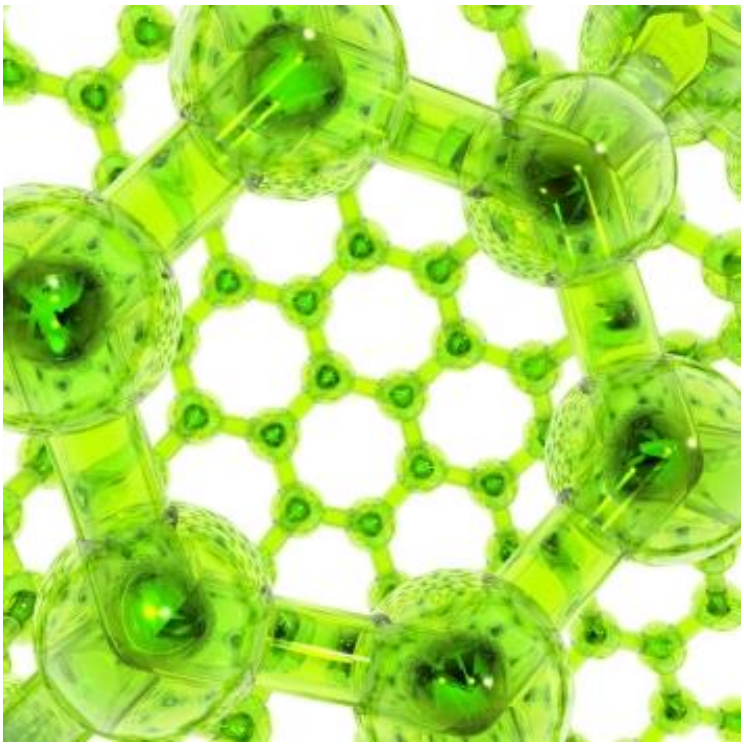
ADVANCING MATERIALS RESEARCH FOR POWER GENERATION



a strategic discussion led by the

Fusion Power Co-ordinating Committee (FPCC)

28 January 2015

14h-18h00

International Energy Agency
9, rue de la Fédération
75015 Paris

International Energy Agency (IEA)

The IEA is an autonomous agency, was established in November 1974. Its mandate is two-fold: to promote energy security amongst its member countries through collective response to physical disruptions in oil supply and to advise member countries on sound energy policy. The IEA carries out a comprehensive programme of energy co-operation among 28 advanced economies[1], each of which is obliged to hold oil stocks equivalent to 90 days of its net imports. The Agency aims 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.

Since the 1980s, the IEA has continued to build good working relationships with countries beyond its membership, in particular major energy consuming, producing and transit countries. Countries with which the IEA seeks enhanced engagement, or key Partner countries (Brazil, China, India, Indonesia, Mexico, Russia and South Africa). Co-operation with these and other partner countries cover a wide range of activities, from joint workshops to in-depth surveys of specific energy sectors or data exchange. Combined, the IEA co-operates with more than 69 countries worldwide.

IEA Energy Technology Network

The IEA Energy Technology Network is an ever-expanding, co-operative group of more than 6,000 experts that support and encourage global technology collaboration. At the head of this vast network is the Committee on Energy Research and Technology (CERT). The CERT is supported in its work through four topical working parties, including the Fusion Power Co-ordinating Committee.

Committee on Energy Research and Technology

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 also provides guidance to its working parties and experts' groups to examine topics that address current energy technology, or technology policy, issues.

Fusion Power Co-ordinating Committee (FPCC)

Created by the IEA Governing Board in 1975, the objective of the FPCC is to enhance fusion research, development, demonstration and deployment (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-operation on fusion carried out under the fusion Implementing Agreements.

[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 Commission also participates in the work of the IEA.

ISSUES FOR CONSIDERATION

Addressing energy security and environmental protection

As recent IEA analyses have consistently highlighted, the world is facing unprecedented energy challenges. The continued use of traditional sources of energy combined with the increasing need for energy in regions with high economic growth are serving to make ever more difficult efforts to curb the rise in global greenhouse gas emissions. Research and development ('R&D') to find new sources of energy and technologies, and to improve the efficiency of existing technologies, will be central to resolving the impasse.

As highlighted in the IEA's *Tracking Clean Energy Progress 2014*, even in spite of impressive increases in stimulus spending in several OECD countries in recent years, the average share of energy in total national R&D expenditure across OECD countries has remained disappointingly low compared to national spending in other R&D arenas such as health and defence.

At the same time, recent years have witnessed growth in absolute terms in national budget allocations for energy R&D globally, as well as a rise in the share of emerging economies in global energy innovation and energy R&D. Now more than ever, significant additional efforts are needed to deploy available technologies and to continue efforts towards technology breakthroughs that will enable a sustainable energy future.

Technologies with significant potentials

Increasing R&D funding will support the move to markets of those emerging technologies with significant potential to increase security of supply and greenhouse gas reductions across sectors: ultra-super-critical coal-fired power plants, energy storage (hydrogen, electricity, thermal), carbon capture and storage, photovoltaic and fusion. Yet each of these energy technologies or carriers have considerable R&D barriers to their further development and deployment - each related to materials. For this reason materials research is a strategic scientific priority for many countries worldwide. The supply of rare earth minerals or critical materials, methods for testing and benchmarking, managing extremely high temperatures, as well as the effects of gases on chamber wall materials are the focus of research of relevance to all these areas.

The potential of energy from fusion

Fusion energy is the focus of much R&D worldwide, including materials. The ITER prototype project is a bridge towards a first plant that will demonstrate the large-scale production of electrical power and tritium fuel self-sufficiency: the demonstration power plant (DEMO). DEMO will lead fusion into its industrial era by putting fusion power into the grid as early as 2040. By the last quarter of this century, if ITER and DEMO are successful, electricity from a low-carbon, environmentally friendly source could become commonplace.

The role of the FPCC

The FPCC is strongly committed to advancing research to develop large base-load, clean power to the electricity network in the most efficient manner possible. A strategic objective of the FPCC is to accelerate knowledge transfer between fusion devices and experiments by highlighting and addressing cross-cutting issues. This workshop will provide insights for the FPCC in support of DEMO, a strategic objective of the FPCC for the period 2015-2017.

Through this special session dedicated to recent advances in materials science the FPCC provides the platform for scientists and experts involved in materials research to share knowledge and gain insights. This event will benefit from recent discussions from the CERT strategic session on rare earth minerals and critical materials (June 2012).

IEA Fusion Power Co-ordinating Committee (FPCC)

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AGENDA

TIME	ITEM
14:00	**Setting the scene: in preparation for DEMO** *Thomas Vanek, Chair, Fusion Power Co-ordinating Committee*
14:30	**Materials for Nuclear Fission and Fusion Reactors** *Dr. Richard Kamandje, Physics Section, International Atomic Energy Agency*
15:00	**Advanced Steels, Structural Materials, and High Heat Flux Components** *Dr. Michael Rieth, Karlsruhe Institute of Technology, Project Leader of WPMAT, EUROfusion Consortium*
15:30	Break
15:45	**Recent advances in materials research for nuclear fusion** *Dr. Peter Pappano, Chair, Implementing Agreement for a Programme of Research and Development of Fusion Materials*
16:15	**Nuclear science and materials for advanced fuel cycles and nuclear waste transmutation** *Dr. Concetta Fazio, DG Joint Research Centre, Institute for Transuranium Elements , Materials Research Unit, European Commission*
16:45	**Roundtable Discussion** *Moderator: Mr. Thomas Vanek, FPCC Chair*
17:45	**Closing comments** *Mr. Thomas Vanek, FPCC Chair*
18:00	Close

For further information about the Fusion Power Co-ordinating committee, see
www.iea.org/topics/nuclearfissionandfusion/

Photo courtesy of the National Science Foundation has awarded NYU researchers and their colleagues at Caltech a $2 million grant to develop cutting-edge nanomaterials that hold promise for improving the manufacturing of advanced materials, biofuels, and other industrial products. ©iStockPhoto.com/Shunyu F