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Project title	Linear Collider studies	Job number 000000
Meeting name and number	Kick off 1/22	File reference
Location		Time and date 1 February 2022
Purpose of meeting	Kick off	
Present	John Osborne, CERN Steinar Stapnes, CERN Duncan Nicholson, Arup Jin Sasaki, Arup Hayley Ho, Arup	Roddy Cunningham, CERN Matt Sykes, Arup Alex Chen, Arup Jamie Mercia, Arup
Apologies	Yung Loo	
Circulation	Those present	

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Action

## 1.1 Scope of Works

John Osborne (JO) clarifies the requirements.

### Task 1: design feasibility

Traditional thermal tunnels are to harvest heat emitted from train operations. CERN wants the study to look into rock bases heat as a primary source, science based heat (heat in tunnel) is in secondary.

Geothermal gradient can be calculated simply with the ground data supplied by CERN. Additional ground heat information from two sources may assist this:

- CERN data from current facilities (particularly from “cold” Cryogenic facilities)
- Data from local deep geothermal holes (from GADZ?)

Access to thermal tunnel can be shafts or boreholes. Losses to surface for deeper science facilities will be assessed. Sensitivity to vertical alignment changes will be assessed.

Prepared by AC

Date of circulation

Date of next meeting

# Minutes

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Action

Heat yield and useful energy would be compared against a baseline of commercial/domestic shallow ground source heat pumps.

There is significant experience of the underground aspects of the heat capture and transfer to surface; however the surface aspects can be challenging. CERN operate heat capture on some of its facility and this experience would be useful for the study.

## Task 2: demand feasibility

No need to identify individual buildings at this stage of the study, we are to keep it generic. Initial target users are mainly the science clusters, with possibility to link to surrounding buildings (if there is additional capacity). These will be around the shafts.

Mid tunnel heat capture for other surface buildings is possible through boreholes, so understanding these potential users is useful (again generically)

Although early in the process it would be useful to have a tool to flag areas of interest automatically in GIS (when buildings lie over the tunnel buffer).

The impact of additional cooling on the science will be noted as a potential benefit. Cooling capacity will be quantified in the study for CERN discussion with CLIC team

## Task 3: life cycle carbon / net zero

To look at carbon saving measures and the potential whole-life benefits from tunnel cooling. This would be compared with a simple carbon calculation for the facilities to see what offsetting potential exists over the life of the underground works.

### 1.2 Actions

1. A meeting with Serge Claudet to understand work has been done, relevant publications/presentations are welcome – JO to arrange
2. Information of LHC heat emission and ventilation - JO to provide
3. A meeting with CERN's GIS team, 3D GIS tool - JO to organise
4. Send JO a list the building datasets needed - Jamie Mercia
5. (Internal action: GEON perspective - AC to talk to MF)