“NRG IS COMPOSED OF HIGHLY QUALIFIED, SKILLED PEOPLE AND A UNIQUE SET OF INSTALLATIONS, ALLOWING US TO OPTIMALLY SERVE OUR MARKETS”

NIELS UNGER
PRESIDENT NRG

“NRG’S CORE VALUES - SAFE AND RELIABLE OPERATIONS - ARE BEING EMBEDDED IN THE DNA OF EVERY NRG EMPLOYEE”

HARRIE BUURLAGE
VICE PRESIDENT NUCLEAR
NRG: making nuclear technology work for society and you
NRG is an innovative, internationally operating nuclear service provider and Europe’s largest producer and supplier of medical isotopes. Every day, some 25,000 patients worldwide are diagnosed using isotopes produced by NRG. Our 500 employees work with an extensive global partner network in healthcare, energy, industry, government and science.

Solid background
NRG’s main office and major facilities are based at the ‘Energy & Health Park’ in Petten, The Netherlands. This is the location where Reactor Centre The Netherlands was founded in 1955 and the nuclear facilities were taken into operation in the early sixties. The site also houses ECN, NRG’s parent company and the largest Dutch energy R&D institute as well as the European Commission Joint Research Centre, which owns the High Flux Reactor, and Mallinckrodt Pharmaceuticals, our main customer for medical isotopes.

Our mission
We fulfil society’s need for high quality nuclear research and innovation, safe and reliable nuclear isotope production and provide services to organisations working with nuclear technology.

Key values
NRG strives to safeguard its role as nuclear services provider and develop the organization through international expansion and new activities. Partnerships, transparency and strict compliance with all relevant guidelines are of the greatest importance to NRG. Our key values lead us in everything, from strategic decisions to everyday activities. Our guiding principle is always, ‘we do it safely or not at all’.

Employees are expected to work safely and reliably, act in a financially robust way, adopt a market and client-oriented attitude, be open and transparent in their actions and professional and expert in their work.

Organisational structure
Commercial activities for the radiation market are contained in the Irradiation Solutions unit. Activities related to nuclear safety, asset integrity, decommissioning & waste and integrated radiation protection are organised in the Consultancy & Services unit.

The Research & Innovation unit contains all R&D activities, ensuring synergy between various research fields and highlighting overlap. Research themes are now being redefined with stakeholders and structural capacity will be created to develop products not yet imagined.
UNIQUE NUCLEAR INFRASTRUCTURE

At NRG, we realise our business, research and innovation goals with the help of our unique infrastructure. Our nuclear facilities play a key role in isotope fabrication and irradiation for certification and test purposes, together with our people with their unparalleled knowledge as well as an established international network.

NRG is a globally respected partner in various areas. We focus on continuously improving the safety and efficiency of nuclear reactors, developing methodologies for the design of advanced nuclear systems and alternative manufacturing processes for medical applications. Other recognised fields of expertise include computational physics simulations.

High Flux Reactor

The HFR is a light water-cooled material test and irradiation reactor rated at 45 MW thermal power. It offers a constant, high neutron flux and is operational during a large number of days per year. The HFR offers various irradiation positions, in both the in-core and ex-core (pool side facility) region. This allows the HFR to achieve and simulate different irradiation conditions. Every day, the HFR plays an important role in society, by producing medical isotopes and facilitating energy supply research.

Hot Cell Laboratories

In the Hot Cell Laboratories, radioactive materials irradiated in the High Flux Reactor can be processed for further research and production. These materials can be handled, processed, examined and repackaged on the HCL’s numerous cell lines. In some of these hot-cells radioactive waste is characterized and sorted in categories. The labs are equipped with radiation-shielding Hot Cells, lined with concrete or lead: a safe environment for working on (highly) radioactive materials.
Decontamination & Waste Treatment

This facility is fully equipped for the decontamination of radioactively contaminated material and treatment of (liquid) radioactive waste streams. Techniques employed include high-pressure, abrasive and ultrasonic cleaning. Following the cleaning process, radioactive waste is treated, stored in barrels or transported to a government-approved storage location in the Netherlands or abroad. The DWT has a versatile license to handle third party, foreign solid and liquid wastes.
Products and Services

Isotopes
The vast majority of the NRG’s activities for medical and industrial isotope applications are supported by the ‘irradiation chain’. NRG utilizes a unique set of five nuclear facilities, each offering a wide range of services and solutions from procurement of raw materials to delivery and logistics all over the world.

Fuel & Materials
NRG offers a unique combination of facilities, expertise and experience for testing, examining and qualifying materials for use in the nuclear industry. At our High Flux Reactor materials can be exposed - under controlled conditions - to irradiation levels comparable to or higher than a nuclear power plant. In this way, existing nuclear energy technologies can be made safer and more efficient.

Radiation Protection
To support safe and responsible working, we provide versatile, integrated service packages to the nuclear, NORM and healthcare sectors. These focus on regulatory compliance and protecting people and the environment. Our ‘one-stop-shop’ offers everything from on-site radiation protection to backend solutions for NORM waste. Expert compliance management systems, risk analyses, training and monitoring services ensure clients are in control of radiation protection.

Safety & Risk
NRG employs a diverse group of consultants with extensive experience in the international nuclear field. They provide advice and support in the main areas of nuclear safety, technology and regulation and the overlap between these areas. We combine theoretical knowledge of (inter)national regulations, procedures and trends with practical ‘on site’ experience. Services are focused on operators of nuclear power plants as well as adjacent industries, such as the oil and gas industry.

Asset Optimisation
Asset Optimization encompasses a wide range of services related to efficiently keeping your equipment and / or means of production up and running and extending its functional lifetime where possible. Effective asset integrity management ensures optimal reliability, technical integrity, safety and regulatory compliance. NRG asset integrity knowledge is not only used in the nuclear industry, but also by utilities, industries and regulators in Europe, America and South Africa.

Decommissioning & Waste
To meet the increasing need for safe, cost-effective radioactive waste disposal, the decommissioning sector is rapidly developing. As a licensed site operator, we perform dismantling, decontamination and recycling tasks on various waste streams: decontaminating NORM waste, dismantling reactor components, providing advanced radiochemical characterization of representative samples. Clients may rest assured their waste is stored safely and effectively according to stringent criteria.
“NRG’S SUCCESS IS BUILT ON THE QUALITY, COMMITMENT AND PROFESSIONALISM OF OUR EMPLOYEES”
“FOR YEARS, NRG AND MALLINCKRODT HAVE WORKED CLOSELY TOGETHER, IN PRODUCING HIGH-QUALITY PRODUCTS CONTRIBUTING TO THE WELL-BEING OF THOUSANDS OF PATIENTS EVERY DAY”

FRANK DE LANGE
MANAGING DIRECTOR
MALLINCKRODT MEDICAL B.V.
IRRADIATION SOLUTIONS

Nuclear expertise for health, energy & environment
Irradiation Solutions is engaged in the production process of medical and industrial isotopes and conducting characterization and qualification tests for structural materials and fuel. The unit provides a broad range of irradiation services.

Essential contributions to public health
NRG provides medical isotopes to radiopharmaceutical companies and research centres. Due to the material’s half-life, just-in-time logistics are essential. Molybdenum is the principal medical isotope and new treatment methods are boosting the demand for special products. Therefore, NRG also produces Lutetium-177, indispensable in treating patients with neuro-endocrine tumors, as well as, for instance, Iridium-192, Strontium-89, Samarium-153 and Yttrium-90.

The combination of therapy and diagnostics is a highly promising emerging medical field. Treatment can be tailored to individual patients and adjusted for maximum effectiveness with minimal side effects. NRG is actively engaged in the development of new isotopes for therapeutic and diagnostic applications and personalised treatment.

Safe, reliable energy
NRG’s industrial isotopes are indispensable for non-destructive testing. In the semiconductor industry and the oil and gas industries these are widely used, for example to check transport pipe welding.

For the nuclear industry, NRG performs numerous materials characterization tests and qualifications. Tested materials are used for applications in existing and new nuclear fission and fusion reactors. We offer decades of experience with the irradiation of fuel for high temperature reactors and are a global leader in graphite irradiation and research.

NRG helps operators qualify materials for new applications and ascertain the remaining lifetime of materials used in existing nuclear plants.

Innovation and customer support
Our Irradiation Solutions division is proactively working on developing improved production methods for, among other things, medical isotopes. We are constantly critically examining alternative routes and products.

Irradiation Solutions adds value to its existing services and takes a great deal of work out of the customer’s hands. NRG can provide standard irradiation performance services, as well as customer-specific pre- and post care elements throughout the entire chain. This could include the purchasing of raw materials, development and manufacture of product capsules for irradiation and preparation, handling, transport and permit applications.
CONSULTANCY & SERVICES

International focus
With 125 highly qualified engineers and consultants, NRG’s Consultancy & Services unit is a mid-size entity that delivers bespoke solutions to industries and organizations that work with nuclear technologies across the globe. We are independent from other technology providers, utilities, or regulatory bodies. We support the operations of the High Flux Reactor and other advanced nuclear infrastructure, from complex design modifications to routine radiation protection services. Our propositions are rooted in the 24/7 routine of the Petten licensed nuclear site. This puts us in the unique position to meet our client’s needs in a professional and unbiased way, allowing them to work safely, reliably and efficiently with nuclear technology and radioactivity.

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Decommissioning & waste management
The decommissioning sector is rapidly developing and professionalizing in search of ever increasing client’s needs for the safe and cost effective disposal of radioactive wastes. As a licensed site operator, we perform dismantling, decontamination, and recycling tasks on various waste streams. Decontamination of NORM contaminated materials is our daily routine. We dismantle activated components of reactor internals in NPPs, supplemented with advanced radiochemical characterization of representative samples. With our offerings, our clients know that waste is stored safely and effectively following stringent waste acceptance criteria.

Nuclear compliance & projects
The need for safe operations of nuclear assets places strict demands on regulatory compliance and integrity of nuclear assets over their complete life cycle. C&S has a long track record in design reviews and periodic safety reviews of a multitude of NPPs across Europe. We apply robust methodologies to evaluate the long term operation of NPPs. Risk modelling and non-destructive inspection services furthermore underpin operational safety and asset integrity. Our advanced fuel management methodologies, used by utilities and NPP operators around the globe, help minimizing operational cost. Our bespoke consultancies and services ensure the highest levels of safety, performance, and reliability of our client’s assets.

Integrated radiation protection
To support customers working safely and responsibly with radiation, we provide a versatile, integrated package of services to nuclear, NORM and healthcare sectors. Our offerings are focused on compliance with regulations, and the protection of people and environment from radiation. We provide a one-stop-shop, from on-site radiation protection support, to backend solutions for NORM waste. We are the number one dosimetry supplier in the Netherlands. With our expert compliance management systems, supplemented by risk analyses, training, and monitoring services, our clients are 24/7 in control of their radiation protection needs.
“NRG OFFERS UNIQUE IN-DEPTH KNOW-HOW OF NUCLEAR COMPLIANCE, ASSET INTEGRITY, RADIATION PROTECTION AND WASTE MANAGEMENT, WHICH ENABLES US TO ENSURE A SAFE, EFFICIENT AND RELIABLE WORKING ENVIRONMENT”

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“THE RESEARCH SERVICES OF THE EUROPEAN COMMISSION WILL CONTINUE TO PROMOTE THEIR COOPERATION WITH NRG BY FOSTERING EVIDENCE-BASED SCIENTIFIC AND TECHNICAL RESEARCH RESULTS IN SUPPORT OF THE COMPLETE ENERGY POLICY CYCLE”

ROGER GARBIL
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Becoming smarter and more efficient
NRG has more than 50 years of experience in research and innovation, and has been producing medical isotopes for more than 15 years. Bringing together research and innovation in a separate unit has placed a central focus on longer-term developments. Many research assignments come from national and international government-funded research programs. Nuclear applications are indispensable for the future of energy and health. To identify long-term trends, NRG maintains close contacts with the industry and the international research community.

Preparing for the future of healthcare
An ageing population and increasing prosperity are leading to increased demand for medical radioisotopes for diagnosis and therapy. NRG invents and develops alternatives to existing production and brings innovations in the nuclear logistical process.

New developments in medical technology increasingly require new medical radioisotopes to continue offering patients tailored, affordable medical diagnoses and treatment. DIVA (Dutch Isotopes Valley), a joint venture between URENCO, TU Delft and NRG, aims to continue providing better medical isotopes to treat more types of cancer through more accurate diagnoses and therapies. DIVA offers a unique combination of facilities and expertise, enabling development and production of new medical isotopes. NRG is constantly in touch with end users of existing and potential new products, such as LUMC (Leiden), Erasmus MC (Rotterdam) and the Dutch Cancer Institute.

Rethinking nuclear energy
As energy consumption increases, NRG continues to develop and improve new and existing methods of providing nuclear energy to end-users with a focus on sustainability and safety. Within this broad field of research, NRG focuses on four key themes:

► Reactor Operation and safety: controlling the risks of hydrogen, cooling of the core and the spent fuel pool, fuel behaviour and efficiency and extending the life of existing plants.

► Advanced nuclear technology: development and certification of new materials with improved properties for future use in reactors, optimal use of natural resources and raw materials and the safety of future generations of plants.

► Decommissioning of nuclear installations: reducing and recycling waste, mapping decommissioning risks of dismantling specific components and systems.

► Radiation: innovative dosimetry, training and education, development of measurement and modelling methods.