

GIF++ Gas System

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<http://gif-irrad.web.cern.ch/>

Upgrade and Concerns
EATM 13/02/2024

Joined Facility BE/EP



- ▶ **EHN1 infrastructure**
- ▶ **Beam line H4**
- ▶ **General GIF infrastructure**
 - ▶ **Bunker shielding / Rack infrastructure**
 - ▶ **Electricity, cooling & ventilation, primary system supply...**
- ▶ **Access system (contact to)**
- ▶ **General safety EHN1 (incl. GIF)**
- ▶ **^{137}Cs Irradiator**
- ▶ **Local gas distribution**
- ▶ **User operation**
 - ▶ **Irradiation requests, beam request, space management**
 - ▶ **User installations**
 - ▶ **User contact**
- ▶ **Safety (setups & users)**

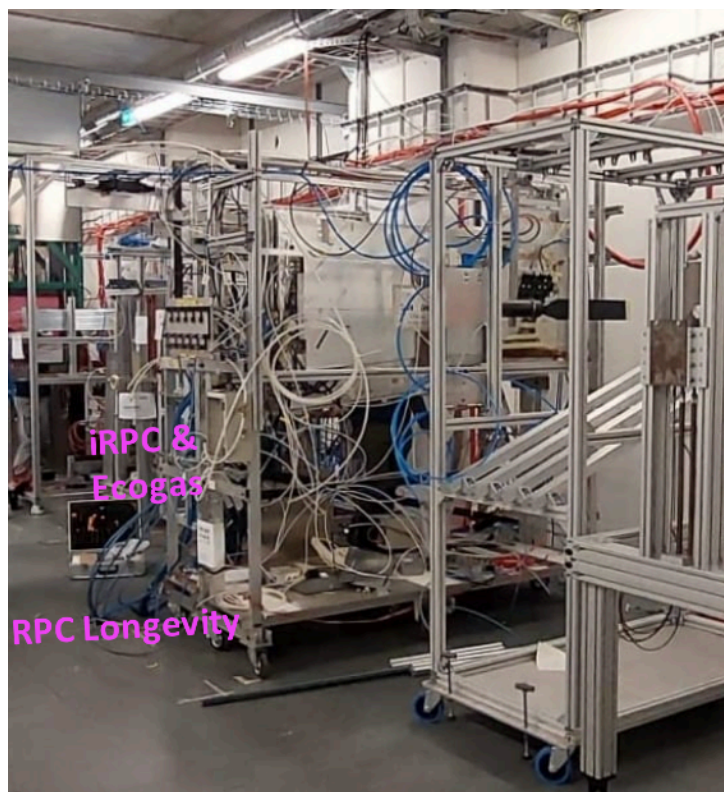
GIF++ is a unique facility purpose-built for testing real detectors in realistic environment with LHC experiment readout systems & gas mixers

No existing alternatives worldwide.

In addition to R&D, ageing tests and detector validations before installation in the LHC Experiments, the search for new environmental “friendly” gas mixture has become a major part of the GIF++ operation.

More gas mixtures are (will be) used in GIF++ in parallel then before, requiring several new mixer racks (~30kCHF, 3 months construction)

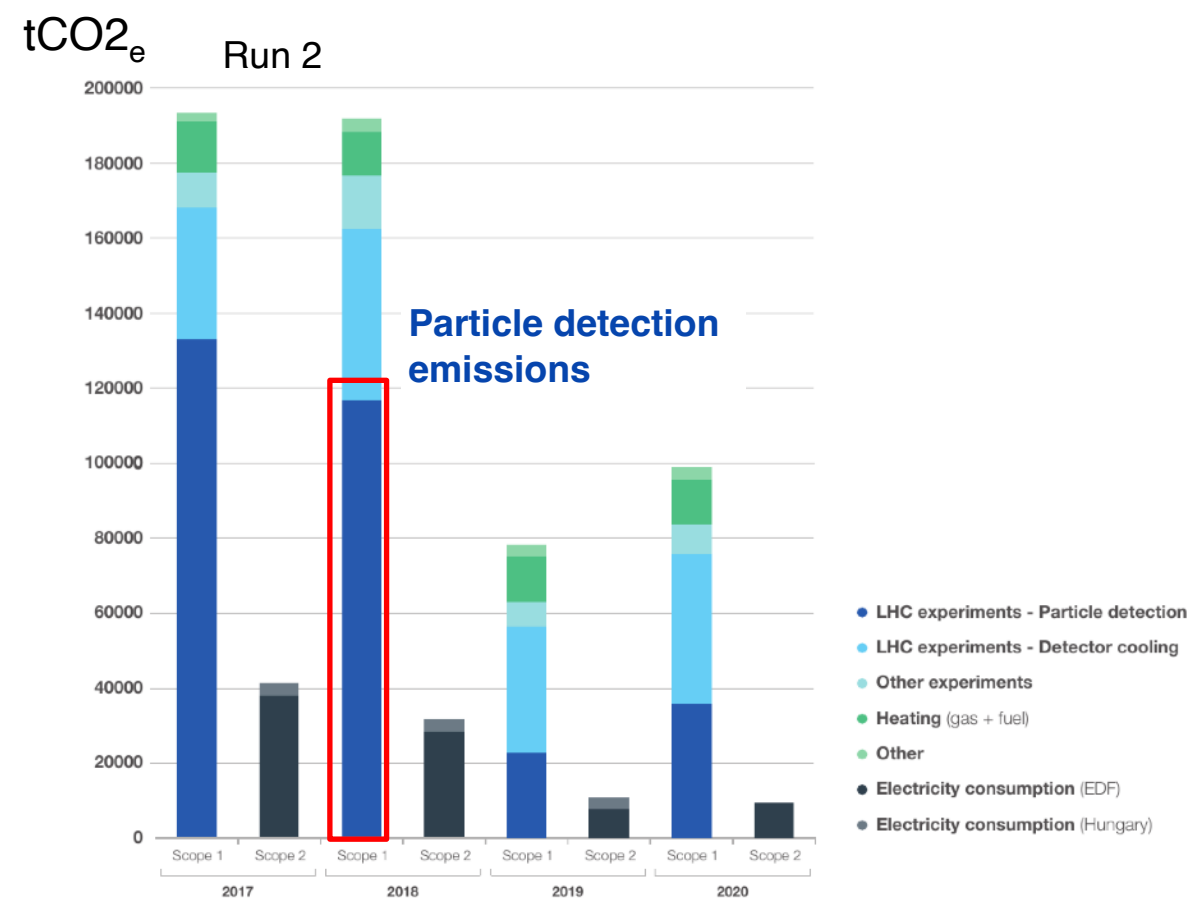
ECO-Gas



Search for environmentally friendly gas mixture with lower Global Warming Potential (GWP) than standard RPC mixture

EP-DT-FS - B. Mandelli et al

e.g. Seminar G. Rigoletti : <https://indico.cern.ch/event/1155238/>

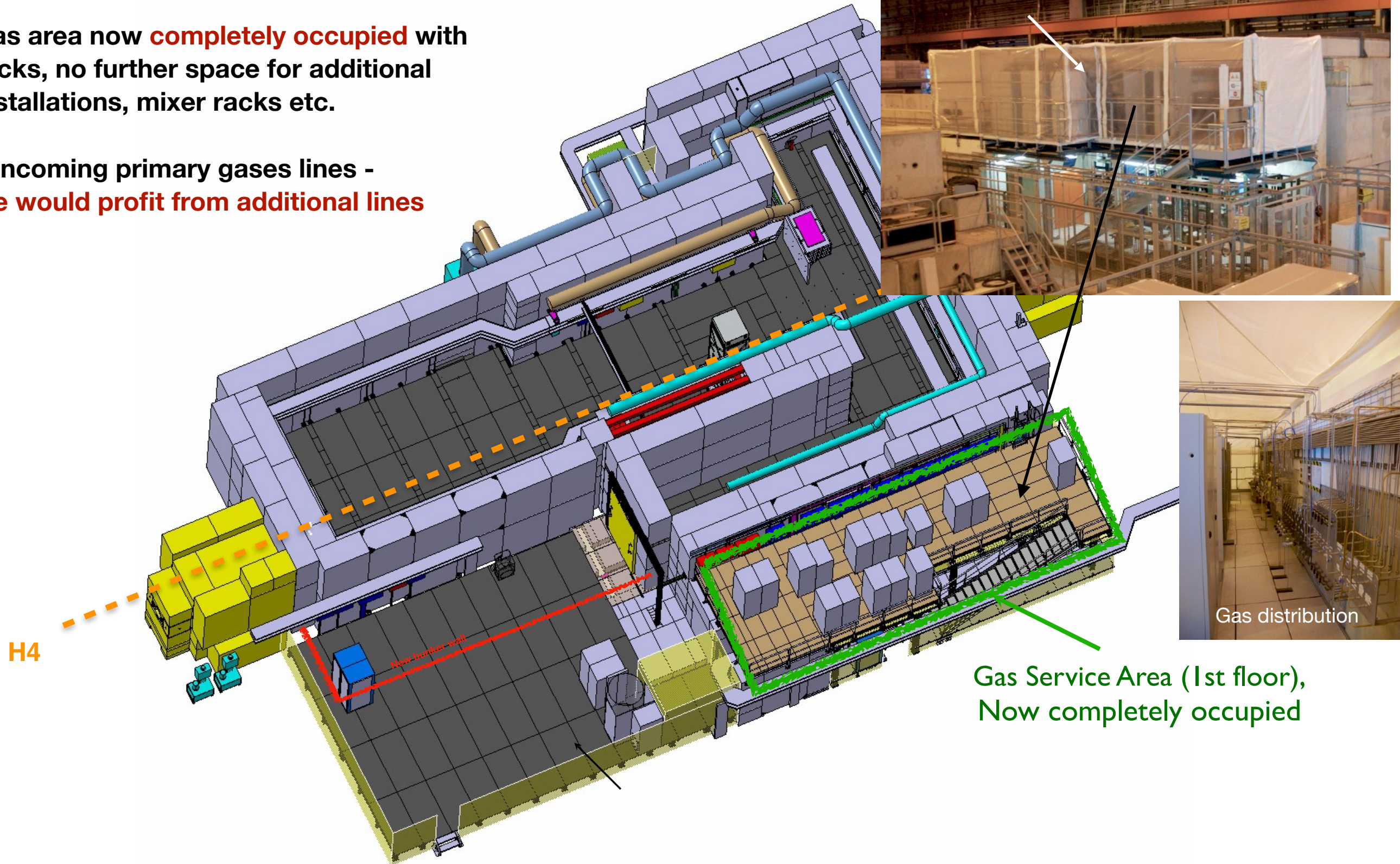


<https://hse.cern/environment-report-2019-2020>

GIF++ Gas Rack Area Extension

Gas area now **completely occupied** with racks, no further space for additional installations, mixer racks etc.

4 incoming primary gases lines - **we would profit from additional lines**

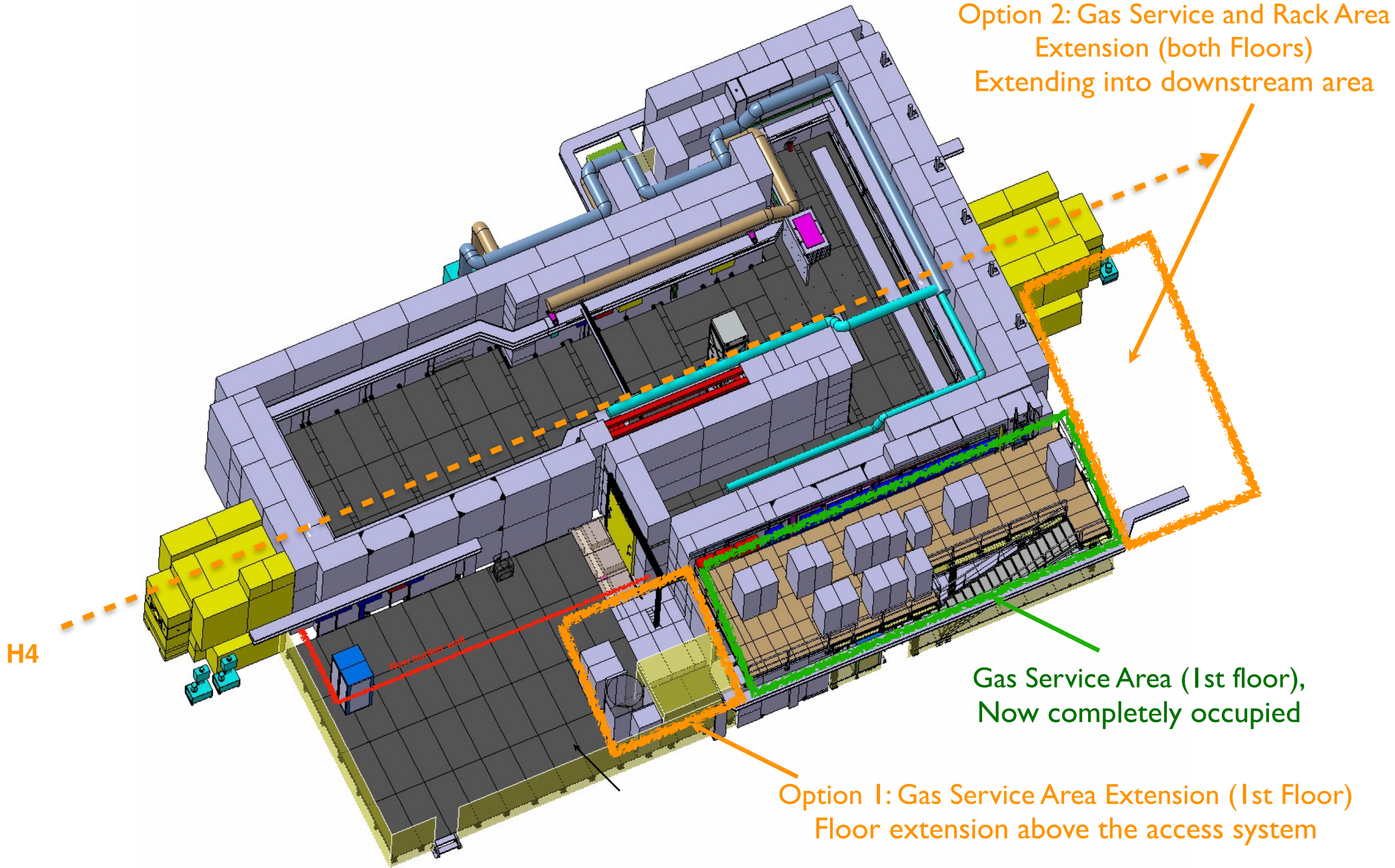


H4

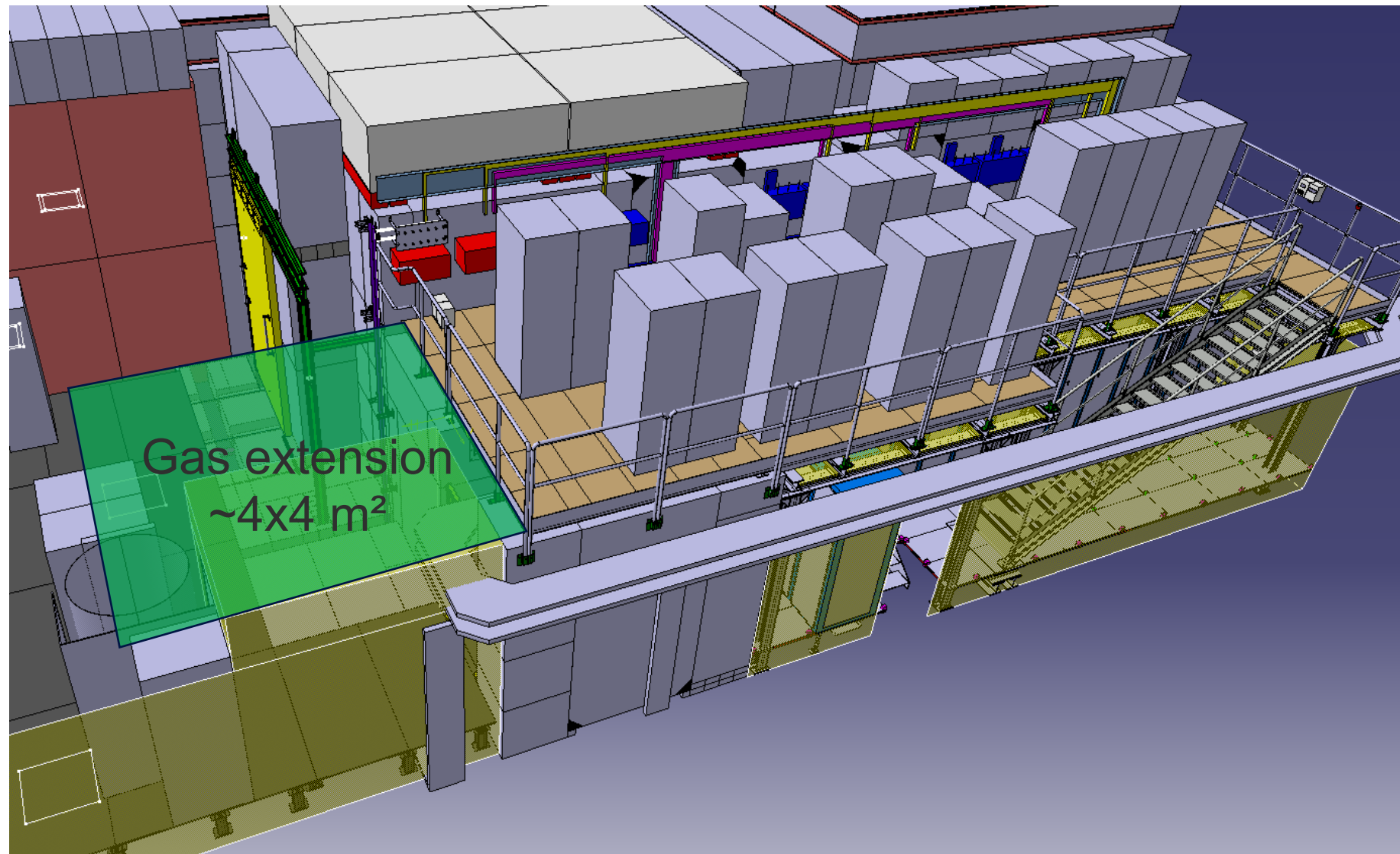
Gas Service Area (1st floor),
Now completely occupied

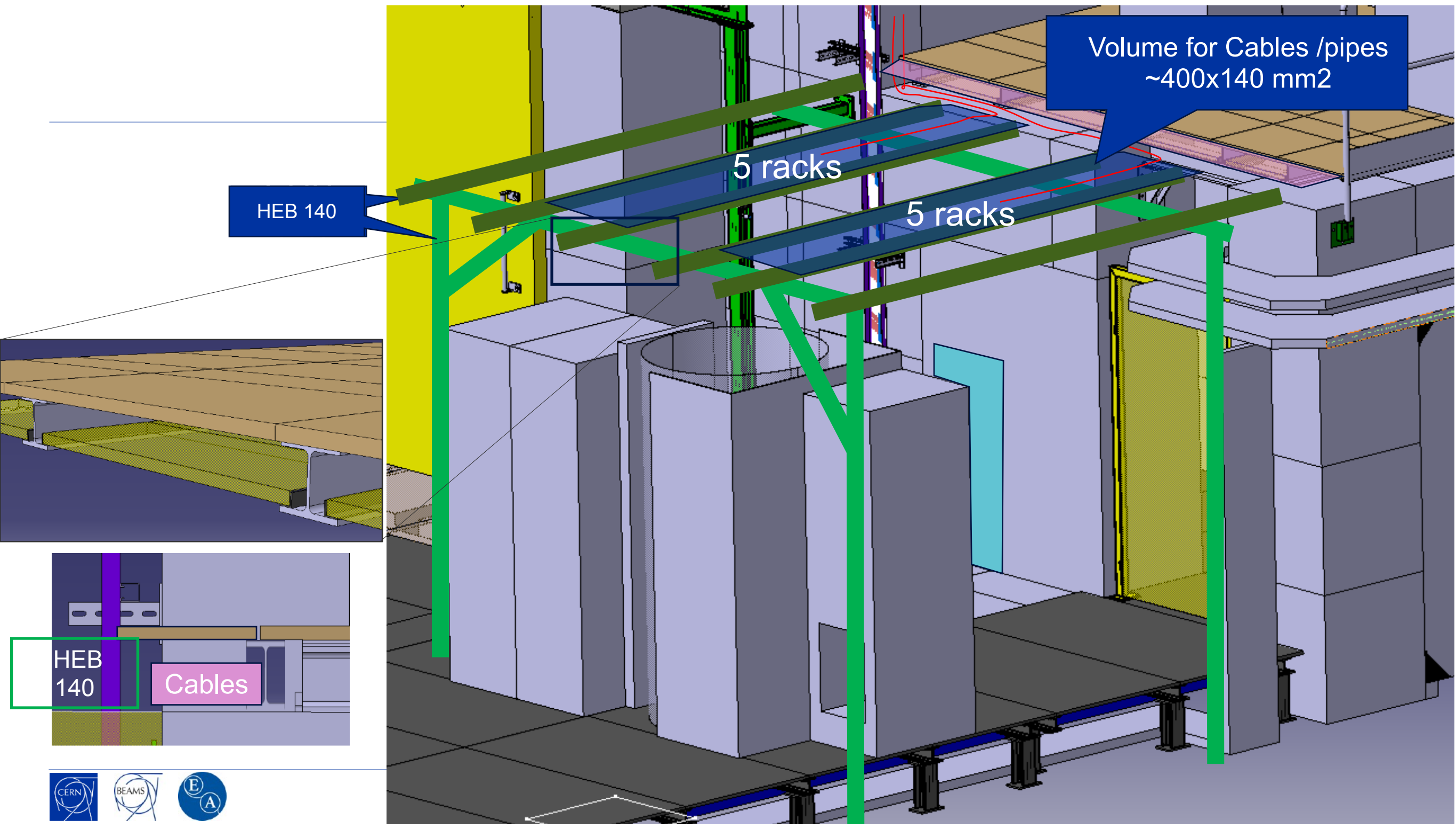
Gas distribution

GIF++ Gas Rack Area Extension



GIF⁺⁺ Gas Rack Area Extension





Very preliminary design ideas / several options with/without false floor.....

Upcoming : Upgrade to Gas Exhaust System

The gas system infrastructure is a key element of the successful R&D programs performed at the GIF++

EP-DT-FS

R.Guida et al

Gas recirculation module



- ▶ **2023 showed a significant increase in RPC chambers tested at GIF++**
 - Increase in the overall gas consumption, especially in the RPC mixture
 - **Gas consumption no longer negligible** ($\approx 10\%$ of ATLAS)
- ▶ We currently have a simple exhaust line to the outside, all gas consumption is contributing to the **CERN environmental footprint**
- ▶ A gas recirculation system was installed, but not commissioned
 - will need ≈ 30 kCHF + manpower from EP-DT-FS to be operational



Mixture distribution

Monitoring of pressure, O₂/H₂O, temperature, atmospheric pressure

Additional software controlled pressure regulation for very low flow regimes

Gas mixing unit

- ▶ **Proposal to install an additional RPC gas-recuperation system at GIF++**
 - ≈ 250 kCHF + manpower from EP-DT-FS for building and operation (!)
- ▶ **Not all setups can be connected to a recirculation or recuperation system.**
 - Only feasible to long term stable setups
 - Not possible for systems where chambers get swapped all the time

And Concerns.....

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ENGINEERING CHANGE REQUEST		
Renovation of Gas Distribution Infrastructure for Building 887 Jura Side		
BRIEF DESCRIPTION OF THE PROPOSED CHANGE(S): The North Area gas distribution system was partially renovated during LS2 as part of the NA-CONS project through WP4.3. However, it remains to carry out the renovation of the gas distribution of the EHN1 (Building 887) on the JURA side, that is described in this ECR and foreseen for YETS23-24.		
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DOCUMENT SENT FOR INFORMATION TO:		

- ▶ Presented in last EATM
 - Since GIF⁺⁺ gas system is a relatively new installation, I was not aware how much we will be affected by this.
 - Turns out that our installations uses the same patch panels now under renewal
 - unlikely (?) to find a alternative supply due to the high gas consumption
- ▶ **Proposed work will stop the GIF⁺⁺ (except one user) for the duration of the work (2-3 weeks ?)**
- ▶ Would have been nice to learn this a bit earlier
 - Distribution list includes only EP Safety, no other coordinator or user

▶ **Scheduling :**

- Can this work be scheduled in parallel with our annual maintenance ?
(first 1-2 weeks after Christmas closure every year)
- Schedule would need to hold, as we will then plan work on the facility / irradiator

▶ **Consolidation :** Can we add a few more gas lines from 909 to GIF⁺⁺ ?