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Henri Niittymäki

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REPORT



Highlights of International Cooperation for Safety, Security and Safeguards in 2023

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Keywords

KEYWORDS: Nuclear safety, security and safeguards, regulatory control, international cooperation, effectiveness, global safety, international partnerships, regulatory bodies, support projects, leadership support, cross-border cooperation, skill development, training programs, international regulations, evolving challenges

AVAINSANAT: Ydin- ja säteilyturvallisuus, ydinmateriaalivalvonta, viranomaisvalvonta, kansainvälinen yhteistyö, tehokkuus, globaali turvallisuus, kansainväliset kumppanuudet, viranomaiset, tukihankkeet, johtamisen tuki, rajat ylittävä yhteistyö, taitojen kehittäminen, koulutusohjelmat, kansainväliset määräykset, kehittyvät haasteet

NYCKELORD: Kärn- och strålsäkerhet, kärnämneskontroll, myndighetstillsyn, internationellt samarbete, effektivitet, global säkerhet, internationella samarbeten, myndigheter, stödprojekt, ledarskapsstöd, gränsöverskridande samarbete, kompetensutveckling, utbildningsprogram, internationella regelverk, nya utmaningar



Abstract

The Radiation and Nuclear Safety Authority (STUK) is an independent governmental organisation for the regulatory control of radiation and nuclear safety in Finland (Safety, Security and Safeguards). The basis for STUK's international cooperation is maintaining and increasing the awareness and effectiveness of the work carried out by the authority. International cooperation is also the practical tool for STUK to address global radiation and nuclear safety questions. At STUK, the International Cooperation Unit is responsible for coordinating and liaising the activities carried out in co-operation with our international partners, such as the International Atomic Energy Agency (IAEA) and regulators across the globe. The unit also manages the international support and service projects of STUK and supports the leadership of STUK in its work on international forums. This report outlines STUK's international activities in 2023, emphasizing the importance of cross-border partnerships, skill enhancement through training, and understanding international regulations. These initiatives contribute to global safety, safeguards and security in the face of evolving challenges.



Tiivistelmä

Säteilyturvakeskus (STUK) on riippumaton valtionhallinnon organisaatio, joka valvoo säteily- ja ydinturvallisuutta Suomessa (3S). STUK:n kansainvälisen yhteistyön perustana on viranomaisen työn tunnettuuden ja vaikuttavuuden ylläpitäminen ja lisääminen.

Kansainvälinen yhteistyö on STUK:lle myös käytännön väline käsitellä maailmanlaajuisia säteily- ja ydinturvallisuuskysymyksiä. STUK:n kansainvälisen yhteistyön yksikkö vastaa kansainvälisten yhteistyökumppaneiden, kuten Kansainvälisen atomienergiajärjestön (IAEA) ja eri puolilla maailmaa toimivien sääntelyviranomaisten kanssa yhteistyössä toteutettavien toimien koordinoinnista ja yhteydenpidosta. Yksikkö hallinnoi myös STUK:n kansainvälisiä tuki- ja palveluhankkeita ja tukee STUK:n johtoa sen työskentelyssä kansainvälisillä foorumeilla. Tässä raportissa hahmotellaan STUKin kansainvälistä toimintaa vuonna 2023 korostuen rajat ylittävien kumppanuuksien, osaamisen vahvistamisen koulutuksen ja kansainvälisen sääntelyn ymmärtämisen merkitystä. Näillä aloitteilla edistetään maailmanlaajuisia turvallisuus- ja ydinmateriaalivalvontaa muuttuvien haasteiden edessä.



Sammanfattning

Strålsäkerhetscentralen (STUK) är en oberoende statlig organisation som ansvarar för tillsynen av strål- och kärnsäkerheten i Finland (3S). Grunden för STUK:s internationella samarbete är att upprätthålla och öka medvetenheten om och effektiviteten i det arbete som myndigheten utför. Internationellt samarbete är också STUK:s praktiska verktyg för att ta itu med globala strål- och kärnsäkerhetsfrågor. STUK:s enhet för internationellt samarbete ansvarar för samordningen av och kontakterna för den verksamhet som bedrivs i samarbete med våra internationella partner, såsom Internationella atomenergiorganet (IAEA) och tillsynsmyndigheter runt om i världen. Enheten sköter också STUK:s internationella stöd- och serviceprojekt samt stöder STUK:s ledning i dess arbete på internationella forum. I denna rapport redogörs för STUK:s internationella verksamhet under 2023 och vikten av gränsöverskridande partnerskap, stärkande av kompetensen, utbildning och förståelse för internationell reglering. Dessa initiativ kommer att bidra till globala säkerhetskontroller och kärnämneskontroll inför föränderliga utmaningar.



Strengthening International Cooperation: Working together

In a world often beset by challenges and conflict, the international cooperation stands as a beacon of hope and progress. As we reflect on our achievements and commitments in the realm of global collaboration, it becomes evident that our collective efforts have yielded good results.

In times of crisis and change, it is important that we work hand in hand, helping and advising those in need. By standing with Ukraine, we reaffirm our collective resolve to promote peace, stability, and security in the region, and beyond. By working hand in hand with AFCONE, we contribute to the advancement of sustainable development and the promotion of nuclear non-proliferation objectives on the whole African continent. It is impressive!

The tight Nordic cooperation serves as a model of effective regional collaboration. By leveraging our collective strengths and resources, we enhance our capacity to tackle threats. Supporting the International Atomic Energy Agency (IAEA) in safeguards implementation, as well as our engagement in the Global Initiative to Combat Nuclear Terrorism (GICNT) and the International Partnership for Nuclear Disarmament Verification (IPNDV) work, underscores our commitment to strengthening the global nuclear security architecture.

As we celebrate our achievements in international cooperation, we must remain strong. By standing together, we can overcome challenges, seize opportunities, and build a better future for generations to come. Let us continue to work hand in hand, inspired by the values of cooperation, and mutual respect, as we strive to create a more peaceful, just, and sustainable world for all. Because it is our duty.

I am happy to say that the experts working with me are eager to find ways of managing our work in the changing environment with a resilient attitude. STUK has the happiest civil servants in the world!

Elina Martikka
Head of Unit, International Cooperation

1 Addressing Regional Radiological and Nuclear Concerns

Recognizing that safety, security, and safeguards are core competences of STUK, international cooperation in these fields requires a transparent way of working and proactive efforts with our partners. The aim is to develop and maintain cooperation with our international counterparts. In this way, we enable positive effects on our own operations to ensure safety, safeguards and security.

The shifting safety, safeguards and security landscape has brought about frequent changes in our daily work routine. As a result, it has become crucial to explore fresh approaches for collaborating with various divisions of the national regulatory authority. This collaboration is vital to uphold a seamless exchange of information, maintain situational awareness, and respond effectively. While nuclear-related activities persist, our commitment to safeguarding human health and the environment remains unwavering. The necessity to sustain cooperation on safety, security, and safeguards persists, particularly in addressing regional radiological and nuclear issues. This ongoing effort ensures the enduring relevance of our endeavors in this field for both Finnish and global interests.

1.1 Regional Cooperation Program

In 2023, STUK's International Unit continued developing a new type of Regional Cooperation Programme established in 2022. Regional Cooperation Program will act as an umbrella for all STUK's regional activities. The programme will be managed by a programme manager within the International Unit, and will focus on bilateral and multilateral projects and cooperation with the authorities and operators of countries bordering Finland and Europe to promote nuclear and radiation safety. The objective of the programme is preparedness for emergencies, radiation and nuclear safety, and to closely monitor that the environment is being maintained and ensured. An important instrument in the programme is cooperation between authorities, especially between the Nordic authorities, but also in the Baltic Sea region, with a special focus on Ukraine. Through the programme, STUK also aims to promote the Non-Proliferation Treaty and nuclear waste management.

Regional programme forms an essential part of STUK's international cooperation, where we are proactively committed to promoting regional cooperation. During 2023, STUK has defined the main focus areas of the regional programme, which are shown in the following figure.

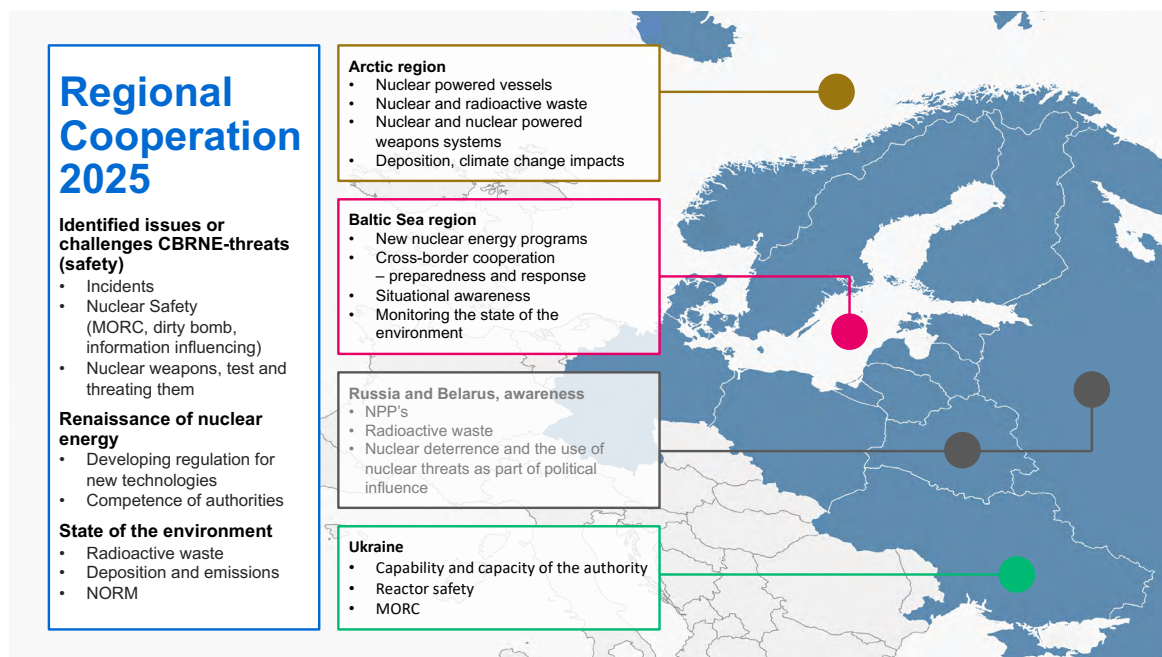


FIGURE 1. STUK's Regional Program, CBRN Challenges – Environmental Impact. Picture STUK.

1.2 Joint Action Plan for Nordic Nuclear and Radiation Safety and Security cooperation – Establishing Nordic Strategy Group

Nordic countries' radiation and nuclear safety authorities have long-standing collaboration mechanisms, such as Nordic Chiefs meetings and the NKS forum, which have proven effective in aligning their efforts and contributing to EU and global initiatives. However, recent years have seen rapid and significant shifts in their operating environment, notably driven by climate concerns, heightened electricity demands, and escalating security threats like the conflict in Ukraine. These changes could impact the existing cooperation frameworks among Nordic Chiefs.

In response to these challenges, during their annual meeting in Reykjavik in August 2023, the Nordic Chiefs deliberated on how to adapt to the evolving landscape. They decided to form a Nordic Strategic Group (NSG) tasked with identifying shared strategic priorities for Nordic authorities amidst these new conditions. Over the next year, the NSG will explore potential common priorities and assess how they can be integrated into existing cooperation structures and practices.

The Nordic Strategy group's goal is to conduct a comprehensive assessment of the current circumstances and the obstacles they present. Its aim is to propose strategies for strengthen-

ing Nordic collaboration in areas that would bolster both collective and individual capacities to address these challenges. This might involve:

- Identify potential new working areas, and possible need for changes in the existing work areas,
- Identify potential changes in the co-operation structure, governance model and way of working,
- Identify any other important aspects that may have relevance for the Nordic co-operation.

As a result of the work, the group prepares a report that suggests priorities and includes concrete proposals for actions/activities with timeframes (short, mid, and long term) for their completion. The report will offer explanations for the chosen priorities, rationale behind proposed modifications, and the relevance of actions or activities for Nordic cooperation. Additionally, it will provide practical advice for implementing these efforts effectively.

1.3 Standing with Ukraine: Providing Support

Communication with the Ukrainian authority (SNRIU) and its technical support organisation SSTC NRS had been established before the start of Russia's war of aggression against Ukraine. Avoiding to future incidents, for example highlighting areas where emergency response plans need to be addressed together. The aim was to ensure that the necessary resources and expertise are available in the EU to mitigate the impacts of such incidents. Overall, learning from this experience is essential to improving preparedness and response to radiological and nuclear incidents.

STUK planned and implemented in the summer 2023 eSiteView 3D scanner system donation from Finland to Ukraine. With careful coordination and foresight, arrangements were made to deliver the state-of-the-art eSiteview 3D scanner system to SSTC NRS. The process involved not only the careful planning of physical transportation of the equipment but also the training sessions in Finland to ensure its effective utilization. Through thoughtful execution and collaboration, the donation was successfully implemented, marking a milestone in advancing technological capabilities in the region.

As early as March 2022, STUK sent a rotating team of experts trained to respond to questions related to radiological and nuclear incidents to the European Emergency Response Co-ordination Centre (ERCC) in Brussels. The purpose of this assistance was to provide advisory support to ERCC to help it build a picture of the radiological situation in Ukraine.

For 2023, this expert support was provided through a separate project and a joint consortium. STUK is a party to a consortium whose other parties are SCK CEN, ENCO, FMI and the Belgian equivalent authority. The consortium produces regular situational awareness in Ukraine for the ERCC and, if necessary, supports the Centre in a possible dangerous situation. The consortium has a two-year service project contract (EAHSP RN) with DG ECHO.

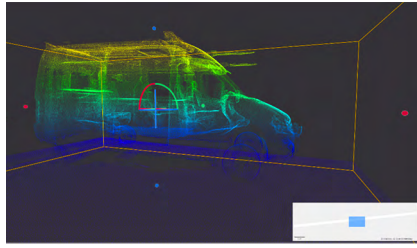


FIGURE 2. Training of the SSTC NRS experts to use the eSiteview 3D scanner system in Ukraine.

Photo SSTC NRS, Ukraine.

1.4 Finnish Ukrainian Radiation and Nuclear Safety Cooperation Project (FURN)

In 2023, STUK developed together with the regulatory authority of Ukraine SNRIU and its technical support organization SSTC NRS a cooperation project. The resulting Finnish Ukrainian Radiation and Nuclear Safety Cooperation (FURN) project is funded by the Institutional Cooperation Instrument of the Ministry of Foreign Affairs of Finland. The two-year FURN project consists of two main tasks:

- Task 1: Regulatory cooperation between STUK and SNRIU/SSTC.
- Task 2: Procurement and delivery of a radiation detection vehicle to SSTC NRS and provision of training for its use.

The aim of the Task 1 is to increase the capacity of SNRIU/SSTC and its being implemented in cooperation with the Norwegian Ukrainian Regulatory Cooperation Programme. In practice STUK experts are reviewing and commenting the deliverables of the Norwegian Ukrainian Regulatory Cooperation programme managed by DSA, and STUK organizes trainings, visits, workshops that directly support the achievement of common objectives.

The donation of the radiation detection vehicle to Ukraine is a prime example of Nordic cooperation. It involves co-funding of the Nordic partners: DEMA, DSA and SSM, and the new detection vehicle to be handed over to SSTC is called NORDIM which stands for Nordic Radiation Detection and nuclide Identification Module.



FIGURE 3. Planning of the FURN project in Helsinki, 2023. Sergii Iegan, Aapo Tanskanen and Anna Borzdova. Photo STUK.

1.5 Nordic Cooperation

Since the collapse of Soviet Union, the Nordic authorities have cooperated in the provision of assistance to the former Eastern European countries in accordance with the European Neighbourhood Policy, whose aim is to maintain the stability and security in these areas and to promote economic, political and social development. The Russian invasion of Ukraine caused an immediate cancellation of all the planned support projects with the Soviet-era Russian nuclear power plants near the Finnish border. Simultaneously, the Russian invasion dramatically increased the need of support in Ukraine.

In response to the new challenging situation, the Nordic partners STUK, SSM and DSA started to organise weekly videoconferences in order to share information about the situation and the support needs of Ukraine, and to coordinate the support activities. Later during the year, DEMAs and the IAEA, which has a coordinating role with regard to international support activities related to radiation and nuclear safety, also joined these coordination meetings. During the meetings, each party shared information about its support for Ukraine. Thanks to the meetings, Nordic support for Ukraine has been coordinated and effective. Additionally, it's worth noting that these online meetings continued throughout 2023.

1.6 The Russian Federation: A Frozen Connection

STUK has cooperated with Russia's Leningrad and Kola nuclear power plants since the early 1990s. These places have Soviet-era reactors located close to the Finnish border. Previous cooperation projects have included the delivery of several safety-related systems and equipment representing Western technology. As part of the support, diagnostic and analysis tools and training have also been provided. Cooperation between STUK and the two Russian plants remained frozen in 2023.

Nonetheless, through the regional program, STUK successfully compiled a comprehensive situational report on Russian nuclear facilities in 2023. The work utilized a combination of publicly accessible data and information based on expert assessment on nuclear facilities in Finland's vicinity that are important for safety.

In 2023, STUK naturally continued to monitor radioactivity and assessed, for example, the consequences of a radioactive atmospheric release caused by Nuclear-Powered Vessel (NPV) accident and during a transit of Floating Nuclear Power Plant (FNPP) transport accident. These have been separately reported in STUK A-series research reports.

1.7 EU Civil Protection Mechanism

In 2023, Finland, under the leadership of the Ministry of the Interior, started for the development and maintenance of the rescEU CBRN storage capacity at EU level, which is part of the EU Civil Protection Mechanism, in cooperation with the Ministry of Social Affairs and Health, the National Institute for Health and Welfare, the National Emergency Supply Agency and the Radiation and Nuclear Safety Authority. Preparatory work for the project began in 2020 and application made in 2022. Finnish application was approved by the European Commission in December 2022.

Finland's future rescEU capabilities will enhance the strategic preparedness and readiness of the entire European Union to respond to CBRN threats, especially in Northern Europe and the Baltic Sea region. The CBRN storage package includes CBRN protective equipment, measuring instruments, support equipment and CBRN drugs and vaccines. The total cost of the project is €242 million and the planned duration of the project 1 January 2023–30 September 2026.

In the summer 2023, Finland under the same domestic consortium applied capacity for extra equipments and medical materials. Now Finland got a new project worth 62.9 million euros, which includes a new storage. The project will store medical materials, such as small devices, surgical instruments and medical supplies. In addition, we store radiation measuring devices and medicines that are needed, e.g. in primary care and surgery.

The purpose of the project is to produce new first-hand information and expertise for STUK on the implementation of CBRN storage capabilities. In these both projects, STUK will participate in the definition of training in the use of RN measuring devices with the Ministry of Social Affairs and Health (MSAH) and in the support given to the NESA to ensure the best possible procurement, storage and functionality of RN personal protective equipment and measuring equipment.

Finland's strategic objective is to continue to maintain the capacity beyond this period if the commission's budget packages in future periods allow it.

1.7.1 Expert project to provide efficient support for the ERCC – Emergency Response Coordination Center

The European Civil Protection Mechanism is coordinated by the Emergency Response Coordination Centre (ERCC) in Brussels. In 2023 STUK continued providing advisory support on radiological hazards to ERCC as a member of the EAHSP-RN consortium led by the Belgian nuclear research centre. The support consisted of

- 1 expert support in the event of radiological and nuclear hazards,
- 2 exercises related to the expert service
- 3 training for ERCC staff.

Since the beginning the project has focused mainly on assessment of the radiological situation in Ukraine. The project is planned to continue with two additional years.

The functioning of the EU Civil Protection Mechanism is based on the resources provided by the Member States and made available to the disaster-stricken country's response operation. In connection to this is the rescEU project launched by the EU to create a common European disaster capability pool. The stockpiling period is until autumn 2026.

2 Cooperation and Knowledge Sharing

2.1 Supporting AFCONE in “Uplifting Nuclear Safeguards in Africa”

The European Union, Government of Finland (MFA & STUK) and African Commission on Nuclear Energy (AFCONE) have initiated a 5-year programme “Uplifting Nuclear Safeguards in Africa 2023–2027”. This Programme is funded by INSC instrument of the EU (4,4 M€) and the Government of Finland (0,5 M€). For STUK this programme is a flagship project through which we can share our expertise in regulatory control of nuclear materials and this way contribute to safety and security globally, in alignment with Africa strategies of the EU and Finland.

After two years of planning, drafting and piloting, STUK is now working closely with AFCONE, to provide expert support needed to implement this ambitious programme, that aims at strengthening international nuclear safeguards in Africa. Programme will build capacity in Pelindaba Treaty States Parties, and enable these States to fulfil their obligations in accordance with the Pelindaba Treaty, Comprehensive Safeguards Agreements and Additional Protocols. Under this landmark endeavour safeguards trainings are now for the first time organised under leadership of African organisation – AFCONE. The programme will also support AFCONE in ramping-up its operations and establishing regional structures to support safeguards implementation in Africa.

In practice, this programme will develop and expand capacity to support IAEA inspection activities, improve reporting under Comprehensive Safeguards Agreements, Additional Protocols, and the Treaty of Pelindaba.

Collective Uplifting

Uplifting Nuclear Safeguards in Africa is an endeavour that aims at building new networks, structures and sustainability in implementation of nuclear safeguards in Africa. Word “uplifting” emerged as a key message from the fact, that IAEA safeguards are almost universally in place in Africa, but many States need support in the effective implementation. Therefore, the programme visions itself as a window of opportunity for African safeguards experts to build new networks under auspices of AFCONE to share experiences and enable collective learning. AFCONE’s newly established Regional Collaboration Centres for safeguards play a key role here. In 2023 AFCONE and STUK organised the first set of safeguards trainings in South Africa and Namibia, with significant contributions and support from South African Nuclear Energy Corporation (NECSA), Department of Mineral Resources of South Africa (DMRE) and Ministry of Health and Social Services National Radiation Protection Authority of Namibia (NRPA) as well as the IAEA.

During the first implementation year of the programme (4/23 to 3/24) main safeguards capacity building activities were:

- Needs assessment, based on extensive survey that was sent to first ten States that were invited to the programme.
- Training event tailored for safeguards managers, focusing on international obligations, national legislation and SSAC processes, organised in Pelindaba Centre of NECSA in South Africa in May 2023.
- Two hands-on training events tailored for national safeguards inspectors. These trainings focused on inspections planning, HM5 measurements, inspections processes and reporting to the IAEA.
 - In August 2023 such first hands-on training was organised in Swakopmund, Namibia, where the participants were able to carry out inspection exercise at the Husab Uranium mine operated by the Swakop Uranium Ltd. and then to follow the road of the UOC all the way to the Walvis Bay harbour, where lessons were learned on cooperation between port and customs authorities, the mine operator, as well as the safeguards regulator.
 - Similar hands-on training event was organised in October in Pelindaba Centre of NECSA. Inspection exercises were now conducted at the waste storage facility at the Pelindaba Centre, and the group then had another field demonstration at Gammatec NDT Supplies SOC Ltd. that is a provider of non-destructive testing equipment.
- The last training event of the first implementation year took place in Cape Town in January 2024. This workshop on SSAC framework development was a follow-up activity, that was designed based on feedback during previous training events as well as needs assessment survey responses.

Trainings were organised with a programmatic approach, where a number of training events were available for a limited number of States at one time. Repeated encounters enabled participants to build networks and to learn to know fellow experts, and for this reason atmosphere during the exercises developed into encouraging one, that enabled open dialogue and sharing of experiences, as one of the participants noted.

The first “pilot group” of States that were invited to the programme were selected mainly based on their activities in the Uranium supply chain: proven resources, mining, mineral processing or exports. In 2024 the Programme will expand, and some 15 more States are invited to join a similar set-up of basic trainings along which tailored follow-up activities will be developed.

In 2023 each training event was attended by 20–25 participants. Regulators from following 14 States were involved: Algeria, Botswana, Comoros, DRC, Ghana, Malawi, Morocco, Namibia, Niger, Rwanda, South Africa, Tanzania, Tunisia, Zambia.



FIGURE 4. Group familiarizing to UOC production process at Husab Uranium Mine, before inspection exercise in Namibia, August 2023. Photo STUK.



FIGURE 5. Outreach at the African Union Summit in Feb 2023. From left: AFCON ES Enobot Agboraw, STUK Head of International Co-operation Elina Martikka, Head of the Policy and cooperation Section Thomas Huyghebaert from EU mission to AU, Ambassador of Finland Outi Holopainen and Deputy Prime Minister of Namibia, Netumbo Nandi-Ndaitwah. Photo STUK.

Outreach for Policy Makers

Effective IAEA safeguards are the precondition for peaceful use of nuclear energy, and thus creates potentiality for the benefits (i.e. health and prosperity) that these nuclear technologies may provide.

Along capacity building AFCONE and STUK organised a set of outreach events aimed for decision makers, with the purpose of raising awareness about safeguards obligations of the State, and the benefits of the peaceful use of nuclear energy. Experience has shown that safeguards improvements require sustained attention not only at the operational, but also at the governmental level. The commitment and ownership of safeguards by Safeguards Regulatory Authorities is essential for the success in achieving this programme's goals.

During the Programme preparation and the first implementation year, four events were organised in total, including a grand kick-off in the residence of the Ambassador of Finland in Vienna, side-event at the African Union Summit in Addis Ababa, and side-events in INMM/ESARDA and NPT PrepCom 2023. These events were greatly supported by the European Commission and Ministry for Foreign Affairs of Finland.

Way Forward

Two years after preliminary discussions with AFONCE on the idea of developing an African safeguards programme, its implantation is now in full speed. AFCONE and STUK have developed a strong partnership for the programme management, that takes advantage of unique assets of both organisations: STUK's experience in regulatory control of nuclear materials as well as managing international projects, and AFCONE's unique mandate, network, strategic vision, and understanding of the practical safeguards challenges in Africa.

In upcoming years, the programme will maintain the programmatic approach, focus on sustainability, outreach and practical "hands-on" approach. By the end of 2025 the Programme has expanded across Africa and basic safeguards trainings have been provided to a large majority of Pelindaba States.

AFCONE and STUK also intend to take advantage of opportunities to continually raise awareness and garner support for the programme in relevant international and multilateral events, as well as to organise discussion on topics such as regional legal frameworks and the future of safeguards in Africa, legislative reform needs and long-term targets.

Towards the end of the programme, it will be important to prioritize activities that ensure that the process that is now emerging will continue, and the results will be sustainable. At the same time follow-up and monitoring of developments must continue and needs based prioritisation will be done.

2.2 International Training Activities

In 2023, coordinated by the International Cooperation Unit, STUK continued its international training activities aimed at promoting nuclear and radiation safety globally.

STUK's training programmes are designed to provide participants with the necessary knowledge and skills to effectively manage and mitigate potential nuclear and radiation risks.

STUK's international training activities in 2023 covered a range of topics including safeguards, nuclear safety, emergency preparedness and response, and regulatory oversight. These training sessions were tailored to meet the specific needs of participants from different countries and organisations and were delivered by experienced experts in their respective fields. Through its training activities, STUK aims to enhance the capacity of its international partners to strengthen global efforts to ensure the safe and peaceful use of nuclear energy.

With over 60 years of experience in nuclear and radiation safety, STUK has become a trusted partner for many countries and international organisations in their efforts to improve nuclear and radiation safety.

Overall, STUK's international training activities in 2023 represented a continuing commitment to promote nuclear and radiation safety worldwide, and to share expertise and experience with the international community.

STUK actively hosted cooperation visits also during whole year 2023. Most of the visits were carried out in cooperation with IAEA Technical Cooperation (TC). STUK was visited by experts from other countries, such as Slovakia, Uzbekistan, Latvia and Vietnam. Similarly, STUK experts participated in numerous IAEA missions and technical meetings in Vienna.

STUK – NNSA Middle East Workshop: Safeguards Implementation in Focus

In summer 2023, STUK, in cooperation with NNSA, organised a workshop on the following topics: "Sharing Experiences of State Authorities Responsibilities for Safeguards Implementation". Key focus areas included State authority structures, pandemic-era challenges, and strategies for balancing safeguards with all other regulatory responsibilities. Workshop participants gained valuable insights during technical visit to Fortum and VTT, witnessing also the cooperation and communication efforts between STUK and stakeholders.

Continuing cooperation with ENEN in Master of Safeguards

In 2023, the Master of Safeguards programme second round started in cooperation with ENEN, IAEA and Polytechnic Milano was completed. STUK was in the first round for this training programme which is designed for professionals who work in the nuclear industry, regulatory authorities or other organisations that deal with nuclear materials. Master of Safeguards is based on the requirements of the IAEA and is accredited by the European Safeguards Research and Development Association (ESARDA). The programme is offered in collaboration with universities and research institutions across Europe and is open to participants from around the world.

Overall, Master of Safeguards provides professionals with the knowledge and skills necessary to effectively implement nuclear safeguards measures and contribute to the global effort to prevent the proliferation of nuclear weapons.

Strengthening partnership with University of Jyväskylä and University of Helsinki: Insights from Professors of Practice

In 2022, STUK appointed two professors of practice at the University of Jyväskylä and the University of Helsinki. According to the universities, a person who has significant professional competence and merits outside the higher education world and whose competence can be considered to be of particular benefit to the university's teaching and research activities and wider societal interaction can be appointed as Professor of Practice. The position of Professor of Practice is filled by invitation. A professorship of practice is always fixed-term and part-time in addition to the person's actual duties.

During 2023, STUK determinedly developed cooperation with universities, taking into account the strengths of its own role as an authority. In various experiments, the emphasis is naturally also on developing international cooperation. As one example, planning started in 2023 by STUK, the University of Jyväskylä and European Nuclear Education Network (ENEN) for contributions to the second round of Specialised Master of Safeguards training program.

2.3 Cooperation with Nuclear Newcomer and Expanding countries together with STUK International Ltd.

STUK International Ltd, formed in 2016, is a 100% state-owned company that enables STUK to provide radiation and nuclear safety expertise services globally. Customers of the company are existing or developing regulators, public or private organizations in the field of radiation and nuclear safety. The services offered by STUK International Ltd. are based on the internationally recognized expertise and highly skilled professionals of STUK.

In 2023, STUK, represented by STUK International Ltd, participated the following projects or their preparations:

- Support for National Nuclear Energy Working Group of Estonia regarding an analysis on radiation protection,
- Continued support for ANVS from the Netherlands in benchmarking the Finnish oversight procedures in the new nuclear builds,
- Development of safeguards regulation with NRRC of Saudi Arabia,
- Development of emergency preparedness strategy with NRRC of Saudi Arabia,
- Dose assessment workshop for National Environment Agency of Singapore,
- Support for EU funded project related to increasing the capacity and capabilities of the Nigerian Nuclear Regulatory Authority,
- Support for EU funded project related to the strengthening the nuclear safety and radioprotection regulator in Türkiye.

Additionally, STUK International Ltd and STUK participated together the Finland pavilion at the IAEA General Conference in September 2023, and begun to work together with other Finnish stakeholders to organize the next Nordic Nuclear Forum 2024 in Helsinki.

3 Expert Support in International Projects

The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) entered into force in Finland in 1970. For fifty years, the treaty has been a key prerequisite for the peaceful use of nuclear energy in Finland, a country that, as a user of nuclear energy, has had solid grounds for preventing the proliferation of nuclear weapons.

The Ministry for Foreign Affairs of Finland (MFA) is financing the projects, which are related to non-proliferation, nuclear security and disarmament. The Radiation and Nuclear Safety Authority (STUK) has technical expertise to offer the projects. The good cooperation between the MFA and STUK deepens the common understanding between the political and technical fields, and enables Finland to have the best possible knowledge in international negotiations. This work is an important part of STUK's international cooperation. In addition, STUK participates in the non-proliferation and safeguards-related working groups ESARDA and NSG. A summary of the results for 2022 is presented next.

FINSP – Finnish Support Programme for the IAEA Safeguards

Member states support programs to the IAEA safeguards provide a very specific mechanism through which the member states can provide IAEA both in-kind and financial contributions. This mechanism was created on purpose already in 1970's. The first Member State Support Program (MSSP) was established in 1977. MSSPs play an important role in strengthening and sustaining the IAEA's nuclear verification capabilities.

As of 31.12.2023 there are 24 active MSSPs, when European Commission is accounted for. Most MSSPs provide IAEA access to facilities and expertise for training and field testing of equipmen. Some MSSPs also contribute with direct financial support and through provision of Cost Free Experts and Junior Professional Officers to the IAEA.

MFA and STUK have made an agreement for the implementation of FINSP for a term of three years 2022–2024. For 2022, MFA set aside funding of €170,000. The actual expenditure of the programme in 2020 was €184 029,17.

In 2023 FINSP had serious problems when trying to coordinate Non Destructive Assay (NDA) Courses for the IAEA inspectors in Loviisa NPP. Security screening of the IAEA inspectors was delayed to the extent that only 4 trainees out of 24 were able to have access to the NPP Fortum, STUK and the IAEA decided then have just only one course instead of two. FINSP had no real leverage to remedy the situation, since the security clearances are stipulated in the law. The situation will be considered before the following courses are arranged.

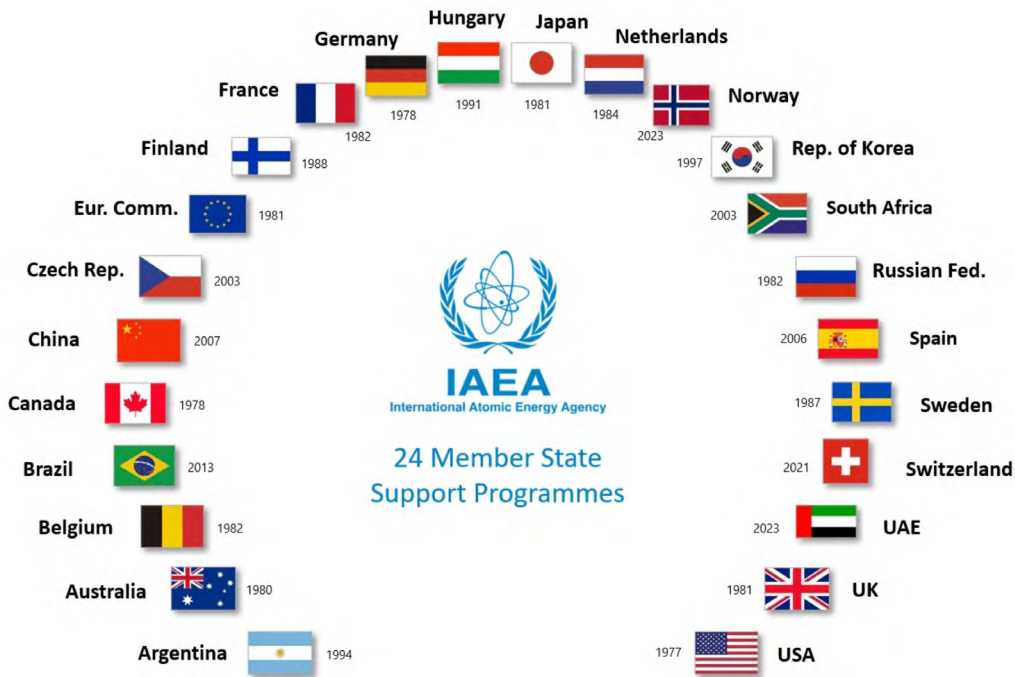


FIGURE 6. Member States’ Support Programmes. Picture IAEA.

Passive Gamma Emission Tomograph (PGET) is NDA verification instrument which has been developed for decades under various MSSP tasks. PGET is by far the most sensitive NDA instrument to detect partial defects from spent nuclear fuel assemblies, since it is capable of detecting single missing pin from the item. The instrument is now in operational use. FINSP has also provided training opportunities for the IAEA inspectors in NDA courses.

The IAEA, EC and STUK have selected PGET is the main instrument for verifying the spent fuel going to repository, for which purpose unattended data collection and analysis mode (UGET, Unattended PGET) has been developed by the IAEA with the support of FINSP and the United States SP. The task took major steps forward during 2023. However, Finland is not fully satisfied with the outcome of UGET, because of its operational constrains. The task may require continuation.

Finland has one Small Modular Reactor (SMR) concept going forward strong, namely LDR50 by VTT and Steady Energy, designed for district heating. Through FINSP the designers of LDR50 have access to the IAEA safeguards department and they can also take into account IAEA’s safeguards concepts. The task also provides IAEA important information about evolving environment, which can be taken consideration when developing new, more efficient, safeguards concepts.

The IAEA has a traineeship program, where young professionals from all over the world spent for almost an year in the IAEA. The program has also been supported by FINSP. In June 2023, two STUK experts spent 2 days with trainees to share knowledge about the elements of State system of accountancy and control (SSAC) and how the implementation of safeguards can be efficiently and effectively set up nationally. The experience was very good for all parties.



FIGURE 7. The IAEA DG Rafaelo Grossi provided FINSP IAEA's Certificate of Appreciation for 35 years of support. The certificate was received by Ms. Elina Martikka, The Head of International Cooperation Unit, STUK on 21st of Feb 2024. Photo STUK.



FIGURE 8. IAEA trainees, with STUK experts in June 2023. Photo STUK.

IAEA Interregional Training Courses

At the end of November 2023, STUK organised a course: “Interregional Training Course on Implementation of National Requirements for Nuclear Power Programmes”. Participants came from Egypt, Nigeria, Ghana, Poland, Türkiye and Uzbekistan. During the course week, in addition to lectures by IAEA experts, STUK’s experts from all fields of comprehensive security as well as on communication and preparedness shared their experiences and practices. Reinforcements also came from Fortum. The course visited the final disposal facility and the encapsulation plant for spent nuclear fuel at Olkiluoto, as well as the emergency response centre of STUK. The course was implemented as FINSP activity.

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FIGURE 9. An overview of the IAEA Newcomers Course’s 2023 visit to STUK and Olkiluoto for hands-on learning. Photo STUK.

IPNDV – International Partnership for Nuclear Disarmament Verification

The International Partnership for Nuclear Disarmament Verification (IPNDV) was established on the initiative of the United States in 2014. The other participants in IPNDV come from both nuclear and non-nuclear weapon states. A third phase of IPNDV started at the beginning of 2020. IPNDV develops methods and procedures for the verification of nuclear disarmament.

Finland has been participating in IPNDV since its inception. STUK’s tasks in IPNDV have always been connected to the development of technological verification methods.

In 2023, two in-person meetings and a measurement campaign were organised. STUK participated to all these activities. One of the in-person meetings included a separate workshop on information barriers. Final report from the conducted measurement campaign will be published in 2024. In Finland, the University of Jyväskylä joined IPNDV research and development on 2022 when the STUK and the University implemented a neutron measurement campaign in STUK's irradiation hall. The data were analyzed and published in ESARDA Bulletin magazine in April 2023.

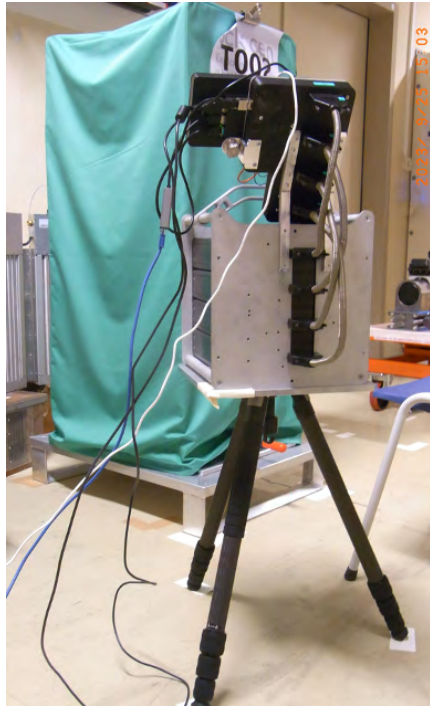


FIGURE 10. Facet measuring a 2nd template object during the IPNDV Belgium measurement campaign in 2023. BeCamp2. Photo SCK CEN.

GICNT – Global Initiative to Combat Nuclear Terrorism

Nuclear Security activities often include cooperation between multiple authorities. Nuclear Security also has a strong international aspect. The Global Initiative to Combat Nuclear Terrorism, GICNT, established in 2006, has been one of the most important international fora for nuclear security. In total, 89 states and six international organisations have participated to the work of GICNT. Member states' nuclear security capabilities and cooperation have been developed, for example by organising exercises.

The activities of GICNT are at a standstill due to the war in Ukraine. Different countries are now hosting nuclear security events outside the GICNT umbrella. Finland is actively participating to these efforts. In 2023 STUK participated two table-top exercise events, two coordination meetings and one technical meeting. In addition to these, several expert contributions for the IAEA were also made.

ESARDA and INMM – International Non-Proliferation Organisations

STUK is a member of the ESARDA and has appointed experts to its committees and most of the working groups. STUK has a board member in the ESARDA Executive Board and the Edito-

rial Committee. At the end of 2023, STUK experts were chairing of the IS (Implementation of Safeguards and Export Control working groups.

INMM/ESARDA Joint Annual meeting was held in May 2023 in Vienna. STUK’s experts contributed to the meeting with several presentations and papers and in panel discussions.



FIGURE 11. Outlook on Final Disposal of SNF – Safeguards presented by director Jaakko Leino in INmm/ESARDA Joint annual meeting 2023. Photo STUK.

In autumn 2023, a working group meeting was held in Finland and STUK, bringing together the IS and FD (Final Disposal) working groups.

NSG – Nuclear Suppliers Group

The Nuclear Suppliers Group (NSG) is a multilateral export control regime and a group of nuclear supplier countries that seek to prevent nuclear proliferation by controlling the export of materials, equipment and technology that can be used to manufacture nuclear weapons. It has 48 participating governments. Finland is represented on the NSG forum by the Ministry for Foreign Affairs. NSG meetings were again cancelled due to the pandemic. STUK technical expert participated in NSG Technical Expert Group (TEG) meeting in November 2023.

4 Abbreviations and acronyms

AFCONE	African Commission on Nuclear Energy
AUKUS	Enhanced trilateral security partnership between Australia, the United Kingdom and the United States
DEMA	Danish Emergency Management Agency
DSA	The Norwegian Radiation and Nuclear Safety Authority
ENCO	Independent Safety and Security Consultancy
ENEN	European Nuclear Education Network
ERCC	Emergency Response Coordination Centre
ESARDA	European Safeguards Research and Development Association
EU	European Union
FINSP	Finnish Support Programme to the IAEA Safeguards
FMI	Finnish Meteorological Institute
GICNT	Global Initiative for Combating Nuclear Terrorism
IAEA	International Atomic Energy Agency
INIR	Integrated Nuclear Infrastructure Review (INIR), IAEA
INMM	Institute of Nuclear Materials Management
INSC	European Instrument for International Nuclear Safety Cooperation
IPNDV	International Partnership for Nuclear Disarmament Verification
MFA	Ministry for Foreign Affairs
MORC	Material out of Regulatory Control
MOU	Memorandum of Understanding
MOI	Ministry of Interior
MSAH	Ministry of Social Affairs and Health
NESA	National Emergency Supply Agency
NDA	Non Destructive Assay
NKS	Nordic forum for research, competence building, experience exchange and networking in nuclear and radiation safety with focus on reactor safety, including decommissioning, and emergency preparedness.
NORM	Naturally Occuring Radioactive Material

NPP	Nuclear Power Plant
NRRC	Nuclear and Radiological Regulatory Commission
NSG	Nuclear Suppliers' Group
RESCEU	Updated EU Civil Protection Mechanism to protect citizens from disasters and manage emerging risks
SCK CEN	Belgian Nuclear Research Centre
SMR	Small Modular Reactor
SNRIU	State Nuclear Regulatory Inspectorate of Ukraine
SSAC	State system of accounting for and control of nuclear material
SSM	The Swedish Radiation Safety Authority
SSTC NRS	State Scientific and Technical Center for Nuclear and Radiation Safety of Ukraine
STUK INTERNATIONAL LTD.	State company which enables STUK to provide radiation and nuclear expert services globally
TVO	Teollisuuden Voima Oyj

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International Cooperation in a Nutshell



Active participation
in the IAEA
review missions and
technical meetings



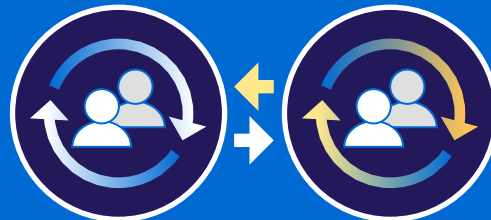
Multiple countries have been
networked and AFCONE
hundreds have been
trained



Developing
international partnerships
and yes, there are quite many working group that
STUK participates actively



Tens of meetings
with International
organizations and counter
regulatory bodies
around the world



On-going dialogue
with our colleagues in Ukraine,
to provide
regulatory assistance



The rescEU for improving CBRN reserve:
two Multimillion Euro projects
with Government collaboration



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