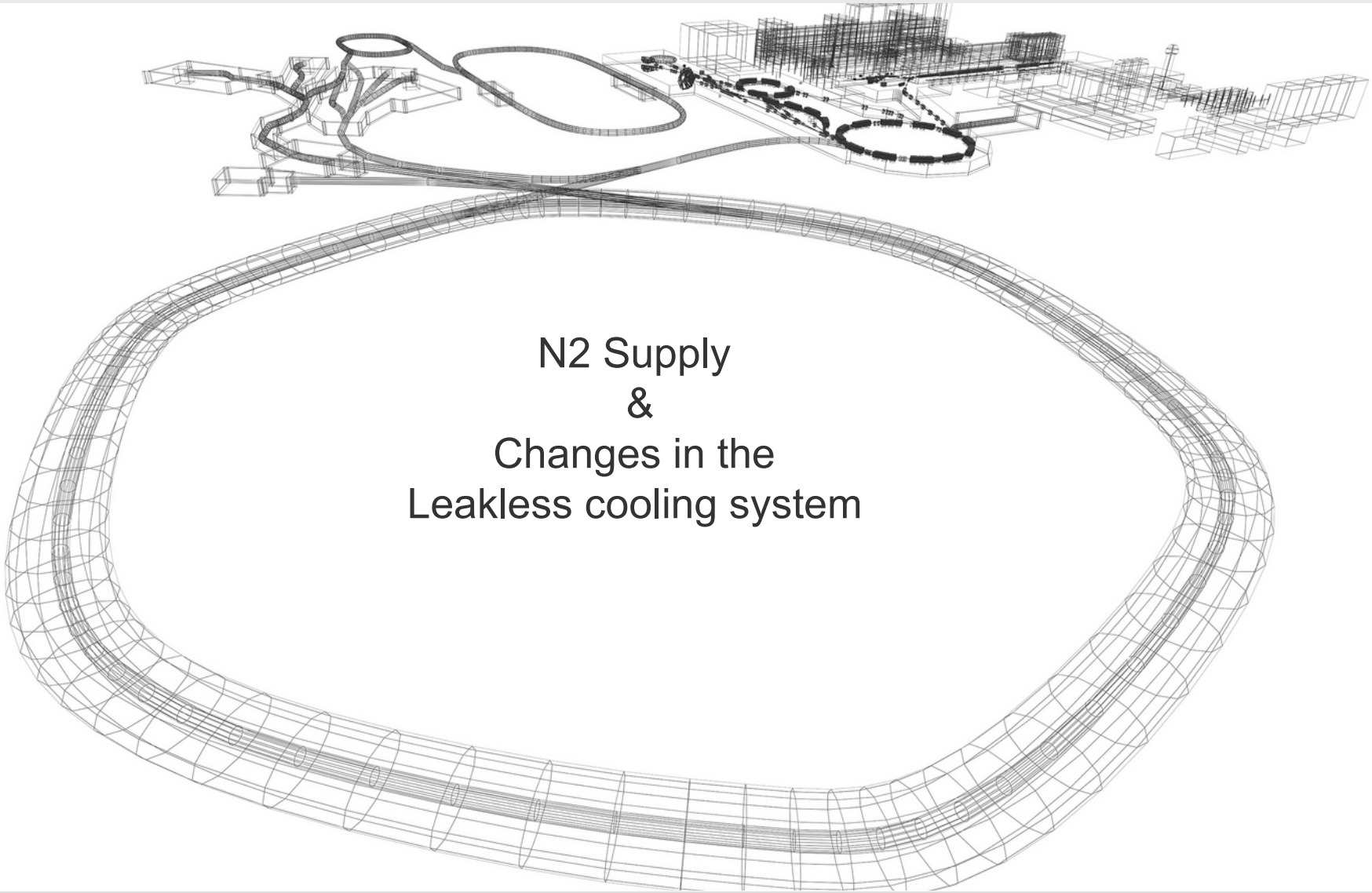


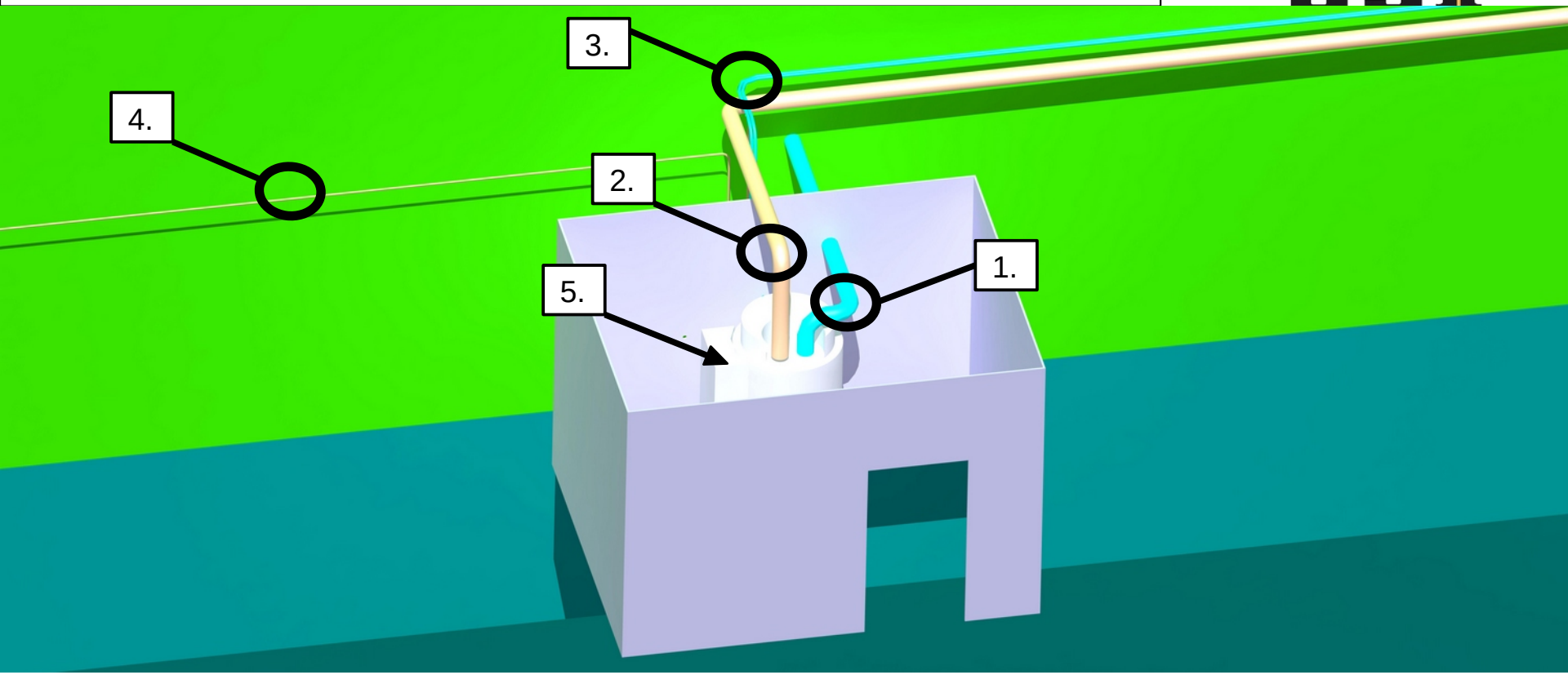
N2 Supply
&
Changes in the
Leakless cooling system

Topics

- Draft of the Krygenic Shack and main gas piping for gaseous Nitrogen

- Update on Leakless cooling system

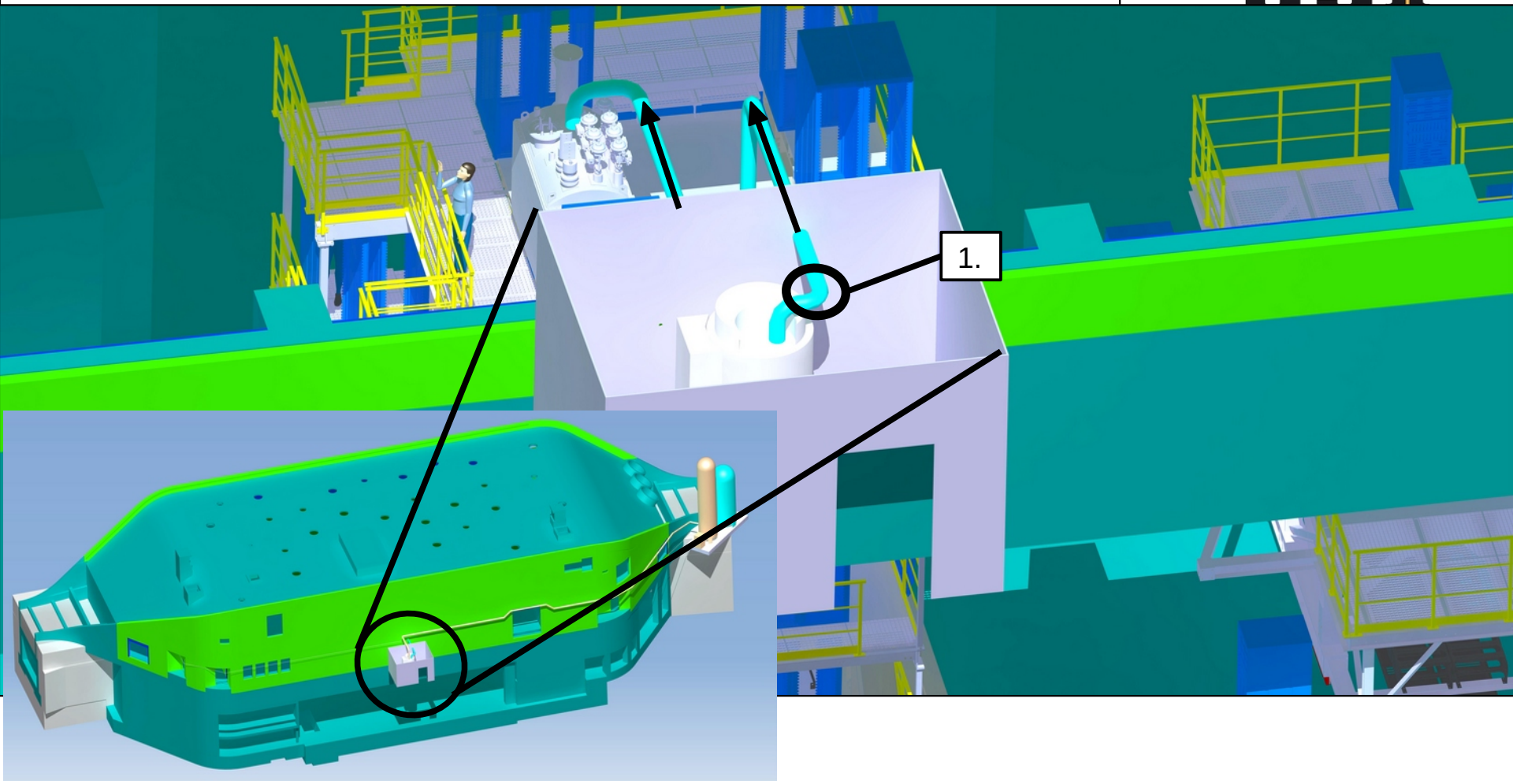
3. Global Layout of the N2 Main Supply system → “Kryo Shack”



Kryogenic Shack & assemblies

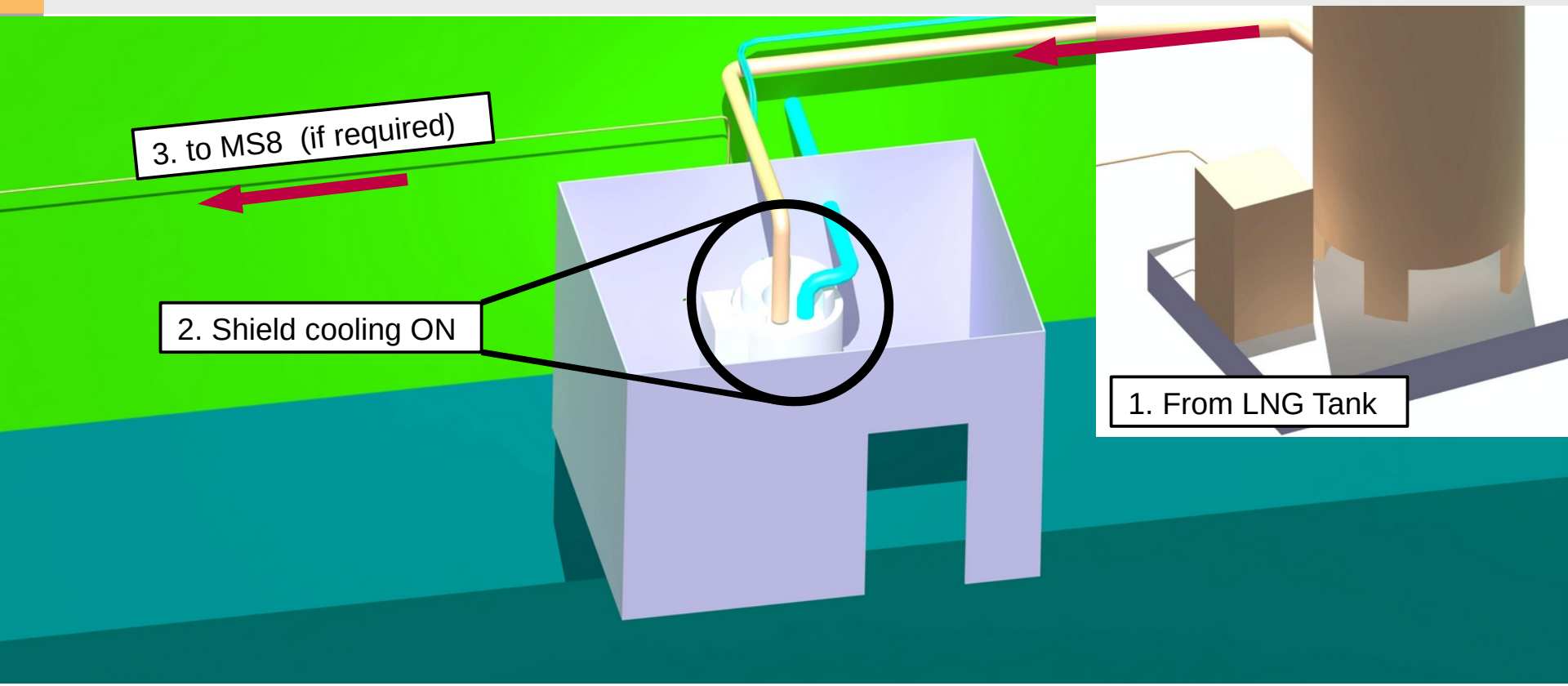
1. HE Transferline (DN 150) provides for Shield Cooling
2. LNG Transferline (DN 150) provides for auxiliary cooling of the Shield
3. Recovery line (access and return) cycles HE to the recovery compressor
4. Line for gaseous (DN 20) N2 → to Supply room
5. Cryogenic Heat exchanger for cooling the Solenoid and producing gaseous Nitrogen

4. Location of the Kryo Shack



- Position of the Kryo Hut at the shortest distance to the Solenoid Magnet
- Allows for shorter routing of expensive HE Transferline
- Fastening of Line facilitated by choosing straight topology

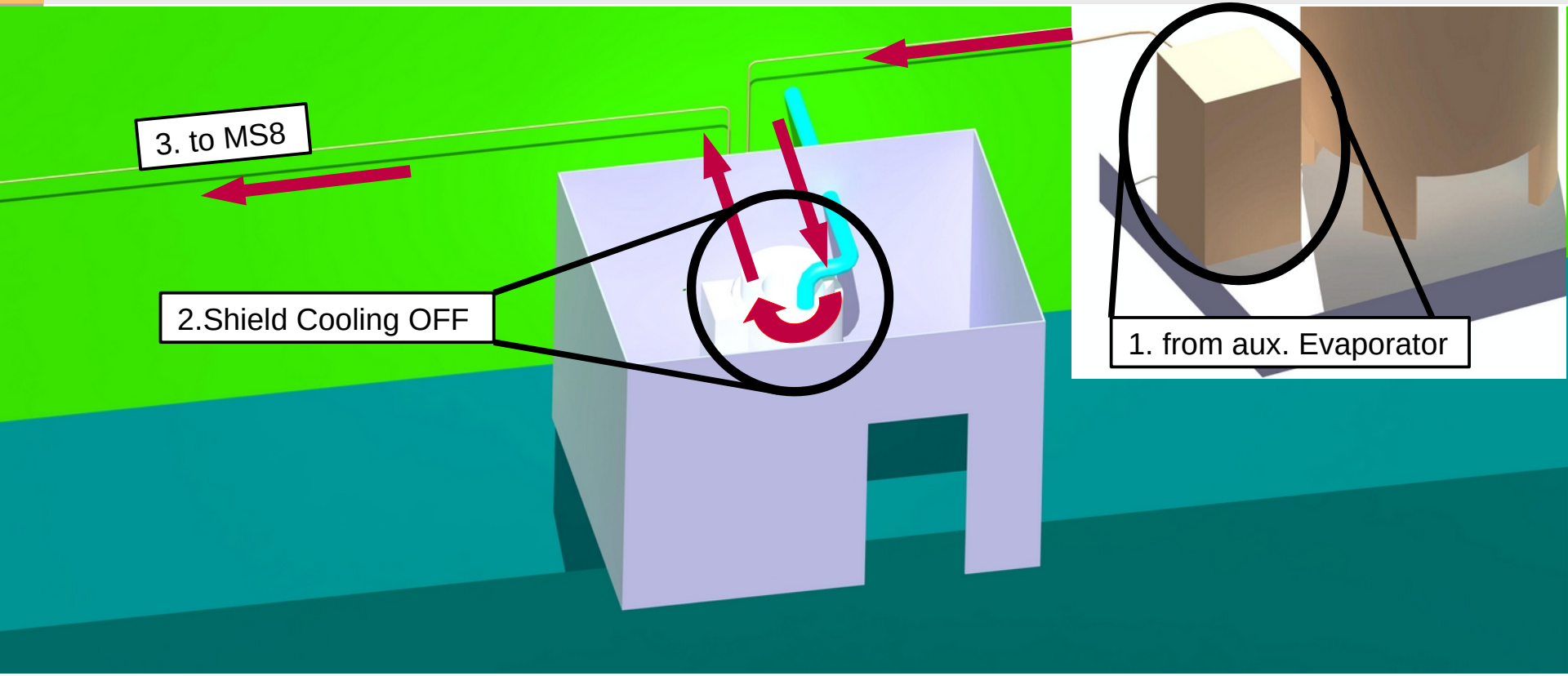
5. - Operating mode - Maint. Position, Shield cooling active



- HE shield cooling active (Experiment in maintenance pos.)

1. Transferline (DN 150) brings along liquid Nitrogen for the Shield Cooling (77 Kelvin)
2. Warmed up N2 (ca. 84 - 96 Kelvin) either exhausted into environment OR alternatively
3. collected and cycled to Mixing Station MS8 for use, if required

6. - Operating mode – Beam Position, Shield cooling not active

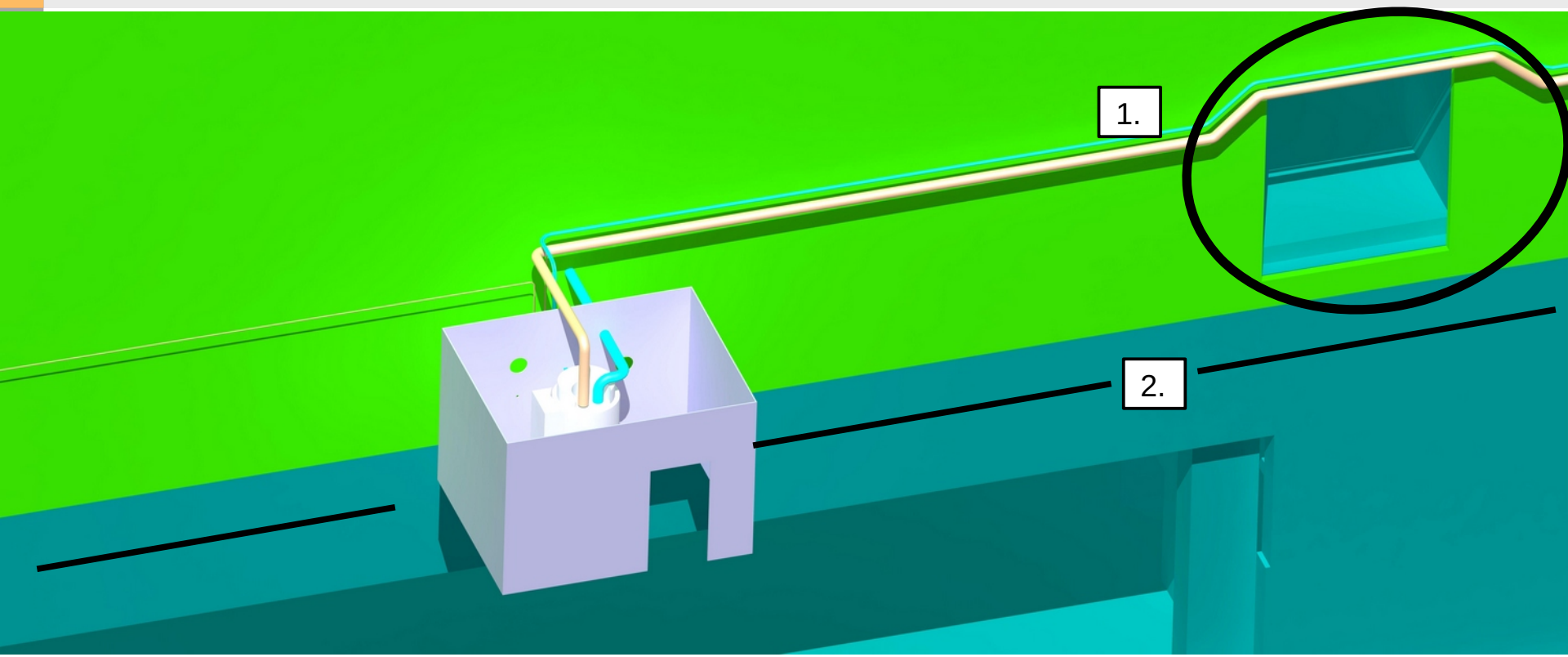


- HE Shield cooling not active - (Experiment is in beam position)

1. Auxiliary Evaporator will maintain production of gaseous N2
2. Shield Cooling is OFF
3. Supply of gaseous N2 is mandatory

Bifurcation & slide valve in access and exit ways needed to maintain flow control

7. Main gas routing plant → Obstacles ahead !

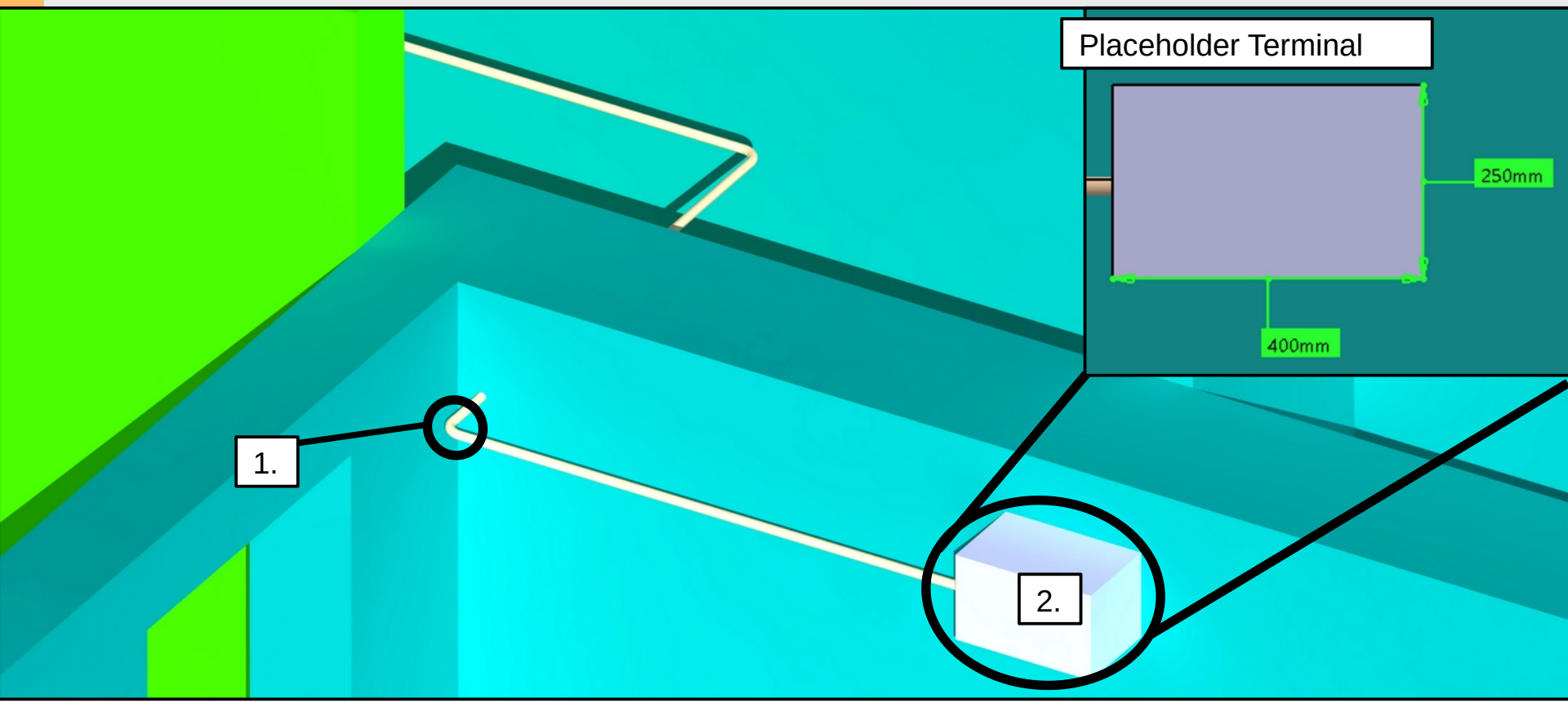


Gas Routing mustn’t impede Truck Supply opening ! → Plenty of talking with FSB which option suits best

Two Options:

1. either routing above the upper rim of truck entry (actual scheme), or alternatively
2. routing through duct / well in the ground

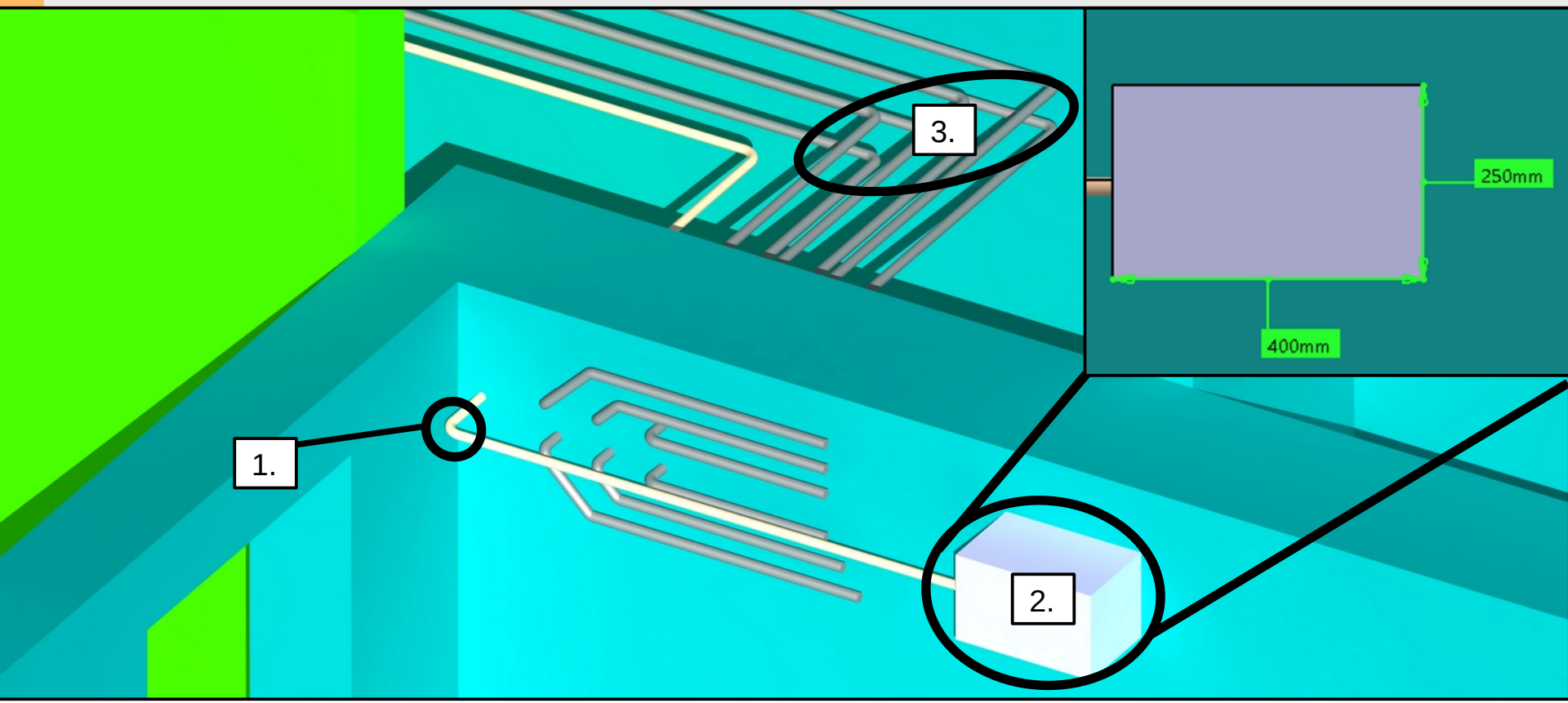
8. Access of gaseous nitrogen for use inside E10.103 / Terminal



First draft of Valve terminal

1. Incoming N2 line DN 20 accessing Valve Terminal ceiling (assumed with 400 mm x 250 mm)
2. Attention at collisions with other Technical gas lines provided from Technical building Infrastructure
3. Other technical gas lines have to be routed as well.

9. Experiment gases routed close to N2 Line

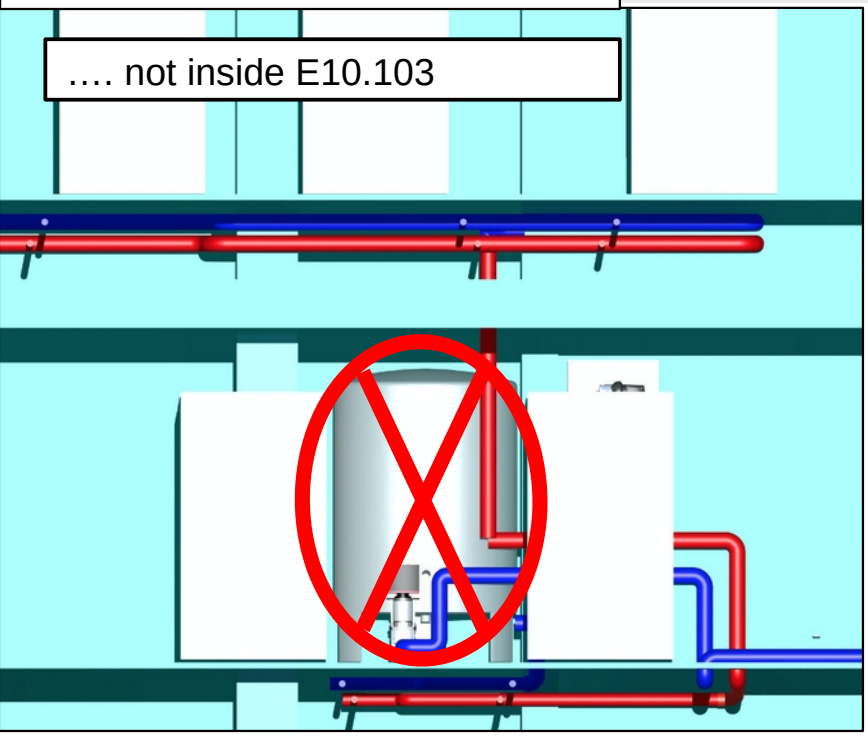


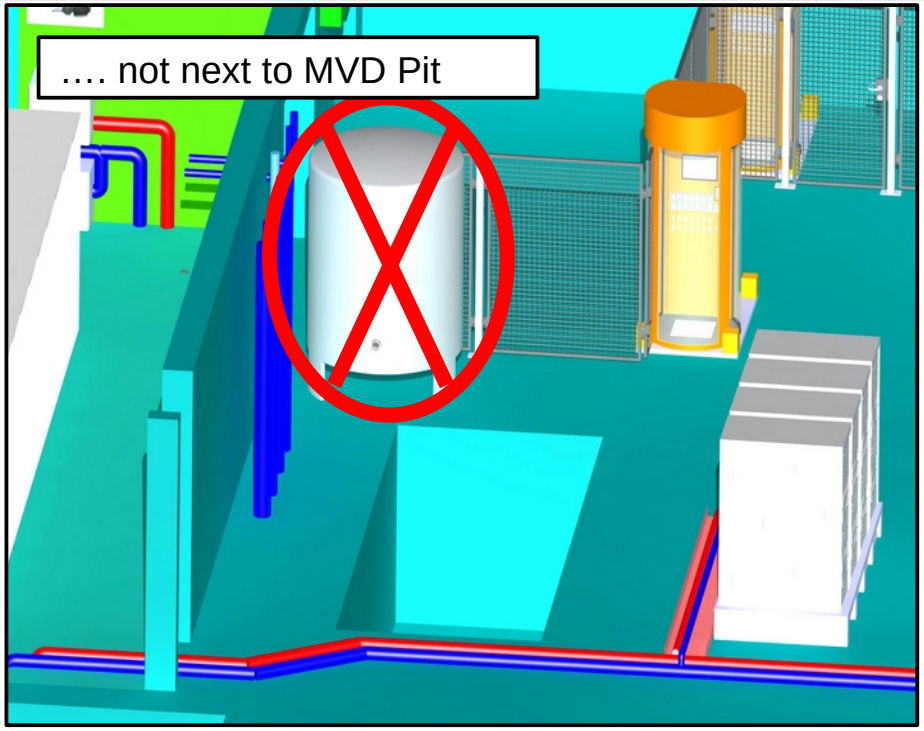
First draft of Valve terminal

(1.) Incoming N2 line DN20 (20,6mm) accessing Valve Terminal
(2.) Valve terminal, (placeholder) → Routing from there further to MixingStation MS 8
(3.) TGA Lines (provided for Technical gases & Pressurized Air) → Check for Collisions needed

Changes in the Leakless cooling system

11. Placement of Tank





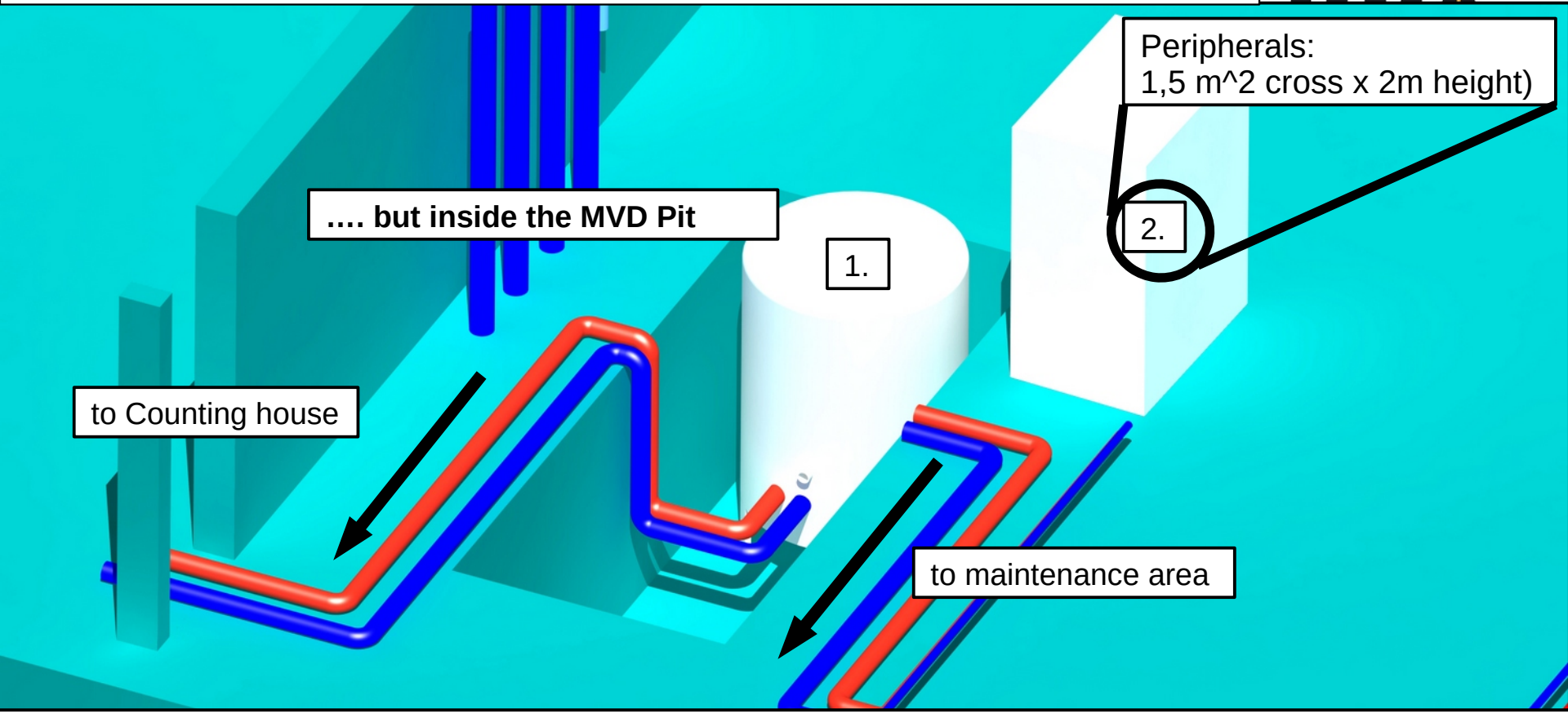
Leakless system needs to work in Racks in level E10.:

At least 2 m positive water column upstream needed between tank water level and heat exchanger inside rack.

→ To achieve 2 height level placement of heat exchangers in E10 level racks topmost !

Only feasible option → tank inside MVD Pit.

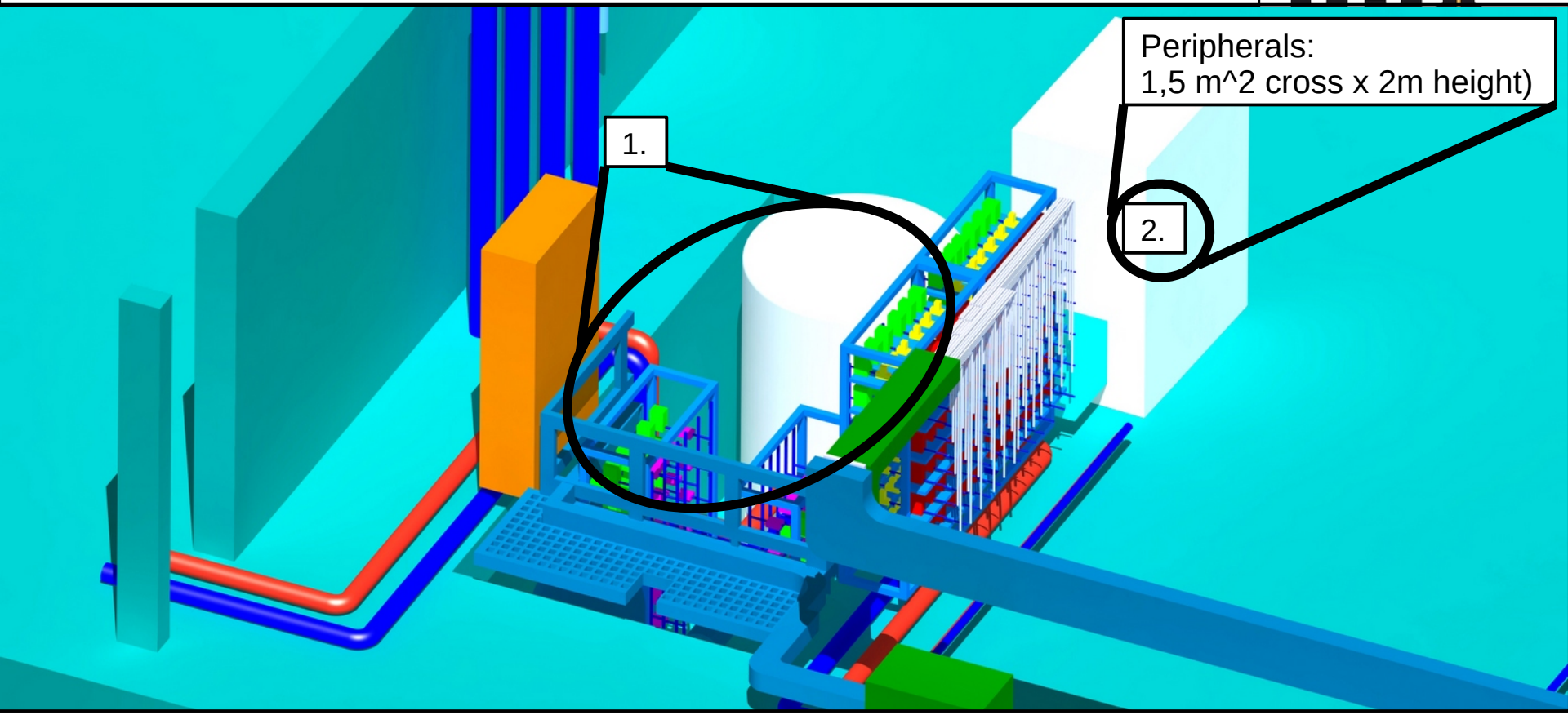
12. New Constraints: Situation inside the MVD-Pit



- (1) Spatial situation with the tank (1.5 m (Ø) x 2.3 m (height))
- (2) Peripherals (placeholder) to be placed inside pit also
  (Control rack, pumps, Filter station & Primary heat Exchanger)

! Recalculating the size of tank needed → But how many heat exchangers will be employed !

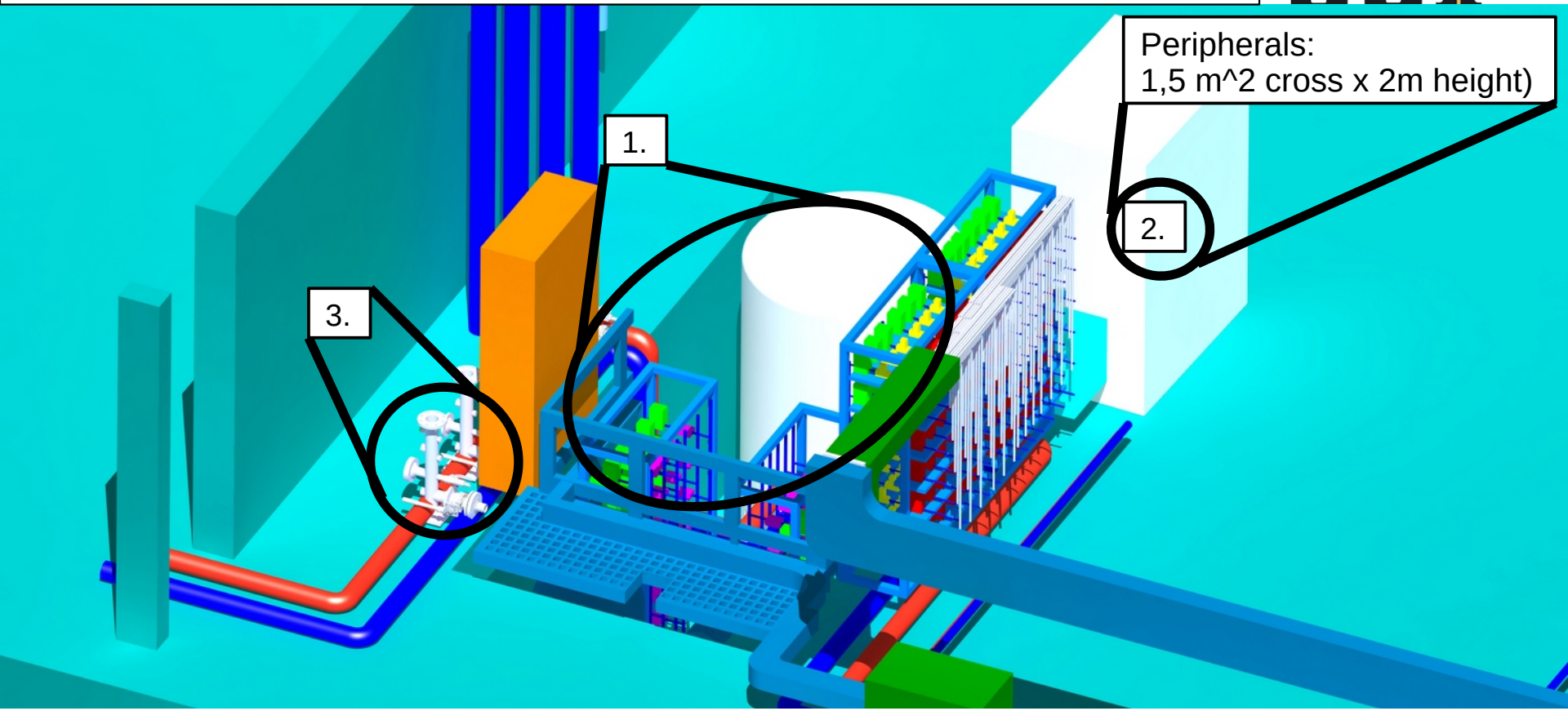
13. New Constraints: MVD-Pit & MVD Assembly (from Silvia Coli)



- (1.) Placement of tank & MVD in Pit (mandatory !)
- (2.) Placement of peripherals in Pit (mandatory !)

Increase of Pit area planned (I.e by 50 %) to accommodate all parts inside
Change Request with FSB necessary to apply changes !

14. New Constraints: MVD-Pit With water manifolds



- (1.) Placement of tank & MVD in Pit (mandatory !)
- (2.) Placement of peripherals in Pit (mandatory !)
- (3.) placement of water manifolds (to be checked)

Option: Waterlines to Counting House can be moved downstream to set Manifolds free

15. Points to clarify:

- Change Request for FSB: (Adjustment of MVD Pit size)

To do: Reassessing space situation of the MVD pit opening with all components
(Tank & Peripherals, MVD, EMC, → (Increase by 50 % enough ?)

- Question: Is Silvia's MVD draft still up to date ?
- Question: Any first EMC Drafts to be had ?

Dependency:
Size of the tank changes with number of Heat exchangers
How many heat exchangers are going to be employed ?

! CERN's recommendation to make leakless system working: !
- Limiting overall pressure drops to 200 - 400mBar between inlet/outlet of users (racks).

I recommend:

Only one unit per rack which can cool up to 10 KW. (If population plans allow that)

→ Less costs, less installation effort, Less space consumed,
& less pressure losses)

Thank you for your attention