

November 29, 2009

Technical Document 2
attached to the
Convention concerning the construction and operation of a
Facility for Antiproton and Ion Research in Europe (FAIR)

**Detailed breakdown of the construction costs and table showing
the estimated annual incidence of expenditure for construction
and operation**

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Technical Document 2 attached to the FAIR Convention provides information on the construction costs and the estimated annual incidence of expenditure for both construction and operation of the FAIR facility as provided for in Article 5 paragraphs (5) and (9). In addition, it provides information on the costs for the commissioning of the FAIR facility.

- 1. Total costs for construction**
- 2. Estimated annual incidences of expenditure for construction of the Modularized Start Version**
- 3. Annual operating costs**
- 4. Costs for commissioning**

1. Total costs for construction

The information below is based on the approach to the project cost calculation as approved by the ISC/AFI and ISC/STI working groups. In a multi-step process, cost estimates were scrutinised and evaluated by the different advisory committees established by the ISC/STI and also by an independent review of the Dornier and Fichtner Consulting Companies. The total expected construction costs amount to 1493 million €. These costs include 46 million € for the operation of a FAIR GmbH to be founded and operated during the FAIR construction phase. The calculation refers to the price level as of 2005 and does not include any taxes.

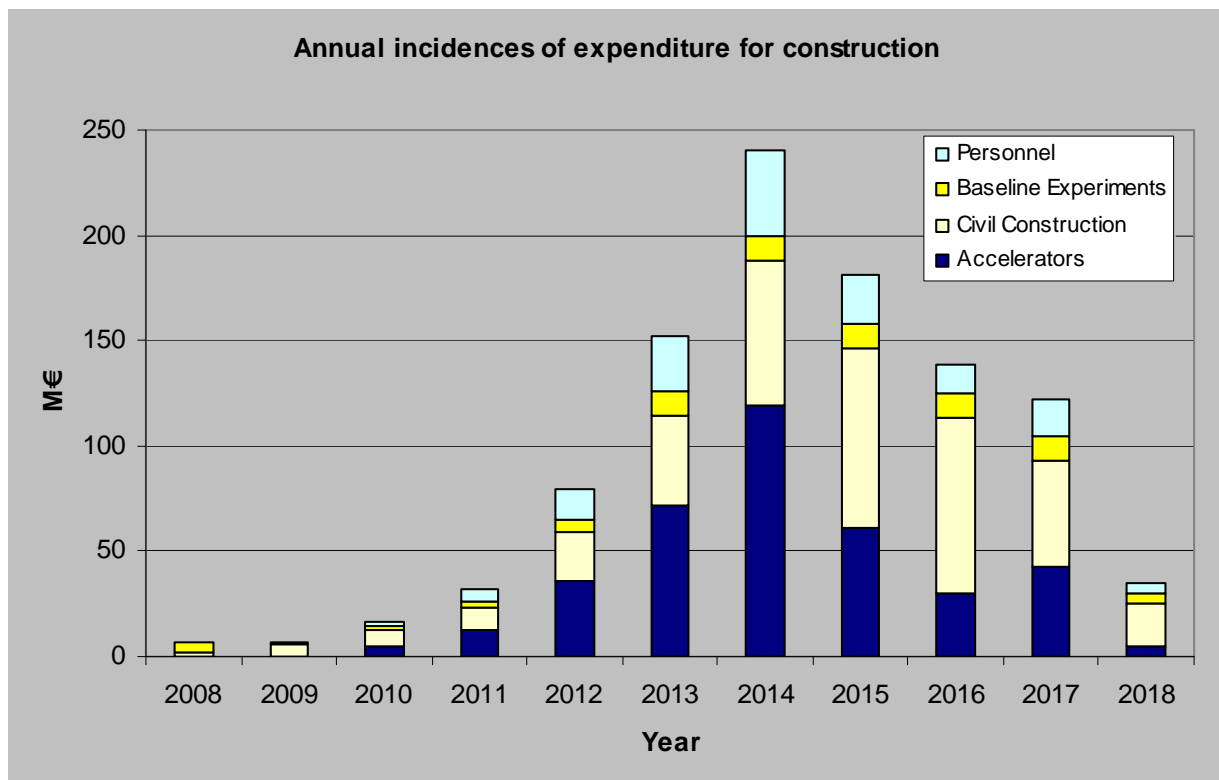
2. Estimated annual incidences of expenditure for construction of the Modularized Start Version

The actual time schedule of civil construction for the Modularized Start Version described in Technical Document 1B attached to the FAIR Convention in combination with the sequence of installations of accelerators and baseline experimental facilities will determine the annual expenditure. Taking the total construction costs as basis, a realistic scenario assuming the beginning of civil construction in 2010/2011 is given in Table 1 and Figure 1. The time scale of expenditures for the construction phase may be extended beyond the actual duration of the construction phase (2010–2018) by three years to cover delays in final payments for items not being fully accepted or to take into account payments that are due only at the end of a warranty period.

Table 1: Estimated annual incidences of expenditure for construction. Monetary values refer to prices as of 2005 and do not include taxes.

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total (M€)
Total annual expenditures	6,9	6,5	17,8	33,5	81,2	153,6	242,3	182,6	140,6	124,1	37,4	1026,5

Figure 1: Graphical view of data from Table 1



3. Annual operating costs

The final operation costs documented here are the result of a multiple assessment and refinement performed by GSI and the international experts of ISC/AFI and ISC/STI. The results of the cost determination process were published in a Supplement to the FAIR Baseline Technical Report (BTR) on March 30, 2006. The corresponding figures are summarised in Table 2. In the calculation of the operating budget, no resources for a scientific programme were included. Annual operation costs for full operation of FAIR are estimated to add up to 118 M€.

Table 2: Annual operation costs for full operation of FAIR (without taxes)

figures in M€, based on 2005 prices	FAIR
category	total costs
primary energy	24
operation of accelerators and rings	46
technical infrastructure	33
user support	5
management	10
total	118

4. Costs for commissioning

Commissioning is regarded technically as an interim phase between construction and operation. In the commissioning phase, individual accelerators and rings of FAIR will be tested and optimised with respect to the design parameters with a real particle beam. Approach and technical details were approved by the ISC/STI in September 2006.

Based on a differentiated evaluation of the operations costs and personnel resources involved in the commissioning of the different installations, the calculated total costs for commissioning amount to 26,5 million € based on 2005 prices excluding taxes.