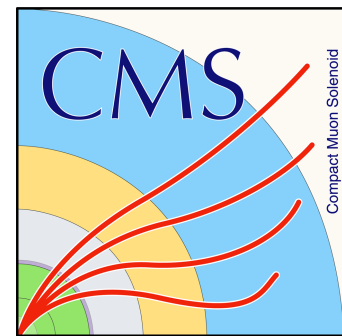


Upgrading and Up-keeping of CO2 System



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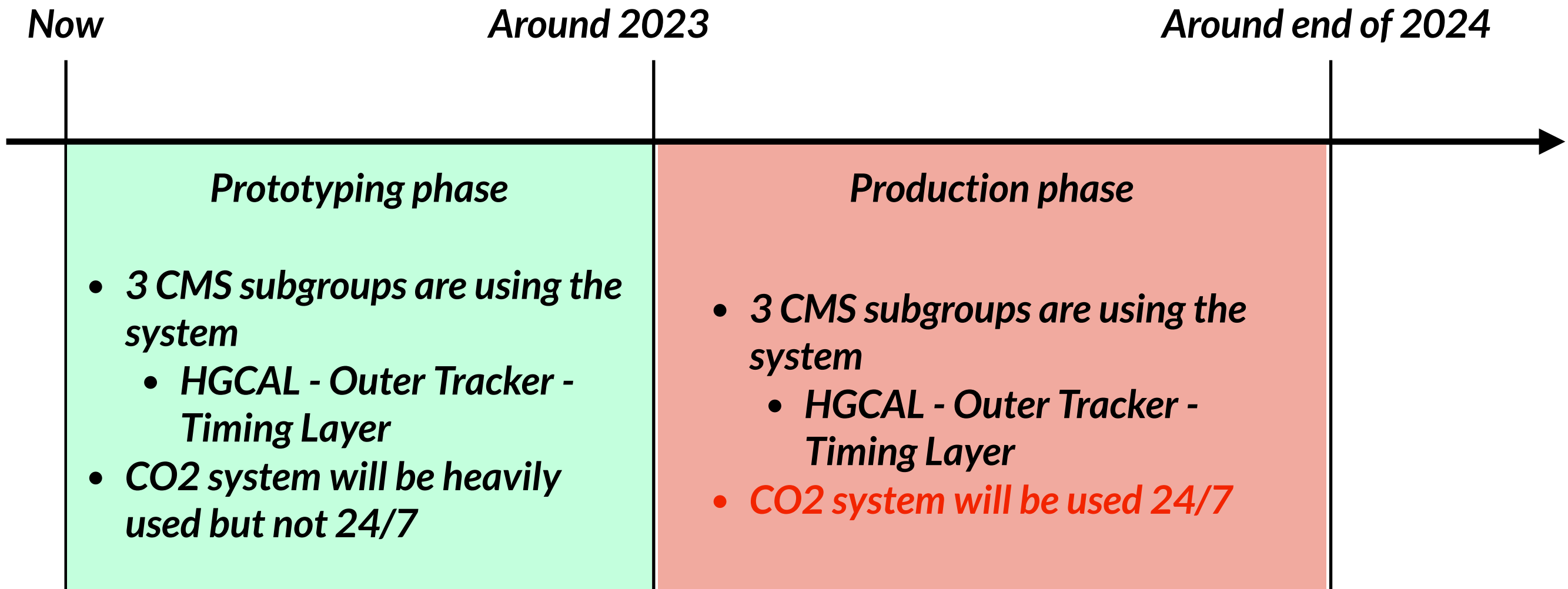
Outline

- CMS Phase 2 upgrade timeline
- CMS CO₂ needs
 - Now until the phase 2 upgrade is completed
- CO2 system upgrades needed
- Plans for maintenance and up keeping of CO2 system



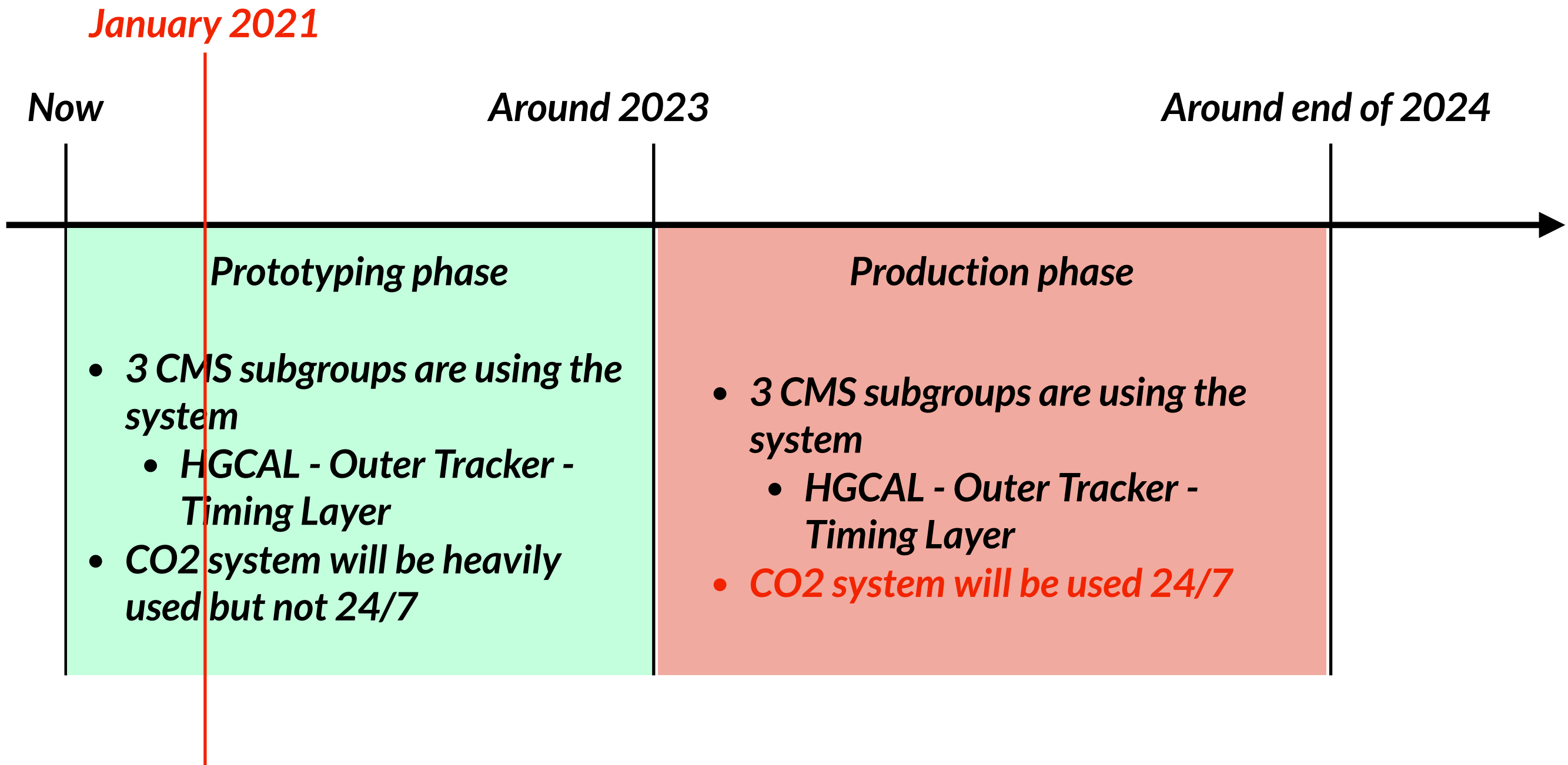
CMS Phase 2 Upgrade

- The timeline is roughly:



CMS Phase 2 Upgrade

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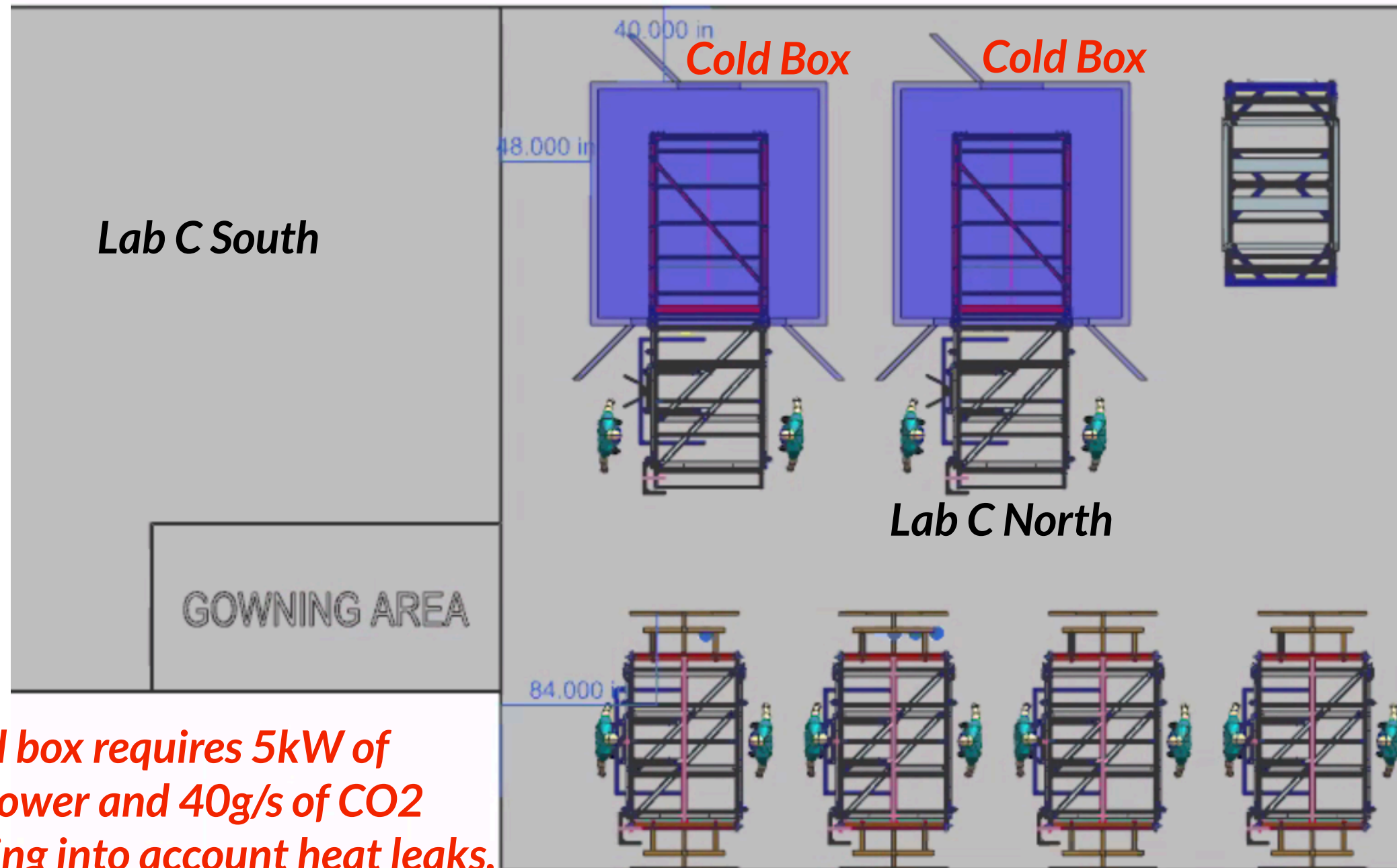
Preparing SiDet and lab C for production has started

First set of modifications to the CO2 system are needed around January 2021



CO2 Needs

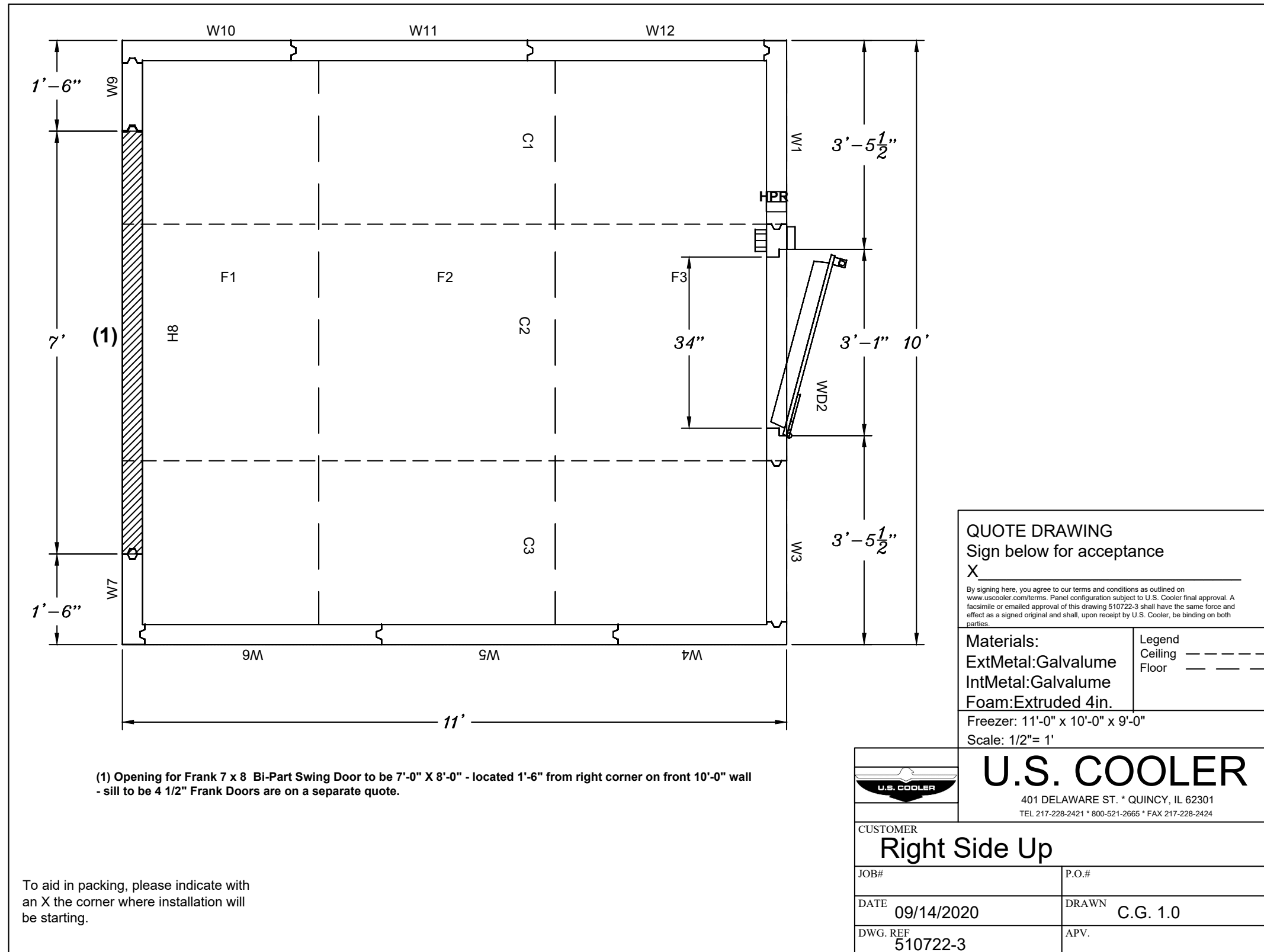
- The largest cooling capacity is needed by HGICAL
 - Both during prototyping period and production period
 - One cold box is needed during the prototyping phase
 - 2 cold boxes are needed eventually for production



Each cold box requires 5kW of cooling power and 40g/s of CO2 flow, taking into account heat leaks.



Each Cold Box



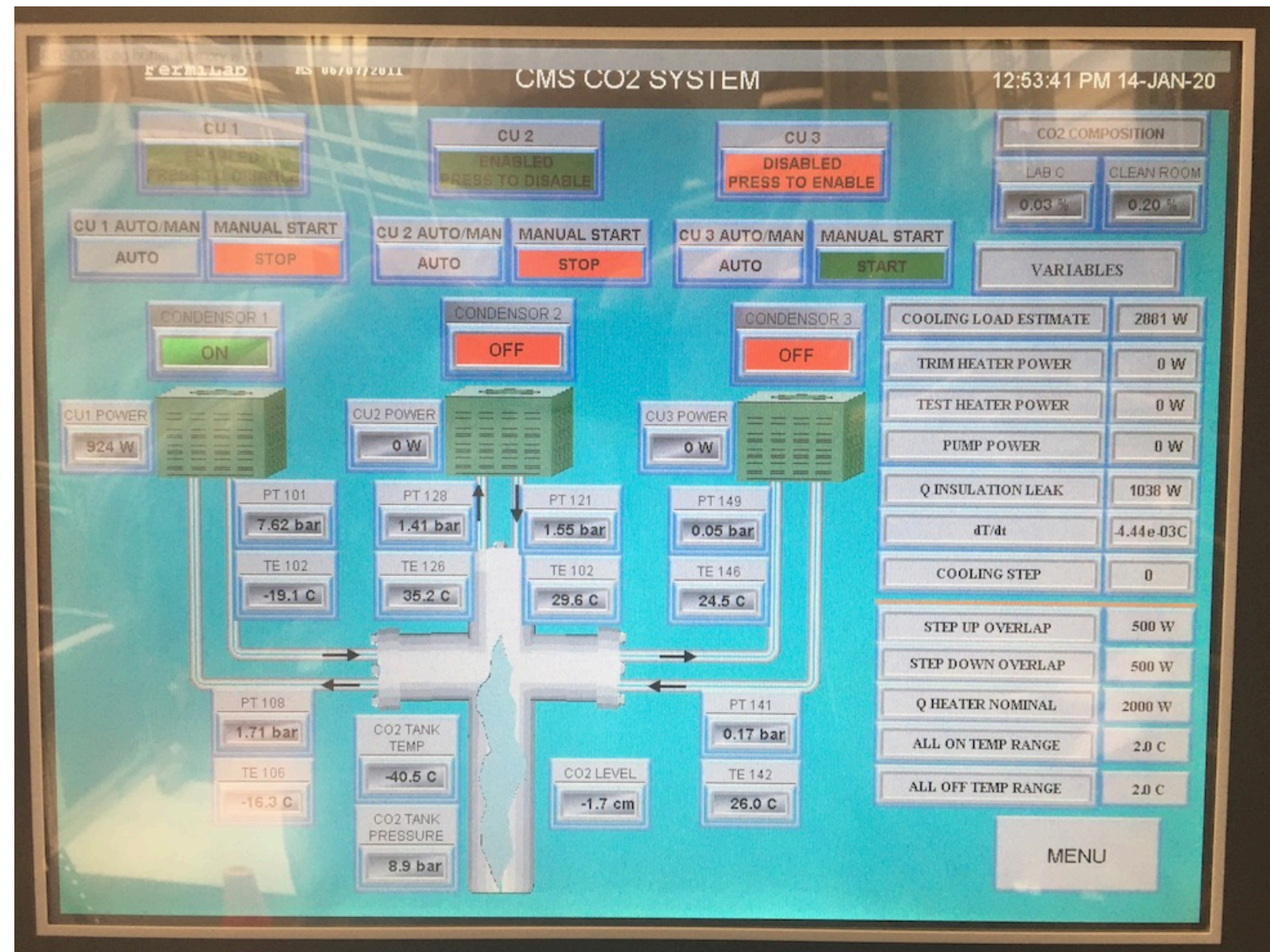
First round of Upgrades

- Bringing in the CO2 cooling into lab C North for the cold boxes
 - It would be useful to consider two scenarios and compare them:
 - 1) we only cool 1 cold room at a time
 - 2) we cool both cold rooms simultaneously
- We are planning to build 1 cold room first around January.
 - Add the hook-up points with valves to the CO2 system
 - Transfer lines and manifold in the cold room



Upgrades needed for the Production Phase

- Upgrade is needed for the production
- Right now:
 - 3 condensensors:
 - 1.1 kW
 - 2 kW
 - 4 kW
- Planning to upgrade to:
 - $3 \times 4 \text{ kW} = 12 \text{ kW}$



Up-keeping the CO2 System

- The CO2 system is a crucial system needed for the success of CMS phase 2 upgrade project
 - 3 CMS sub detector upgrade projects depend on the CO2 system
 - **Once the production starts the system needs to be operational 24/7**
 - Any issues need to be addressed in a timely manner as the production rate depends on the CO2 system
 - fixing the 2 condensing units and bringing the system back to life took ~ 2.5 months this time (ongoing)
- Perhaps we can organize this effort better and the mechanical engineering department can be in charge of up-keeping the CO2 system and developing a plan for upgrading and maintaining the system



Thanks!

