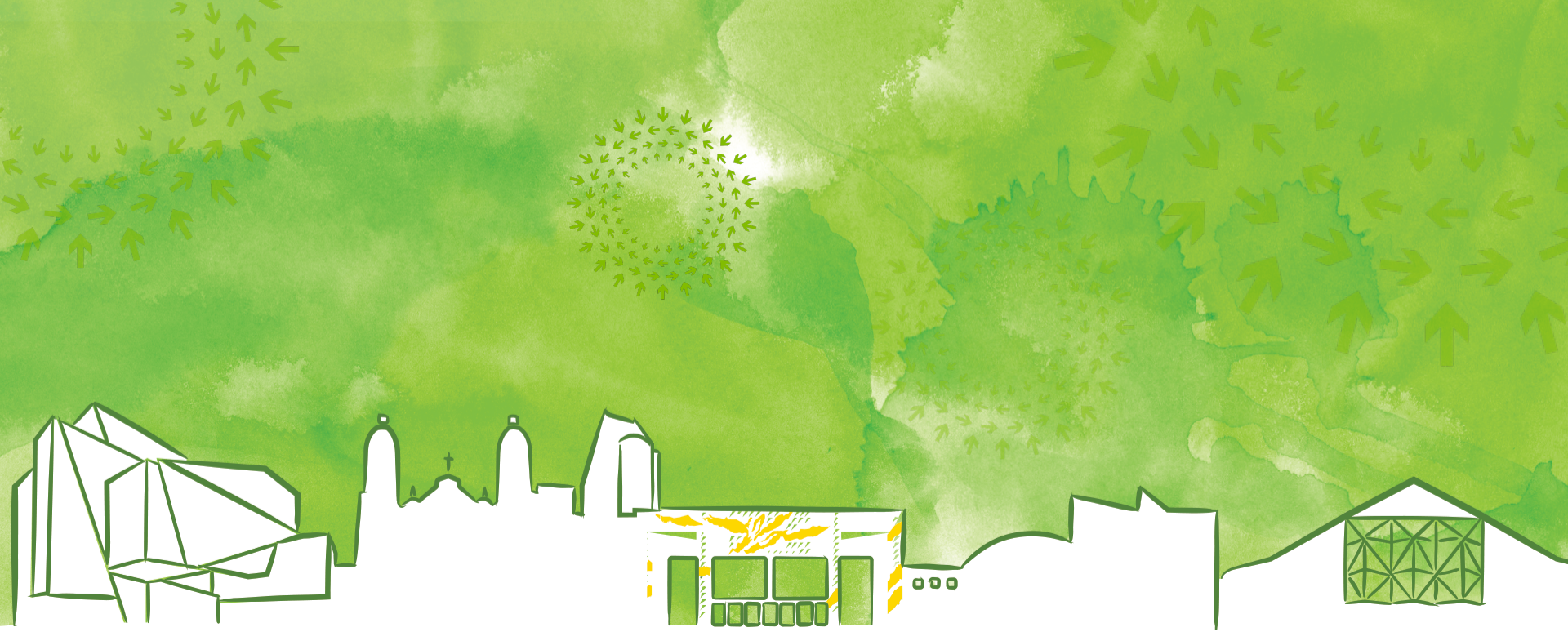


OCP Engineering Workshop

10 August 2016 | Durham, NH

upcoming contributions to OCP

orange™

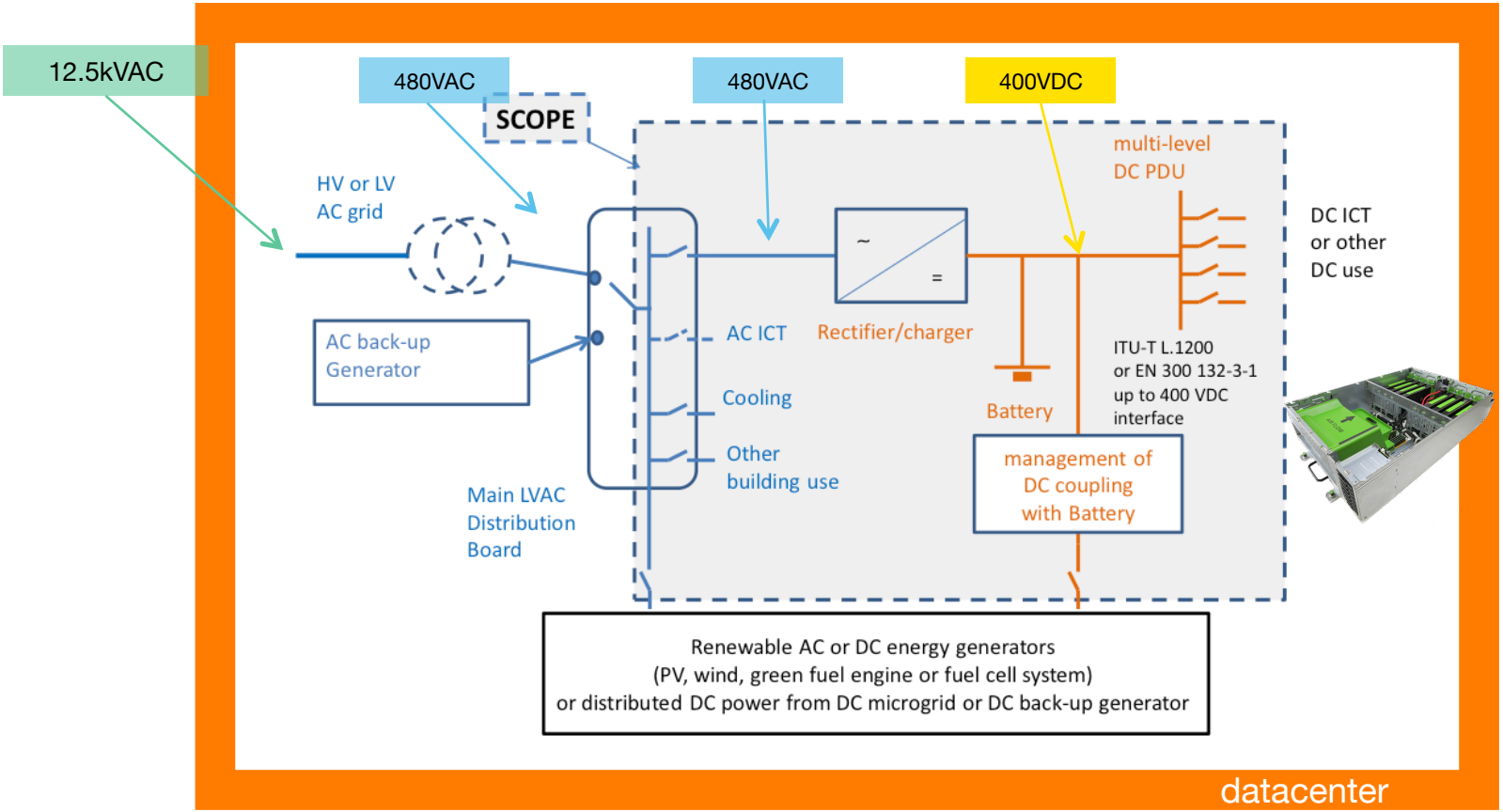
Jérémy Huylebroeck
OCP engineering meeting Aug 10th, 2016

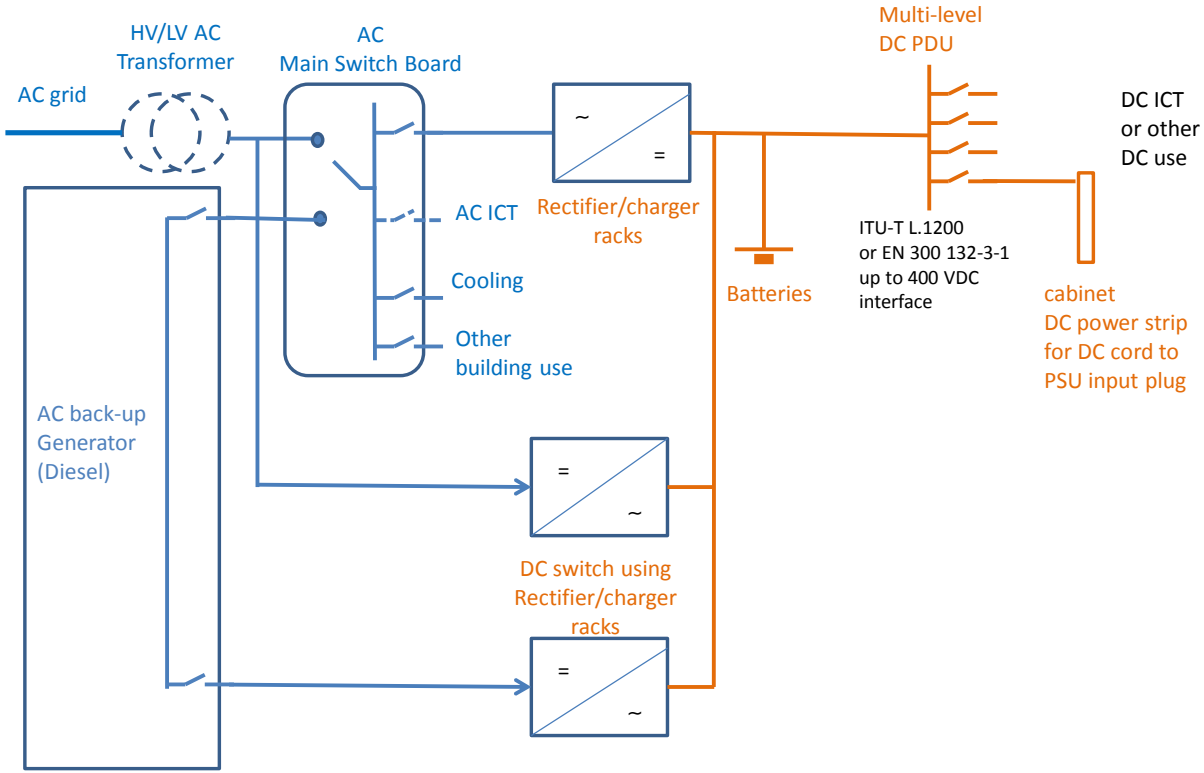
1 – datacenter design

power feeding architecture with **Direct Current** up to 400VDC

specification for power feeding systems architecture of up to 400 VDC for ICT equipment in data or telecommunication centres, and customer premises useful for datacentre design guide.

This specification is mainly based on ITU-T Recommendation L.1204 on up to 400VDC power feeding architectures and ETSI EE EN 300 132-3-1 and ITU-T L.1201 power feeding interface to ICT equipment.


12.5kVAC
480VAC
SCOPE
480VAC
400VDC
multi-level
DC PDU
HV or LV
AC grid
DC ICT
or other
DC use
AC back-up
Generator
AC ICT
Rectifier/charger
Cooling
Battery
ITU-T L.1200
or EN 300 132-3-1
up to 400 VDC
interface
Other
building use
management of
DC coupling
with Battery
Main LVAC
Distribution
Board
Renewable AC or DC energy generators
(PV, wind, green fuel engine or fuel cell system)
or distributed DC power from DC microgrid or DC back-up generator
datacenter



Example of implementation of an end to end DC system with AC and DC switching of the Diesel back-up Generator showing all the major components

Pros

higher end-to-end efficiency (few %)

removes intermediate conversions

safer lower current than 48V

smaller cables, space saving, can reuse AC cables

no active phase balancing

simpler electronic increases reliability, improving lifetime

no heavy batteries in server rooms, in case of raised floor

separate thermal zone for servers/batteries

transition path from AC

leverages standards from ETSI, IEC, ITU

Technology maturity

not common in server rooms but…

common in solar energy, hybrid cars

components are massively produced

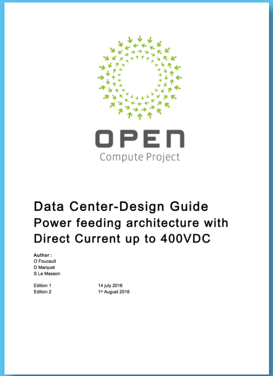
status

Figure 6. Emerson 10 kW 400V rectifier

Figure 11. Blade servers cabinets powered in 400Vdc

tests in Orange datacenter in Velizy, France, with off the shelf but non-OCP gear

paper submitted a few years back to IEEE
http://ieeexplore.ieee.org/xpl/login.jsp?tp=&arnumber=6099717



draft being submitted to OCP

Looking for European partner to test on OCP (Open Rack or other)

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2 – water-cooling for servers

early work

Fig. 1. Picture of half of the power supplies and servers.

did test of efficiency
on modified blade servers

Applied Thermal Engineering

Research paper

Experimental and numerical study of water-cooled datacom equipment

Published at :
http://www.sciencedirect.com/science/article/pii/S1359431115002537

need to adapt to OCP servers and racks

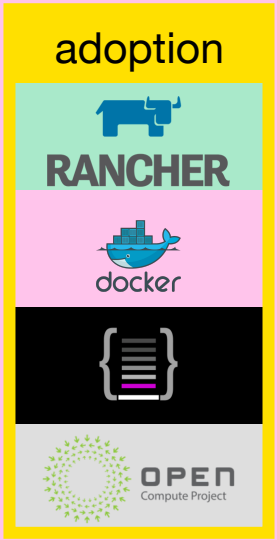
Looking for a hardware European partner to do a larger test deployment in collaboration with a French university

3 – turn-key software provisioning stack

Goal
help OCP adoption by offering a tested software stack making the hardware usable off the shelf

proposing to **integrate a suite of existing open source software** allowing to:

- provision hardware (firmware/BIOS)
- provision operating systems (PXE, ONIE for servers and network)
- provision a container based middleware for efficiency
- optionally configure networks via OCP solutions like Snaproute



Thank you

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OPEN
Compute Project