Worldwide LHC Computing Grid

REPORT ON PROJECT STATUS, RESOURCES AND FINANCIAL PLAN

COMPUTING RESOURCES REVIEW BOARD
29TH OCTOBER 2013

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This status report covers the period from April 2013 – October 2013. Further details on progress, planning and resources, including accounting and reliability data, and detailed quarterly progress reports, can be found in the documents linked to the Progress Reports section on the WLCG web site.

2.2. SITE RELIABILITY

The reliabilities for the last 6 months for CERN and the Tier 1 sites are shown in Table 2.

Table 2: WLCG Tier0/1 Site Reliability

April 2013 - September 2013
Target for each site is 97.0%
Colors: Green > Target Orange > 90% of Target Red < 90% of Target

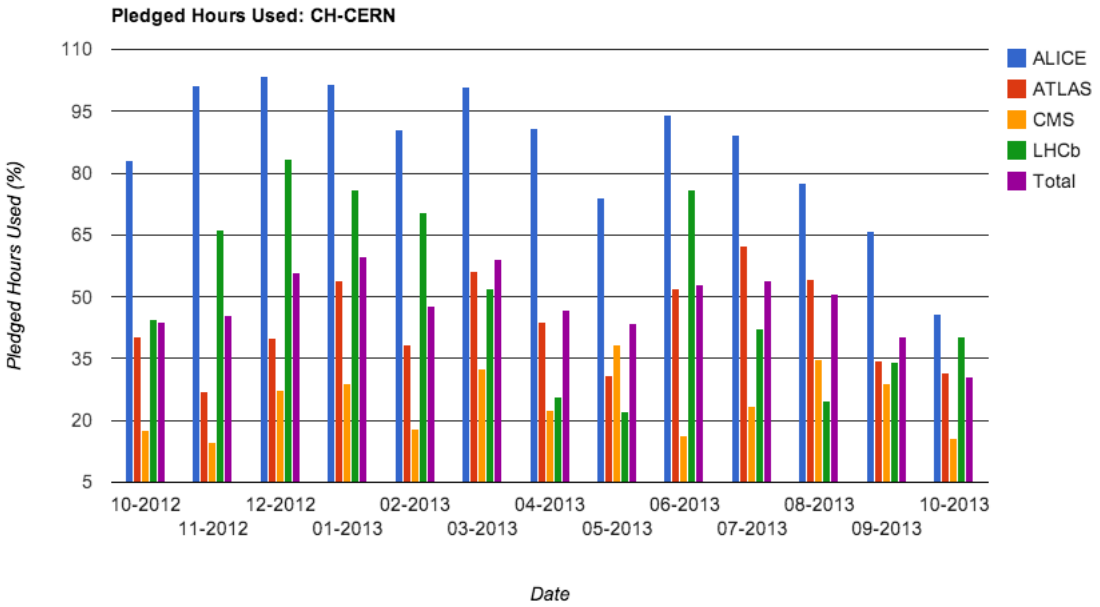
Average of 8 best sites (not always the same 8)

Month	Reliability
Apr 2013	100
May 2013	100
Jun 2013	100
Jul 2013	100
Aug 2013	100
Sep 2013	100

Average of ALL Tier 0 and Tier 1 sites

Month	Reliability
Apr 2013	96
May 2013	99
Jun 2013	99
Jul 2013	99
Aug 2013	99
Sep 2013	99

Site	Apr 2013	May 2013	Jun 2013	Jul 2013	Aug 2013	Sep 2013
CH-CERN	100	100	100	97	95	100
CA-TRIUMF	100	100	100	100	99	98
DE-KIT	100	100	100	98	99	100
ES-PIC	100	100	100	100	99	96
FR-CCIN2P3	80	100	100	100	100	100
IT-INFN-CNAF	100	100	100	100	100	100
KR-KISTI-GSDC	100	86	97	95	97	94
NDGF	100	100	98	100	99	100
NL-T1	98	100	99	100	100	99
TW-ASGC	100	100	99	99	100	94
UK-T1-RAL	100	100	98	99	100	99
US-FNAL-CMS	100	100	100	98	100	100
US-T1-BNL	100	100	100	100	100	100
Target	97	97	97	97	97	97



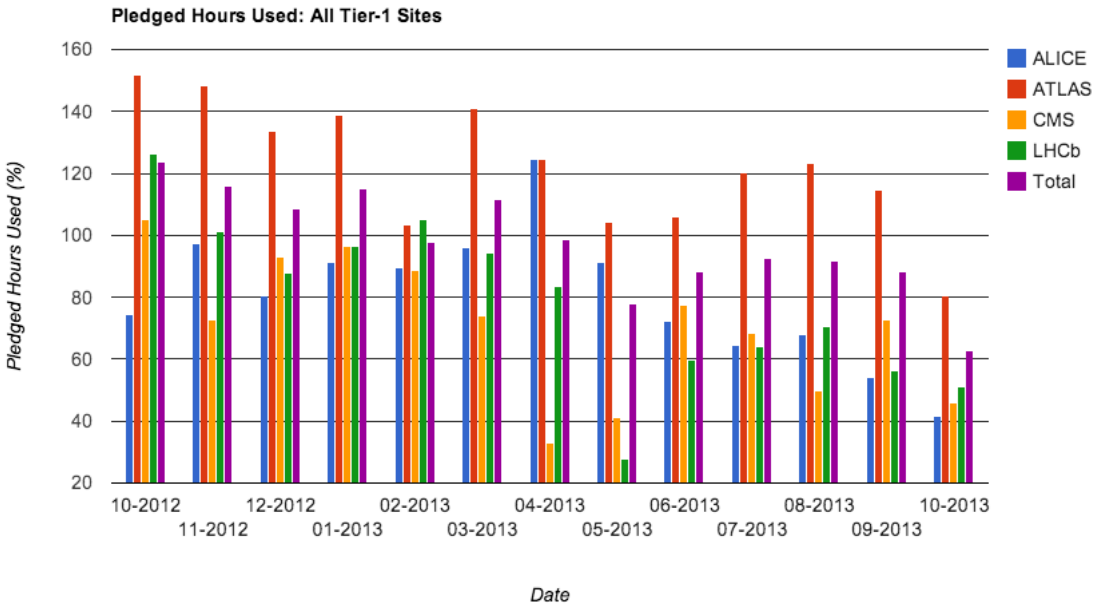


Figure 7: Comparison of CPU usage with pledges for 2012+13;(top) CERN; (bottom) Tier 1s

4.1.2. Tier 2 Accounting

Tier 2 accounting reports can also be found in the WLCG Document Repository.
Figure 9 shows the cumulative Tier 2 CPU delivered during 2012 and the first part of 2013 by country. This partitioning is very close to that expected from the pledge values.

Figure 10 compares the Tier 2 CPU delivered in 2012 and 2013 to date with the pledges, for each experiment and overall. Again, as was observed with the Tier 1s the overall use is at or even above 100% (indicating that often more resources are available than actually pledged).

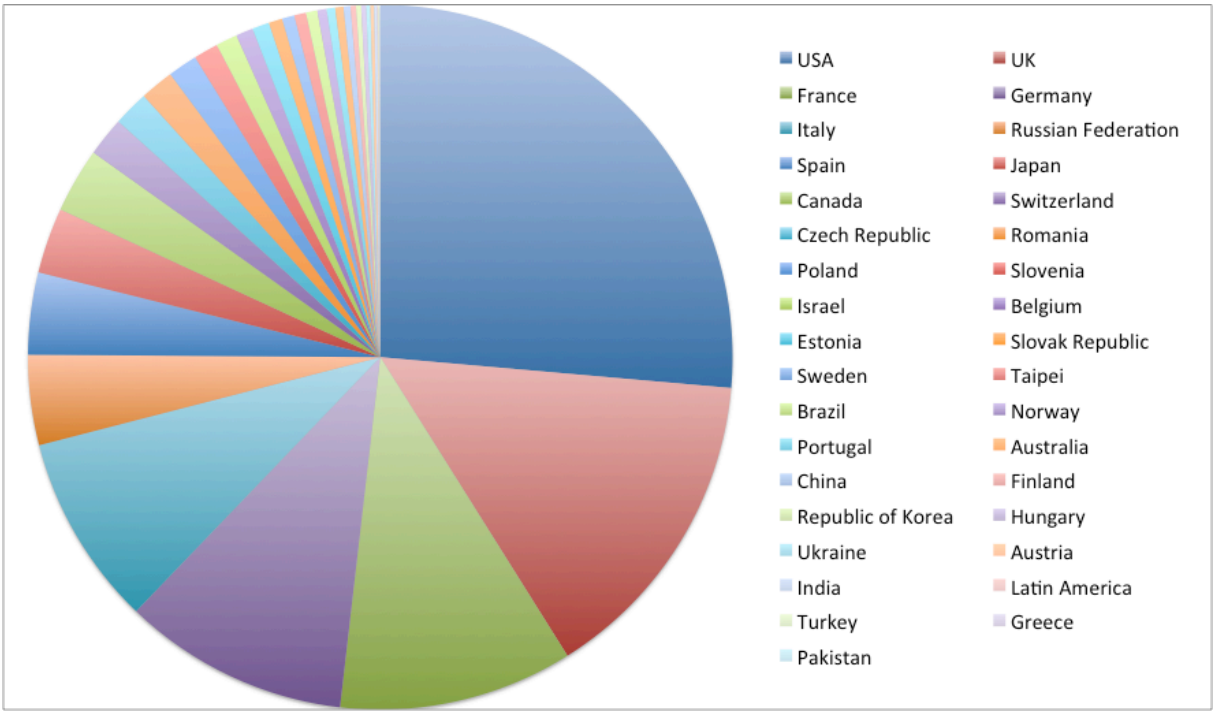


Figure 8: Tier 2 cumulative CPU time delivered by Country (2013 year to date)

As noted in the last report it is clear from Figures 8 and 10 that ATLAS has access to a fairly significant amount of CPU in addition to the formally pledged amounts, both at Tier 1s and particularly at Tier 2 sites.

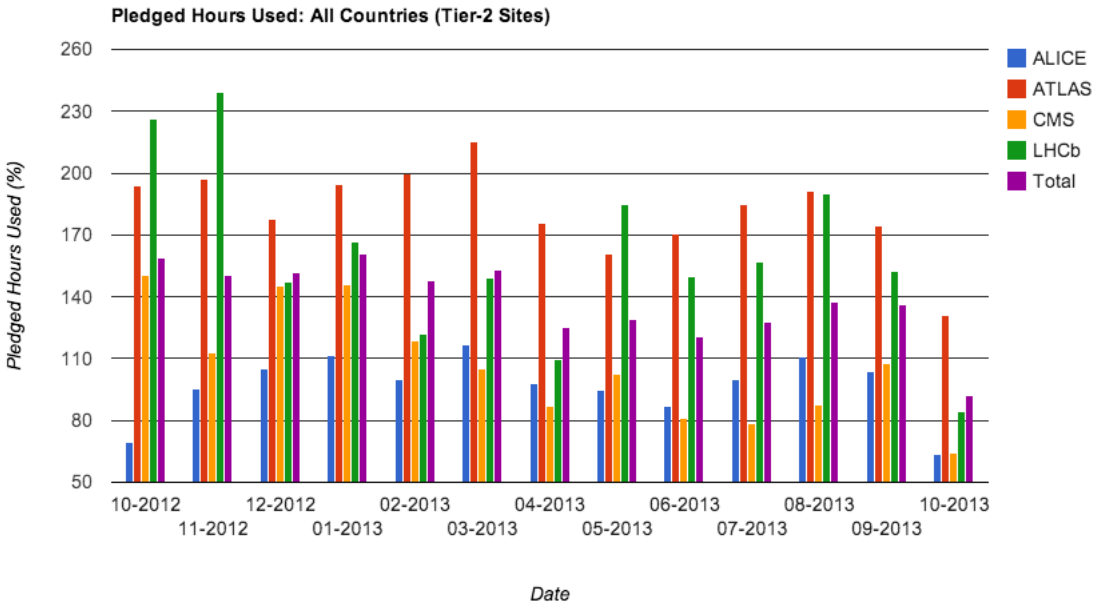


Figure 9: Comparison of CPU usage with pledges for 2012: Tier 2s

The comparison plots of CPU against pledge (such as Figure 8, 10) can be obtained from the MyWLCG portal (http://grid-monitoring.cern.ch/mywlcg/trends/) and in particular can be obtained country by country for the Tier 2s.

4.2. STATUS OF EXPERIMENT REQUIREMENTS AND RESOURCE PLEDGES

As described at an earlier previous RRB meeting, the requirements and pledges are now managed through the online REBUS tool. Figure 10 gives a snapshot of the situation for 2014 and 2015 as of October 2013 (but this can be consulted using the REBUS tool at any time). The annexes of this report give the detailed breakdown by experiment and federation for 2013, 2014 and 2015.

For 2014 this reflects the requirements as presented at the previous RRB, with the pledges as updated during October (with a few still to be updated). Following this RRB the requirements will be updated to reflect the Scrutiny Group recommendations. The 2015 summary reflects the current understanding of the situation, but will be updated following this RRB with the outcome of the scrutiny of the updated experiment requirements, although many of the pledges are not yet known.

Tier	Pledge Type	ALICE	Required	Balance	ATLAS	Required	Balance	CMS	Required	Balance	LHCb	Required	Balance	SUM	Required	Balance
Tier 0	CPU (HEP-SPEC06)	90,000	135,000	-33%	111,000	111,000	0%	121,000	121,000	0%	34,000	40,000	-15%	356,000	407,000	-13%
Tier 0	Disk (Tbytes)	8,100	8,300	-2%	10,000	11,000	-9%	7,000	7,000	0%	4,000	6,400	-38%	29,100	32,700	-11%
Tier 0	Tape (Tbytes)	14,000	12,000	17%	31,000	27,000	15%	28,500	26,000	10%	8,500	6,600	29%	82,000	71,600	15%
Tier 1	CPU (HEP-SPEC06)	104,740	110,000	-5%	367,294	355,000	3%	158,675	175,000	-9%	109,608	110,000	0%	740,317	750,000	-1%
Tier 1	Disk (Tbytes)	8,760	10,100	-13%	35,903	33,000	9%	23,336	26,000	-10%	11,744	14,000	-16%	79,743	83,100	-4%
Tier 1	Tape (Tbytes)	11,450	6,000	91%	47,579	44,000	8%	48,330	55,000	-12%	10,986	11,100	-1%	118,345	116,100	2%
Tier 2	CPU (HEP-SPEC06)	154,447	190,000	-19%	466,104	390,000	20%	431,082	390,000	11%	58,193	47,000	24%	1,109,826	1,017,000	9%
Tier 2	Disk (Tbytes)	11,886	12,800	-7%	50,978	49,000	4%	29,414	27,000	9%	1,029	0	0%	93,307	88,800	5%

Tier	Pledge Type	ALICE	Required	Balance	ATLAS	Required	Balance	CMS	Required	Balance	LHCb	Required	Balance	SUM	Required	Balance
Tier 0	CPU (HEP-SPEC06)	130,000	190,000	-32%	200,000	240,000	-17%	271,000	267,000	1%	44,000	40,000	10%	645,000	737,000	-12%
Tier 0	Disk (Tbytes)	11,200	10,800	4%	15,500	15,000	3%	15,200	15,000	1%	6,700	7,100	-6%	48,600	47,900	1%
Tier 0	Tape (Tbytes)	16,900	27,000	-37%	33,000	38,000	-13%	31,000	38,000	-18%	10,400	11,800	-12%	91,300	114,800	-20%
Tier 1	CPU (HEP-SPEC06)	106,640	110,000	-3%	439,062	478,000	-8%	246,325	325,000	-24%	113,308	110,000	3%	905,335	1,023,000	-12%
Tier 1	Disk (Tbytes)	11,041	13,600	-19%	42,792	47,000	-9%	23,370	30,000	-22%	11,846	16,000	-26%	89,049	106,600	-16%
Tier 1	Tape (Tbytes)	10,170	21,000	-52%	65,659	74,000	-11%	61,855	80,000	-23%	15,035	20,800	-28%	152,719	195,800	-22%
Tier 2	CPU (HEP-SPEC06)	134,417	200,000	-33%	486,878	522,000	-7%	444,441	500,000	-11%	57,445	47,000	22%	1,123,181	1,269,000	-11%
Tier 2	Disk (Tbytes)	12,237	16,000	-24%	52,589	65,000	-19%	28,414	31,000	-8%	1,115	0	0%	94,355	112,000	-16%

Figure 10: Summary of pledge situation for 2014 and 2015: Experiment requirements as confirmed at April 2013 RRB, compared to current pledge data. 2015 pledge data is incomplete.

4.2.1.1. Future resource requirements

The recent update of the computing models has reviewed the expected evolution of resource requirements over the 3 years of LHC Run 2. The figures below show that evolution for 2014 to 2017. The straight lines on the figures represent an extrapolation of the actual pledged resources between 2008-2012, while the curves represent the anticipated capacity that should be achievable with flat budgets (see following section).

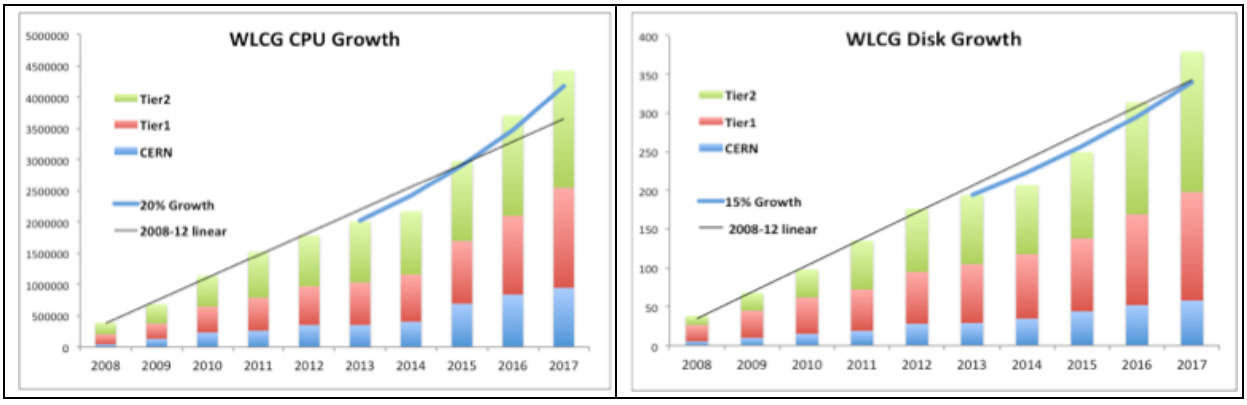


Figure 11: Expected evolution of requirements for CPU and disk for LHC Run 2. See text for explanation of the curves.

Spain PIC	2013	2014	2015	Split 2014	ALICE	ATLAS	CMS	LHCb	SUM 2014
CPU (HEP-SPEC06)	30804	32640	46563	Offered		18105	8925	5610	32640
				% of Total		5%	5%	5%	5%
Disk (Tbytes)	3550	3723	4743	Offered		1683	1326	714	3723
				% of Total		5%	5%	5%	5%
Tape (Tbytes)	5345	5615	8915	Offered		2244	2805	566	5615
				% of Total		5%	5%	5%	5%

Taipei ASGC	2013	2014	2015	Split 2014	ALICE	ATLAS	CMS	LHCb	SUM 2014
CPU (HEP-SPEC06)	33874	27669	20639	Offered		18919	8750		27669
				% of Total		5%	5%		5%
Disk (Tbytes)	4275	3875	2700	Offered		2475	1400		3875
				% of Total		8%	5%		7%
Tape (Tbytes)	4000	4000	4000	Offered		2000	2000		4000
				% of Total		5%	4%		4%

UK Tier1 (note 1)	2013	2014	2015	Split 2013	ALICE	ATLAS	CMS	LHCb	SUM 2014
CPU (HEP-SPEC06)	76300	95230	95230	Offered	2200	44380	14000	34650	95230
				% of Total	2%	13%	8%	32%	13%
Disk (Tbytes)	8240	10030	10030	Offered	200	4130	2080	3620	10030
				% of Total	2%	13%	8%	26%	12%
Tape (Tbytes)	11780	12410	12410	Offered	120	5500	4400	2390	12410
				% of Total	2%	13%	8%	22%	11%

US-ATLAS Tier1	2013	2014	2015	Split 2013	ALICE	ATLAS	CMS	LHCb	SUM 2014
CPU (HEP-SPEC06)	74000	82000	110000	Offered		82000			82000
				% of Total		23%			23%
Disk (Tbytes)	8100	7600	11000	Offered		7600			7600
				% of Total		23%			23%
Tape (Tbytes)	8600	10000	16000	Offered		10000			10000
				% of Total		23%			23%

US-CMS Tier1	2013	2014	2015	Split 2014	ALICE	ATLAS	CMS	LHCb	SUM 2014
CPU (HEP-SPEC06)	58000	70000	130000	Offered			70000		70000
				% of Total			40%		40%
Disk (Tbytes)	11000	11000	12000	Offered			11000		11000
				% of Total			42%		42%
Tape (Tbytes)	24000	22000	32000	Offered			22000		22000
				% of Total			40%		40%

Summary Ext. Tier1s	2013	2014	2015	2014	ALICE	ATLAS	CMS	LHCb	SUM 2014
CPU (HEP-SPEC06)	675946	740317	905335	Offered	104740	367294	158675	109608	740317
				Required	110000	355000	175000	110000	750000
				Balance	-5%	3%	-9%	0%	-1%
Disk (Tbytes)	74784	79743	89049	Offered	8760	35903	23336	11744	79743
				Required	10100	33000	26000	14000	83100
				Balance	-13%	9%	-10%	-16%	-4%
Tape (Tbytes)	113135	118345	152719	Offered	11450	47579	48330	10986	118345
				Required	6000	44000	55000	11100	116100
				Balance	91%	8%	-12%	-1%	2%

Ext. Tier1 Requ. 2014	ALICE	ATLAS	CMS	LHCb	SUM
CPU (HEP-SPEC06)	110000	355000	175000	110000	750,000
Disk (Tbytes)	10100	33000	26000	14000	83,100
Tape (Tbytes)	6000	44000	55000	11100	116,100

TIER 1 Notes

Note 1: UK : UK Tape is provisioned on demand. The full pledge will not be deployed until required.

See also the online WLCG Resources Pledges database at: **http://wlcg-rebus.cern.ch/apps/pledges/resources/**

Norway, UNINETT SIGMA Tier2	2013	2014	2015	Split 2014	ALICE	ATLAS	CMS	LHCb	SUM 2014
CPU (HEP-SPEC06)	3190	3190	3190	Offered		3190			3190
				% of Total		1%			1%
Disk (Tbytes)	490	490	490	Offered		490			490
				% of Total		1%			1%

Pakistan, Pakistan Tier-2 Federation	2013	2014	2015	Split 2014	ALICE	ATLAS	CMS	LHCb	SUM 2014
CPU (HEP-SPEC06)	6365	6365	6365	Offered			6365		6365
				% of Total			2%		2%
Disk (Tbytes)	300	260	350	Offered			260		260
				% of Total			1%		1%

Poland, Polish Tier-2 Federation	2013	2014	2015	Split 2014	ALICE	ATLAS	CMS	LHCb	SUM 2014
CPU (HEP-SPEC06)	17200	19200	0	Offered	4670	6050	5290	3190	19200
				% of Total	2%	2%	1%	7%	2%
Disk (Tbytes)	1060	1120	0	Offered	325	465	330		1120
				% of Total	3%	1%	1%		1%

Portugal, LIP Tier-2 Federation	2013	2014	2015	Split 2014	ALICE	ATLAS	CMS	LHCb	SUM 2014
CPU (HEP-SPEC06)	6400	6000	6000	Offered		3000	3000		6000
				% of Total		1%	1%		1%
Disk (Tbytes)	420	360	360	Offered		190	170		360
				% of Total		0%	1%		0%

Romania, Romanian Tier-2 Federation	2013	2014	2015	Split 2014	ALICE	ATLAS	CMS	LHCb	SUM 2014
CPU (HEP-SPEC06)	34500	38000	39000	Offered	17000	16100		4900	38000
				% of Total	9%	4%		10%	6%
Disk (Tbytes)	2120	2330	2510	Offered	1290	1000		40	2330
				% of Total	10%	2%		-	4%

Russian Federation, RDIG (note 1)	2013	2014	2015	Split 2014	ALICE	ATLAS	CMS	LHCb	SUM 2014
CPU (HEP-SPEC06)	69776	81403	112703	Offered	20467	29185	31690	61	81403
				% of Total	11%	7%	8%	0%	8%
Disk (Tbytes)	4972	6542	9089	Offered	1645	2345	2547	5	6542
				% of Total	13%	5%	9%	-	7%

Slovak Republic, Slovak Tier2 Federation	2013	2014	2015	Split 2014	ALICE	ATLAS	CMS	LHCb	SUM 2014
CPU (HEP-SPEC06)	9600	9600	10400	Offered	4800	4800			9600
				% of Total	3%	1%			1%
Disk (Tbytes)	360	530	620	Offered	280	250			530
				% of Total	2%	1%			1%

Slovenia, SiGNET, Jozef Stefan Inst.	2013	2014	2015	Split 2014	ALICE	ATLAS	CMS	LHCb	SUM 2014
CPU (HEP-SPEC06)	15000	15000	20000	Offered		15000			15000
				% of Total		4%			4%
Disk (Tbytes)	900	900	1500	Offered		900			900
				% of Total		2%			2%

Spain, ATLAS Federation	2013	2014	2015	Split 2014	ALICE	ATLAS	CMS	LHCb	SUM 2014
CPU (HEP-SPEC06)	18000	20600	26100	Offered		20600			20600
				% of Total		5%			5%
Disk (Tbytes)	2550	2800	3250	Offered		2800			2800
				% of Total		6%			6%

Spain, CMS Federation	2013	2014	2015	Split 2014	ALICE	ATLAS	CMS	LHCb	SUM 2014
CPU (HEP-SPEC06)	20000	20000	25000	Offered			20000		20000
				% of Total			5%		5%
Disk (Tbytes)	1500	1500	1600	Offered			1500		1500
				% of Total			6%		6%

Spain, LHCb Federation	2013	2014	2015	Split 2014	ALICE	ATLAS	CMS	LHCb	SUM 2014
CPU (HEP-SPEC06)	2800	2800	0	Offered				2800	2800
				% of Total				6%	6%
Disk (Tbytes)	1	1	0	Offered				1	1
				% of Total				-	-

Sweden, SNIC Tier2	2013	2014	2015	Split 2014	ALICE	ATLAS	CMS	LHCb	SUM 2014
CPU (HEP-SPEC06)	7870	7870	7870	Offered	2820	5050			7870
				% of Total	1%	1%			1%
Disk (Tbytes)	920	920	920	Offered	400	520			920
				% of Total	3%	1%			1%