

2021

ANNUAL REPORT

nagra.

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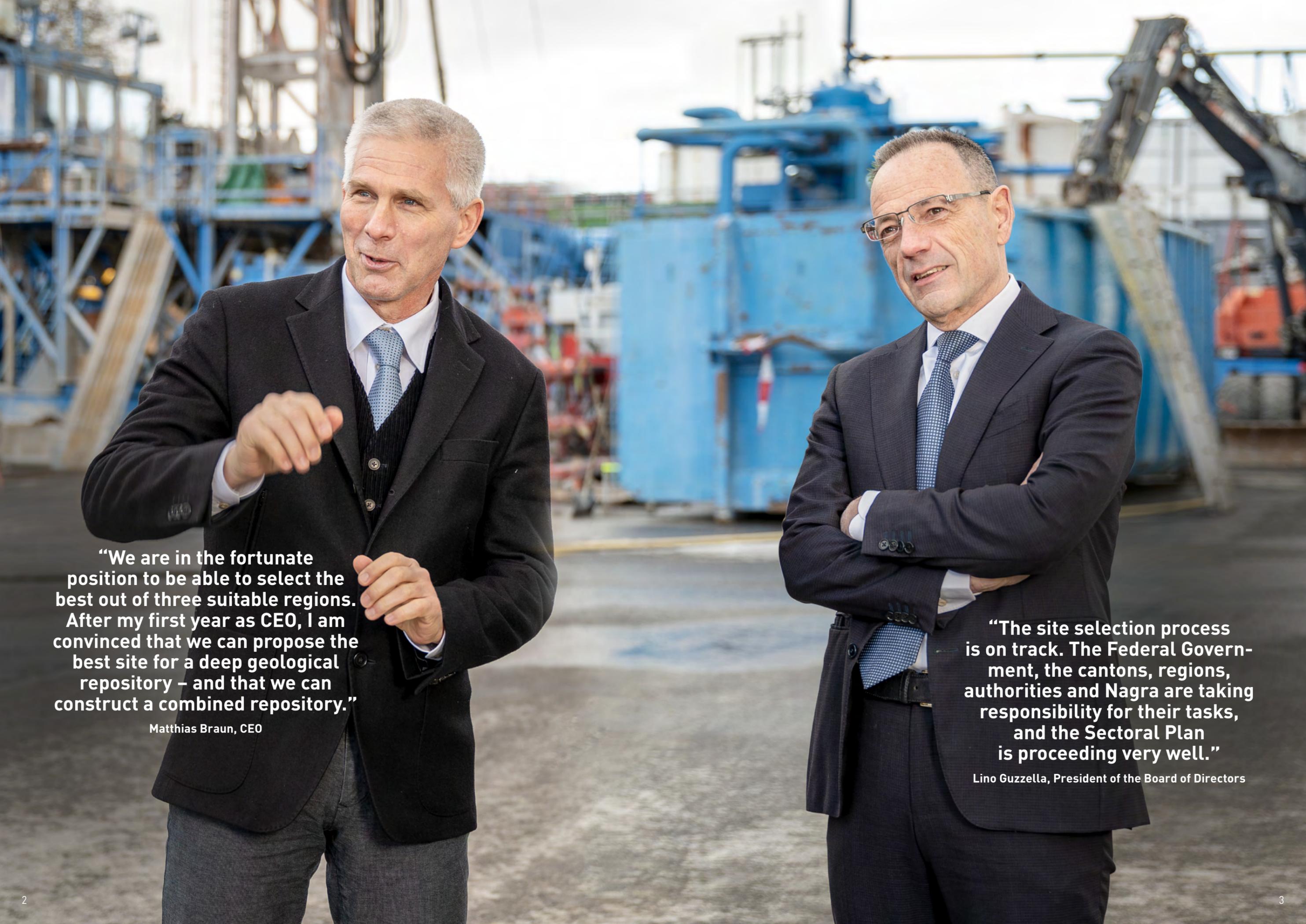
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“We are in the fortunate position to be able to select the best out of three suitable regions. After my first year as CEO, I am convinced that we can propose the best site for a deep geological repository – and that we can construct a combined repository.”

Matthias Braun, CEO

“The site selection process is on track. The Federal Government, the cantons, regions, authorities and Nagra are taking responsibility for their tasks, and the Sectoral Plan is proceeding very well.”

Lino Guzzella, President of the Board of Directors



“I have learnt a lot in my first year as Nagra’s CEO, particularly from my excellent team.”

Matthias Braun, CEO

NAGRA IS READY TO ANNOUNCE THE SITING PROPOSAL

In their joint interview, Matthias Braun, CEO, and Lino Guzzella, President of the Board of Directors, look back at the year 2021 when they both took office. They present their views on the project of the century of deep geological disposal as it approaches the siting proposal.

Mr. Guzzella, you became the new President of the Board of Directors in 2021, and Mr. Braun, you took over as Nagra’s new CEO. What are your most important insights from your first year in office?

Guzzella: I was impressed with how well Nagra is integrated into the scientific community network and with the high level of its scientific publications. At the same time, I am also fascinated by Nagra’s approach to collaboration with the siting regions. The interested parties engage in genuine dialogue. Overall, I can say that the site selection process is on track. The Federal Government, the cantons, regions, authorities and Nagra are taking responsibility for their tasks, and the Sectoral Plan is proceeding very well.

Braun: I have learnt a lot in my first year as Nagra’s CEO, particularly from my excellent team. I have also exchanged views with many people outside Nagra, including individuals who are sceptical about our project. This interaction has been very valuable to me.

Where does Nagra stand now, just before the siting proposal for a deep geological repository?

Guzzella: We benefit from the efforts of all our staff, both past and present, and I am grateful for this. I was able to take office in an organisation that is on track.

Braun: We are in the fortunate position to be able to select the best out of three suitable regions. After my first year as CEO, I am convinced that we can propose the best site for a deep geological repository – and that we can construct a combined repository: in other words, one repository for all the radio-

active waste. Our proposal will meet all safety criteria and be based on a sound scientific and technological foundation. We are now in possession of the necessary knowledge.

Mr. Guzzella, you are professor at ETH, the Swiss Federal Institute of Technology, where you have also held the positions of rector and president. Mr. Braun, for many years, you worked for large international corporations such as Shell. How do you apply your work experience to your new tasks?

Guzzella: The challenges are not really that different. Neither Nagra nor ETH can conduct science in a vacuum. Both organisations require funds and public acceptance. Just like ETH, Nagra is caught in the interplay between science, economics, technology, society and politics.

Braun: In large international corporations, major projects on the scale of the deep geological repository are business as usual. My involvement in several major projects has taught me to keep quality, time and costs under control. This is valuable experience for my work at Nagra.

How do these different backgrounds – ETH on the one side, international corporations on the other – affect how you work together?

Guzzella: We have a good relationship. I bring in more of an outside perspective. Matthias Braun, as CEO, knows his organisation very well and leads it in a goal-oriented manner.

Braun: For me, our collaboration works just as it should between a President of the Board of Directors and a CEO. Our roles are clearly defined.

Nagra is currently focused on the upcoming siting proposal. But how important is this step seen against the background of the project of the century of a deep geological repository? After all, Nagra has been conducting research for 50 years, and the repository will not be closed for another century.

Braun: The siting proposal is important because it marks the transition from the planning phase to the licensing phase. With regard to the site selection process, we have now completed the majority of the work required. We can soon pass the ball to the authorities and politicians, who will review our proposal and decide on the general licence.

Guzzella: If we were talking about a house, you could say that the foundations have been laid and planning has been completed. As soon as we get the go-ahead, in our case the general licence, we can start construction. The siting proposal is important, but it is not the only key milestone. There will be more, and Nagra will work through them one by one – reliably, tenaciously and, as in the past, in dialogue with the authorities and the general public.

Braun: In terms of formalities, the general licence application takes priority. However, the public, especially the residents of the affected regions, are much more concerned with our siting proposal.

Guzzella: In theory, we could hold off with communicating the siting proposal until we submit the general licence application. However, by already announcing this year for which region we plan to prepare an application for submission around two years from now, we want to demonstrate our commitment to transparency. That is what this is about.

Around ten years from now, Swiss voters could decide on the general licence if a referendum is called for against the decision of the Federal Parliament. What is your view on the milestone of a national referendum?

Guzzella: The older I get, the more I value direct democracy. In this sense, I would be pleased to see our important project gain legitimacy through this democratic process. The corresponding dialogue with all of society is important and helpful.

Braun: The deep geological repository for all of Switzerland's radioactive waste follows the tradition of

“I would be pleased to see our important project gain legitimacy through direct democracy.”

other major Swiss projects. For projects such as these, we must practise solidarity, and this is best expressed in a national referendum. In this sense and as a Swiss citizen, I would welcome bringing this project to a vote.

Speaking of milestones, which ones were the most important for the 2021 business year?

Braun: Surely that would be the progress and subsequent completion of the deep borehole campaign. Despite the coronavirus, we achieved all our goals with hardly any delays. The team has really done a fantastic job here. During the entire campaign, which lasted almost three years, there was not one single serious accident, and the results and rock samples are all of good quality – I am very satisfied.

Guzzella: Quality, timing and costs met expectations. Nagra executed this complex project in a highly professional manner. Those responsible deserve great recognition for this. Another important milestone was reached in participation: the regional conferences responded to and accepted Nagra's infrastructure proposal.

Braun: On a sunny Saturday morning last year, I visited a regional conference. On this glorious summer day, around one hundred people had gathered in the town hall to talk about the surface infrastructure. This is not something I take for granted; the participation of the regions is impressive. The Swiss Federal Office of Energy leads the site selection and participation process in a professional manner, and I have the impression that the regions are actively involved.

Guzzella: In 2021, the Cost Study was also important. swissnuclear is responsible, but Nagra makes significant contributions. As our project moves forward and our plans become more concrete, the costs involved become clearer. What stands out is that the costs are no longer increasing.



“I am fascinated by Nagra's collaboration with the siting regions. The interested parties engage in genuine dialogue.”

Lino Guzzella,
President of the Board of Directors

Mr. Guzzella, when you took office you emphasised that you represent the members of the Cooperative and wish to see an even closer collaboration between Nagra and the Board of Directors.

Guzzella: A constructive climate prevails within the Board of Directors, and we pursue our common goal with great dedication and pleasure. For this, I am very grateful to my colleagues.

Let us venture a quick look into the future: The siting proposal will be announced very soon and following this, the general licence application will have to be prepared and submitted before the authorities review it and the Federal Council

and Parliament come to a decision. What will Nagra focus on during this phase?

Guzzella: Until now, it was primarily the potential siting regions who were familiar with Nagra's activities and the issue of deep geological disposal. This issue will now be put on the agenda for the whole of Switzerland, and in the upcoming years, our general licence application will become a subject of national debate.

Braun: Our job is not done yet. Preparing the general licence application is an extremely challenging task. Research will continue and I am looking forward to moving our project ahead together with all the Nagra staff, the Board of Directors and our political and administrative partners.

FACTS & FIGURES

➔ WASTE MANAGEMENT PROGRAMME 2021

Nagra's comprehensive approach

On behalf of the radioactive waste producers, we prepare an updated Waste Management Programme every five years. The Programme is required by law and outlines the framework for the long-term planning of the deep geological repository. This includes documenting our waste management concept and describing the steps required to plan, construct, operate and close the repository. In addition, we describe what decisions have to be reached by what date, what principles they are based on and how we will develop these.

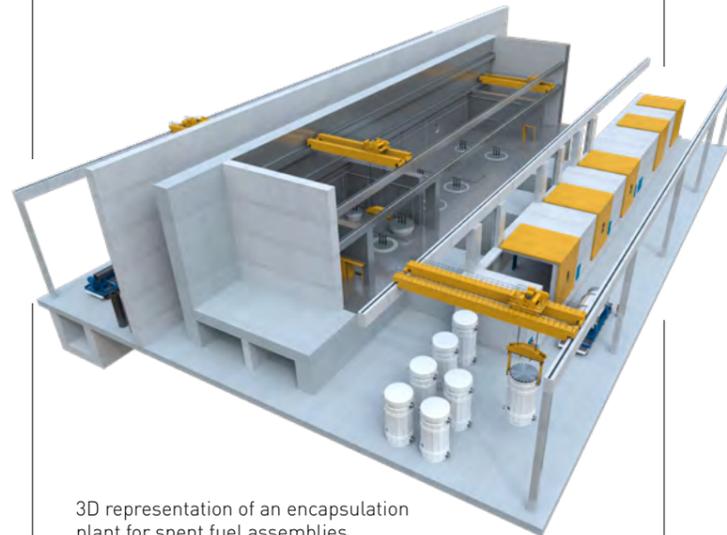
The updated Waste Management Programme was published in late 2021. Its focus is on the progress achieved since the last Programme of 2016. We also show how we responded to the requirements of the Federal Council and the recommendations of the authorities. The Programme has to be submitted to the federal authorities and approved by the Federal Council. In parallel, we also published our updated Research, Development and Demonstration programme (RD&D Plan) in late 2021.



→ nagra.ch/en/technischer-bericht-21-01

➔ SITE SELECTION

Nagra increases its digital presence



3D representation of an encapsulation plant for spent fuel assemblies

In 2021 and early 2022, Nagra has continued to prepare intensively for the siting proposal. We successfully completed the deep borehole campaign conducted to investigate the underground. The resulting knowledge allows us to compare the three potential siting regions for a deep geological repository in detail.

To better visualise and analyse the enormous volumes of data from the seismic measurements and deep boreholes, we set up a state-of-the-art computer laboratory equipped with large screens at the end of 2021. Further digital innovation was introduced in the form of Building Information Modelling (BIM). We use BIM for the repository projects that were specifically adapted to the respective siting regions. We now have a digital model of the repository projects for all three siting regions that provide a basis upon which we can continue our work. These digital models also help us to make great progress with planning the underground disposal areas.

➔ TIMETABLE

Time schedule for the project of the century

In the future, Switzerland intends to dispose of its radioactive waste in a deep geological repository. To identify the safest site for the repository, we have been conducting decades-long, detailed investigations of the underground in Northern Switzerland. We have obtained a comprehensive picture and are now ready. The Jura Ost, Nördlich Lägern and Zürich Nordost siting regions are in the final selection for the repository site. In autumn 2022, we will announce which site we consider to be the most suitable. This milestone is called "site selection in preparation for the general licence application". We believe that a combined repository in which we can dispose of all the waste categories at one joint location is the most sensible variant. We will prepare a general licence application for the proposed site and will submit this to the Federal Council around 2024. In this application, we will specify the repository site and the main features of the project. Our documents will be reviewed by the federal authorities and their experts. Around 2029, the Federal Council will decide whether to grant the licence and will submit its decision to the Federal Assembly. This licence can still be opposed in an optional referendum but, if all goes well, the construction of a deep geological repository in Switzerland could start in around ten years.

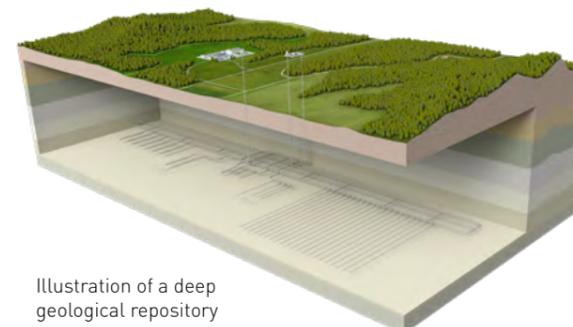
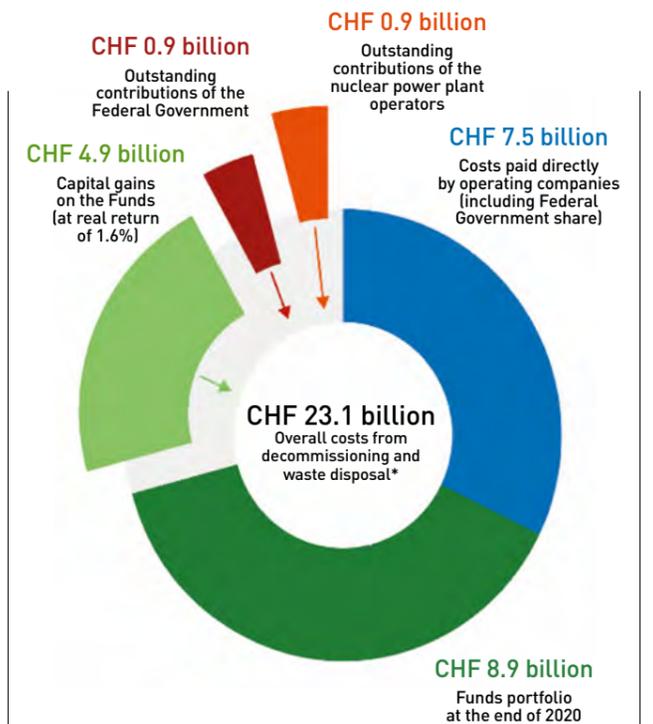


Illustration of a deep geological repository



➔ COST STUDY 2021

What is the cost of waste disposal?

Every five years, the association of the Swiss nuclear power plant operators (swissnuclear) calculates the anticipated costs of disposing of the waste from Swiss nuclear installations and of decommissioning these installations. The latest Cost Study was published in October 2021 and includes the most recent findings and experience from national and international dismantling projects and from planning deep geological repositories. Nagra contributed data and information.

The study confirmed that financing of decommissioning and waste disposal is secured and includes a considerable financial safety reserve. Compared to the previous study, the overall costs are stable to slightly decreasing and currently amount to CHF 23.1 billion. The results of the study are currently being reviewed by independent experts.

*Overview of the overall costs from decommissioning and waste disposal, based on the variant of complete dismantling and two separate repositories at different sites.

OVERVIEW OF THE DEEP BOREHOLES IN 2021



➔ RHEINAU-1 BOREHOLE

Fault does not impair tightness

In Rheinau, we deviated a borehole to investigate the properties of the Opalinus Clay. The results are important for all three potential siting regions.



➔ A GOOD PROTECTIVE BARRIER

Scrutinising the Opalinus Clay

The deep boreholes allowed us to complete and refine our existing image of the underground. Our focus was on determining the thickness, tightness, composition and depth of the Opalinus Clay. This rock constitutes the most important safety barrier of a deep geological repository and encloses the radioactive waste in the long term. In each of the three regions, the layer of Opalinus Clay is over one hundred metres thick, very tight and quietly bedded and extensive enough to host a combined repository.

➔ POSITIVE CONCLUSION

Self-sealing works

Initial results show that the Opalinus Clay does not exhibit significantly increased permeability in the vicinity of the fault area. In addition, it was possible to demonstrate under realistic conditions that the clay rock can self-seal within just a few days.



The Bachs-1 deep borehole is located in the Bachs Valley (Bachsertal) in the western part of the Nördlich Lägern siting region.

➔ CORAL REEF AND ROCK FORMATIONS

Tight reef

In the eastern section of the Nördlich Lägern siting region, there is an old, fossilised coral reef in the rock formations above the Opalinus Clay. We could confirm that it is as tight as the surrounding rock formations. We started the Bachs-1 borehole in autumn 2021 to explore the western part of the Nördlich Lägern siting region beyond the coral reef. We were also able to verify the results of the Stadel-2 borehole. In Bachs, the Opalinus Clay is located at a depth of between 807 and 915 metres.



➔ STADEL-3 BOREHOLE

Investigating traces of the past

We initially became aware of an unusual body of rock in Nördlich Lägern in our 2D seismic campaign. The Bülach borehole revealed that this was, in fact, a fossilised coral reef. With the Stadel-3 borehole, we collected additional data on the Opalinus Clay and the reef.

➔ FINAL BOREHOLE

Successfully completed

Since April 2019, nine deep boreholes were drilled in the Jura Ost, Nördlich Lägern and Zürich Nordost siting regions. The final borehole in Bachs (Nördlich Lägern) was completed in spring 2022.

“This is an exciting time to be contributing to this project of the century.”

**Cornelia Wigger,
Senior Construction
Manager & Environmental
Planner**

EVERY ONE OF US IS NEEDED HERE

With the aim of identifying the most suitable site for a repository, Nagra is using deep boreholes to investigate the underground rock formations. Senior Construction Manager Cornelia Wigger makes sure that the construction projects have the lowest environmental impact possible.

When I first started working here, I said: “Nagra gave me the most exciting job”. I still believe this to be true. This is an exciting time to be contributing to our project of the century: we can hardly wait to announce the siting proposal and, in the autumn of 2022, we will finally be able to do so. As environmental planner, it is my responsibility to ensure that our construction projects progress with as little impact on the environment as possible. For example, I make sure that we respect the required distances from groundwater resources and from wildlife and nature reserves – or that we protect the soil. For all our boreholes, we excavated the healthy soil only to return it to the site once drilling was completed. As environmental and spatial planning topics are important for the overall project, many threads come together at my desk. I work with highly specialised physicists as often as with tunnelling engineers and am also involved in strategic decision-making. This multi-faceted aspect of my

“It has always been important to me to make a useful contribution to society.”

job makes it so exciting. I like to keep busy and feel that I am making a useful contribution. Most of all, I am fascinated by the scope of the project. I am not just talking about the financial and economic interests but mainly about finding the best solution for radioactive waste disposal – worldwide. I am impressed by the close interaction and mutual support between the waste management organisations, departments, experts and universities. It has always been important to me to make a useful contribution to society. This was also the case for my doctorate, and to know that the results from my thesis are now being used for the safety analyses of Nagra and other organisations is a great feeling.

CONSTRUCTING A DRILL SITE IN RECORD TIME
2021 was a special year for me because, as Senior Construction Manager, I was able to successfully complete the construction of the Bachs drill site despite facing difficult conditions. The bad summer caused us problems: due to the continuous rainfall, for a long time the ground was too wet to allow environmentally friendly construction. At the same time, we were under time pressure to complete the project on schedule. Keeping the construction team motivated was not always easy. However, we really pulled through as a team, kept an eye on the weather report around the clock and even tested the soil of the construction site on the occasional Sunday and holidays. I was very pleased with how this team, which mostly consisted of external specialists, worked together so well. I am proud that we managed to construct the drill site in record time despite the inclement weather. Last but not least, this was managed in collaboration with the local residents. Every one of us is needed here to realise a project as huge as a deep geological repository. To be a part of this means a lot to me.

CORNELIA WIGGER

Cornelia Wigger studied geography as a major and obtained her doctorate in geology, her minor. At the Paul Scherrer Institute, she investigated the permeability of radionuclides in clay rocks. This, combined with her desire to make a useful contribution to society, made her a perfect candidate for Nagra. After a six-month internship during which she obtained her doctorate, Nagra employed her as environmental and spatial planner in 2017. From 2019 to 2021, she was also Senior Construction Manager of the construction sites for the deep boreholes in Bachs and Stadel-3.

THIS IS A UNIQUE CROSS-GENERATIONAL PROJECT

Anita Joray is Assistant to the Division Head Communication and Public Affairs. Alongside her administrative tasks, she devotes her time to the concerns of the interested public. Dialogue with people is particularly important to her. After thirty years, she still enjoys being involved in this project of the century.

Due to the pandemic, I had much less contact with the public than usual in 2021, which is a great pity. I missed the opportunity for exchange. I have been working for Nagra for almost 30 years and have always had an open ear for people's concerns. I like to listen and try to answer questions – at information booths, exhibits, events or guided tours of the drill sites.

A UNIQUE CROSS-GENERATIONAL PROJECT

When I first started working here, the fronts between advocates and opponents were hardened. It was difficult to conduct a dialogue. In the 1990s, Nagra considered Canton Nidwalden as a potential site for a low- and intermediate-level waste repository. This caused an outcry, and the population defeated the project at the ballot box. I was there at the time to support the voting campaign. This was not always easy and I had to take quite a lot of flak. People were looking for a scapegoat for a problem which society itself had caused. Fortunately, the discussion is less passionate and emotional nowadays. The younger generation knows that we have to work together to find a joint solution, and they have a more objective attitude to deep geological disposal

ANITA JORAY

Anita Joray has experienced a lot at Nagra over the years: the trained office administrator has been supporting the project of the century in the Communication and Public Affairs Division for almost thirty years. Working at the intersection between politics, science and society, dialogue with the public is important to her. She is not only responsible for financial and administrative matters but also for coordinating different activities such as exhibits, workshops and events. Anita Joray has two grown-up children.

“Every one of us contributes to the solution of a large societal problem – we can only achieve our goal by working together.”

– they help to advance the discussion. This is a unique cross-generational project: we develop the solution for radioactive waste, and the next generation will bring the project to its conclusion. I will have made my own small contribution, which is very motivating.

Aside from organising information events and guided tours, I take care of our division's finances and make sure that our team is performing well in general. Due to the pandemic, many events that we had already started planning were cancelled in 2021. Instead, we looked ahead to the siting proposal due in autumn 2022. How do we communicate the proposal to make sure everyone can understand our decision? What will the local population want to know? We will be there for the people in the region, listen to their questions and take their concerns into consideration – this is very important to me. Last but not least, our division was restructured in 2021 and with Philipp Senn, we have a new division head. He has brought in fresh energy! I really enjoy working for Nagra. We are a great team. Every one of us contributes to the solution of a big societal problem: we can only achieve our goal by working together. The long duration of the project makes it all the more important to foster communication and appreciate minor accomplishments. The upcoming announcement of the siting proposal in autumn 2022 is a major milestone and great achievement for Nagra of which we can be proud.



“The younger generation knows that we have to work together to find a joint solution, and they have a more objective attitude to deep geological disposal – they help to advance the discussion.”

Anita Joray
Assistant to the Division Head
Communication & Public Affairs



“We all want to contribute to making the world a better place.”

Tim Vietor, Division Head Safety, Geology & Radioactive Materials

WE ARE NOW READY TO REACH KEY DECISIONS

Tim Vietor is far from feeling bored: together with his team, he provides the scientific foundation for the siting proposal for a deep geological repository due in autumn 2022. He recounts what he enjoyed most in 2021 and what motivates him anew each day.

This is the most exciting phase of the project – at least in my opinion. At this time, my team and I have to reach key decisions: we will determine which site is safest and most suitable for a deep geological repository. Later, we can go into more detail, but, right now, we are laying the tracks that will eventually take us to our goal.

What do I do at Nagra? Everything fun! All sciences come together in my division. We refine our scientific deliberations and develop and document them. In other words: we provide the scientific foundation for the site selection and the safety case. It makes sense for me, as a geologist, to head the team in this phase as the repository-related questions we are currently confronted with concern geology. We cannot “create” the best and safest geological situation, but it is up to us to identify it.

ALWAYS NEW ASPECTS TO CONSIDER

Working for Nagra is never boring, even if we have been working on the same project for many years. At the beginning, we asked ourselves: is this even feasible? Is the deep geological disposal of radioactive waste safe? We have known for quite a while now that it is indeed safe, but follow-up questions arose: What is the most suitable site for a repository? What qualifies it as safe? There are always new aspects to consider. In my job, I have to be incredibly versatile, not just in terms of scientific understanding but especially with regard to good communication skills.

Convincing others of our mandate comes quite easily to me. After all, our planet has limited resources. If we want to lead more sustainable lives, we have to clean up the waste from the past. This is exactly where we come in. We are the technical expert commission that would like to solve a problem on behalf of the entire population. If radioactive waste is not properly enclosed, it can, over time, pose a potential threat to the environment.

My work is important and useful – and for this reason, I really enjoy what I am doing.

In 2021, I was especially pleased with the positive results from the Rheinau borehole. Once again, we were able to show that the so-called self-sealing of our host rock, the Opalinus Clay, also works in this siting region. I could literally feel a huge weight lift from my shoulders when our predictions actually came true. I was also pleased that I was able to start working on the siting proposal. Some indications are emerging, despite the fact that a lot of data remain to be analysed. We will present the results to the public in autumn 2022. What I like most about my job are my colleagues: most of them get a gleam in their eyes when they talk about their work. This is because they know how valuable their work is to society. We all want to contribute to making the world a better place.

TIM VIETOR

Tim Vietor is Division Head Safety, Geology and Radioactive Materials and Member of the Executive Board. As a geology student, he never expected to end up in the field of applied sciences. However, after obtaining his doctorate and after ten years of research as a post-doctorate, he came to Nagra in 2005. He has been putting his heart and soul into Nagra’s mission ever since. As Head of Field Investigations, he was responsible for experiments in the underground rock laboratories from 2011 to 2016. As Division Head since 2016, he leads Nagra’s scientific team. Tim Vietor is married and has three children.

WE MUST NOT GET LOST IN MINOR DETAILS

What do we need to know when, and how do we approach unresolved issues? As Head of Research & Development, Irina Gaus has to be able to answer these questions. She explains what she was working on last year and what is planned for the next few years.

In the past, the concept of a deep geological repository was hardly tangible. Now, the project is taking shape. Different research programmes around the world are making important progress. Announcing our siting proposal in 2022 and preparing the general licence application in 2024 combines all of our most important scientific findings from decades of research. This is very gratifying.

WE ALL PURSUE THE SAME RESEARCH GOAL

As Head of Research & Development, I coordinate Nagra's numerous research projects and make sure that the relevant topics are addressed at the right time. What do we need to know now? Which questions will we answer later? As the project will continue for several more decades, our time schedule has to be carefully thought out. For example, since we will not be needing the disposal containers before 2050, it is not necessary to decide today what they should look like then. We want to make our decisions as late as possible but as early as necessary. I have to be familiar with all fields of research to make sure we keep an overview and avoid getting lost in the details. In my job, I bring very different people and disciplines together – such as nuclear and materials scientists, physicists, geologists and engineers. This is very exciting! We all pursue the same research goal: a feasible and safe repository for radioactive waste in Switzerland. The pandemic continued to make our work more difficult in 2021, but Nagra staff remain dedicated. I was very pleased that we still managed to work together so well and could continue our research work and keep to our schedule.

AN INTENSIVE PERIOD LIES AHEAD

In 2021, I was very busy preparing the RD&D (Research, Development and Demonstration) Plan. In this publication, we outlined all of our research goals – up to around 2125, when, according to current planning, the repository will be definitively closed. We will, for example, continue to concen-

“We all pursue the same research goal: a feasible and safe repository for radioactive waste.”

trate on upcoming ice ages. How will these impact deep rock formations and thus potentially the repository as well? At the moment, our key focus is on the submission of the general licence application in 2024. This will probably comprise around 5000 pages, so we are looking at a work-intensive period. At the same time, I am really looking forward to it. Switzerland's population has decided to opt out of nuclear energy. For society to be able to look forward to a future without legacy waste, we have to bring the chapter on radioactive waste to a satisfactory conclusion. This is our mandate, and I want to contribute my fair share.

IRINA GAUS

The Head of Research & Development has been involved with exploring the underground for a long time: After obtaining her doctorate in geology in Belgium, she was employed by the French Geological Survey, where she dealt with carbon sequestration and drinking water. She started her career with the British Geological Survey. In 2007, she joined Nagra in the International Services and Projects Division, where she was responsible for technical and strategic consultation services in Europe and overseas. In 2016, she became Head of Research & Development. This position also includes coordinating international collaboration with other organisations, universities and the International Atomic Energy Agency, IAEA.



“We want to make our decisions as late as possible but as early as necessary.”

Irina Gaus
Head of Research & Development

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President of the Board of Directors

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Däniken

Kernkraftwerk Leibstadt AG

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Commission for Communication and Information

Dr. Thierry Strässle

Chair

Swiss Confederation

Commission for Legal Affairs

Hansueli Sallenbach

Chair

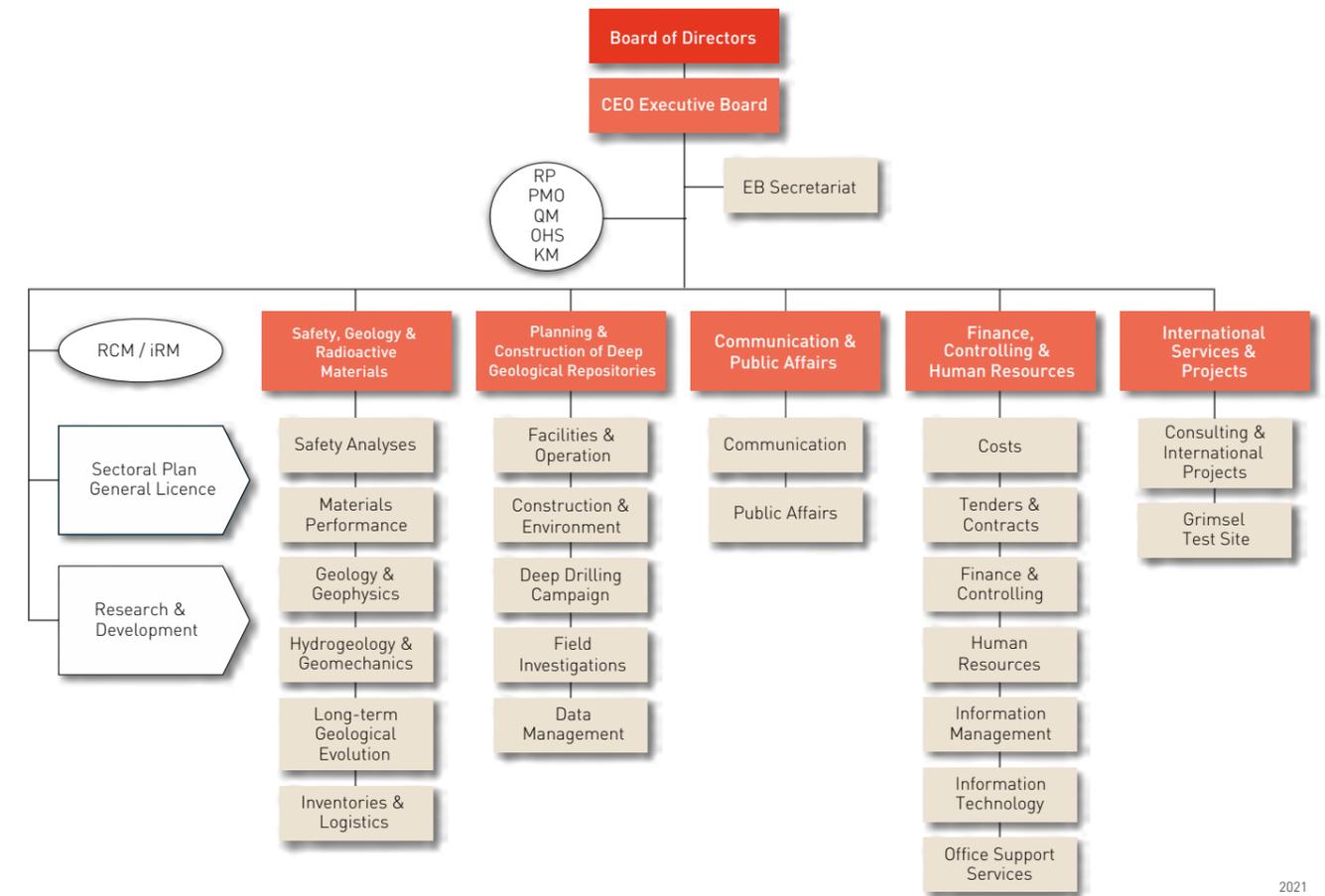
Axpo Holding AG

Statutory Auditor

PricewaterhouseCoopers AG

Zürich

ORGANIGRAM OF THE HEAD OFFICE



- RP: Radiation Protection
- PMO: Project Management Office
- QM: Quality Management
- OHS: Occupational Health and Safety
- KM: Knowledge Management
- RCM: Requirements and Configuration Management
- iRM: integrated Risk Management

Head office

In 2021, 119.6 Nagra employees held full-time positions.

Board of Directors and annual general meeting

The Board of Directors held four meetings in 2021. The main focus of all meetings was on supporting the Sectoral Plan process. The Board of Directors also took note of the planned research and development projects for 2022 and approved a corresponding framework credit. The Technical Committee met four times, and the Commission for Communication and Information held three meetings. The Finance Commission met twice to consider the closing of the annual accounts for 2020, the budget for 2022 and the accumulated accounts. The annual general meeting of the members of the Nagra Cooperative was held on 30th June 2021. The members approved the annual report and accounts for 2020.

EXECUTIVE BOARD



The members of the Executive Board are (from left to right): Severin Wälchli, Reto Beutler, Markus Fritschi (Deputy CEO), Philipp Senn, Tim Vietor, Matthias Braun (CEO) and Maurus Alig.

In 2021, the Board of Directors appointed Philipp Senn as new Division Head Communication and Public Affairs. The 44-year-old assumed responsibility on 1st September 2021, succeeding Markus Fritschi who will retire in 2023. Until then, Fritschi remains Nagra's Deputy CEO.

ANNUAL FINANCIAL STATEMENTS 2021

COMMENTS ON THE ANNUAL FINANCIAL STATEMENTS 2021

The current financial statements for 2021 were prepared in line with the provisions of the relevant Swiss legislation, in particular the articles on commercial accounting and financial reporting of the Code of Obligations for individual financial statements (Articles 957 to 962).

Total expenditure minus proceeds from sales of goods and services and other income is borne by the members of the Cooperative, which results in a balanced year-end result.

Operating income amounted to CHF 116.1 million (2020: CHF 120.3 million) and project expenditure amounted to CHF 90.9 million (2020: CHF 96.2 million). In reporting year 2021, the deep borehole campaign was again responsible for most of the project expenditure. The two exploratory boreholes in Stadel and Rheinau were completed, and drilling at Bachs, the ninth and last borehole of the deep borehole campaign, will continue until spring 2022.

At CHF 21.9 million, staff costs are slightly higher compared to the previous year. The net proceeds from sales of goods and services decreased slightly, and other operational costs, depreciation and the financial result are comparable to those of the previous year.

Further information can be found in the notes on the annual financial statements.

Wettingen, 18th March 2022



Dr. Matthias Braun, CEO

INCOME STATEMENT

Note	1.1.–31.12.2021	1.1.–31.12.2020	
	CHF	CHF	
C1	Net proceeds from sales of goods and services		
	Net proceeds from services for third parties	4 575 140	5 124 339
	Research contributions from third parties	-	119 473
	Net proceeds from services for Cooperative members	386 117	376 785
	Total net proceeds from sales of goods and services	4 961 256	5 620 598
C2	Contributions of members of the Cooperative		
	Contributions to administration costs	700 000	700 000
	Contributions to project expenditure	109 875 578	113 677 911
	Total contributions of members of the Cooperative	110 575 578	114 377 911
	Other operating income	587 707	284 764
	Operating income (total output)	116 124 542	120 283 273
C3	Cost of materials (project expenditure)	90 926 902	96 222 557
C4	Staff costs	21 900 002	20 781 179
C5	Other operational costs	2 901 941	2 839 242
C10	Depreciation and value adjustments on fixed assets	236 010	238 797
	Operating result	159 687	201 498
	Financial income	-79 391	-72 439
	Financial costs	89 122	146 249
	Ordinary result	149 956	127 688
	Extraordinary, non-recurring or prior-period income	-	-
	Annual profit before taxes	149 956	127 688
	Direct taxes	149 956	127 688
	Annual result	-	-

BALANCE SHEET

Note	Assets	31.12.2021 CHF	31.12.2020 CHF
	Current assets		
	Cash and cash equivalents	11 386 254	26 532 321
C6	Trade receivables	1 574 347	806 985
	Due from third parties	1 365 172	598 476
	Due from members of the Cooperative	209 175	208 509
C7	Other current receivables	893 633	864 701
	Towards third parties	893 633	864 701
C8	Non-invoiced services	3 086 668	2 569 929
C9	Accrued income and prepaid expenses	4 693 820	455 300
	Total current assets	21 634 722	31 229 236
	Capital assets		
C10	Tangible fixed assets	1 484 070	1 632 494
	Total capital assets	1 484 070	1 632 494
	Total assets	23 118 792	32 861 730
	Equity and liabilities		
	Current borrowed capital		
C11	Trade payables	9 945 514	7 398 082
	Due to third parties	9 927 833	7 379 742
	Due to members of the Cooperative	17 681	18 340
	Other current liabilities	1 822 265	1 509 322
	Due to third parties	1 822 265	1 509 322
C12	Advance payments received	4 304 484	3 848 689
C13	Deferred income and accrued expenses	6 906 529	19 965 637
	Total current borrowed capital	22 978 792	32 721 730
	Total liabilities	22 978 792	32 721 730
C14	Equity		
	Cooperative capital	140 000	140 000
	Annual result	-	-
	Total equity	140 000	140 000
	Total equity and liabilities	23 118 792	32 861 730

CASH FLOW STATEMENT

Note		1.1.-31.12.2021 CHF	1.1.-31.12.2020 CHF
	Annual result	-	-
C10	Depreciation and value adjustments on fixed asset items	236 010	238 797
	Change in net current assets		
C6	Decrease (+) / increase (-) trade receivables	-767 362	87 818
C7	Decrease (+) / increase (-) other current receivables	-28 932	363 173
C8	Decrease (+) / increase (-) non-invoiced services	-516 739	-284 059
C9	Decrease (+) / increase (-) prepaid expenses	-4 238 520	487 462
C11	Decrease (-) / increase (+) trade payables	2 547 432	678 513
	Decrease (-) / increase (+) other current liabilities	312 943	773 597
C12	Decrease (-) / increase (+) advance payments received	455 795	343 743
C13	Decrease (-) / increase (+) deferred income and accrued expenses	-13 059 108	7 617 235
	Cash flow from operating activities	-15 058 481	10 306 280
C10	Investments in fixed assets	-87 586	-304 883
	Cash flow from investment activities	-87 586	-304 883
	Cash flow from financing activities	-	-
	Change in cash and cash equivalents	-15 146 067	10 001 397
	Change in cash and cash equivalents	2021	2020
	Cash and cash equivalents as of 1st January	26 532 321	16 530 924
	Cash and cash equivalents as of 31st December	11 386 254	26 532 321
	Net increase/decrease in cash and cash equivalents	-15 146 067	10 001 397

NOTES ON THE ANNUAL FINANCIAL STATEMENTS

A) General information

Accounting legislation

The current financial statements were prepared in line with the provisions of Swiss law, in particular the articles on commercial accounting and financial reporting of the Code of Obligations for individual financial statements (Articles 957 to 962).

Company, name, legal form and registered office

Nagra, National Cooperative for the Disposal of Radioactive Waste,
Hardstrasse 73, Postfach, 5430 Wettingen, Switzerland

Type of audit

According to legal requirements (Article 727 Item 2 of the Code of Obligations), the annual financial statements of Nagra are subject to an ordinary audit.

Currency used for the accounting

The accounting is in the national currency (Swiss Francs; CHF).

Cash flow statement

The cash and cash equivalents form the basis for the presentation of the cash flow statement. Cash flow from operating activities is calculated using the indirect method.

Approval of the annual financial statements

The Board of Directors approved the annual financial statements on 18th March 2022 on behalf of the annual general meeting.

B) Information on the principles applied in the annual financial statements

The main positions in the annual financial statements are assessed as follows:

Cash and cash equivalents

Cash and cash equivalents comprise petty cash and credit balances on bank accounts. They are carried at nominal value. Foreign currency positions are carried at the exchange rate on the reporting date.

Trade receivables

Trade receivables are reported at the invoiced amount minus the allowances made for the bad debts provision. The allowance is formed based on the maturity structure and recognisable credit risks.

Receivables and payables towards involved parties

These positions are exclusively receivables and payables towards involved parties (i.e. the members of the Cooperative).

Non-invoiced services

The capitalised work in progress and the received advance payments result exclusively from contracts for third parties. For the ongoing projects, all expenditure is capitalised in work in progress, and all advance payments received are booked as a liability.

Fixed assets

Fixed assets are reported at acquisition cost minus the accumulated depreciation over the estimated useful lifetime of each asset category. Investments in hardware below CHFk 20 (one-off) and software below CHFk 100 (one-off) are debited directly to the income statement.

The lifetimes for depreciation fall within the following bandwidths for the individual categories that are relevant for Nagra:

Land	Depreciation only in the case of value impairment
Buildings	20 to 50 years
Operating and business equipment	5 to 10 years
IT hard- and software	2 to 3 years

Tenant fixtures are written off over the duration of the tenancy or, if shorter, over the useful lifetime of the asset, or are debited directly to the income statement.

Expenditure on repairs and maintenance that does not add value is debited directly to the income statement. Renewals that change the useful lifetime of assets are capitalised.

Assets removed from operation or sold are written off on the assets account at their acquisition values and the accumulated depreciation. The resulting profits or losses are entered in the income statement.

Payables

All payables are carried at nominal value. Services received and incurred liabilities are deferred according to the period.

Provisions

Provisions are formed when, based on events that have occurred in the past, the company has a legal or factual obligation, the extent and due date of which are unknown but can be estimated.

C) Information, breakdowns and notes on the annual financial statements

C1) Net proceeds from sales of goods and services

Proceeds from third parties decreased this reporting year but still lie markedly above the long-term average. While no proceeds could be recorded from research contributions (no invoicing period in 2021), the proceeds from NPP operators are comparable to those of the previous year.

C2) Contributions of the members of the Cooperative

The contributions of the members of the Cooperative are invoiced on a quarterly basis according to the budget approved by the Board of Directors. A deviation from the budget leads to an additional charge or a credit that is booked in the year of accounting as prepaid expenses or deferred income. This has an annual result of CHF 0.

Primarily due to the unplanned ninth deep borehole in Bachs, reporting year 2021 recorded an expenditure excess of CHF 4.5 million compared with the budget. This excess will be invoiced to the members of the Cooperative.

C3) Cost of materials (project expenditure)

The project expenditure is made up as follows:

Project-related external services for:	2021	2020
	CHFk	CHFk
Projects: – deep borehole campaign	53 006	57 020
– others	26 970	29 112
Communication	1 631	895
Fees (ENSI, SFOE)	8 987	8 743
Travel expenses	333	453
Project-related external services	90 927	96 223

C4) Staff costs

In line with the resource planning approved by the Board of Directors, staff costs, including social contributions, increased to CHF 21.9 million. This was mainly due to an increase in staffing. The average staffing level in 2021 was 109.5 full-time positions, 10.1 temporary positions and 1.4 internships (2020: 104.6 full-time positions, 9.1 temporary positions and 1.4 internships).

C5) Other operational costs

Other operational costs include rents and expenditure on property of CHFk 1,197, expenditure on information technology of CHFk 707 and further operational costs of CHFk 999. In total, these costs slightly exceed those of the previous year.

C6) Trade receivables

Compared to the previous year, trade receivables increased by CHFk 767, primarily associated with a new partner at the Grimsel Test Site (CHFk 840) and one-off sales of equipment in connection with the terminating deep borehole campaign (CHFk 263).

C7) Other current receivables

Other current receivables include guarantee and cash contributions (e.g. for securing the centralised billing procedure of the Swiss Federal Customs Administration) to the amount of CHFk 842 in total and CHFk 52 for various smaller items.

C8) Non-invoiced services

Non-invoiced services consist of accrued internal services and third-party services for different projects. Project-specific verification is available.

C9) Accrued income and prepaid expenses

Accrued income and prepaid expenses are primarily made up of the balance of the year-end result (CHFk 4,455) but also include pre-payments for the year 2022 for Suva (CHFk 163) and a credit from operations at the Mont Terri Rock Laboratory (CHFk 76).

C10) Tangible fixed assets

	Land and buildings	Office and workshop	Vehicles	Total
	CHFk	CHFk	CHFk	CHFk
Acquisition value as per 01.01.2020	1 825	1 079	758	3 662
Additions		219	86	305
Disposals			-83	-83
Acquisition value as per 31.12.2020	1 825	1 298	761	3 884
Additions		15	72	88
Disposals		-568		-568
Acquisition value as per 31.12.2021	1 825	745	833	3 404
Accumulated depreciations as per 01.01.2020	525	988	583	2 096
Additions	30	120	89	239
Disposals			-83	-83
Accumulated depreciations as per 31.12.2020	555	1 108	589	2 252
Additions	30	119	87	236
Disposals		-568		-568
Accumulated depreciations as per 31.12.2021	585	659	676	1 920
Carrying value as per 01.01.2020	1 300	91	175	1 566
Carrying value as per 31.12.2020	1 270	190	172	1 632
Carrying value as per 31.12.2021	1 240	87	157	1 484

C11) Trade payables

Compared to the previous year, trade payables increased by CHFk 2,547 to CHFk 9,946, mainly due to commitments from the deep borehole campaign.

C12) Advance payments received

Advance payments received are for accrued internal services and third-party services for various projects. Project-specific verification is available. Due to the higher volume of third-party contracts, the advance payments received as per 31st December 2021 rose by CHFk 456 to CHFk 4,304.

C13) Deferred income and accrued expenses

Deferred income primarily consists of outstanding settlements for previously rendered services connected to the deep borehole campaign. Additional important deferrals include fees of the SFOE for the 4th quarter of 2021 (CHFk 935) and of ENSI in the amount of CHFk 786. The deferral for the head office amounts to CHFk 887 and for outstanding vacation time and overtime to CHFk 1,833.

C14) Equity

The Cooperative capital is unchanged with CHF 140k and is divided into 140 share certificates of CHF 1,000 each, with 7 certificates of 20 shares each being distributed.

ACCUMULATED ACCOUNTS INCLUDING ADJUSTMENTS

D) Further information

Liabilities towards pension schemes

As of 31st December, there were the following liabilities towards pension schemes:	31.12.2021	31.12.2020
	CHF	CHF
Contribution statement December	271 218	257 796

Contingent liabilities

Nagra is not involved in any legal actions, legal disputes, regulatory or tax investigations, inquiries or other legal procedures that could have financial consequences for the annual financial statements for 2021.

As of 31st December 2021, there were no guarantee obligations.

Risk report 2021

On 30th June 2021, the Board of Directors approved Nagra's risk report for 2021.

Remuneration disclosure of the Statutory Auditor

(in accordance with Article 961a of the Code of Obligations)

The Statutory Auditor claimed the following remuneration:

	2021	2020
	CHF	CHF
Audit of the annual financial statements	24 000	24 000
Additional audits	8 500	3 000
Total	32 500	27 000

(excluding expenses and VAT)

Note	Total income	Excluding interest:		As per 31.12.2020	Excluding interest:		As per 31.12.2021
		Increase 2020	adjustment payments 2020		Increase 2021	adjustment payments 2021	
		CHF	CHF	CHF	CHF	CHF	CHF
	Swiss Confederation	8 408 970	91 627 759	144 985 002	8 336 235	–	153 321 237
	Axpo Power AG	24 411 233	–21 273 221	340 172 960	23 546 224	–	363 719 184
	BKW Energie AG	11 980 216	–10 914 330	161 368 544	11 603 636	–	172 972 180
	Kernkraftwerk Gösgen-Däniken AG	30 223 655	–26 299 055	438 925 824	29 090 706	–	468 016 530
	Kernkraftwerk Leibstadt AG	38 653 837	–33 141 153	525 020 924	37 298 777	–	562 319 701
	Contributions to project expenditure	113 677 911	–	1 610 473 254	109 875 578	–	1 720 348 832
	Contributions to administration costs	700 000	–	92 370 000	700 000	–	93 070 000
	Contributions of Cooperative members to Nagra	114 377 911	–	1 702 843 254	110 575 578	–	1 813 418 832
	Contributions GNW	–	–	65 265 331	–	–	65 265 331
E1	Total contributions	114 377 911	–	1 768 108 585	110 575 578	–	1 878 684 163

NOTES ON THE ACCUMULATED ACCOUNTS

Note	Total expenditure	Increase	As per	Increase	As per
		2020	31.12.2020	2021	31.12.2021
		CHF	CHF	CHF	CHF
	Geoscientific studies	20 767 568	253 325 915	20 115 460	273 441 375
	Nuclear technology and safety	2 473 315	59 025 481	2 633 116	61 658 597
	Radioactive materials	1 411 969	51 381 141	1 550 205	52 931 346
	Facility planning	1 751 034	37 983 881	2 039 359	40 023 240
	Generic (non-site-specific) work	2 492 438	122 316 922	2 567 908	124 884 830
	General programme costs	4 819 183	114 549 923	4 373 165	118 923 088
	Fees and compensation	4 371 327	83 593 637	4 493 520	88 087 157
	L/ILW programme	38 086 834	722 176 900	37 772 733	759 949 633
	Geoscientific studies	53 754 651	471 737 028	50 614 131	522 351 159
	Nuclear technology and safety	4 498 524	86 878 566	4 218 533	91 097 099
	Radioactive materials	1 377 314	31 757 915	2 259 845	34 017 760
	Facility planning	2 607 663	34 418 647	3 007 542	37 426 189
	Generic (non-site-specific) work	3 682 386	143 516 669	3 154 227	146 670 896
	General programme costs	5 299 213	99 938 423	4 355 047	104 293 470
	Fees and compensation	4 371 326	85 314 437	4 493 520	89 807 957
	HLW programme	75 591 077	953 561 685	72 102 845	1 025 664 530
E2	Project expenditure for repository programmes	113 677 911	1 675 738 585	109 875 578	1 785 614 163
	Administration and general project expenditure	700 000	92 370 000	700 000	93 070 000
	Total expenditure for L/ILW and HLW programmes, administration and general project expenditure	114 377 911	1 768 108 585	110 575 578	1 878 684 163

The accumulated treatment of the contributions of the members of the Cooperative and the application of these contributions form the basis, at the time of waste disposal, for any adjustments of payments among the members. It also indicates which work has resulted in project-related expenditure.

The structure of the total income is oriented primarily to the operating accounts.

E1) Contributions of the members of the Cooperative

The contributions of the members of the Cooperative towards covering project costs are calculated based on the thermal output, the service-lifetime-weighted output and the expected waste volumes of the individual nuclear power plants of the members.

The contributions of the members in the total amount of CHF 110.6 million (CHF 114.4 million in 2020) correspond to those in the income statement. A contribution of CHF 0.7 million to administration costs is included.

As a result of the decision of the Federal Council on 27th September 2019, the Federal Government in 2020 compensated the insufficient contributions made in the past by paying CHF 137.2 million (plus VAT) that was divided among the NPP operators. The interest share of the repayment amounted to CHF 45.6 million. As the members of the Cooperative have stated the wish to depict the compensation payments nominally, the repayment by the Federal Government in the previous financial year 2020 is stated as CHF 91.6 million.

The GNW contributions include payments by GNW for contract work on the Wellenberg project. This project is terminated.

E2) Project-specific expenditure for the repository programmes

The two repository programmes (L/ILW and HLW) basically have the same structure in the presentation of the accumulated accounts and are oriented towards the most important technical tasks to be performed up to the completion of waste disposal activities. If there is no explicit reference to a specific programme, the following explanations of the individual positions apply to both projects.

a) Geoscientific investigations

Geological investigations for identifying potential siting regions comprise geological studies in the investigation area of Northern Switzerland for the deep geological disposal of high-level waste, as well as the processing of geological information for the disposal of low- and intermediate-level waste.

b) Nuclear technology and safety

The work comprises the safety-based evaluation of potential siting regions as well as laboratory studies on the near-field and on the different backfill materials.

REPORT OF THE STATUTORY AUDITOR TO THE GENERAL MEETING OF NAGRA, NATIONAL COOPE- RATIVE FOR THE DISPOSAL OF RADIOACTIVE WASTE

c) Radioactive materials

This includes expenditure on assessing the disposability of waste packages and on ongoing documentation and inventorying of radioactive waste.

d) Facility planning

This position includes expenditure on developing the concepts for the surface and underground facilities for the repositories for HLW and L/ILW.

e) Generic (site-independent) investigations

This includes work on developing methodologies, modelling and validation of the models used in safety analyses, laboratory studies, participation in the work in the rock laboratories (Grimsel and Mont Terri) and the research programmes of the EU.

f) General programme costs

This expenditure results from programme management, expenditure on cost studies and public affairs activities.

g) Fees and compensation

This includes the fees passed on to Nagra from the regulatory and safety authorities.

Report of the Statutory Auditor on the annual financial statements for 2021

As statutory auditor, we have audited the accompanying financial statements of Nagra, National Cooperative for the Disposal of Radioactive Waste, which comprise the income statement, balance sheet, cash flow statement and notes, for the year ended 31st December 2021.

Management's responsibility

Management is responsible for the preparation of the financial statements in accordance with the requirements of Swiss law and the Cooperative's articles of incorporation. This responsibility includes designing, implementing and maintaining an internal control system relevant to the preparation of financial statements that are free from material misstatement, whether due to fraud or error. Management is further responsible for selecting and applying appropriate accounting policies and making accounting estimates that are reasonable in the circumstances.

Auditor's responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Swiss law and Swiss Auditing Standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or to error. In making those risk assessments, the auditor considers the internal control system relevant to the entity's preparation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control system. An audit also includes evaluating the appropriateness of the accounting policies used and the reasonableness of accounting estimates made, as well as evaluating the overall presentation of the financial statements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the financial statements for the year ended 31st December 2021 comply with Swiss law and the Cooperative's articles of incorporation.

Report on other legal requirements

We confirm that we meet the legal requirements on licensing according to the Auditor Oversight Act (AOA) and independence (Article 906 CO in connection with Article 728 CO) and that there are no circumstances incompatible with our independence.

In accordance with Article 906 CO in connection with Article 728a, Paragraph 1, Item 3 CO and Swiss Auditing Standard 890, we confirm that an internal control system exists which has been designed for the preparation of financial statements according to the instructions of Management.

We also confirm that the register of the members of the Cooperative is kept in compliance with Swiss law and the Cooperative's articles of incorporation. We recommend that the financial statements submitted to you be approved.

PricewaterhouseCoopers AG



Thomas Wallmer
Audit expert
Auditor in charge



Fabian Stalder
Audit expert

Zurich, 18th March 2022

APPENDICES

WASTE INVENTORIES AND VOLUMES

Radioactive waste arises mainly from electricity production in the Swiss nuclear power plants. It is also produced from the use of radioactive materials in the areas of medicine, industry and research (MIR waste).

Waste volumes at the end of 2021

Nagra maintains a centralised database of all waste packages as a service to the waste producers. The following table shows the volumes and activities of waste prepared for geological disposal as of the end of 2021. The table does not contain pre-conditioned raw waste and waste packages prepared for processing in the Zwiilag plasma furnace, for example.

Conditioned waste (31st December 2021, figures rounded)	Volume (m ³)	Activity (Bq)
Nuclear power plants	3 131	1.0 · 10 ¹⁵
Zwiilag interim storage facility	2 941	6.8 · 10 ¹⁸
Swiss Federal Interim Storage Facility (MIR) (waste from medicine, industry and research)	1 625	1.5 · 10 ¹⁶

The Zwiilag waste consists of waste packages delivered to the interim storage facility from the power plants, waste packages from the plasma furnace, steel flasks with vitrified high-level waste from reprocessing and transport casks containing spent fuel assemblies.

Predicted waste volumes and inventories for deep geological disposal

Planning the geological repositories requires information on expected waste volumes. The total volume of waste for disposal will be around 82 000 cubic metres packaged in disposal containers (see table for details). The volume of waste from the NPPs and Zwiilag results from the given operating lifetimes; the volume of waste from medicine, industry and research is based on the end of operation of the L/ILW repository.

Predicted waste volumes (47- /60-year NPP operation) ¹	L/ILW (m ³)		ATW (m ³) ²		HLW/SF (m ³)	
	conditioned	packaged	conditioned	packaged	conditioned	packaged
BA-KKW Operational waste from the NPPs (from cleaning systems and mixed waste), incl. post-operational phase	11 100	29 691				
RA-KKW NPP reactor waste (activated components)	407	1 436				
SA-KKW NPP decommissioning waste	19 239	24 951	25	25		
WA-KKW NPP reprocessing waste			99	432	114	377
MIR	11 762	15 614	165	524	9	11
OFA Waste from the future surface facilities for the L/ILW & HLW repositories	220	582				
BE-KKW Spent fuel assemblies					1 367	8 892
Total volumes	42 727	72 274	289	981	1 490	9 280
Percentage (rounded)	96.0%	87.6%	0.7 %	1.2%	3.3%	11.2%

¹ Basis: Waste Management Programme 2021 (WMP 21)
Operating lifetimes: NPP Mühleberg 47 years (till 2019), other NPPs 60 years
Takes into account a decay storage period of radioactive materials for a maximum of 30 years with subsequent conventional disposal.
For explanations on the current waste volumes compared to previous modelling assumptions (MIRAM), see Nagra NTB 21- 01

² Alpha-toxic waste

Picture credits

Pages 2, 3, 4 and 7: Matthias Braun and Lino Guzzella
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Page 8: 3D representation of an encapsulation plant for spent fuel assemblies
Source: Nagra

Page 9: Illustration of a deep geological repository
Source: Nagra

Page 10 (top left): Patricia Hinterholzer at the drill site
Photo: © Boris Baldinger

Page 10 (bottom left): Nagra Core Storage Facility
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Page 10 (top right): Opalinus Clay investigations
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Page 11 (top): Drone image of the Bachs drill site
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