



CMS

Draft Budget for Construction 2009

CERN-RRB-2008-100

Cf. CERN-RRB-2008-098

A. Petrilli, RRB-27, November 11, 2008

Compact Muon Solenoid



Introduction

- **This document summarizes the preliminary funding requirements for all the payments planned in 2009 to follow the CMS construction schedule**
- **In 2009, all subdetectors will be in the data taking phase**
 - **only the DAQ will continue with installation and commissioning of DAQ slices and**
 - **ECAL will be installing the Preshower**



Introduction

- **This document covers requests for all subsystems for funds available under the CMS MoU and Cost to Completion**
- **Step 1 (cf. CMS Status Report, CERN-RRB-2008-095) funds have been fully utilized during 2007 and 2008**
- **No additional Step 2 funds are requested in 2009**
- **This Draft Budget for the year 2009 is based on the overall planning as presented in the CMS Status Report (cf. CERN-RRB-2008-095)**



Comments

- **The present estimates for all payments in 2009 add up to 2 MCHF**
- **Together with the payments made by the end of 2007 (527 MCHF), the 2008 budget planned payments (19 MCHF), the total estimated payments by the end of 2009 would total some 548 MCHF**
- **This is about 100% of the funding requested under MoU, CtC and Step 1**



Comments

- **This Draft Budget is based on the breakdown of items in the CMS Construction MoU and its *All-Silicon Tracker* amendment**
- **As for the past, all figures shown as *Payments expected in 2009* are to be considered as best estimates at this time because the actual expenditure will depend, case by case, on commercial tenders received, contract negotiations, currency fluctuations and actual payments during 2008**



Overview of 2009 Construction Budget (MCHF)

All figures in MCHF

All data extracted from Annex 10

Income Expected - Planned Payments									
Planned payments									
Income expected in 2009 plus funds from 2008									
Funds expected to be carried forward from 2008									
	Magnet								
	Tracker								
	Electromagnetic Calorimeter	0.2				1.8			2.0
	Hadron Calorimeter	0.2				1.8			2.0
	Muon Detector								
	Trigger and Data Acquisition								
	Offline Computing								
	Infrastructure								
	Commissioning & Integration								
	TOTALS								



Comments

- **The present Draft Budget is balanced provided ALL Step 1 and Step 2 requested funds are pledged**
- **Step 1 funds will be completely paid by the end of 2008**
- **Step 2 funds have been partly used to cover additional expenses for commissioning in 2008 and will be paid by the end of 2008 (cf. CERN-RRB-2008-095)**



Summary

- **Annex 10 of CERN-RRB-2008-098 summarizes the Draft Budget for 2009 by Funding Agency and by subsystem**

The RRB is invited to approve the Draft Budget for CMS Construction in the Year 2009



CMS

Draft Budget for M&O 2009

Compact Muon Solenoid

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Cf. CERN-RRB-2008-099

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Status of M&O MoU Signatures

Funding Agency	Signed on
Austria	9-Oct-2002
Belgium-FNRS	23-Aug-2002
Belgium-FWO	20-Aug-2002
Brazil	
Bulgaria	7-Aug-2008
Colombia	19-Sep-2008
CERN	4-Dec-2002
China NSFC/CAS	2-Aug-2002
Croatia	8-Oct-2002
Cyprus	16-Aug-2002
Estonia	17-Oct-2002
Finland	19-Sep-2002
France-CEA	26-Aug-2002
France-IN2P3	25-Sep-2002
Germany	12-Sep-2002
Greece	
Hungary	13-Sep-2002
India	16-Sep-2002
Iran	
Ireland	
Italy	25-Nov-2002



Status of M&O MoU Signatures

Funding Agency	Signed on
Korea	25-Oct-2006
Mexico	
New Zealand	
Pakistan	3-Mar-2003
Poland	19-Oct-2004
Portugal	26-Jun-2002
RDMS-Dubna	17-Sep-2002
RDMS-Russia	26-Mar-2006
Serbia	12-Aug-2005
Spain	17-Feb-2003
Switzerland-ETHZ	
Switzerland-PSI	
Switzerland-Univ. Basel	15-Nov-2002
Switzerland-Univ. Zurich	27-Nov-2002
Taipei	12-Jul-2002
Turkey	12-Mar-2003
UK	24-Sep-2002
USA-DOE/NSF	14-Oct-2002



Introduction

- **The CMS Collaboration presents the Draft Budget for both Category A and Category B M&O expenses**
- **The sharing of the M&O-A expenses is based on the PhD count**
 - **The list of PhDs participating in CMS has been updated as required by the M&O MoU**
 - **Engineers can sign physics papers if M&O-A is paid**
- **The sharing of M&O-B expenses is based on responsibility for all subsystems**



Introduction

- **Both M&O-A and M&O-B expenses have been presented to the RRB Scrutiny Group for M&O and feedback has been taken into account.**
- **The M&O-A cost estimates have been updated with respect to the October 2007 RRB meeting leading to a decrease of some 600 kCHF**
- **For readability, we present all figures by Funding Agency. Details are available by Institute. For invoicing purposes, CMS will follow the same arrangements as for the previous year.**



2009 M&O-A Budget: Overview Annex A.1

Maintenance & Operations (kCHF)		Year
Group	Description	2009
Maintenance & Operations	Detector related costs	3,913
	Secretariat	290
	Communications	120
	On-line computing	2,400
	Test beams, calibration facilities	115
	Laboratory operations	270
	General services	1,655
	Core Computing Infrastructure & Services	1,645
Maintenance & Operations Total		10,408
Power	Electricity	1,800
Power Total		1,800
Grand Total		12,208



2009 M&O-B Budget: Overview Annex B.1

Year	2009
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Amount (kCHF/FTE)			Detector					Core Computing	Grand Total
Description	Ref.	Details	Tracker	ECAL	HCAL	Muon	Trigger		
Material Resources (kCHF)	B.1.01	Mechanics	26	28	90	7			150
	B.1.02	Gas-system	14	5	2	20			41
	B.1.03	Cryo-system			0				0
	B.1.04	Cooling system	31	35	2	10			77
	B.1.05	FE electronics	0	0	0	172			172
	B.1.06	Standard electronics, PS (LV, HV)	548	215	0	185			948
	B.1.07	Standard electronics, Crates	0	48	0	68			116
	B.1.08	Standard electronics, RO Modules	748	167	0	245	499		1,659
	B.1.09	Controls, (DCS, DSS)	58	100	0	134			292
	B.1.10	Sub-Detector Spares	0	210	0	74			284
	B.1.11	Areas	233	80	6	82			401
	B.1.12	Communications	23	21	134	29			207
	B.1.13	Store Items	48	60	31	49			188
	B.1.14	Hired Manpower @CERN	660	465	317	286	200		1,928
Material Resources (kCHF) Total			2,389	1,433	581	1,362	699		6,464
Human Resources (FTE)	B.2.01	Technical Manpower @CERN	8	10	0	15	8		41
	B.2.02	Core Computing Manpower @CMS						96	96
Human Resources (FTE) Total			8	10	0	15	8	96	137



M&O-B Manpower

- **As reported in October 2007 and April 2008, CMS is working towards Memoranda of Agreement (MoA) to formalize the service work to operate the CMS detector**
- **HCAL M&O-B item B.2.01 has been reduced to zero as it is completely covered by the MoA**



2009 Total M&O Draft Budget (kCHF)

Funding Agency	Category A	Category B	Total Category A+B	Total Invoiced
Austria	151.2	113.8	265.0	151.2
Belgium-FNRS	159.1	125.9	285.0	159.1
Belgium-FWO	111.4	155.9	267.3	111.4
Brazil	140.0		140.0	140.0
Bulgaria	55.7		55.7	55.7
CERN	565.0	668.2	1,233.2	565.0
China	74.7	15.7	90.4	74.7
Colombia	18.7		18.7	18.7
Croatia	56.0	25.6	81.6	56.0
Cyprus	28.0	16.5	44.5	28.0
Estonia	9.3		9.3	9.3
Finland	127.3	111.9	239.2	127.3
France-CEA	151.2	98.8	250.0	151.2
France-IN2P3	366.0	285.3	651.3	366.0
Germany-BMBF	477.4	388.1	865.5	477.4
Germany-DESY	175.1	30.1	205.1	175.1
Greece	103.4	75.1	178.5	103.4
Hungary	63.7		63.7	63.7
India	220.3	45.6	265.9	220.3
Iran	37.3		37.3	37.3
Ireland	18.7		18.7	18.7



2009 Total M&O Draft Budget (kCHF)

Funding Agency	Category A	Category B	Total Category A+B	Total Invoiced
Italy	1,472.1	1,347.2	2,819.3	1,472.1
Korea	112.0	31.4	143.4	112.0
Mexico	37.3		37.3	37.3
New Zealand	46.7		46.7	46.7
Pakistan	28.0	78.5	106.5	28.0
Poland	95.5	184.7	280.2	95.5
Portugal	55.7	34.5	90.2	55.7
RDMS-DMS	205.3		205.3	205.3
RDMS-Russia	506.1	57.5	563.6	506.1
Serbia	28.0	12.0	40.0	28.0
Spain	294.4	103.3	397.7	294.4
Switzerland-ETHZ	135.3	138.8	274.1	135.3
Switzerland-PSI	87.5	59.8	147.3	87.5
Switzerland-UNIV	39.8	34.4	74.1	39.8
Taipei	168.0	71.3	239.3	168.0
Turkey	149.3		149.3	149.3
United Kingdom	477.4	324.6	802.1	477.4
USA-DOE	3,188.5	1,439.1	4,627.6	3,188.5
USA-DOE-NP	147.9		147.9	147.9
USA-NSF	804.1	390.8	1,194.8	804.1
USA-NSF-NP	27.7		27.7	27.7
Grand Total	11,216	6,464	17,680	11,216



Outstanding Contributions M&O-A

- **The total currently outstanding amount for 2002-2007 is 243 kCHF**
- **Agreements have been reached to cover some 221 kCHF of the above amount in the near future**

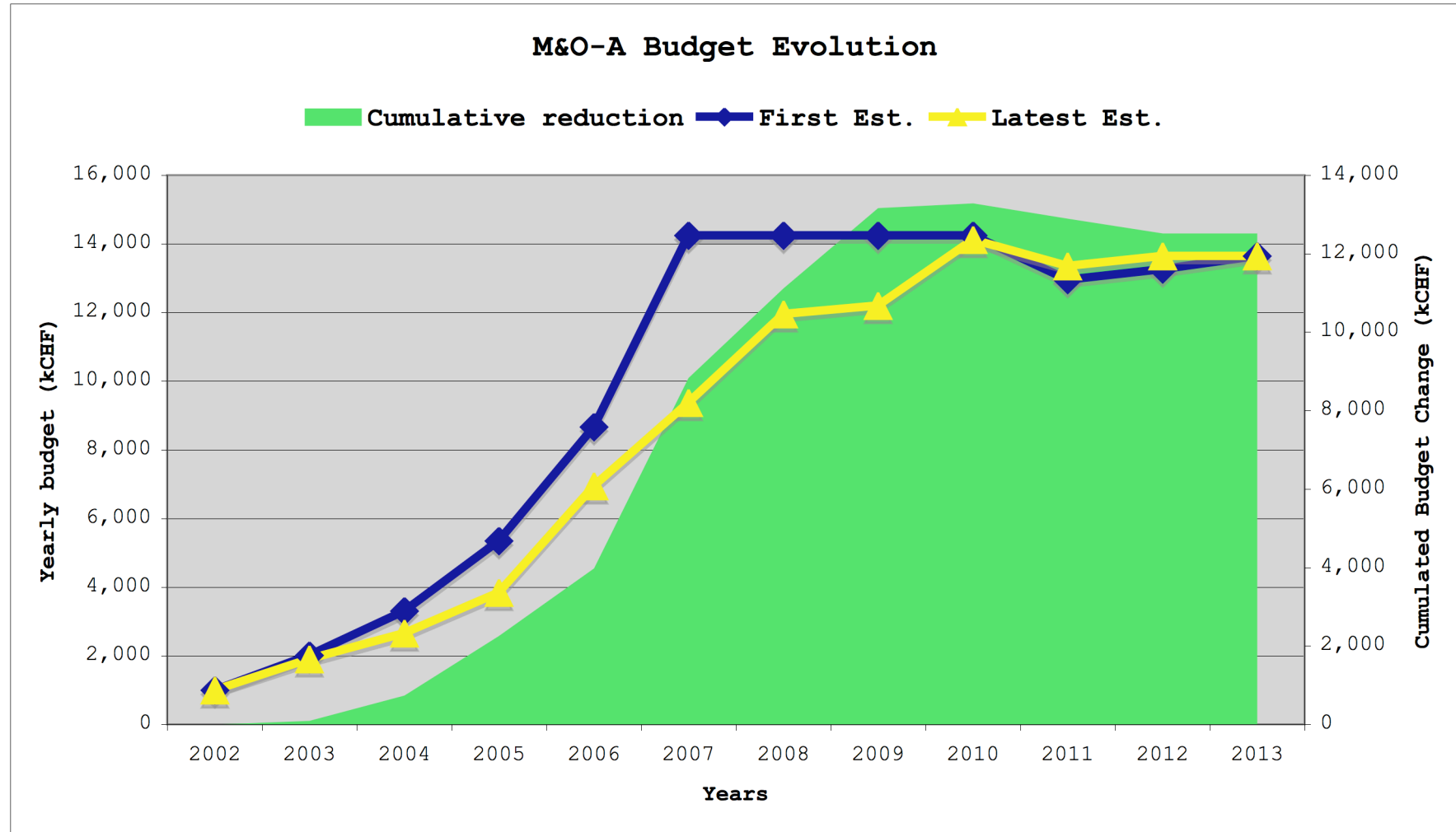


M&O Evolution

- **The M&O category A estimates are overall stable since last year**
 - **as the number of PhDs is gone up, the cost per PhD is very similar to last year**
- **The M&O category B estimates are also overall stable since the April RRB**
 - **changes are due to reprofiling to reflect the actual expenses**

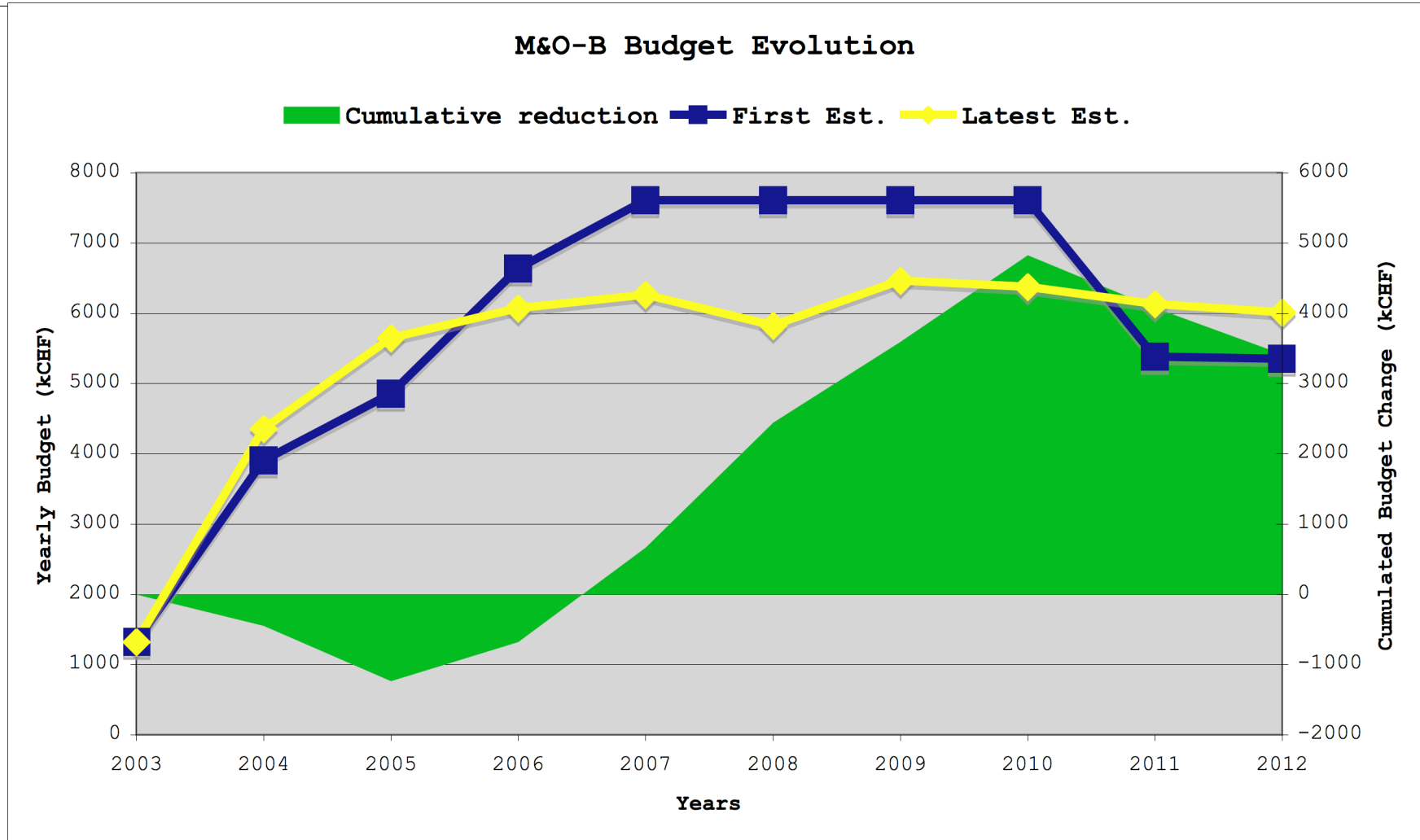


M&O-A Evolution





M&O-B Evolution





Summary

The RRB is invited to

- **approve the Draft Budget for M&O Category A for the year 2009**
- **take note of the Draft Budget for M&O Category B for the year 2009 and its sharing amongst the CMS Funding Agencies**

It should be noted that the M&O Category B Draft Budget will not be invoiced but that those funds should be made available to the CMS collaborating Institutes