FUSION FOR ENERGY

The European Joint Undertaking for ITER and the Development of Fusion Energy

THE GOVERNING BOARD

DECISION OF THE GOVERNING BOARD ADOPTING THE PROJECT PLAN (EDITION 2010) OF THE EUROPEAN JOINT UNDERTAKING FOR ITER AND THE DEVELOPMENT OF FUSION ENERGY

THE GOVERNING BOARD:

HAVING REGARD to the Statutes annexed to the Council Decision (Euratom) No 198/2007 of 27 March 2007 establishing the European Joint Undertaking for ITER and the Development of Fusion Energy (hereinafter "Fusion for Energy") and conferring advantages upon it[1] (hereinafter "the Statutes") and in particular Article 6(3)(d) and Article 11 thereof,

HAVING REGARD to the Financial Regulation of Fusion for Energy[2] adopted by the Governing Board on 22nd October 2007, last amended on 18th December 2007[3] (hereinafter "the Financial Regulation"), and in particular Article 30 thereof;

HAVING REGARD to the Resource Estimates Plan adopted by the Governing Board at its meeting of 26th November 2009;

HAVING REGARD to the comments and recommendations of the Executive Committee on the proposal for the Project Plan at its meeting of 11-12th November 2010[4];

HAVING REGARD to the comments and recommendations of the Technical Advisory Panel on the proposal for the Project Plan provided during its meeting of 11-12th November 2010,

Whereas:

(1) The Director should, in accordance with Article 8(4)(c) of the Statutes, draw up the project plan for a period of five years;

(2) The project plan should include (a) a statement on the aims and activities of the Joint Undertaking for the following five years and (b) a description of the status of the activities and projects of Fusion for Energy containing the necessary information on changes occurred since the previous version;

(3) The Executive Committee should in accordance with Article 7(3)(b) of the Statutes comment on and make recommendations to the Governing Board on the proposal for the Project Plan;

(4) The Governing Board should adopt the project plan.

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1 O.J. L 90, 30.03.2007, p. 58.

2 F4E(07)-GB03-11 Adopted 22/10/2007

3 F4E(07)-GB04-06 Adopted 18/12/2007

4 F4E(10)-EC24-Summary Adopted 12/11/2010

HAS ADOPTED THIS DECISION:

Article 1

The Project Plan (Edition 2010) of Fusion for Energy annexed to this Decision is hereby adopted.

Article 2

This Decision shall have immediate effect.

Done at Barcelona, 2nd December 2010

For the Governing Board

Carlos Varandas

Carlos Varandas

Chair of the Governing Board

ANNEX

FUSION FOR ENERGY PROJECT PLAN
(EDITION 2010)

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INTRODUCTION

The European Joint Undertaking for ITER and the Development of Fusion Energy or 'Fusion for Energy' (F4E) was created under the Euratom Treaty by a decision of the Council of the European Union.

F4E was established for a period of 35 years from 19th April 2007 and its offices are situated in Barcelona, Spain. The objectives of F4E are three fold:

- Providing Europe's contribution to the ITER International Fusion Energy Organisation (IO) as the designated EU Domestic Agency for (DA) Euratom;
- Implementing the Broader Approach Agreement between Euratom and Japan as the designated Implementing Agency for Euratom;
- Preparing in the longer term for the construction of demonstration fusion reactors (DEMO).

In accordance with the Financial Regulation of F4E and its Implementing Rules, this Project Plan lays down an indicative programme of activities that are foreseen to be implemented in the following ten year period 2009-2018. This information is complemented by the Resource Estimates Plan.

The legal basis and organization of Broader Approach Agreement and the role of F4E in its implementation differ from ITER case. As a consequence the part of F4E for the Broader Approach Agreement activities is presented in a separate section with a format appropriate to the nature of the activities.

All F4E activities presently planned for DEMO are covered under the Broader Approach Agreement and presented in the BA section of the Project Plan.

The information presented in this Project Plan which is intended to be adopted by the Governing Board is complemented by four annexes provided for information: annex 1 provides a detailed Work Breakdown Structure of the European in kind contributions to ITER which annex 2 and its three sub-annexes (2.1 - 2.3) provide detailed information on the Broader Approach projects.

ITER

OVERALL SCENARIO

At the 7th ITER Council in July 2010 the new ITER baseline was approved.

The adopted baseline foresees a first plasma (FP) in November 2019. Such a scenario has already been used since the beginning of 2010 by both the ITER Organization (IO) and the DAs as a working basis for the further development of the project.

Such a schedule was confirmed by F4E to be in line with the request of the Governing Board to mitigate the costs and risks for the delivery of the EU components on the critical path The F4E decision was based on investigations carried out in collaboration also with industries and other experts and after having studied, a number of fabrication procedures, which could be adopted to accelerate the delivery of the critical items (i.e construction of the buildings, the fabrication of the TF coils and of the VV sectors).

The baseline schedule is characterized by the following main dates for the components in the critical path (Fig.1):

Buildings:	
Assembly Hall and Cleaning Facility (Ready For Equipment – RFE- 1A)	December 2014
Partial Access to Tokamak Pit (RFE 1B)	March 2015
Tokamak Building Ready for Equipment (RFE 1C)	May 2015
Delivery Date for the first couple of EU TF Coils	April 2015
Delivery Date for first EU Vacuum Vessel Sector	May 2015
Delivery Date for last EU TF Coil to be assembled	September 2016
Delivery Date for last EU Vacuum Vessel Sector	October 2016

With the award this year of the large manufacturing contracts in the critical areas (i.e. TF winding pack manufacture, vacuum vessel fabrication) we will receive from the suppliers an optimization of the fabrication routes and the progress based on the actual development of the work.
Here are the main features of the baseline schedule:

- The risks for buildings and TF remain modest;
- The major risk in the fabrication of the VV consists in starting the machining of the second sector 30 months before the completion of the first sector;
- Both PF coils and divertor inner vertical target (IVT) are close to the critical path. Therefore, for the IVT the use of two production lines is foreseen.

The Project Plan assumes that:

- the Procurement Arrangements (PAs) between F4E and the ITER International Organisation (IO) are concluded on time and according to the agreed level of design;
- the planning of the activities and the corresponding delivery of components, by the other ITER Domestic Agencies will be respected.

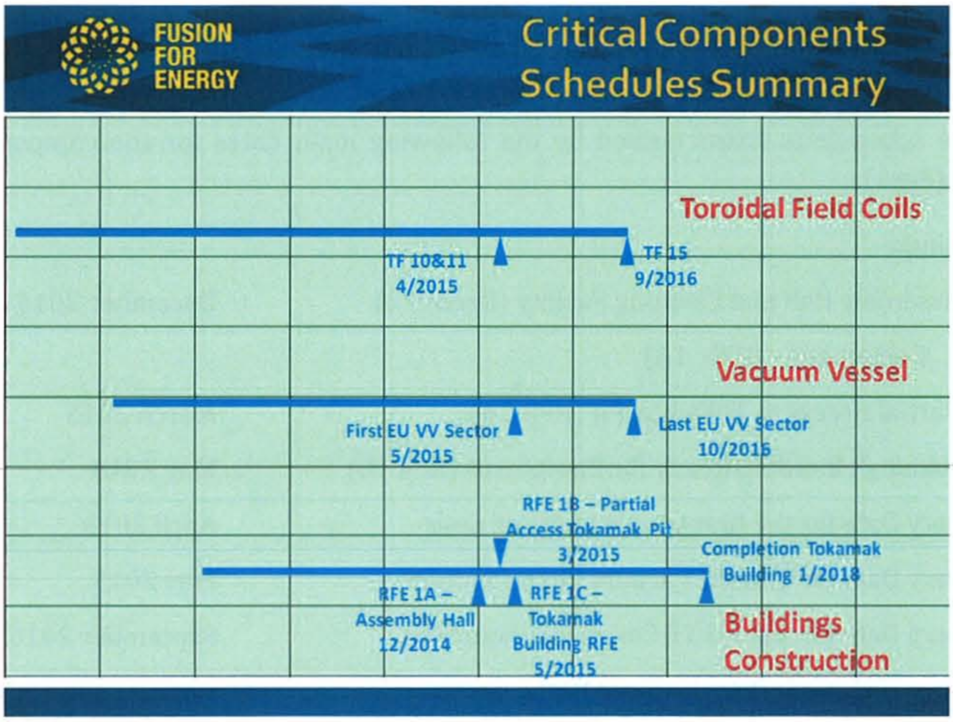


FIG. 1 – SCHEDULES SUMMARY OF THE EU CRITICAL COMPONENTS

It should also be mentioned that a cost containment/reduction exercise is being carried out both by IO and inside F4E to see where margins exist to decrease the cost of the ITER machine and therefore create the necessary contingency (of credit in IO and of budget in F4E) to face any possible future increase during the construction phase and/or cost increase with respect to the estimate in not yet signed contracts. Such actions are not included into this version of the Project Plan, as the agreement of both the ITER Council and the F4E Governing Board will be required before they can be considered approved and therefore implemented into the baseline documents.

THE WORK BREAKDOWN STRUCTURE (WBS)

The Project Plan uses the ITER Work Breakdown Structure (WBS) as it is defined in the ITER document 2NC9T7.

The table below shows a summary description of the WBS and the associated ITER credit, taking into account the Project Change Requests (PCRs) and the Additional Direct Investments (ADIs) approved by the ITER Council.

WBS	**Description**	**kIUA**	**MEuro 2008**
00.01.01.02	Magnets (20% of the conductor for the TF conductor, Winding Packs for 10 TF Coils, 10 Case-winding pack insertion, 5 PF coils – P2-PF6),	186.36	279.2
00.01.01.03	Vacuum vessel (7 sectors of the main vessel and blanket coolant manifolds)	92.06	137.92
00.01.01.06.02	Blanket (48.4% of the first wall modules)	42.1	63.07
00.01.01.06.03	Divertor (inner vertical target and	31.4	47.04

	cassette bodies)		
00.01.05.09	Remote Handling (RH) (divertor RH, the cask transfer system, in vessel viewing and metrology system, and NBI RH)	44.6	66.82
00.01.03.06.03	Vacuum & pumping (8 torus and 2 cryostat cryopumps, panel cryopumps for the neutral beam system, valve boxes and associated cryolines, and leak detection/localisation system)	15.22	22.8
00.01.03.06.02	Tritium plant (consisting mainly of the Water Detritiation System (WDS) and the Hydrogen Isotope Separation System (ISS))	18.216	27.29
00.01.03.04.02	Cryoplant system (50%)	30.677	45.96
00.01.03.02	Steady-state and pulsed power supply systems (shared with other parties)	31	46.44
00.01.02.03.02	ICRH (equatorial port plug incorporating one ICRH antenna and spares)	4.458	6.679
00.01.02.03.03	ECRH (four upper port plugs incorporating EC launchers each fed by 8 waveguides + 32% gyrotron sources + 66% power supplies)	37.245	55.8
00.01.02.03.04	Neutral beam Heating System (100% assembly and testing/and active correction and compensation coils/Beam Line components + ~41% beam source and high voltage bushing, ca 76% pressure vessel, magnetic shielding, ca 31% power supplies) and Neutral Beam Test Facility (64.7%)	83.35	124.872
00.01.02.02	Diagnostics (roughly 25% of all diagnostic systems)	35.487	53.165
00.01.04	Buildings (all concrete and steel frame buildings)	454.17	680.42
00.01.03.05.03	Waste treatment and storage	10.1	15.131
00.01.03.06.05	Radiological protection	4.2	6.292
	Total	**1120.643**	**1678.9**

NB: The amounts in Euro come from a multiplication by the kIUA-Euros 2008 official exchange rate (1.498). **It does not correspond to an estimate revision.**

The table below shows a summary of the EU Procurement Arrangements with the dates of signatures (yellow shading for those already signed).

PA Title	PA Signature Date

Magnets - Toroidal Field Coils	June 2008
Magnets - Poloidal Field Coils	June 2009
Magnets - Pre-Compression rings	May 2010
Magnets - PF Conductor	May 2009
Magnets - TF Conductor	December 2007
Vacuum Vessel Sectors	November 2009
Blanket First Wall	July 2012
Divertor Cassette Integration	June 2011
Divertor – Inner Vertical Target	March 2010
Divertor Remote Handling	July 2011
Remote Handling – Transfer Cask System	May 2012
Remote Handling - In-Vessel Viewing System	December 2011
Neutral Beam Remote Handling	May 2012
Torus and Cryostat Cryopumps	June 2013
Cold Valve Boxes (including Cryojumpers)	July 2013
Neutral Beam and Diagnostic Neutral Beam Cryopumps	TBD
Leak Detection and Localisation Components	December 2013
Water Detritiation System - 1st part: Tritiated water holding tanks (storage and emergency)	April 2011
Water Detritiation System – 2nd part: residual WDS system (process components without tritiated water holding tanks)	December 2013
Isotope Separation System	February 2015
Cryoplant: LN_2 Plant, 80K Loop, Auxiliaries	December 2010
Detailed design of the Steady-State Electrical Network (SSEN) and Pulsed Power Electrical Network (PPEN)	October 2009
Assembly of the Steady-State Electrical Network (SSEN) and Pulsed Power Electrical Network (PPEN) and SSEN cables	February 2011
Material procurement for SSEN	October 2011
Material procurement for SSEN Emergency Power Supply	October 2011
Ion Cyclotron Heating Antenna	September 2013
Electron Cyclotron Upper Launcher – Primary Confinement System	September 2013

Electron Cyclotron Upper Launcher – Rest of Launcher & Assembly	January 2015
Electron Cyclotron Radio-Frequency Sources	August 2011
Electron Cyclotron Radio-Frequency Power Supplies	December 2011
Neutral Beam - Assembly	June 2014
Neutral Beam -Beam sources and high voltage bushings	January 2019
Neutral Beam -Beam line components	September 2017
Neutral Beam -Confinement and Shielding	June 2013
Neutral Beam –Active Correction and Compensation Coils	November 2013
Neutral Beam Power Supplies and Related Systems	July 2009
Neutral Beam Test Facility	October 2010
Diagnostics – Phase 1	Possible TBD in 2011
Diagnostics – Phase 2	Possible TBD in 2011
Poloidal Field Coil Manufacturing Building	November 2008
Architectural and Engineering Services	May 2009
Excavation and Support Structure	May 2009
Anti-seismic Bearings	May 2009
Construction (Reinforced Concrete Buildings and Steel Frame Buildings)	July 2010
Radiological and Environmental Monitors System	June 2012
Acceptance of Type A waste design proposal (including costs)	December 2015
Detailed design of Type A waste structures, systems and components (SSCs), tendering, fabrication, installation and commissioning.	2015 - 2024
Conventional Waste	TBD

A detailed description of each WBS is provided in Annex I.

ITER Credit

The progress in the signature of the EU PAs is shown in Fig.2 to 4. The summary takes into account the modifications to the official Procurement Sharing amongst the ITER Members up to IC-4 (June 2009 - ITER_D_2NB68G v1.9).

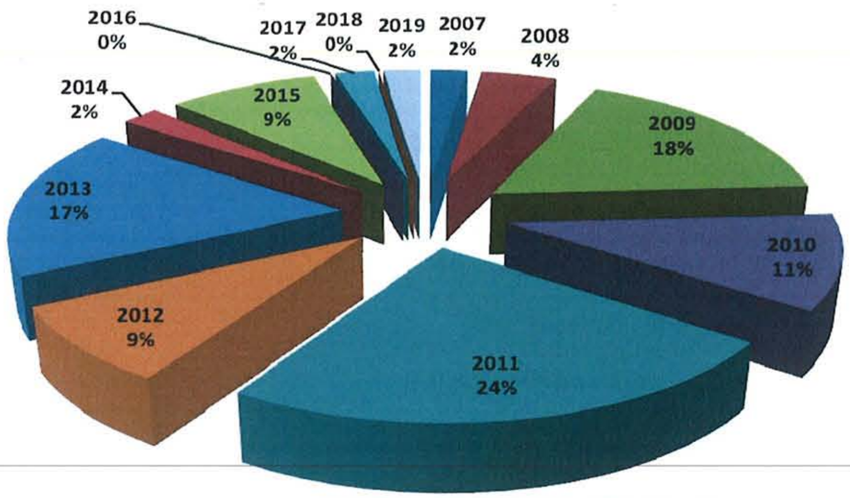


Fig. 2 – Percentage of the total number of PAs to be signed each year

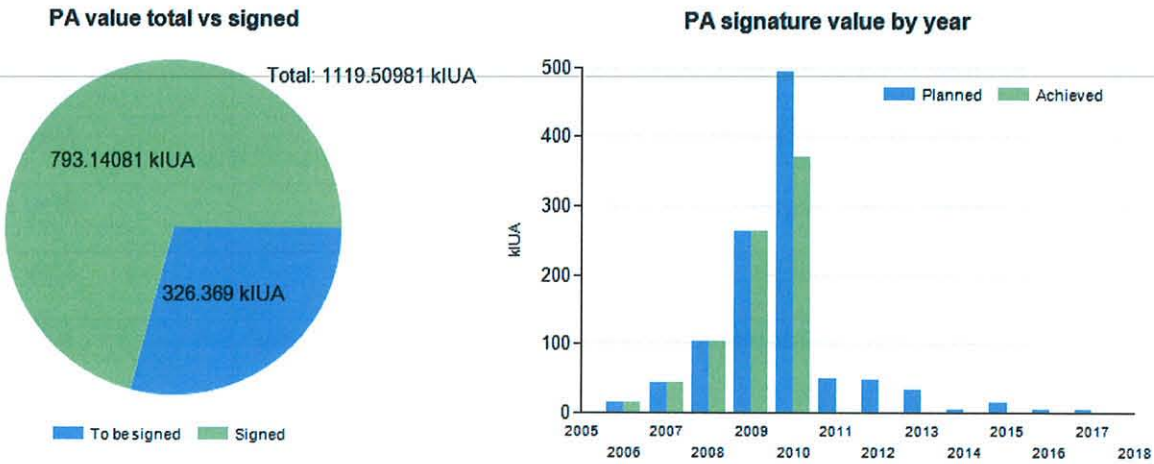
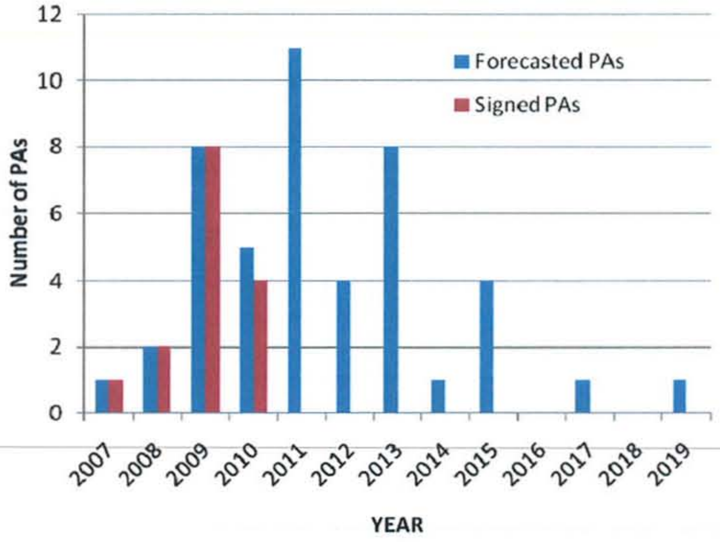


Fig. 3 – Signed EU Procurement Arrangements according to value (courtesy of ITER)



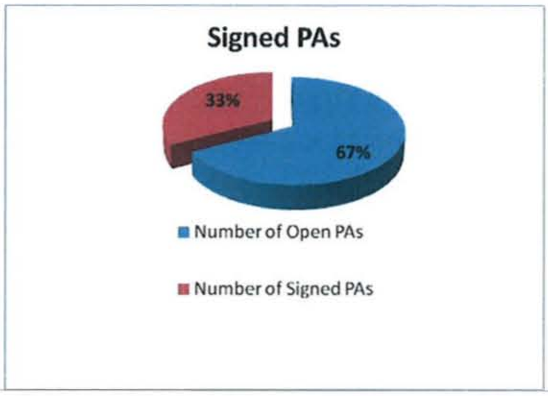


Fig. 4 – Signed EU Procurement Arrangements according to number

Based upon the milestones agreed in the signed PAs and according to a preliminary assumption on the credit distribution over the years made by IO on the ones still to be signed, the estimated amount of ITER credit that is foreseen to be awarded to the EU in the period 2010-2019 is given in Fig. 5. In the same figure, the credit already earned by EU for in-kind procurements (up to now only in the areas of building) is shown. Note that this does not include the additional amount of ITER credit that will be allocated to EU/F4E for Additional Direct Investments (once approved by the ITER Council), as well as approved PCRs, ITER Task Agreements (ITAs) and Seconded EU Staff.

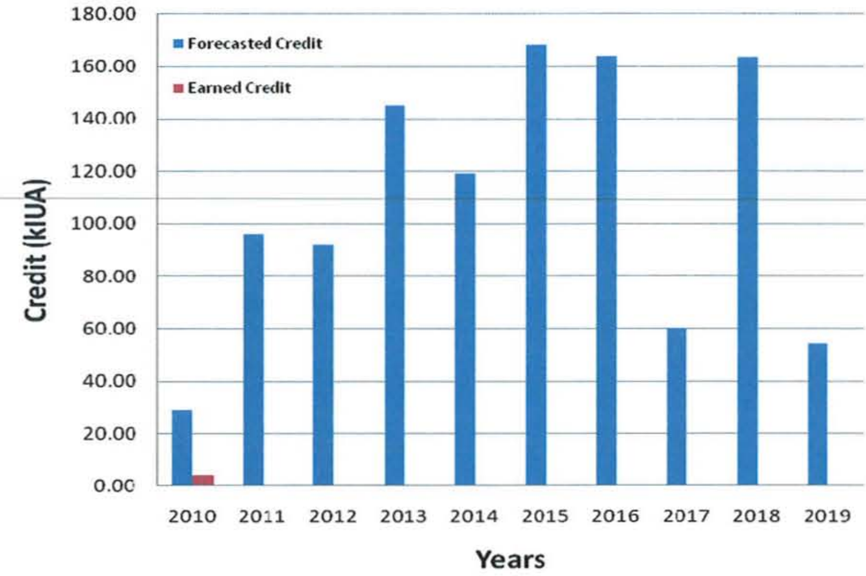


Fig. 5 Yearly distribution of the EU credit for in-kind procurements in the period 2010-2019 (courtesy ITER)

Main Milestones

Some main short- and long-term milestones that arise from the Updated Schedule are presented in tables 1 and 2 and explained further in the individual detailed descriptions of each Work Breakdown Structure (WBS). A "traffic light" indication of the status of each milestone is provided to indicate the status of the activity:

Colour	Meaning
	Milestone met (typically: contract signed)
	On time
	Delay possible, but no significant impact. To be closely monitored
	Delay expected. Significant impact

TABLE 1 – MAIN SHORT TERM MILESTONES (2009-2014)

WBS	System	Milestone	DA	Expected Date	Status
00.01.01. 02.02	Magnets – TF Coils	Contract Signature for Prototype Radial Plate (Lot 1)	EU	September 2009	Signed
00.01.01. 02.02	Magnets – TF Coils	Contract Signature for Prototype Radial Plate (Lot 3)	EU	December 2009	Signed
00.01.01. 02.02.x	Magnets – TF Conductor	Contract signature for Cu Strand Production	EU	April 2009	Signed
00.01.01. 02.02.x	Magnets – TF Conductor	Contract signature (supplier A) for SC Strand Production	EU	August 2009	Signed
00.01.01. 02.02.x	Magnets – TF Conductor	Contract signature (supplier B) for SC Strand Production	EU	December 2009	Signed
00.01.01. 02.02	Magnets – TF Coils	Contract Signature TF Coils Winding Pack	EU	July 2010	Signed
00.01.01. 02.02.x	Magnets – TF Conductor	End of Cu strand production	EU	April 2011	
00.01.01. 02.02	Magnets – TF Coils	Radial plate prototypes completed	EU	May 2011	
00.01.01. 02.02	Magnets – TF Coils	Contract signature for Radial Plate procurement	EU	November 2011	
00.01.01. 02.02	Magnets – TF Coils	Dummy double pancake completed	EU	January 2013	
00.01.01. 02.03	Magnets – PF Coils	Contract signature for PF coils*	EU	March 2011	
00.01.01. 02.03	Magnets – PF Coils	Dummy Double Pancake for PF6	EU	March 2013	
00.01.01.	Magnets – Pre-Compression Rings	Contract signature for Pre-Compression Rings	EU	March 2011	

02.02.25					
00.01.01. 02.02.25	Magnets – Pre Compression Rings	Qualification (excl. option: Manufacture and testing of first-of-a-series ring)	EU	March 2013	
00.01.01. 02.02.25	Magnets – Pre Compression Rings	Delivery of lower 6 pre-compression rings to IO (3 + 3 spares)	EU	July 2014	
00.01.01. 02.02.x + 00.01.01. 02.03.x	Magnets – TF & PF Conductors	Signature of contract for cabling and jacketing**	EU	November 2010	
00.01.01. 02.02.x	Magnets – TF Conductor	Delivery of conductors from EU	EU	March 2014	
00.01.01. 02.03.x	Magnets – PF Conductor	Delivery of conductors for PF6 coils	EU	Mid 2013	
00.01.01. 03.02	Vacuum Vessel	Contract Signature for Main VV Sectors	EU	October 2010	
00.01.01. 03.02	Vacuum Vessel	In-Wall Shielding delivery (for Sector 5)	IN	May 2012	
00.01.01. 03.02	Vacuum Vessel	Start of Sector 5 Assembly	EU	April 2014	
00.01.01. 03.02	Vacuum Vessel	Start of Sector 3 fabrication	EU	June 2012	
00.01.01. 06.02.05	Blanket First Wall	Completion of HHF test on FW full-scale prototype	EU	February 2014	
00.01.01. 06.03	Divertor Cassette	Manufacturing of Cassette Prototype	EU	September 2013	
00.01.01. 06.03	Divertor Inner Vertical Target (IVT)	Manufacturing and Testing of IVT Prototype	EU	August 2014	
00.01.03.	Vacuum Pumping	Torus Cryopumps and related equipment: testing of PPC completed	EU	April 2013	

06.03					
00.01.03. 06.03	Vacuum Pumping	NB pumping system: procurement of MITICA cryopump completed.	IO/EU	September 2014	
00.01.03. 06.02.06	Tritium Plant	Design Review of Final Design of WDS water holding tanks (both emergency and storage tanks)	EU	December 2011	
00.01.03. 06.02.06	Tritium Plant	WDS emergency tanks delivered at ITER site	EU	August 2013	
00.01.03. 04.02	Cryoplant	LN_2 plant detail design approved by IO	EU	May 2013	
00.01.03. 04.02	Cryoplant	80K loop detail design approved by IO	EU	May 2013	
00.01.03. 02.02.03 & 00.01.03. 02.02.02	Power Supplies	All design completed	EU	March 2014	
00.01.02. 03.02	Ion Cyclotron H&CD Antenna	Final Design completed	EU/IO	June 2013	
00.01.02. 03.03.04	Electron Cyclotron Upper Launcher	Final Design Review Primary Confinement System (FCS)	EU/IO	January 2013	
00.01.02. 03.03.04	Electron Cyclotron Upper Launcher	Final Design Review Launcher Assembly	EU/IO	March 2014	
00.01.02. 03.03.08	Electron Cyclotron Power Sources	Decision to Continue on the Coaxial Cavity Gyrotron Progr	EU	2011	
00.01.02. 03.03.16	Electron Cyclotron Power Supplies	Main Contract for Main and Body Power Supplies Signed	EU	September 2012	
00.01.02. 03.04.28	Neutral Beam System – Power Supplies	Start of procurement for NBTF	EU	July 2010	
00.01.02.	Neutral Beam System – NBTF	NBTF PA signature	EU	October 2010	

03.06					
00.01.02. 03.06	Neutral Beam System – NBTF	SPIDER ready for operation	EU	July 2014 (tbc)	
00.01.02. 02.06.30	Diagnostics	On-vessel magnetics diagnostics sensors/platforms and external Rogowski coil design complete	EU	May 2012	
00.01.02. 02.06.30	Diagnostics	On-vessel magnetics diagnostic sensors/platforms delivered	EU	July 2013	
00.01.02. 02.06.03	Diagnostics	Blanket bolometer diagnostic platform design complete	EU	December 2012	
00.01.02. 02.06.03	Diagnostics	Blanket bolometer diagnostic platforms delivered	EU	February 2014	
00.01.02. 02.06.05	Diagnostics	Core-plasma charge exchange recombination spectroscopy port plug component design complete	EU	November 2014	
00.01.02. 02.06.31	Diagnostics	Plasma Position Reflectometer in-vessel mm-wave component design complete	EU	November 2011	
00.01.02. 02.06.31	Diagnostics	Plasma position reflectometer in-vessel mm-wave components delivered	EU	February 2014	
00.01.02. 02.06.21	Diagnostics	Mid-plane visible/IR wide angle viewing system port plug component design complete	EU	December 2014	
00.01.02. 02.06	Diagnostics	In-Vessel Services on-vessel cables design complete	EU	February 2012	
00.01.02. 02.06	Diagnostics	In-vessel services on-vessel conduits delivered	EU	May 2014	
00.01.02. 02.02	Diagnostics	Upper Port Plug #01 design integration complete	EU	December 2013	
00.01.04	Site & Buildings	End of PF Coils Building Assistance Contract	EU	December 2009	Completed
00.01.04	Site & Buildings	Start of Architect Engineer Contract	EU	April 2010	Signed
00.01.04	Site & Buildings	End of Value Engineering Contract	EU	February 2010	Completed

00.01.04. 03.02.26	Site & Buildings	PF Coil Building – Construction design complete	EU	September 2010	
00.01.04. 03.02.26	Site & Buildings	PF Coils fabrication building – Final Acceptance of the works	EU	December 2011	
00.01.04. 03.02.01	Site & Buildings	Excavations & Support Structures – Final acceptance of the works	EU	November 2011	
00.01.04	Site & Buildings	AE Services – Tender design complete	EU	September 2011	
00.01.04. 03.02.03	Site & Buildings	Start of Tokamak Building Construction	EU	January 2012	
00.01.04. 03.02.08	Site & Buildings	Start of Hot Cell Building Construction	EU	June 2014	
00.01.06. 04.03.01	Test Blanket Modules (TBM)	TBM prototypical mock-ups (PMU) conceptual design achieved	EU	December 2012	
00.01.06. 04.03.01	Test Blanket Modules (TBM)	TBM fabrication technologies: Preliminary welding procedure specifications (pWPS) ready	EU	December 2011	

* The PF coil signature has a delay of 6 months, which can be recovered either through the available float or maintaining three months of float with the accelerated delivery schedule proposed in the call-for-tender (to be confirmed with the potential suppliers).

** About 4 months of delay from original schedule due to delayed contract award and decision by F4E management to stop the signature, in order to clear some issues with the selected supplier. The delay can be recovered via the following actions: (1) speeding up the preparation phase of the facilities for cabling and jacketing and the qualification processes; (2) compensation with conductors supplied by other DAs; (3) shorter time for cold testing at 77K in place of 4K.

TABLE 2 – MAIN LONG TERM MILESTONES (2015 – ONWARDS)

It is assumed that recovery actions are implemented.

WBS	System	Milestone	DA	Expected Date	Status
00.01.01. 02.03	Magnets – PF Coils	Delivery of PF5 to IO	EU	February 2015	
00.01.01. 02.03	Magnets – PF Coils	Delivery of PF6 to IO	EU	March 2015	
00.01.01. 02.02.25	Magnets – Pre Compression Rings	Delivery of upper 3 pre-compression rings to IO (excl. option + 1 spare)	EU	July 2015	
00.01.01. 02.02	Magnets – TF Coils	Delivery of TF10/TF11 to IO	EU	April 2015	
00.01.01. 02.02	Magnets – TF Coils	Last Radial Plate delivery	EU	End 2015	
00.01.01. 02.02	Magnets – TF Coils	Delivery of TF6 to IO	EU	August 2015	
00.01.01. 02.03	Magnets – PF Coils	Delivery of PF2 to IO	EU	August 2015	
00.01.01. 02.02	Magnets – TF Coils	Delivery of TF7 to IO	EU	September 2015	
00.01.01. 02.02	Magnets – TF Coils	Delivery of TF2	EU	December 2015	
00.01.01. 02.02	Magnets – TF Coils	Delivery of TF3	EU	January 2016	
00.01.01. 02.02	Magnets – TF Coils	Delivery of TF16	EU	May 2016	
00.01.01. 02.02	Magnets – TF Coils	Delivery of TF14/TF15 to IO	EU	September 2016	

00.01.01.02.03	Magnets – PF Coils	Delivery of PF4 to IO	EU	October 2016	
00.01.01.02.02	Magnets – TF Coils	Delivery of TF19	EU	December 2016	
00.01.01.02.03	Magnets – PF Coils	Delivery of PF3 to IO	EU	December 2017	
00.01.01.03.02	Vacuum Vessel	Sector 5 Fabrication, Ass'y, Testing & Delivery	EU	May 2015	
00.01.01.03.02	Vacuum Vessel	Sector 4 Fabrication, Ass'y, Testing & Delivery	EU	October 2015	
00.01.01.03.02	Vacuum Vessel	Sector 3 Fabrication, Ass'y, Testing & Delivery	EU	November 2015	
00.01.01.03.02	Vacuum Vessel	Sector 2 Fabrication, Ass'y, Testing & Delivery	EU	February 2016	
00.01.01.03.02	Vacuum Vessel	Sector 8 and 9 Fabrication, Ass'y, Testing & Delivery	EU	July 2016	
00.01.01.03.02	Vacuum Vessel	Sector 7 Fabrication, Ass'y, Testing & Delivery	EU	October 2016	
00.01.01.06.02.05	Blanket First Wall	First Wall : 1st of the series delivered	EU	July 2015	
00.01.01.06.02.05	Blanket First Wall	First Wall: Series delivered	EU	March 2020	
00.01.01.06.03	Divertor Cassette	Batch 1 – Manufacturing of 6 Cassette Bodies	EU	Apr 2015	
00.01.01.06.03	Divertor Cassette	Integration of 60th Divertor Cassette (last to be procured)	EU	February 2021	
00.01.01.06.03	Divertor Inner Vertical Target (IVT)	Stage 1 – Manufacturing of 6 IVTs	EU	June 2016	

00.01.01. 06.03	Divertor Inner Vertical Target (IVT)	Stage 3 – Manufacturing of 36 IVTs	EU	January 2020	
00.01.05. 09.01.04	Divertor Remote Handling	DIV RH manufacturing design completed and approved	EU	October 2015	
00.01.05. 09.01.04	Divertor Remote Handling	DIV RH delivered to ITER site, installed, accepted and handed-over to IO	EU	September 2017	
00.01.05. 09.02.06	Remote Handling – Transfer Cask System	Final TCS 1st batch casks for ITER manufacturing design completed and approved. (content of batch 1 still TBD in agreement with IO)	EU	March 2017	
00.01.05. 09.02.06	Remote Handling – Transfer Cask System (TCS)	TCS batch 1 delivered to ITER site, installed, accepted and handed-over to IO: (batch 2 could follow 2 years later, TBC)	EU	August 2018	
00.01.05. 09.01.06	Remote Handling – In-Vessel Viewing System (IVVS)	IVVS-GDC plugs (with provisional IVVS) for ITER: manufacturing design completed and approved	EU[5]	April 2015	
00.01.05. 09.01.06	Remote Handling – In-Vessel Viewing System (IVVS)	IVVS-GDC plugs (with provisional IVVS, TBD/TBC) delivered to ITER site, installed, accepted and handed-over to IO (final IVVS should follow ~3.5 years later, TBC)	EU	January 2017	
00.01.03. 06.03	Vacuum Pumping	Start contract for manufacturing LD&L system	EU	August 2015	
00.01.05. 09.02.02	Neutral Beam Remote Handling	NB RH 1st priority items (monorail crane and others TBD) manufacturing design completed and approved	EU	July 2015	
00.01.05. 09.02.02	Neutral Beam Remote Handling	NB RH 1st priority items (monorail crane and others TBD) delivered to ITER site, installed, accepted and handed-over to IO (2nd priority items should follow ~1 year later, TBC)	EU	April 2017	
00.01.03. 06.03	Vacuum Pumping	Torus Cryopumps and related equipment: End of delivery	EU	July 2016	
00.01.03. 06.03	Vacuum Pumping	Cold Valve Boxes: end of delivery	EU	October 2015	

[5] interface with CN DA for GDC

00.01.03. 06.03	Vacuum Pumping	HNB & DNB pumping system: end of delivery	EU	April 2020	
00.01.03. 06.03	Vacuum Pumping	Delivery of LD&L system to ITER site	EU	July 2017	
00.01.03. 06.02.04	Tritium Plant	Design review of Final Design of ISS.	EU/IO	August 2016	
00.01.03. 06.02.04	Tritium Plant	ISS delivered to ITER site	EU	October 2021	
00.01.03. 06.02.07	Tritium Plant	Manufacturing of residual WDS and delivery to ITER site	EU	October 2021	
00.01.03. 04.02	Cryoplant	All systems handed over to IO	EU	November 2017	
00.01.03. 04.02	Cryoplant	2nd LN2 plant commissioned	EU	February 2017	
00.01.03. 04.02	Cryoplant	2nd 80K loop commissioned	EU	November 2016	
00.01.03. 02.02.02	Power Supplies	All procurements completed	EU	March 2016	
00.01.02. 03.02	Ion Cyclotron H&CD Antenna	Antenna delivered to ITER site	EU	January 2019	
00.01.02. 03.03.04	Electron Cyclotron Upper Launcher	First launcher delivered to ITER site	EU	June 2019	
00.01.02. 03.03.04	Electron Cyclotron Upper Launcher	Fourth launcher delivered to ITER site	EU	December 2020	
00.01.02. 03.03.08	Electron Cyclotron Power Sources	1st Set (2MW) of Gyrotrons (Tube and SCM) Delivered to ITER	EU	August 2018	
00.01.02. 03.03.08	Electron Cyclotron Power Sources	4th Set (2MW) of Gyrotrons (Tube and SCM) Delivered to ITER	EU	August 2019	

00.01.02. 03.03.16	Electron Cyclotron Power Supplies	Last Set of EC HVPS Delivered to ITER	EU	January 2018	
00.01.02. 03.06	Neutral Beam System – NBTF	MITICA ready for operation	EU	November 2016 (tbc)	
00.01.02. 03.04	HNB - Assembly	HNB1 assembly completed	EU	September 2021	
00.01.02. 03.04	HNB - Assembly	HNB2 assembly completed	EU	January 2022	
00.01.02. 02.06.08	Diagnostics	Divertor magnetics sensors delivered	EU	May 2020	
00.01.02. 02.06.35	Diagnostics	Radial Neutron Camera port plug component design complete	EU	November 2015	
00.01.02. 02.06.35	Diagnostics	Radial neutron camera port plug components delivered	EU	November 2017	
00.01.02. 02.06.43	Diagnostics	LIDAR core-plasma Thomson scattering port plug component design complete	EU	August 2015	
00.01.02. 02.06.43	Diagnostics	LIDAR core-plasma Thomson scattering port plug components delivered	EU	August 2018	
00.01.02. 02.06.04	Diagnostics	LFS collective Thomson scattering port plug component design complete	EU	August 2015	
00.01.02. 02.06.04	Diagnostics	LFS collective Thomson scattering port plug components delivered	EU	August 2018	
00.01.02. 02.06.05	Diagnostics	Core-plasma charge exchange recombination spectroscopy port plug components delivered	EU	March 2018	
00.01.02. 02.06.21	Diagnostics	Mid-plane visible/IR wide-angle viewing system equatorial port plug #03 components delivered	EU	November 2017	
00.01.02. 02.06.33	Diagnostics	Pressure gauge/platform design complete	EU	January 2015	

00.01.02. 02.06.33	Diagnostics	Pressure gauges/platforms delivered	EU	November 2017	
00.01.02. 02.02	Diagnostics	JA-DA Divertor Impurity Monitor upper port plug #01 components delivered from IO	IO (JA)	March 2017	
00.01.04. 03.02.03	Site & Buildings	Construction – Tokamak RFE	EU	May 2015	
00.01.04. 03.02.03	Site & Buildings	Completion of Tokamak Building Construction	EU	December 2017	
00.01.04. 03.02.08	Site & Buildings	Completion of Hot Cell Building Construction	EU	March 2018	
00.01.03. 05.03	Radwaste Type A and Conventional Waste	Design review of solid and liquid radwaste system and components	F4E	November 2017	
00.01.06. 04.03.01	Test Blanket Module (TBM)	Final engineering design review achieved	EU	January 2016	
00.01.06. 04.03.01	Test Blanket Module (TBM)	Ancillary systems and support equipment delivered to ITER site for assembly	EU	July 2019	
00.01.06. 04.03.01	Test Blanket Module (TBM)	TBMs (EM-TBMs) + Port Plug Frame assembly tested	IO	March 2020	

RISK MANAGEMENT

The risk management activity for the project includes three main parts: (i) the analysis of event risks, (ii) the risks assessments for the different systems, (iii) the schedule uncertainty analysis.

Items (i) and (iii) have to be assessed at project level, as input of IO and the other DAs is important to reach an overall analysis. Details of the latest results on these two items can be found in Annex II.

As far as the analysis of the event risks is concerned, in September 2010 F4E was requested by IO to provide the necessary input for the overall assessment at project level. The exercise included both an update of the already identified risks (in the previous exercise) as well as the identification of new ones.

The top 10 event risks identified by F4E in the analysis, and transmitted to IO, are shown in Table 3.

ITER Risk Nr.	Category	Risk	Risk Score (normalized)
5	Management and Management Systems	Systems to govern and manage the project are ineffective (separation of responsibilities for design and financing)	**1**
5 BIS	Management and Management Systems	Systems to govern and manage the project are ineffective (separation of responsibilities for design and schedule)	**1**
45	Work Scope and Schedules	Lack of contingency in the schedule in a number of critical issues	**1**
11	Management and Management Systems	Safety Regulations / License Conditions are breached, causing delays or cost over runs	**0.8**
56	Design and Engineering Integration	Designs are not frozen following final design review	**0.64**
56 BIS	Design and Engineering Integration	Designs are not completed in time for scheduled manufacture	**0.64**
57	Design and Engineering Integration	Poor interface definition leads to integration failure	**0.64**
24	Management and Management Systems	Change process is slow and delays project	**0.64**
63	Design and Engineering Integration	Drawings and models will be produced and delivered late	**0.64**
37	Work Scope and Schedules	Lack of scope clarity will cause the schedule or cost estimate to be exceeded	**0.6**

Table 3 – F4E Top 10 Event Risks by Score (normalized to the highest value)

As far as the EU in-kind procurements are concerned, Table 4 presents a list of the top risks and the corresponding mitigation actions as they have been identified up to now. More detailed information and a broader analysis of the risks and their assessment for the EU procurements packages are presented in Annex II.

TABLE 4 – SUMMARY OF TOP RISKS FOR EU IN-KIND PROCUREMENTS

The shaded areas refer to an initial risk now obsolete due to the activity evolution.

Components	Type	Description	Mitigation
TF and PF Conductor			
	Interfaces	Cable production coming from many other DAs. In particular some strand/cable are coming from RF. Components (cables and final conductors) have to cross EU-RF border. Risk: custom/formality problems.	Careful follow up on production and transportation. Anticipation of custom clearance discussions with relevant authorities.
	Technological	Jacketing, compaction: Insertion of long length cable. Compaction by rollers or dies. Risk: Damage of the cable during the insertion NDT control of jacket welds. Risk: presence of defects and leaks.	Intense monitoring during qualification phase
Toroidal Field Coils			
	Interfaces	Conductors and coil cases, produced by several DAs, are integrated in the TF coils. Risk of delivery delays by other DAs. This could force WP suppliers on hold with consequent financial claims to F4E.	(i) Require conductors and coil cases 3 months before needed date. (ii) Close monitoring of the DAs production status.
	Commercial/ procurement	Only one consortium in Europe was capable to carry out the whole procurement (radial plates, winding packs, coil insertion and cold tests). Risk of monopoly situation and of a cost increase.	Split procurement in smaller technologically-homogenous work packages accessible to more competitors with specific competences: Radial Plates, Winding Packs and Coil Case Insertion.
	Technological	Risk associated with the fabrication of the radial plates is the combination of large dimensions (up to 12m) and tight tolerances (tenths of mm).	Manufacture two prototypes: one side and one regular, using different manufacturing routes in order to explore different fabrication technologies to find the best value-for-money
	Technological	No previous experience of the production of coils of this size with wind, react and transfer technology. Different behaviour of conductors during heat treatment. Risk of delay due to development and learning curve.	i) Manufacture one double pancake prototype (already in PA) before starting production. ii) Carry out an intense R&D program before starting series production. iii) Utilize experience gained with the TF Model Coil iv) Synergy with Japanese DA.

	Technological	Risk coil insertion: Welding of the coil case is very complex due to the variable thickness (from 30 to 120 mm) and because there is a risk to damage the winding pack during the operation. Non Destructive Testing (NDT) is also critical due to geometrical constraints.	i) Pre-qualify critical processes (weld and NDT) well in advance. ii) Launch investigation of technologies to protect winding during welding. iii)Work in close contact with JA DA to benefit from synergy
Poloidal Field Coils			
	Commercial/ procurement	Suppliers forced to use the facility on-site, outside their premises with all logistic and operational issues, displacement of work force and recruitment of local man power. Lengthy settlement and problems with the design of the building, which is almost finalized	(i) Use previous PF coil manufacturing studies carried out by industry (ii) Iteration/negotiation with tenderers during call-for-tender before building design is finalized and to understand regulations to work on site
	Commercial/ procurement	Only a few suppliers have sufficient experience to face this challenging supply. Risk of lack of competition and therefore cost increase.	(i) Enhance interest from potential suppliers involved in the TF coil tenders. (ii) Investigate involvement of other potential suppliers not specialized in magnet production, but heavy metal work. (iii) Open market outside EU+CH.
	Commercial/ procurement	This supply will be carried out in parallel with the three major supply contracts for the TF coils (radial plates, TF winding and insertion), which will already utilise the production capacities of the few potential European suppliers. Risk of cost increase due to the lack of competition or delays.	(i) Maintain interest of all potential suppliers. (ii) Open market outside EU+CH
	Technological	The required production rate is very high: multiple production lines in parallel are needed for pairs of PF coils starting from PF6/PF5. In addition, considering the size of the industries with expertise in magnets, this could require additional recruitment and training of new staff with high risk of human errors. Risk of failure during pre-industrialization and production.	i) Utilize multiple resources on-site. ii) Close support and monitoring of the supplier production status.

Precompression Rings			
	Technological	Unexpected design issue after scaling up from tested 1/5 scale to full-size rings. Risk of failure after the assembly	Manufacture and test of additional first-of-a-series pre-compression ring
	Technological	Pre-compression ring assembly. Risk of damage to the brittle material of the pre-compression ring during assembly would reduce the lifetime; the extent of the reduction would depend on the position and severity of the damage.	Manufacture one spare top pre-compression ring (the bottom pre-compression rings already have a spare set).
Vacuum Vessel			
	Technological	Welding operations could bring to defects requiring repair and rework.	F4E follows up qualification processes a) Supplier qualification process are ready well in advance b) The mock ups cover all welding configuration c) Material for qualification is available well in advance
	Commercial/ procurement	The start of the construction activities prior to the finalization of design interfaces could lead to change notices to the Supplier. Risk of scrap and other changes to be paid by F4E.	(i) Define with ITER the process for requests for changes. (ii) No construction activity starts before the finalization of the design for the interface components. (iii) Include flexibility provisions in the contract.
	Technological	Lack of a full-size sector prototype and prescribed tight tolerances are not achieved. Risk to reject the first-of-a-kind sector.	Extensive mock ups and distortion modelling to be completed before embarking on the critical stages of first sector construction is foreseen in the selected manufacturing route by the VV Supplier

	Interfaces	Due to the lack of control over the supply of the Inner-Wall-Shielding (IWS) plates, that is under the responsibility of the IN-DA, the IWS blocks could arrive with low quality dimensional and cleanliness specifications. Delays in delivery of IWS blocks can cause also delays in certain fabrication stages of the VV Sectors resulting in a late sectors delivery. Risk of correction works due to low quality of IWS blocks coming from IN DA is recognized as potential risk and a close follow up of engineering and fabrication activities by VV Supplier and F4E are foreseen as mitigation actions.	Improve interface with IO, supplier and IN DA in order to anticipate better the characteristics of the IWS blocks. The participation of the VV Supplier at the factory acceptance test is essential to overcome these issues
	Commercial/ procurement	Market situation and perceived difficulty of material production and full order books of material suppliers. Material procurement is commenced directly by VV Supplier and advance material procurement is foreseen to tackle possible market fluctuations.	(i) Material procurement is done in stages with enough quantity to cover construction needs of the first sector series. (ii) Advance material procurement is foreseen to tackle possible market fluctuations
	Commercial/ procurement	Stringent and late input of requirements from IO and the Agreed Notified Body (ANB) with additional inspections and other requirements imposed on the VV supplier. Risk of possible production delays and cost increase	Define communication process with ANB and IO. (Negotiations with IO to question the real need for the additional inspections, hold points)
Blanket / First-Wall			
	Commercial/ procurement	Possibility to create a consortium by the two companies presently prequalified. Risk of monopoly and cost increase	(i) Identify additional grouping of skilled companies constituted by experienced sub-contractors with a credible but not yet qualified prime contractor (ii) Open market outside of EU+CH.
	Commercial/ procurement	Management by the prime supplier of a high quantity of subcontractors in parallel. Risk of bottleneck and schedule delay	(i) Anticipated work on supply strategy including sub-suppliers. (ii) Separate production lots (iii) Open market outside EU+CH.
	Commercial/ procurement	Start fabrication of the full-scale prototype(s) after PA. Risk of missing delivery date and therefore a schedule slippage.	Divide procurement contract in 3 successive steps: - prototype advanced as part of an ITA

		- first of the series - series
Interfaces	Late feedback from Remote Handling development work (experimental demonstration). Risk of design not fully RH compatible that would need to be revised.	(i) Require IO/BIPT to improve RH integration : The FW is RH Class 1 (Scheduled maintenance tasks (upgrades, predictable, refurbishment)) and then maintenance tasks shall be verified on physical mock-ups before design is finalized. (ii) Include flexibility provisions in the contract.
Technological	Full scale prototype not qualified for one of the competitors. Risk of delays for this one competitor and therefore a schedule slippage.	Apply corrective measures and restart the qualification of the competitor (full-scale prototype)
Commercial/ procurement	No discussion with the tenderers before tendering. Risk of late understanding of specs with increase of cost and delay of schedule.	(i) The possibility of a procedure with a technical dialogue before the submission of tenders (competitive dialogue) should be envisaged. (ii) Organize open information days for industry.
Technological	Use of not yet mature fabrication techniques at the moment of call for tender. Risk of equipment out of spec and therefore rejection of an equipment batch.	Performance of additional prequalification : The qualification programme shall be built -to test mock-ups that integrate all the selected technologies, -to test the selected technologies under the test conditions as close as possible of the expected acceptance test conditions of the manufacturing activities.
Interfaces	Diagnostic integration difficulties. Risk to revise the design.	Require IO/BIPT to improve diagnostic definition : The design activities shall be coordinated so that every component RO involved are integrating the constraints of the other connected components in their design.
Commercial/ procurement	No rework is considered in the present schedule. Risk of cost and schedule impact.	Consider rework in F4E plans Optimise the number of parallel production lines Include flexibility provisions in the contract.
Commercial/ procurement	No float is considered in the present schedule. Risk of cost and schedule impact.	Develop a realistic internal F4E schedule Optimise the number of parallel production lines Include flexibility provisions in the contract.

Divertor Inner target	F4E does not identify any very high risks		
	Commercial	Risk of having only one supplier for the procurement of the Carbon Fibre Composite (CFC) material, with possible high costs.	R&D launched to qualify on time a second material supplier.
	Schedule	Risk of higher rejection rate due to non conformance of CFC material supply	Material procured from two qualified suppliers
Divertor Cassette Integration			
	Schedule	Tight tolerances for the assembly of the Inner Vertical Target onto the cassette body to be performed by the EU DA. Risk of delay due to components out of tolerances.	R&D to qualify the assembly procedure and possibly relax the fabrication tolerances.
	Schedule	Risk of delay due to rejection of components supplied by other DAs not satisfying the requirements of tight tolerances.	Require IO to perform close follow-up of PFC supply, diagnostic fabrication and qualification from other DAs..
Remote Handling (RH)			
	Technological	Risk common to all the RH packages (less relevant for NB RH due to the lower (10^2-10^3 less) gamma radiation field: no availability of radiation (rad) hard motors/sensors/electronics.	Survey and R&D to identify components that can be used in ITER environment. Launch R&D actions where needed
	Commercial/ Procurement	Absence of strong field of competitors in Europe for the procurement of the RH systems	Inform about our needs and identify groups of skilled companies consisting of experienced sub-contractors with potential prime contractors Open competition outside EU+CH for selected systems.
	Technological	Risk of non-performing RH system because of poor definition of interfaces with the components to-be-handled and non-obvious bugs in the hardware/software. Risk of cost increase and schedule delay.	Prototyping and testing prior to release of final production
Vacuum pumping and Leak Detection/Localization			

	Interfaces	Late and poor/incomplete input of documents/interfaces by IO. Risk of cost overruns and slippage in schedule.	(i) Produce clear working plan with IO; (ii) Implement strict interface control measures
	Technological	Risk of inadequate valve performance.	(i) Employ a Pre-Production Cryopump (PPC) to address all valve issues; (ii) Employ specialist valve manufacturers in the early stages of design.
	Technological	Risk of poor pump performance due to excessive pressure drop in the cryopanels	Quantify experimentally pressure drop characteristics of cryopanels
	Technological	Risk of T-compatibility as presence of magnetic fields and radiation environment and high detection sensitivity are critical issues for leak detection, leak localization equipment. Risk of cost overruns and schedule slippage.	Addressing the issue from the beginning in the design and manufacturing contracts of the components subject to leaks and, if necessary, carry out some R&D to develop dedicated/suitable mass spectrometry leak detection devices. R&D to develop leak localization systems.
Tritium Plant			
	Interfaces	Late and poor/incomplete input of documents/interfaces by IO. Risk of cost overruns and slippage in schedule.	(i) Produce clear working plan with IO; (ii) Implement strict interface control measures
	Commercial/ Procurement	Lack of competition or even lack of suppliers for the procurement package Risk of cost overruns	Business intelligence programme (market survey, benchmarking and supplier workshops). Open competition outside of EU+CH.
Cryoplant			
	Commercial /procurement	The predominant position of two potential suppliers could result in a lack of competition and consequently very high costs.	Perform an extensive market survey based on the various procurement packages. Assess several procurement strategies, with a view to selecting a procurement scheme and drawing a list of candidate suppliers.
	Technological / schedule	Unclear cryoplant functional requirements at the time of signing the contract(s) Risk of cost overruns and non compliance with the real needs.	(i) Ensure sound coordination and good communication between all the stakeholders; (ii) Ensure F4E has an overall view of the cryogenic system;

			Carry out strict interface control and implement adequate project management and configuration control rules
Instrumentation & Control			
	Technological	The scope for each plant systems to be delivered to IO has not been fully clarified. Potentially more complex and costly development.	Invest effort in keeping F4E aware of the evolution of the scope of a system. Identify potential scope creep and initiate procedures to correctly manage process.
Ion Cyclotron Antenna			
	Technological	Low antenna loading. Risk of reduction in antenna performance and therefore not all required power delivered to ITER	Procure and install the second antenna immediately
	Technological	Coupled power or pulse length limited by thermal limits. Risk of reduced performance of the antenna.	Design Antenna to approved engineering design codes. Test prototypes of any components involving novel cooling methods. Test prototypes of cooling system performance.
Electron Cyclotron Upper Launcher			
	Technological	cantilevered fixation and unfavourable aspect ratio of the upper port plugs. Risk of redesign with cost and schedule implications.	Over-design port plug structure, minimize EM induced eddy currents Refine em model of port + plug and guarantee interfaces
	Technological	Moving mirrors in the port front (near to the plasma)	Design cooling to cope with possible increased EC power absorption due to plasma contamination – dimension steering pivots for worst case disruptions
Electron Cyclotron Power Sources and Power Supplies			
	Technological	2MW gyrotron for ITER: higher power to be handled. Risk of reduced performances and lower reliability.	(i) 3-industrial-prototypes strategy for the 2 MW development; (ii) involvement of industry and collaboration with Associates for the development phase; (iii) preparation of the design of a conventional 1MW cylindrical cavity gyrotron as a back-up solution
	Technological	2MW gyrotron for ITER: relatively late start of the	(i) preparation of the design of a

		development programme involving industry. Risk of schedule slippage or reduced performances.	conventional 1MW cylindrical cavity gyrotron as a back-up solution; (ii) working in 2 shifts during prototype testing; (iii) increasing the brazing and bake-out capacity of the industrial supplier during manufacturing of series production; (iv) anticipate the procurement of the long lead components for the series production; (v) open the tender to outside Europe
NBI			
	Technological	Delays in the operation of NBTF-MITICA or in the achievement of the expected results may lead to the situation that not all the key components could have been tested and the relevant risk could not have been completely mitigated.	1) Delay as much as possible the launch of the affected procurement contracts 2) Draw up procurement contracts will as much flexibility as possible to allow changes.
	Technological	The unavailability on the market of the Absolute Valve may cause that a Supplier may not be found and/or the procurement of the Absolute Valve with a metallic seal of 1.6 meters may cause serious difficulties.	A specific R&D program has been launched directly by IO for the manufacture and the test of a size 1 metallic seal & seat.
	Technological	The European 1MV DC bushing connecting to HVD1 is non standard and the integration technically challenging which means that there is no guaranteed industrial interest to deliver at reasonable cost.	1) Consultation with external expert, 2) Procurement strategy (competitive dialog), 3) Bushing prototype as part of procurement as main mitigating action
Diagnostics			
	Technological	Diagnostic components viewing the plasma are exposed to a combination of erosion by energetic neutrals and deposition of migrated carbon/beryllium eroded at the divertor and first-wall. This results in very demanding specifications for 'first mirrors' in diagnostic optical systems (LIDAR, CXRS and WAVS) for which no design solutions exist and could mean that first mirror lifetime is not consistent with RAMI requirements for diagnostic systems.	1) Transfer to IO liabilities for design underperformance against RAMI requirements for systems including first mirrors; and 2) Agree with IO a set of minimum mitigation measures to be incorporated in the design (likely to include mechanical shutters and calibration systems).

Management	ITER procedures envisage conduct of design reviews for whole diagnostic systems but sub-systems of individual diagnostics have a wide range of delivery dates in the IPS from 2013 to 2021. R&D and design efforts could therefore be conducted (in support of the design reviews) well before they are required for manufacture of the sub-system, which may result in a commitment profile inconsistent with the budget.	Organise the PA along the lines of 'separable sub-systems', with limited and easily defined interfaces, to allow phasing of design and supply meeting DA resource-levelling requirements
Schedule	Slow contractual procedures, e.g. due to the insufficiency of F4E technical personnel; a very small supplier base (single bidders); inadequate contract tender responses; or protracted contract negotiations could lead to an inability to place timely contracts or complete R&D/Design on time. As a result the PA schedule might not be met and liabilities could be incurred in connection with delays in cross-party interfaces.	1) Minimize the number of R&D/design contracts by structuring system development as one large, initial contract (for suppliers to prove their ability to deliver complete, technically competent work to schedule) and a longer-term framework contract to complete the design (i.e. ensuring a very close collaboration between F4E and suppliers, making it possible to manage the development with a limited number of F4E personnel); and 2) Carry out time-critical tasks using contracts with full supplier liability rather than on a 'best-efforts' basis
Technological	The high radiation environment experienced by in-vessel diagnostic components leads to very demanding specifications for in-vessel electrical joints, for which no qualified design solutions exist. Development of currently envisaged electrical joining concepts for in-vessel diagnostics may not be capable of meeting RAMI requirements for this environment.	1) Conduct of urgent R&D/Design as far as possible before PA signature – Urgent R&D for all diagnostic systems included in 2009 and 2010 Workprogrammes; and 2) Follow several, parallel R&D paths.
Schedule	Hardware needed for R&D and design activities undertaken in one contract may have to be procured in a second, independent contract and which could be inconsistent with the first contract's schedule. This could result in delays to the R&D and design schedule and/or incomplete R&D with a consequence that the PA schedule might not be met.	1) Implement framework contracts in a number or areas for the supply and support of R&D/design activities. Pre-selected suppliers should be able to respond quickly to the procurement needs arising from R&D/design contracts; and 2) Use contracts allowing both R&D/design and procurement activities.

	Commercial	The diagnostic system-level design could fail to meet the ITER requirements as defined in the PR. If the PR requirement is required by the PA, this would result in a non-conformity and resultant cost increases, if ITER IO insist that requirements must be met.	1) Agree in PA technical specifications reduced requirements for system that are more likely to be achievable; 2) Agree higher target requirements to be achieved by the design, on a best effort basis only; and 3) Design system to be upgradable to higher performance later during the ITER operational life, for maximum compatibility with the ITER Project objectives.
Buildings			
	Commercial	High number of design changes. Risk of cost overruns.	(I) Panel of adjudicators (II) Assistance of Architect Engineer, Support to the Owner and legal expert (III) Make sure that the design specifications are fully and consistently defined.
	Technological	Large number of buildings, some of nuclear type, in a relatively small space with associated large risks to manage construction site activities. Constructability risk (logistics, access, storage areas). Risk of conflict in time and space use between construction contractors leading to delay and over cost	(i) To launch the call for tender for site preparation in 2010 to anticipate the arrival of companies and thousands of workers in 2012-2016 . (ii) To negotiate with IO to defer assembly of equipment that are not essential. (iii) To limit interfaces between construction companies by limiting the number of contracts.
	Interfaces	(i) Delay in the interface data provision by IO; (ii) Delay in IO approval after Design Reviews; (iii) Underestimate of the duration by F4E. Technical Architect Engineer - contract detailed design phase	(I) To define with IO a procedure for the release of interface data, each interface data associated with a deadline (II) To associate IO early in the Design process before launching the official Design Reviews (III) To renegotiate the interim milestones with the AE input
Radwaste Treatment & Storage Systems			
	Interface	Currently a low level of confidence that the design will meet the project requirements. Risk of higher operation costs.	Increase number of meetings with IO. Ensure correct processes are followed.Ensure that the building design minimised the number of 'captive' items so that any delays to the process design have a minimum impact on overall cost and programme

	Interface	To date it is not clear what is included in the PP-66. More in particular, the equipment for the Radwaste building is divided in two batches: the first one will be purchased within the EU PP-66, the second one with the operation budget.	Clarification with IO is necessary.

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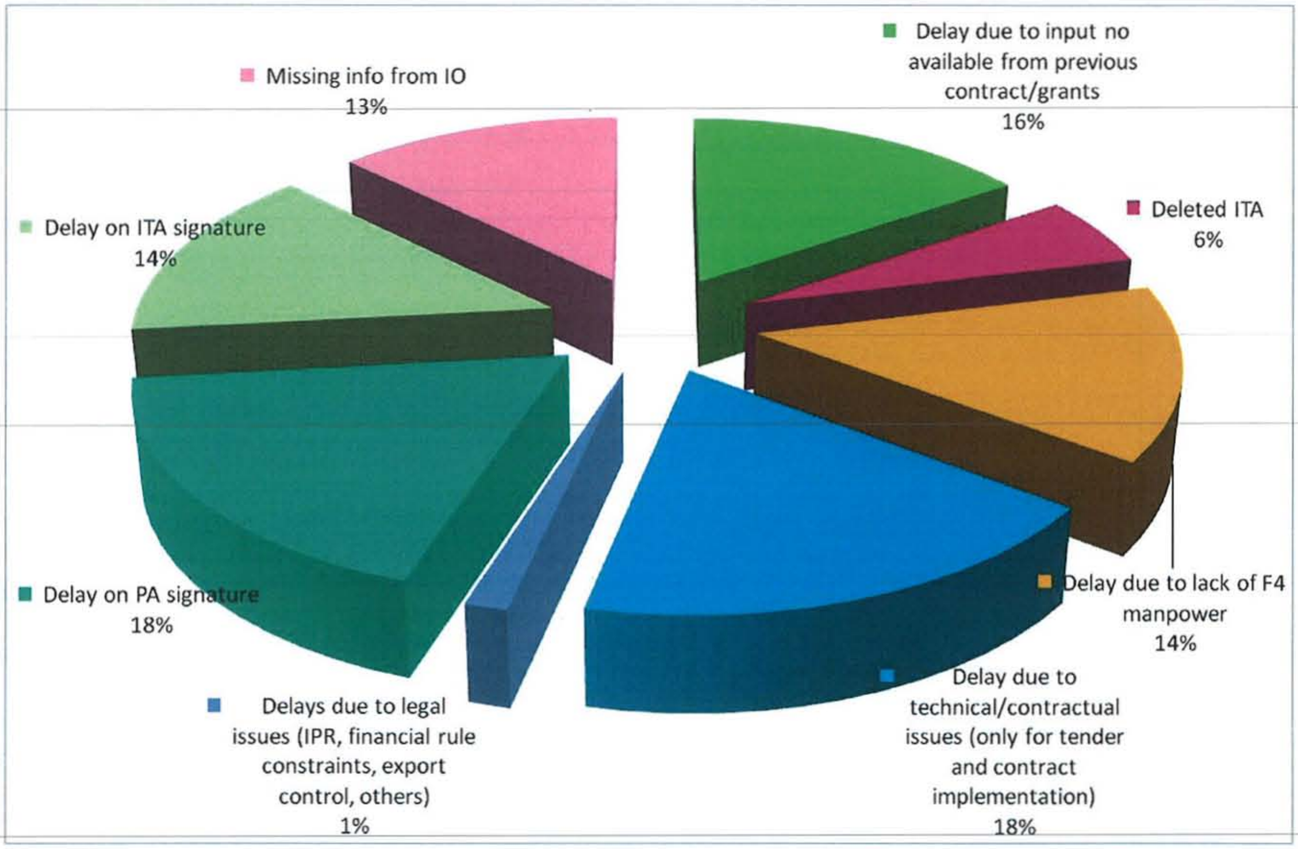
MONITORING OF F4E ITER-RELATED ACTIVITIES IN 2007-2010

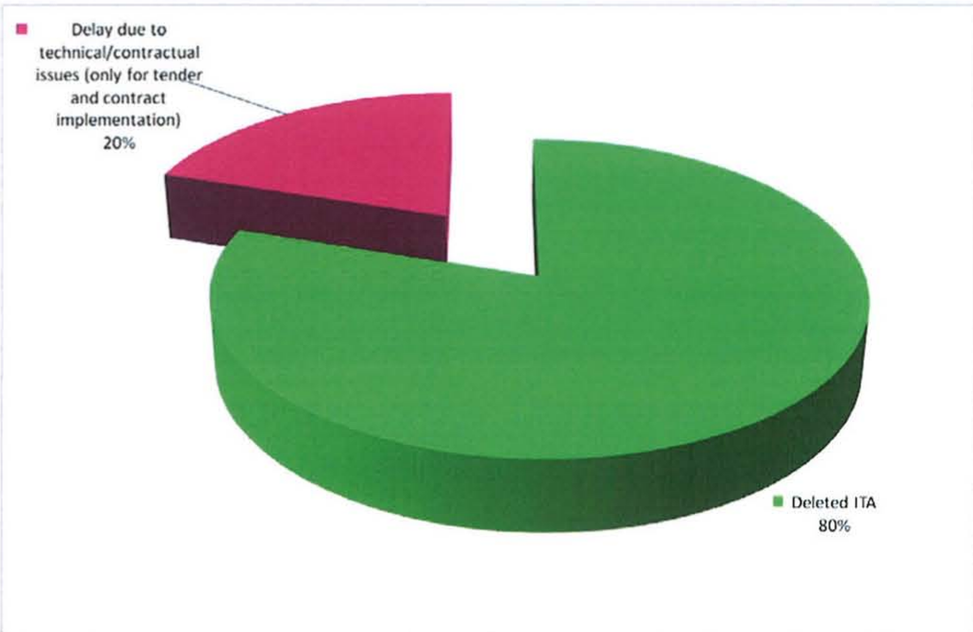
The following information takes into account the status as of 1st October 2010 of all activities launched up to now by Fusion for Energy.

The following pie charts provide a global view of the situation and, for more detailed information, please refer to Part III of "Annex 1 to the Project Plan (Edition 2010)European in kind contributions to ITER".

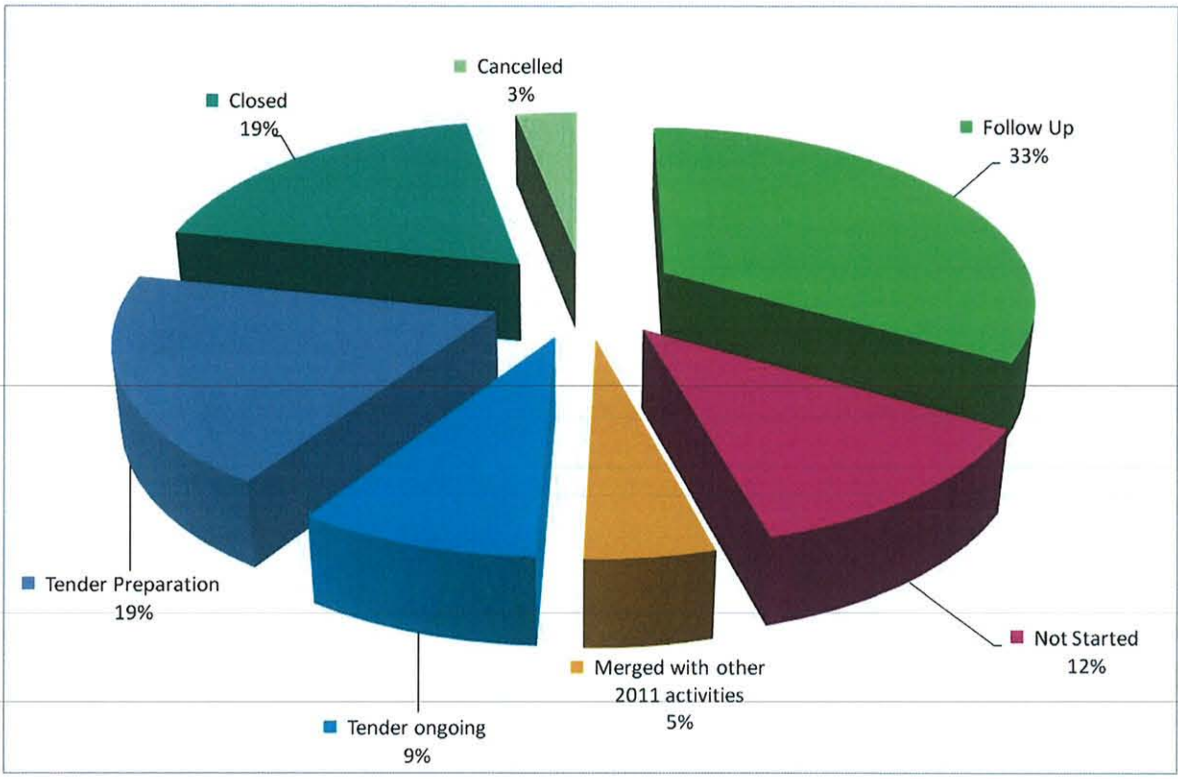
Reasons for moving activities from 2010 to 2011



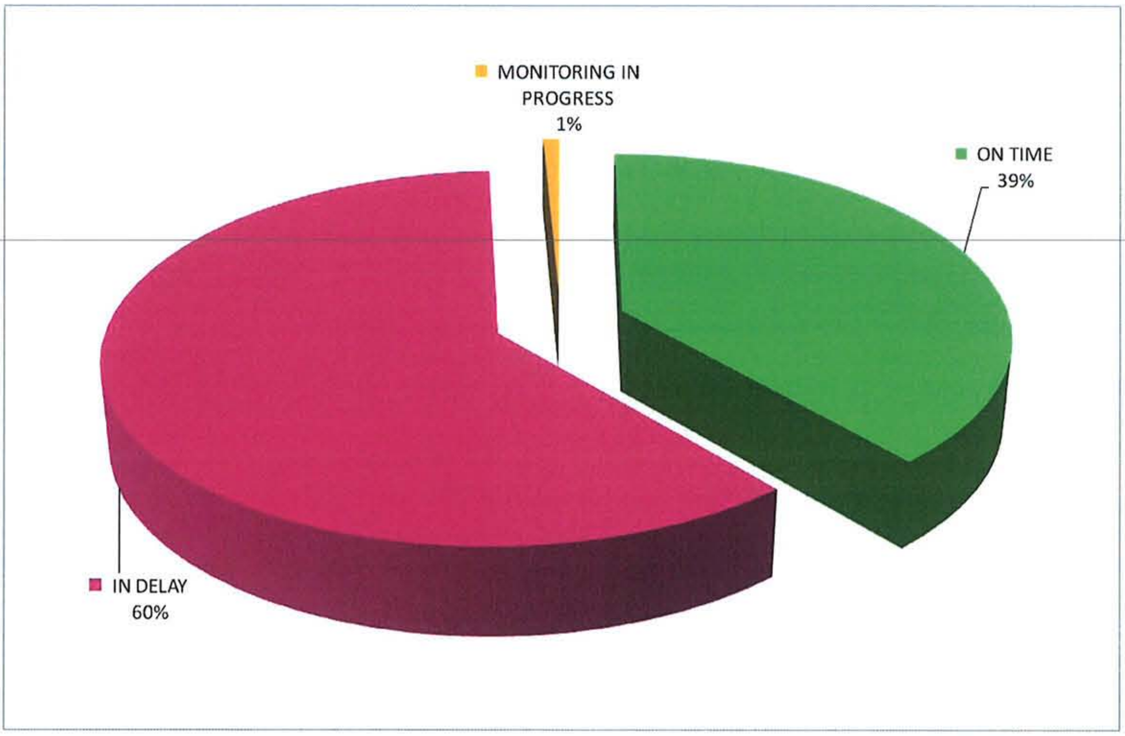
Reasons for cancelling activities in 2010



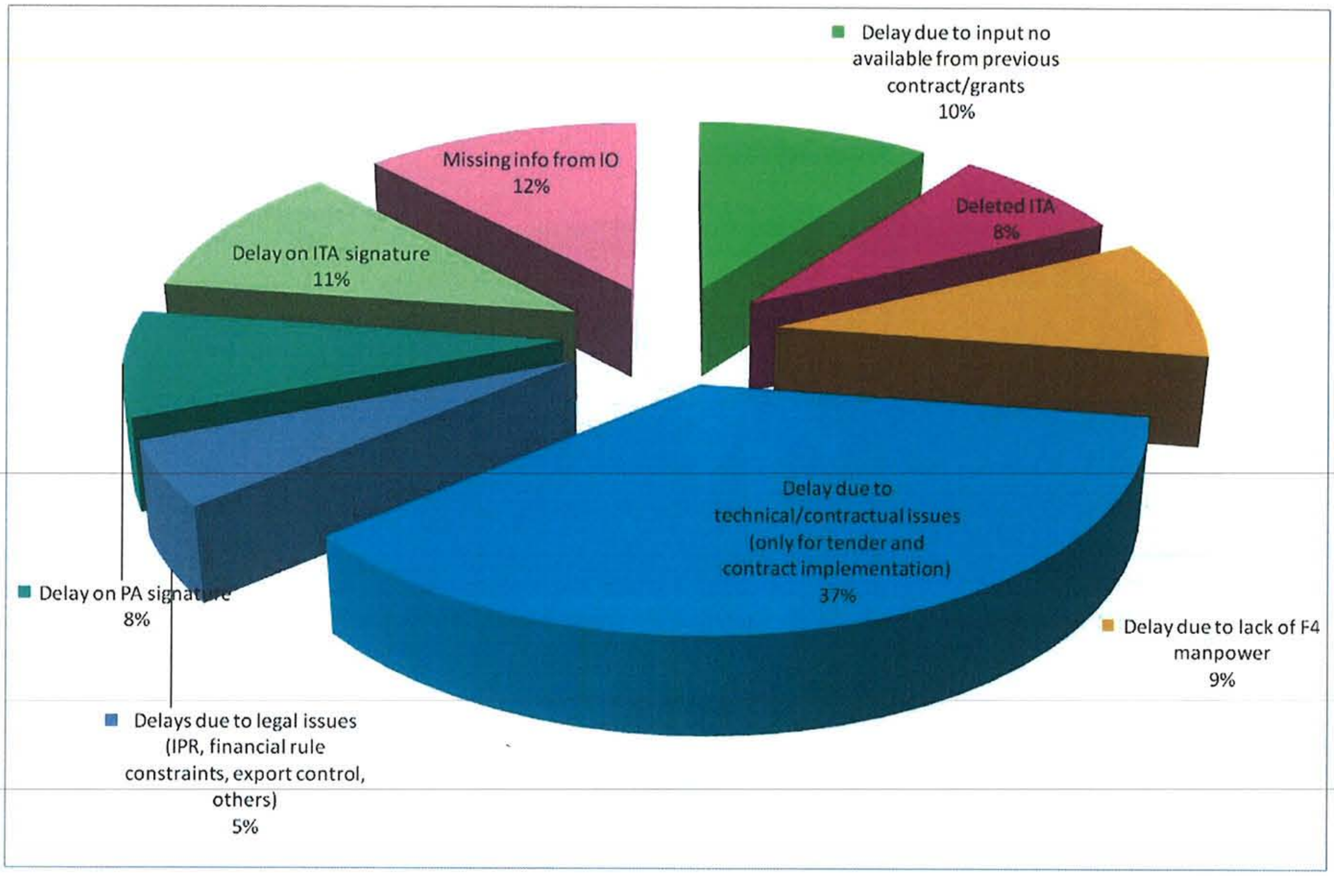
2007-2010 Activities: Implementation Status



2007-2010 Activities: In Delay vs On-Time



2007-2010 Activities: Reasons for Delay


Delay due to input no available from previous contract/grants 10%
Missing info from IO 12%
Deleted ITA 8%
Delay on ITA signature 11%
Delay due to technical/contractual issues (only for tender and contract implementation) 37%
Delay on PA signature 8%
Delay due to lack of F4 manpower 9%
Delays due to legal issues (IPR, financial rule constraints, export control, others) 5%

Quality Assurance (QA)

F4E-related QA

The development and establishment of a Quality System in F4E is part of its overall management strategy and is included among the obligations as an items provider to the ITER and Broader Approach Projects.

The F4E Quality Management System implements, for safety relevant components and activities, the requirements of the 'Order of August 10 – 1984' (French Republic *'Arrêté du 10 Août 1984'*) and, in general, uses as a basis the IAEA Safety Requirements GS-R-3 (2006) and ISO 9000 series as applicable.

Quality Management System

The F4E Quality Management System (QMS) composed of:

- Management Systems Manual:
  a description of the QA system for F4E operations
- Specific Project Quality Assurance Programs:
  a description of the technical QMS and systems integration / interface harmonization management for Broader Approach and ITER procurement items
- Processes and procedures:
  a process approach to quality management
- Instructions and Checklists
  documents that provide information about how to perform the task activities and processes consistently
- Forms, Templates and Records
- External Documentation

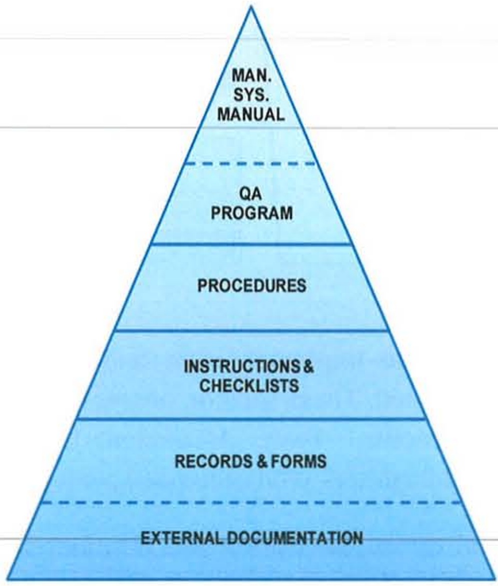


Figure 6 – QA Documentation

Management Systems Manual

The Management Systems Manual encapsulates the overall management of F4E:

- Quality Assurance Policy, F4E Governance;
- F4E Organisation (OBS, Distribution of Responsibilities, PB);
- Planning, QA Management, Implementation (WBS, ITER and BA Projects, QA, Resources);
- Documentation (Quality Documents, Management System) ;
- Monitoring and Reporting (Internal Control Standards, Audits, Risk Management., Strategic Reviews, Reporting through the Annual Activity Report, Management reports, etc.);
- Improvement (Assessment, Configuration Management and Continual Improvement).

PROCESS APPROACH

An expected result is achieved more efficiently when the corresponding actions and resources are managed as processes ('process approach'). Processes are being defined for all the identified processes needed for achieving the intended organization outputs. For each process all the actions, documentation, appropriate review and approval, reporting and records are defined

The current processes interaction in F4E is represented in Fig. 7.

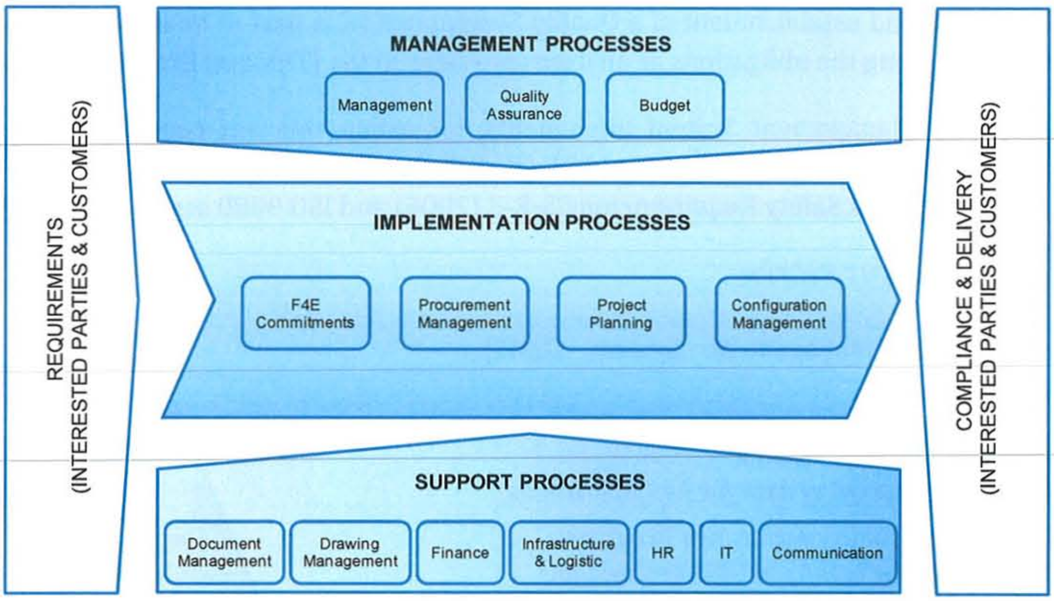


Figure 7 – Overall F4E Process

Most of the implementation and management processes have already been defined and are being implemented. These include processes (and sub processes) to deal with F4E Commitments (Procurement Arrangements, Task Agreements), Procurement Management and Configuration Management (nonconformities, deviations and project changes).

Part of the support processes is simultaneously being defined with the development of software tools to manage the Human Resources, Missions and internal requests (IT, logistics, etc.).

QA RELATED TO ITER PROCUREMENTS

PROJECT QUALITY ASSURANCE

Within the scope of the specific project QA Programs of the quality system, F4E has developed a specific QA Program for IO to establish the overall framework to achieve the quality criteria for items and services provided by F4E to the ITER project. This QA Program (for the procurement of the EU in-kind components) has been approved by the IO.

As part of the formalisation and approval of the F4E commitments toward the ITER Project, F4E develops a Strategy Proposal for each project. Based on this strategy, F4E issues a Project Management Plan describing and defining:

- the provisions implemented to comply with the customer requirements and the project reporting rules;
- all interfaces within the project and in particular those between F4E responsible officers;

- the division of the project in the various work packages that have to be contracted with economic operators.

For each work package, F4E issues a management specification at the time of the call for tender and the selected supplier needs to provide a thorough quality plan following the different points raised by F4E in their specifications.

Supplier certification according to a specific international standard is not usually required (but recommended). The quality level is accomplished through the compliance with the F4E Management Specification.

Supplier compliance to the requirements is assured by a close follow-up and monitoring by the F4E, including regular visits, scheduled quality audits and follow-up of the specific work package control plan.

The integration of the F4E Configuration Management processes with the ITER Configuration Management F4E is dealt by a dedicated 'F4E-ITER Project Configuration Management Plan' developed within the framework of the F4E quality system.

BROADER APPROACH ACTIVITIES

Fusion for Energy is the Implementing Agency for the EU contribution to the 3 BA projects, designated by Euratom to discharge its obligations as defined in the BA Agreement. In particular, F4E is the organisation delegated to agree and conclude Procurement Arrangements (PAs) with the Japanese Implementing Agency (JAEA).

Nevertheless, with few exceptions, most of the activities to be undertaken in the frame of the BA agreement are to be carried out in-kind by the EU-Voluntary Contributors. These are some of the members states represented in the Governing Board of F4E which pledged to contribute to the BA projects, namely Belgium, France, Italy, Germany, Switzerland and Spain. In turn, each VC will channel its contributions through the procurement arm of "Designated Institutions" (VC-DIs). F4E concludes Agreements of Collaboration (AoC) with the VC-DI, to secure delivery of the EU contributions to meet the requirements of each Procurement Arrangement.

Each of the BA Projects, while having some important differences, share the common feature of being based on a collaboration in which the Parties contribute both to the definition of the overall integrated design and to the detailed design and realisation.

JAEA and Fusion for Energy (F4E), nominated as Implementing Agencies (IA) by the Japanese Government and the European Commission, are the entities entitled to agree and sign any official document regarding the implementation of the BA agreement and in particular Procurement Arrangements.

The implementation of the projects is supervised by the Parties through the Broader Approach Steering Committee and its advisory bodies: the Project Committees for each project. In the case of the Satellite Tokamak Program and IFMIF/EVEDA, the organization put in place for their implementation includes at technical/operative level an "Integrated Project Team" which executes the project. It is formed by the union of a) the Project Team (with a small number of staff), b) the EU-Home Team, and c) the JA-Home Team. The implementation of a similar structure for the IFERC project is in progress. The IPT for each project operates under a Common Quality Management System (CQMS). This regulates the collaboration of the IPT members, identifying the common templates and procedures, for example for configuration and procurement management. Each project's CQMS has the same basic structure, with some additional tailoring to the specific needs of each project. At the European level each project has its own QMS, which defines how the project operates with the VCs, and how it interfaces with F4E QA Management.

PROJECT IMPLEMENTATION PLANS

For each BA project, individual Project Plans covering the whole duration of the project and that include both European as well as Japanese activities are prepared by the Project Leaders and submitted annually to the BA Steering Committee (BASC). A summary is given below and further details and the project plans themselves are provided in annex 2 and the three sub-annexes 2.1-2.3.

The schedule of submission of the project plans now differs somewhat between the projects. The STP project plan was approved in March 2010 and will be updated again in March 2011. The report below therefore reflects additional information updating the approved project plan. Updated IFERC and IFMIF project plans have been recommended by their Project Committees in October 2010 and are being submitted for BASC approval in December 2010.

The F4E Project Plan to manage the European contribution to BA activities is constrained by these individual project plans endorsed by the BASC.

SATELLITE TOKAMAK PROGRAMME

Background

The mission of the JT-60SA project is to contribute to the early realization of fusion energy by supporting the exploitation of ITER and research towards DEMO by addressing key physics issues associated with these machines, in particular by designing , constructing and operating a device:

- capable of confining break-even equivalent class high-temperature deuterium plasmas lasting for a duration longer than the timescales characteristic of plasma processes;
- pursuing full non-inductive steady-state operation with high plasma beta close to and exceeding no-wall ideal stability limits.
- establishing ITER-relevant high density plasma regimes well above the H-mode power threshold.

The initial design was revised extensively in 2008, and this "re-baseline" forms the basis for the current procurements.

Overall Construction Schedule

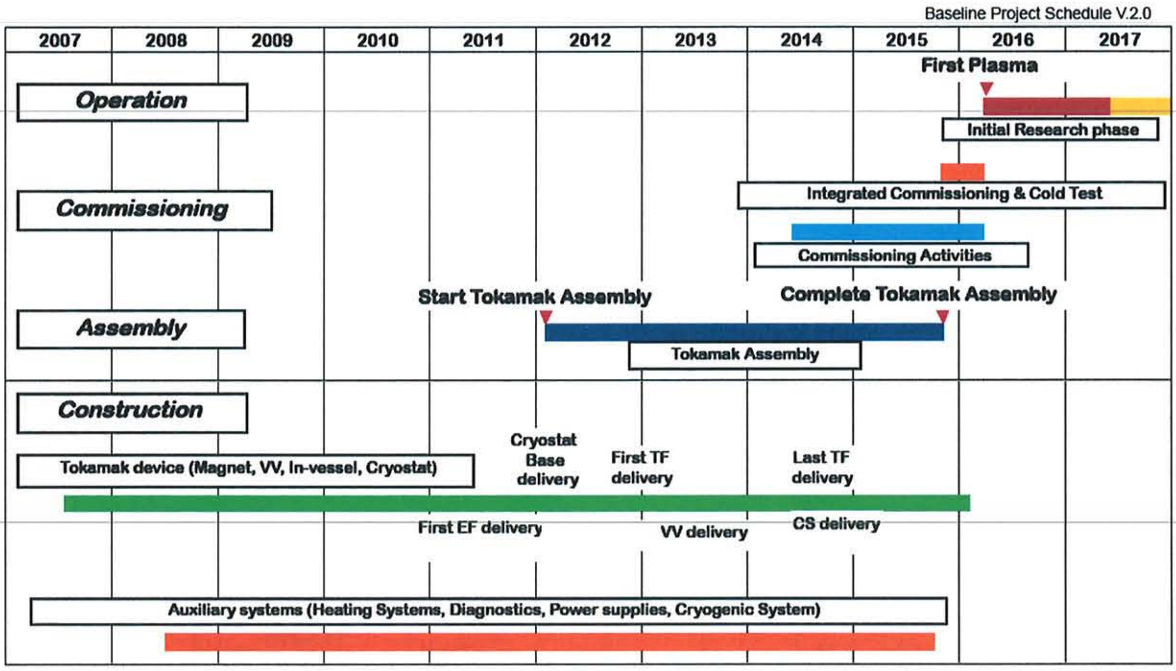


Fig.1: STP Baseline Project Schedule (approved at the SC-4 December 2008)

Status of EU Contributions

TF Coils (CEA/ENEA/F4E): the PA was signed in July 2010. The contract for strand (F4E) was signed in October 2010, and that for cabling/jacketing (F4E) will be signed within 2010. CEA and ENEA have started tender actions for their individual 9 coil and casing procurements. The TF coils are on the critical path.

The high temperature superconductor current leads PA was signed in February 2010. Work on the production at KIT is progressing as planned.

The scope of TF coil testing (CEA/SCK) was already agreed at project level at the end of 2009. In 2010 Switzerland withdrew its contribution and the reallocation of the work is still under discussion. CEA decided to install the test facility in Saclay. Belgium has already placed the contract for the cryostat. The PA and AoCs remain to be signed, probably early in 2011. This testing is on the project critical path.

Cryogenic system (CEA): the PA is expected to be signed early in 2011, a little later than expected.

Quench protection circuits (cRFX): the PA was signed in December 2009, and the procurement contract is now planned to be signed at the end of 2010, a little delayed.

Switching Network Units (ENEA) and the Superconducting Magnet Power Supplies (CEA/ENEA): the technical scope has been agreed already in June 2010. ENEA expects to be able to sign a supply contract and AoC on the SNU within 2010, whereas the SCMPS is on hold pending CEA agreement.

Electron Cyclotron Power Supplies: originally intended to be procured by Switzerland, now on standby pending a resolution to compensate for the Swiss default.

Cryostat (CIEMAT): the cryostat base PA was already signed in December 2009 and the contract began in July 2010. There is currently a 2 month delay, possibly recoverable. This item is on the critical path. The cryostat body will now be partly (the lid) procured by Japan, so some rearrangement of scope has been necessary. The PA needs to be signed within March 2011, to place the contract within November 2011.

Exploitation plan

In light of cost issues, it is foreseen that the JT-60SA machine will be upgraded step by step according to a phased operation plan consisting of an Initial Research Phase, an Integrated Research Phase, and an Extended Research Phase. Exploitation within the Broader Approach (BA) period is planned to be in the first part of the Initial Research Phase which includes HH operation for plasma commissioning

In the hydrogen phase of the initial research phase, the main aim will be the integrated commissioning of the system with and without plasma operation, as well as the preparation of the deuterium operation at full plasma current and high heating power up to 23 MW, including 10MW of positive ion source NB, 10MW of negative ion source NB and 3MW of ECRF at 110GHz. A lower single null divertor with partial mono-block target is planned in this phase.

This should be followed by 1) DD operation for identification of issues in preparation for full DD operation. 2) an integrated research phase, and 3) an extended research phase as shown in Table 2.1.1.

Table 1: STP Operation phases and availability of key components

<table>
<tr><th></th><th>Phase</th><th>Expected Duration</th><th></th><th>Annual Neutron Limit</th><th>Remote Handling</th><th>Divertor</th><th>P-NB</th><th>N-NB</th><th>ECRF</th><th>Max Power</th><th>Power x Time</th></tr>
<tr><td rowspan="2">Initial Research Phase</td><td>phase I</td><td>1-2y</td><td>H</td><td>-</td><td rowspan="3">R&D</td><td rowspan="2">LSN partial monoblock</td><td>10MW</td><td rowspan="5">10MW</td><td rowspan="2">1.5MW x100s + 1.5MW x5s</td><td>23MW</td><td rowspan="4">NB: 20MW x 100s 30MW x 60s duty = 1/30
ECRF: 100s</td></tr>
<tr><td>phase II</td><td>2-3y</td><td>D</td><td>4E19</td><td rowspan="3">Perp. 13MW
Tang. 7MW</td><td>33MW</td></tr>
<tr><td rowspan="2">Integrated Research Phase</td><td>phase I</td><td>2-3y</td><td>D</td><td>4E20</td><td rowspan="2">LSN full-monoblock</td><td rowspan="3">7MW</td><td rowspan="2">37MW</td></tr>
<tr><td>phase II</td><td>>2y</td><td>D</td><td>1E21</td><td rowspan="2">Use</td></tr>
<tr><td>Extended Research Phase</td><td></td><td>>5y</td><td>D</td><td>1.5E21</td><td>DN</td><td>24MW</td><td>41MW</td><td>41MW x 100s</td></tr>
</table>

IFMIF/EVEDA

The original objective of the Engineering Validation and Engineering Design Activities (EVEDA) of IFMIF was "to produce a detailed, complete, and fully integrated engineering design of the International Fusion Materials

Irradiation Facility (hereinafter "IFMIF") and all data necessary for future decisions on the construction, operation, exploitation and decommissioning of IFMIF and to validate continuous and stable operation of each IFMIF subsystem". The initial duration of the project was set for 6 years, starting from June 2007.

Four main lines of activity were foreseen:

- The engineering design of the IFMIF facility, which is the principal objective of the EVEDA phase in view of preparing the construction of IFMIF;
- The design, construction, commissioning and operation of an accelerator prototype which is the low energy prototype of the two IFMIF accelerators, which represents a ambitious project to demonstrate full beam current performance and reliability;
- The engineering design and engineering validation activities for the Target Facility, which depends in particular on the design, the construction and the operation of the Li Test Loop;
- The engineering design and engineering validation activities for the Test Facility.

The last two lines form two sets of R&D programmes to provide the data bases needed to proceed to the engineering design of the IFMIF facility integrating the accelerator design with the Target Facility and the Test Facility designs.

Since the above concept was formulated, the context changed to some extent:

- Influenced by the ITER budget situation, the 8th Framework Programme (2014-2020) currently does not foresee a budget line for the construction of IFMIF.
- ITER will not operate in DT before 2026, delaying the need to launch IFMIF construction.
- DEMO design work is consequently also delayed, so the IFMIF users are not clearly identified today.
- Conversely, the ITER Test blanket community is increasingly interested in IFMIF as a data source, due to ITER delay.
- Due to the overall economic crisis and the consequent reduction in research budgets, it is difficult for potential hosts to register their interest.
- Nevertheless, the construction and experimental programme of the Accelerator Prototype is exceptional and challenging, and has strong interest from the worldwide accelerator community, so deserves a high priority.

As a result, the countries involved in the IFMIF-EVEDA made a detailed re-evaluation leading to the following conclusions:

- Higher priority is now given to the validation activities, and in particular to the Prototype accelerator.
- conversely the engineering design of IFMIF, to be provided at the end of the current EVEDA phase (i.e. June 2013) will not be at the level of detail originally envisaged, in particular all Conventional Facilities will be at a preliminary design level (since the site is unknown), enabling nevertheless a reasonable estimate of the plant value;
- it is expected that all major technological deadlocks of IFMIF will have been solved, meaning that it will be possible subsequently to prepare all technical specifications of industrial contracts for its construction with the possibility for the companies to commit on performances at a reasonable cost.

The result is a revised project plan, thoroughly analysed with both IAs and currently being recommended to the BASC, as shown in Figure 2.

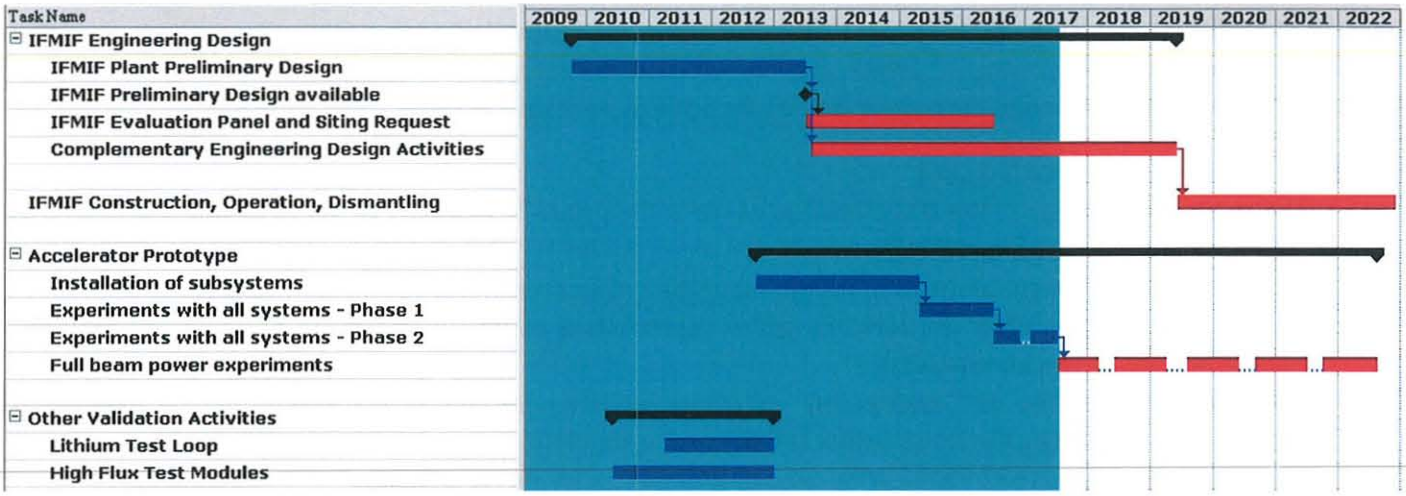


Figure 2 Revised Project Plan Proposal for IFMIF, also beyond the EVEDA

In this scheme:

- the blue area corresponds to the duration of the BA Agreement; the experiments on the Accelerator Prototype are conservatively considered only until its end, with a hold point one year after the start of experiments on the whole accelerator;
- blue lines are financed in the framework of the BA agreement;
- red lines are today not financed;
- the date of site decision is today unknown.

The four main milestones in the proposed extended EVEDA are the following:

- **June 2013**: Delivery of the IFMIF Preliminary Design Report;
- **June 2015**: Start of the experiments of the whole Accelerator Prototype;
- **June 2016**: Hold Point after one year of experiments on the Accelerator Prototype; evaluation of performances and of potential further effort needed to reach full specifications;
- **June 2017**: End of the studies in the framework of the Broader Approach agreement.

Status of EU Contributions

Control System of Prototype Accelerator (CEA): AoC signed, PA signed in October 2010.

RF Quadrupole (INFN): AoC being signed. On critical path.

Superconducting RF Linac (CA): AoC' being signed. On critical path.

Lithium Target (ENEA/SCK): 3 of 4 PAs signed. 1 AoC being signed.

IFERC

The IFERC activities include three sub projects - DEMO Design and R&D activities, establishment and operation of a Computer Simulation Centre, and establishment and operation of a Remote Experimentation Centre - as well as the construction of the buildings to house all these activities. The high level schedule is shown in Figure 3

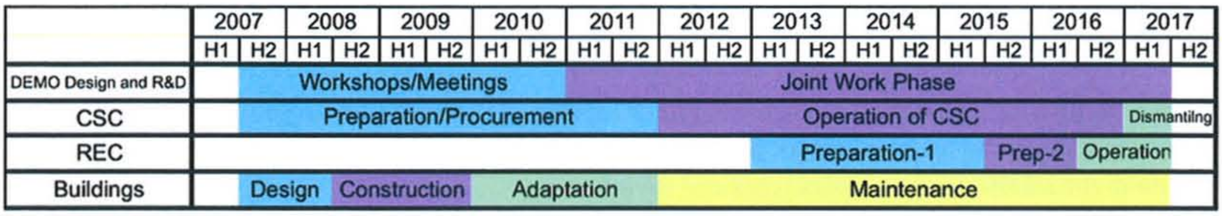


Figure 3 IFERC High Level Project Schedule

DEMO Design

The activity has two phases:

Phase One: Analyse common elements for DEMO (2007-2010)

Phase Two: Develop Potential DEMO Designs (2011 - mid 2017)

Phase One activities have so far been conducted by a number of workshops/meetings. At the end of Phase One a major review took place to recommend specific goals for Phase Two, and a small group of experts outlined a proposal for Phase Two joint activities. Proposed Terms of Reference for DEMO Design Activities (DDA) are to be presented at the BASC in December 2010. The joint work would be organized as follows:

Phase Two-A, *Jan 2011 – Dec 2012:* Consolidation of knowledge, to define a sound common basis for DEMO design, definition of priorities for R&D tasks

a. Definition of design criteria and cost models
b. Analysis of key design issues and options and launch preliminary work
c. Preparation and start implementation of system design code;

Phase Two-B, *Jan 2013 – Dec 2014*: Detailed studies

d. Follow-up work on key design issues and options and narrow down design options on which concentrate further analysis work
e. Adjustment of Design Criteria, Design Equations, and cost models
f. Evaluation of sets of DEMO parameters as a function of uncertainties
g. Preparation of intermediate documentation.

Phase Two-C, *Jan 2015 – Jun 2017:* Development of pre-conceptual design options for DEMO

h. Develop integrated conceptual design/ work final review and
i. Preparation of final documentation.

It is expected that this design activity will also suggest specific R&D activities, some of which would be carried out on ITER, or on the Satellite Tokamaks (JT-60SA) and other facilities.

DEMO R&D

The DEMO R&D activities aim at establishing a common basis for a DEMO design from the technology point of view. Five R&D tasks will be carried out:

- SiCf/SiC Composites
- Tritium Technology
- Materials Engineering for DEMO Blanket
- Advanced Neutron Multiplier for DEMO Blanket
- Advanced Tritium Breeders for DEMO Blanket

Each activity will be performed in phases, so that its progress and priority can be reviewed. The credit value allocation for each R&D activity may be rearranged.

Computer Simulation Centre:

The objective is to provide and exploit a super-computer located in Rokkasho for large scale simulation activities to analyse experimental data on fusion plasmas, prepare scenarios for ITER operation, predict the performance of ITER, and contribute to the DEMO design physics basis and BA activities.

During Phase One (July 2007 - December 2011), the goal is to set up the supercomputer and the associated peripheral equipment in the CSC/REC Building located in the Rokkasho BA site and to commission it.

A user-based special working group (SWG1) was set-up in 2008 to define the system requirements and assist the procuring IA in determining selection criteria, supplier selection, and acceptance requirements. The PA for the supply of a supercomputer and peripheral equipment was signed in 2010, with the aim of concluding the contracts (CEA) also for its operation and maintenance, in March 2011. This is the main task of the EU-IA. The main task of JA-IA is to prepare interfaces for the installation of the equipment and to contribute to the seamless integration of the IT equipment and services in the International Fusion Research Centre, in particular by providing support for the interface with the users. For this purpose, the two agencies conduct intensive preparation work.

A second special working group (SWG2) will start in 2011 to make recommendations on project selection procedures, user utilisation rules, and the role of an advisory committee to preside over the process.

In Phase Two (January 2012 - December 2016), the activity will be to effectively operate the system and to coordinate the time-sharing for users. It is also important to involve early in the process the fusion community, in order to ensure that the appropriate codes are developed for the simulation and modelling of ITER, of the other fusion experiments, and for the design of DEMO and future fusion power plants.

Remote Experimentation Centre (REC)

The Remote Experimentation Centre will aim to facilitate broad participation of scientists into ITER experiments. Remote experimentation techniques will be tested on existing machines, such as the Advanced Superconducting Tokamak. Preparatory activities will start in BA year 6, and the exploitation of REC will take place during BA years 9 and 10. Such operation will also require the existence of a sufficiently broadband network in Rokkasho. Negotiations were begun in 2010 with a view to its introduction in time for the operation of the Computational Simulation Centre. The future use of the REC on ITER will be discussed with the ITER Parties and IO.

Site

Site activities within the scope of the BA Agreement include the construction of the IFERC buildings and preparation of site infrastructure, and contribution to the management of the site, office equipment, insurance, and utilities (including data networks). The construction of the Administration and Research Building, CSC and REC Building, and the DEMO R&D Building, was completed in March 2010. PAs for further adaptations of these buildings are foreseen in 2010, and are to be completed in 2011, before installation and operation of the computer. PAs will also be prepared in 2011 regarding site management, etc.