TECHNICAL ADVISORY COMMITTEE # 8
on the Transmutation Experimental Facility (TEF)

Marc SCHYNS (SCK CEN), Michael BUTZEK (FZJ),
Kazuo HASEGAWA (QST), Kei ITO (Kyoto Univ.),
Georg MÜLLER (KIT), Thierry STORA (CERN),
Yukinobu WATANABE (Kyushu University)

Meeting held on 2, 9 & 16 February 2022
Online meetings

T-TAC 2022 REPORT

Contents

EXECUTIVE SUMMARY

The 8th Technical Advisory Committee T-TAC for the Transmutation Experimental Facility (TEF) project held their meetings online on 2, 9 and 16 February 2022.

The T-TAC thanks the J-PARC Director Dr T. Kobayashi for providing a comprehensive view of the TEF project through detailed presentations from his staff. The T-TAC members acknowledge the high commitment of the team involved to this project as well as note that the team has carefully considered the recommendations made during the previous T-TAC meeting.

The observations, comments and recommendations included in this report are based on the presentations and information that have been provided to T-TAC during the meetings.

As specially requested for this T-TAC meetings, the concrete approach to implement the R&D activities in line with the next JAEA's med- to long-term plan for JFY2022-2028 has been reviewed.

T-TAC recognizes the funding constraints and the need of reconsidering the implementation strategy of TEF. It is however recommended to carefully set the priorities of the proposed activities given the available resources from FY 2022 on. Several concrete hints are included in the reported set of comments and recommendations.

T-TAC considers the R&D works carried out by J-PARC as highly valuable contributions to the international ADS community and acknowledge the continuous efforts deployed by J-PARC to set-up collaborations with other organisations on national and international level in the frame of the Japanese ADS program.

INTRODUCTION

T-TAC thanks J-PARC/JAEA for the excellent meeting organization. T-TAC appreciated the time and diligence all the presenters have invested in order to convey a high density of information and material. Also, the efforts of the speakers during the meeting to address the comments & recommendations of previous T-TAC meeting are much appreciated.

T-TAC is required to advice primarily on the following items:

- Validity of the design concept to meet the primary purpose of the proton irradiation facility, that is, contributing to nuclear transmutation technology development and versatile needs to the facility

- Direction and technical aspect of R&D activities on high-power accelerator, proton beam and target technologies for the primary purpose

In addition to the recurrent request described in its mission, T-TAC in **this year is especially asked to advice on concrete approach to implement the R&D activities in line with the next JAEA's med- to long-term plan for JFY2022-2028.**

1. Report from the Target Technology Development Section

1.1 Status facility design (target system) & activities of the TTD section.

Observations

- The past and on-going activities for the design of the spallation target & the development of the key LBE technologies:
  - LBE conditioning (oxygen control, impurity management),
  - Specific instrumentation (flow rate & velocity, pressure, …),
  - Remote Handling for the target system,

  as well as the construction of loops and test rigs needed for the realization of TEF-T and ADS, have been presented.

- The target concept was changed from annular-tube type to trolley type by taking into account the accumulated J-PARC MLF experiences. The vacuum vessel covers the target head to confine primary activated LBE and reaction products in accidental case.

- The target maintenance workflow is presented. The pipe is cut, welded and inspected remotely. The gamma ray background is estimated at about 1/100 of the allowable background level of the weld inspection equipment, 50 Gy/h.
- Preliminary result of the safety evaluation for the public dose in case of an LBE leak is reported.
- Access has been given to the T-TAC members to the TDR in EN (562 pages, January 2019).

Comment

Proposed activities in the M-LT plan of 2022-28 of the TTDS can be arranged in 3 linked areas: PIE design (new on-top), TEF-T and ADS. Many tasks have been listed and need to be performed. However, T-TAC has little information to conclude that these tasks can be achieved with the existing resources (human and financial). It is questionable whether in the context of the expected decrease in resources from 2022 on, it will be possible to address them all properly within the section even with the on-going international collaborations. Prioritization will most likely be necessary.

Recommendations

1.1.1 T-TAC appreciates the effort to summarize the Technical Readiness Level (TRL) in tables for the Target System, Instrumentation and Remote Handling. Consider to refine the granularity of the design level in conceptual, basic and detailed or even to use an established rating scale like the UK nuclear (see figure). The evolution of these tables in the following T-TAC meetings can help to track the progress.

1.1.2 As several components did not yet reach the mock-up level, updating the TDR released in January 2019 might be necessary in the near future. Ensure that TDR keeps up-to-date when for example significant progress is made in the component design.

1.1.3 Consider to include in the plan from the beginning, the development of the cold trap/filtering system, as impurity management in LBE is important for TEF-T as well as ADS to avoid blockages of the flow respectively in the target and later in the core. If, as mentioned in the presentation, the needed resources are presently not available to realize this work, consider to reduce or postpone the activities concerning natural circulation as different research teams worked already on this subject.

1.1.4 Consider to use the same coolant (liquid or gas) for the Heat Exchangers in the TEF-T and ADS cases in order to avoid ‘duplicate’ efforts to set-up the heat transfer model.

1.1.5 Include in the priorities the safety evaluation for workers in the accidental release case, since the outcome of such an analysis can have an impact on equipment design and building design.

Example : TRL as UK nuclear specific rating scale

Phase	TRL	Stage	Description
Research	TRL1	Basic principles	The basic properties have been established
	TRL2	Invention and Research	A practical application is invented or the investigation of phenomena, acquisition of new knowledge or correction and integration of previous knowledge.
	TRL3	Proof of concept	Demonstration in principle that the invention has the potential to work.
Deployment	TRL4	Bench Scale	Starting to be developed in a laboratory or research facility.
	TRL5	Pilot Scale	Undergoing testing at small to medium scale size in order to demonstrate specific aspects of the design
Deployment	TRL6	Large Scale	Undergoing testing at or near full-scale size. The design will not have been finalised and the equipment will be in the process of modification. It may use a limited range of simulants and not achieve full throughput
	TRL7	Inactive Commissioning	The technology is undergoing inactive commissioning. Works testing and factory trials on the final designed equipment using inactive simulants comparable to that expected during operations. Testing at or near full throughput will be expected
	TRL8	Active Commissioning	The technology is undergoing active commissioning
Operations	TRL9	Operations	The technology is being operationally used in an active facility

1.2 Atomic Energy Society of Japan's Materials roadmap and relation to TEF and PIE.

Observations

- The ADS group participated in AESJ Materials Roadmap (RM) development.
- ADS research project is well positioned in the new RM and needs for further material development for ADS are clearly derived.
- RM calls for research about "Materials used in high-energy proton irradiation and LBE corrosive environments"
- JAEA's PIE facilities (WASTEF and RFEF) are scheduled to be dismantled in about 10 years, and an alternative PIE facility is needed.
- Conceptual design studies of the new PIE facility were presented.

Comments

- T-TAC recognizes that worldwide there are very few experiences and practical no possibilities to obtain material data under relevant LBE and ADS irradiation conditions. Therefore, construction of TEF-T is desired to study combination of different effects rather than separated effects in different loops. Additionally, post-irradiation examination is essential to real progress in advancing or upgrading materials for ADS. Therefore, T-TAC appreciates the design activities started for the new PIE facility. Keeping the PIE facility next to the TEF-T is also very beneficial.

- Activities within the materials RM could be included in the PSi program as several efforts exist worldwide by using multi-physics/multi-scale methods.

Recommendations

1.2.1 T-TAC is impressed by the active and successful work on the implementation of the ADS needs into the AESJ material road map. To strengthen role of the ADS research project, it is strongly recommended to continue this activity and keep visibility.

1.2.2 As long as the realization of TEF-T is not predictable at time, data collection from running loop experiments (and international collaborations) should be further collected to advance the material database. QA of loops operation has to be ensured (calibration program of instrumentation, training of operator, NCR's logbook, …)

1.2.3 Beside TEF-T, PIE facility is essential for ADS development. Due to budgetary constraints from 2022 a good sharing of efforts between all interested parties should be envisaged starting from the definition phase. Collect the requirements of the user groups at J-PARC in approved documents and focus on the TEF-T needs & organize the sharing of design.

1.3 Oxygen control technology and status of LBE loop facilities.

Observations

- The Oxygen Concentration (OC) was well controlled automatically within appropriate OC range in OLLOCHI loop by flowing hydrogen or oxygen-mixed gas on free surface.

- The OC reduction rate was strongly related to the supplied gas temperature and the reduction rate increases significantly by increasing the gas temperature from 200 °C to 300 °C under the LBE temperature condition of 450 °C.

- The performance of oxygen pump for OC control was tested and the result showed superior performance to the OC control by gas flowing method.

- LBE loop facilities (IMMORTAL, OLLOCHI, LAPIN) have been well realized and, in particular, the feasibility of non-contact type ultrasonic flowmeter was checked in IMMORTAL.

Recommendations

1.3.1 Because, OC control technique is already advanced and show very good results in pot- and loop experiments like OLLOCHI, T-TAC recommends:

- to focus on the application of Oxygen Pumps,
- to extend the activity regarding the transfer of the OC to TEF-T and ADS conditions (which approach, control from surface or active sensor, or both, how many pieces of Oxygen Pump or gas plenum area, simulations of kinetic of exchange….). In other words, analyze how to upscale the knowledge of OC gained during the operation of the existing loops to the cases of the larger facilities TEF-T and ADS.

1.4 Upgrade of electromagnetic flow velocimeter for LBE.

Observations

- For the upgrade of electro-magnetic (EM) probe, a permanent magnet is replaced by an electromagnet and the calibration test showed the velocity can be measured successfully under the high LBE temperature, i.e. higher than Curie temperature.
- Ultra low noise amplification method was developed to intensify the signal with maintaining low noise level.
- The solubility of EM probe material probe was checked by SEM-EDX observations after long-term LBE immersion test.

Comment

T-TAC has confidence in the feasibility of EM probe for precise velocity measurement of LBE flow and encourages further developments. Similar studies carried out in Europe (e.g. [Schaub, T., Wüstling, S., Konrad, J., Tasler, M., Experiments in Fluids 62(10), 210, 2021]) can be used as a basis for a quantitative comparison of the achieved performances.

Recommendations

1.4.1 The development of EM probe has been conducted favorably and it can be expected that the improved EM probe gives superior velocity measurement performance in the near future. The ultra-low noise amplification method is one most important technique in the improved EM probe, and therefore, the effectiveness of the method should be shown quantitatively by, e.g. S/N ratio.

1.4.2 Solubility of EM probe material should be low in LBE. The presented materials like 316SS, Mo, W and Zr are not considered by T-TAC as the best candidate materials as the oxide scales formed, are not very adherent and will be most probably be lost under flow conditions. Materials like commercial Kanthal APM wire (FeCrAl steel containing 5.8 % Al) or

Iridium would be a better choice. Up to now, the long-term immersion test was conducted in static (no flow) condition under only one LBE temperature condition. Consider tests with LBE flow.

1.4.3 Also assess the dependency on flow velocity assessed by the upgraded probe and LBE temperature.

2. Report from the Facility and Application Development Section

2.1 Status of the facility design (other than the target system) and activities of the FAD section

Observations

- Activities were presented both for the completion of TEF-T with a reduced footprint and for the design of a 1.5GeV ADS facility, for instance with a complete design of the corresponding Linac.
- Different accelerator components were prototyped and tested successfully, such as the beam separator and laser beam stripping.
- The tunnel extension and the TEF-T facility with a reduced footprint have been presented.
- Design concepts from the MLF target design have been adopted to the new TEF-T design.
- Basic concept for proton beam window seems to be state-of-the-art design. Design was optimized to cope with increased beam current density.
- TRL were introduced for the TEF-T facility, and Readiness level of systems have been reduced due to changes from the TEF-T to the new facility layout with less area.

Comments

- Adopting the MLF design and benefiting from their experience where ever possible, will reduce necessary effort for TEF-T design.
- Changes of the beam foot print as well as changing the position of the proton beam window, might help reducing the beam current density. This would be beneficial reducing loads and irradiation damage on the window.
- Some of the ancillary system will need redesign to cope with the reduced area of the facility. This can be more challenging than anticipated.
- Adopting TRL scale for the full fledge ADS 1.5GeV facility, will help identifying which part of the 400 MeV TEF-T will provide relevant input for the ADS facility.

Recommendations

2.1.1 For the next T-TAC, a better description of the support R&D program/design is needed for the facility and the integration of the different components, as well as progression of the TRL table loaded with schedule.

2.1.2 Estimate of the resources and cost to completion scheme for both TEF-T and ADS facilities.

2.2 Neutronics study

Observations

- T-TAC recognizes steady progress in systematic measurements of nuclide production cross sections, back-streaming neutrons, and displacement cross sections at J-PARC. In addition, the Gaussian Process Regression (GPR) method was successfully applied to nuclear data evaluation for nuclide production cross sections up to 3GeV.
- Measurements of double-differential neutron production cross sections and thick target neutron yields for Fe and Pb were newly carried out using 107-MeV proton beam from the FFAG accelerator at Kyoto University. A measurement plan was also introduced for the mass distribution and neutron multiplicity in high-energy proton-induced fission.

Comments

- Systematic comparisons of the measured nuclide production cross sections, with various reaction models used in ADS neutronics simulation are very useful for understanding of the current predictive power of the models and their improvement.
- There is inconsistency between TTNY and DDX for Pb. Namely, the measured TTNY at 60 deg. is smaller than the INCL4.6/GEM calculation, while the measured DDX shows rather good agreement with the INCL.4.6/GEM calculation. The reason should be further investigated.
- Additional nuclear data are also necessary to estimate radiation effects caused by secondary particles (i.e., neutron, proton, other light ions) produced by primary proton incidence on LBE.

Recommendations

2.2.1 The nuclide production cross sections have been systematically accumulated by the measurements at J-PARC and a new GPR method of cross section evaluation was developed. Improvement of the JENDL/HE2007 library and the reaction models used in PHITS should be launched in collaboration with the nuclear data group and the PHITS developer group in JAEA as well as researchers outside JAEA.

2.2.2 As for the cross-section measurements in JFY2022-2028, the experimental facilities such as FFAG in Kyoto U, RCNP in Osaka U and RIKEN-RIBF should be actively utilized in collaboration with universities and other institutes, which will lead to saving research resources and educating students and young researchers.

2.3 Accelerator development for ADS

Observations

- Optimized design of the Half Wavelength Resonator (HWR) section is reported. The number of cryomodules is changed from one to three.
- The beam trip rate estimation is updated from the latest J-PARC linac experiences. The beam trip frequency is normalized by number of RF sources. The trip of > 5 min dominates from RF sources and DC power supply.
- Study results of the semiconductor power source as an alternative for klystrons is reported.
- The fault compensation scenario is studied in case of cavity and magnet failures. The beam loss is well confined to < 1 W/m.
- The progress of the development of the Single Spoke Resonator (SSR) is reported. Some parts have been fabricated and assembly of the central part will be finished in FY2021. The vertical test is scheduled in 2025.

Comments

- T-TAC recognized that the re-design of the HWR is reasonable and more realistic in terms of assembling process and maintenance. The reference design of the JAEA ADS has been more consolidated.
- T-TAC endorses the RF source choices of the SSA for 162 and 324 MHz. T-TAC also understands that the power level of the 648 MHz is widely covered and it is not easy to choose, but further study is needed.
- The accelerating cavity fault case study is important to take high reliability and fast recovery. A case study by using standing-by cavities to compensate energy is also proposed.
- The estimation of the trips based on the J-PARC linac is well studied but may differ between normal conducting linac and superconducting one.
- T-TAC concerns the slow pace of the development of the SSR due to reducing the budget.

Recommendations

2.3.1 Study further the 648 MHz RF source choices in terms of the cost, operation and maintainability to establish the reference design and cost estimation.

2.3.2 Study trip rate experiences for the superconducting linac, such as SNS. This will help a recovery scenario study.

2.3.3 Proceed steadily the development of the spoke cavity. If possible, consolidate the budget and accelerate the process.

2.3.4 Follow-up the developments of the Spoke cavities at ESS and PIP-II (Fermi).

2.4 Beam monitor development

Observations

- Study on some profile monitor for the ADS target is reported.
- The SiC wire monitor is feasible based on the 3GeV MLF experiences.
- The Ion Profile Monitor (IPM) is a non-destructive type and test is underway at the 3NBT. Further improvements are needed to reduce noises to take clear signals.
- The luminescence monitor is tested and light yield degradation is observed with irradiation.

Comment

The beam size is rather large compared to the conventional accelerator monitors. The mechanical feasibility is also needed to study.

Recommendations

2.4.1 Study mechanical feasibility (wire tension control, cross talks, etc.) for the SiC monitor.

2.4.2 Study further for the IPM to reduce noises.

2.4.3 Consider on-going developments at CERN of new carbon based wires (for wire scanners, no wire grid though).

3. T-TAC #8 CONCLUDING REMARKS

T-TAC congratulates the team for the progress accomplished and notes that the project has considered the recommendations from the previous T-TAC.

T-TAC recognizes the collaborative efforts already deployed by J-PARC for the Japanese ADS program with other organizations on national and international (SCK CEN, KIT, PSI) level and further encourages growth in it.

T-TAC recognizes that the R&D topics are in-line with the needs for designing and constructing TEF, the experience acquired during the R&D works will provide the hands-on experience required for the safe and efficient operation of the TEF facility.

The present option of the TEF-T target concept is reasonable in terms of reliable operation and maintenance.

T-TAC recognizes the funding constraints and the need of reconsidering the implementation strategy of TEF. It is however recommended to carefully set the priorities of the proposed activities given the available resources from 2022 on. Several hints are included in the present recommendations. Once the granted resources on the long term (up to 2028) are known, a plan of the proposed activities needs to be established (rough resource loaded planning, milestones and stage-gates, …). This will also ease the follow-up.

Based on the provided information, T- TAC considers in order to fit the financial constraints for the med-long term plan 2022-28 to: reduce priority on the LBE natural circulation, increase the priority regarding impurity management, consider the acquired Oxygen Control expertise as mature, restrict the design activities for PIE facility to the needs for TEF.

A detailed plan to implement the PSi program using advanced computer simulations tools and utilizing existing facilities as disclosed by the "P-T Technology Evaluation Task Force" was not presented to T-TAC. A first step to define the PSi program could be the identification of the topics to be included in the PSi program and its associated list of code as well as the necessary validation program including the needed experiments to validate the results of the calculations. Show the complementarity between the PSi program and the intended experimental work and highlight the involvement of the simulation tools with the expected progress in the TRL's.

T-TAC considers the R&D works carried out by J-PARC as highly valuable contributions to the international ADS community.

SUMMARY OF THE RECOMMENDATIONS BY SECTIONS IN THE REPORT

1.1. Status facility design (target system) & activities of the TTD section.

1.1.1. T-TAC appreciates the effort to summarize the Technical Readiness Level (TRL) in tables for the Target System, Instrumentation and Remote Handling. Consider to refine the granularity of the design level in conceptual, basic and detailed or even to use an established rating scale like the UK nuclear (see figure). The evolution of these tables in the following T-TAC meetings can help to track the progress.

1.1.2. As several components did not yet reach the mock-up level, updating the TDR released in January 2019 might be necessary in the near future. Ensure that TDR keeps up-to-date when for example significant progress is made in the component design.

1.1.3. Consider to include in the plan from the beginning, the development of the cold trap/filtering system, as impurity management in LBE is important for TEF-T as well as ADS to avoid blockages of the flow respectively in the target and later in the core. If, as mentioned in the presentation, the needed resources are presently not available to realize this work, consider to reduce or postpone the activities concerning natural circulation as different research teams worked already on this subject.

1.1.4. Consider to use the same coolant (liquid or gas) for the Heat Exchangers in the TEF-T and ADS cases in order to avoid ‘duplicate’ efforts to set-up the heat transfer model.

1.1.5. Include in the priorities the safety evaluation for workers in the accidental release case, since the outcome of such an analysis can have an impact on equipment design and building design.

1.2. Atomic Energy Society of Japan’s Materials roadmap and relation to TEF and PIE.

1.2.1. T-TAC is impressed by the active and successful work on the implementation of the ADS needs into the AESJ material road map. To strengthen role of the ADS research project, it is strongly recommended to continue this activity and keep visibility.

1.2.2. As long as the realization of TEF-T is not predictable at time, data collection from running loop experiments (and international collaborations) should be further collected to advance the material database. QA of loops operation has to be ensured (calibration program of instrumentation, training of operator, NCR’s logbook, …)

1.2.3. Beside TEF-T, PIE facility is essential for ADS development. Due to budgetary constraints from 2022 a good sharing of efforts between all interested parties should be envisaged starting from the definition phase. Collect the requirements of the user groups at J-PARC in approved documents and focus on the TEF-T needs & organize the sharing of design.

1.3. Oxygen control technology and status of LBE loop facilities.

1.3.1. Because, OC control technique is already advanced and show very good results in pot- and loop experiments like OLLOCHI, T-TAC recommends:

- to focus on the application of Oxygen Pumps,
- to extend the activity regarding the transfer of the OC to TEF-T and ADS conditions (which approach, control from surface or active sensor, or both, how many pieces of Oxygen Pump or gas plenum area, simulations of kinetic of exchange….). In other words, analyze how to upscale the knowledge of OC gained during the operation of the existing loops to the cases of the larger facilities TEF-T and ADS.

1.4. Upgrade of electromagnetic flow velocimeter for LBE.

1.4.1. The development of EM probe has been conducted favorably and it can be expected that the improved EM probe gives superior velocity measurement performance in the near future. The ultra-low noise amplification method is one most important technique in the improved EM probe, and therefore, the effectiveness of the method should be shown quantitatively by, e.g. S/N ratio.

1.4.2. Solubility of EM probe material should be low in LBE. The presented materials like 316SS, Mo, W and Zr are not considered by T-TAC as the best candidate materials as the oxide scales formed, are not very adherent and will be most probably be lost under flow conditions. Materials like commercial Kanthal APM wire (FeCrAl steel containing 5.8 % Al) or Iridium would be a better choice. Up to now, the long-term immersion test was conducted in static (no flow) condition under only one LBE temperature condition. Consider tests with LBE flow.

1.4.3. Also assess the dependency on flow velocity assessed by the upgraded probe and LBE temperature.

2.1. Status of the facility design (other than the target system) and activities of the FAD section

2.1.1. For the next T-TAC, a better description of the support R&D program/design is needed for the facility and the integration of the different components, as well as progression of the TRL table loaded with schedule.

2.1.2. Estimate of the resources and cost to completion scheme for both TEF-T and ADS facilities.

2.2. Neutronics study

2.2.1. The nuclide production cross sections have been systematically accumulated by the measurements at J-PARC and a new GPR method of cross section evaluation was developed. Improvement of the JENDL/HE2007 library and the reaction models used in PHITS should be launched in collaboration with the nuclear data group and the PHITS developer group in JAEA as well as researchers outside JAEA.

2.2.2. As for the cross-section measurements in JFY2022-2028, the experimental facilities such as FFAG in Kyoto U, RCNP in Osaka U and RIKEN-RIBF should be actively utilized in collaboration with universities and other institutes, which will lead to saving research resources and educating students and young researchers.

2.3. Accelerator development for ADS

2.3.1. Study further the 648 MHz RF source choices in terms of the cost, operation and maintainability to establish the reference design and cost estimation.

2.3.2. Study trip rate experiences for the superconducting linac, such as SNS. This will help a recovery scenario study.

2.3.3. Proceed steadily the development of the spoke cavity. If possible, consolidate the budget and accelerate the process.

2.3.4. Follow-up the developments of the Spoke cavities at ESS and PIP-II (Fermi).

2.4. Beam monitor development

2.4.1. Study mechanical feasibility (wire tension control, cross talks, etc.) for the SiC monitor.

2.4.2. Study further for the IPM to reduce noises.

2.4.3. Consider on-going developments at CERN of new carbon based wires (for wire scanners, no wire grid though).

Appendix I – Agenda for 8th T-TAC Meeting

2nd February, 2022			
Japan	EU		
16:00	08:00	Welcome	T. Kobayashi
16:05	08:05	Self-introduction	
16:20	08:20	Mission of T-TAC, J-PARC Overview	T. Kobayashi
16:50	08:50	Closed session (decision of individual charge)	
17:00	09:00	Overview of Nuclear Transmutation Division	F. Maekawa
17:45	09:45	Transmutation Experimental Facility Program and Future Direction	S. Meigo
18:30	10:30	Closed session	
20:00	12:00	Adjourn	

9th February, 2022			
Japan	EU		
16:00	08:00	Report from the Target Technology Development Section	
16:00	08:00	Status of the facility design (target system) and activities of the section	T. Sasa
16:30	08:30	Atomic Energy Society of Japan's Materials roadmap and relation to TEF and PIE	S. Saito
16:55	08:55	Oxygen control technology and status of LBE loop facilities	H. Obayashi
17:20	09:20	Upgrade of electromagnetic flow velocimeter for LBE	G. Ariyoshi
17:45	09:45	Report from the Facility and Application Development Section	
17:45	09:45	Status of the facility design (other than the target system) and activities of the section	S. Meigo
18:15	10:15	Neutronics study	K. Nakano
18:45	10:45	Accelerator development for ADS	Y. Kondo
19:15	11:15	Beam monitor development	S. Meigo
19:30	11:30	Closed session	
20:00	12:00	Adjourn	

16th February, 2022			
Japan	EU		
16:00	8:00	Closed session	
18:00	10:00	Summary report by the chair person	
19:00	11:00	Adjourn	

Appendix II – Mission and charge to T-TAC 2022 from J-PARC

by T. KOBAYASHI

Mission of T-TAC

To advise primarily to the following items,

- Validity of the design concept to meet the primary purpose of the proton irradiation facility, that is, contributing to nuclear transmutation technology development, and versatile needs to the facility
- Direction and technical aspect of R&D activities on high-power accelerator, proton beam and target technologies for the primary purpose

Charge of T-TAC 2022

In addition to the recurrent request described in its mission, T-TAC in this year is especially asked **to advice on concrete approach to implement the R&D activities in line with the next JAEA's med- to long-term plan for JFY2022-2028**.

Appendix III - Committee members for T-TAC 2022

	NAME	AFFILIATION	POSITION
1	Marc SCHYNS	SCK CEN	Institute Director Advanced Nuclear Systems
2	Michael BUTZEK	Forschungszentrum Jülich	Team leader automation, magnet bearing and gears
3	Kazuo HASEGAWA	National Institutes for Quantum Science and Technology (QST)	Director of Nuclear fusion reactor materials research and development
4	Kei ITO	Institute for Integrated Radiation and Nuclear Science, Kyoto University	Associate professor
5	Georg MÜLLER	Karlsruhe Institute of Technology	Deputy Director, Head of Department Professor
6	Thierry STORA	The European Organization for Nuclear Research (CERN)	Senior Physicist, PRISMAP coordinator
7	Yukinobu WATANABE	Interdisciplinary Graduate School of Engineering Sciences, Kyushu University	Professor