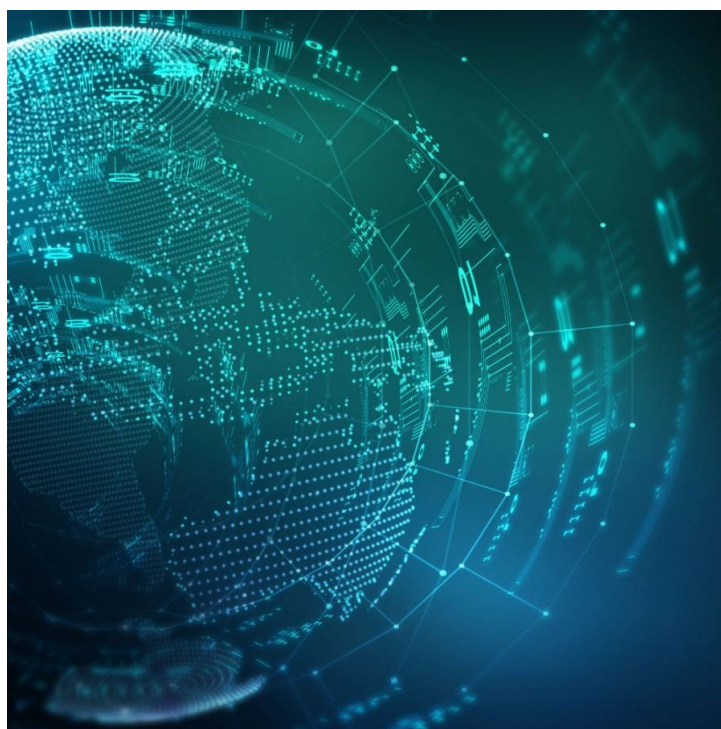


Fusion R&D priorities



a strategic discussion and webinar led by the
Fusion Power Co-ordinating Committee (FPCC)

24 January 2018 14h-18h00

ITER
Route de Vinon-sur-Verdon
St. Paul Lez Durance, France

International Energy Agency (IEA)

The IEA works to ensure reliable, affordable and clean energy for its 29 member countries and beyond. Our mission is guided by four main areas of focus: energy security, economic development, environmental awareness and engagement worldwide.

The IEA carries out a comprehensive programme of energy co-operation among 29 advanced economies¹. The Agency aims are to:

- Secure member countries' access to reliable and ample supplies of all forms of energy; in particular, through maintaining effective emergency response capabilities in case of oil supply disruptions.
- Promote sustainable energy policies that spur economic growth and environmental protection in a global context – particularly in terms of reducing greenhouse-gas emissions that contribute to climate change.
- Improve transparency of international markets through collection and analysis of energy data.
- Support global collaboration on energy technology to secure future energy supplies and mitigate their environmental impact, including through improved energy efficiency and development and deployment of low-carbon technologies.
- Find solutions to global energy challenges through engagement and dialogue with non-member countries, industry, international organisations, and other stakeholders.

Directed by its member countries, the IEA has developed close co-operative working relationships with major emerging economies. Since 2015, Brazil, China, India, Indonesia, Morocco, Singapore and Thailand activated Association status with the IEA. The Agency also works extensively with other countries in the Black Sea and Caspian regions as well as the Middle East and North Africa. Combined, the IEA co-operates with more than 69 countries worldwide.

IEA Energy Technology Network

The IEA Energy Technology Network is a co-operative group of more than 6,000 experts who support and encourage energy technology collaboration.

[Committee on Energy Research and Technology \(CERT\)](#)

Comprised of senior experts from IEA member governments, the Committee on Energy Research and Technology (CERT) considers effective energy technology and policies to improve energy security, encourage environmental protection and maintain economic growth. Under the guidance of the IEA Governing Board, the CERT oversees the technology forecasting, analyses and the research, development, demonstration and deployment (RDD&D) strategies of the IEA Secretariat, notably through its flagship publication, *Energy Technology Perspectives*, and the series of energy technology roadmaps. The CERT is supported in its work through four working parties, including the Fusion Power Co-ordinating Committee.

[Fusion Power Co-ordinating Committee \(FPCC\)](#)

The objective of the FPCC is to enhance fusion RDD&D activities with a strategic approach to realising fusion energy in both IEA member countries and key partner countries. The FPCC accomplishes this objective by promoting, initiating and co-ordinating international co-operative experiments of the IEA member countries participating in the FPCC, the partner country representatives, the FPCC Steady State Operations Coordination Group (SSOCG), and the participants in the eight specialised [Technology Collaboration Programmes \(TCPs\)](#).

¹ Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea (Republic of), Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States. The European Union also participates in the work of the IEA.

Rationale

Introduction

The FPCC strategic sessions enable the fusion research community, and public and private sector stakeholders to share experiences and lessons learned in addressing the challenges towards realisation of fusion power. This session addresses an objective of the FPCC Strategic Plan strategy 2018-2020: to accelerate knowledge transfer between fusion devices and joint experiments by highlighting and examining cross-cutting issues. This includes stimulating and rationalising R&D (including the important role of the IEA Technology Collaboration Programmes, or TCPs) and to support the ITER programme.

The state-of-play of fusion R&D

To set the scene, data collection of public research activities among IEA member countries, selected Partner countries and the IEA TCPs was conducted. This mapping enables an overview of research priorities, capabilities and remaining barriers for fusion research, and the role of fusion within the overarching energy framework. The aim is not to rally support for further investments, but rather to carry out an objective assessment of current activities.

Fusion requires long-term investment and correspondingly huge potential for global returns, requires adequate, sustained government support and international collaboration. The issue of costs of fusion research is one that attracts attention. Yet public expenditures on research for energy represents only 4% of total R&D for all sectors, and fusion R&D represents 7% across all energy R&D.² For this reason at COP21 in Paris, 21 countries pledged to double their energy R&D budgets through a global initiative: [Mission Innovation](#). With any energy source the sustainability of fuel supply, environmental impacts, safety, value chains, employment or other socio-economic issues are also considered, in particular as the energy source moves from theory to practice, from prototype to demonstration plant, and ultimately deployment.

Industry R&D needs

Transferring scientific knowledge into applications presents some challenges but also considerable benefits to the private sector and to civil society. The OECD estimates that 50–70% of productivity (GDP) growth arises from innovation³ and others would estimate the return on investment at 30-100%. There are numerous cases of spill-overs from publicly funded research to the private sector⁴, such as magnetic resonance imaging (MRI) used for health, which benefitted from developments of super conductors driven by fusion research. Building the ITER components has enabled the ITER Parties to create manufacturing capacities in a wide range of technologies.

ITER R&D challenges, needs and the way forward

While progress is being made on the scientific, technical and material issues, maintaining the momentum remains a considerable challenge. As highlighted in the 2016 strategic session “[Gaps Analysis in Strategic Research Priorities in Support of DEMO](#)”, roadmaps to successful demonstration of fusion energy were presented: China, India, Japan, Korea, the United States and Europe (Fusion for Energy). Further efforts to align these programmes would strengthen the groundwork for a sustainable energy future. Therefore now is the time to increase co-operation in order to accelerate results.

Outcomes expected

Outcomes expected include enhanced or new co-operation among fusion research efforts worldwide. The FPCC will synthesise the discussions and communicate the key messages with near-term relevance to the CERT and to policy makers, relevant industries, and civil society.

² OECD (2017) OECD.Stat (stats.oecd.org) data extracted on 13 Dec 2017 13:21 UTC (GMT) and IEA RD&D Online Data Service (www.iea.org/statistics) data extracted on 13 Dec 2017 13:30 UTC (GMT).

³ Nature (2010), Macilwain, C. “[What Science is Really Worth](#)”, published online 9 June 2010 | Nature 465, 682-68.

⁴ ScienceProgress (2012), Erickson, J. “[The High Return on Investment for Publicly Funded Research](#)”, 10 Dec 2012.

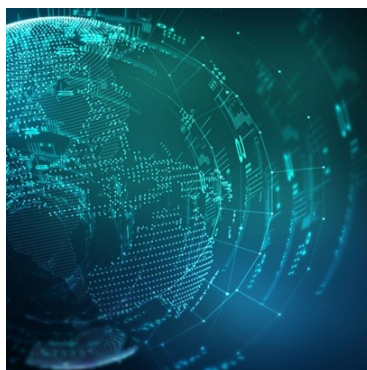
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AGENDA

14:00	Introductory remarks <i>Chair, Fusion Power Co-ordinating Committee</i>
14:15	State-of-play of fusion R&D <i>Carrie Pottinger, International Energy Agency (IEA)</i>
14:45	Industry R&D needs <i>Fusion for Energy (F4E)</i>
15:15	<i>Break</i>
15:30	ITER R&D challenges, needs and the way forward <i>Bernard Bigot, Director-General, ITER</i>
16:00	Roundtable Discussion <i>Moderator: FPCC Chair</i>
	<i>Questions for discussion with Technology Collaboration Programmes:</i> • <i>What are the current R&D priorities for ITER and beyond?</i> • <i>Which R&D priorities require enhanced international collaboration?</i> • <i>How can Technology Collaboration Programmes contribute?</i>
17:30	Wrap-up and closing remarks <i>Chair, Fusion Power Co-ordinating Committee</i>
18:00	Meeting close



Presentations and proceedings of the meeting are available at
www.iea.org/workshops/http://www.iea.org/workshops/

For further information about the Fusion Power Co-ordinating committee, see
www.iea.org/aboutus/standinggroupsandcommittees/cert/fpcc/