Excellencies,
Distinguished Guests, colleagues and friends
Ladies and gentlemen,

When we lay a trail, we do it for our society. When we develop innovative nuclear applications, we offer our society key solutions to challenges in a changing context. What are the current challenges for society and how can SCK CEN, with its expertise, contribute to overcoming them? There are three main areas: Nuclear energy production, end-of-life solutions and nuclear medicine.

1. How can the nuclear sector contribute to secure a sustainable energy supply?

With the war on Ukraine, security of supply and strategic autonomy have come to the foreground. The contribution of nuclear energy in a transition energy mix has been debated intensively and the long term operation of current nuclear power plants has been put forward to reduce the heavy reliance on Russian oil and natural gas. In this context, Belgium decided to keep open Doel 4 and Tihange 3 after 2025.

Besides long term operation, building new nuclear reactors is being considered in Europe. Not only just the traditional ones, but also particular ones: small modular reactors. They need a lower initial capital investment, offer a passive safety and the ability to respond in a safe and flexible way to electricity demand in combination with e.g. hydrogen production. Efforts to build the first small modular reactors are worldwide geared up so that they become operational by the end of the decade.

But these are water-cooled ones – the same coolant technology as for Doel and Tihange. The small modular reactors for which **our government** has

allocated a research budget of 100 million euros, have to respond to a set of criteria such as a more efficient use of nuclear fuel and less production of radioactive waste.

To reach this goal, we'll need fast neutrons. A coolant – other than water – helps to keep these neutrons fast. Here, we will deviate from the mature water technology, exploring an innovative design concept. Due to the innovative character, there is more research and development needed before a possible commercial deployment in 2040.

On our 70th anniversary, we are happy to announce that in Belgium, we'll take up the challenge to perform the needed research and development of these innovative SMR's. It is our ambition not to do it alone, but to join forces with universities, research centres and private partners. Today, we are reconnecting with the spirit of the early pioneering times. We thank the government for this opportunity, for the trust in our knowledge and for the acknowledgement in our expertise placing Belgium in a privileged position.

Why are we in a privileged position? Thanks to MYRRHA, we have expertise in a specific coolant technology that allows the neutrons remain fast, namely a heavy liquid metal. If Belgium would decide to investigate lead-cooled SMRs, one could benefit from MYRRHA's development pathway in terms of the R&D of heavy liquid metal technology, the design of reactor components operating in such environment and the associated pre-licensing process with the Belgian safety authorities. The objective of MYRRHA is not to be an SMR, but a multi-purpose research facility that wants to tackle the question of the legacy spent fuel.

Currently, three main options exist:

- Direct geological disposal;
- Geological disposal after **reprocessing**;

- Geological disposal combined with **partitioning and transmutation**.

With MYRRHA, we want to contribute to the demonstration of the third option, we want to demonstrate concentrated transmutation on a semi-industrial scale. Why are we so eager to demonstrate this process? It can reduce the radiotoxicity of the waste and reduce the ecological footprint of a future geological disposal repository.

International cooperation and financing is however essential if we want to realise MYRRHA. As such, we set up the MYRRHA AISBL to welcome international partners. Now, the time has come to hunt for international participation in the consortium with the full support of the Belgian government and to realise the first phase of MYRRHA: the 100 MeV accelerator and its target stations, in short the MINERVA-project.

This brings us immediately to the second challenge with regard to nuclear energy production: the needed end-of-life solutions, in particular in a **nuclear phase-out in Belgium.**

As you know, the decision was made to gradually shut down nuclear power plants. Upon closure, a new, major challenge awaits us. The nuclear power plants must be decommissioned. The aim is to restore the site to its original state, while reducing the amount of radioactive waste to the bare minimum in a cost-effective way.

In short? It will represent one of the largest projects in Belgium, but it will also mean a lot of **opportunities** for optimisation through R&D. That is the reason why the federal government included decommissioning in its recovery plan. 25 million euros will be allocated to research and development **of sustainable decommissioning**.

Why does this involve our future? Dismantling a nuclear power plant is a complex process. It requires legal compliances, planning, information management, extensive knowledge, resources and state-of-the-art techniques. With BR3, the first PWR in Europe, and many other nuclear facilities such as the BN MOX plant and the Thetis reactor, we already went through such a process. We are familiar with the requirements from the Belgian regulatory authorities for the release of materials, and the challenges surrounding the management of radioactive waste.

This will allow us to act as a knowledge compass for the Belgian industry. We will support them by improving existing technologies and procedures. These technologies can cover a wide range of areas: from decontamination techniques for reducing the amount of waste, to characterisation techniques for precisely determining whether materials can be given a second life. Or even modern ways of managing waste streams, such as artificial intelligence or 3D visualisation. We will therefore invest in new facilities for validating techniques and innovations leading to **sustainable decommissioning.**

Besides the application in the dismantling of NPP's, different waste streams and forms have been generated in the past and will be produced with new upcoming scientific projects or during site remediation. An efficient and adequate management of these waste streams and forms will strongly benefit from innovative techniques and insights. The public-public partnership with NIRAS plays an important role in this respect.

With the RECUMO project, SCK CEN and IRE, through a public-public partnership, will also provide a structural solution to the radioactive residues coming from uranium target processing and will secure in this way the production of Mo-99 radioisotope for diagnostic purposes.

This then brings us to the next challenge that is not energy related. It concerns:

3. the growing number of cancer patients. How can we not only contribute to the diagnosis of cancer, but also to its treatment?

Increasing life span is set to lead to a rising number of cancer cases and larger groups of people living longer with the disease. Eric already hinted that nuclear medicine will play an increasingly important role in the fight against cancer. This was one of the motives to refurbish our BR2, to prepare the reactor for the period till 2036 and thus to continue our current contributions.

But we want to step up the fight against cancer by largely stimulating current developments in nuclear medicine. Nuclear medicine is at a tipping point: targeted cancer treatments with therapeutic radiopharmaceuticals are on the rise. In this process, a carrier molecule brings a therapeutic radioisotope to the cancer cells in the body. As soon as the carrier molecule has attached to the cell, the radioactive isotope will irradiate the cancer cell with the intention of disrupting the DNA of the tumour cell. The tumour cell dies, shrinks and may possibly even disappear entirely.

These developments make a difference in the world, meaning a world of difference for many patients. Therefore, in addition to our current vital production of medical radioisotopes for diagnosis, we will produce new radioisotopes for therapeutic applications. And these are not empty promises, two isotopes and their production facilities are in the pipeline.

The first one is lutetium-177, a promising radioisotope currently used for the treatment of prostate cancer. The raw material is already being produced today by our BR2, but we want to go one step further: the production at our site of a pure Lu-177 radioisotope of radiopharmaceutical quality. SCK CEN

and the National Institute for Radioelements (IRE) are working hand in hand to enable the large-scale production and distribution of the isotope.

The second one is actinium-225, a novel radioisotope which has significant potential in the treatment of cancer. To date, extensive research and numerous studies are underway which aim to tackle both high prevalence cancers including prostate, lung, colon, breast, pancreatic, blood and kidney cancers, but also rarer forms of cancer like glioblastoma, the deadliest form of a very invasive brain cancer.

Together, with IBA, SCK CEN is working towards the large-scale production of actinium-225 for patient use. By ensuring the availability in large quantities, we'll make this therapeutic solution accessible to the greatest number of patients! With the official creation of the spin-off between IBA and SCKCEN, we will start the search for possible investors to realise the production facility as soon as possible.

We are grateful that the developments of both radioisotopes, lutetium-177 and actinium-225, also benefit from the recovery plan endorsed by our government and we will accompany these developments with the necessary competences in radiobiology, radiochemistry and dosimetry for supporting R&D, in particular for pre-clinical research.

How will we deal with these important challenges in combination with our current activities? This will be the subject of the strategic plan that we are currently preparing. But one element will in any case remain our top priority: the safe and secure operation of our nuclear facilities.

All the foregoing is nice, but what is the essential element to reach it?

The highly skilled and intrinsically motivated SCKCEN collaborator. In the past we have been able to count on them and this will also be our key element of success in all our future endeavors.

Therefore, I am very proud to have been selected by our Board to become Director-General of SCK CEN on November 1, 2022. As Eric stated before, SCK CEN has it all. We have the experienced staff, unique infrastructure and the ability and motivation to respond to a changing societal context. We've built pioneering infrastructures in the past and are still building new ones.

Because we want to make a difference for our society. Now and in the future.