

East Area Renovation Project

COST AND SCHEDULE REVIEW 3

Expenditures and budget forecast
Activities pending final approval

Sébastien EVRARD Project Leader, EN-EA 21 November 2019
On behalf of the Project team
<https://edms.cern.ch/document/2269106/1>



ENGINEERING
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EAST AREA RENOVATION



Outline



- Some reminders
- Budget
- Items with potential of cost increase
- Activities pending final approval
- Summary

Some reminders

- Initial budget defined mid-2016: 23,838 kCHF, split from ACC-CONS
- CSR I & II identified various activities uncovered or partially covered in the project baseline. The corresponding missing budgets amounted to **3 MCHF**
- The scope of the project evolved regarding the Civil Engineering work for Building 157 replacement of the roof corresponding to an additional budget need of **1 MCHF**
- M2P transfers reduced the material budget by **1 MCHF**, CVI cuts by another **1,3 MCHF**
- Tendering process for magnets showed an overrun of **2 MCHF**
- The project team proposed to reduce some WP scopes allowing a CtC reduction of **- 3 MCHF**
 - Electrical systems: DC cables will be kept and re-used (except extremities)
 - Cooling and ventilation: the B. 157 hall ventilation will be postponed to after LS2
- The project team and SMB identified additional funding opportunities (~1 MCHF)

• **CSR2 acknowledged a project budget of 22.5 MCHF, needs = 25.5 MCHF**

Figures <small>(source EDMS1821277)</small>	CVI (kCHF)	CTC (kCHF) Material only including M2P
MTP2016	N/A	23,838
MTP2017	- 1,246	22,592
MTP2018	- 51	22,541

Budget – recent developments

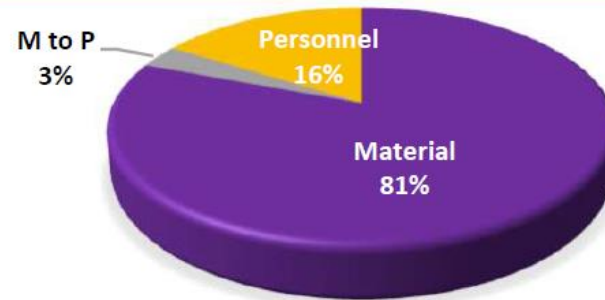
- The project requested a CtC budget increase of 3,320 kCHF during the preparation of MTP 2020-2024 (EDMS 20448902, backup slides)
- Consequences on Material Budget
 - Before MTP 2020-2024: **22,541 kCHF**
 - MTP 2020-2024:
 - Additional request 3,320 kCHF
 - Granted : 2,669 kCHF → **still 651 kCHF missing**
 - OFEN incentive Office Federal de l’Energie (CH)
 - Granted: 796 kCHF (as not yet available, **not included in M budget right now**)
 - After MTP: **25.210 kCHF**
 - Arbitration & Reprofilng exercises → rebaseline sent to all GL’s involved.

PRE exercise	Figures <small>(source EDMS1821277)</small>	CVI (kCHF)	New Budget allocation (kCHF)	CTC (kCHF) Material only including M2P
	MTP2018	- 51		22,541
	MTP2019	0	+ 2,669	25,210

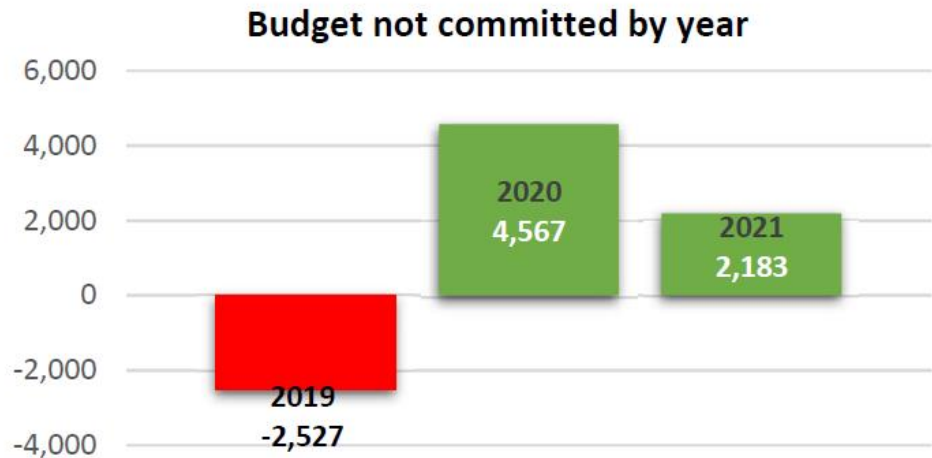
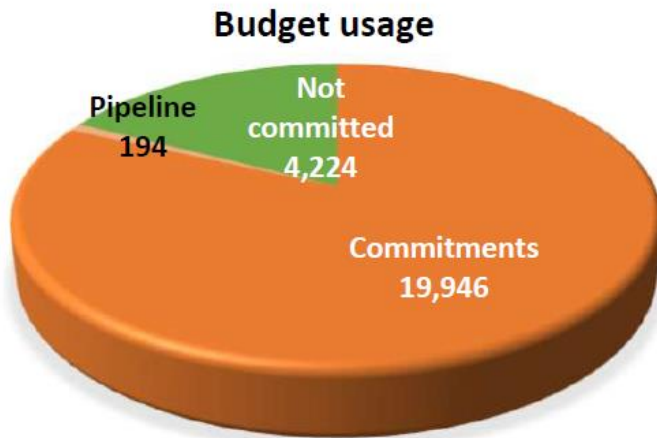
Budget (Situation on November 18th, 2019)

Cost to Completion (P+M) in kCHF 30,159

Material	24,364
M to P	959
Personnel	4,836
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	30,159

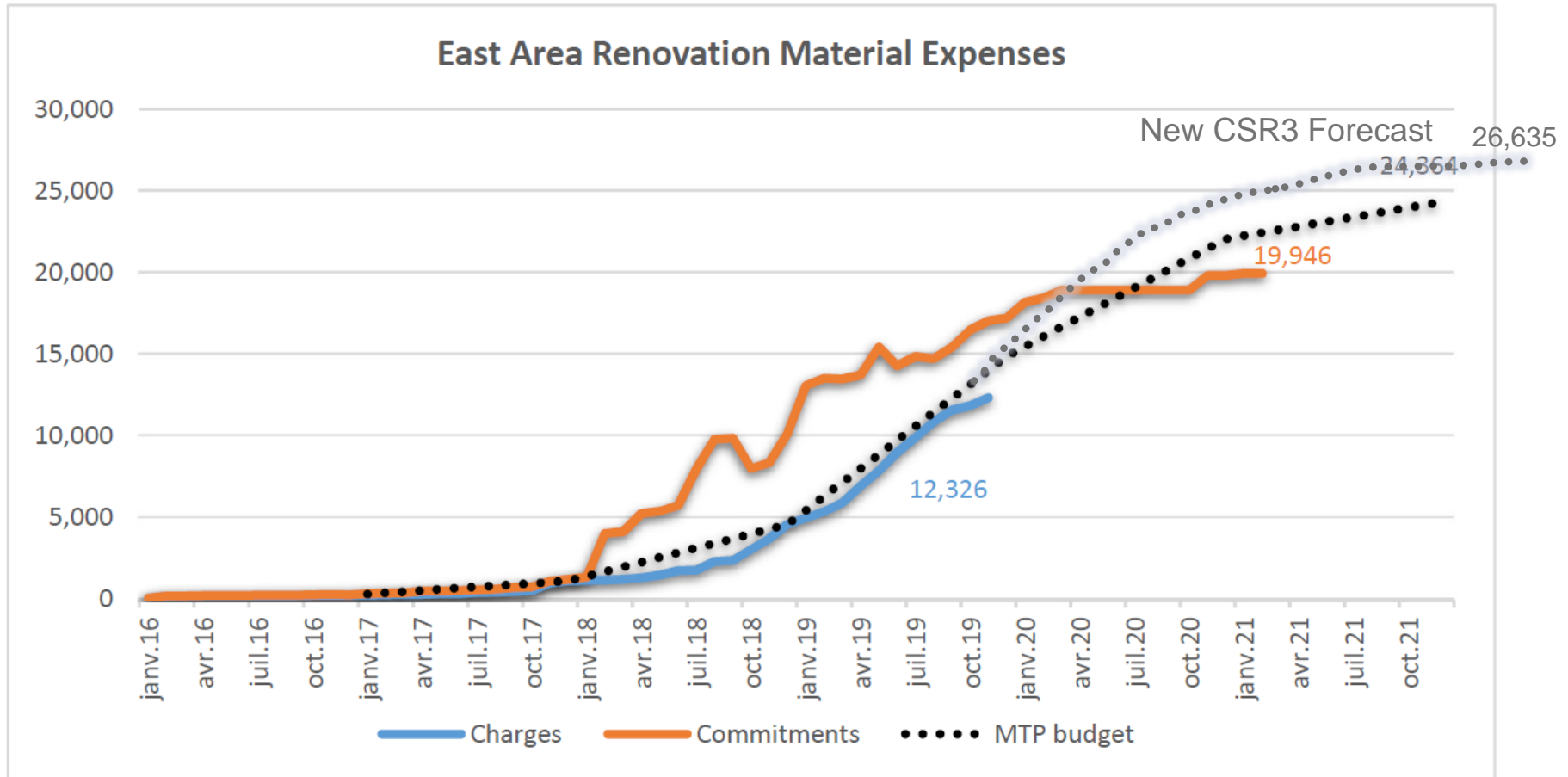


Material Budget in kCHF 24,364



Courtesy of E. Delachenal

Budget (Situation on November 18th, 2019)



Courtesy of E. Delachenal

Budget Situation by Budget Code vs Cost to Completion

Depart	Group	Budget code	Budget code description	Code status	Charged to Budget Code since 2016 (CHF)	Pluri-annual Commitment (CHF)	Pipeline (CHF)	CtC (CHF)	Commitments incl. Pipeline (CHF)	% CTC
BE	BI	64715	PS Marguerites	Black list	154,390	154,390	0	154,390	154,390	100%
BE	BI	64717	Beam Instrumentation	Active	2,315	2,315	1,611	94,000	3,926	4%
BE	BI	64718	Beam Instrumentation-XBPF	Active	67,952	96,492	0	100,200	96,492	96%
BE	CO	66070	Beam control (CESAR)	Active	0	0	0	62,000	0	0%
BE	ICS	72185	Personnel protection system . Primary zone (EAR 16.1)	Active	1	1	0	200,001	1	0%
BE	ICS	72169	Alarms	Active	9,621	14,843	0	460,021	14,843	3%
BE	ICS	72173	Personnel protection system: Secondary zone (EAR16.2)	Active	0	0	0	90,000	0	0%
EN	CV	53592	East Area Ventilation Hall_PP	Active	112,169	128,191	5,308	240,000	133,499	56%
EN	CV	53594	East Area Ventilation Primary Zones	Active	4,983	487,782	13,523	453,000	501,305	111%
EN	CV	53593	East area cooling	Active	164,247	1,384,026	36,871	1,417,339	1,420,897	100%
EN	CV	53595	East Area ventilation systems for Building 251	Active	3,148	145,390	0	600,000	145,390	24%
EN	EL	51290	AC electrical infrastructure	Active	63,023	726,963	118,497	1,901,000	845,459	44%
EN	EL	51291	Partial replacement of DC cables	Active	163,979	436,035	0	1,120,241	436,035	39%
EN	HE	54369	Transport and heavy handling	Active	185,464	205,300	0	492,300	205,300	42%
EN	STI	63211	Beam intercepting devices (BID): Beam stoppers & targets	Active	487,648	765,036	0	669,290	765,036	114%
EN	SMM	63223	BID remote control	Active	1,682	15,462	0	72,000	15,462	21%
EN	SMM	89238	Survey	Active	42,488	94,370	0	119,918	94,370	79%
EN	EA	89222	Various items linked to dismantling of the area	Active	103,530	179,540	0	398,901	179,540	45%
EN	EA	89223	Counting room	Active	0	0	0	241,000	0	0%
EN	EA	89224	Layout change of beam lines	Active	20,641	57,353	655	301,024	58,008	19%
EN	EA	89229	Shielding modifications	Active	5,565	5,565	0	90,000	5,565	6%
EN	EA	89228	Permanent barracks outside	Active	38,882	38,882	0	90,882	38,882	43%
EN	EA	63222	Collimators, targets, absorbers, converters	Active	2,436	12,660	0	366,284	12,660	3%
EN	EA	89232	FSU for vacuum	Active	263,154	294,920	0	626,066	294,920	47%
EN	EA	89231	Project management	Active	113,726	113,726	0	945,414	113,726	12%
EN	EA		Sales of material	Active			0	-100,000	0	0%
EN	EA		Extra roof works for energy savings	Active			0	-300,000	0	0%
EN	EA		OFEN incentive still missing	Active			0	-796,000	0	0%
EN	EA	89237	Commissioning & operation	Active	0	0	0	50,000	0	0%
EN	EA	89239	Safety	Active	0	0	0	90,000	0	0%
EN	EA	89234	Support for beam line components	Active	4,991	28,656	0	135,000	28,656	21%
EN	EA	89235	False-floor in B.251	Active	30,722	267,401	0	250,000	267,401	107%
EN	EA	89233	EAR-24.7 Infrastructure in B.251 (including CV and SMB)	Active	54,577	91,089	0	405,070	91,089	22%
EN	EA	89236	Decabling campaign (signal cables)	Active	208,112	273,886	0	399,665	273,886	69%
EN	EA	64716	Gas systems	Active	30,237	47,747	11,160	350,000	58,908	17%
HSE	RP	57397	RP monitoring system and RP surveillance	Active	52,831	70,930	0	250,000	70,930	28%
SMB	SE	76356	Roof, cladding and gutter renovation	Active	3,321,466	3,493,281	0	3,378,871	3,493,281	103%
SMB	SE		OCEN subvention still missing	Active			0	-525,000	0	0%
SMB	SE		Funding of asbestos removal from SITE-CONS	Active			0	-200,000	0	0%
TE	EPC	99635	EPC.14 : East Area Consolidation	Active	4,318,122	5,620,811	1,910	5,163,836	5,622,721	109%
TE	MPE	98471	WIC for PS east area	Active	3,961	19,746	0	200,000	19,746	10%
TE	MSC	99450	Magnet Upgrade	Active	2,257,561	4,640,699	4,725	4,105,994	4,645,424	113%
TE	VSC	99834	Control vacuum	Active	29,618	29,618	0	132,080	29,618	22%
IT	CS	47447	Networks	Active	2,109	2,109	0	70,000	2,109	3%
Grand Total					12,325,351	19,945,216	194,260	24,364,789	20,139,476	83%

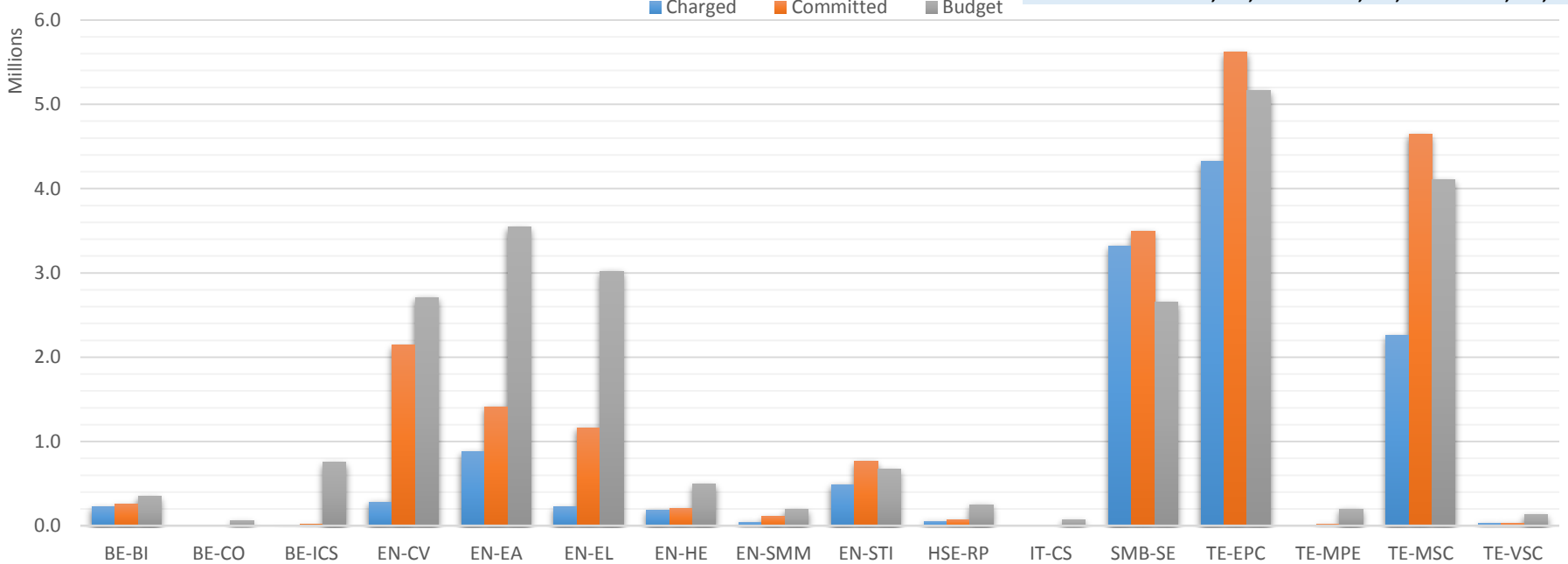
Budget External Revenues/Incentives

Budget code description	Code status	Pipeline (kCHF)	CtC (kCHF)
Sales of material	Active	-172	-200
Extra roof works for energy savings	Active	0	-300
OFEN incentive still missing	Active	0	-796
OCEN subvention still missing	Active	0	-525
Funding of asbestos removal from SITE-CONS	Active	0	-200
Funding from HSE (electrical NCs)	Inactive	0	-150
Funding from R2E (remaining activities from LS1)	Inactive	0	-100
		TOTAL	- 2,271

- Actual CtC: Current CtC + 2.271 MCHF to come
- Actual Material budget = 24,364 + 2,271 =26,635 kCHF
- **These External Revenues/Incentives are absolutely necessary to balance the project budget**

Budget Situation by Group

Group	Charged	Committed	Budget
BE-BI	224,657	253,197	348,590
BE-CO	0	0	62,000
BE-ICS	9,622	14,844	750,022
EN-CV	284,547	2,145,389	2,710,339
EN-EA	876,573	1,411,426	3,543,307
EN-EL	227,001	1,162,998	3,021,241
EN-HE	185,464	205,300	492,300
EN-SMM	44,170	109,831	191,918
EN-STI	487,648	765,036	669,290
HSE-RP	52,831	70,930	250,000
IT-CS	2,109	2,109	70,000
SMB-SE	3,321,466	3,493,281	2,653,871
TE-EPC	4,318,122	5,620,811	5,163,836
TE-MPE	3,961	19,746	200,000
TE-MSC	2,257,561	4,640,699	4,105,994
TE-VSC	29,618	29,618	132,080
Grand Total	12,325,351	19,945,216	24,364,789

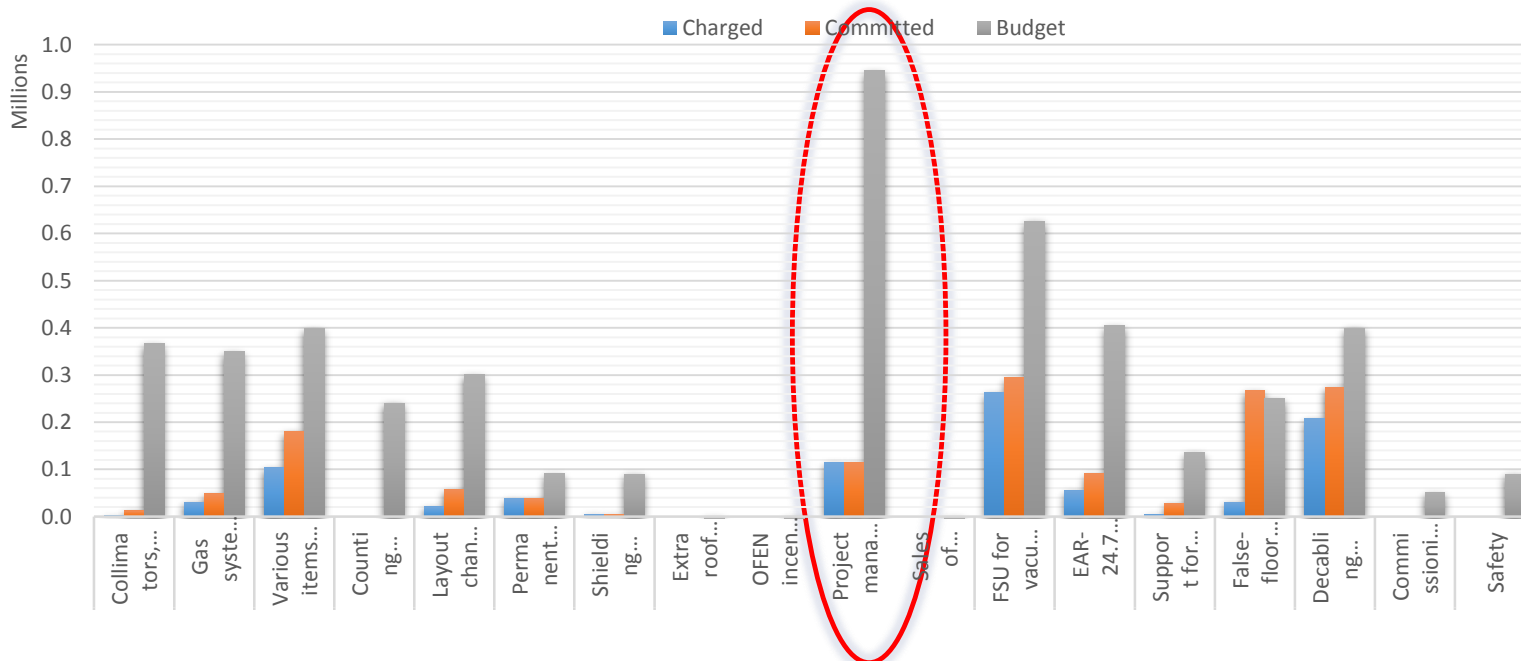


Courtesy of E. Delachenal

Budget EN-EA

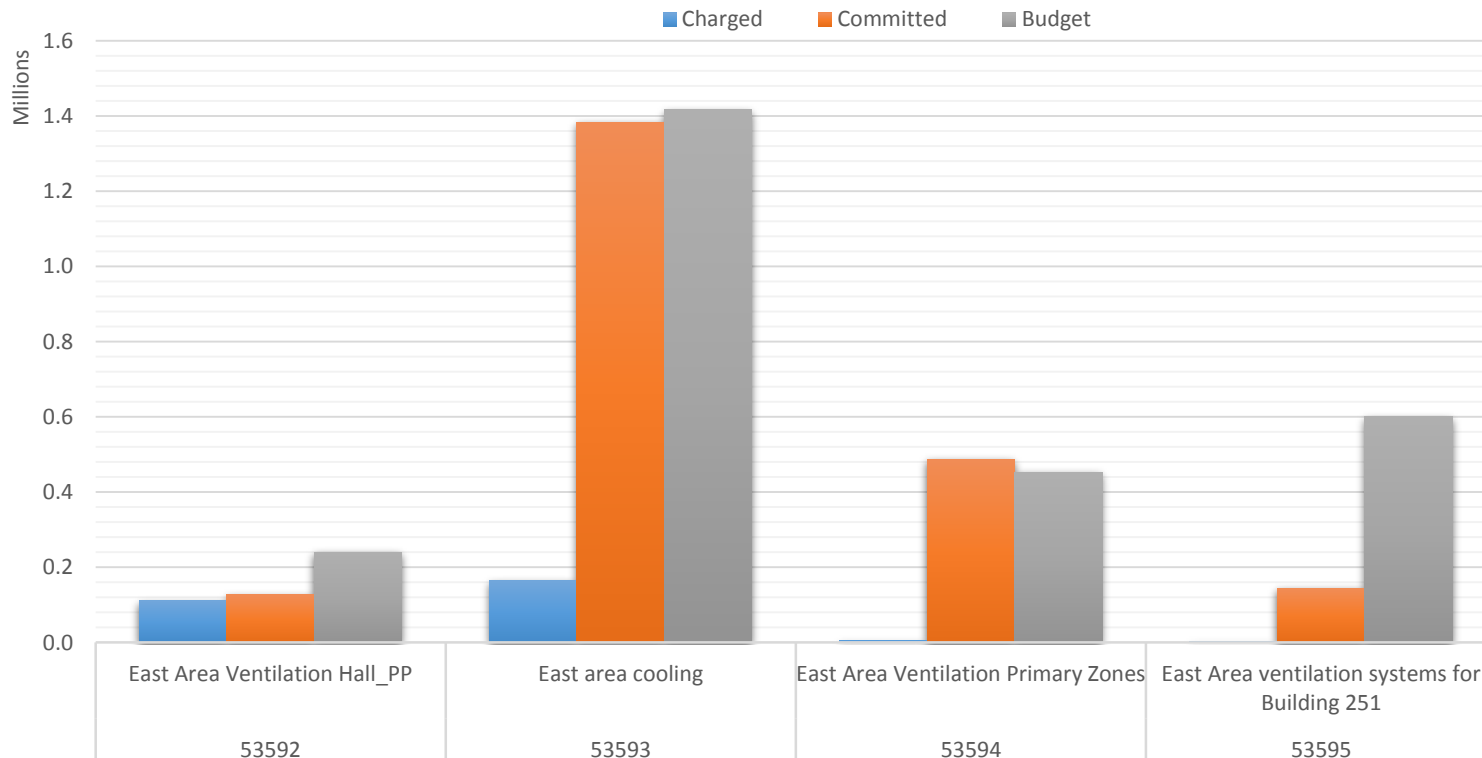
- Group coordinating the project
 - A lot of various activities
 - Project cash flow budget ~1 MCHF, recommendation of CSR1 (~5 % of Mat. Budget)
 - M2P: 204 kCHF
- Challenging delivery schedule
 - Equipment readiness reviews

Budget code	Budget code description	Charged	Committed	Budget
63222	Collimators, targets, absorbers, converters	2,436	12,660	366,284
64716	Gas systems	30,237	47,747	350,000
89222	Various items linked to dismantling of the area	103,530	179,540	398,901
89223	Counting room	0	0	241,000
89224	Layout change of beam lines	20,641	57,353	301,024
89228	Permanent barracks outside	38,882	38,882	90,882
89229	Shielding modifications	5,565	5,565	90,000
89231	Extra roof works for energy savings			-300,000
89231	OFEN incentive still missing			-796,000
89231	Project management	113,726	113,726	945,414
89231	Sales of material			-100,000
89232	FSU for vacuum	263,154	294,920	626,066
	EAR-24.7 Infrastructure in B.251 (including CV and SMB)	54,577	91,089	405,070
89234	Support for beam line components	4,991	28,656	135,000
89235	False-floor in B.251	30,722	267,401	250,000
89236	Decabling campaign (signal cables)	208,112	273,886	399,665
89237	Commissioning & operation	0	0	50,000
89239	Safety	0	0	90,000
Grand Total		876,573	1,411,426	3,543,307



Budget EN-CV

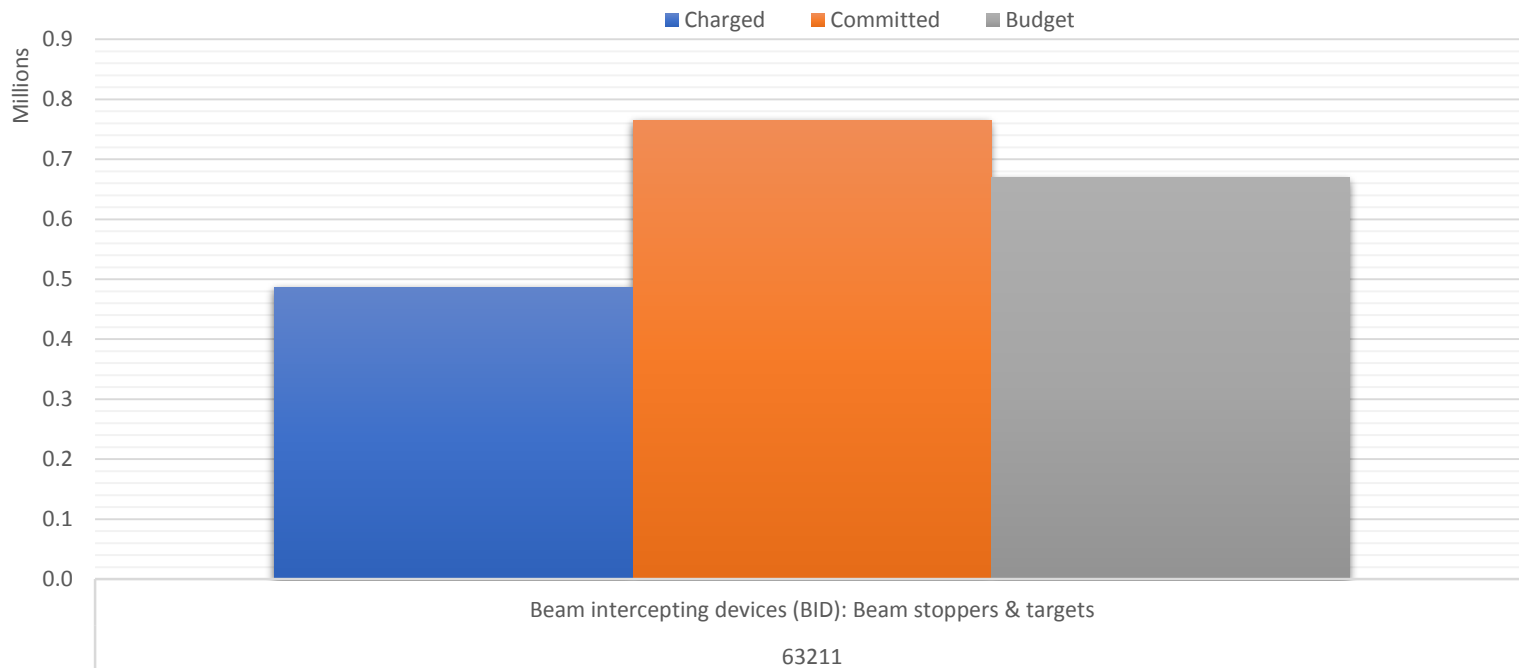
Budget code	Budget code description	Charged	Committed	Budget
53592	East Area Ventilation Hall_PP	112,169	128,191	240,000
53593	East area cooling	164,247	1,384,026	1,417,339
53594	East Area Ventilation Primary Zones	4,983	487,782	453,000
53595	East Area ventilation systems for Building 251	3,148	145,390	600,000
Grand Total		284,547	2,145,389	2,710,339



Budget EN-STI

- M2P: 214 kCHF
- Yet 30 kCHF to come

Budget code	Budget code description	Charged	Committed	Budget
	Beam intercepting devices (BID): Beam			
63211	stoppers & targets	487,648	765,036	669,290
Grand Total		487,648	765,036	669,290



Budget SMB-SE

100% completed

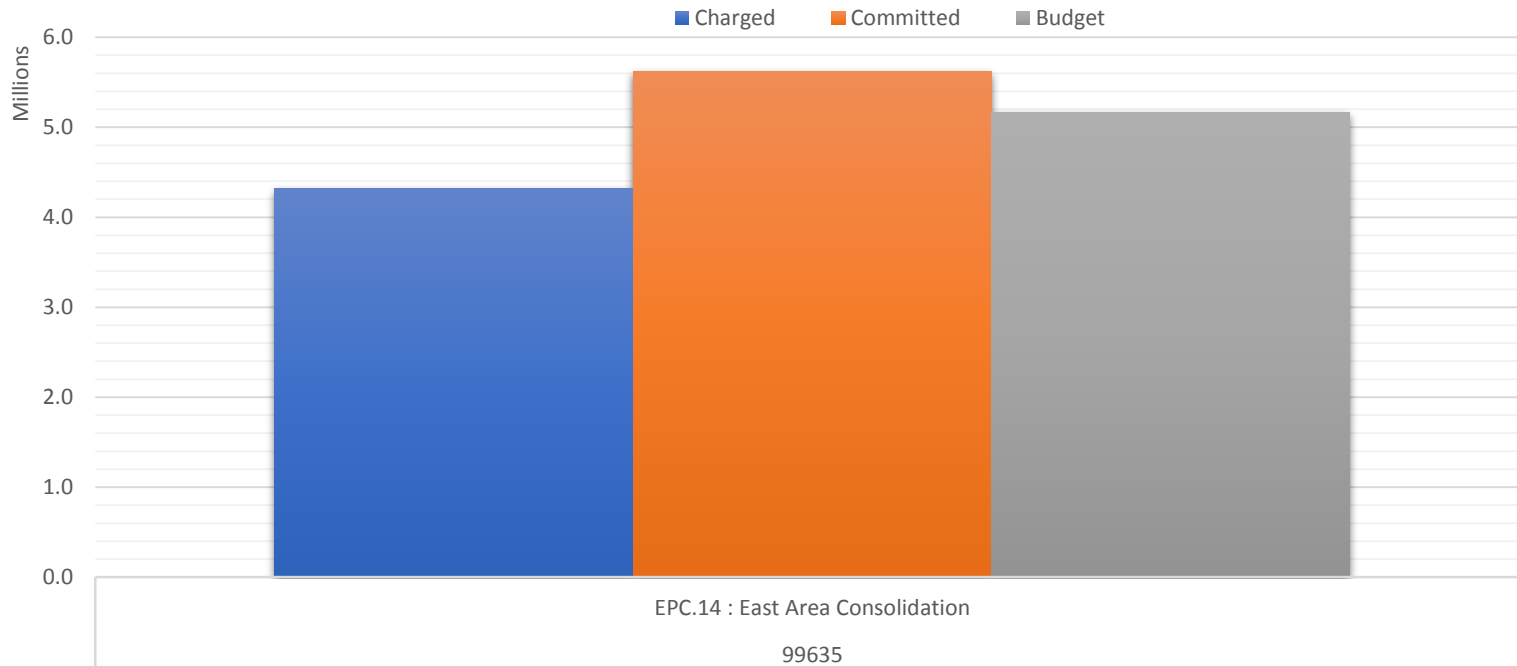
Budget code	Budget code description	Charged	Committed	Budget
76356	Funding of asbestos removal from SITE-CONS			-200,000
76356	OCEN subvention still missing			-525,000
76356	Roof, cladding and gutter renovation	3,321,466	3,493,281	3,378,871
Grand Total		3,321,466	3,493,281	2,653,871



Budget TE-EPC

M2P: 206 kCHF
Yet 50-100 kCHF
to come

Budget code	Budget code description	Charged	Committed	Budget
99635	EPC.14 : East Area Consolidation	4,318,122	5,620,811	5,163,836
Grand Total		4,318,122	5,620,811	5,163,836

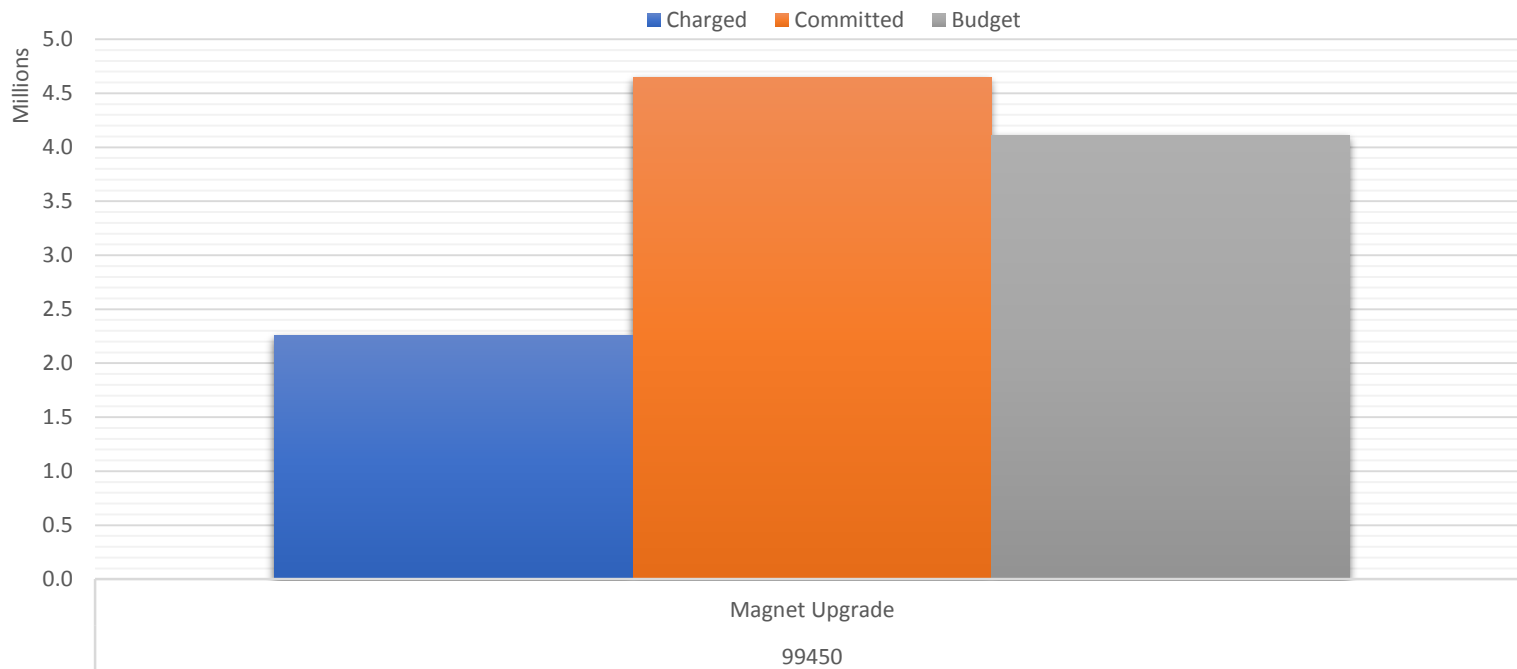


Budget TE-MSC

M2P: 335 kCHF

Yet 50-100 kCHF to come

Budget code	Budget code description	Charged	Committed	Budget
99450	Magnet Upgrade	2,257,561	4,640,699	4,105,994
Grand Total		2,257,561	4,640,699	4,105,994



Items with potential of cost increase

- **Risk presented at CSR2 successfully managed/mitigated**
 - Co-activities SMB/Operation/Cloud → smoothly managed with no (small) extra cost
 - Operation requirements out of the scope of the SIRIUS family → split coil and double powering solution + proof of concept established with actual PCs and magnets
 - Late procurement procedure vs FC approval: EPC, SMB, MSC, CV contracts launched in due time

Items for CSR3	Unwanted event	likelihood	Mitigation measure	Recovery plan
Cash flow	Lack of cash flow	High	See next slide	See next slide
Airtightness of primary area	Underpressure of -20 Pa not achievable → increase in cost	High	Preliminary on-site test to chose the most (cost) effective technique	Review underpressure level required
Underground DC cables still containing PVC	Safety issue in case of fire or failure	High	Leave some spare DC cables	Replace failing cable Accept failure time
OF and signal cabling campaign	Discrepancy between owner groups and EL cost estimates	Medium	Refine current estimates, review cable needs and routing	Groups find extra budget or pull the cables themselves within their estimated budget

Risk: Cashflow issue

- Actual Material budget at 26.6 MCHF i.e. **we plan to spend 26.6 MCHF**, however only 24.3 MCHF are currently available in our budget
- We are confident because **additional revenues/incentives will come in later** (even after the project completion in 2021)
- How to address this constraint?
 - At short term, use of our **project cash flow budget** to cover some WP over-commitments
 - Make **additional savings** on «not yet committed» activities
 - Let the project accounting **open till the end of 2022**

Further Savings

- Still 6,689 kCHF to commit (considering increased CtC)
- Some activities seems to be very well within allocated budget and should generate some savings after completion

Activity	Possible savings
AC network	250 kCHF
Collimators	100 kCHF
Vacuum	50 kCHF

- Some activities can be postponed. Re-use of existing infrastructure

Activity	Possible savings
Barracks	52 kCHF
Counting rooms	241 kCHF

- This would lead to 693 kCHF savings

Activities out of scope/pending final approval

These are all unfunded activities !

- Recommended from project management [total of 610kCHF] by priorities
 - 7 BLMs on F61 and T08 (cost estimate : +80 kCHF)
-> critical for beam steering and minimizing activation levels
 - B. 251 Heating system (cost estimate : +450 kCHF)
-> critical impact on equipment lifetime and water circuit integrity during winter
 - Primary area air tightness on a best effort basis (cost estimate : + 80 kCHF)
-> proposal to restrict to confirmed underpressure w/o specific delta-P (as it was done for CHARM during LS1)
- Recommended for post-project implementation of B.251 [total of 820kCHF]
 - Thermal insulation (SITE-CONS, SMB, cost estimate 405 kCHF +/- 30 %) -
> to be decided after project completion and coupled to AC request
 - Air cooling (cost estimate : +415 kCHF)

Summary

- CtC increase of 2.669 MCHF after MTP 2019 exercise
- Commitments : 83 %, Charges: 50 %, all big orders launched
- The Project also relies on external income/incentives which are absolutely necessary to balance the project budget and increase the CtC by another 2.2 MCHF
- A risk of lack of cash flow has been identified. At short term, use of the project cash flow budget to cover some WP over-commitments, then implementation of further cuts on not yet committed activities if so required
- The Project invites the CSR panel to recommend (or give an opinion on):
 - The endorsement of the new CtC of 26.6 MCHF (Material) and the authorisation for the project to make commitments up to that limit + a margin of 1 MCHF.
 - The contributions of CERN partners into the project budget as soon as possible (R2E, SMB site-CONS, HSE)
 - The approval of installing a heating system for the B.251 ventilation and BLMs on F61 and T08
 - The review of the safety requirement for the primary area (under pressure required level) considering past experiences at CERN

Acknowledgements

- Many thanks to the project team members:

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Thank you !



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Backups



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CSR2 follow-up

CSR2 recommendations:

- not to change the CtC before the MTP approval in June 2018. **Done only after MTP2019**
- to reduce the scope of two work packages (existing DC cable will be re-used instead of being replaced by new ones and the B.157 ventilation renovation will be postponed to after LS2). **Done**
- to implement further savings in the various existing WP's to cover unfunded or partially funded activities. **Done → new budget baseline implemented → feedback from various WP leaders: these budget reductions impaired severely the correct achievement of their deliverables. Motivation for new budget allocation request in MTP 2019 exercise.**
- The Civil Engineering works and, as well as ventilation & cooling works of building 251 are not in the scope of the project. **With the new MTP2019 budget allocation, ventilation of B.251 is now funded, not the cooling works.**
- The review panel recommends EN-CV and TE-EPC to assess on heat deposition in the air and in water, and make a comparison with the present situation. **Done in parallel to the energy study.**
- The review panel recommends to study the common use of the CLOUD chiller and the cooling of building 251 or to seek for other possible synergies (B. 156,...). **Both options have been investigated but are not technically feasible, unfortunately.**

Scope change

- Scope reduction
 - B.157 ventilation (outcome of CSR2)
 - DC cable full replacement (outcome of CSR2)
- Scope increase
 - Roof replacement (EDMS 1893886)
 - Roof Absestos removal (EDMS 1893886)
 - Ventilation in B.251 (outcome of PB3)

Project Plan for B.251 ventilation

- Air cooling for power converters = requirement not identified during the Project pre-study. Water cooling well included at that time.
- Not funded in initial budget, out of the scope of the project.
- Issue discussed at CSR2:
 - The Civil Engineering works and, as well as ventilation & cooling works of building 251 are not in the scope of the project.
 - The review panel recommends EN-CV and TE-EPC to assess on heat deposition in the air and in water, and make a comparison with the present situation. **Done in parallel to the energy study.**
 - The review panel recommends to study the common use of the CLOUD chiller and the cooling of building 251 or to seek for other possible synergies (B. 156,...). **Not possible unfortunately.**
- Project plan:
 - Install air ducts in false-floor during LS2
 - Install only AHU (no heating and no air cooling) and stop the beamlines in case of overheating in power converters during summer to avoid any damage
 - Assess the situation end 2021 and decide for chiller installation if some money is remaining at the end of the project.
 - Project Board Recommendations : relieving by switching off some beam lines, assess # cut off days based on SPS experience

Budget Additional request EDMS 20448902

Subject : East Area Renovation Project – Budget shortfall after Cost and Schedule Review #2

The Cost and schedule review 1 (Dec. 2016) and 2 (April 2018) [1] identified various activities uncovered or partially covered in the project baseline. These activities and corresponding budgets amounting to 3 MCHF are defined in table 1. Consequently, the CSR2 acknowledged a project budget shortfall of about **3 MCHF**. ($CtC_{2018} = 22.5$ MCHF, needs = 25.5 MCHF).

Furthermore, the scope of the project evolved regarding the Civil Engineering work for Building 157 with the addition of the insulation of exposed gable walls and the replacement of the roof corresponding to an additional budget need of **1 MCHF**. The management fully supported this change, defined possible extra funding end 2017 to avoid worsening further the project budget situation. The decision making process is well-documented [2].

The budget situation was presented in EATSMB [3] on May, 15th 2018 and at IEFC [4]. As a result of the discussions, it was agreed:

- not to change the CtC before the MTP approval in June 2018
- to reduce the scope of two work packages (existing DC cable will be re-used instead of being replaced by new ones and the B.157 ventilation renovation will be postponed to after LS2).
- to implement further savings in the various existing WP's to cover unfunded or partially funded activities.

Since the last CSR, detailed technical studies showed that reducing the scope of the two identified WPs leads to less savings (500kCHF less) than presented in EATSMB [3]. This is mainly due to the need of replacing DC cables in tortuous routing areas, i.e. more cables than expected, only the straight routing areas being kept.

Following EATSMB recommendations, the project management has completed a budget rebaseline in order to stick to the MTP target figures by ordering significant cuts, which are summarised in the table 2. The total of these cuts amounts to 3,320 MCHF.

However, having got the feedback from various WP leaders, these budget reductions impaired severely the correct achievement of their deliverables.

The project management has ranked this negative impact by WP, giving the following priorities:

Priority 1: impact on safety and facility performance

The beam can be switched on at the end of the renovation but in a degraded mode in terms of performance and safety. Some guiding principles of the project would not be achieved:

- Energy savings: This project was approved based on a business case for energy savings [5]. The current energy savings estimate (600 kCHF/yr detailed in table 3) would drop (no replacement of demineralised water pumps).
- Improved safety: the primary area ventilation would be cancelled; the access sectorisation would be kept unchanged.
- Beam operation: reduced number of beam monitors and collimators reducing beam-tuning capacity.

Priority 2: impact on technical infrastructure reliability

Restricted decabling campaign leaving in place orphan signal cables and DC cables in Building 263. No de-stratification ventilation installed reduced upgrade on AC distribution in B.157.

Priority 3: impact on infrastructure for users and other

The user's facilities would not be upgraded as initially planned.

In the event of more flexibility identified in the CERN MTP or new funding opportunities, the project management would ask again a CtC increase, which could partially or totally cover the cuts recently implemented, according to the following scheme:

Priority covered	Budget requested
1	1885 kCHF
1+2	3145 kCHF
1+2+3	3320 kCHF

Budget Additional request EDMS 20448902

Dept.	Group	WBS (EDMS 1730966)	Description	Budget code	Year 2019	Year 2020	Year 2021	Rebaseline cut (kCHF)	Priority
BE	ICS	EAR 16	Personnel protection system . Primary zone (EAR 16.1)	72185	20	10	0	30	1
EN	HE	EAR 11	Transport and heavy handling	54369	30	20	0	50	1
EN	EA	EAR 21	Collimators, targets, absorbers, converters	63222	10	10	0	20	1
EN	STI	EAR 5	Beam intercepting devices (BID): Beam stoppers & targets	63211	10	0	0	10	1
HSE	RP	EAR 13	RP monitoring system and RP surveillance	57397	10	10	0	20	1
SMB	SE	EAR 12	Roof, cladding and gutter renovation	76356	300	0	0	300	1
TE	EPC	EAR 3	EPC.14 : East Area Consolidation	99635	200	0	0	200	1
TE	MSC	EAR 2	Magnet Upgrade	99450	100	100	0	200	1
BE	ICS	EAR 15	Alarms	72169	20	20	0	40	1
BE	ICS	EAR 16	Personnel protection system: Secondary zone (EAR16.2)	72173	5	5	0	10	1
EN	EA	EAR 19	Safety	89239	5	5	0	10	1
EN	EA	EAR 24	EAR-24.7 Infrastructure in B.251	89233	125	60	10	195	1
EN	CV	New WU	HVAC for Building 251 (power coverters)	TBD	0	300	200	500	1
EN	CV	EAR 10	East Area Cooling	53593	80	200	20	300	1
subtot					915	740	230	1,885	Prior. 1
EN	CV	EAR 10	East Area Ventilation Hall_PP	53592	25	100	0	125	2
EN	EL	EAR 9	Orphan cable dismantling	51291	220	100	0	320	2
EN	EL	EAR 9	AC electrical infrastructure	51290	60	200	20	280	2
EN	EL	EAR 9	Option 1 full dismantling PVC	51291	100	100	0	200	2
TE	MPE	EAR 14	WIC for PS east area	98471	10	10	0	20	2
EN	EA	EAR 6	FSU for vacuum	89232	25	25	0	50	2
EN	EA	EAR 23	Support for beam line components	89234	10	5	0	15	2
EN	EA	EAR 23	False-floor in B.251	89235	10	35	5	50	2
EN	EA	EAR24	Decabling campaign (signal cables)	89236	100	100	0	200	2
subtot					560	675	25	1,260	Prior. 2
EN	EA	EAR 24	Various items linked to dismantling of the area	89222	20	20	0	40	3
EN	EA	EAR23	Counting room	89223	15	15	0	30	3
EN	EA	EAR 23	Layout change of beam lines	89224	20	15	0	35	3
EN	EA	EAR 23	Permanent barracks outside	89228	5	5	0	10	3
EN	EA	EAR 1	Project management	89231	20	20	10	50	3
BE	BI	EAR 4	Beam Instrumentation	64717	5	5	0	10	3
subtot					85	80	10	175	Prior. 3
Total					1,560	1,495	265	3,320	

Budget for shielding

Shielding location	Quotations	Budget Available	CB
Beam Dump (14 t of cast iron, for March 2020)	<u>65kCHF</u> (framework contract – Greece)	65 kCHF	89224
Roof Ceiling – Target area (Dec-2020)	<u>75KCHF</u> (framework contract – France)	80 kCHF	89229
Roof Ceiling – Mixed area (janv-2021)	Version with metallic structure: Estimation 100kCHF	100 kCHF	89224
Roof Ceiling – T8 Chicane (end 2020)	<u>80-90 kEuros</u> (Refurbishment of CERN steel beams with framework contract)	100 kCHF	R2E to come
Various special blocks	<u>10kCHF</u> (framework contract)	10 kCHF	89229
Total	340kCHF	355 kCHF	

