

The Gas Team and the LHC gas systems: introduction

Outlook

- The Gas Team
- Experiment/detectors contact persons, egroups
- M&O Budget update
- Beyond M&O funds
- Future consolidations and upgrades (after LS2)
- Conclusions

The Gas Team

EP-DT-FS Gas Team. In the following only Gas Team

Roberto
Project leader



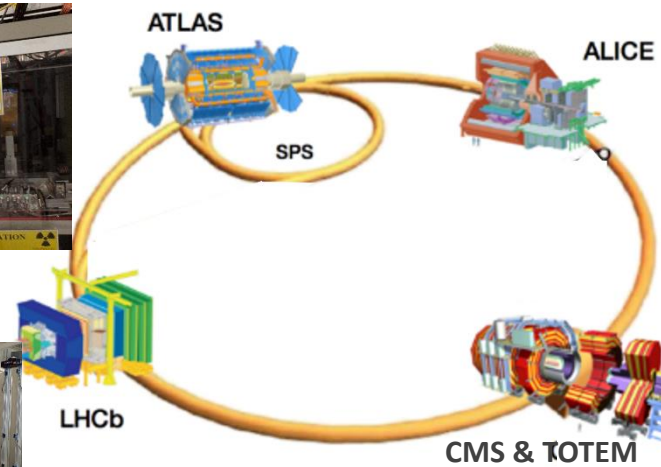
Louis-Philippe

ALICE, non-LHC and analysis

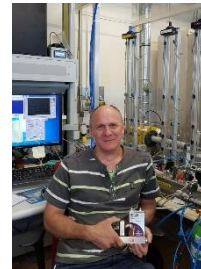


Kacper

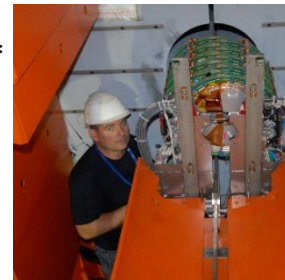
ATLAS and Pumps



Patrick
LHCb
and electrical



Andrea*
CMS

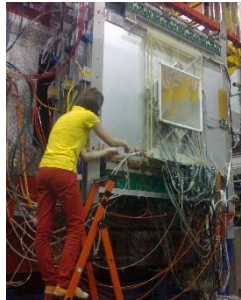


Students: Tech, Doct, TTE, Trainee



FS - Gas & Cooling workshop
3-7 FSU

Beatrice
LHC-M&O and R&D



Frederic*
LHC-M&O



Michal*
Controls software



* Also involved in other not gas systems projects

The Gas Team

Project leader: Roberto Guida

LHC M&O responsible: Beatrice Mandelli, Frederic Merlet

Gas system site responsible:

- ALICE: Louis-Philippe De Menezes
- ATLAS: Kacper Kapusniak
- CMS: Andrea D'Auria
- LHCb: Patrick Carriè

1st contact: gas piquet 162516

In case of any problem:

- *Contact LHC M&O responsible*
- *Project leader*

CMS detector contact persons

Egroup for communications between gas team and experiments.

Free subscription and unsubscription (to facilitate the detector contact persons in keeping the list updated)

For CMS:
gas-users-CMS

Members are:

<input type="checkbox"/>	Name	Type	Login	Email	
<input type="checkbox"/>	ALEKSANDROV, Aleksandar (EP-UCM)	Person	AALEKSAN	aleksandar.aleksandrov@cern.ch	
<input type="checkbox"/>	ANDREEV, Valery (EP-UCM)	Person	ANDREEV	Valeri.Andreev@cern.ch	
<input type="checkbox"/>	BALL, Austin (EP-CMX-SCI)	Person	AUSTIN	Austin.Ball@cern.ch	
<input type="checkbox"/>	BENVENUTI, Alberto	Person	BENVENUT	Alberto.Benvenuti@cern.ch	
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<input type="checkbox"/>	BUONTEMPO, Salvatore (EP-UCM)	Person	BUONTEMP	Salvatore.Buontempo@cern.ch	
<input type="checkbox"/>	COLALEO, Anna (EP-UCM)	Person	ACOLALEO	Anna.Colaleo@cern.ch	
<input type="checkbox"/>	D'AURIA, Andrea (EP-DT-FS)	Person	DAURIAA	Andrea.D'Auria@cern.ch	
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<input type="checkbox"/>	MANDELLI, Beatrice (EP-DT-FS)	Person	BMANDELL	beatrice.mandelli@cern.ch	
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<input type="checkbox"/>	REDONDO FERNANDEZ, Ignacio (EP-UCM)	Person	REDONDO	ignacio.redondo.fernandez@cern.ch	
<input type="checkbox"/>	TEYSSIER, Daniel Francois (EP-UCM)	Person	TEYSSIER	Daniel.Francois.Teyssier@cern.ch	Self added member
<input type="checkbox"/>	TROPEA, Paola (EP-DT-FS)	Person	PTROPEA	Paola.Tropea@cern.ch	
<input type="checkbox"/>	TURINI, Nicola (EP-UHC)	Person	NTURINI	Nicola.Turini@cern.ch	
<input type="checkbox"/>	VAI, Ilaria (EP-UCM)	Person	IVAI	ilaria.vai@cern.ch	Self added member
<input type="checkbox"/>	YANG, Xiaofeng (EP-UCM)	Person	XYANG	Xiaofeng.Yang@cern.ch	
<input type="checkbox"/>	ZEUNER, Wolfram (EP-CMX-SCI)	Person	ZEUNER	Wolfram.Zeuner@cern.ch	

To facilitate communication add:
- *detector*
- *On-call numbers*

LHC gas systems maintenance and operation agreement

Proposal for a change/improvement starting from Run3

Following last year feedback, change in the M&O agreement

Currently (from the M&O agreement):

“The piquet person will write a short report of intervention in the elogbook of the experiment.”

It will be replaced by:

“The piquet person will write a short report of intervention in the gas systems elogbook. Users member of the egroup gas-users-CMS-ELOG will be automatically notified. It is responsibility of the relevant detector contact persons to subscribe themselves into the egroup. The detector contact persons will decide if it worth to “copy/paste” the info in the elog of the experiment”

All the rest concerning communication remains. For example, “The piquet person will inform the shift leader on duty of any intervention or repair.”

2019: M&O and consolidations/upgrades

- **Standard maintenance:**

Material and manpower costs covered by the M&O agreement

MFCs maintenance

Consumables (lab, tools, connectors, ...)

Gas analysis (calibration gases, materials, O2 cells, maintenance, ...)

Power supply maintenance

Pump maintenance 30000 h

Pump maintenance 2000 h

Purifier maintenance

Safety valve maintenance

Pneumatic controls

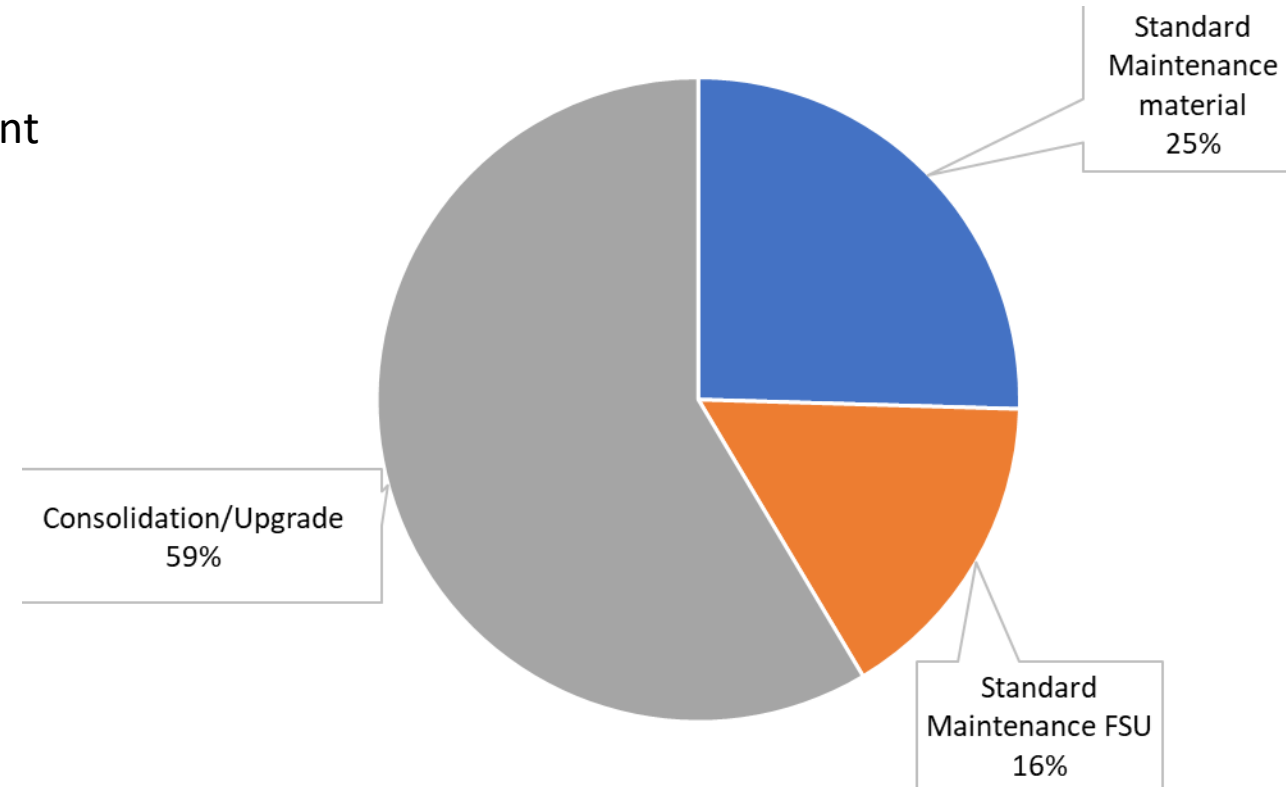
PLC & Power Supply (~60 kCHF in 2019)

- **Consolidation/upgrade:**

Material and manpower costs not covered by the M&O agreement

2019-CMS:

- GEM (new gas system) **in operation but not yet paid by GEM. At some point issue need to be solved**
- RPC-UpgradeDistribModules, Dummy Chambers, Purifier upgrade - *to be paid but first we prefer to understand results from R&D on regulation valves*



M&O 2019 budget status for CMS

106% budget used

Beyond M&O budget: M&O addendum

M&O addendum: <https://edms.cern.ch/document/1838074>

- 1) Operation of detector technologies with gas recirculation systems at HL-LHC luminosities
- ~~2) Gas systems for new environmental friendly gas mixtures~~
- 3) Gas systems R&D for upgrade/consolidation

→ 1 doctoral, 1 technical, 1 TTE (the latter for the 1st year 50% for CMS-CF4 recuperation) hired and integrated in the team.

Examples:

Gas analysis (gas chromatograph, upgrade of gas analysis rack and more)

Gas recuperation (upgrades/consolidations of the present CF4 plant, development of R134a-SF6 recuperation plants)

Developments for future upgrades

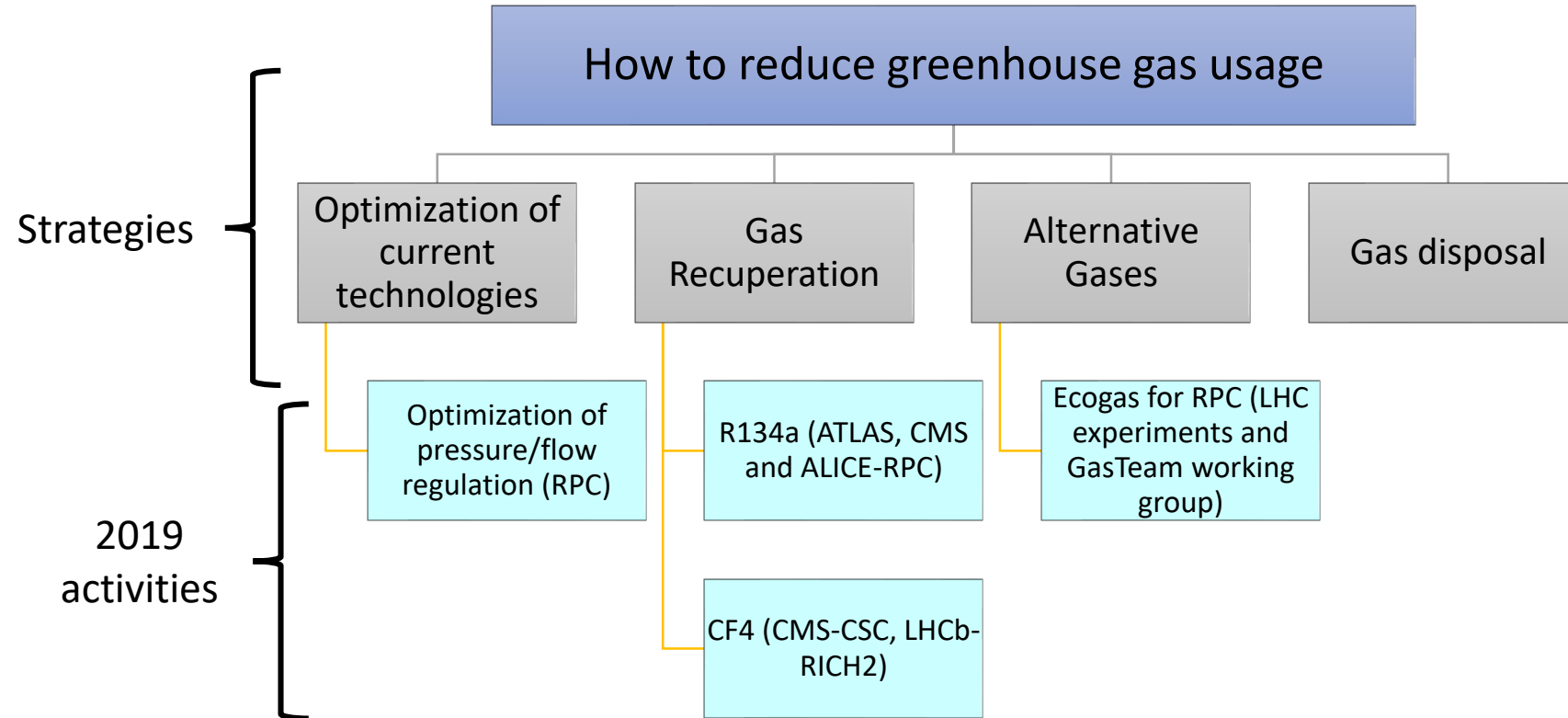
40 k CHF from CMS

It will become part of the M&O agreement from Run3

Beyond M&O budget: Gas Systems R&D

CERN Environmental Protection Steering board (CEPS)

Special funds allocated for 2019-2026 to boost activities in the addendum and many others:



Beyond M&O budget: Gas Systems R&D

Preparation of **Gas System test bench** for:

- Development of standardized maintenance Procedures
- Development/test of software modifications
- Test of new hardware components
- ...

Starting from LHCb-OT gas system not used anymore



EP-DT and CMS strategy to reduce R134a consumption

2019: Started discussion for preparation of a common strategy for R134a:

- Completion of the prototype recuperation unit validation
- Construction on the final recuperation unit

In addition to Gas team proposal accepted by CEPS, for CMS we are discussing:

- Regular recuperation and re-injection of R134a from 2022
- Purchase of R134a equivalent to 1 y of RPC operation in today's conditions
- Purchase of a storage dewar and installation at P5

To be clarified budget allocation/usage from CMS (material for final R134a plant, resources, R134a-and CF4- storage)

EP-DT and CMS strategy to reduce R134a consumption

Resources situation:

M&O addendum:

2020 <-> 1 Tech, 1 doct, 1 TTE

CEPS for R&D:

2020 1 doct; [+ 1 TTE anticipated to boost activities]

2021 1 doct, 1 fellow, 1 TTE

Experienced resources (physicist or engineer) missing for coming years:

1 fellow physicist

1 fellow engineer

1 TTE (electrical)

Beyond LS2

- ...
- ...
- ...

It is very useful to collect ideas and prepare the team (anticipating any potential resource issue)

Conclusions

LHC M&O

- LHC M&O activities are well defined and supported by the M&O agreement.
- 2019 budget situation is ok

Beyond M&O

- M&O addendum and CEPS budget will allow addressing new challenges and solve old issues (examples: improvement of RPC gas systems to cope with detector fragility and R134a recuperation).

Beyond LS2

- Mandatory to collect ideas now to prepare the team: anticipating any potential resource issue

Update of M&O agreement

- Include gas system elog and egroups
- Include addendum