



CAHIER D'ACTEUR

Concertation publique suisse
du Futur Collisionneur Circulaire

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WIFO ■

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Le point de vue de WIFO

En bref, que défendez-vous ?

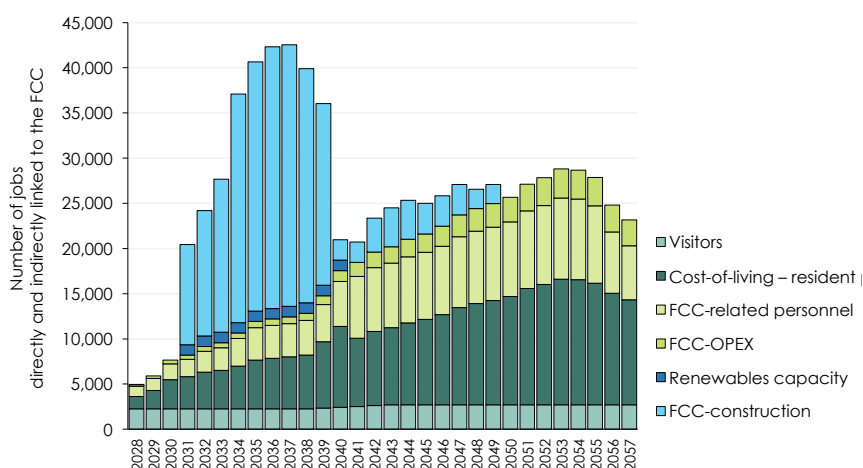
CERN, the European Organization for Nuclear Research, is hosting an international collaboration that develops scenarios for a new circular particle-collider based research infrastructure, the Future Circular Collider (FCC). Such a research infrastructure can also contribute to scientific and technological progress in many other areas that will be needed to construct and operate such a facility. Apart from science-changing insights and technological developments, there are direct economic benefits likely to arise from this project: the opportunities for firms to contribute to the installation and operation of this machine and the jobs that go along with these opportunities.

The FCC is estimated to cost 12.1 billion CHF to construct and another 8.5 billion CHF to operate over its initial 15-year period. Using the economic model ADAGIO, we estimate that this will be associated with a cumulated 50 bn CHF of (world-wide) value added, in an average year securing around 26,000 jobs. Apart from the economic effects linked directly to the FCC itself, the host region will benefit from the cost-of-living expenditures of up to 11,000 FCC-related personnel as well as around 300,000 annual tourists expected to visit the largest machine ever built.).

Building CERN's Future Circular Collider ¹

We, a team of economists from WIFO, the Austrian Institute of Economic Research, have estimated the economic and employment effects that are connected to the construction and operation of a new particle collider-based research infrastructure that extends the current scientific research activities at CERN. These effects arise mainly from the construction of the particle collider in a more than 90 km long circular underground structure, its operating expenses, and the consumption related to its employees. Additional economic effects exist but can only be estimated today as far as they are known and depending on their development status. An example is the supply of the research infrastructure with renewable electricity capacities and the effects of a sizable number of touristic visitors. Additional opportunities that are not yet fully developed today, such as heat supply near surface sites, the reinforcement of the regional electrical infrastructure, the strengthening of regional water supply and treatment facilities, sustained education, training, and innovation activities are not captured in this report. According to our estimations using an economic global input-output model, over the 30 years of FCC-related construction and operation, the economic linkages translate into an **average annual global value added of almost 1.7 bn CHF and more than 26,000 jobs¹** (including the installation of renewables capacity, consumption by resident personnel and visitors) which are directly and indirectly related to the FCC, as **Erreur ! Source du renvoi introuvable.** shows. This means that **in addition to about 6,000 directly project-related science, engineering, administration, and management jobs, more than 20,000 jobs are secured to provide the goods and services for the construction and operation of the FCC**, as well as for the goods and services that are consumed by FCC staff and visitors.

Summary of annual employment effects related to FCC construction and operation; World total



Source: Own calculations based on CERN data.

By estimating the regional structure of the effects linked to the construction and operation of the FCC, the analysis has shown that the connection between contribution to CERN, direct contracts and indirect benefits is not always clear-cut. The host countries, Switzerland and France, and especially the canton of Geneva and the "départements" of Ain and Haute-Savoie will benefit most from the FCC, predominantly during operation: direct and indirect effects from the personnel and their consumption as well as the up to 300 thousand touristic visitors per year are concentrated in the region; Swiss and French firms will contribute goods and services during construction and operation, although they are not limited to the region¹. **Around 13,000 jobs will be filled or created on average in France and Switzerland.** On the other side of the world, China, which is not a member of CERN, is estimated to have sizable economic benefits due to its prominent role in global value chains, making the case for closer (and more formal) co-operation with countries not yet included in the CERN member club.

In these simulations and estimations, we tried to cover some aspects that go beyond the narrowly defined purpose of the FCC; these include for instance the installation of renewable capacity and the touristic aspects, but also the induced effects from the cost-of-living expenditures of FCC personnel. However, this is certainly not exhaustive, and a multitude of additional effects and developments with links to the FCC might be identified, whose economic potential however could not be explored here:

- A global co-operation on a technologically intensive project like the FCC creates a special environment in which personal and institutional networks can thrive, laying the foundation for future collaborations on scientific or commercial endeavors.
- FCC contracts with their exacting specifications on size and quality push the limits for many suppliers, even for those that would not be counted as "high tech"¹.
- Given the dimensions of the tunnel housing the FCC, the excavated material should not be simply transferred to deposits; instead, processes should be developed for innovative use of this "waste" material.
- Similarly, the FCC can trigger the development of more efficient electrical distribution systems, heat exchangers and cooling systems, which will benefit many future users of such equipment.
- As in the past (e.g. with the World Wide Web), FCC-related work is likely to advance the state-of-the-art in software applications, from business information systems to general software libraries.
- Part of the up to 11,000 people would contribute to the regional economy through their consumption spending. However, the project would also be an important economic player in the region beyond these induced effects. With respect to the current impacts that CERN generates, the FCC's perimeter of economic effects would be enlarged.

Conclusion

At a general level, the results derived and presented in this report show that the "costs" that a project like the FCC entails are also connected with "economic impacts and bene-fits", in terms of sales opportunities for firms and employment opportunities for scientists and non-scientists alike. By concentrating on a core set of transmission mechanisms only, these results constitute a lower bound for



the expected economic effects. Therefore, even though the narrow economic linkages of the construction and operation of the FCC are not larger than would be expected for a project of this size, the potential for spillovers into probably quite unrelated areas of technology and business are certainly much more pronounced – for example, only few projects would have the FCC's touristic attractiveness, not to mention its technological and scientific potential.

¹ for the full report, see Streicher, G., Building CERN's Future Circular Collider, https://www.wifo.ac.at/wp-content/uploads/upload-3004/s_2023_cern_69927_.pdf

² However, these figures must be interpreted with some caution. Beside other steady-state assumptions, it is based on constant labour productivity. Therefore, the effects are estimated as if the FCC was constructed and operated today. This need not be considered a shortcoming, as it helps to grasp the size of the estimated effects when referring to a familiar frame of reference – the economy as we know it today.