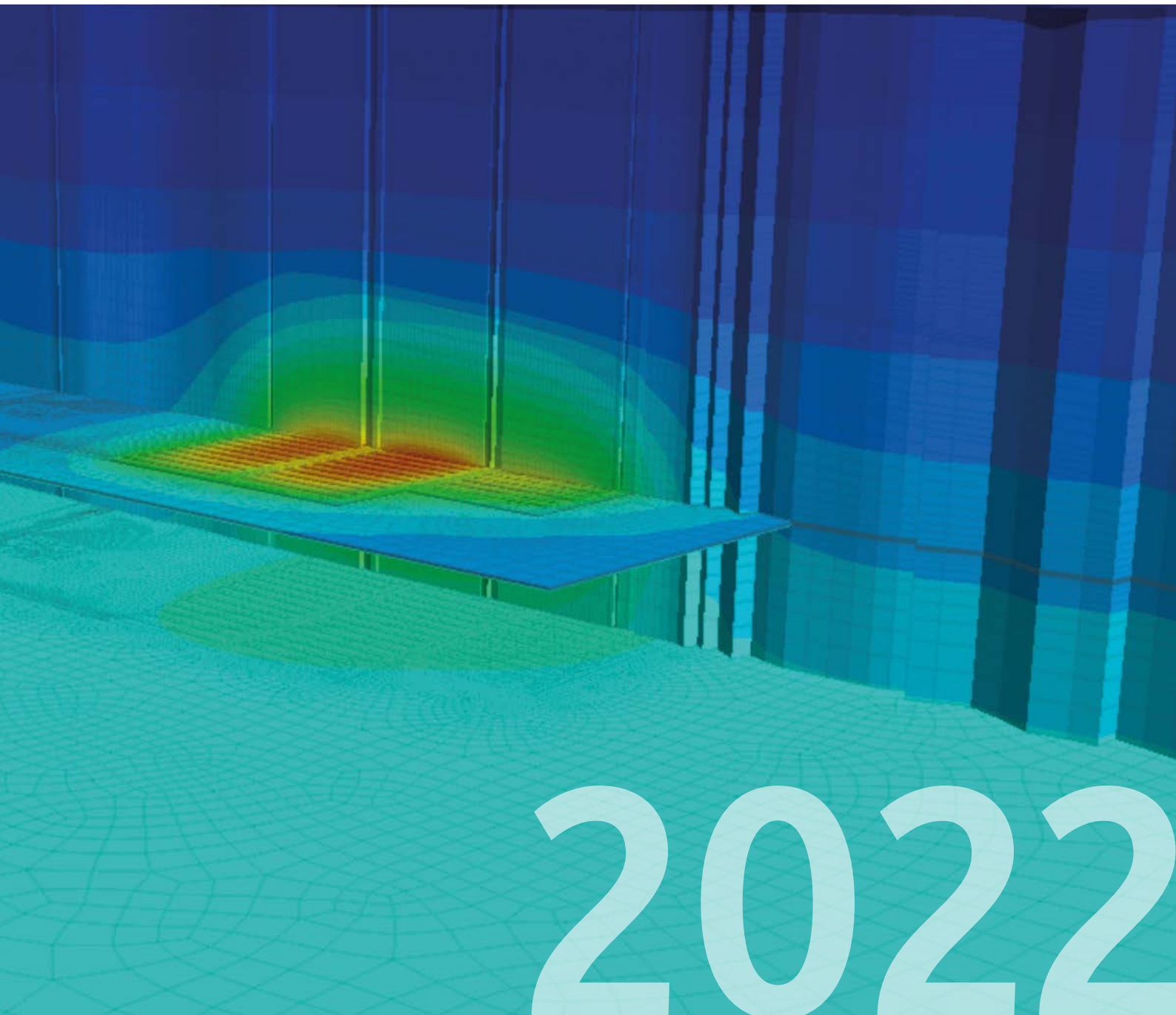




ANNUAL REPORT



2022

Income Statement

For the period from January 1 to December 31, 2022

| all figures in T€ | 2022 | 2021 |
|----------------------------------------------------------------------------------------|--------------|--------------|
| 1. Turnover | 5,675 | 6,158 |
| 2. Change in inventory of work in progress | 229 | -103 |
| 3. Other operating income | 77 | 42 |
| | 5,981 | 6,097 |
| 4. Cost of materials | | |
| a) Cost of raw materials, consumables, and supplies and of purchased merchandise | 57 | 15 |
| b) Cost of purchased services | 1,024 | 1,648 |
| | 1,081 | 1,663 |
| 5. Personnel expenses | | |
| a) Wages and salaries | 3,373 | 3,172 |
| b) Social security contributions and expenditures for pensions and similar obligations | 832 | 814 |
| | 4,205 | 3,986 |
| 6. Depreciation and amortisation of intangible and tangible fixed assets | 26 | 29 |
| 7. Other operating expenses | 443 | 327 |
| | 226 | 92 |
| 8. Interest and similar expenses | 11 | 16 |
| 9. Taxes on income | 78 | 36 |
| | 89 | 52 |
| 10. Results after taxes | 137 | 40 |
| 11. Other taxes | 1 | 6 |
| 12. Net profit for the year | 136 | 34 |

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Dear Readers,

Just do it! Often, it is not possible to see the course of a new path through to the end. What's more, taking a new path is against our nature. In Germany in particular, we want to have everything under control, planned down to the smallest detail before we act, while we like to stick to the tried and tested. But the tried and tested rarely endures for long. This is something we have had to learn, sometimes painfully, in recent years. Everyone, from politics to the industry to the private sector, has had to rethink and has been forced to take previously unimaginable paths. But we did not bury our heads in the sand; instead, we broke new ground and just did it.

In retrospect, not every branch of the new paths we took was right: too extreme, too costly, at the wrong time, or it was simply the wrong branch. But something had to be done, and in the end, everything is better than the original situation.

At the beginning of this millennium, for example, the German programme for the disposal of high-level radioactive waste had reached a point where two positions diametrically opposed each other and brought the entire programme to a standstill. The former Federal Minister for the Environment, Peter Altmaier, recognised the deadlock and completely relaunched the programme. Was everything wrong that had been done before? No! But in order to be able to move forward again on the disposal issue, new paths had to be taken.

Some of the decisions were criticised from the beginning, and some of this criticism was confirmed in retrospect. A current example is the early legal commitment to end the search for a repository in 2031. This date was reviewed by BGE based on the experience gained in the first years of the search for a repository and on the findings from international repository programmes, with the result that this date is practically impossible to keep. However, it was

right to start with the new programme in the first place, because otherwise BGE would probably not even be in a position to carry out such a review, let alone be able to realise the progress achieved so far.

The new waste management programme also poses new challenges for BGE TECHNOLOGY GmbH. In addition to the generational changes taking place, there are now new requirements for the business processes of BGE TECHNOLOGY GmbH as a federal company. As we are an independently operating company without direct financing, new structures had to be created and processes implemented that could not be fully reconciled with the tried and tested processes. But here, too, the motto was: just do it! With this motto, we were able to successfully complete our projects in 2022 and thus implement the wishes and needs of our customers. How we succeeded in doing this, we would like to show you again in this annual report with the help of selected projects.

But of course, success only partly depends on formal structures and processes. What is essential is the trust placed in us by our partners and clients at home and abroad. The cooperation and exchange with our parent company, BGE, in particular constitute an important basis of our activities. On behalf of BGE TECHNOLOGY GmbH, I would therefore like to thank all our partners and clients as well as our parent company! My personal and special thanks go to the team of BGE TECHNOLOGY GmbH who, despite all the hurdles and challenges, once again made an excellent job and "just did it"!

Now I hope all readers enjoy reading this annual report and remain with my warmest regards.

Yours,
Thilo v. Berlepsch
Managing Director

2022

Our Team





Welcome to the Team

Kerim Reddigk

Mechanical Engineer
Geotechnical Engineering
Department

»At BGE TECHNOLOGY GmbH, I have the opportunity to work on environmental protection and to contribute my previous experience from my job and studies to the safety measures at the Asse mine. Interdisciplinary, varied tasks enable me to continuously develop myself, both professionally and personally. I would like to thank my new colleagues at BGE TECHNOLOGY GmbH and my colleagues at BGE for their support during my familiarisation period, which makes me look positively to the future.«

Dr. Martin Neuhaus

Physicist
Repository Technologies
Department

»BGE TECHNOLOGY GmbH offers me the opportunity to combine my professional experience as a development engineer in the projects and also the knowledge gained during my university career as a geo- and astro-physicist. The mix of national and international projects, as well as a diverse range of tasks, are very appealing to me, and I look forward to working with my colleagues on finding solutions to the burning issues of repository safety and the search for a repository.«

Dr. Wolf Andreas Schmidt

Physicochemist and
Electrical Engineer
Repository Technologies
Department

»For me, BGE TECHNOLOGY GmbH is a company where knowledge is continuously used to develop new approaches to solutions for current issues in the disposal of radioactive waste. As a new colleague, you can always rely on the competence and expertise of your team members. For this reason, personal and professional development is an important goal of my work in national and international projects.«

Elzbieta Schmeidel

Physicist
Geotechnical Engineering
Department

»As member of the Geotechnical Engineering team, I have the opportunity to expand my experience in the field of research and development of construction materials. I find the varied and challenging work very exciting and interesting. Since my first day, I have appreciated the collegial and friendly atmosphere in the company. We work closely together in the team and benefit greatly from our respective expertise.«

Torsten Rißland

Technical Assistant for
Information Technology
(System Administrator)

»BGE TECHNOLOGY GmbH is not an "unknown entity" for me. For a long time, I provided them with IT support and advice from my position at BGE. In this context, several computer programmes such as databases for the research projects ANSICHT, ISIBEL, and CHRISTA were developed. Now I look forward to the new and exciting tasks that await me in the IT environment of BGE TECHNOLOGY GmbH.«

Dr. Ajmal Gafoor

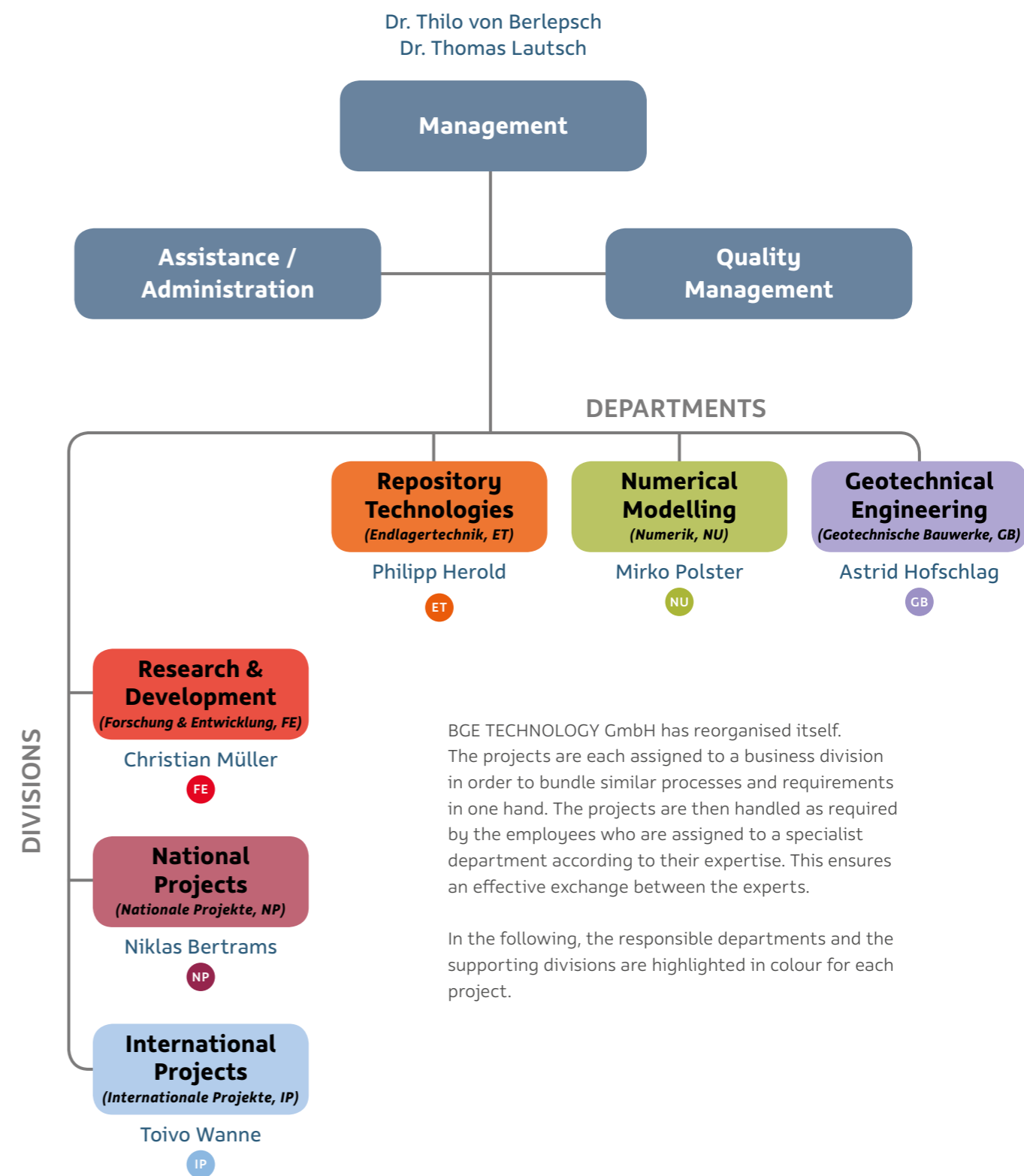
Civil Engineer
Numerical Modelling
Department

»BGE TECHNOLOGY GmbH offers a modern working environment as well as interesting and challenging tasks in the field of safe disposal of radioactive waste. I am very pleased to have the opportunity to work as a civil engineer in this exciting field and to contribute my previous experience in numerical modelling and in the analysis of coupled processes. I am fascinated by the diversity of the tasks as well as the personal and professional development opportunities.«



Managing Directors of BGE TECHNOLOGY GmbH
Dr. Thilo von Berlepsch, Dr. Thomas Lautsch

New Organisation



BGE TECHNOLOGY GmbH has reorganised itself. The projects are each assigned to a business division in order to bundle similar processes and requirements in one hand. The projects are then handled as required by the employees who are assigned to a specialist department according to their expertise. This ensures an effective exchange between the experts.

In the following, the responsible departments and the supporting divisions are highlighted in colour for each project.

Divisions



Research & Development (Forschung und Entwicklung)



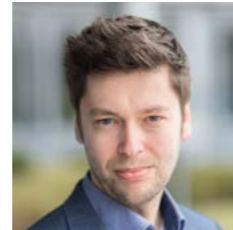
National Projects (Nationale Projekte)



International Projects (Internationale Projekte)

Research & Development

(Forschung und Entwicklung, FE)



Christian Müller

The Research and Development Division is an integral part of our corporate culture, whose main task is the initiation, realisation, and implementation of research and development projects. Our goal is to compile, apply, and further develop the

current state of the art in science and technology with regard to our business activities. We are thus making an important contribution to the national waste management programme of the Federal Government by maintaining and further developing the knowledge on disposal- and repository-specific topics. In cooperation with the departments Repository Technologies, Numerical Modelling, and Geotechnical Engineering, the division coordinates the research projects in our company.

Within the framework of our research activities, close cooperation and communication with other companies, research institutions, and our parent company BGE play an important role, as we are convinced that joint action can lead to more efficient and more successful projects as well as better knowledge transfer. Flexibility and adaptability are also essential factors, as requirements or the state of knowledge in the field of repository research can always change. Thus, it is important for us to react quickly to new challenges and to be able to adapt. Transparent communication and the publication of our research results are of great concern to us in order to strengthen confidence in our projects in the field of repository research.

National Projects

(Nationale Projekte, NP)



Niklas Bertrams

An important goal of BGE TECHNOLOGY GmbH (BGE TEC) is the acquisition and conservation of disposal- and repository-specific knowledge in order to make it available to third parties. The Federal Government's interest in BGE TECHNOLOGY GmbH,

as required by the Public Corporate Governance Code of the Federal Government (PCGK), is safeguarded by us by making our generated knowledge available to BGE. This is a key task of the National Projects Division. In doing so, compliance with the high quality standards of BGE is to be ensured in particular.

The implementation of this task of the National Projects Division is achieved through the acquisition and processing of projects of BGE and the continuous cooperation in all major projects. According to the technical requirements of the tasks, the project teams are made up of experienced experts from the different departments of our company. For example, a team of experts from the Repository Technologies and Numerical Modelling Departments of BGE TEC is working together on the development of waste containers in crystalline host rock for the site selection department of BGE. Together with the departments and the other divisions of BGE TEC, our knowledge management is coordinated, so that our core competences are permanently available and always to a sufficient extent. The projects of the National Projects Division benefit greatly from the know-how gained in national research projects and in international projects.

As the newly appointed head of the also new National Projects Division, I am very much looking forward to effectively putting this into practice in our day-to-day business.

International Projects

(Internationale Projekte, IP)



Toivo Wanne

The International Projects Division of BGE TECHNOLOGY GmbH (BGE TEC) is responsible for the marketing, acquisition, and contractual handling of the company's international projects. The department is involved in the technical exchange with

international partners and clients in order to further promote the establishment of BGE TEC throughout the world. Our parent company BGE also benefits from our knowledge of international best practices that we have gained through international projects and cooperations.

In addition, we ensure the international visibility of our company for existing clients and partners and actively network with potential new clients and partners. The main objective is to further develop BGE TEC's reputation as a renowned, highly qualified contact in the field of radioactive waste management. The division's day-to-day activities include contract management, keeping track of the status of all international projects, acting as a central point of contact for clients in contract matters, maintaining relationships with existing clients and partners, establishing contacts with new clients and partners, and being the responsible lead for preparing tenders.

Departments



Repository Technologies (Endlagertechnik)



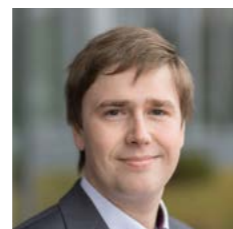
Numerical Modelling (Numerik)



Geotechnical Engineering (Geotechnische Bauwerke)

Repository Technologies

(Endlagertechnik, ET)



Philipp Herold

The tasks of the Repository Technologies Department are generated from the fields of design, planning, construction, operation, decommissioning, and closure of repositories for radioactive waste and can also be extended

to comparable tasks in conventional mining. The required degree of planning and detail can vary significantly. The development of a repository project is usually associated with the development of emplacement concepts.

Other topics include retrievability and recovery or transport and emplacement technology. As is typical for development projects, the level of detail increases with each planning phase. Further tasks of the department are, for example, the development and testing of technologies for the construction of support structures, for the backfilling and closure of underground cavities, surface accesses, the implementation and review of cost estimates, the design and development of waste containers, the preparation, revision and updating of FEP catalogues, as well as the scenario development within the framework of long-term safety assessments.

From the tasks mentioned, it quickly becomes clear how important interdisciplinary teamwork is for the department. A broad professional spectrum and the ability of the individual staff members to work in a team are decisive for the success of the department. At the same time, however, the transition between the specialist fields and thus the conservation and transfer of knowledge within the department are essential. This also includes promoting the scientific/technical knowledge development of our employees. Carrying out our research projects gives us the opportunity to continuously further develop the state of the art in science and technology in the field of repository technologies.

Numerical Modelling

(Numerik, NU)



Mirko Polster

In future, the Numerical Modelling Department will bundle the specialist technical competences in the area of calculation capabilities and rock mechanical assessments. It is here that both the support of research projects of the Federal Ministry for the

Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) or the European Union and the processing of numerical modelling tasks for specific international and national projects take place. This includes the sites of our parent company BGE.

The scope of tasks ranges from "classical" rock mechanical analyses, such as stability demonstrations for underground cavities and lining systems, to the evaluation of the stability and integrity of geotechnical and geological barriers, to forecasts of the long-term development of a repository. In addition to the work for specific sites, design calculations and safety analyses are also carried out for generic repositories in all host rock types. Depending on the respective task, the thermal, hydraulic, and mechanical impacts and processes and their couplings are modelled in the numerical calculations. For this purpose, various software tools adapted to the respective problems are used. In addition to commercial codes, open-source solutions are used, which – after proper validation and verification – can be specifically adapted to the issues in question. One future focus is, for example, the programming of interfaces in order to be able to use the respective advantages of the individual numerical codes through their coupling or in order to implement material models (constitutive models) in other codes.

In addition, the Numerical Modelling Department supports our parent company BGE by providing assistance with planning services, by preparing safety-related demonstrations for licensing procedures, by providing technical support to external contractors, and by reviewing and ensuring the quality of calculation results and documents produced internally by BGE or by third parties.

Geotechnical Engineering

(Geotechnische Bauwerke, GB)



Astrid Hofschlag

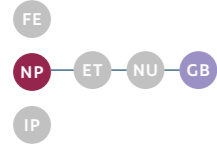
In the Geotechnical Engineering Department, sealing systems are developed, optimised, and executed. These applications are used for our clients in both national and international radioactive waste management and disposal projects as well as

in conventional mining. The tasks range from the development and planning of backfilling and sealing concepts to the development of special construction materials and the corresponding manufacturing and processing techniques to their practical implementation.

One focus is on the improvement of hydraulic pathways, i.e. the reduction of permeabilities through injections. Here, mixing, pumping, and injection techniques are used and continuously further developed. By means of a geotechnical measuring method developed in our department, a quantitative assessment of the hydraulic permeability can be made. Due to our constant presence in the construction supervision of geotechnical structures and the associated information and knowledge gain, a continuous assessment and adaptation of the individual process chains is possible.

Furthermore, the increasingly specific requirements for the construction materials necessitate the further development of standardised testing procedures, their planning, execution, and also their analysis. This is an essential basis for the safety analyses to be carried out in the Numerical Modelling Department.

I see the main challenges for the future in the conservation of knowledge and in interdisciplinary networking. The resulting synergy effects enable the expansion of existing competences and the adaptation of applied and proven procedures to future problems.



Sealing of the Emplacement Chambers in the Konrad Repository

Konrad Repository

The Konrad mine is being converted into the first repository for low- and intermediate level radioactive waste in Germany to be licensed under nuclear law. The emplacement chambers will be arranged in fields. They will be up to 1,000 m long, approx. 7 m wide, and 6 m high. The waste packages will be stacked section by section. After the end of an emplacement campaign, a wall made of shotcrete has to be erected so that the residual cavities can be filled with a flowable construction material. The remaining chamber sections up to the transport drifts as well as the ventilation boreholes to the return air collection drifts have to be backfilled in the same way. In this case, however, the shotcrete cannot be sprayed onto the waste packages directly, but a stable support structure that allows the erection of shotcrete walls had to be developed.

Based on a compilation of potentially suitable materials and an evaluation matrix, BGE decided to use quickly and easily stackable concrete cylinders as the support surface.

In addition, the employees of BGE TECHNOLOGY GmbH have developed a shotcrete recipe in accordance with the state of the art and the experience gained in the use of shotcrete at BGE. Further work by the employees is concerned with the optimisation of the backfill material, since in addition to the original planning, not only iron ore but also clay- and lime-containing rocks are to be used as aggregate. The production of backfill material that is always in line with the requirements and has a variable composition also requires corresponding control of the underground backfill processing plant.

BGE TECHNOLOGY GmbH works in close cooperation with the colleagues of BGE at the Konrad mine and the staff of DMT GmbH & Co. KG, Industrial Engineering Department. The bundling of comprehensive know-how, practical experience, and detailed knowledge of repository design made it possible to create essential prerequisites for a smooth emplacement operation at the Konrad repository.



Tests with tube viscosimeter



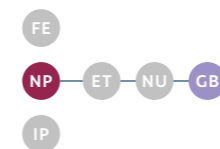
»The safe operation of a repository also includes the smooth and safe execution of processes. Suitable materials and technical equipment need to be available. Well-founded know-how from numerous disciplines contributed to the project, so that we are well prepared for the future.«

DR. HANS-JOACHIM ENGELHARDT, GEOSCIENTIST



»The construction materials we use do not come "off the shelf". They are developed or adapted by us according to the respective requirements. This includes intensive preparation for the quality assurance when subsequently carrying out construction measures, borehole backfilling, and injections.«

DR. LIESELOTTE VON BORSTEL, MINERALOGIST



Contributing to Sustainable Backfilling Measures

Material Development

The Federal Company for Radioactive Waste Disposal (Bundesgesellschaft für Endlagerung, BGE) operates repository mines in deep geological formations in Germany. The stability of the underground cavities is limited in time. In order to maintain rock stability and integrity and in order to avoid subsidence of the earth's surface, these cavities have to be backfilled. During the production and transport of the backfill materials, large amounts of greenhouse gas can be released. BGE is committed to operating its facilities in a climate-neutral manner. This commitment has a decisive influence on the selection and optimisation of the backfill materials and the implementation of the backfilling measures.

In principle, bulk materials that originate from the excavation of the respective cavities of the mine have the smallest carbon footprint. It is therefore reasonable that underground cavities at the Konrad mine, for example, will be backfilled with the mine's own material during the conversion from an iron ore mine to a repository mine. As such an approach is not possible in all areas, many cavities will be backfilled with flowing and self-hardening material. An important point in this case is that the materials must attain sufficient strength. This is achieved with the help of binders in the backfill material. In terms of the type of binders, a distinction can be made between cement-based materials and so-called magnesia binders. As BGE TECHNOLOGY GmbH has extensive experience in the development of backfill materials and the associated placement technologies, BGE has commissioned BGE TECHNOLOGY GmbH with optimising the backfilling process and with developing backfill materials with the lowest possible carbon footprint. In a first step, individual raw materials and supply chains were examined. In this process, all transport and logistics aspects were checked for their environmental compatibility and improved correspondingly. With regard to cement-based construction materials, especially the proportion of Portland cement clinker plays



Underground construction materials laboratory at the Morsleben repository

a decisive role in the carbon footprint. In order to reduce this footprint, new recipes have been developed that include cement-based additives such as pozzolan and latent hydraulic additives. In magnesia binders, magnesium oxide, which is obtained from $MgCO_3$, is traditionally used as binder. As a lot of energy has to be used for this process and the carbon dioxide contained in the $MgCO_3$ is released, this is the point where we saw potential for improvement. The current focus is thus on developing a magnesia construction material with natural brucite in order to reduce the carbon footprint. The measures and approaches taken so far show that BGE and BGE TECHNOLOGY GmbH are on the right track to protect man and the environment through the safe disposal of radionuclides and the implementation of sustainable and future-oriented technologies.



Development of Waste Containers for Disposal in Crystalline Rock

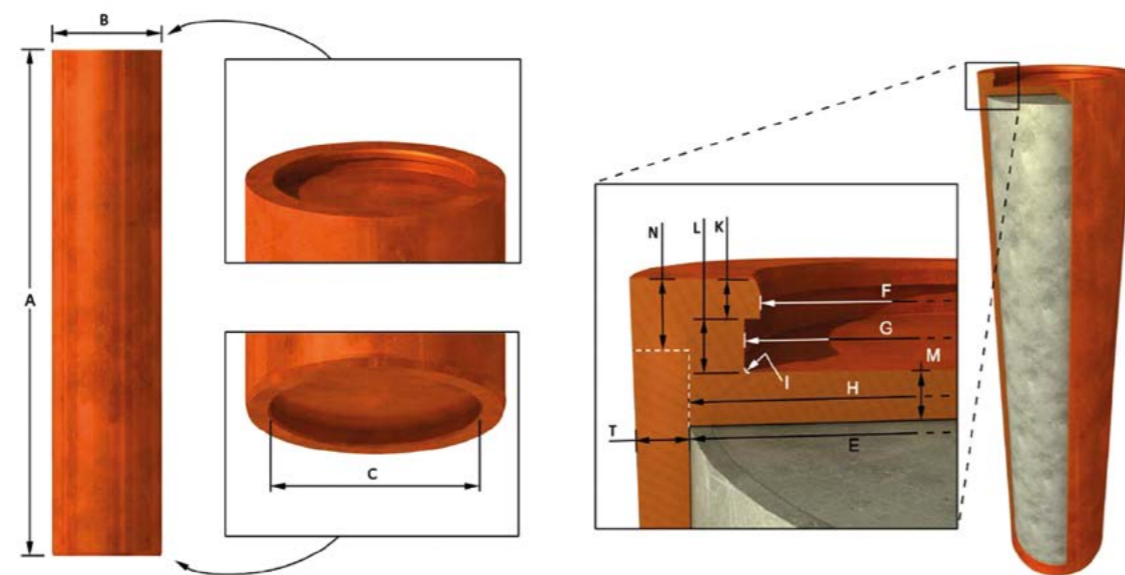
Project ELBRock

In spring 2022, BGE commissioned the project "Development of waste container concepts for deep geological disposal of high-level radioactive waste in crystalline host rock (ELBRock)". BGE TECHNOLOGY GmbH is working on this project in a consortium led by GNS Gesellschaft für Nuklear-Service mbH. Within the framework of this project, up to three waste container concepts for crystalline host rock are to be developed.

The first step in the ELBRock project was to compile the necessary boundary conditions and influencing parameters for the subsequent development of the waste container concepts. For this purpose, the geological properties of crystalline host rock were determined, and an overview of the waste inventory to be disposed of in Germany was compiled. Subsequently, the international state of the art in science and technology for disposal in crystalline host rock

was summarised. This included a description of existing container and repository concepts, emplacement techniques and technologies, conditioning procedures, and possible waste container materials. Based on this, the requirements for and impacts on waste containers will be determined.

For the comprehensible and reproducible evaluation of already existing and new container concepts, a criteria catalogue has to be prepared. Subsequently, the evaluation of existing container concepts in view of the German boundary conditions and requirements as well as the development of new ideas for container concepts can be started. From these, up to three container concepts will be selected and further developed. In parallel, the main features of an assessment of the operational and long-term safety are to be developed within the framework of a safety and safety verification concept.



One example of a canister concept for borehole disposal in crystalline rock (Source: SKB)



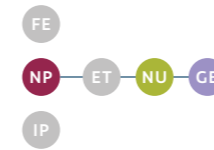
»In crystalline host rock, the waste container is one of the key components of a repository. In Germany, container concepts have so far only been available for rock salt, but development is also progressing for the other host rock types. I am pleased about the productive cooperation with our project partners from the industry and with BGE as our client.«

ANSGAR WUNDERLICH, MECHANICAL ENGINEER



»Sealing structures, the backfilling of cavities, and geologic barriers are to ensure the containment of radioactive waste, in order to protect the environment and the population. The construction of the sealing structures in accordance with the requirements is tested in experiments carried out in cooperation with the specialist departments of BGE.«

DR. ALI HUSSEIN, MECHANICAL ENGINEER



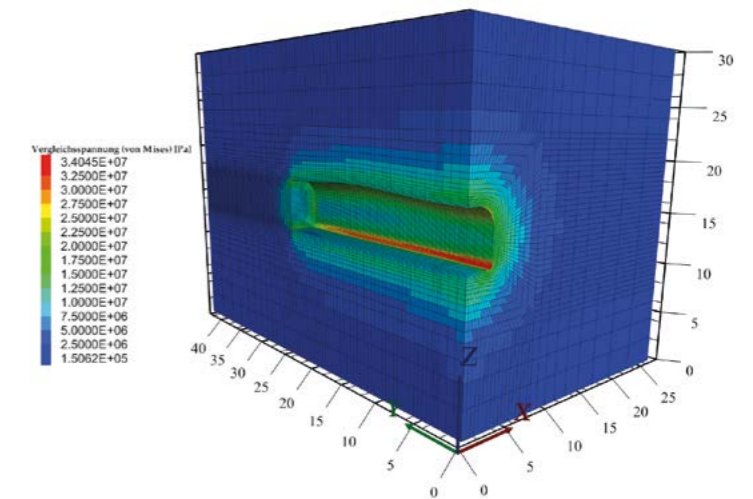
Experiment-related Modelling: Demonstration Structure in Anhydrite Rock

Morsleben Repository, ERAM

Sealing structures are important for isolating radioactive waste from the biosphere in the long term. Due to this fact, the decommissioning concept for the ERAM comprises the construction of drift and shaft seals. 24 drift seals will be constructed in rock salt and one of them in anhydrite rock. In order to demonstrate the technical feasibility of construction in situ, large-scale demonstration structures will be built. They will also be used to obtain thermal, mechanical, and hydraulic parameters, in order to systematically evaluate the functionality of the seals. BGE TECHNOLOGY GmbH supports BGE in the planning of these structures.

To systematically assess the feasibility of a drift seal, mechanical and hydraulic characteristics have to be known. The sealing system consists of a 20-m-long core barrier, which is sandwiched between an abutment and the end of the drift. The construction material will be a magnesium oxide-based concrete adapted to the requirements. Its very high final strength should also be emphasised. Compared with other MgO concretes, the heat generation during setting is relatively high.

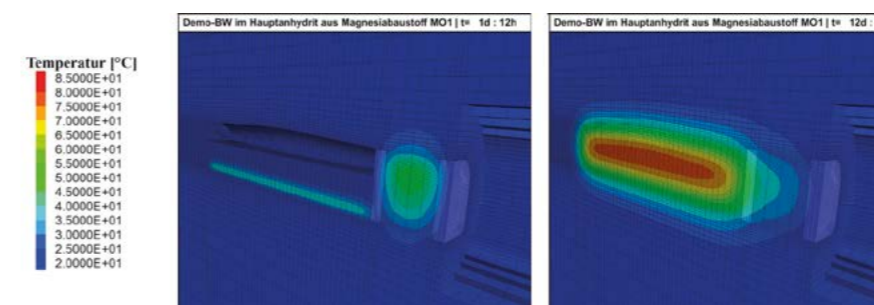
For the planning of the experiment and the selection of the geotechnical measuring systems, knowledge of the amount of heat released and of the temperatures is required. The temperatures in the structure were estimated in advance by means of thermal analyses. As the material parameters of the new



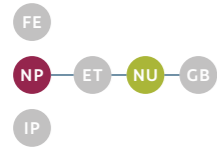
Demonstration structure in the main anhydrite of the ERAM: Stress state of the rock mass (model section)

formulation were not yet fully known at the beginning, the thermal forecast was carried out based on the knowledge of comparable MgO formulations.

In addition to the temperature field calculations, it is also checked whether strength exceedances can occur in the rock mass as a result of the excavation or of re-cutting or due to the thermomechanical restraining stresses from the concreting. Based on the analyses, it can then be assessed whether there is possible damage (and increase in permeability) of the compact anhydrite. Eventually, a model calibration with the results of the geotechnical measurements at the demonstration structure will be carried out.



Demonstration structure in the main anhydrite: Temperature development during the setting process of MgO concrete at two different times, after 1.5 days (left) and after 12.5 days (right).



Stability Analysis of the Landing Station Shaft Marie

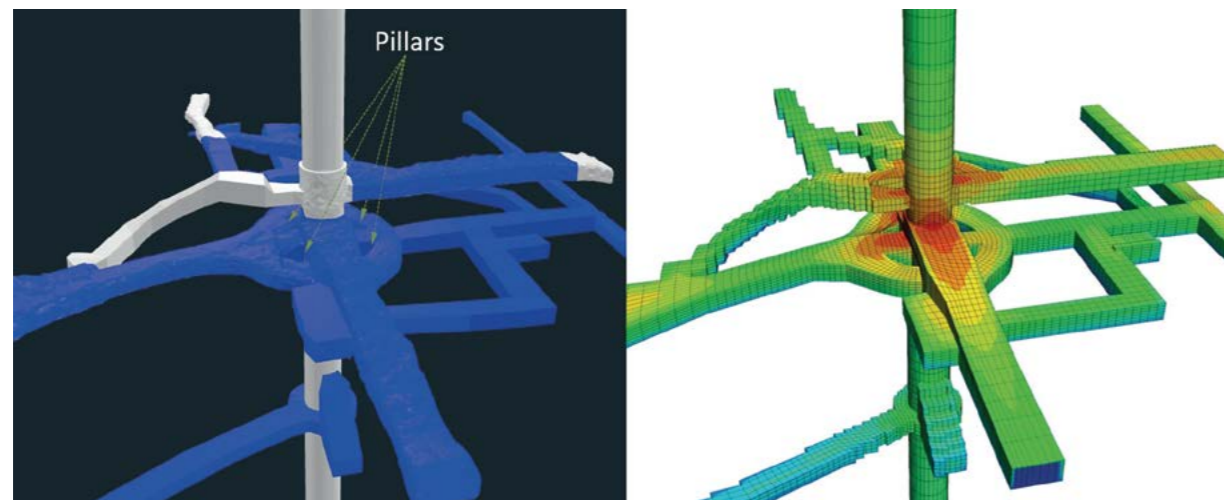
Morsleben Repository, ERAM

The shaft "Marie" serves as a ventilation shaft and escape route in the Morsleben repository for radioactive waste, ERAM. The shaft, named after the mine owner's wife, was sunk 125 years ago with a diameter of 5.8 m. In search of potash salt, a shaft landing station was established 90 m below the salt table at a depth of 360 m. Prior to a planned renovation of the shaft landing station, the rock mechanical situation at the site needs to be assessed.

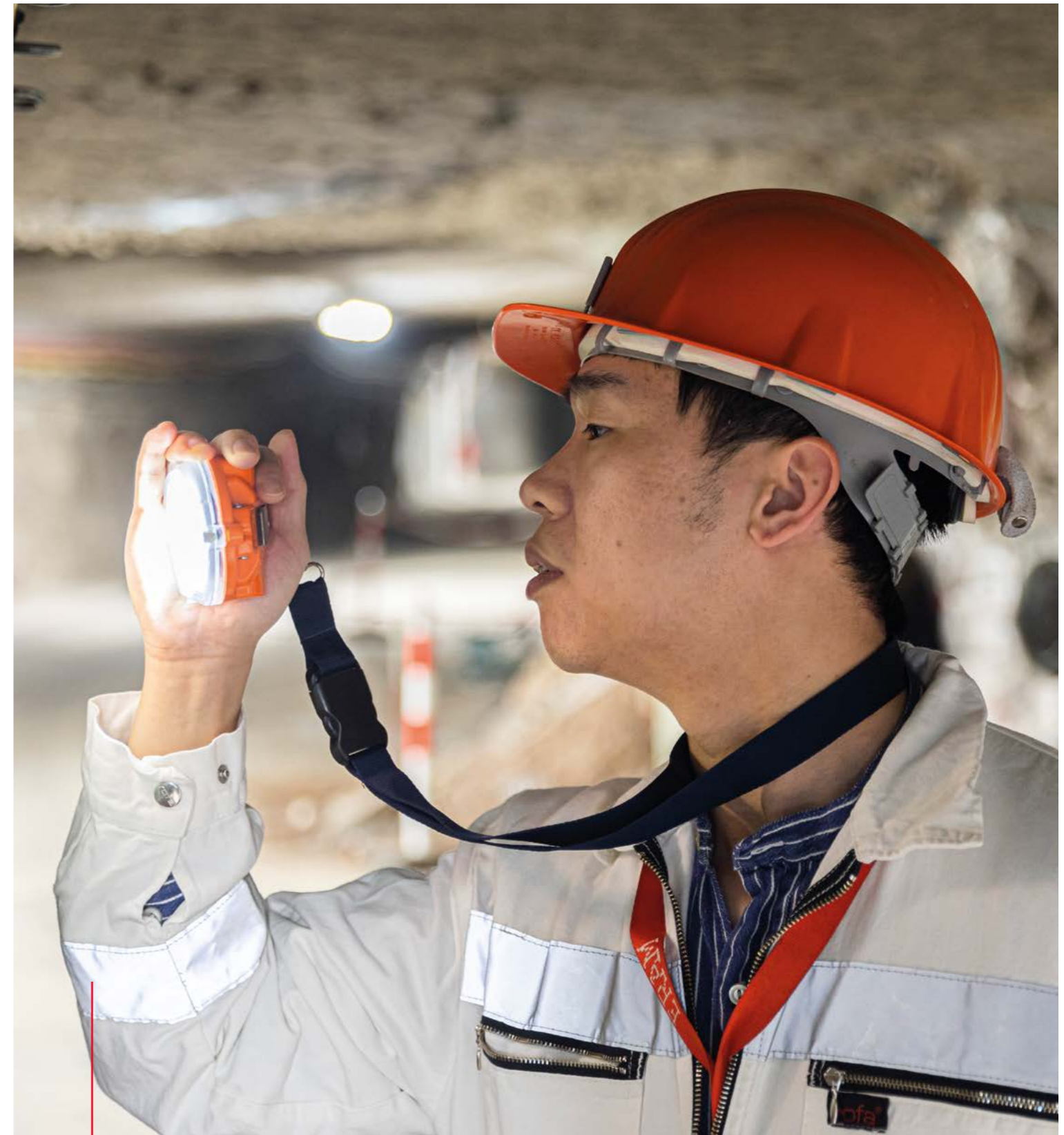
The landing station is located in the main rock salt of the Staßfurt series. It is connected to the mine via four drifts. Additional shaft bypasses formed pillars with a low thickness, which are partially secured with masonry. Recently, movements and displacements of the masonry, some of which had already cracked, were detected. Prior to the renovation, it is necessary to identify the causes for these dis-

placements and to analyse the rock mechanical conditions in the area of the shaft landing station. For this purpose, geotechnical measurement methods are combined with numerical calculations in order to assess the stability. Together with BGE's Department of Geotechnics, the staff of BGE TECHNOLOGY GmbH developed a measuring concept consisting of convergence stations and long extensometers, which are designed as a continuous measurement chain that monitors the load-bearing behaviour of the critical areas.

The high-precision magnetostrictive extensometers record the displacements at 20 measuring points along the borehole with a resolution of 70 µm. In addition to geotechnical monitoring, the accumulated measurement data is used to verify the 3D calculation model.



Landing station in shaft Marie at the 360 m level and surrounding drifts (left) and corresponding modelling results of displacements (right)



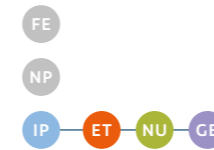
»The landing station in shaft Marie with its extensive excavations and complex structure is a very important component of the Morsleben repository. It is challenging to recreate the landing station precisely as is in the numerical world. I am very pleased that I managed to do it. I really enjoy the implementation.«

GANG LI, GEOTECHNICAL ENGINEER



»Being able to continue to support Norway in its search for a repository solution for the existing radioactive waste inventory is an exciting challenge. The international exchange and the many open questions make this project particularly varied and interesting. The fact that no concept has yet been decided on shows once again that there are many routes to the same goal when it comes to finding a safe solution for radioactive waste disposal.«

TILMAN FISCHER, DEEP DRILLING ENGINEER



Supporting the Norwegian Plans for HLW Disposal

Repository Concept, NND

Norwegian Nuclear Decommissioning (NND) is responsible for the disposal of the radioactive inventory of the Scandinavian state. Since 2020, BGE TECHNOLOGY GmbH (BGE TEC) has been supporting NND as part of a consortium that also included the Finnish companies A-Insinöörit Oy (AINS Group), Mitta Oy, and VTT Technical Research.

In the past few years, the consortium carried out technical advisory services and developed basic concepts. To continue and intensify this work, NND signed a significant framework agreement with the new consortium GeoRen (Geological Repositories for Norway) in October 2022. In addition to BGE TEC, the consortium also includes the Finnish companies AINS Group, Mitta Oy, VTT, Geological Survey of Finland (GTK), and Posiva Solutions Oy (PSOY), as well as the Norwegian company Rambøll.

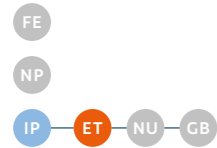
The consortium has more than 40 years of experience in the field of radioactive waste disposal and the development of geological repositories. This experience includes extensive international expertise, which

helps NND to find a concept for a long-term, safe, reliable, and cost-effective solution for the disposal of radioactive waste in Norway. In addition, as a result to the broad experience of the companies involved, various repository concepts and solutions can be considered and further developed. This is where the knowledge and practical experience from the repository solutions in progress and under construction in the various host rocks and geological conditions are particularly useful. This enables the consortium to identify and develop solutions for all types and streams of waste, including waste from the operation and decommissioning of research reactors and spent fuel.

BGE TEC will support GeoRen in particular by providing and developing geological disposal solutions. For the next four years, BGE TEC's expertise will thus be helpful in assisting GeoRen in all areas of waste disposal, from drilling technology issues for deep borehole disposal, to the development of waste containers, to the modelling of thermal processes in a repository.



Concept for the surface facilities of the Norwegian repository



Waste Container Development for HLW Disposal in the Netherlands

Waste Container Concept COVRA



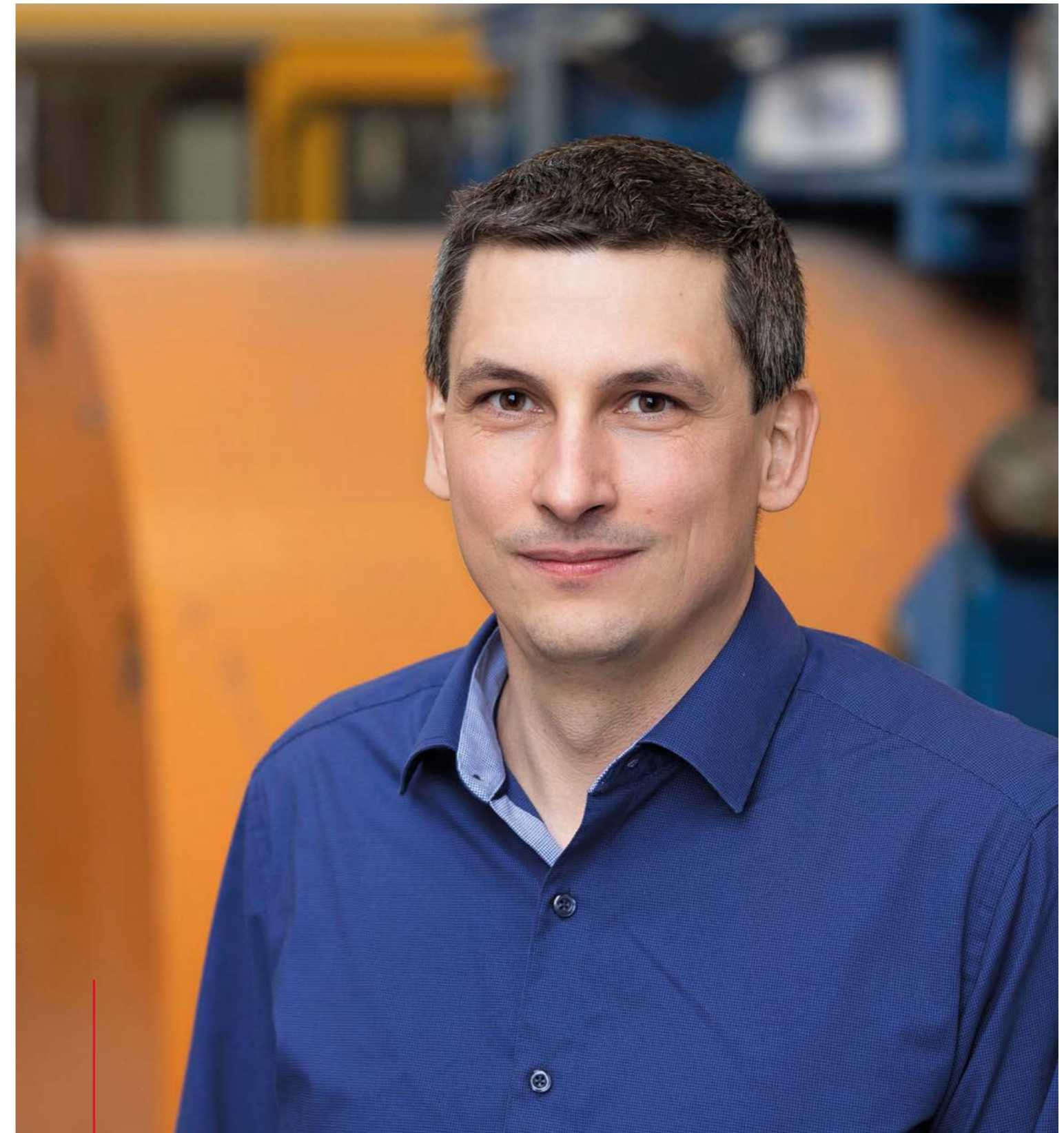
POLLUX® cask for the disposal in rock salt

The Central Organisation for Radioactive Waste (COVRA) is responsible for the collection, processing, storage, and disposal of all types of radioactive waste generated in the Netherlands, and already operates a long-term interim storage facility and a reprocessing plant.

COVRA considers either a multinational repository or two national repositories as disposal options, taking into account two host rock types for the disposal of high-level radioactive waste: poorly indurated clay or rock salt – either as embedded salt or as a salt dome. For the disposal in claystone, a waste container in the form of a supercontainer has already been developed; for the disposal in rock salt, no reference container has been developed yet. Thus, COVRA commissioned BGE TECHNOLOGY GmbH with the design of such a container.

In the first phase of the project, the requirements and boundary conditions for the container concept were defined in consultation with COVRA. In addition, the international status of container concepts was reviewed through a literature research, with a special focus on self-shielding containers. Subsequently, we began to develop a container concept especially tailored to the requirements of COVRA. In addition to this, we also assessed the supercontainer concept known from claystone for its possible use in rock salt.

In the second phase of the project, the container concept was further refined and elaborated together with GNS, Essen, where a mechanical design of the container concept was prepared and the shielding and corrosion behaviour were evaluated. Furthermore, it was considered how the long-term behaviour of the container concept can be taken into account in a safety case.



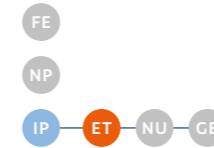
»The know-how of BGE TECHNOLOGY GmbH is in demand in international repository projects. It was very interesting to develop a container concept that was adapted to the Dutch requirements. The work was a team effort of colleagues from BGE TECHNOLOGY GmbH and COVRA.«

DAVID SEIDEL, MECHANICAL ENGINEER



»International projects are often also highly interesting because work cultures and ways of doing things can be very different from the ones we are familiar with. German pragmatism and Japanese politeness harmonised very well in this case, and we look forward to further tasks with NUMO.«

DR. BERNT HAVERKAMP, GEOPHYSICIST (far left)



BGE and BGE TECHNOLOGY GmbH Intensify Their Cooperation with NUMO

NUMO

Since 2018, BGE has maintained a bilateral cooperation agreement with the "Nuclear Waste Management Organization of Japan (NUMO)", which includes BGE TECHNOLOGY GmbH. NUMO is the Japanese counterpart of BGE. The cooperation is intended to establish a highly effective and structured exchange of experience in the field of radioactive waste management between the organisations.

Among other topics, the agreement focuses on engineering technologies for repositories. In this regard, a joint project was carried out in 2022 to exchange information on the state of the art in science and technology in the underground transport of waste containers for high-level radioactive waste. The work was divided into three work packages. In the first, BGE TECHNOLOGY GmbH documented the state of the art in shaft hoisting technology for

high-level waste containers and heavy payloads. In addition to the technical description of such a hoisting system, the concepts for demonstrating operational safety were illustrated. In the second work package, BGE TECHNOLOGY GmbH reviewed concepts for the shaft and ramp transport technology developed by a contractor of NUMO. In the third work package, the latest developments in emplacement devices for containers for low- and intermediate-level waste were exchanged. In this context, the department for repository preparation at the Konrad mine was very helpful and provided background information and illustrations. The cooperation has thus provided an insight into the respective planning states and the technical solutions for the individual technical challenges in both countries. In 2024, it is planned to launch another project on hoisting technology.

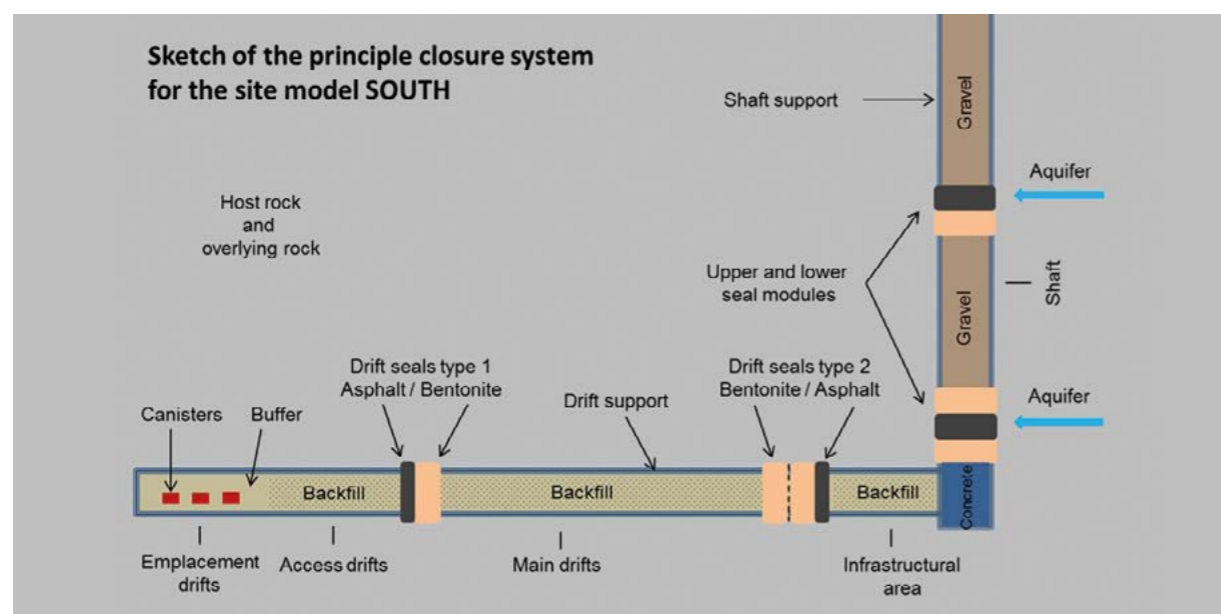


Demonstration test for the shaft transport of waste containers



Repository Research in Claystone

Project ANSICHT-II



Sketch of the main barriers that are to ensure safe containment as defined within the ANSICHT-II research project

Within the scope of the preceding research project ANSICHT, a draft of a methodical approach to demonstrate the safety of repository systems in claystone in Germany was developed. On behalf of the then-called Federal Ministry for Economic Affairs and Energy (BMWi, now BMWK), the Project Management Agency Karlsruhe (PTKA) commissioned BGE TECHNOLOGY GmbH, the Federal Institute for Geosciences and Natural Resources (BGR), and GRS gGmbH with the joint project ANSICHT-II, in order to test this methodology in detail and to develop it further.

Taking into account the Ordinance on Repository Safety Requirements (EndSiAnfV), specific individual assessments were developed and presented, thus illustrating the respective nature of the safety assessment. The intention was to identify and clearly outline, which questions essential for conducting a safety assessment are still open.

The aim of the ANSICHT-II research project was to evaluate the aforementioned methodology through

various individual assessments, to identify any weaknesses, and to provide approaches for improvement. For this purpose, the project group applied, tested, and revised the modelling concept. In addition to this, analyses of uncertainties as well as of the influence of heterogeneities within the host rock on the compliance with the criteria for the evaluation of the containment-providing rock zone (CRZ) were carried out.

Even a site with a suitable CRZ can only host a safe repository if it is possible to seal the necessary excavations in the CRZ in a long-term safe manner after emplacement has been completed. In the course of revising the closure concept, BGE TECHNOLOGY GmbH evaluated the main barriers that are to ensure safe containment. The work was rounded off with an analysis of the robustness of the geotechnical barrier system. Finally, it was described how and in which way an assessment of the radiological safety can be carried out based on the indicators specified in the EndSiAnfV.



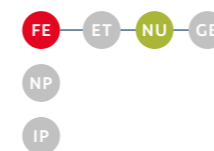
»Due to their favourable barrier properties, claystones are being investigated for the disposal of radioactive waste in many countries. Because of their coupled thermal, hydraulic, and mechanical properties, claystones are challenging from a geotechnical and geomechanical perspective. These processes and their interactions can only be understood through extensive research.«

PAOLA ROCÍO LEÓN-VARGAS, CIVIL ENGINEER AND GEOTECHNICIAN



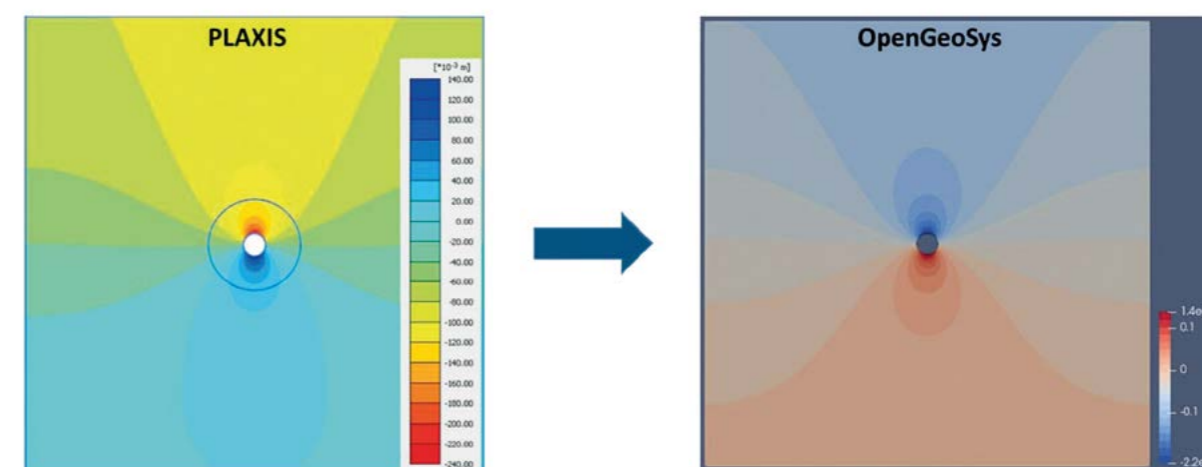
»In safety assessments, material models describe the behaviour of the host rock and of the geotechnical barriers. These models are based on decades of research and are difficult to reproduce. Nevertheless, it is necessary to implement existing material models into common numerical codes. BGE TEC and its partners have succeeded in developing solutions for this problem.«

ERIC SIMO, CIVIL ENGINEER (to the right)



A New Approach to Using Material Models in any Numerical Code

Project PIONIER



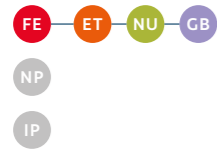
Geomechanical stresses and deformations after excavation of an emplacement drift in claystone calculated with the computer codes PLAXIS and OpenGeoSys using the hypoplastic model for claystone

Carrying out safety assessments as a basis for demonstrating the safe containment of radioactive waste requires in-depth knowledge of the material behaviour of the host rock and surrounding rock in the repository system as well as of the construction materials of the geotechnical barriers. Mathematically, the behaviour of these materials is formulated in constitutive material models and then applied in numerical safety assessments. Implementing a constitutive material model is a long, tedious, and error-prone process. This is especially true for geomaterials, where a large number of models have to be considered.

Within the scope of the project PIONIER, BGE TECHNOLOGY GmbH was commissioned by BGE to develop constitutive material models for claystone and bentonite. Together with the Geotechnical Institute of the TU Bergakademie Freiberg, the Charles University Prague, and the French Alternative Energies and Atomic Energy Commission (CEA), BGE TECHNOLOGY GmbH developed a new approach for the further

application of existing implementations of constitutive material models, which thus become available in other numerical codes.

The developed approach was implemented in the code generator MFront. MFront is a C++-based code generator developed by CEA and available via MGIS interfaces for many academic and industrial solvers. The new approach is based on using MFront as an interface for existing material model implementations. So far, this approach has been tested for material models implemented for the finite element codes Abaqus and PLAXIS. These models were successfully used in OpenGeoSys. This made it possible, for example, to apply an advanced material model for tertiary clays, which has been under development for more than a decade at Charles University in Prague, to the safety investigations in the German repository programme. Currently, the approach for material models implemented in other finite element codes is being tested and further developed.



Reducing Potential Fluid Pathways in Crystalline Rock

Project PRECODE

For the site selection department of BGE, the joint project PRECODE, funded by BGE, researches the impacts of mining activities at great depths on the integrity of crystalline rock in the context of high-level waste disposal. While RWTH Aachen University focuses on the formation of the excavation-damaged zone during drift excavation, BGE TECHNOLOGY GmbH develops injection designs for the improvement or sealing of disturbed rock areas as well as a method for quantifying the dilatancy and fluid pressure criteria in crystalline host rock formations. In both cases, the Rotondo granite of the Bedretto Underground Laboratory for Geosciences and Geoenergies (BULGG) in Switzerland, operated by ETH Zurich, serves as the crystalline test environment.

The permeability of intact crystalline rock is generally low. In rock formations, however, it can be increased if, for example, there are natural fissures or cracks due to excavation. Crystalline rocks themselves are not able to heal these potential pathways.



Experiments in the Bedretto underground laboratory (Switzerland)

In order to seal potential pathway in the excavation damaged zone in the vicinity of emplacement areas and to thus improve the host rock capacity for containing radionuclides, BGE TECHNOLOGY GmbH is testing the feasibility of long-term stable injections using silicate-based injection agents. They are similar to the silicate-dominated crystalline rock, which suggests a similarly long durability in this environment. The first step was to develop a wide range of reference formulations of particle-free and particle-containing injection agents on a laboratory scale. They differ in particular with regard to their suspension properties (flowability, setting time) and their solid state properties (permeability, strength). In the next step, these reference formulations will be tested on a pilot plant scale under defined conditions, focusing on their production and processing. Their application under in-situ conditions will then be carried out exemplarily on fissures of the Rotondo granite in the BULGG, where BGE TECHNOLOGY GmbH was able to investigate the properties of a tunnel section in the first half of 2022. Based on fracture mapping and core analyses, different flow paths in the rock were identified, and their hydraulic properties before injection were determined with the help of water pressure tests.

As a result of the multi-stage material testing by BGE TECHNOLOGY GmbH, a range of injection agents are to be available to ensure the sealing of different pathways in crystalline rock. This also includes the transferability of the injection designs to other crystalline sites.



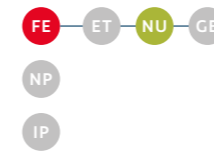
»I enjoy watching in PRECODE how planning and assumptions become facts and new insights. The latter will be very helpful in the planning of a repository in crystalline rock. In my view, the fact that the teamwork has a large practical component in addition to the theoretical tasks ensures an even better quality of cooperation.«

DR. ANDREAS KELLER, MINING ENGINEER



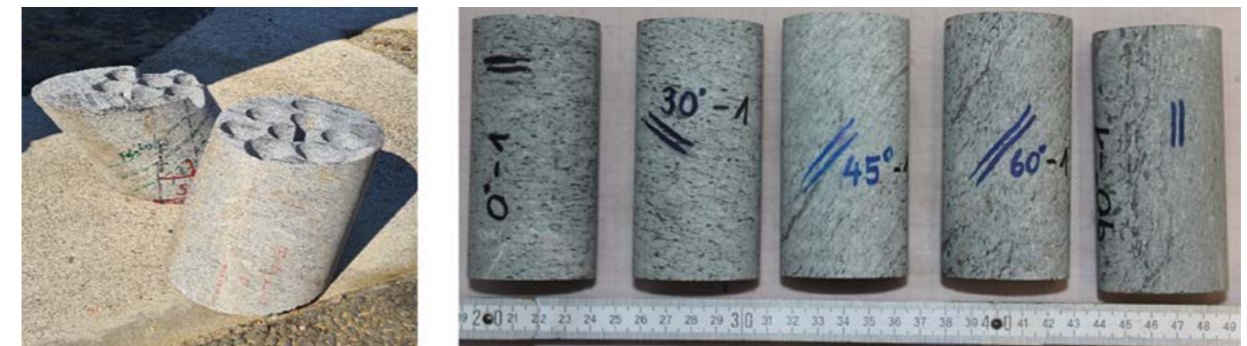
»The rock mechanical properties of crystalline rock are quite complex. It is an interesting challenge to represent this numerically. In the BARIK project, the Hoek-Brown criterion is implemented to predict elastoplastic behaviour and failure of fractured crystalline hard rock.«

DR.-ING. ALIREZA HASSANZADEGAN, GEOMECHANICAL ENGINEER



Development and Testing of a Constitutive Model for Crystalline Rock

Project BARIK

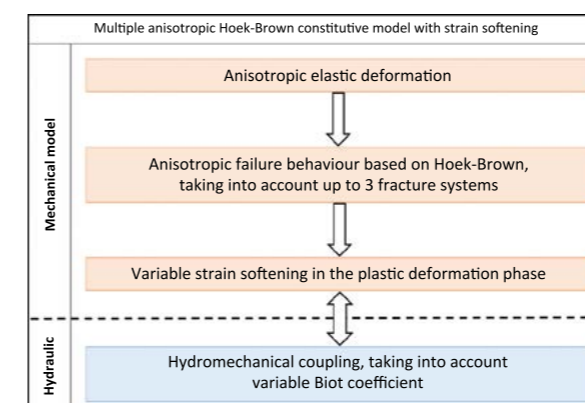


Freiberg gneiss (metamorphically superimposed granite with pronounced anisotropy) as rock sample for property determination

Predictive model calculations based on known and validated constitutive models and the corresponding rock parameters serve as the basis for demonstrating the integrity of the geologic barrier of a repository. When demonstrating the integrity of crystalline host rock, the integrity criteria specified in the safety requirements are to be applied. This includes the dilatancy criterion. As part of the CHTISTA-II research project, which was funded by the Project Management Agency Karlsruhe on behalf of the Federal Ministry for Economic Affairs and Energy (BMW), BGE TECHNOLOGY GmbH used the GSI system for safety assessment, applying the Hoek & Brown failure criterion as dilatancy criterion. The GSI system includes fracturing in the evaluation of the strength of a hard rock.

The aim of the BARIK research project is to develop and test an extended Hoek & Brown material model that can account for anisotropic strength behaviour both within the rock matrix and in a fractured rock body. The BARIK material model is to be used to test whether the formulation and quantification of the dilatancy criterion is sufficient in the case of crystalline host rock, or whether modifications or specifications are necessary with regard to the consideration of anisotropic strength behaviour. The modelling of the effective stress state also requires the consideration of the Biot coefficient as a hydromechanical coupling parameter in fractured rock. The BARIK constitutive model considers the behaviour of the rock matrix and of the fractures separately. Both components are assigned their own failure criterion with explicit strength properties. The superposition then results in the overall rock behaviour, taking into account the lowest or effective strength.

This approach enables the determination of the influence of the position and orientation of fractures on the strength behaviour of a crystalline rock. This allows a more detailed analysis of the mechanical behaviour of fractured rocks. The research project is being carried out jointly with TU Bergakademie Freiberg, and project results are expected in mid-2023.



Principle structure of the constitutive model

Management Report



Management Report for the Financial Year 2022

Sphere of Activities

BGE TECHNOLOGY GmbH (BGE TEC), Peine, is a 100% subsidiary of Bundesgesellschaft für Endlagerung mbH (BGE). The business objective of the company is to generate and maintain special knowledge relevant to waste management and disposal and to make it available to BGE as required.

The main business areas of BGE TEC as a highly specialised engineering company operating at both national and international level continue to be in the field of engineering and consulting services for the disposal of radioactive waste. This includes national and international research and development projects for the safe disposal of these wastes, in particular of high-level waste and spent fuel elements.

BGE TEC finances its business activities through services acquired against competition. A distinction must be made between direct awards by public contracting authorities, primarily for research projects, which are generally settled according to the Guidelines for Pricing on the Basis of Cost. The company receives funds from the federal government only indirectly through contracts with organisations or federal ministries subordinate to the federal government, which are awarded exclusively in accordance with the provisions of public procurement law. Furthermore, projects are acquired through tenders or bids, where pricing is done against competition. In addition, the company provides services to BGE under the terms of an agency agreement.

The requirements of environmentally responsible action are taken into account by the company's activities, which specifically focus on protecting the environment.

MANAGEMENT

The company uses the annual results as financial performance indicator to manage the company. Further performance indicators are outlined in the business development, results of operations, and net assets and financial position sections.

Research & Development

A high priority is the processing of research and development projects (R&D). Of particular importance for the expansion of know-how and for future tasks in Germany are the management of and participation in joint cooperation projects with other leading research institutions involved in radioactive waste disposal, in particular concerning safety and safety demonstration concepts for repositories in various deep rock formations and the closure of such repositories, as well as concerning the development of constitutive models in the relevant host rocks crystalline rock, rock salt, and claystone. The R&D projects carried out by the company are divided into site-independent projects, mainly funded via the research framework programme of the Federal Ministry for Economic Affairs and Energy (BMWi) or, since the elections to the Bundestag, the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV), and R&D projects carried out for BGE. In conjunction with BGE, BGE TEC thus ensures that the expertise for the planning, construction, operation, and closure of radioactive waste repositories is preserved and further developed based on the state of the art in science and technology. In the reporting period, the company was involved in a total of 12 national and international research and development projects.

Without the R&D projects awarded by BGE, the related expenditures amounted to T€ 882 (previous year T€ 1,090).

Financial Report

BUSINESS DEVELOPMENT

International projects on various aspects of the disposal of radioactive waste, especially in deep geologic formations and in various host rocks (claystone in Belgium and Switzerland, rock salt in the Netherlands and the UK as well as magmatic host rock in Germany, Norway, Canada, and South Korea) were again of particular importance.

The company gave advice and support to its clients in the special field of radioactive waste management in various repository-specific areas. The tasks ranged from the identification of waste classes and their disposal paths to the development of repository concepts for different host rocks in general and, in particular, of technologies, for example, for the development of containers for radioactive waste disposal in rock salt or crystalline rock or for the improvement and stabilisation of the host rock, to the implementation of mining activities such as the routine construction of flow barriers at the Asse mine. The company carried out safety assessments, developed the necessary basic and coupled material models, and implemented these in existing simulation tools for the performance of safety assessments.

Furthermore, the company supports in particular international clients in their waste management and repository project activities, in which new technologies are to be implemented in accordance with international safety standards. In this context, projects and activities for clients in Australia and Norway as well as for the International Atomic Energy Agency (IAEA), in which concepts and technologies for the disposal of radioactive waste in deep boreholes are being developed, are particularly worth mentioning.

The knowledge and experience gained in R&D projects, but also in exchange with other waste management organisations, are made directly available to BGE, e.g., within the scope of work on repository design or the implementation of research projects for the selection of a repository site. Furthermore, BGE TEC supported BGE in the processing of requirements from the procedure for the decommissioning of the Morsleben repository, including the development of special construction materials for the safe closure of the mine. For instance, in addition to the integrity analyses carried out for the geologic barrier, the associated uncertainties were analysed and evaluated. Within the scope of the construction of the Konrad repository, BGE TEC has also been

working on rock mechanics tasks. BGE TEC carried out numerical calculations to assess the stability of the mine workings and their supports. In addition, BGE TEC worked on tasks related to the development of construction materials for underground use. The company also provided services for the Asse II mine concerning several major tasks related to hazard prevention and emergency planning activities. What should be pointed out is that BGE TEC is involved in the design and construction of sealing structures and the assessment of their functionality.

BGE TEC's knowledge and experience gained in national and international activities are also in demand internationally, beyond specific projects. Experts from the company are represented in advisory bodies of the Dutch and Norwegian waste management organisations, in working and advisory bodies of the IAEA and the Organisation for Economic Cooperation and Development / Nuclear Energy Agency (OECD/NEA) as well as in Programme Committees of international conferences.

According to the Federal Statistical Office (Destatis), the gross domestic product (GDP) of bn¹ € 3.86 in 2022 increased compared with 2021 (bn € 3.61). Adjusted for price and calendar effects, there is a change of +2.0%. Compared to the rest of Europe, the gross domestic product grew at a below-average rate, but this is due to the fact that Germany's economy suffered a relatively small decline in the first year of the Corona pandemic. Due to the company's business model, the overall economic development in Germany has neither a short-term nor an immediate decisive influence on BGE TEC. Nationally and internationally, BGE TEC is active in very long-term, partly independently financed programmes with large planning horizons. In addition, R&D projects are financed via the federal budget within the framework of multi-year funding programmes. This considerably reduces the risk that a company can be subjected to due to economic fluctuations.

¹ In accordance with Destatis 1bn = 10¹²

In the financial year 2022, BGE TEC continued to implement the respective directives of the crisis team set up at BGE, but the impairments of the pandemic caused by Covid 19 steadily decreased. This is evident, among other things, in the intensification of personal acquisition activities and meetings with clients.

Overall, the company continued its stable development in the past financial year. Turnover amounted to T€ 5,675 (previous year: T€ 6,158), and a net profit for the year of T€ 136 (previous year: T€ 34) was generated. As of December 31, 2022, the company had orders on hand amounting to T€ 6,572.

RESULTS OF OPERATIONS

Compared with the previous year, turnover decreased by T€ 483 to T€ 5,675.

Other operating income increased to T€ 77 (previous year T€ 42). The main items included in other operating income are the reimbursement of premiums for 2021 from the architects' liability insurance of T€ 32 (previous year: T€ 0), participation fees from a workshop of T€ 19, remuneration in kind of T€ 11 (previous year: T€ 10), as well as reimbursements of the ancillary costs 2021 for the rented office space in the amount of T€ 4 (previous year: T€ 8).

Within the cost of materials, the expenses decreased mainly for purchased services for project assistance by third parties and the parent company BGE. The item also includes energy and fuel costs as well as expenses for repairs and maintenance work.

Personnel expenses increased by T€ 219 to T€ 4,205 compared with the previous year, which is due to the regular salary increase.

Other operating expenses amounting to T€ 443 (previous year: T€ 327) mainly include rental expenses for office space, insurance costs, travel costs, ancillary personnel costs, and postal and transport costs.

Income taxes are divided into T€ 38 for trade tax and T€ 40 for corporate income tax (including solidarity surcharge).

NET ASSETS AND FINANCIAL POSITION

Compared with the previous year, the balance sheet total has increased by T€ 204 and amounts to T€ 4,233.

On the assets side, inventories increased by a total of T€ 229 to T€ 589, in particular due to the increase in work in progress for current projects.

Receivables and other assets decreased by T€ 821 to T€ 1,524 compared with the previous year due to lower trade receivables and receivables from affiliated companies. They include, in particular, claims against BGE from the intercompany invoicing of services for project support.

The bank balances increased by T€ 733 to T€ 2,019 compared with the previous year's balance sheet date.

On the liabilities side, equity increased to T€ 2,783.

The net profit for 2022 amounts to T€ 136. Subject to the approval of the sole shareholder, this amount and the profit carried forward in the amount of T€ 34 are to be distributed to the sole shareholder.

The provisions mainly comprise pension obligations (T€ 490; previous year T€ 443) and other provisions amounting to T€ 349 (previous year T€ 299). The other provisions were set aside in particular for personnel expenses. Overall, the level of provisions increased from T€ 742 to T€ 841.

Liabilities decreased by T€ 31 to T€ 609. The largest single item at T€ 243 relates to other liabilities for obligations from VAT and taxes on wages still to be paid, amounting to T€ 218.

Compared with the previous year, the equity ratio remained constant at 65.7%. The equity capital continues to completely finance the fixed assets and inventories.

The company is solvent at all times, as current liabilities are fully covered by cash and cash equivalents.

Personnel and Social Report

As of December 31, 2022, the company's workforce consisted of 39 employees. The proportion of women in the department heads is 33%. The handling of the tasks of the company is supported by employees of BGE under the terms of an agency and service agreement with BGE. This primarily involves the provision of commercial services. The company is integrated into the industrial safety concept and compliance organisation of BGE.

Forecast, Risk, and Opportunity Report

Risks from order processing are controlled promptly by means of controls accompanying the order. There is adequate insurance cover for risks that the company can usually expect to encounter. There are no risks threatening the company's continued existence.

Although BGE TEC has business relations with Russia and Ukraine, the war in Ukraine currently has no immediate impact. In the existing but dormant scientific and technical cooperation between the Russian Federation and the Federal Republic of Germany in the fields of reactor safety research and waste disposal and repository research, BGE TEC participates in joint projects with independent work packages and thus only in indirect relation to Russian partners. There are no tenders for projects in Russia or Ukraine. According to the current status of acquisition activities, no orders from these countries are expected in the short term. Thus, there is no direct impact on planned turnover and results.

Compared with the previous year, the inflation rate in Germany was +8.7% in January 2023, due to price increases, including higher energy costs. The rising prices that can be observed overall also have no significant direct impact. Some expenses such as travel costs and laboratory materials can be settled via clients. Overall, the impact for BGE TEC can thus be minimised through appropriate cost control.

Indirectly, however, the employees' representatives derive demands for salary adjustments in the same

order of magnitude as the inflation rate. Salary adjustments can only be partially passed on to clients, as fixed hourly rates have been agreed, especially in the profitable international projects. There is a close exchange between BGE TEC and its shareholder on these developments with the aim of being able to counteract the effects in a timely manner.

The order volume remains at a high level. The company's capacity utilisation is already fully secured for 2023 and partially secured for 2024.

The company's activities continue to focus on developing and expanding the core competence of the BGE/BGE TECHNOLOGY GmbH group in order to be able to offer high-quality services on a national and international level. In 2023, it is intended to expand and intensify activities to further attractive and interesting markets. In addition, the transfer of knowledge to and as support for BGE is to be continued by making available scientific and technical personnel. This concerns the site selection for a repository for heat-generating waste, safety analyses by means of numerical calculations, and the further development of construction materials for the existing repository projects.

With an unchanged order volume, a positive result of approx. T€ 125 is expected for 2023, without taking into account special effects. This illustrates the economic stability of BGE TEC.

Annex to the Financial Year 2022

General Information

BGE TECHNOLOGY GmbH (BGE TEC) has its registered office in 31224 Peine, Eschenstraße 55, and is registered with the commercial register at the Local Court of Hildesheim, HRB no. 101385.

The company is a small corporation within the meaning of Section 267 (1) HGB. The annual financial statements of BGE TEC are prepared voluntarily in accordance with the regulations applicable for large corporations.

To improve the overall clarity of presentation, individual items have been combined in the balance sheet and income statement and are shown separately in the notes to the financial statements.

The accounting and valuation methods have remained unchanged as against the previous year.

The income statement was prepared according to the total expenditure format.

Accounting and Valuation Methods

Figures shown in the balance sheet for intangible assets and tangible assets are based on the cost of purchase. Intangible assets – consisting exclusively of software – are written off by straight-line method over a period of three to five years, and tangible assets are written off by straight-line method over their expected useful life (three to fifteen years). Minor value assets with acquisition or production costs of more than € 250 but not more than € 1,000 are combined into an annual collective item and written off uniformly over a period of five years.

Orders that have been commenced (work in progress) are valued at the directly attributable production costs in accordance with the minimum valuation threshold under commercial law.

Advance payments are recognised at nominal value.

Receivables, other assets, and cash and cash equivalents are reported at their nominal value.

Identifiable individual risks are taken into account by value adjustments on receivables. Other assets are reported at nominal value.

Prepaid expenses and deferred income consist of payments made before the balance sheet date insofar as they relate to a specific period after that point in time.

Subscribed capital is reported at nominal value.

Provisions are reported at the amount deemed necessary for the fulfilment thereof according to sound business judgment.

Provisions for pensions are calculated on the basis of actuarial calculations using the projected unit credit method, taking into account the "Mortality Tables 2018 G" of Prof. Dr. Klaus Heubeck, Cologne. The reported pension obligations for individual commitments are governed by the benefit regulations and the contribution-based pension scheme of Bochumer Verband (Bochum Association). Provisions for pensions are discounted at the average market interest rate of the past ten financial years as published by Deutsche Bundesbank (Section 253 (2) HGB), which corresponds to 1.78 % (previous year 1.87 %). Salary dynamics are taken into account at 2.75 % (previous year 2.5 %) p.a., while pension dynamics continue to be taken into account at 1.0 % p.a.

The difference resulting from the valuation of the pension provisions at the 7- or 10-year discount rate amounts to T€ 33. Due to sufficient reserves in accordance with Section 272 (2) Clause 4 HGB, the amount is not subject to a distribution block.

The valuation of anniversary bonuses and death benefit obligations is also calculated on the basis of the actuarial calculations using the projected unit credit method, taking into account the "Mortality Tables 2018 G" of Prof. Dr. Klaus Heubeck, Cologne. The current discount rate is 1.44% (previous year: 1.35%).

Other provisions with a term of more than one year are discounted at the average market interest rate prevailing over the past seven financial years corresponding to their remaining term.

Provisions for archiving costs serve to fulfil legal and contractual archiving obligations for business documents and records. The provisions are calculated based on an average remaining archiving period of ten years and an estimated cost increase of an unchanged 2.5 % p.a. The provisions are discounted at the corresponding average market interest rate of 1.17 % (previous year 1.04 %).

The other provisions take into account all identifiable risks and contingent liabilities.

Liabilities are reported at the settlement amount.

The deferred tax asset surplus was not reported. The valuation of deferred taxes is based on a tax rate of 29.3 % (15.82 % for corporate income tax including solidarity surcharge and 13.48 % for trade tax). Differences between commercial law and fiscal law arise in particular with regard to pension provisions.

Receivables and liabilities in foreign currency are valued at the mean exchange rate applicable at the time of the business transaction. The valuation on the balance sheet date is based on the mean spot exchange rate. If the remaining term is one year or less, Section 253 (1) Clause 1 and Section 252 (1) Clause 4 Subclause 2 HGB are not applied.



Balance Sheet as of December 31, 2022

Assets

| all figures in T€ | As of 31. 12.2022 | As of 31. 12.2021 |
|-----------------------------------------------------------------------------------|----------------------|----------------------|
| A. Fixed assets | | |
| I. Intangible Assets | | |
| Industrial property rights and similar rights and assets acquired against payment | 14 | 14 |
| II. Tangible assets | | |
| Other assets, operating, and office equipment | 54 | 24 |
| | 68 | 38 |
| B. Current assets | | |
| I. Inventories | | |
| 1. Work in progress | 589 | 360 |
| | 589 | 360 |
| II. Receivables and other assets | | |
| 1. Trade accounts receivable | 336 | 732 |
| 2. Receivables from affiliated companies | 908 | 1,419 |
| 3. Other assets | 280 | 194 |
| | 1,524 | 2,345 |
| III. Bank balances | 2,019 | 1,286 |
| C. Prepaid expenses and deferred charges | | |
| Deferred charges | 33 | 0 |
| | 4,233 | 4,029 |

Equity and Liabilities

| all figures in T€ | As of 31. 12.2022 | As of 31. 12.2021 |
|----------------------------------------------------|----------------------|----------------------|
| A. Equity | | |
| I. Subscribed capital | 511 | 511 |
| II. Capital reserves | 179 | 179 |
| III. Revenue reserves | | |
| Other revenue reserves | 1,923 | 1,923 |
| IV. Profit carried forward | 34 | 0 |
| V. Net profit for the year | 136 | 34 |
| | 2,783 | 2,647 |
| B. Provisions | | |
| 1. Provisions for pensions and similar obligations | 490 | 443 |
| 2. Tax provisions | 2 | 0 |
| 3. Other provisions | 349 | 299 |
| | 841 | 742 |
| C. Provisions | | |
| 1. Advance payments received on orders | 46 | 119 |
| 2. Trade payables | 159 | 267 |
| 3. Payables to affiliated companies | 161 | 173 |
| 4. Other liabilities | 243 | 81 |
| | 609 | 640 |
| | 4,233 | 4,029 |

Notes to the Balance Sheet

Assets

Fixed assets

Movements of individual items of fixed assets are shown in the fixed assets movement schedule.

The financial assets consist of a cooperative share in Volksbank BraWo eG acquired in 2012.

Receivables and other assets

As in the previous year, all receivables and other assets have a remaining term of less than one year.

Receivables and other assets include receivables from affiliated companies (T€ 908; previous year T€ 1,419) arising from claims for project work and receivables from the final settlement of orders with foreign customers. In addition to this, the other assets relate to tax refund claims.

Equity and Liabilities

Subscribed capital

Subscribed capital remains unchanged at T€ 511. It is fully paid up and is held to 100 % by Bundesgesellschaft für Endlagerung mbH (BGE).

Capital reserves

The capital reserves amounting to T€ 179 originate from other contributions according to Section 272 (2) Clause 4 HGB.

Revenue reserves

Revenue reserves amount to T€ 1,923. Of this amount, T€ 1,794 consist of retained earnings from previous financial years and T€ 129 from a change in accounting method resulting from the German Accounting Law Modernisation Act (BilMoG) as of January 1, 2010.

Other provisions

| all figures in T€ | 31.12.2022 | 31.12.2021 |
|-----------------------------|------------|------------|
| Employee-related provisions | 319 | 270 |
| Archiving costs | 22 | 22 |
| Other obligations | 8 | 7 |
| | 349 | 299 |

Employee-related provisions in the amount of T€ 319 include, in particular, special compensations and vacation obligations.

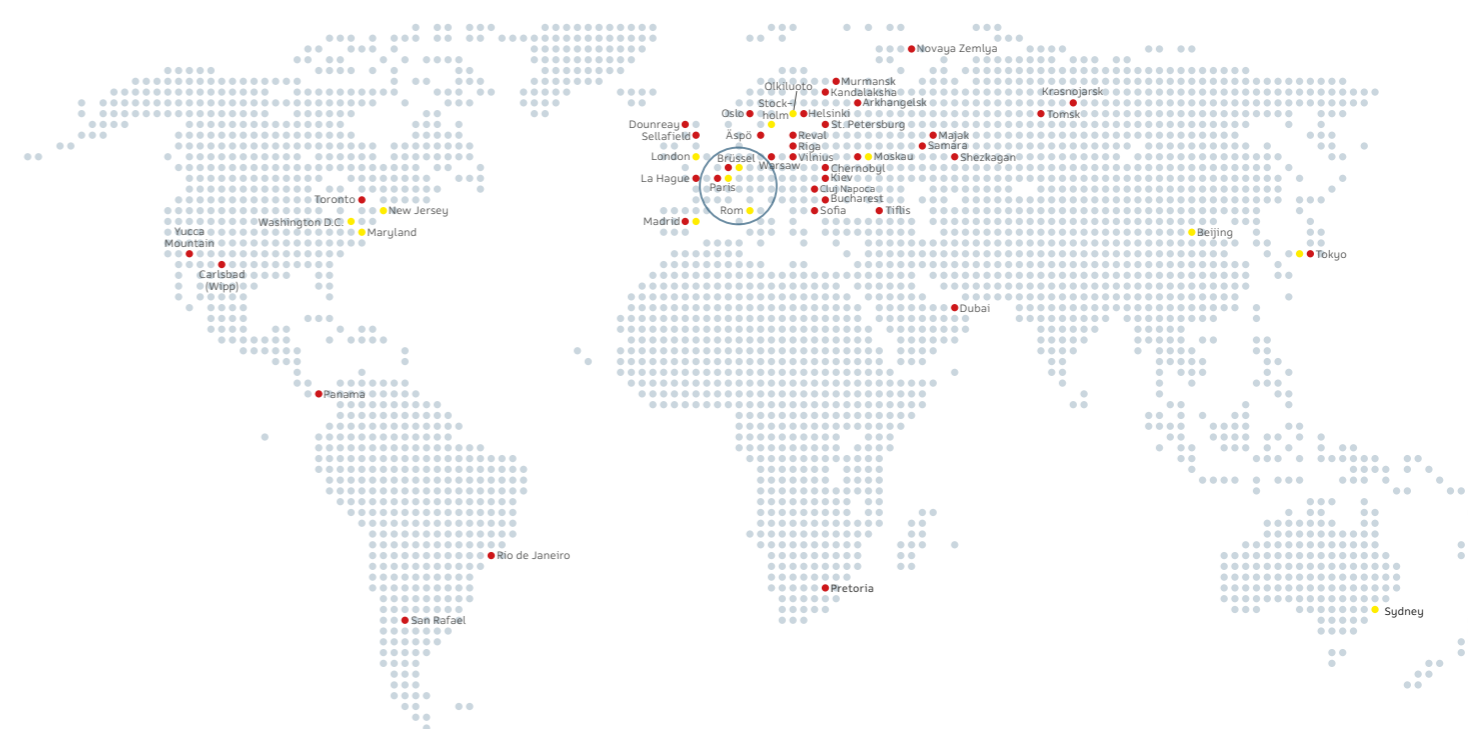
Liabilities

The final settlement of orders with foreign customers led to a reduction in advance payments received to T€ 46 (previous year T€ 119).

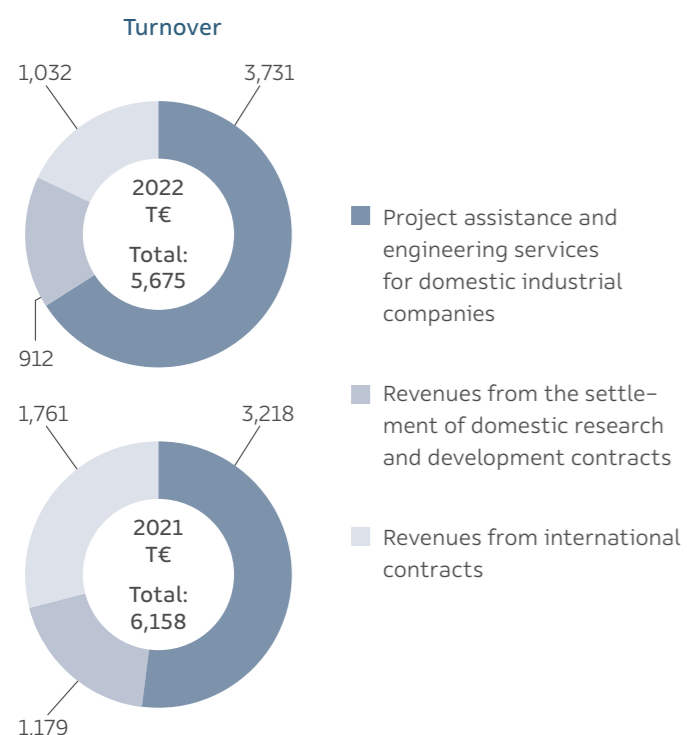
Liabilities to affiliated companies amounting to T€ 161 (previous year T€ 173) are attributable in full to the sole shareholder and result from trade payables.

Other liabilities (T€ 243; previous year T€ 81) consist primarily of value-added tax and wage tax obligations, which are still outstanding to an amount of T€ 218 (previous year T€ 79).

As in the previous year, all liabilities amounting to T€ 609 have a remaining term of less than one year and are unsecured.



Notes to the Income Statement



Revenues from project assistance and engineering services for industrial companies were generated exclusively in Germany. Revenues from international contracts were generated by engineering services.

Increase in inventory of work in progress

The increase in inventories in the amount of T€ 229 results from orders not yet settled as of the balance sheet date.

Other operating income

Other operating income increased compared with the previous year and includes income unrelated to the accounting period in the amount of T€ 37 (previous year T€ 23). This results primarily from the credit note for an architect's liability insurance (T€ 32; previous year T€ 0) as well as the credit note for the 2021 ancillary cost settlement for rented office space (T€ 4; previous year T€ 8). Furthermore, this item includes in particular remuneration in kind (T€ 11; previous year T€ 10).

Cost of materials

The cost of materials includes expenses for purchased services for project work by third parties and the parent company BGE (T€ 1,005; previous year T€ 1,629), expenses for repairs and maintenance work (T€ 14; previous year T€ 16) as well as energy and fuel costs (T€ 5; previous year T€ 3).

Personnel expenses

The increase in personnel expenses by T€ 219 to T€ 4,205 is primarily due to the regular salary increase.

Other operating expenses

Other operating expenses (T€ 443; previous year T€ 327) are mainly attributable to rents (T€ 131; previous year T€ 133), insurance expenses (T€ 113; previous year T€ 90), travel expenses (T€ 98; previous year T€ 18), ancillary personnel costs (T€ 34; previous year T€ 16), postal and transport costs (T€ 22; previous year T€ 21), and other general administrative expenses amounting to T€ 45 (previous year T€ 49). As in the previous year, they do not include any expenses unrelated to the accounting period.

Interest and similar expenses

| all figures in T€ | 2022 | 2021 |
|-------------------------------------------------------------------------|-----------|-----------|
| Interest from the accrual of interest on pensions and other obligations | 8 | 9 |
| Interest on third-party orders and similar expenses | 3 | 7 |
| | 11 | 16 |

Taxes on income

Taxes on income include trade tax (T€ 38) and corporate income tax (T€ 40, incl. solidarity surcharge) for the current financial year.

Contingent Liabilities and Other Financial Obligations

The company conducts its business operations in rented office premises. This results in payment obligations in the amount of T€ 37.

As of the balance sheet date, there are no other significant contingent liabilities or other financial obligations.

Other Disclosures

Corporate bodies

In 2022, the company was managed by the following managing directors:

- Dr. Thilo von Berlepsch, Niedernwöhren, Managing Director
- Dr. Thomas Lautsch, Peine, Technical Managing Director of Bundesgesellschaft für Endlagerung mbH (BGE), Peine

Deviating from section 5.2.5 of the Public Corporate Governance Code (PCGK) of the Federal Republic of Germany, no age limit has been set for the management of BGE TECHNOLOGY GmbH so far. The contracts of the current management are limited in time so that no member of the management will reach the legal age limit before expiry of the contract.

The remuneration of the Management Board in the reporting year 2022 comprises the fixed salary payments including ancillary benefits. Performance-related remuneration bonuses are paid.

| Managing Directors | Base salary | Ancillary benefits | Others | Total remuneration according to § 285 HGB | Pension provisions according to § 249 HGB |
|-------------------------|-------------|--------------------|----------|-------------------------------------------|-------------------------------------------|
| all figures in T€ | | | | | |
| Dr. Thilo von Berlepsch | 165 | 13 | 0 | 178 | 14 |
| Dr. Thomas Lautsch | 0 | 0 | 0 | 0 | 0 |
| Total | 165 | 13 | 0 | 178 | 14 |

Pension obligations to former members of the management are accrued in the total amount of T€ 216; their current remuneration amounted to T€ 10 in 2022.

Auditor's fees

The total auditor's fees charged for the financial year are presented in the consolidated financial statements of BGE.

Annual average number of employees

Pursuant to Section 267 (5) HGB, the company had an average of 37 employees (previous year 34). Of these, 10 are female and 27 male.

Appropriation of net income

Subject to the approval of the sole shareholder, the net profit for the year of T€ 136 is to be distributed.

Group affiliation

BGE TECHNOLOGY GmbH is a 100% subsidiary of BGE. As parent company, the latter prepares consolidated financial statements for the smallest and largest group of companies, in which the annual financial statements of BGE TEC are included. The consolidated financial statements are submitted to the operator of the Electronic Federal Gazette and published in the Federal Gazette.

Public Corporate Governance Code (PCGK)

The company submitted and published the compliance declaration 2021 in accordance with the Public Corporate Governance Code of the Federal Republic of Germany on July 20, 2022. The compliance declaration for 2022 will be published on the company's website in June 2023.

Peine, March 31, 2023

Dr. Thilo von Berlepsch
Managing Director

Dr. Thomas Lautsch
Managing Director

Fixed Assets Movement Schedule

| all figures in T€ | Acquisition and Production Costs | | | | |
|---------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------|-----------|------------------|---------------------|
| | As of 01.01.2022 | Additions | Disposals | Re- transfers | As of 31.12.2022 |
| I. Intangible Assets | | | | | |
| 1. Purchased concessions, industrial property and similar rights and assets, and licenses to such rights and assets | 157 | 7 | 2 | 0 | 162 |
| | 157 | 7 | 2 | 0 | 162 |
| II. Tangible assets | | | | | |
| 1. Other assets, operating, and office equipment | 263 | 48 | 37 | 0 | 274 |
| | 263 | 48 | 37 | 0 | 274 |
| Sub-total | 420 | 55 | 39 | 0 | 436 |
| III. Financial assets | | | | | |
| 1. Other loans | (250 €) | 0 | 0 | 0 | (250 €) |
| | (250 €) | 0 | 0 | 0 | (250 €) |
| Total fixed assets | 420 | 55 | 39 | 0 | 436 |

| Value Adjustments | | | | | Net Book Values | |
|-------------------------------------------|-----------|-----------|------------------|-------------------------------------------|---------------------|---------------------|
| Accumulated depreciation 01.01.2022 | Additions | Disposals | Re- transfers | Accumulated depreciation 31.12.2022 | As of 31.12.2022 | As of 31.12.2021 |
| I. Intangible Assets | | | | | | |
| 143 | 7 | 2 | 0 | 148 | 14 | 14 |
| 143 | 7 | 2 | 0 | 148 | 14 | 14 |
| II. Tangible assets | | | | | | |
| 239 | 19 | 37 | 0 | 221 | 53 | 24 |
| 239 | 19 | 37 | 0 | 221 | 53 | 24 |
| 382 | 26 | 39 | 0 | 369 | 67 | 38 |
| III. Financial assets | | | | | | |
| 0 | 0 | 0 | 0 | 0 | (250 €) | (250 €) |
| 0 | 0 | 0 | 0 | 0 | (250 €) | (250 €) |
| 382 | 26 | 39 | 0 | 369 | 67 | 38 |

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Morsleben repository, workshop: Mirko Polster, Dr. Ali Hussein, and Gang Li from BGE TEC with red helmets and Hagen Beiler from the Morsleben mine

www.bge-technology.de

Model calculation RANGERS

