

FCCIS Mining the Future® Competition Guidelines

Competition Overview

The Future Circular Collider (FCC) project envisages the construction of a large-scale Research Infrastructure that is based on a new, 100 km long, quasi-circular particle collider. This particle accelerator would be placed in an underground structure that consists of a tunnel, alcoves at regular intervals, large caverns and access shafts. These facilities would be between 150 and 350 metres underground. The construction project would generate about 9 million m³ of excavated materials. A large quantity of these materials is molasse, a heterogeneous, sedimentary rock that covers the plains north and south of the Alps. It is frequently found in the Geneva basin¹.



Figure 1: Excavation of a shaft for the PM17 shaft at CERN in molasse ground (OPEN-PHO-ACCEL-2018-008, Copyright by CERN).

The Future Circular Collider Innovation Study (FCCIS) is a Horizon 2020 EU-funded Research and Innovation project, under Grant Agreement number 951753.

¹ https://ge.ch/geodata/SITG/CATALOGUE/INFORMATIONS_COMPLEMENTAIRES/GEOMOL_RAPPORT_WEB_RESUME.pdf

The FCCIS Mining the Future® Competition (the “Competition”) has been launched by Montanuniversität Leoben, Austria (the “Competition Organiser”) and CERN, both members of the FCCIS consortium, to identify credible approaches for the innovative re-use of the molasse materials that are expected to be encountered during the construction phase, in order to help reduce the amount of excavated materials that will have to be disposed in landfills.

A Judging Panel of internationally renowned experts from subsurface-engineering, excavation materials re-use, and innovation management will judge the Competition over a period of around one and a half years to select the most promising application.

The winner of the Competition will be awarded financial assistance for services required to advance the technology readiness level (TRL) of the proposed technology, in terms of carrying out further needed tests and analysis activities for the proposed re-use approach in laboratories. Such analysis works will be contracted by the Competition Organiser for the winner. They may include small scale and/or large-scale tests at facilities such as the full-scale underground research centre ZaB-Zentrum am Berg. This procedure aims at bringing the new product, service or process to market.

The award, as described above, has a value of up to 40 000 EUR.

PART 1 – Participation in the Competition

A. Participation requirements

Participation in the Competition is open to the following legal entities and natural persons from countries that are eligible to participate in the EU-funded Horizon 2020 framework programme²:

- Individual persons;
- Non-profit, academic and higher education organisations;
- International European Interest Organisations (IEIOs);
- For-profit organisations, including companies and firm consortia which have their corporate headquarters in EU or Horizon 2020 associated countries.

Please note that legal entities and natural persons affiliated to entities that have designated a member to the Judging Panel are not eligible to participate³.

Applications by participants that do not meet the above participation requirements will not be evaluated.

The Competition Organiser reserves the right to limit, or restrict upon notice, participation in the Competition to any person or entity at any time.

Participants may withdraw from the Competition at any time.

B. Application process and deadline

Participants must submit their applications using the form that is made available on the Competition website through the following link:

<http://cern.ch/registration-mining-the-future>

The submission of applications to the Competition starts on 15 April 2021.

The deadline for submission of applications to the Competition is 31 October 2021.

It will not be possible to submit applications to the Competition after the deadline.

Applications that are submitted by participants after the deadline are non-compliant with these Competition Guidelines and will not be evaluated.

Any personal data submitted as part of the applications will be processed in accordance with the applicable legal frameworks.

² https://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2018-2020/annexes/h2020-wp1820-annex-a-countries-rules_en.pdf

³ The concerned organisations are: B+G Betontechnologie + Materialbewirtschaftung AG (Switzerland), Cerema (France), CETU (France), Montanuniversität Leoben (Austria), IBP Fraunhofer (Germany), SIMATEC (Switzerland), TELT (France, Italy), Wirtschaftsuniversität Wien (Austria).

C. Application Content & Criteria

Each application must meet the following criteria in order to be considered by the Judging Panel:

- The application must contain a credible and promising solution for the re-use of molasse excavated materials with a likelihood that the proposed technology can be turned into a product, service or industrial process by 2030.
- The solution must be originally developed or implemented.
- The application must explain all activities necessary to produce one or more end products or end-use processes or services using molasse that has resulted from a subsurface excavation process. The details of the construction methodology are not determined and may vary from conventional tunnelling using roadheaders and/or drill and blast, to mechanised tunnelling using tunnel boring machines, where the type of face and ground support is not determined. The existing raw data from different laboratory tests (provided as supplemental materials to the participants in this Competition) does therefore not include an inventory of pollutants that emerge from the subsurface construction methods.
- The application must contain a description of the current technology readiness of the proposed technology (TRL scale level indication, refer to [Annex 1: Technology Readiness Levels \(TRL\)](#)), including evidence of the feasibility in a controlled, laboratory environment.
- Only proposals that have successfully completed TRL 3 at the time of submission are eligible for participation in the competition.
- Demonstration of TRL 4 is required in Phase 2 of the competition.
- The technological process must be developed for non-military purposes only.

Applications that do not meet the above criteria will not be evaluated.

Participants may submit single or multiple applications, provided that each application represents a distinct technological approach and molasse conversion process.

PART 2 – Evaluation of Applications

A. Judging Panel

The Judging Panel is composed of international experts from around the globe in the fields of geology, subsurface engineering, materials science, innovation management and environmental management. The Judging Panel may, at its discretion, involve additional scientific advisors on a consultancy basis at any stage in the Competition evaluation, provided that the decision to do so is made unanimously by the Judging Panel.

The Judging Panel evaluates, on a best-efforts basis, the applications in an impartial and constructive manner, each Judge in a personal capacity and not representing any company or organisation.

Each Judge will treat information received in the course of the Competition as confidential and commits to using the information solely for the purposes of evaluating the applications.

If a Judge becomes aware that he/she has a conflict of interest with any of the participants, he/she is required to promptly inform the Competition Organiser. Should a conflict of interest or the perception of same be established, he/she shall cease all activities related to the Competition. The Competition Organiser reserves the right to excuse any member of the Judging Panel in the event of any actual or perceived non-compliance with their responsibilities.

B. Evaluation process, evaluation criteria and scoring

All applications received by the deadline will be evaluated in a transparent and non-discriminatory manner.

Phase 1: Technical and business viability assessment

In Phase 1, the Judging Panel will evaluate the applications for their technical and business viability on the basis of the criteria set out below.



Evaluation criteria

I. Technical feasibility	
Points	Description
0	Not feasible
1	Not credible or feasibility not likely
2	Possible in principle with substantial additional developments
3	Feasible with additional developments
4	Technology ready with development that only concerns the set-up of the process

II. Economic viability in terms of revenue	
Points	Description
0	No to insignificant value (0 to 1 Euro per m ³ of treated materials)
1	Small value (1 to 20 Euro per m ³ of treated materials)
2	Some value (21 to 50 Euro per m ³ of treated materials)
3	Relevant value potential (51 to 100 Euro per m ³ of treated materials)
4	High value (more than 100 Euro per m ³ of treated materials)

III. Societal value	
Points	Description
0	Negative value (use case creates additional nuisances such as pollution)
1	Value neutral (no additional value created for the society)
2	Little value, considering also nuisances created
3	Some value, considering also nuisances created
4	High value, considering also nuisances created

IV. Project relevance	
Points	Description
0	No relevance: The application does not concern materials expected in the future circular collider project or use case cannot be implemented in the concerned project perimeter / region.
1	Insignificant relevance: Only a small fraction < 10% of the excavated materials are concerned by the application or the use case is difficult to implement in the region concerned by the project.
2	Moderate relevance: A relevant amount up to 30% of the excavated materials are concerned by the application and the use-case can be implemented in the region concerned by the project.
3	Medium relevance: Up to 50% of the excavated materials are concerned by the application and the use-case can be implemented in the region concerned by the project.
4	High relevance: More than 50% of the excavated materials are concerned by the application and the use-case can be implemented in the region concerned by the project.

Evaluation process

The points of all four criteria are summed up. A maximum score of 16 can be reached.

Applications that receive 12 points or more will proceed to Phase 2.

Entries that are excluded at Phase 1 will no longer be considered in the subsequent phase.

In the event that none of the applications receive 12 points in Phase 1, the Competition will cease and there will be no winner.

All participants will be notified by the Competition Organisers as to whether they will continue to Phase 2 or not.

The Judging Panel is not required to provide unsuccessful participants that do not proceed to Phase 2 with feedback regarding their evaluation.

By taking part in the Competition, participants accept the outcome of the Judging Panel evaluation as final and binding.

Evaluation results cannot be contested.

Phase 2

Phase 2 of the Competition comprises a detailed scientific and technical review of the applications selected in Phase 1.

Based on the criteria used to pre-select applications in phase 1, the selected applications will be carefully examined in phase 2.s

Phase 2 uses the same evaluation criteria as phase 1, namely:

1. Technical feasibility
2. Economic viability
3. Societal value
4. Project relevance

The detailed review in phase 2 aims to further assess and clarify the ranking of the selected submissions in order to identify the most credible, promising and viable technology among them.

Each of the participants will meet the Judging Panel, through the use of a video conferencing tool. During this session, the Judging Panel will carry out an interview style review to elucidate further information in relation to the application. In particular, the Judging Panel will verify the technical readiness of the proposed technology in the application by requesting demonstrations by the participants of their technologies in a controlled environment.

In the Phase 2 evaluation, the Judging Panel may consult further domain-specific experts in order to assess the technical readiness of the proposed technology in the application.

The Judging Panel will select the winner of the Competition. The winner will be awarded a prize, as detailed in Part 2 C below.

If the Judging Panel deems that none of the applications in Phase 2 can demonstrate the necessary level of technical readiness of their proposed technology, the Judging Panel may decide that the Competition does not have a winner, and no prize will be awarded.

The Judging Panel will produce a written justification for the selection of the winner and the reasons for non-selection of the applications which passed to Phase 2.

As above, participants must accept the outcome of the Judging Panel evaluation as final and binding.

Evaluation results cannot be contested.

C. Award

Following the adjudication of Phase 2 of the Competition, the Judging Panel will announce a single or no winner in August 2022.

In the event that a winner is selected, an award ceremony is scheduled to take place in October 2022 at ZaB-Zentrum am Berg (www.zab.at), an underground research centre of the Competition Organiser. In case of ongoing restrictions related to the Covid-19 pandemic, should it be necessary, the award ceremony may be held remotely by videoconference.

The award is a service contract made available by the Competition Organiser and will contain a contribution to the TRL advancement of the winning application by contracting technical services in laboratories and testing facilities from small scale to large-scale tests.

The most suitable option will be determined by the Competition Organiser, taking into account the winner's specific circumstances.

The service will be contracted directly by the Competition Organiser.

The total financial value of the award does not exceed 40 000 EUR.



1. Annex 1: Technology Readiness Levels (TRL)

Where a topic description refers to a TRL, the following definitions apply, unless otherwise specified:

TRL 1 – basic principles observed

TRL 2 – technology concept formulated

TRL 3 – experimental proof of concept

TRL 4 – technology validated in lab

TRL 5 – technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies)

TRL 6 – technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies)

TRL 7 – system prototype demonstration in operational environment

TRL 8 – system complete and qualified

TRL 9 – actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space)

The threshold for submission of a technology to this competition is a successfully completed and demonstrated TRL 3 by the time of submission. Demonstration of TRL 4 is required in Phase 2 of the competition.