

## Research and Development Infrastructure Task Force

### R&D infrastructure

Today's research infrastructure needs, from R&D to demonstration and deployment, cover major scientific equipment, scientific collections, structured information, information and communications technology (ICT)-based infrastructures. These facilities are single-sited or distributed throughout several countries. GIF member countries are faced with a wide spectrum of issues related to infrastructure, many of which are globally unique and regionally distributed. A great deal of stakeholders are involved, from ministries to researchers and industry, with an underlying and growing use of e-infrastructure. Research infrastructures present opportunities for, and yet difficulties in, interactions between basic research and industry. Public and private funding appears to always be lacking, and individual countries do not have the critical mass or the dimensions to implement large research infrastructures. There is therefore a real need to co-operate on a broad international level. Substantial research, development and demonstration (RD&D) of systems' conceptual/detailed designs are needed, as are other analyses. Refurbishment and/or construction of research infrastructure and facilities are increasingly complex and costly. By identifying the latest R&D needs and mapping infrastructure, opportunities exist to plan for the shared use of existing facilities and to undertake the development of others. The most important priorities are in the areas of the fuel cycle, fuel and materials irradiation, reactor safety, dedicated loops, mock-ups and test facilities, advanced simulation and validation tools, and transnational access to infrastructures, as well as the education and training (E&T) and knowledge management (KM) of scientists and engineers. GIF members strongly support a co-ordinated revitalization of nuclear RD&D infrastructures worldwide to a level that would once again help move forward in an accelerated manner a new generation of reactors.

### Background/terms of reference

**Background:** At the 43<sup>rd</sup> GIF Policy Group (PG) meeting held on April 2017 in Paris, France, it was decided to establish the new GIF Task Force on R&D Infrastructure (RDITF). This task force accomplished its objectives over a short duration

and took maximum benefit from the results through a dedicated workshop that was held in February 2020.

**Objectives:** Identify essential R&D experimental facilities needed for the development, demonstration and qualification of Gen-IV components and systems, including activities to meet safety and security objectives. To this end, the task force prepared relevant presentations and papers, and engaged with the private sector through a dedicated workshop. In the second phase, the task force promotes the utilization of the experimental facilities for collaborative R&D activities among GIF partners.

**Organization:** In 2019, the task force gathered and compiled from the six Gen-IV System Steering and provisional System Steering Committees their respective contributions in the area of infrastructures (existing infrastructure, needs and gaps). The year 2020 was focused on the second phase of this task force: "Promote the utilization of the experimental facilities for collaborative R&D activities among the GIF partners." To this end, existing mechanisms and approaches were identified, including organizational points of contact, to obtain access to relevant R&D facilities in GIF member countries. This information will then be made accessible to GIF participants and R&D organization, for example through the GIF website and the GIF members network. This action will promote closer NEA, GIF and IAEA international cooperation initiatives to stimulate joint funding from member countries and/or enterprises, as well as mutual benefits to be capitalized.

### Main achievements in 2020

The completion of phase 1 and 2 of this task force led to two main actions in 2020/2021. Chronologically:

- Action no. 1: the GIF International Workshop with Nuclear Industry, which included SMR vendors and supply chain SMEs was organized successfully, with a total of 60 high-level participants, on 18-20 February 2020, at the NEA headquarters, in Boulogne-Billancourt, France. The first day and a half, the workshop was devoted to the topic of advanced manufacturing (see the AMME TF report in this chapter). The second half of the workshop was dedicated

Figure RDITF-1. GIF RDITF Workshop: "Views from the Private Sector, an Outlook for SMRs"



The discussion and questions session; from left to right: Dominique Hittner (USNC), Lou Martinez Sancho (CIO KAIROS Power), Stefano Monti (IAEA), Robin Manley (OPG), Richard Wain (Rolls Royce), Arkady Karneev (Rosatom), Frederik Vitabäck (GE-Hitachi), David Leblanc (Terrestrial Energy).

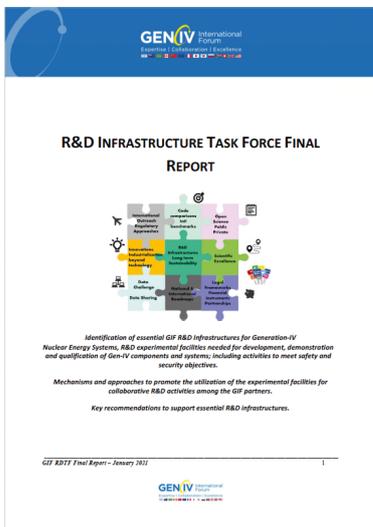


Figure RDTF-2. Cover page of the RDTF final report

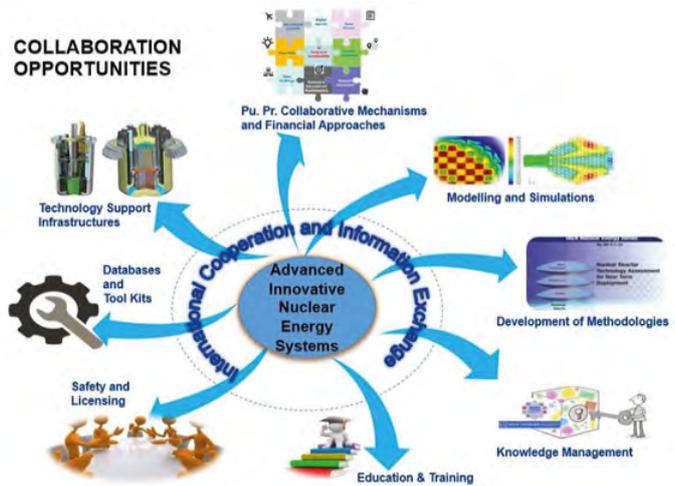


Figure RDTF-3. The virtuous wheel of international cooperation

to R&D infrastructure needs and opportunities. It included a review of RDTF efforts by system and roundtables with the private sector. The aim was: 1) to identify collaboration opportunities between private and public sectors for Gen-IV systems; 2) to ensure a networking event, gathering both GIF representatives and industry to create links; 3) to present concrete examples of collaboration between governmental organizations and industry; and 4) to gather views from the private sector on how to expand the relationship between GIF and the private sector in this field. The workshop was video recorded and can be seen on the GIF website ([www.gen-4.org/gif/jcms/c\\_82829/workshops](http://www.gen-4.org/gif/jcms/c_82829/workshops)).

- Action no. 2: A dedicated GIF RDTF final report was presented at the GIF EG/PG meeting in Weihai (China, October 2019) for complete validation in 2020 from the Experts Group and the Policy Group. The report was finalized in early 2021 and uploaded to the GIF website. This final report is made up of 12 chapters that can be read independently, including an overview of R&D infrastructures for the six systems, along with cross-cutting R&D infrastructures, mechanisms and approaches for collaboration and key recommendations and conclusions.

The report thus provides a clear overview of R&D infrastructure for the six systems, as well as a cross-cutting approach. Chapters 10 and 11 offer an explanation of mechanisms and approaches for collaborative R&D activities (with examples in the appendix) and some recommendations to enhance or facilitate these activities.

It is stipulated in the report that because of its position within the relevant bodies of all member countries, and its close relationship with key influential nuclear institutions, GIF should play a proactive role in ensuring the optimization of available experimental platforms, as well as their sustainable use over the longer term. This can be carried out effectively by:

- promoting regular meetings to update relevant catalogues, compendium or databases of installations (i.e. at least once every two years);
- recalling that this subject is essential when preparing future international symposia and seminars;
- acting as the driving force for proposals within the

framework of international initiatives, which could promote experimental infrastructures or enable the creation of new shared tools.

These two materials (i.e. the workshop record and final report) should be considered as a real springboard for enhancement of R&D facility use in future.

### Conclusions (and/or next steps)

The missions assigned to this task force have been successfully fulfilled. As such, it is not considered relevant to further pursue the actions of this task force, as stipulated in the RDTF terms of reference. In accordance with the key recommendations given above, and the position of the GIF Policy Group in this regard, it will be necessary to determine how these initiatives will be articulated and should evolve in future

Taking into account the analyses and recommendations made by RDTF members, as well as private sector feedback from the workshop in February 2020, it would be preferable to seek for a new dedicated task force emerging from the conclusions of this RDTF report. Moreover, following all the recommendations set out above, it is necessary to highlight two topics largely put forward during the RDTF workshop. They are the sharing of:

- verification/validation and uncertainty quantification (VV&UQ) approaches and best practices between the different member countries;
- reflections on how to improve exchanges with regulators, at an early stage, to simplify and enable faster licensing processes for innovative systems, for example SMRs.

These two items could be the starting point for new GIF task forces that would be considered a logical continuation of the RDTF Task Force.



**Roger Garbil**

Chair of the RDTF, with contributions from RDTF members