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

Nicolas Bellegarde on behalf of EN-EL
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
Agenda

1. Introduction

2. LIU & Consolidation
   a. Major projects
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3. Maintenance

4. Operation

5. Planning & Conclusion
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.
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
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
  - 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**

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LIU & Consolidation

• Injector de-cabling project – Status per machine

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

- **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
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
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

• 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

- 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

• 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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5. Planning & Conclusion
## Planning & Conclusion

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<th>WHEN</th>
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<tbody>
<tr>
<td>BE2</td>
<td>RUN2</td>
<td>YES</td>
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<tr>
<td>ME91</td>
<td>RUN2</td>
<td>YES</td>
</tr>
<tr>
<td>New cables for Meyrin machine network ME59</td>
<td>RUN2</td>
<td>YES</td>
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<tr>
<td>Substations ME65/66/74 (West Zone Meyrin)</td>
<td>RUN2</td>
<td>PARTIALLY</td>
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<tr>
<td>SPS renovation substations HT/BT and auxiliaries</td>
<td>RUN2/LS2</td>
<td>PARTIALLY</td>
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<tr>
<td>Substation ME24/25 (LIU/BOOSTER)</td>
<td>RUN2/LS2</td>
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<tr>
<td>Consolidation AUG</td>
<td>RUN2/LS2</td>
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<tr>
<td>Consolidation 48 Vdc</td>
<td>RUN2/LS2 + …</td>
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<tr>
<td>Consolidation 400kV park BE (firewalls, HTB transformers…)</td>
<td>LS2</td>
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<td>Substations ME16/49/76 (PS Complex)</td>
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<td>BUDGET REQUESTED</td>
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<td>Autotransfer: new for 66 kV + consolidation 18 kV</td>
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<td>ME9</td>
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<td>400kV protection system</td>
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## Planning & Conclusion

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<th>PROJECT</th>
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<td>Replacement UPS Chloride and Schneider</td>
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<td>Consolidation low voltage network PS complex</td>
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<td>Local control infrastructure consolidation</td>
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<td>Consolidation and upgrade (LIU) of the LV distribution in the PS-TT2</td>
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<td>Replacement protection relays LHC</td>
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<td>3.3 kV network Zone North</td>
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<td>Substations HM1/HM2 (Prevesin Admin area)</td>
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*Note: Cabling and optical fibre activities not listed*
Planning & Conclusion

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<td>Qtr 3</td>
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CERN LS2 DAYS 29-30 SEPTEMBER 2015

N. Bellegarde / EN-EL 28
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.
Thank you