

Report of the Scrutiny Group to the LHC RRBs

On behalf of the LHC Scrutiny Group
Heidi Sandaker
University of Oslo

RRB, CERN, October 2018



**UNIVERSITY
OF OSLO**

2019 Scrutiny Cycle - Membership of the Group

CAMPBELL, Michael	CERN, EP Department
CHRISTIE, William	Brookhaven National Lab., US
DANIELSSON, Hans	CERN, EP Department
DANNHEIM, Dominik *	CERN, EP Department
FATEMI, Renee *	Univ. of Kentucky, US
FREY, Ariane *	Gottingen, DE
GOLDSTEIN, Joel	Bristol, UK
LUBRANO, Pasquale	Univ. Perugia and INFN, IT
POESCHL, Roman	IN2P3, FR
PRODON, Sylvie	CERN, FAP Department, Service Contracts
SANDAKER, Heidi	University of Oslo, NO, Chair
SCHMIDT, Burkhard	CERN, EP Department , Secretary
SCHWANDA, Christoph	Institute of High Energy Physics, Vienna, AT
VASSEUR, Georges	CEA/IRFU, FR

* New members 2019

Composition :
36% from CERN
21% new members in 2019
43% of members started in 2018
29% women



2019 Scrutiny Cycle - Meetings & Activities

- May 8-10 - Scrutiny Group spring meeting
- June 2019 - In-detail meetings with the experiments
- Sept. 2-3 - Scrutiny group fall meeting

Goal to have the best possible scrutiny and at the approximate same level

Ongoing improvements of our own work

- Composition - proposal to change the mandate to 3 years to have improved continuity
- Meetings
 - optimise the preparations so that the meetings are as efficient as possibly to have more time for in-depth questions
 - discussing differences in the in-detailed meetings with the experiments
 - shifted in time to allow better travel arrangements for the group members
- Report
 - proposal to make a 2-step writing process to have less work in autumn
 - better alignment between sub-group reports and the summary report
 - correlation with autumn financial report to check for discrepancies ?
- Deadlines
 - when and what information is uploaded varies a bit, maybe make it the same to allow the SG sub-groups the same time to prepare
 - At the moment events occurring during the last stages of writing the report is deferred to the spring meeting - to be looked into



2019 Scrutiny Cycle - Common topics and special issues

General Topics :

- *Following up on the cash balance reconciliation* between CERN Finance reports and the experiment's M&O A budgets. → A few discrepancies occurred this year but after investigation and discussions there was **excellent agreement** maintained for all experiments
- *Long-term projections for the special online computing replacement accounts*, which should not accumulate excessive reserves, and are allowed to go negative. → See slide
- *M&O B carry over*. In RRB-2017-070 it was agreed that carry-over on sub-detector M&O B accounts should aim to stay below approximately 30% of the yearly budget. → All experiments this is relevant for show plans and execute down-spending
- *Tracking of entry fees*. These fees are not subject to the same level of scrutiny as M&O expenditures, and remain at the discretion of the collaboration management. → No issues found

Specific Topics of 2019:

- *LS2 work and the inclusion of new detectors* → Discussed with the experiments at the stage they are at
- *Follow-up on differences in M&O budgets between running and shutdown years as requested in the RRB meeting in April 2019.* → This was reviewed and the differences between experiments understood
- *Common funds*. Does the collection of Common Funds proceed according to plan. → Overall yes

Issues raised by the experiments:

- Changes to the radiation standards may affect cost impacts and is currently being studied.
- Increased costs and reducing use of Greenhouse gases is being studied
- Experience of uncertainties of host lab contributions to Phase-2 Infrastructure costs

We would like to stress the importance of support by collaborating institutes to existing detector systems not only for new detectors and upgrade work



2019 Scrutiny Cycle - Context

2018: LHC in operation. Collisions from late April 2018 after a regular YETS. Highly efficient data collection by the experiments !

2019: Long Shutdown 2 (LS2). Extensive work has started to:

- upgrade and maintain existing detectors and their computing systems
- install and commission new detectors
- improve the infrastructure and services for a stable and safe operation of the detectors and to achieve an optimal working environment for staff and students.

2020: Long Shutdown 2 (LS2) continues

Global sum of M&O A and B, w/o power:

2018: 46.8 MCHF

2017: 47.2 MCHF

2018: 47.0 MCHF

2012: 51.2 MCHF

2015: 47.5 MCHF

2016: 46.9 MCHF

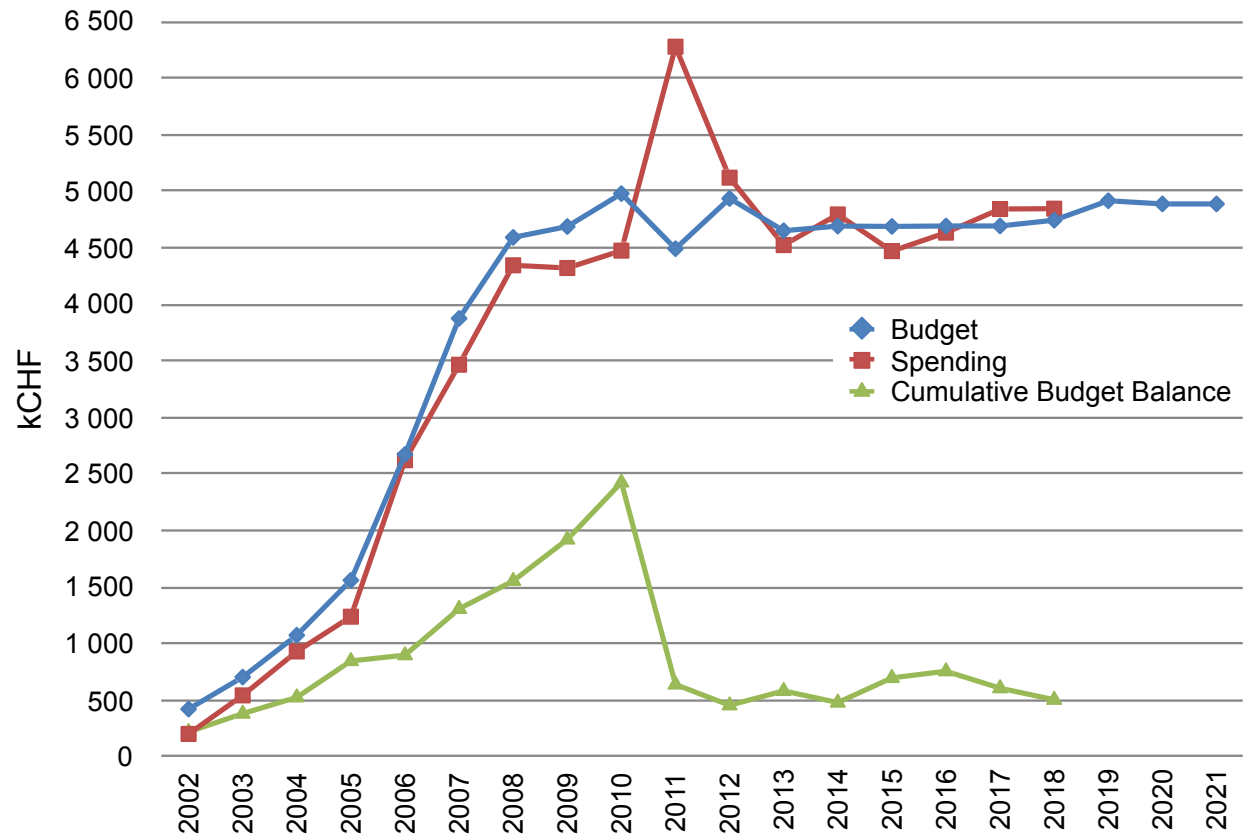


ALICE M&O A - overview and evolution

Closing report 2018

- Budget w/o power: **4,743 kCHF**
- Actual costs w/o power: **4,845 kCHF**
- End of year open commitments: **87 kCHF**
- NMS power costs: **9 kCHF**

M&O A evolution: →



Graph does not include open commitments

Budget request 2020 and future projections

M&O A (kCHF)	2019	2020	2021	2022	2023
TOTAL without power	4,915	4,887	4,887	4,887	4,887
Grand Total	4,949	4,921	6,770	6,770	6,770



ALICE M&O A details and M&O B

M&O A details

- Small overspending in 2018 due to additional gas delivery and unplanned interventions in the counting rooms.
 - Significantly reduced unpaid contributions from members
- Budget requests for 2020 is about the same as for 2019, as well as the projections for following years.
 - A small decrease to adjust for changes to the M&O levels after LS2
 - When the O2 plant is in operation this part of the budget will be reviewed
 - A very recent change concerning the purchase of parts for the readout system has not been scrutinised by SG

M&O B

- 2018 budget was **1,452 kCHF**, actual spending was **1,712 kCHF**
- 18% overspending mainly to reduced accumulated reserves from previous years, according to plan, further reduction planned during the coming years
- Budget request for 2020 is **970 kCHF**, reflecting the reduced needs during LS2 (~ 500 kCHF less than in operation years)
- Higher projections from 2021 accounts for the requirement of upgraded systems

M&O B	2019	2020	2021	2022	2023
Grand Total (kCHF)	1088	970	1498	1430	1448
Technical Manpower (FTE)	239	225	250	249	198

The SG recommends approval of the ALICE M&O A and M&O B closing reports for 2018, and the budget requests for 2020

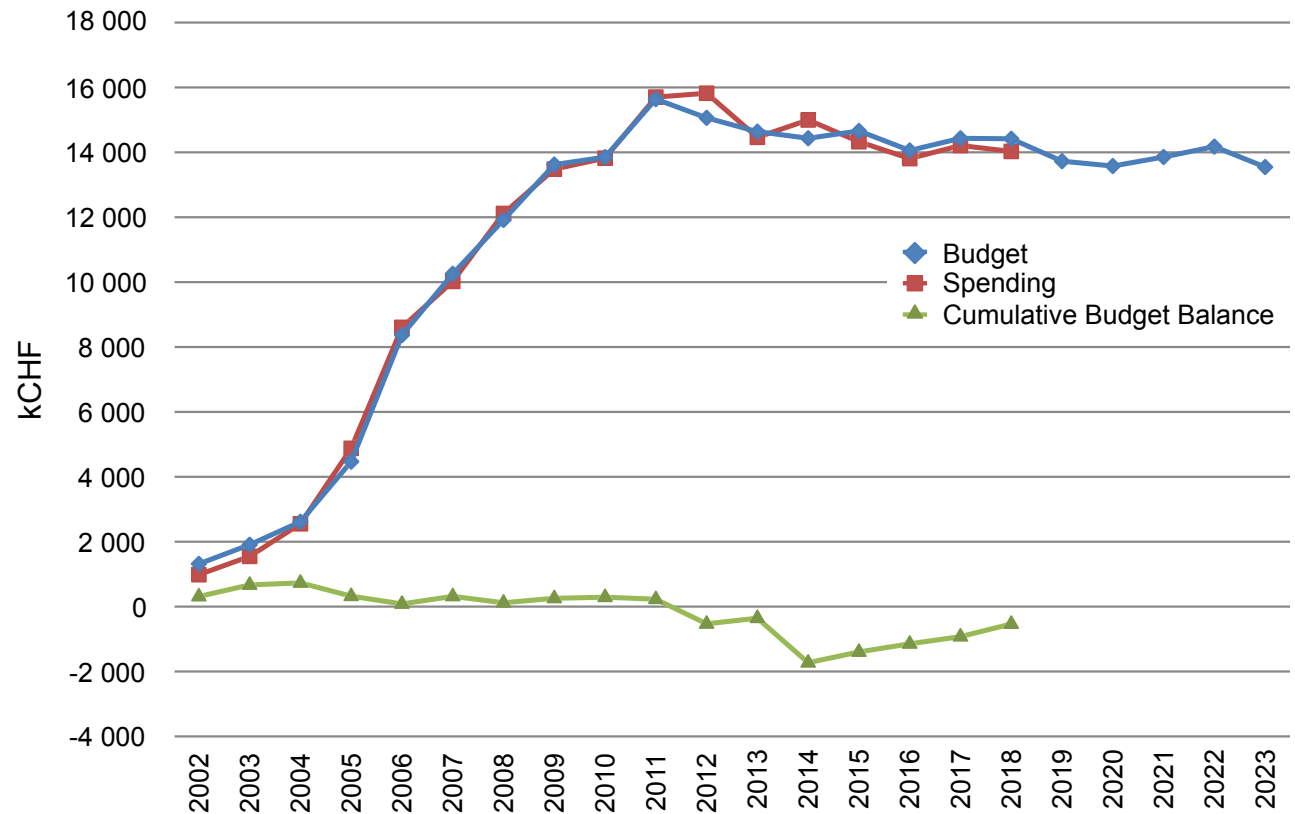


ATLAS M&O A - overview and evolution

Closing report 2018 overview

- Budget w/o power: **14,404 kCHF**
- Actual costs w/o power: **14,015 kCHF**
- End of year open commitments: **222 kCHF**
- NMS power costs: **724 kCHF**

M&O A evolution: →



Graph does not include open commitments

Budget request 2020 and future projections:

M&O A (kCHF)	2019	2020	2021	2022	2023	2024
TOTAL without power	13,715	13,525	13,683	14,022	13,409	13,404
Grand Total	15,915	15,725	15,883	16,222	15,609	15,604



ATLAS M&O A details and M&O B

M&O A details

- Small underspending in 2018 originates mainly from a change to the magnet cryogenic system
- Open commitments are also dominated by the magnet system (hardware)
- The budget for 2020 has decreased slightly, the reduction will be absorbed by the online computing budget.
- Cost of greenhouse gases is expected to increase, for this detector related costs have increased in 2020 and 2021

M&O B

- 2018 budget was **4,876 kCHF**, actual spending was **4,573 kCHF**
 - A net underspending which adds to the reserves, but still well below the target limit of 30%.
 - The LAr subsystem is reducing their larger carry-overs by returning the surplus to the funding agencies until 2022
- 2020 budget request is **5,795 kCHF**. The budget request to the FA 5,675 kCHF (minus the 120 return of funds for LAR)
 - The main change from 2019 to 2020 is due to the forward detectors

M&O B	2019	2020	2021	2022	2023	2024
Grand Total (kCHF)	5,635	5,795	5,577	5,218	5,791	5,796
Technical Manpower (FTE)	278	258	265	255	262	252
Core Computing (FTE)	152	152	152	152	152	152

The SG recommends approval of the ATLAS M&O A and M&O B closing reports for 2018, and the budget requests for 2020

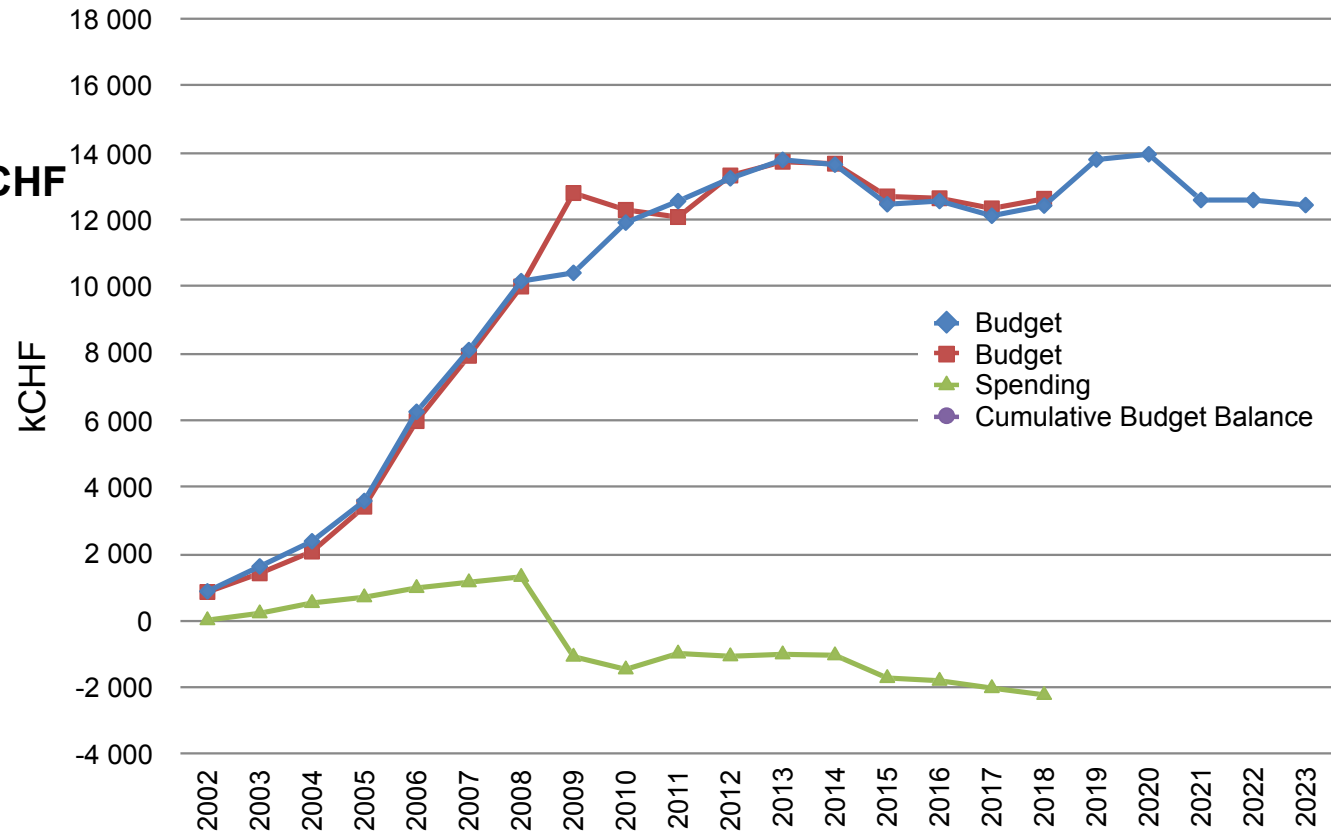


CMS M&O A - overview and evolution

Closing report 2018

- Budget w/o power: **12,420 kCHF**
- Actual costs w/o power: **12,623 kCHF**
- End of year open commitments: **463 kCHF**
- NMS power costs: **683 kCHF**

M&O A evolution: →



Graph does not include open commitments

Budget request 2020 and future projections

M&O A (kCHF)	2019	2020	2021	2022	2023
TOTAL without power	13,797	13,955	12,586	12,586	12,436
Grand Total	15,497	15,655	14,286	14,286	14,136



CMS M&O A details and M&O B

M&O A details

- The small overspend in 2018 is mainly due to intensive work program during the technical shutdown (YETS) 2017/2018
- Budget requests in 2020 includes a small increase e.g. due to :
 - Moving some of the BRIL activities to M&O A, from M&O B
 - Further preparation for the proposed new Control Room
 - Extra costs due to an incident of UPS fire
 - New study on how to deal with Greenhouse gases

M&O B

- 2018 budget was **4,908 kCHF**, spending was in line with the budget
 - Mechanisms are in place and being followed to spend down the surplus to the target of 30%
- 2020 budget request is **5,953 kCHF** and includes plans to further spend down reserves for subsystem M&O B
 - Increase of 462 kCHF from the 2019 budget primarily due to increased LS2 activities and the introduction of HGCal in M&O B
 - CT-PPS budget is fully incorporated
 - Some BRIL activities moved to M&O A to improve the sharing between institutions (membership fee)

M&O B	2019	2020	2021	2022	2023
Grand Total (kCHF)	5,491	5,953	6,003	6,393	6,578
Core Computing (FTE)	8	8	8	8	8

The SG recommends approval of the CMS M&O A and M&O B closing reports for 2018, and the budget requests for 2020

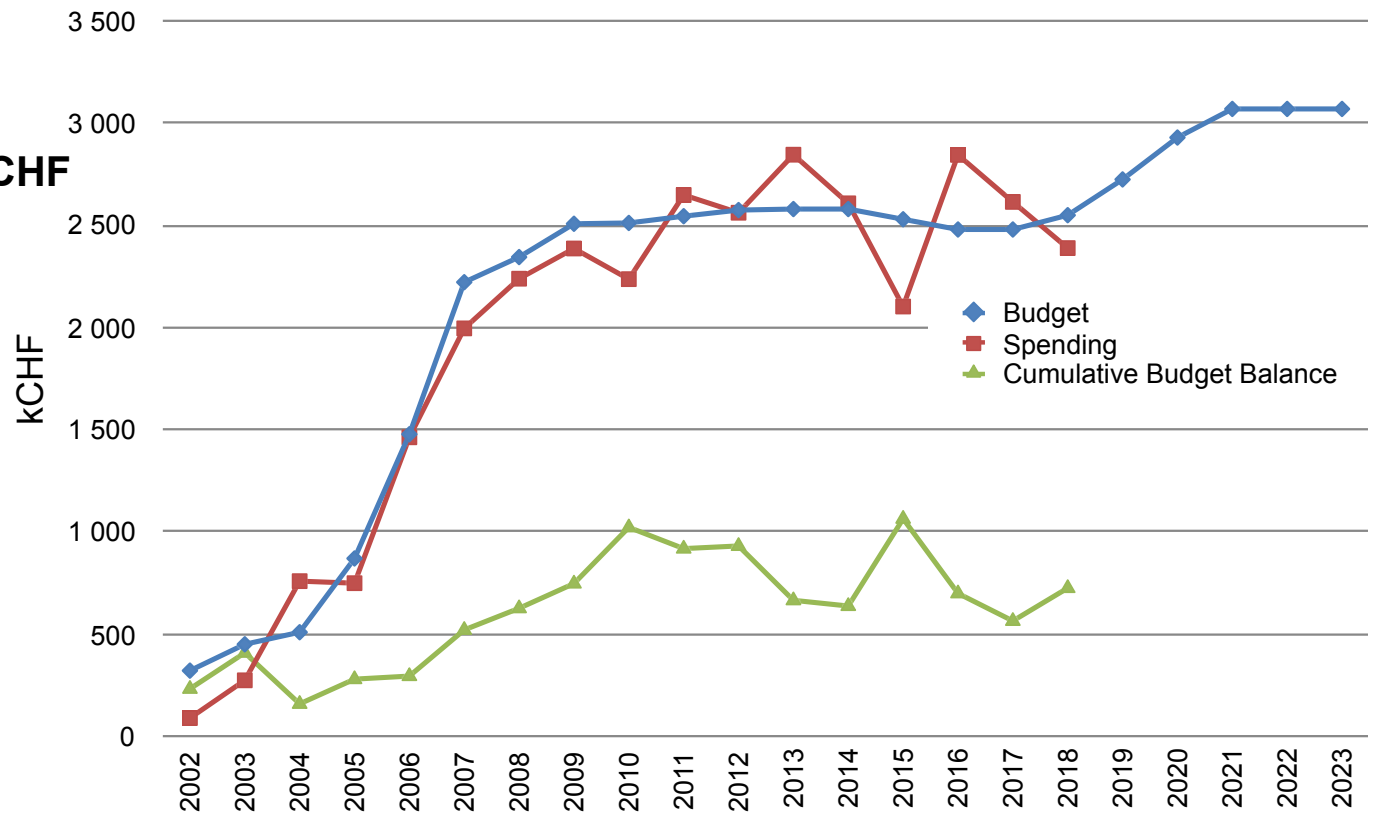


LHCb M&O A - overview and evolution

Closing report 2018

- Budget w/o power: **2,550 kCHF**
- Actual costs w/o power: **2,389 kCHF**
- End of year open commitments: **79 kCHF**
- NMS power costs: **55 kCHF**

M&OA evolution: →



Budget request 2020 and future projections

Graph does not include open commitments

M&O A (kCHF)	2019	2020	2021	2022	2023
TOTAL without power	2,725	2,930	3,070	3,070	3,070
Grand Total	4,025	3,400	3,370	3,670	3,670



LHCb M&O A details and M&O B

M&O A details

- Small underspending in 2018 mostly due to early acquisition of storage components in 2017
- Budget request for 2020 is increasing as part of a smooth step up to 23% higher M&O A budget levels expected for the post-LS2 detector
 - 170 kCHF of accumulated surplus is planned to be spent in 2020

M&O B

- 2018 budget was **980 kCHF** and the spending followed this well, it has been constant over the years within 10%
- M&O B is completely under the responsibility of the subsystems
- For 2020 the budget is 1000 kCHF, and it is expected to keep this level for the following years

M&O B	2019	2020	2021	2022	2023
Grand Total (kCHF)	980	1000	1000	1000	1000

The SG recommends approval of the LHCb M&O A and M&O B closing reports for 2018, and the budget requests for 2020



2019 Scrutiny Cycle - Totem

Reminder: TOTEM will be completed in 2021

Integration into CMS Transition period from 2018 - 2021 defined in MoU (CERN-MoU-2018-003)

M&O A

Closing report 2018

- Budget w/o power: **493 kCHF**
- Actual costs w/o power: **479 kCHF**

Budget 2020 and future projections

M&O A	2019	2020	2021
Grand Total	426	426	473

- M&O B**
- Spending in 2018 was **247 kCHF**, exactly on budget
 - M&O B budget request is **128 kCHF** per year, due to removed detector and the CT-PPS budget is now fully integrated in CMS as from 2019

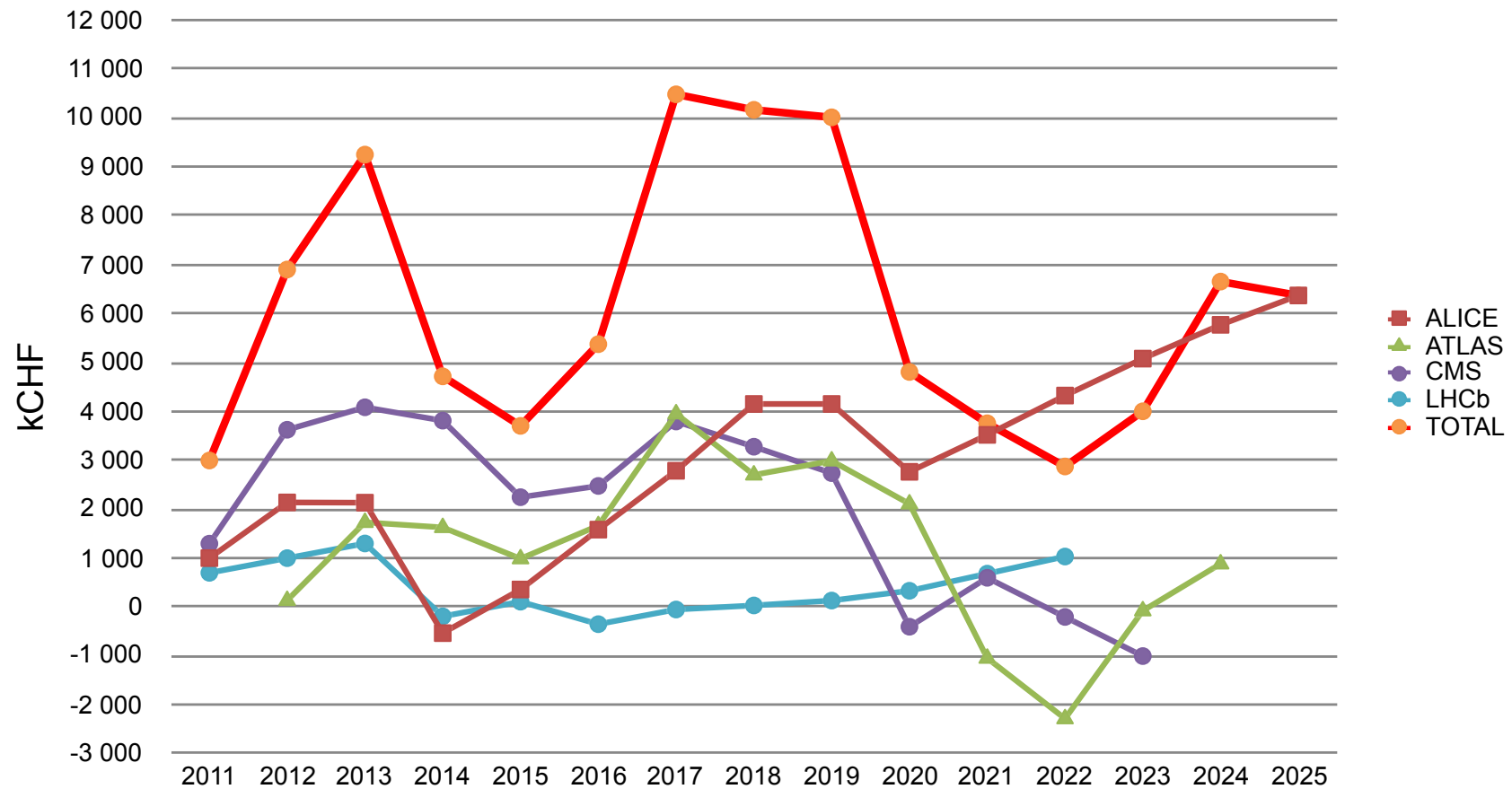
The SG recommends approval of the TOTEM M&O A and M&O B closing reports for 2018, and the budget requests for 2020



2019 Scrutiny Cycle - Special Online Replacement Account

Observation of the development of the Online Replacement Account

- Experiments presented updates to their plans for the use of the account
- All experiments plan for periods of negative balance, with different approaches. The account for ALICE is planned to go negative in 2026, ATLAS in 2021, CMS in 2020 and LHCb in 2023.



2019 Scrutiny Cycle - Upgrade Common Fund

ALICE *Phase-1 Upgrade CF* budget 5.8 MCHF, by the end of 2019 5,4 MCHF was collected from the FA. 4,3 MCHF has been spent or committed by the end of 2019. The plan is to spend the remainder of the funds by end of 2020 or beginning of 2021.

ATLAS *Phase-1 Upgrade CF* budget for the NSW budget is up from 3,047 kCHF in 2018 to 3,457 kCHF. The expenditures until mid-2019 amounts to 2,215 kCHF including open commitments. The overspending of 400 kCHF is planned be taken from the remainder of the Construction common fund.

Phase-2 Upgrade CF budget is of 24.4 MCHF to be collected over 9 years from 2018 to 2026 with a flat profile of 2.7 MCHF per year. In June 2019, contributions of the order of 2,688 kCHF have been received and 109 kCHF spent.

CMS *Phase-1 Upgrade CF* has been collected (98%) and already most of the tasks has been completed. About 430 kCHF is expected to remain uncommitted in this fund, which is planned to be spent on critical items, as agreed with the SG. The plan is to close the Phase-1 Common Fund at the end of LS2.

Phase-2 Upgrade CF budget is 25 MCHF, to be collected over 9 years from 2018 to 2026 with a profile in agreements with the Funding agencies. Spending at the end of 2018 is reported as 1,957 kCHF

LHCb *Phase-1 Upgrade CF* budget is of 15,710 kCHF, with approximately 90% available or fully committed. The total amount spent/committed by May 2019 was 3,872 kCHF. Spending will peak towards the end of LS2, and most of it on computing (just-in-time purchase).



Acknowledgements

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And last but not least many thanks to the CERN management

