

EN-EL Activities for LS2 LIU, Consolidation, Maintenance, Operation

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LS2 DAYS

29-30 SEPTEMBER 2015

<http://indico.cern.ch/event/436424/>

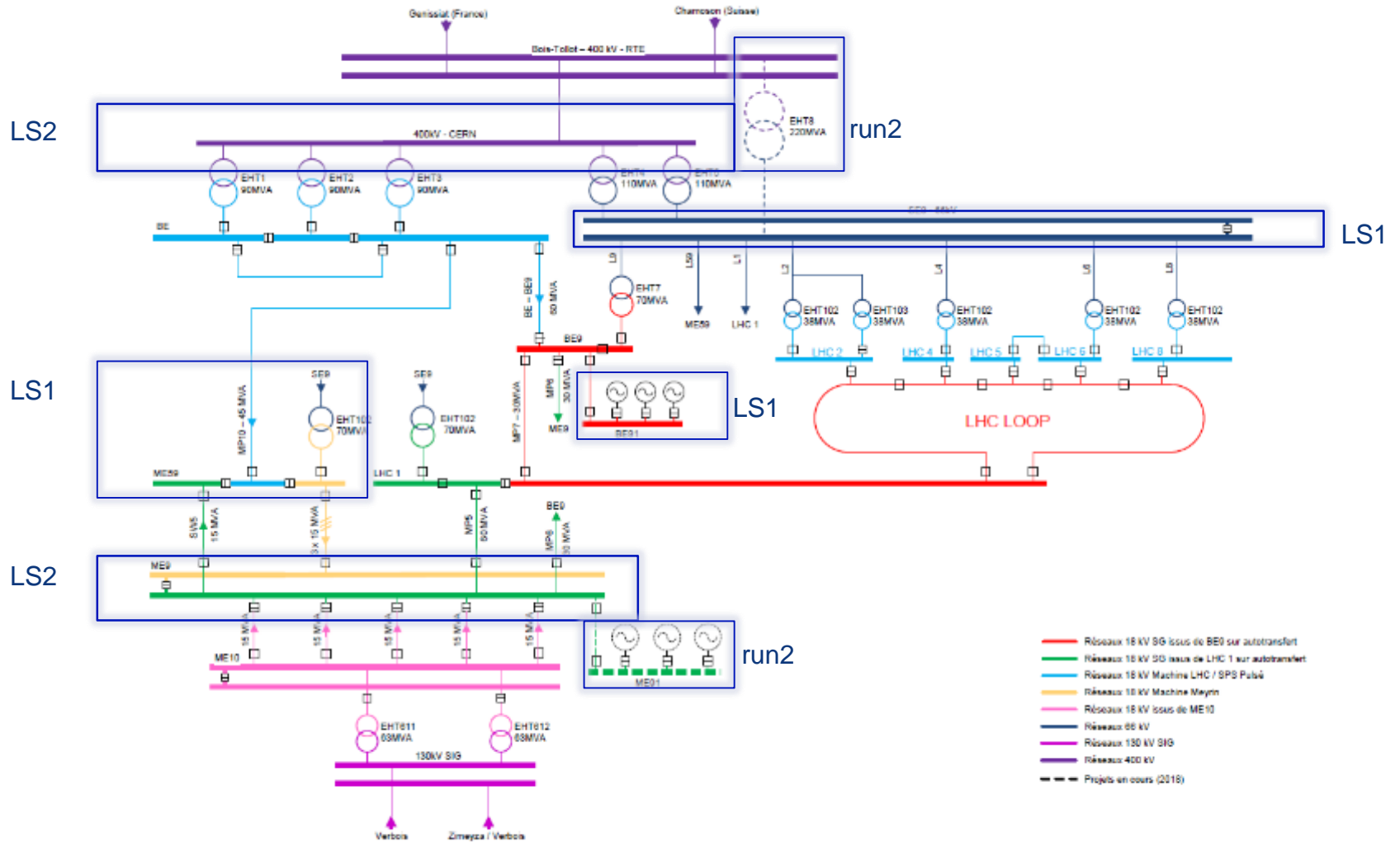
Agenda

1. Introduction
2. LIU & Consolidation
 - a. Major projects
 - b. Other projects/works
 - c. Activities not yet confirmed
3. Maintenance
4. Operation
5. Planning & Conclusion

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Overview of the electrical network



Methodology

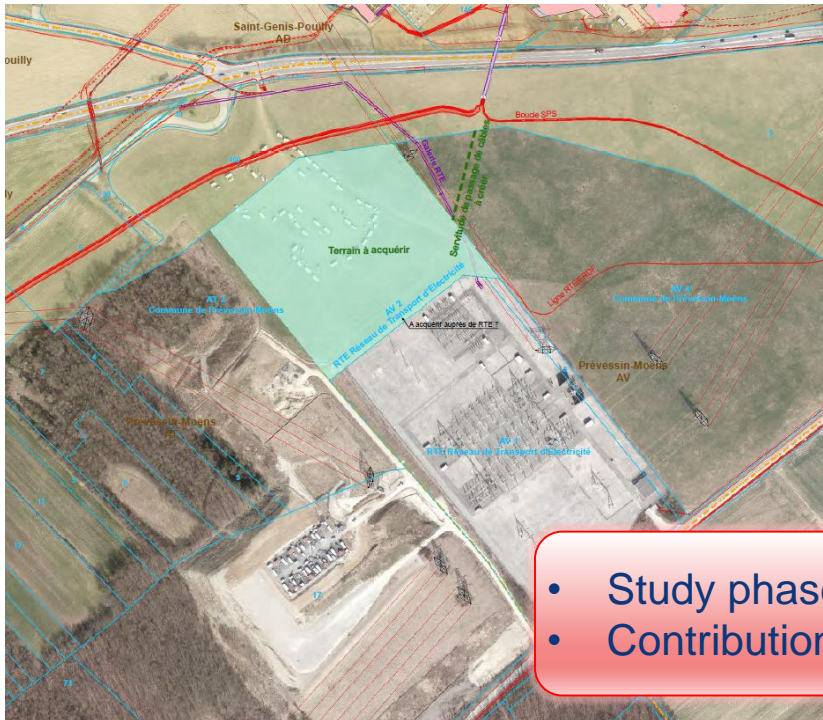
- It is envisaged to work in **campaigns** as far as practicable
 - To be implemented for maintenance activities (as it was done during LS1)
 - To be implemented for projects/works
 - Already implemented for cabling and optical fibre activities
- **This is critical to ensure that a maximum number of activities will be carried out.**

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LIU & Consolidation

- Major projects – **Run2**
 - New diesel generators in Meyrin (ME91)
 - New 400 kV substation (BE2)

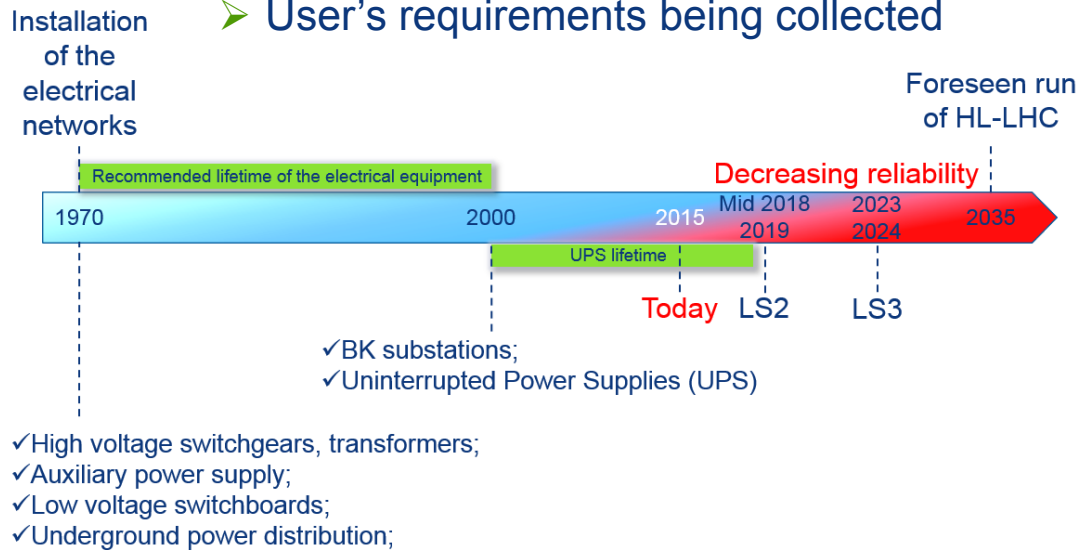


- Study phase ongoing
- Contribution GS & EN-CV

LIU & Consolidation

• Major projects – Run2 / LS2

- Renovation of the 400 kV protection system (**not funded yet**)
- Consolidation and upgrade (LIU) of the SPS electrical infrastructure (**overall budget to be confirmed at the end of the study phase**)
 - 7 BAs to be done in total (incl. new BAF3 for RF)
 - User's requirements being collected



- Study phase ongoing
- Possible contribution GS & EN-CV for new buildings

LIU & Consolidation

- Major projects – **LS2**

- Renovation of the main Meyrin substation (ME9)

Note: 18 kV cables to be hauled before LS2

Contribution GS & EN-CV

- Consolidation of the 400 kV park in Prévessin (new incoming circuit breaker, firewalls, transformer non-conformities, etc.)
- Consolidation and upgrade (LIU) of the LV distribution in the PS complex (resourcing needs being studied with overall budget to be confirmed)
- Consolidation and upgrade (LIU) of the LV distribution in the PSB (incl. cable dismantling program) (resourcing needs being studied with overall budget to be confirmed)

LIU & Consolidation

- Injector de-cabling project – **Run2 / LS2 / ...**

- To **identify** and **remove obsolete cables** within the injector complex, until end of LS2
- First priority: Identification of obsolete cables in the **Booster** and **SPS BA5**
 - Partial / total removal must be decided by end September 15'
 - Triggered by LIU needs (room in cable containment)
- Second priority: **SPS BA3**
- Third priority: Identification of obsolete cables in the **PS, TT2, LINACs**

	RUN 2015	YETS 2015-2016	RUN 2016	EYETS 2016-2017	RUN 2017	YETS 2017-2018	RUN 2018	LS2
BOOSTER								
Cable identification	IDENTIFICATION	IDENTIFICATION						
Cable labelling		LABELLING						
Cable disconnection		DISCONNECTION						
Cable removal				REMOVAL		REMOVAL		
SPS								
Cable identification	IDENTIFICATION	IDENTIFICATION						
Cable labelling		LABELLING						
Cable disconnection		DISCONNECTION						
Cable removal				BA5 LEFT REMOVAL		BA5 LEFT REMOVAL		BA5 RIGHT & BA3 REMOVAL
PS, TT2 & Linacs	TO BE DEFINED							

LIU & Consolidation

- Injector de-cabling project – Status per machine

Machine/area	Total number of signal and control cables	Identified obsolete cables on Sept. 21 st
Booster	12'000	3'000 (25%)
SPS – BA5	~ 6'500	3'250 (50%)
SPS – BA3	~ 8'000	0
PS – CENTRE RING	~ 7'000	963 (14%)
TT2	~ 3'000	72 (2.5%)

- **Booster:**

- 3000 obsolete cables to be removed (consolidation budget) before LS2
- 2800 used cables to be removed and replaced during LS2 for LIU (LIU budget)
- 2 big cable campaigns for EN-EL (EYETS16-17, YETS17-18 and LS2)
- Strong commitment from all the equipment groups during identification and disconnection stages
→ **Resources to be secured for YETS15-16**

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LIU & Consolidation

- Other projects/works
 - Modification of the existing 18 kV Autotransfer and new 66 kV Autotransfer (**not funded yet**)
 - Consolidation of UPS systems (Chloride and Schneider) (**not funded yet**)
 - Consolidation of 48 V DC systems (SPS, LHC substations on surface, Meyrin, new EN-EL projects)
 - Renovation of the machine network in Meyrin (West Area – ME65/66/74) (**partially funded**)
 - Local control infrastructure consolidation (more than 150 remote I/O stations and cross-wiring junctions from LEP to be replaced)

LIU & Consolidation

- Other projects/works

- TE/EPC

- New SVC in Meyrin (ME59)

- Replacement of the SPS SVC in Prévessin (BE)

- LIU-PSB

- Renovation substation ME25 + new building 245

- Other users' projects

- Experiments

- SM18, SF18

- East Area

- EHN1

- Etc.

- **See users' presentations for details.**

LIU & Consolidation

- Signal cabling projects

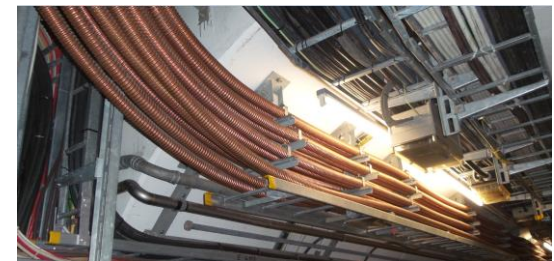
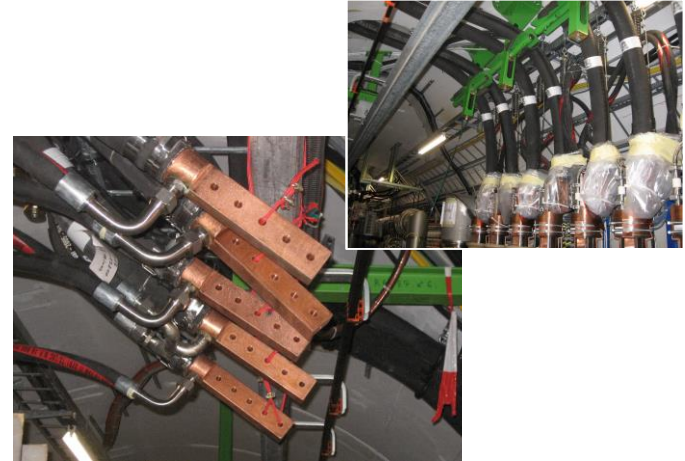
- **Replacement of irradiated cables** (4-5 months during LS2)
 - TDC2-TCC2 (1st priority: already postponed for LS1)
 - TS4- or TS6+ (in 2nd priority to evaluate)
 - Decision to be taken according to the RIACWG recommendations (*EDMS 1369134*)
 - Services needed: RP, Transport, Coordination, Users
- **Repair of aged cables connected to the RAL patch panel** (3-4 months during LS2)
 - SPS P4, P5, P6 and North Area
 - Services needed: RP, Coordination, Users
- **Plus more than 30 other large projects generated by users (LIU, PSS, etc ...) needing signal cables → see users' presentations**



LIU & Consolidation

- DC cabling projects

- **Replacement of DC WCC hoses in LHC-1, LHC-2 and LHC-5** (12-14 months during LS2)
 - Approx. 200 cables concerned for a total length of 2300 metres of hose to be replaced
 - Services needed: EN-HE, EN-MEF, EN-CV, TE-EPC, DGS-RP
- **Removal of unused DC WCC cables in SPS-5L and SPS-5R** (4 weeks during YETS 2015-2016)
 - Required for the integration of the new dump in point SPS-5. Dismantling and disposal of irradiated cables. Retrieval of several lengths as spare cable for future projects or repair.
 - Services needed: EN-HE, EN-MEF, EN-CV, DGS-RP
- **Plus more than 10 projects generated by users (LIU, LHC, Test benches, Labs....) needing DC cables → see users' presentations**



LIU & Consolidation

- Optical fibre projects

- **Consolidation of fibre backbones and main distribution points** (2-3 months during LS2)
 - Increase the fibre capacity in Meyrin, Prévessin and LHC sites
 - Services needed: EN-MEF
- **Deployment of underground SPS fibre infrastructure (part of BI-BPM Upgrade)** (6 months during LS2)
 - Installation of fibre infrastructure in remaining half part of SPS machine
 - Services needed: EN-HE, EN-MEF, TE-EPC, BE-RF
- **Fibrothèque database** (12 months during LS2)
 - Survey on the fibre infrastructure on all machine areas for registration
 - Services needed: EN-MEF



Plus more than 20 other large projects generated by users (LIU, PSS, etc ...) needing signal cables → see users' presentations

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LIU & Consolidation

Budget / Resources

- Activities not yet confirmed
 - **LHC:**
 - Replacement of diesel generator in LHC4
 - Replacement of FIR protection relays
 - **Meyrin:**
 - Renovation of ME49/16/76 (PS and Administrative Areas)
 - **Prévessin:**
 - Renovation of substations HM1 & HM2 (Administrative Area)
 - Renovation of the 3.3 kV network in the North Area and replacement of diesel generator BB81

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Maintenance

To be organized in campaigns

- 400 kV and 66 kV preventive maintenance
 - 1st step: 400 kV preventive maintenance (incl. transformers)
 - 2nd step: 66 kV preventive maintenance (incl. transformers)
 - With the new 400 kV substation (BE2), it will be possible to separate the 400 kV and 66 kV preventive maintenance for the first time
 - The power available at CERN will not be limited during the 400 kV and 66 kV preventive maintenance (instead of a previous limitation to 60 MVA through the Swiss network)

Duration of the above maintenance activities:

- ✓ 400 kV preventive maintenance: in parallel with other consolidation activities
- ✓ 66 kV preventive maintenance: approx. 1 month

Maintenance

To be organized in campaigns

- Other preventive and curative maintenance

- 400/18 kV transformers
- 18/3.3 kV, 18/0.4 kV and 3.3/0.4 kV transformers
- 18 kV and 3.3 kV switchgear
- 400 V switchboards
- 48 V DC, UPS and lighting systems
- AUG (consolidation)

Duration of the above maintenance activities:

- ✓ Meyrin / West Area / PS Complex – Several weeks
- ✓ North Area – 1 week per point (BA80/ BA81/ BA82)
- ✓ SPS – 1 week per point (SPS1/2/3/4/5/6/7)
- ✓ LHC – 1 week per point (LHC1/18/2/3/4/5/6/7/8)

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Operation

- AUG tests:

- Meyrin / West Area – 4 days per year (Admin. Area, PS Complex, ISR, West Area)
- Prévessin / North Area – 4 days per year (Prévessin, BA80, BA81, BA82)
- SPS – 7 days per year
- LHC – 9 days per year

- Auto transfer test:

- 1 day for network preparation
- 1 week-end test
- 1 day for nominal configuration

- “Normal/Secours” test:

- Approx. 2 hours required in total (the test itself requires approx. 10 min early one morning)

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Planning & Conclusion

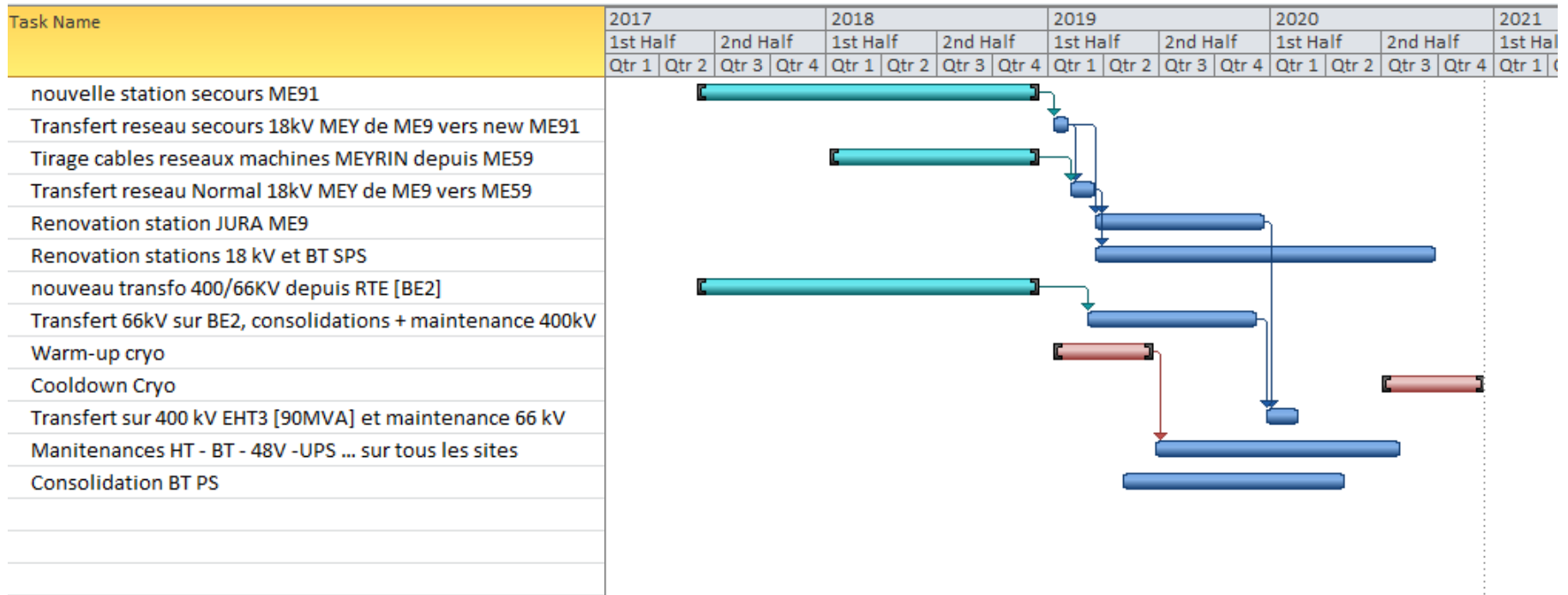
PROJECT	WHEN	FINANCED
BE2	RUN2	YES
ME91	RUN2	YES
New cables for Meyrin machine network ME59	RUN2	YES
Substations ME65/66/74 (West Zone Meyrin)	RUN2	PARTIALLY
SPS renovation substations HT/BT and auxiliaries	RUN2/LS2	PARTIALLY
Substation ME24/25 (LIU/BOOSTER)	RUN2/LS2	YES (LIU)
Consolidation AUG	RUN2/LS2	YES
Consolidation 48 Vdc	RUN2/LS2 + ...	YES
Consolidation 400kV park BE (firewalls, HTB transformers...)	LS2	YES
Substations ME16/49/76 (PS Complex)	LS2	BUDGET REQUESTED
Autotransfer: new for 66 kV + consolidation 18 kV	LS2	NO
ME9	LS2	YES
400kV protection system	LS2	BUDGET REQUESTED

Planning & Conclusion

PROJECT	WHEN	FINANCED
Replacement UPS Chloride and Schneider	LS2	NO
Consolidation low voltage network PS complex	LS2	PARTIALLY
Diesel generator LHC4	LS2	NO
Local control infrastructure consolidation	LS2	BUDGET REQUESTED
Consolidation and upgrade (LIU) of the LV distribution in the PS-TT2	LS2	PARTIALLY
Replacement protection relays LHC	LS2 + ...	BUDGET REQUESTED
3.3 kV network Zone North	LS2 + ...	NO
Substations HM1/HM2 (Preveessin Admin area)	LS2 + ...	NO

Note: Cabling and optical fibre activities not listed

Planning & Conclusion



Planning & Conclusion

- Some activities shall **absolutely** be completed during Run2 in order to carry out the activities scheduled during LS2
- Other activities shall be **anticipated** as much as possible during Run2 but will be completed during LS2
- Necessity to work in **campaigns** to complete as many activities as possible (projects/works/maintenance) – User's requests therefore need to arrive timely
- **Work site supervision** is likely to be significantly increased during LS2 – Refer to LS1 Debriefing Day
- Additional **installation contracts** may have to be put in place before LS2 – Refer to LS1 Debriefing Day



LS2 DAYS

29-30 SEPTEMBER 2015

Thank you