

Training and securing of personnel for the promotion of fusion energy developments

Science and Technology Committee on Fusion Energy: 28 March 2018 (overview)

Purpose of this proposal

- Consistent, long-term R&D will be needed to achieve fusion energy, necessitating the training and finding of personnel who will be able to stay working on such a project for the long haul. We propose sorting out the challenges and taking specific, urgent, and long-term actions.

Professional development today

- A large disparity exists between the number of personnel that will be required and the number currently focusing their efforts on fusion energy development.
- The weight given to fusion research within overall plasma research at universities is declining. Rates of advance to doctoral programs are also on a downward trend in comparison with 2006.
- Although Japan is expected to make great contributions internationally to the ITER project, only a small percentage (~3%) of ITER Organization staff are Japanese.

Required skills and abilities

- The basic ability to develop individual techniques; high expertise in problem solving; and the skill to apply those in a practical manner
- A broad perspective capable of taking in the big picture; the ability to integrate various individual techniques
- Leadership and the ability to work in international co-creation on international projects such as ITER
- Dialog and outreach ability – to explain to society at large in an easy-to-understood manner
- Humanities and social sciences knowledge needed for precise analysis of social situation

Preferable environment

- It will be necessary to create an environment conducive to training and turning out personnel who will be responsible for the DEMO reactor on a continuous and steady basis, with a long-term plan; as well as one conducive to securing and further training such personnel.

Graduate school education

We need to promote academic research, maintain and bolster an environment for basic research in order to increase the number of doctoral candidates.

Personnel mobility

We need to partner domestic R&D with ITER project and BA activities; and to develop such partnerships as a system for knowledge circulation.

Outreach

We need to promote understanding and inspire interest in fusion R&D among all ages, including children.

Challenges

Building an educational program to teach a broad and varied range of specialization; and bringing together industry and academia in order to gain experience with manufacturing and system integration

Creating broad personnel mobility among industry and academia, including the ITER Organization and establishing appealing career paths

Social partnership work, including outreach, incorporating the need to recruit work-ready personnel and to secure future personnel, and promoting public acceptance

Specific actions

- Build a comprehensive fusion education system through intercollegiate partnerships
- Combine graduate school education with research by large experimental devices at domestic and abroad
- DEMO R&D through the combination of graduate school education and training of young scientists
- Graduate school education linked to industry
- Plan workshops for students and young researchers
- Create opportunities to match corporations and graduate students
- For longer-term actions:
 - Promote cross-sectoral graduate school education
 - Set a curriculum that envisions the incorporation of other disciplines

- Set up a system of placement with the ITER Organization based on a hierarchy that includes graduate students, young researchers and seniors
- Flexible placement system that includes maintaining the person's domestic position before being placed with the ITER Organization
- Effective promotion to recruit ITER Organization employees
- Set up a domestic cross-appointment system
- Get more corporations to join the Joint Special Design Team for Fusion DEMO
- For longer-term actions:
 - Link related areas of research with related projects
 - Conduct a follow-up investigation of career paths taken

- Set up an outreach headquarter and draft a plan to promote its activities
- For longer-term actions:
 - Train and secure personnel to promote outreach activities
 - Run outreach activities
 - Lobby to get fusion energy into textbooks and supplementary educational materials