units and PDU to heavy infrastructure
  - → beside server through **IPMI** and Service Processors
- Monitoring is not enough: need remote control
  - → **ambitious project of central technical gestion WIP**
- Current PUE is 1.47
  - tuned during higher temperatures investigation (from 18°C to 23°C)
  - Previous room PUE around 1.7

Hot Water for a Green Campus

- Providing Hot Water to nearby buildings : 70m³/h at 55°C
- Allows better ERE, if not lower PUE

Next steps

- End of first phase: 2012 Q1
  - + 1 * 1600 kVA transformer **WIP**
  - + 1 * 600 kW chiller **WIP**
  - + 1 * UPS chain of 2 * 500 kVA **WIP**
  - + pipes and power lines for 40 more racks **WIP**
- Cabinets procurement as part of infrastructure
- Building Management System **WIP**
- **hungry** infrastructure planned

  beside standard computing, **cloudification** of compute farm

Questions ?

Greetings

Several slides and figures by courtesy of

Dominique Boutigny, Director of CC-IN2P3

Pascal Trouvé

Behind removable partition

- Right hand wall meant to protect computing units during extension, then moved to next pillar

1st computing room evolutions

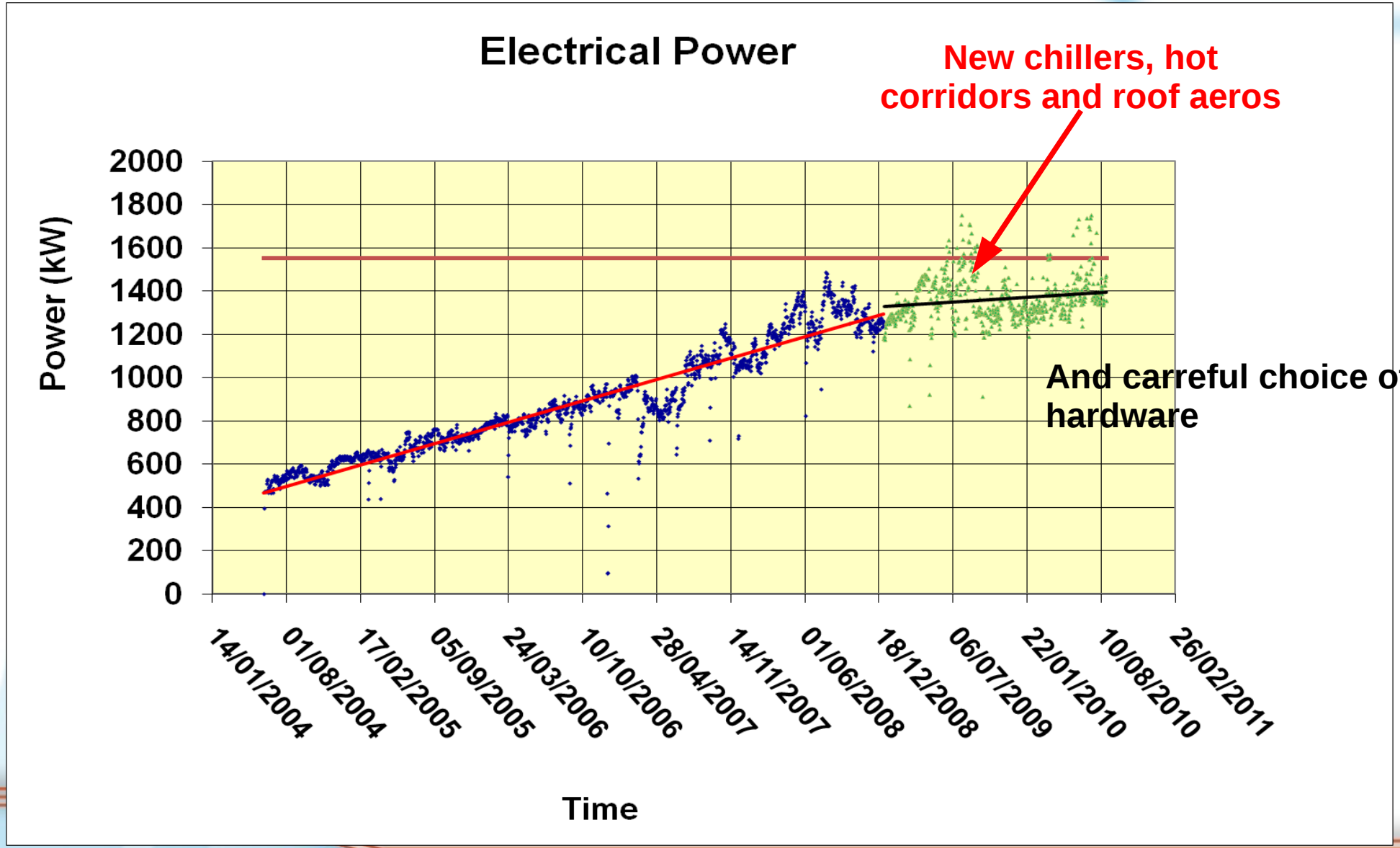
- 800m² used for a mainframe in 1986
- Distributed computing since early 90's

  → Power, cooling and organization issues
- Despite lots of improvement of our infrastructure

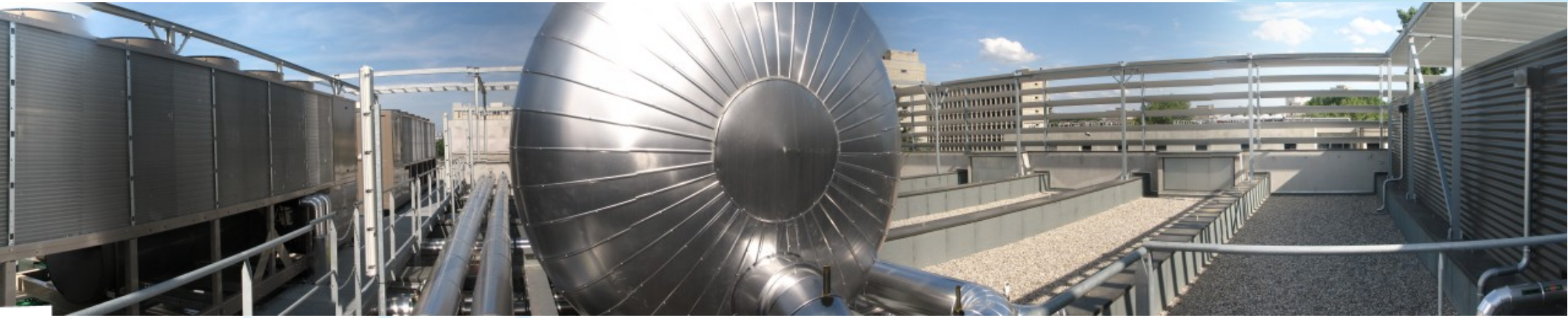
  power distribution, UPS, power generator, chilled water distribution, cooling units, 5 brands of containment systems

  we were so thigh that any modification was a nigthmare

Mandatory new building



Upgrade planned on roof



Several more chillers planned