

CERN-RRB-2012-026

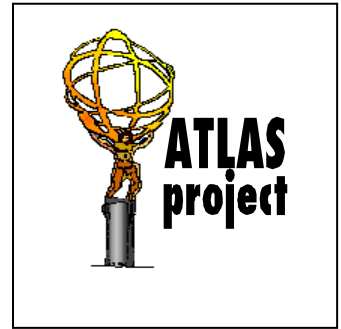
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ATLAS Resources Review Board, April 24, 2012



## **2011 and 2013 ATLAS M&O Budgets**





CERN-RRB-2012-026

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ATLAS Resources Review Board, April 24, 2012

For RRB approval

## **Part 1**




# **Closing Report for 2011 ATLAS M&O Budgets**

# Introduction

*The ATLAS management, supported by the ATLAS Executive and Collaboration Boards, kindly invites the RRB to approve the final M&O payments for 2011.*

The RRB approved the year 2011 Maintenance and Operation (M&O) budget in November 2010 (CERN-RRB-2010-087) for 18.4 MCHF (Category-A), including cost of energy of 2.8 MCHF, and 5.2 MCHF (Category-B), respectively.

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M & O B U D G E T
REPORT ELEMENTS
 Payment Summary
 Activity Description
 Table References

## 1. M&O Budgets for 2011

The final M&O payments in 2011 amounted to 16 621 kCHF in Category-A (including energy for the CERN NMS-part) and 6 372 kCHF in Category-B. The remaining open commitments amounted to 2 387 kCHF in total (A+B). The total payments were 1249 kCHF above the budgeted total income (i.e. invoices sent out) due to past commitments.

In 2011, the Category-A costs covered various technical services invoiced by CERN such as access and cranes operation, site management, providing gases and coolants, running the cooling and ventilation plants (7.6 MCHF) as well as operating the cryogenic plants at Point 1 (1.7 MCHF) and operating the TDAQ system (4.2 MCHF). Core computing infrastructure services were also provided for, and this amounted to 2.1 MCHF.

The CERN member state share of the energy cost for 2011 was paid by CERN in full and partially for those non-member states contributing to the machine construction outside the M&O budget. The cost of energy consumption for 2011 amounted to 0.9 MCHF (non-member state part).

In Category B, the main costs were related to operation of the electronics systems as well as carrying out repairs in-situ in the ATLAS cavern. The above activities included related mechanics, gas and cooling systems (0.3 MCHF), electronics replacements, controls and pool rentals (3.8 MCHF) and area operation and purchasing of store items (0.5 MCHF). Sub-detector spares were purchased worth 0.3 MCHF, including 139 kCHF for the IBL. The hired technical manpower supported all these activities (1.5 MCHF).

The value of in-kind contributions in Category-A amounted to 1.3 MCHF and 81 kCHF made in Category-B in 2011.

As a consequence of the 2011 payments and amortization of the remaining open commitments from the past, the cumulative budget balance (i.e. the approved budgets less executed payments and remaining open commitments) amounts to -1958 kCHF in Category-A and +59 kCHF for Category-B. Due contributions in 2011 amounted to 1.3 MCHF in Category-A and 0.3 MCHF in Category-B.

For Category-A, the status of contributions (sent invoices less received contributions) are shown in the document "Financial Report" (CERN-RRB-2012-012).

**Table 1** summarizes the 2011 M&O payments per system. The participating institutes provided, as part of their detector operation tasks (OTP) obligations, 384 man-years for expert-related activities (excluding shift work), of which 138 man-years in core computing tasks. Table 1 includes also payments made to IBL (more details are provided in CERN-RRB-2012-028).

**Table 2** shows the M&O contributions made for 2011 or earlier by the Funding Agencies for each system.

It should be noted that in order for ATLAS to pay for the 2011 expenses as well as for the past open commitments, permission was given by the CERN Management at the very end of the year to exceptionally overdraw on the M&O-A accounts while waiting for due contributions.

**ATLAS M+O (A) and (B) Payments in 2011 (kCHF)**

Item & Cost Driver (by RRB SG Headings)	Cat. A									Cat. B	Item & Cost Driver (by RRB SG Headings)	
	M & O	Pixel	SCT	TRT	IDGen	LAr	TileC	Muon	Comp.	M & O		
Detector related costs Cryogenics, gas system operations Detector operations, support, safety	5,928						3	76			79	Mechanics
Secretariat 2 FTE charged to ATLAS Publications, consumables	378			224			11				235	Gas systems
Collaborative tools GSM phones Computer network connections Videoconferencing, archiving	366						2	16			18	Cooling system
Core computing (infrastr. & services) Software process service Central production & operation	2,127					362	55	135			552	Front-End electronics
On-line computing System management Hardware replacements (HLT, networks)	3,940	607	427	398	272	890	337	94			3,025	Standard electronics Power supplies, crates, RO-modules
Test beams, facilities Testing equipment (DCS) Consolidation	1,486	9	64		62	27	9	39			210	Controls (DCS, DSS)
Laboratory operations Assembly areas, workshops TDAQ laboratory equipment	113	139	11			190					340	Sub-detector spares incl. IBL (139 kCHF)
General services Heavy handling Technical support, storage Survey Outreach Energy	2,283	95	64	30	80	13	15				297	Areas SR1-operations (ID), system tests, lab. Operations
		3	3	3	4	16	3	10			42	Communications
		8	16	11	3	50	5	12			105	Store items
<b>TOTAL</b>	<b>16,621</b>	<b>861</b>	<b>585</b>	<b>666</b>	<b>421</b>	<b>1,358</b>	<b>630</b>	<b>382</b>	<b>0</b>	<b>4,903</b>	<b>(Excluding hired manpower, Category B)</b>	
Hired manpower at CERN (in kCHF)	incl. above	158	188	135	160	271	177	380		1,469		
Institute manpower (in FTE), excl. shifts(*)	0	31	22	21	23	40	32	77	138	384	Class 3 expert tasks (OTP)	
<b>TOTAL M &amp; O FOR A</b>	<b>16,621</b>	<b>1,019</b>	<b>773</b>	<b>801</b>	<b>581</b>	<b>1,629</b>	<b>807</b>	<b>762</b>	<b>0</b>	<b>6,372</b>	<b>TOTAL M &amp; O FOR B</b>	

Notes

(\*) It is acknowledged that Russia has contributed 150 kCHF as part of its FTE effort in cash

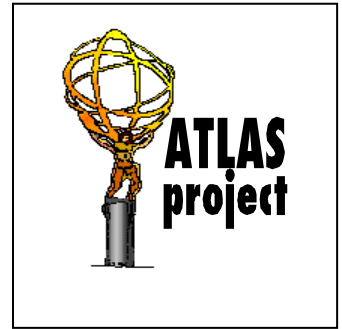
**M+O Contributions (cash and in-kind)  
for ATLAS in 2011 by Funding Agency (kCHF)**

09/04/2012

Funding Agency	Cat.A items*	Category-B item contributions						Total Cat. B	Total A + B	Core comp. Categ.B (FTE)	
		Pixel	SCT	TRT	IDGen	LAr	TileC				Muon
Argentina	30						2	2	32	0	
Armenia	18					2	6	8	26	1	
Australia	61		13		7			20	81	1	
Austria	42		5	5		3		3	16	0	
Azerbaijan	30					1		1	31	0	
Belarus								0	0	0	
Brazil	30							0	30	0	
Canada	607					201		201	808	5	
Chile	30						2	2	32	0	
China NSFC+MSTC	211					6	5	11	222	0	
Colombia	50						2	2	52	0	
Czech Republic	289	14	2		2		10	28	317	2	
Denmark	93			30	5			35	128	0	
France IN2P3	1002	58			11	182	61	311	1313	9	
France CEA	221					61	23	84	305	3	
Georgia	50					2	1	3	53	0	
Germany BM BF	1325	382	63		76	69	51	641	1966	10	
Germany DESY	195					37	37	74	269	8	
Germany MPI	238		29		15	32	15	91	329	1	
Greece	368						22	22	390	0	
Israel	196						10	10	206	2	
Italy	1393	217			27	60	62	152	518	6	
Japan	697		80		46		10	94	230	2	
Morocco								0	0	0	
Netherlands	255		24		14		59	97	352	2	
Norway	127		31		18			49	176	1	
Poland	187		2	7	2			11	198	2	
Portugal	106						6	6	112	0	
Romania	121						6	6	127	0	
Russia	563			14	3	7	6	5	35	598	4
JINR	698			2	1	4	4	10	21	719	1
Serbia	91					4			4	95	0
Slovak Republic	76					5			5	81	0
Slovenia	71		2		1				3	74	2
South Africa	30			2					2	32	0
Spain	347		20		13	46	83		162	509	4
Sweden	238		11	34	12	13	21		91	329	1
Switzerland	187		41		21	9			71	258	0
Taipei	81	2	1		1	1			5	86	0
Turkey	162					5	3		8	170	0
United Kingdom	1580		303		299				602	2182	18
US DOE + NSF	3845	94	9	328		321	347	144	1243	5088	34
CERN	1096		2	224	4	85	85	18	418	1514	17
<b>total contributions</b>	<b>17,037</b>	<b>767</b>	<b>638</b>	<b>646</b>	<b>578</b>	<b>1,156</b>	<b>707</b>	<b>658</b>	<b>5,149</b>	<b>22,187</b>	<b>138</b>
<b>total payments</b>	<b>16,621</b>	<b>1019</b>	<b>773</b>	<b>801</b>	<b>581</b>	<b>1629</b>	<b>807</b>	<b>762</b>	<b>6,372</b>	<b>22,993</b>	

**Notes:**

\* Following invoices sent to Funding Agencies; including energy cost adjustments



CERN-RRB-2012-026

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ATLAS Resources Review Board, April 24, 2012

For RRB to take note

## Part 2




# Preliminary 2013 ATLAS M&O Budget Estimates



# Introduction

*The ATLAS management, supported by the ATLAS Executive and Collaboration Boards, kindly invites the RRB to take note of the preliminary M&O budget estimates for 2013.*

The first M&O budget estimates for the ATLAS detector in 2013 amount to 23.0 MCHF in payments. The year 2013 represents the first long shutdown providing the opportunity for extensive repairs and consolidation work. Despite the shutdown, a large part of the supporting technical infrastructure needs to remain fully operational (e.g. cryogenics, gas, coolants plants, access operations, cooling and ventilation systems).

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M & O B U D G E T	1. Preliminary M&O Budget Estimate for 2013
R E P O R T E L E M E N T S	The preliminary 2013 M&O payments for Category-A items are 17.8 MCHF (including energy) and 5.2 MCHF for Category-B items.
 Budget summary	
 Activity Description	
 Table References	The dominant part of the cost in Category-A is providing the required technical services (e.g. detector access, safety systems, gas systems, heavy handling, crane operations, cooling and ventilation maintenance services, electricity; amounting to 10.5 MCHF). Another cost driver is the operation of the LAr and magnet system at an annual level of 1.6 MCHF. The general support for running the TDAQ system and replacement of equipment is 3.6 MCHF, more than half of which is foreseen for high-level trigger processor replacements, following the planned three full years of operation. Core computing (infrastructure) services are planned at 2.1 MCHF.

Similarly to Category-A, activities in Category-B profit from the shutdown allowing longer access to the detector systems and related interfaces.

The main Category-B cost driver is related to replacing and operating detector modules and related electronics (1.8 MCHF). Sub-detector spares amortization is planned at 0.5 MCHF, including payments for parts of the IBL as well as previous payment advancements that were arranged internally within ATLAS. Scheduled maintenance work of detector structures and mechanics, including the use of store items and areas activities, amount to 0.7 MCHF. The cost of hired technical manpower to run the facilities is estimated at 2.2 MCHF.

The manpower required from institutes for operation expert tasks (OTP), excluding shifts, amounts to 462 man-years. This represents an increase w.r.t previous years, reflecting the additional manpower effort during the long shutdown. Category-B also includes core computing tasks such as core computing management, software project management, data management and computer operations. An estimated manpower effort of 138 man-years is planned to be provided in full as in-kind contributions.

**Figure 1** provides a summary of actual payments up to end of 2011 and a forward look to M&O budget estimates up to 2018, including the full cost of energy and defined parts of the IBL (CERN-RRB-2011-028 Annex 1). The breakdown between Categories A and B is provided in **Table 3**.

**Table 4** gives the breakdown of the M&O (Categories A and B) budget estimates for 2013.

**Table 5** shows the expected contributions for 2013 for each Funding Agency and system (Categories A and B). The Category-A contributions are based on authors holding a PhD or equivalent and are split into two columns; the second column “budgeted” shows the cost sharing including electricity costs and the first column “invoiced” shows the amount to be invoiced to the Funding Agencies, taking into account the energy cost adjustments.

*Figure 1. Evolution of M&O Budget up to 2018 (MCHF)*

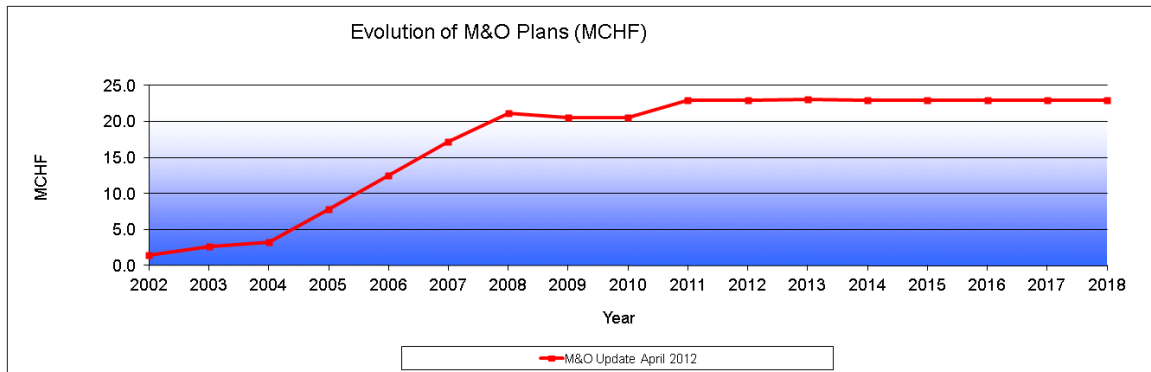


Table 3. Evolution of M&O Budget up to 2018 (MCHF)

M&O BUDGET EVOLUTION (Categories A and B), in MCHF																		
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Category A	1.0	1.6	2.6	5.6	9.0	10.5	14.3	14.4	14.8	16.6	17.9	17.8	17.7	18.4	18.2	18.2	18.1	216.7
Category B	0.4	1.1	0.7	2.2	3.5	6.7	6.8	6.2	5.7	6.4	5.1	5.2	5.3	4.6	4.8	4.8	4.9	74.4
<b>Total (A+B)</b>	<b>1.4</b>	<b>2.7</b>	<b>3.3</b>	<b>7.8</b>	<b>12.5</b>	<b>17.2</b>	<b>21.1</b>	<b>20.6</b>	<b>20.5</b>	<b>23.0</b>	<b>23.0</b>	<b>23.0</b>	<b>23.0</b>	<b>23.0</b>	<b>23.0</b>	<b>23.0</b>	<b>23.0</b>	<b>291.1</b>

**Planned ATLAS M+O (A) and (B) Payments in 2013 (kCHF)**

Item & Cost Driver (by RRB SG Headings)	Cat. A											Cat. B	Item & Cost Driver (by RRB SG Headings)
	M & O	Pixel	SCT	TRT	IDGen	LAr	TileC	Muon	FD	Comp.	M & O		
Detector related costs Cryogenics, gas system operations Shutdown activities, support, safety	6,568					5	8	40	10			63	Mechanics
Secretariat 2 FTE charged to ATLAS Publications, consumables	305			20		1	8					29	Gas systems
Collaborative tools GSM phones Computer network connections Videoconferencing, archiving	507					5						5	Cryo-systems
Core computing (infrastr. & services) Software process service Central production & operation	2,128					15	3	15				33	Cooling system
On-line computing System management Hardware replacements (HLT, networks)	3,314					60			7			67	FE electronics Power supplies, crates, RO-modules
Test beams, facilities Testing equipment (DCS) Consolidation	910	210	240	150	205	295	224	210	44			1,578	Standard electronics
Laboratory operations Assembly areas, workshops TDAQ laboratory equipment	105	10	20	10	5	40	16	30	11			142	Controls (DCS, DSS)
General services Heavy handling Technical support, storage Survey Outreach Energy	3,963					420	30		53			503	Sub-detector spares
		65	50	50	95	10	20		18			308	Areas SR1-operations (ID), system tests, lab. Operations
		3	3	3	5	5	5	5	3			32	Communications
		28	30	72	34	10	23		18			215	Store items
<b>TOTAL</b>	<b>17,800</b>	<b>316</b>	<b>343</b>	<b>305</b>	<b>344</b>	<b>806</b>	<b>397</b>	<b>300</b>	<b>164</b>	<b>0</b>	<b>2,975</b>	(Excluding hired manpower, Category B)	
Hired manpower at CERN (in kCHF)	incl. above	294	294	240	329	389	250	350.2	95			2,242	
Institute manpower (in FTE), excl. shifts	0	31	22	25	23	67	28	100	28	138		462	Class 3 expert tasks (OTP)
<b>TOTAL M&amp;O FOR A</b>	<b>17,800</b>	<b>610</b>	<b>637</b>	<b>545</b>	<b>673</b>	<b>1,195</b>	<b>647</b>	<b>650</b>	<b>259</b>	<b>0</b>	<b>5,217</b>	<b>TOTAL M&amp;O FOR B</b>	

## Proposed Sharing of M+O Contributions for ATLAS in 2013 by Funding Agency (κCHF)

09/04/2012

Funding Agency	Category-A items		Category-B items budgeted									Budget Total	Comp. B (FTE)	Authors M & O-A
	Invoiced*	Budgeted	Pixel	SCT	TRT	IDGen	LAr	TileC	Muon	FD	Total			
Argentina	39	39	0	0	0	0	0	0	2	0	2	41	0	4
Armenia	10	10	0	0	0	0	1	0	0	0	1	11	0	1
Australia	118	118	0	25	0	15	0	0	0	0	41	159	1	12
Austria	17	20	0	2	2	0	2	0	1	0	7	27	0	2
Azerbaijan	20	20	0	0	0	0	1	0	0	0	1	21	0	2
Belarus	49	49	0	0	0	0	0	0	3	0	3	52	0	5
Brazil	99	99	0	0	0	0	0	5	0	0	5	103	1	10
Canada	589	601	0	0	0	0	207	0	0	0	207	808	5	61
Chile	39	39	0	0	0	0	0	0	2	0	2	41	0	4
China NSFC+MSTC	128	128	0	0	0	0	3	0	3	0	6	134	1	13
Colombia	49	49	0	0	0	0	0	0	3	0	3	52	0	5
Czech Republic	285	325	2	1	0	1	0	6	0	5	16	341	3	33
Denmark	95	108	0	0	30	8	0	0	0	0	37	146	1	11
France IN2P3	915	1044	64	0	0	14	208	62	0	13	360	1404	8	106
France CEA	233	266	0	0	0	0	67	0	25	0	92	358	2	27
Georgia	49	49	0	0	0	0	1	0	1	0	2	51	0	5
Germany BM BF	1364	1556	223	53	0	79	78	0	49	53	537	2093	12	158
Germany DESY	250	286	0	0	0	0	32	0	32	34	98	384	2	29
Germany MPI	259	296	0	31	0	19	35	0	17	0	102	397	2	30
Greece	147	167	0	0	0	0	0	0	8	0	8	176	1	17
Israel	193	197	0	0	0	0	0	0	10	0	10	207	2	20
Italy	1373	1566	183	0	0	36	61	56	172	33	540	2107	12	159
Japan	678	690	0	69	0	54	0	20	95	0	238	927	5	70
Morocco	89	89	0	0	0	0	4	0	0	0	4	93	1	9
Netherlands	242	276	0	23	0	16	0	0	56	0	95	371	2	28
Norway	138	158	0	32	0	22	0	0	0	0	54	212	1	16
Poland	199	227	0	2	5	2	0	0	0	3	11	238	2	23
Portugal	112	128	0	0	0	0	0	5	0	1	6	134	1	13
Romania	118	118	0	0	0	0	0	6	0	0	6	124	1	12
Russia	577	660	0	0	12	3	7	5	5	0	33	693	5	67
JINR	256	256	0	0	1	1	3	4	4	0	13	269	2	26
Serbia	59	59	0	0	0	0	3	0	0	0	3	62	0	6
Slovak Republic	78	89	0	0	0	0	4	0	0	0	4	93	1	9
Slovenia	69	69	0	2	0	1	0	0	0	0	3	72	1	7
South Africa	49	49	0	2	0	0	0	0	0	0	2	51	0	5
Spain	371	424	0	18	0	11	37	80	0	0	146	570	3	43
Sweden	268	305	0	13	34	17	15	22	0	5	105	411	2	31
Switzerland	199	227	0	43	0	26	10	0	0	0	78	305	2	23
Taipei	89	89	2	1	0	1	1	0	0	0	4	93	1	9
Turkey	118	118	0	0	6	0	0	0	0	0	6	124	1	12
United Kingdom	1537	1753	0	288	0	317	0	0	0	0	605	2358	14	178
US DOE + NSF	3655	3704	103	0	334	0	319	306	139	76	1277	4981	29	376
CERN	1122	1281	33	31	122	31	94	69	24	36	440	1721	10	130
<b>total</b>	<b>16,344</b>	<b>17,800</b>	<b>610</b>	<b>637</b>	<b>545</b>	<b>673</b>	<b>1195</b>	<b>647</b>	<b>650</b>	<b>259</b>	<b>5,217</b>	<b>23,017</b>	<b>138</b>	<b>1,807</b>
			<b>System-specific items</b>											

**Notes**

\* Invoiced to FAs; includes energy cost adjustments

List of qualified authors with PhD or equivalent (September 30, 2011) used for Category-A

Category-B is based on authors, modulated by CORE contributions

Core computing in Category B (Comp. B) is expressed in Full-Time-Equivalents (FTE). Figure 0 refers to an effort smaller than 0.5 FTE