

***Strategia de participare a Romaniei
la mari colaborari stiintifice internationale***

EURATOM - Fuziune

Florin Spineanu, Association EURATOM – MEdC Romania (INFLPR)

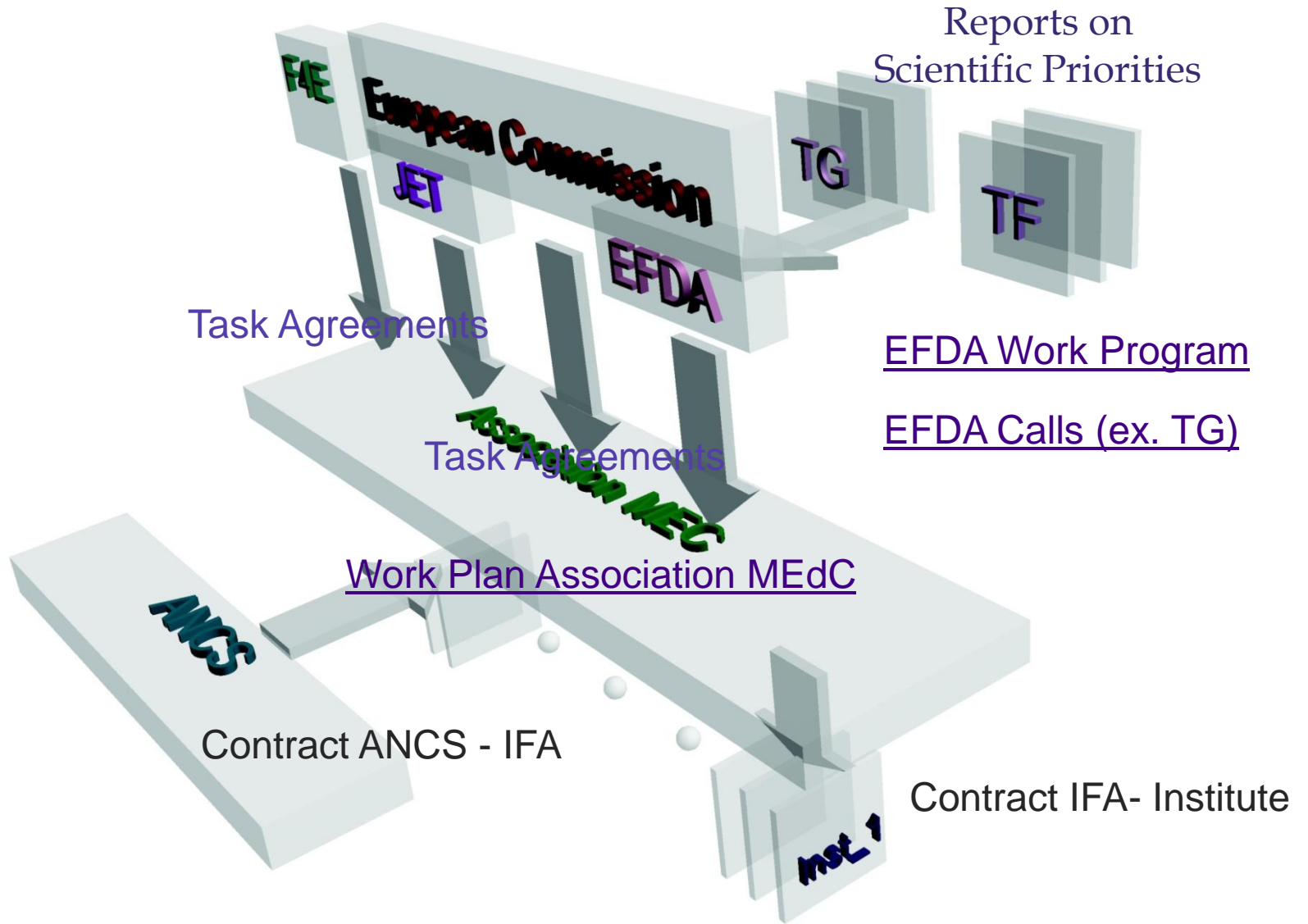
Scopul cercetarii de fuziune termonucleara controlata: o sursa masiva de energie sigura si ecologica

Logica aderarii la EURATOM: *Romania considera realizarea acestei surse (cuasi – ideale) de energie ca pe o problema proprie si isi modeleaza politica relatiilor cu alte entitati avand exclusiv in vedere optimizarea drumului pentru atingerea acestui obiectiv.*

Comisia Europeana conduce direct activitatile de cercetare in Domeniul fuziunii , prin DG-RTD K Energy

Documente de baza:

- Contract of Association
- European Fusion Development Agreement (EFDA)
- JET (Joint European Torus) Implementing Agreement
- Staff Mobility Agreement



Asociațiile EURATOM: o unica structura profesionala

TG, EFDA Work Programme + JET Work Programme, Calls

Task Agreements (Contracte Comisie – Association MEdC):

Rapoarte catre *Project Leader* si *EFDA Responsible Officer*
Reuniuni de Raportare
Project Board Meetings

Work Plan al Association MEdC :

Steering Committee
Aprobarea WP de catre Comisia Europeana
Annual Report pe pagina web a Comisiei Europene

Monitorizare profesionala:

EFDA Steering Committee
STAC (Scientific and Technical Advisory Committee)
CCE-FU
Meetings ale Head of Research Units

Uniformitatea procedurilor

Task Agreements

Order: Individual Task description (Sume, termene)

Notificari: Project Management Plan (Sume, termene)

Project Board Meetings

Bugetul Asociatiei

Steering Committee

Annual Accounts

Indicative Outturn

Contract Monitoring

Mobilities

Steering Committee

Comisia, prin Plan si Raport

Toate Unitatile de Cercetare din Asociatiile EURATOM – State Membre (+)

sunt Laboratoare ale unui Institut unic, cu sediul la Bruxelles
Regulile sunt aceleasi, fara exceptie

Fiecare cercetator din domeniul fuziunii este implicit coleg si colaborator
cu toti ceilalti participanti la cercetarea Europeana integrata de fuziune.

Strategia de colaborare este deci o *strategie de participare*

Distributed R&D 26 Associations in an Integrated Programme

Countries participating in the European Fusion Programme

- Euratom - CEA (1965)
France
- Euratom - ENEA (1980)
Italy (incl. Malta)
- Euratom - IPP (1981)
Germany
- Euratom - FOM (1982)
The Netherlands
- Euratom - FZJ (1982)
Germany
- Euratom - Belgian State
Belgium (incl. Luxembourg)
- Euratom - Risø (1970)
Denmark
- Euratom - UKAEA (1973)
United Kingdom
- Euratom - VR (1978)
Sweden
- Euratom - Conf. Suisse
Switzerland (1979)
- Euratom - FZK (1982)
Germany
- Euratom - CIEMAT (1988)
Spain
- Euratom - IST (1990)
Portugal

- Member States
- Countries associated to the Euratom Framework Programme
- Laboratories of Euratom Fusion-Associations



- Euratom - TEKE 3 (1996)
Finland (incl. Estonia)
- Euratom - DCU (1998)
Ireland
- Euratom - ÖAW (1998)
Austria
- Eur - Hellenic Rep (1998)
Greece (incl. Cyprus)
- Euratom - IPP-CR (1998)
Czech Rep.
- Euratom - HAS (1998)
Hungary
- Euratom - MEdC (1998)
Romania
- Euratom - Univ. Latvia
Latvia (2002)
- Euratom - IPPLM (2006)
Poland
- Euratom - MHE 3T (2006)
Slovenia
- Euratom - CU (2007)
Slovakia
- Euratom - INRNE (2007)
Bulgaria
- Euratom - LEI (2007)
Lithuania

Cu toate acestea, se poate defini un concept restrans de *colaborare* chiar in cadrul acestei structuri integrate

Obiective:

Dezvoltarea unei rezerve nationale de competenta in domeniu in vederea viitoarei exploatari a unui sistem energetic bazat pe fuziune

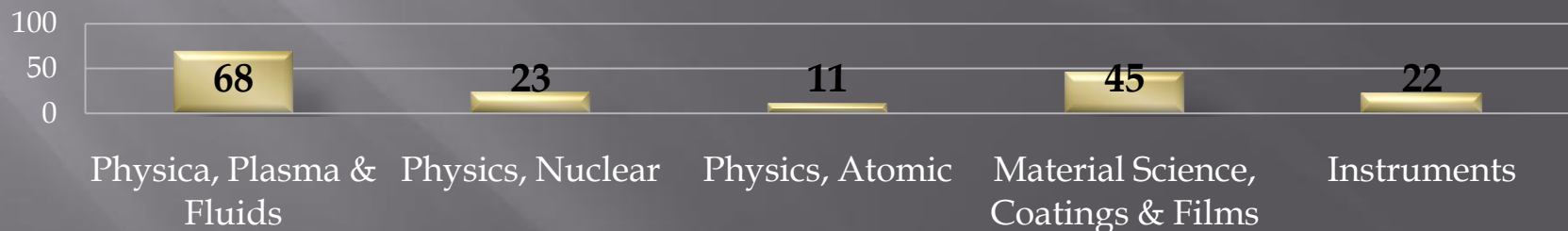
Cresterea competentei industriale si adoptarea unor tehnologii legate de instalatiile de fuziune

Obtinerea de contracte prin care resurse aflate la dispozitia comuna se atribuie pe baza competitionala celor care ofera solutiile cele mai bune.

De mare importanta este si urmatorul obiectiv:

Obtinerea, prin rigoare si competenta, a unei pozitii respectate si corect referentiata in cadrul general al colaborarii. Nu un rol periferic, lipsit de originalitate, in care sa fim alaturati demersurilor stiintifice originate in alte Asociatii. Nu doar o contributie corecta dar fara inventivitate; ci participare cu idei noi, sustinute cu forta sistematica (fenomenologie, analitic, simulare numerica, diagnostica, experiment).

Number of papers per area



Limitele in care putem cauta optimizarea participarii noastre

Comitetul Consultativ EURATOM Fuziune

Fusion Programme Roadmap 2012 – 2020

Objective 1: Delivering EU procurements for ITER

Objective 2: Preparing ITER operation

Objective 3: Training ITER Generation

Objective 4: Laying the Foundation for Fusion Power Plants

European Fusion Development Agreement

Objective 1: ITER Physics (update)

Objective 2: Power Plant Physics and Technology under EFDA

Directiile principalelor colaborari in cadrul strategiei

Campaniile Experimentale de la JET (Joint European Torus, Culham, Anglia). *Va trebui sa pregatim o propunere proprie de experiment.*

Colaborari din cadrul grupurilor agregate in arii tematice stabilite de EFDA – ITER – Physics Topical Groups (ariile tematice A1 - A11)

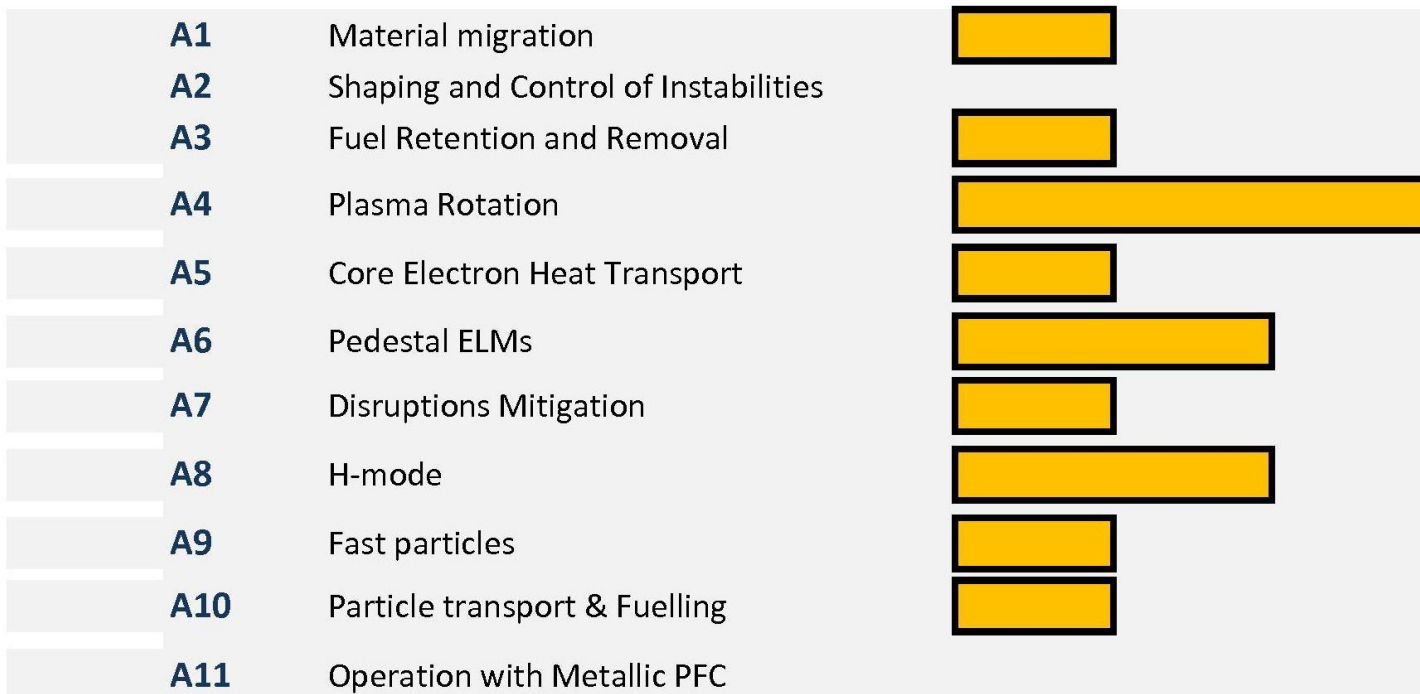
Power Plant Physics and Technology under EFDA: *participare la proiectare*

Integrated Tokamak Modeling (EFDA Task Force ITM). *Trebuie o propunere proprie de simulare numerica ampla.*

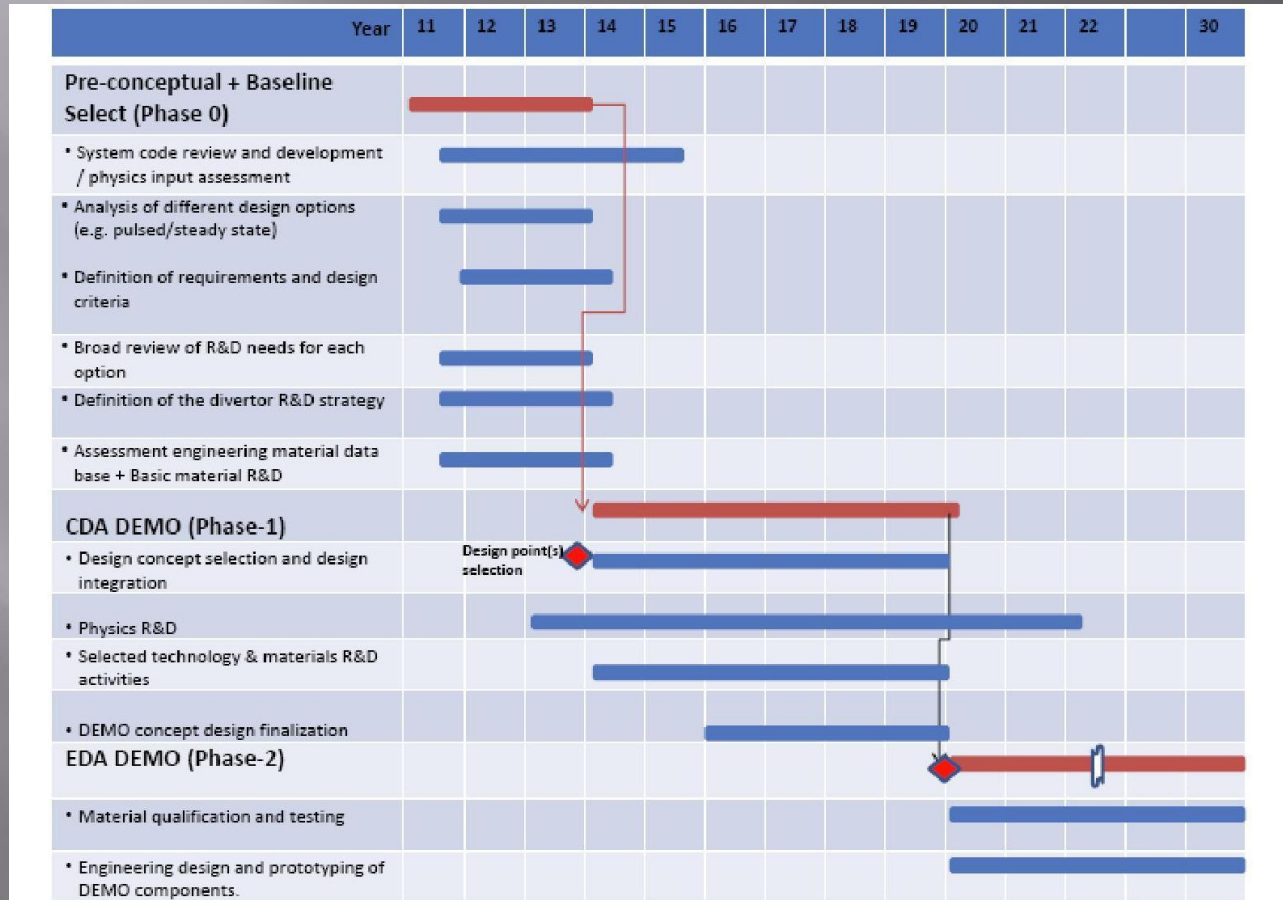
Materials (Task Force) & Fusion Technology at JET (Task Force)

Exploatarea instalatiilor europene care solicita colaborari in sistemul Asociatiilor (Colaborari cu caracter preponderent bilateral)
ASDEX (IPP Garching), Reversed Field Pinch Padova, Italia
Tokamakul FTU, Frascati, Italia

ITER Physics (EFDA)



Power Plant Physics and Technology under EFDA and DEMO (F4E)



Colaborari relativ stabile

Trebuie vizate centre care produc in mod sistematic valoare originala care percep colaborarea cu noi ca un *parteneriat*

Commissariat a l'Energie Atomique France								
Association Etat Belge								
IPP Garching								
KIT Karlsruhe								
IPP Milano								
FOM Nederland								

Proiecte prioritare

Experiment propriu (la JET, ASDEX, JT60, etc.)

Echipa de circa 10 persoane

2 ani

3,000,000 Lei

**Plasma Rotation, Reversal of toroidal rotation
Edge Localised Modes (break-up of current layer)
Pedestal scaling with ρ_{efectiv}**

Experiment prin simulare numerica (Proiect HPC-FF)

Echipa de circa 5 persoane

1,5 ani

800,000 Lei

Transport anormal de moment de miscare toroidal

Studiu (proponere originala) de migratie de impuritati din primul perete

Echipa de circa 5 persoane

1.5 ani

1,000,000 Lei

Tungsten, Beryllium

Scenarii de regimuri reactor in ITER

Echipa de circa 5 persoane

4 ani

2,200,000 Lei

Coduri de calcul existente (acces via ITM)

Proiecte care trebuie mentinute active la un nivel stationar cu perspectiva convertirii la alte subiecte

Fusion Technology at JET

Urmărirea comportării ITER-like Wall	echipa de 2 persoane	1.5 ani	400,000 Lei
Upgrade of JET diagnostics	echipa de 2 persoane	1.5 ani	400,000 Lei

Proiecte care se reduc progresiv

2 ani

1,000,000 Lei

Simulari numerice izolate (se transfera la ITM)

Materiale pentru primul perete (se transfera la DEMO sau PPPT)

Experimente asociate sau parazite (se vor integra in echipe experimentale la JET)

Raspuns la solicitari punctuale

EFDA (ITER Physics)

5 persoane / an 300,000 Lei

ITM Task Force

2 persoane / an 150,000 Lei

Materials Task Force

4 persoane / an 300,000 Lei

Strategia atragerii de personal (cercetatori experimentati si tineri)

Experimentati:

Stabilitate, inalt nivel stiintific, o structura bine organizata (Europa + ITER)
Simplitate organizatorica, care acum este deficitara

Tineri:

Masterat in fuziune

Cursuri facultative care sa fie cuantificate in curriculum

O fractiune din angajarile efectuate periodic sa fie rezervata fuziunii

Concluzii

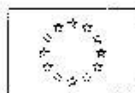
Fuziunea este intr-o perioada extrem de dinamica (ITER, etc.)

Este un model stralucit de integrare la nivel European si mondial (aceasta face ca strategiile nationale sa fie sever constranse, dar, prin compensare, sa beneficieze de o evolutie stabilita de experti)

Fara echivoc: exista proiecte care NU trebuie finantate precum si proiecte care trebuie sustinute energic.

Filozofia de a sustine preeminenta originalitatii (in mod prioritar fata de o subalteritate productiva si onesta) trebuie inca evaluata, ea implica si riscuri.

Fuziunea trebuie sa fie in focarul atentiei comunitatii din cercetare.



EUROPEAN COMMISSION
RESEARCH DIRECTORATE-GENERAL

Directorate J - Energy
Fusion association agreements

Brussels, 31 October 2008
RTD-J-1/FC/D(2008) 583011

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Subject: Association Work Programmes for 2009

Dear Mr. Spineanu,

It is now time to prepare the 2009 Association Work Programmes in order that they can be approved by their Steering Committees before the end of the year.

The enhanced role of EFDA in the programme has already been reflected in the 2008 Work Programmes, where contributions by Associations to EFDA-coordinated activities have been identified. This should also be done for the 2009 Work Programmes since we wish to further reinforce their orientation towards the EFDA priorities. To assist you a copy of the consolidated EFDA 2008/09 Work Programme, including all the elements approved by the EFDA SC, is annexed here (**Attachment 1**).

The Commission members of the Steering Committee will seek the opinion of the EFDA Leader on the EFDA-relevant aspects of the draft Work Programmes. This consultation will also take account of possible additional elements in the EFDA Work Programme which are still to be agreed.

I therefore kindly request that you prepare a draft of the 2009 Work Programme of your Association in the standardised format using the blank template in **Attachment 2** to this letter. Compared to the 2008 template, the only change is a clarification of how cooperations should be presented. Your budget proposal for 2009 should be prepared at the same time, bearing in mind that the overall budget will continue to be constrained.

Some Associations have already prepared a first draft for discussion at a recent Steering Committee meeting. In this case, you are requested to check that the presentation of cooperations is consistent with the updated list shown in **Attachment 2**, to make any changes resulting from discussion at the meeting and to send an updated version to us, if necessary.

In all cases, we encourage you to discuss the preparation of the final draft Work Programme with the scientific officer in Unit J4 with responsibility for your Association¹.

The following timetable shows the important dates:

- **Deadline Friday 21 November 2008:** Final draft 2009 Work Programmes and a budget proposal to be sent to the Commission, by email to the scientific officer in Unit J4 with responsibility for your Association, with a copy to Doug Bartlett (douglas.bartlett@ec.europa.eu).
- **Deadline Friday 19 December:** agreement of the Association Steering Committees to the Work Programmes, either at an already scheduled meeting or by written procedure.

A discussion on these matters will be included in the upcoming Association Steering Committee meetings.

Thank you in advance for your co-operation.

Yours sincerely,



Y. Capouet
Head of Unit J4

cc: O Quintana Trias, F Rille, J Pamela, F Romanelli

Attachment 1: Consolidated EFDA Work Programme.

Attachment 2: Association 2009 Work Programme template

¹ This contact person is one of: Rosa Antidorni, Steven Beech, Ruggiero Giannelis.

EFDA Work Programme 2008 and 2009 (non-JET elements of the WP)

Recommendation:

The EFDA Steering Committee is invited to approve the elements of the 2008 and 2009 EFDA Work Programme presented in this document.

Executive Summary

The non-JET elements of the EFDA Work Programme comprise several chapters:

- Chapter III: Coordinated Activities on Plasma Scenario Development for ITER and DEMO
- Chapter IV: Coordinated Activities on Plasma Wall Interaction
- Chapter V: Coordinated Activities on Theory and Integrated Modelling
- Chapter VI: Emerging Technologies
- Chapter VII: Other Activities

The area Plasma Scenario Development for ITER and DEMO (Chapter III) will be structured along the Research and Development missions, as specified in the Chapter 4 of the document "Seven R&D Missions for the European Fusion Programme" issued in February 2008^{*}. These include the research areas on Burning plasmas (Section III-1), Reliability of Tokamak operation (Section III-2), Compatibility of plasma scenarios with first wall (Section III-3 in close link with the Work Programme of the Plasma Wall Interaction Task Force in section IV), Long pulse and steady state operation (Section III-4), Predicting Fusion Performance (Section III-5) and DEMO physics and plasma scenarios (Section III-6). The implementation of the Coordinated Activities on Plasma Scenario Development for ITER and DEMO will be done via the EFDA Topical Groups, in particular, via Transport, MHD, Heating & Current Drive and Diagnostics Topical Groups. In particular, issues related to predicting fusion performance as specified in Chapter 4 of the document "Seven R&D Missions (...)"¹ will be addressed, among other issues, within the framework of the Transport Topical group in Section III-5 and Section V-1.

Tasks described under Chapter IV relate to R&D Missions 2 and 3 (Reliability of Tokamak operation and Compatibility of plasma scenarios with first wall) and are foreseen to be all implemented under the FWI Task Force.

The integrated modelling activities focussing the long term modelling requirements for ITER and DEMO will be addressed under Section V-2 within the Integrated Tokamak Modelling Taskforce (ITM-TF) Work Programme. These correspond to R&D Mission 5 Predicting Fusion Performance.

Chapter VI includes at present diagnostics in support to ITER construction, Heating and Current drive technologies (which correspond to R&D Mission 4) and Materials R&D (corresponding to R&D Mission 6). These activities will be implemented respectively with the Diagnostics Topical Group, H&CD Topical Group and Fusion Materials Topical Group.

^{*} The European Fusion Research Programme: Positioning, Strategic outlook and need for infrastructure towards DEMO February 2008.

Chapter VII comprises the SERF programme (VII.1), Public Information (VII.2 already approved at EPDA SC) and training activities (VII.3 Goal Oriented Training and Fusion Researcher Fellowships).

Implementation and Resources

The *EFDA Work Programme* is constituted of the *High Priority Tasks*², that are proposed for implementation in the forthcoming calls for participation. In order to provide a consistent scientific picture, the document also presents in *Chapters III and V.1* activities under light co-ordinating by Topical Groups in specific *Research Areas*³, which could yield further tasks to be implemented in future call for participations, and are therefore mentioned in the present document *for information only*.

To distinguish between the Tasks proposed for implementation and Research Areas, *Tasks constituting the Work Programme under Chapters III are presented in boxes*.

Resources under EPDA Art. 5, Priority Support, for the two years 2008 and 2009 are presented in Table 1.

Resources under EPDA Art. 5, Baseline Support, for the two years 2008 and 2009 are presented in Table 2.

Resources under EPDA Art. 7, for the training programme 2008 are presented in Table 3.

Use of Priority Support

The use of priority support targets very high priority research areas for ITER, where urgent R&D is needed. These include, in the area of Transport studies: the role of turbulence and long-range correlations during the development of edge transport barriers; in the area of MHD, specific disruption studies such the development of better diagnostics; in the area of heating and current drive, the development of Lower Hybrid current drive in support of ITER and in the area of diagnostics, developments directly related to ITER and/or in support of physics developments.

In addition, priority support is used where deemed appropriate in support of co-ordinated multi-machine experiments, for co-ordination of activities and in other high priority research areas.

EFDA Work Programme 2008 and 2009

**Table 1: Summary of resources under Art. 5, Priority Support
(Euratom contribution)**

Priority Support		2008	2009
Chapter 3		13 ppy (9.1+3.9)	23 ppy (26.9-3.9)
		396 k€ hardware (440-64+20)	180 k€ hardware*
Chapter 4	PWI	33.81 ppy (13.36 + 18.45+2)	
		224 k€ hardware* (112+112)	
Chapter 5	ITM	10.48 ppy	18,5 ppy
	Gateway Operation**	212 k€ Operation*	
	Transport		7.2 ppy (1.5+5.7)
			168 k€ hardware*
Chapter 6	Materials	15.73 ppy (6.53+9.2)	
		233.04 k€ hardware* (87.12+145.92)	
	Diag & CD	7.5 ppy (5.5+2) 64 k€ hardware	6 ppy (8-2)
	Dust.&Tritium		15.5 ppy 60 k€ hardware*
Chapter 7	Public Information		1 ppy
Reserve***			143 k€ Reserve
Total		80.52 ppy****	71.2 ppy****
		917.04 k€ Hardware	408 k€ Hardware
total in k€ (EC contribution)		2873 k€ (1673+1000+200)	2260 k€ (3260-1000)
		(3085 k€ including Gateway)	

EFDA Work Programme 2008 and 2009

Table 2: Summary of resources under Art. 5, Baseline Support

Art 5	Baseline Support		2008	2009
	Chapter 3		25.5 ppy	47.3 ppy
	Chapter 4	PWI	73.8 ppy	75 ppy
	Chapter 5	ITM	27.3 ppy	36 ppy
		Transp		12.5 ppy
	Chapter 6	Material	47.3 ppy	50.9 ppy
			933 k€ hardware and operation*	1388 k€ hardware and operation *
		Diag & CD	7.7 ppy	12.8 ppy
	Chapter 7	SERF	9.4 ppy	9.4 ppy
	Total		191.0 ppy	243.9 ppy
			933 k€ Hardware and operation	1388 k€ Hardware and operation

EFDA Work Programme 2009
are 197 pagini

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To Relational Scheme](#)

To the Heads of Research Units in EU Fusion
Associations and to the Representatives of the
new Member states and associated countries

Dear Colleagues,

**Subject: EFDA Work Programme 2008 and 2009
Second Call for Participation and Call for Interest – MHD, Diagnostics,
H&CD and Transport**

On 22 July 2008, the EFDA Steering Committee approved the EFDA 2008-2009 Work Programme, including additional identified tasks related to MHD, Diagnostics, H&CD and Transport for which resources under Priority Support had been specified. The purpose of this letter is to invite participation of your Association in these activities.

The activities in this Call will be implemented in three Task Agreements under EFDA Article 5:

Physics Coordination (Typical Groups)

- **WP08-DEM-01** Demo physics and plasma scenarios
- **WP08-DIAG-02** Diagnostic Developments
- **WP08-H&CD-02** Heating & Current Drive Physics
- **WP08-H&CD-03 and 04** Heating & Current Drive Technologies
- **WP08-MHD-01 to 05** MHD
- **WP08-TGS-02** Diagnostics for Physics Studies

Some of the tasks will be implemented in two phases:

Phase I: feasibility study

Phase II: hardware development and/or dedicated experiments on tokamaks or other devices.

All tasks for whom to be implemented in two phases are presently subject to (i) a Call for Participation for their Phase I and (ii) a Call for Interest for their Phase II. Only those Associations having expressed an interest for Phase II will be involved in the Call for Participation in Phase II.

The document supporting this Call (see [Typical Groups Call September 2008.doc](#)) includes deliverables and milestones associated with each task and estimated manpower needs for the 11 proposed Task Agreements.

All responses should be entered into the five tables under the section **Association Proposal (p. 78)**, in which you are requested to complete:

- in Table 1 (Activities proposed under Baseline Support) the Association name, the activities or deliverables you propose to contribute to, a short description of the proposed contribution and the amount of manpower involved;
- in Table 2 (Call for Interest to participate in Phase II) the Association name and short description of contribution you would like to declare an interest in;
- in Table 3 (Activities proposed under Priority Support) the Association name, and a summary of the activities or deliverables you propose to contribute to, a short description of the proposed contribution and the breakdown of manpower, hardware expenditure etc.; Staff proposed for work under Priority Support will be selected on the basis of their experience and skills, the proposed commitment in the task and the Association or research group relevant experience.
- in Table 4 (Response sheet for Priority Support tasks) more detailed information on skills and commitments proposed under Priority Support activities;
- in Table 5 your proposal for Mobility support related to the work proposed.

Should your Association be interested in participating in these Tasks, you are kindly invited to send your answer by Friday 25 October 2008 at the latest to the EFDA RO Duarte Borba (duarte.borba@efda.org) with copy to Administration (jeanie.humphreys@efda.org).

Should you have any question related to this Call, please contact either Duarte Borba or the respective Topical Group Chairs directly:

Piero Martin (MHD)	piero.martin@tel.cnrs.fr
Alain Bécoquet (H&CD)	alain.becoquet@cea.fr
Tony Donné (Diagnostics)	A.J.L.Donne@rijnhuizen.nl
Carlos Hidalgo (Transport)	carlos.hidalgo@ciemat.es

or the Responsible Officers in the Close Support Unit

Boris Weyssov	boris.weyssov@ekla.org (H&CD, Transport)
Daniilo Pacella	daniilo.pacella@efda.org (Diagnostics)
Duarte Borba	duarte.borba@efda.org (MHD)

Yours sincerely,



Jacqueline Pernale
EFDA Leader

Encl:
Topical Groups Call September 2008.doc

cc: A. Bradshaw (Chairman of the EFDA Steering Committee), Y. Capocet (EC), F. Cinesotto (Chairman of STAC), F. Romaneli (EFDA-JET), D. Borba (EFDA), Ruggiero Giannella (EC), Gabriela Saibene (J4E).

EFDA 2008-2009 WORK-PROGRAMME

Call for Participation
including a Call for Interest

Second call for the programme under the Heating & Current Drive,
MHD, Transport and Diagnostics Topical Groups

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The “Co-operation” column indicates where all or part of the work towards a particular objective is to be carried out within the framework of one of the fusion programme’s co-operative structures. The codes used are:

JET Task Forces:	JET-D (Diagnostics and Systems) JET-E (Exhaust) JET-H (Heating) JET-S1 (Scenario 1) JET-T (Transport)	JET-DT (Deuterium-Tritium Operation) JET-FT (Fusion Technology) JET-M (MHD) JET-S2 (Scenario 2)
EU Task Forces:	TF-ITM (Integrated Tokamak Modelling)	TF-PWI (Plasma Wall Interaction)
EU Topical Groups:	TG-D (Diagnostics) TG-M (Materials) TG-T (Transport)	TG-H&CD (Heating and Current Drive) TG-MHD (MHD)
ITPA Topical Groups:	IT-T&C (Transport and Confinement) IT-S (Stability) IT-EPP (Energetic Particle Physics) IT-D (Diagnostics)	IT-EP (Edge Pedestal) IT-S&D (SOL and Divertor) IT-IOS (Integrated Operational Scenarios)
Other international:	IEA (IEA Implementing Agreement)	BL (Bilateral Agreement, please show partner country)

As well as the codes, please enter in the “Co-operations” column an indicative PPY for the contribution of your Association to the EFDA co-ordinated activities under JET-, TF- and TG (not required for IT and other international).

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Directorate J - Energy (Euratom)
Fusion association agreements

Brussels, 19 December 2008
R(2008) 598567

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Ref. Association Euratom/MEDC : Work Programme 2009

Dear Mr. Spineanu, *Am Florin,*

I am pleased to confirm that the Euratom members of the steering committee of the Association Euratom/MEDC are in agreement with the 2009 Work Programme attached to your e-mail sent on 24/11/2008.

In the course of 2009, we will update this Work Programme, should there be a need in the light of further developments in the EFDA Work Programme.

Yours sincerely, *Yvan Caponot*

Yvan Caponot
Head of Unit

Cc.: D. Bartlett, S. Booth, P. Siniscalchi

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