

The EL Activities during 2013 Long Shutdown

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- Projects
- Consolidation of EL infrastructure
- Maintenance
- Upgrades





The programme

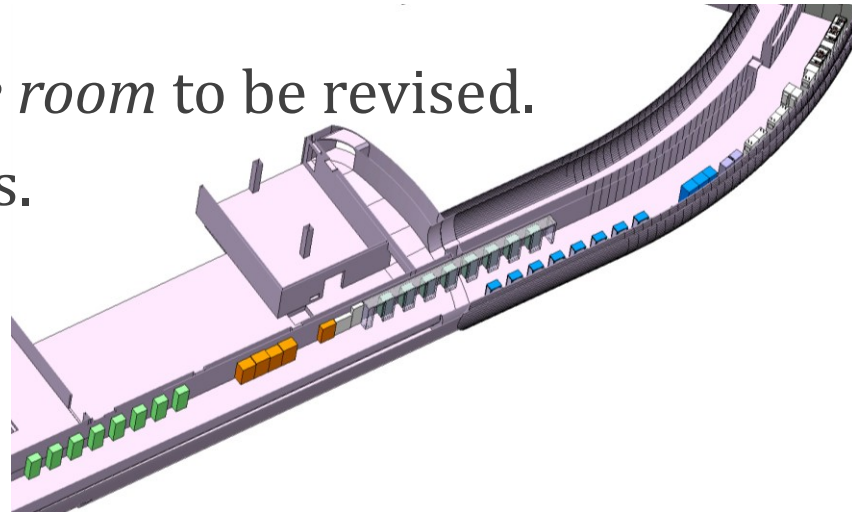
- Projects
 - R2E, Water Cooled Cables, UPSs in the tunnel
 - Infrastructures of the CERN Computer Centre
 - Infrastructures of the CCC Rack Room
- Consolidation of EL infrastructure
 - 66kV protections upgrade,
 - Normal & Safety Networks Substations in Prévessin
 - Renovation of SW (ME59) Substation in Meyrin
 - Renovation of SPS substations (Points 1, 2, 4 and 5)
- Maintenance
 - Mainly UHV and HV switchgear,
 - Transformers,
 - LV switchboards
- Upgrades
 - PLC Upgrade (Diesel connection, Atlas heaters..)
- + the usual unknowns users projects (QPS?, Cables?, ...)





R2E

- Equipment in LHC Points 1, 5, 7 & 8 must be relocated
 - 77 racks/cubicles will be moved out of the high radiation area.
 - Re cabling is not easy: no space in the tunnels, changes in cable length & impedance.
 - The concept of *safe room* to be revised.
 - Huge test programs.
 - Budget: ~5MCHF





The hoses of the Water Cooled Cables



- The hoses had been found to be not within specifications because of presence of chlorine and cracks.
- They are deteriorating
- It is planned to replace the hoses in 3 LHC points (4 right, 6 and 8)
- Length: 3120 m.
- Commissioning and tests.
- Budget: 2.2MCHF (90% under warranty?)





UPSs in the tunnel

- The failure rate of APC SILCON UPSs is sharply increasing.
- 74 UPS in the Tunnel (102 total)
- The failure rate is twice the rate of other brands installed at CERN
- End of life : they were installed in 2004
- No more expertise from APC. They were bought by Schneider
- Total replacement cost about 6 MCHF





Computer Centre

- Physics and critical loads are mixed in the same room and share the same cooling system
- Insufficient autonomy in case of power outage
- Cooling of the critical UPS room not sufficient
- No redundancy for all UPS systems
- IT needs to increase the nominal capacity to 3.5 MW
- A major consolidation and upgrade of the infrastructure systems is needed; for EL this means:
 - increasing the HV loop capacity
 - adding two cubicles and two HV/LV transformers
 - adding 2 sets of 400KVA UPS
 - adding several LV switchboards
- The project has started in December 2010 and is planned to be completed by June 2012
- Our partners in this project are EN-CV and GS-SEM
- Budget: 10.8MCHF





CCC Rack Room

- Dependency from building 870
- Absence of redundant electrical supplies
- Insufficient autonomy of cooling and ventilation
- Insufficient cooling capacity
- Inadequate ventilation of the loads in the rack room



- A major consolidation and upgrade of the infrastructure systems is needed; the study is being finalized.
 - A redundant electrical distribution scheme including standard electrical network, backup diesel network, UPS system and control network (48 V_{dc}).
 - New cooling and ventilation infrastructure to benefit from the new distribution scheme
 - Possibility of annual maintenance of the electrical infrastructure while the CCC is running.
- Project will start before the long shutdown but it has to be implemented when the LHC and the injectors are not running.
- Our partners in this project will be EN-CV and GS-SEM
- Budget: 5MCHF + Civil works





Consolidation of EL infrastructure

- The 66kV protection system is about 25 years old and shows more and more weaknesses (e.g. calibration out of range). The existing relays do not support the functionality needed for selectivity.
- The CCC Rack Room project requires a new substation for normal power distribution and Diesel safety distribution in Prévessin site.
- Replacement of the SW (ME59) substation (1968) in Building 112.
- Replacement of substations in SPS points 1, 2, 4 and 5 following new power cables installation (2011).
- Budget: 10MCHF





Maintenance

- Backlog
 - CERN has been delaying the maintenance and the upgrade operations in the substation in Bois-Tollet requested by RTE since 2009. It involves upgrades in the substation itself and on the Génissiat 400kV OHL line.
 - The maintenance of the Prévessin 400kV field has been delayed twice.
 - The power transformer maintenance operations have been delayed for 2 years on many transformers (e.g. those feeding the cryogenics for LHC)
- During AUG tests last December, more than 10 faulty circuit breakers were identified: they did not open within ~ 150 ms. Some took more than one minute, a few; even worse! The tripping mechanism is bogged by old dried lubricant.





PLC Upgrade

- The PLCs on the LHC electrical network control automatic network reconfigurations like the connection of the Diesel, UPS load shedding, autotransfer, etc. Part of them were installed in the 90s for LEP and the rest for the LHC.
- Some have to be replaced because of *old age*
- Most of them need
 - a software upgrade to bring them in line with similar equipment around the LHC and
 - to be reprogrammed to take into account all the network modifications done since their installations.





What if we postpone the shut down to 2013 ?

- Increased risk for
 - the irradiated cables : EN-EL used to run a yearly campaign for their replacement in the SPS during the 3 month shut down. The last one took place in early in 2009.
 - equipment failures due to a lack of tests and maintenance. These may lead to a major event.... (400kV infrastructure and UPS for QPS are good examples)
- Several projects will have to be (partially) rescheduled
 - IT B513 upgrade
 - CCC powering upgrade
 - EL Consolidation (New substations commissioning)





What if we postpone the shut down to 2013 ?

- Learning from this Christmas break;
 - Time schedule too tight
 - Overloaded program of tests leads to human mistakes.
 - No time available for repair operations of failure detected during tests
 - Program jeopardised by many “urgent” last minutes requests

we will, at least, ask for more time if we only have a short break in 2012

