IGD-TP Newsletter

Issue #7, July 2018

Our Vision: "By 2025, the first geological disposal facilities for spent fuel, high-level waste and other long-lived radioactive waste will be operating safely in Europe."

Editorial

Dear Readers,

This newsletter will be the last published whilst I am Chair of the IGD-TP. I have been privileged to undertake this role, but December 2018 will mark the end of term for both myself and the IGD-TP Secretary, Robert Winsley. I am delighted to announce that the new IGD-TP Chair and Secretary from January 2019 to December 2020 will be Irina Gaus and Ingo Blechschmidt, respectively, from Nagra, and I look forward to working with them during this transition.

Other changes in the membership of the IGD-TP Executive Group (EG) have also taken place during my tenure. Walter Steininger, our representative from BMWi, stepped down in 2017 and Philippe Lalieux of ONDRAF-NIRAS stepped down in 2018 – they are both long-standing supporters of the IGD-TP and we thank them for their excellent work over many years. We welcome our new EG members from BMWi (Annika Schäfers) and ONDRAF (Maarten Van Geet).

Two of our key EC-funded research projects (CAST and JOPRAD) are now complete and four new projects were launched in 2017 (BEACON, CHANCE, DISCO and THERAMIN), alongside our ongoing projects and working groups. In this seventh issue of our newsletter you will find an update on two of our current projects (Cebama and Modern2020) and news from a few of our other ongoing projects as well.

This is a time of considerable change in collaborative R&D in our field across Europe. Following several years of preparation, including the work undertaken through the JOPRAD project, in May 2018 the European Commission called for establishment of a Joint Programme in the field of Radioactive Waste Management and Disposal (RWMD). The proposal submission deadline is 27 September 2018. Outside of the auspices of the IGD-TP, a core group of waste management organisations (WMOs), research entities (REs) and technical services organisations (TSOs) has undertaken significant work to facilitate and develop a proposal for a European Joint Programme (EJP). I'd like to thank Andra for their commitment to supporting the future EJP by co-ordinating the proposal development. The IGD-TP EG has acted to co-ordinate the WMO view in development of the proposal, along with those bodies representing the TSOs and REs. Further information on the transition from the JOPRAD project to development of the EJP proposal is provided in this newsletter.

A summary of key upcoming meetings is included here, but much more information is available on our website (www.igdtp.eu). The revamped website also presents information about each of our historical and ongoing research projects. If you have news or announcements you think the geological disposal community would benefit from hearing please don't hesitate to email the IGD-TP Secretariat.

Jon Martin,
IGD-TP Chair

We are planning an IGD-TP Exchange Forum this December. The change to an EJP approach for EC-funded research means that, in the future, the EG will focus more intently on opportunities for collaboration between WMOs and research needs outside the scope of the EJP. As discussed in this newsletter, Exchange Forum 2018 will be an opportunity to communicate the changing needs and drivers for RWMD research and to identify collaborative opportunities for WMO-funded research. The Forum will also enable the Core Group to present the submitted EJP proposal and to discuss future research proposals for the second EJP phase. We continue to rely on your active participation in our activities and look forward to seeing you in December.

Content

Director of publication: J. Martin, Chair

Editorial team of the Secretariat of IGD-TP
(T. Baldwin, R. Winsley) and project co-ordinators

Contact: secretariat@igdtp.eu
Website: www.igdtp.eu

News & Activities

National Update - Sweden

In March 2011 SKB submitted its applications for licences to construct a Spent Fuel Repository in Forsmark and an encapsulation facility in Oskarshamn. The applications cover the entire system that will enable the final disposal of spent nuclear fuel. They deal with the facility at which the spent nuclear fuel will be encapsulated before final disposal, the encapsulation plant, and the final repository in which it will be placed, the Spent Fuel Repository.

Everything is described in the material submitted to the authorities for their review. This comprises over 10,000 pages and is based on more than 40 years of research and development. The aim is to demonstrate that SKB can meet the legal requirements for the new facilities that are to be constructed and that the facilities can be operated safely for many years to come.

The licensing process has taken several years and the final decision will be made by the Government after the municipalities have answered yes or no. However, the Swedish Radiation Safety Authority (SSM) and the Land and Environment Court (MMD) have now reviewed SKB's applications and submitted their opinions to the Government in January 2018. The answer was a clear yes in SSM's statement to the Government on SKB's system for final disposal of spent nuclear fuel. MMD was also positive in several important respects but called for more documentation on the copper canisters.

Aerial photo and montage of the planned site of the Spent Fuel Repository (centre) at Forsmark.

SSM reviewed SKB's applications under the Nuclear Activities Act and recommends the Government grant a licence for a final repository for spent nuclear fuel in Forsmark and an encapsulation plant in Oskarshamn.

The statement from MMD is also positive in several important respects. The court said yes to the issues relating to the Forsmark site, the rock, the buffer and the environmental impact statement. The court also approved the encapsulation plant and increased capacity in the interim storage facility, Clab. However, the court wants SKB to present more documentation on the properties of the canister and safety in the long term. Furthermore, it wants an investigation of the issue of responsibility after closure, which has also been requested by the municipality.

That the two authorities have come to different conclusions is in part due to the fact that they have tried the applications under different legislations, SSM under the Nuclear Activities Act and MMD under the Environmental Code. They also have different licensing procedures. SSM grants a licence in several steps with continuous updates of the safety analysis, but MMD must say yes or no based on the currently available documentation.

The decision now lies with the Ministry of the Environment and Energy for further investigation. However, before the Government makes a decision, the concerned municipalities must also be consulted since they have the right of veto: Östhammar Municipality regarding the Spent Fuel Repository and Oskarshamn Municipality regarding the encapsulation plant. SKB is working to develop the documentation on the canister required by the court. Information on the copper canister was planned to be produced for the preliminary safety analysis, but SKB will now prioritise the work differently and complete it faster.

For further information see https://www.skb.se/

News & Activities

National Update - Germany

By restructuring the organisational and regulatory framework during the last years Germany has paved the way for the selection of a suitable repository site for high-level waste, starting with a blank map.

The adoption of two new laws were important steps on this way towards the safe disposal of nuclear waste. The Act Reorganising Responsibility for Nuclear Waste Management (VkENOG; 16.06.2017) regulates both the financing of nuclear disposal and the organisational framework. The Repository Site Selection Act (StandAG; 16.05.2017) defines the site selection procedure for a high-level waste repository and all the organisational procedures associated with this process.

Moreover, a new organisational structure was installed. A new supervisory authority, the Federal Office for the Safety of Nuclear Waste Management (Bundesamt für kerntechnische Entsorgungssicherheit, BfE), and a new waste management organisation, the Federal Company for Radioactive Waste Disposal (Bundes-Gesellschaft für Endlagerung mbH, BGE) have been established. The responsibilities for operating interim storage facilities have also been reassigned to the Federal Interim Storage Company (Gesellschaft für Zwischenlagerung mbH, BGZ).

Beside the above described new regulatory and organisational frame, accompanying research is performed. The site selection process and the implementation of a repository for high-level radioactive waste will rely on broad-based scientific support and the continuous advancement of the state of the art in science and technology. For an unbiased selection process it is necessary to achieve and maintain a state of knowledge that is equally advanced for all different host rock options in Germany, effects of extended interim storage until final disposal of waste and containers, and socio-technical aspects of waste management and disposal. Another important aspect is the communication of the site selection process and all further steps to get into a dialogue with the German public about this multi-generation challenge.

To meet these challenges, the Federal Ministry for Economic Affairs and Energy (BMWi) is funding site-independent, implementation related research in radioactive waste management. It is accompanied by basic research funded by the Federal Ministry of Education and Research (BMBF). The Federal Company for Radioactive Waste Disposal (BGE) performs the site-specific examinations and funds necessary research and development activities.

This research will help to develop the necessary methods and technologies, to provide knowledge and expertise, thereby maintaining the technical competence in the field and promoting young scientists.

International collaboration has always been an integral part of the research activities in the field of radioactive waste management in Germany – now that the new site selection process has been started, cooperation with international experts and the exchange of know-how will continue to play a key role in the implementation of radioactive waste management and geological disposal in Germany.

Third MIND Annual Project Meeting was held in May 2018

The Microbiology In Nuclear waste Disposal (MIND) programme is a unique multidisciplinary project which brings together a broad range of leading research institutions and stakeholders in the field of radioactive waste disposal. The objective of this project is to increase the understanding of how life processes will influence the safety and performance of future repositories.

The third MIND Project Annual Meeting and Project Executive Committee meeting took place in Lausanne, Switzerland on 7-9 May. The focus of the fruitful meeting was on evaluation of research gaps.

One of the research highlights so far is the finding of the novel alkaliphilic bacterium *Anaerobacillus isosaccharinicus* that degrades isosaccharinic acid on a relatively rapid timescale; this is a potentially significant finding.

The abstracts and posters will be available on the MIND website from 1 July 2018: http://www.mind15.eu/

News & Activities

First DISCO Annual Project Meeting was held in May 2018

DISCO aims to fill the gap of knowledge on spent fuel dissolution arising from the development and use of novel types of fuel (Cr-doped and MOX). The project aims to enhance understanding of spent fuel matrix dissolution under conditions representative of failed containers in reducing repository environments and to assess whether novel types of fuel behave like the conventional ones.

The 1st Annual Meeting of the DisCo project was held in Sheffield, 15th to 16th May 2018. Hosted by the University of Sheffield, the meeting was attended by 57 representatives of the beneficiaries, the End-User-Group and external organisations. One of the main sessions was a webinar given by K. Spahiu (SKB) on "*The influence of the fuel composition and of the content of various non-uranium cations on the oxidative fuel dissolution*". The webinar was recorded and is available upon request.

An electronic copy of the proceedings of the first Annual Meeting will be available in the following months. The Proceedings will contain an update of the improvements achieved during the first project year.

Further information is available form https://www.disco-h2020.eu/Home/FirstWorkshop

Final CAST General Assembly was held in January 2018

The CAST Project ran from October 2013 to March 2018, with 37 organisations contributing to five technical work packages focussing on potential release mechanisms of carbon-14 from irradiated steels, irradiated Zircaloys, ion-exchange resins and irradiated graphite. It also assessed how the knowledge gained from the related experimental programmes can inform safety assessments undertaken by waste management organisations as end-users. Significant progress has been made on carbon-14 release mechanisms, speciation and release rates during the CAST project, both in terms of novel experimental development and set-up, and in terms of new results that can be used by waste management organisations.

The final General Assembly was successfully held in Lyon in January 2018 to disseminate the outcomes of the CAST project and to act as a forum for related discussion. The overall intention was to bring together scientists working in this field, both to learn more about the CAST project output, and to discuss the implications of carbon-14 release mechanisms in safety assessments of geological disposal facilities. Papers from the symposium will be considered for inclusion in a Special Edition of the Radiocarbon (RDC) journal.

Papers from the meeting are available from https://www.projectcast.eu/publications/general-assembly

IGD-TP is supporting European Joint Programming in the area of radioactive waste management

JOPRAD and the EJP

For over 40 years, underpinning science has been conducted in Europe in the field of radioactive waste management and disposal that has supported progress towards GDF licensing (e.g. in Finland, Sweden and France). Despite this progress RD&D continues to be necessary to, for example, maintain and increase knowledge, reduce uncertainty, cost and dose, address evolving stakeholder concerns and help gain/maintain public confidence.

The European Commission (EC) has funded some of this acquisition of knowledge by supporting RD&D projects through the EURATOM programme. Co-ordination and networking have also been enhanced by their establishment of the IGD-TP platform (currently lead by RWM and solely WMO funded) and the SITEX network.

Now, the EC envisages promoting 'a leap forward' in research cooperation between EU national programmes by setting-up an inclusive joint programme, pooling national resources on specific agreed common objectives. They aim to co-fund an ambitious cohesive and co-ordinated programme rather than a series of ad-hoc individual projects (as was done in the past).

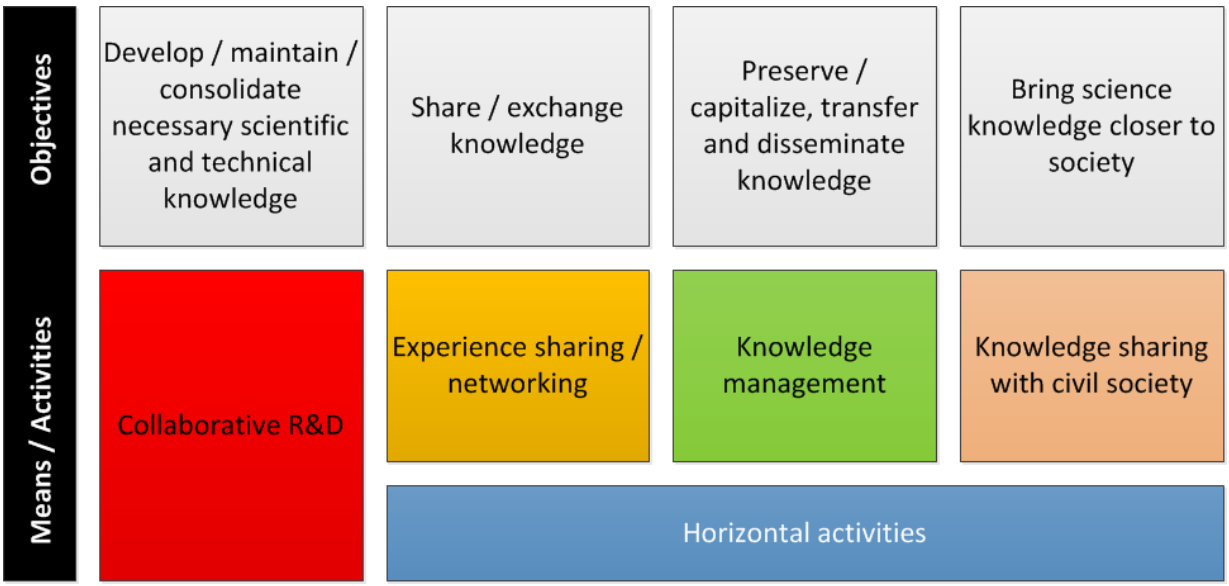
The JOPRAD project was launched (June 2015) to prepare for such a Joint Programme. It did this by identifying the R&D actors in the field and engaged them in developing a shared Vision and Strategic Research Agenda. The EC has now confirmed its intention to co-fund a Joint Programme in radioactive waste management and disposal RWM&D).

Joint Programme R&D Actors

- Waste Management Organisations (WMOs)
- Regulatory Technical Support Organisations (TSOs)
- Nationally funded research entities (REs)
- Waste producers
- Civil society representatives

Joint Programme objectives

The main high level objectives of the Joint Programme are summarised in the graphic below.



Timeline

- Call published October 2017 (opened 15 May 2018, closes 27 September 2018)
- Evaluation of proposal October 2018 to January 2019
- Projects launch June/July 2019
- EJP1 would last for ~60 months (with an EJP2 expected)

IGD-TP is supporting European Joint Programming in the area of radioactive waste management *(continued)*

JOPRAD and the EJP

Anticipated budget

- Available EC budget is 26-32.5M€
- At an EC funding rate of ~55%, this equates to a total programme cost of 47-59 M€
- Participants would need to be able to bear the costs that are not funded by the EC

Participation

To participate, organisations must be mandated by their national programme owner (i.e. a Governmental department). Mandated Actors can be:

- WMOs whose mission covers RWM&D
- TSOs providing the technical and scientific basis to support decision making by regulators
- Nationally funded research entities (REs)

Any other organisations (i.e. the supply chain) would only receive EC funding if they were 'linked third parties' to a Mandated Actor (i.e. flow-through funding).

Development of EJP1 RD&D and Strategic Study work packages (first wave)

Based on the outputs of the JOPRAD project and further prioritisation exercises, seven RD&D and two Strategic Study work packages have been proposed for EJP1, along with a number of knowledge management activities.

RD&D	Development and Improvement Of NUmerical methods and Tools for modelling coupled processes (DONUT)
	Assessment of Chemical Evolution of ILW and HLW Disposal Cells (ACED)
	Mechanistic understanding of gas transport in clay materials
	Influence of temperature on clay-based material behaviour (HITEC)
	Cement-Organics-Radionuclides-Interactions (CORI)
	Fundamental understanding of radionuclide retention (FUTuRE)
	Spent Fuel Characterization and Evolution Until Disposal
Strategic Studies	Uncertainty Management multi-Actor Network (UMAN)
	Waste management routes in Europe from cradle to grave

IGD-TP input

These work packages were developed based largely on prioritisation exercises conducted by the IGD-TP Executive Group and SITEX in March 2017, guided by the JOPRAD Programme Document and taking into account past and ongoing EC projects. Since the initiation of these nine work packages the IGD-TP has been actively involved in an ongoing review and iteration exercise. The focus of our review has primarily been to ensure that the scientific/technical content of the EJP proposal is guided by implementation needs, ensuring the funding is spent on relevant work that is needed to implement geological disposal. A first review round was undertaken in December 2017 to January 2018 and a second review stage was recently conducted in April to May 2018. At each stage the IGD-TP provided a common and unified position to the EJP Core Group that is working hard to co-ordinate the production of a successful EJP proposal.

IGD-TP Exchange Forum 8 – Announcement and Call for Posters

Date: 3-4 December 2018
Location: BMWi, Berlin, Germany

safe solutions for radioactive waste

We are delighted to announce that the IGD-TP's eighth Exchange Forum will be hosted by BMWi in Berlin this December and is open to all IGD-TP members and stakeholders (technical or not) interested in geological disposal of radioactive waste.

Background

For eight years now the IGD-TP Executive Group, comprising European waste management organisations (WMOs) and organisations responsible for implementation-related RD&D programmes representing eleven different nations, have been meeting three times per year to progress joint radioactive waste management RD&D. During this timeframe the IGD-TP has implemented working groups which have discussed, initiated and, in many cases, now delivered technical projects aligned around our commonly-agreed priorities that are documented in our Strategic Research Agenda (SRA). To date, achievements of our platform include:

- Following up nine FP7 projects (totalling 61M€/28M€ EC) all of which have successfully completed and the majority of which have been debriefed back to the community via previous exchange fora (e.g. PEBS, MODERN, FIRST-NUCLIDES, REDUPP, BELBaR, DOPAS and LUCOEX);
- Led scope development and needs driven alignment of four Horizon 2020 projects in WP 2014-2015 (MODERN2020, CEBAMA, MIND and JOPRAD), totalling 21M€/15M€ EC funding;
- Led scope development and needs driven alignment of a further four Horizon 2020 projects in WP 2016-2017 (~16M€ EC funding), which started in June 2017 (THERAMIN, BEACON, DISCO and CHANCE).
- Contributed towards the scope development and needs driven alignment of many of the developing European Joint Programme Work packages, particularly GAS, CORI, HITEC, SFC, UMAN and ROUTES.

Content

The IGD-TP's eighth Exchange Forum (EF8) will be a two-day event, with a dual focus. The first day will be dedicated to the developing European Joint Programme on Radioactive Waste Management (EJP on RWM). The EJP Core Group will lead sessions dedicated to:

- Presenting the R&D topics, strategic/networking studies and knowledge management activities that comprise the initial scope of the EJP on RWM.
- Presenting the shared EJP Strategic Research Agenda (SRA) and collaboratively identifying possible additional topic suggestions.
- Brainstorming possible future projects/scope for a second wave of the EJP (noting that the outputs of this brainstorming session would be sent to the future EJP Governance Team for their consideration/use).
- Updating the community on the expected EURATOM Call WP2019-2020.

The change to an EJP approach for EC-funded research means that the IGD-TP Executive Group will now focus more intently on direct implementation-related opportunities for collaboration between members and their common research needs that sit outside of the scope of the developing EJP. Therefore, the IGD-TP Executive Group will lead sessions on the second day of EF8 that aim to:

- Communicate the changing needs and drivers for radioactive waste management research (in light of the complimentary and parallel EJP).
- Update IGD-TP members on the platform's activities during 2017 and 2018.
- Collectively explore collaborative opportunities for implementation-related research projects that are complementary, but separate to, the common areas of interest being addressed via the developing EJP proposal. Initially, we will do this by discussing the current status, challenges and potential solutions in three specific technical topic areas (see overleaf).

IGD-TP Exchange Forum 8 – Announcement and Call for Posters *(continued)*

Date: 3-4 December 2018
Location: BMWi, Berlin, Germany

This Exchange Forum will therefore help to prepare for future collaborative implementation-related RD&D that is complimentary to the EJP activities and which can be progressed in parallel. The three technical topic areas that the Executive Group would like to focus on at EF8 are:

- ***Technical topic 1: "Technical issues in support of retrievability"***
- ***Technical topic 2: "High-heat generating waste (HHGW) containers"***
- ***Technical topic 3: "Advanced site characterisation techniques"***

At the end of day 1, the IGD-TP will host an evening poster session that aims to showcase cutting-edge radioactive waste management RD&D that aligns to the IGD-TP's SRA. Exchange Forum participants are strongly encouraged to submit poster applications that are consistent with this goal.

There are many reasons why you should attend including:

- Find out the latest information on the EJP proposal and other EC calls
- Explore the potential for future collaborative research with IGD-TP members
- Informally discuss new issues and the current status of WMO programmes
- See what is happening at the EU level
- Discover emerging RD&D developments
- Take advantage of a great networking opportunities

Practical Information

Registration: Participation is free of charge, but registration of participants is mandatory. Registration will be open via the IGD-TP website (www.igdtp.eu) from 1 August 2018.

Venue: German Federal Ministry for Economic Affairs and Energy (BMWi), Invalidenstraße 48, 10115 Berlin *(for directions see https://www.bmwi.de/Navigation/EN/Ministry/Getting-to-the-Ministry/getting-to-the-ministry.html)*

Hotels: There are many hotel options in the proximity of BMWi's office, including the following possibilities:

- Mercure Hotel Berlin City (https://www.accorhotels.com/gb/hotel-5341-mercure-hotel-berlin-city/index.shtml
- Hotel ibis Berlin Hauptbahnhof (https://www.accorhotels.com/gb/hotel-8601-ibis-berlin-hauptbahnhof/index.shtml)
- IntercityHotel Berlin Hauptbahnhof (https://www.intercityhotel.com/en/hotels/all-hotels/germany/berlin/intercityhotel-berlin-hauptbahnhof)
- Hotel Motel One Berlin Hauptbahnhof (https://www.motel-one.com/en/hotels/berlin/hotel-berlin-hauptbahnhof/)
- Hotel Augustinenhof (https://www.hotel-augustinenhof.de/en/)
- Hotel Grenzfall (http://en.hotel-grenzfall.de/bernauer-strasse/)

Key Dates

11 July 2018	First announcement
1 August 2018	Registration opens
August 2018	Second announcement
30 September 2018	Poster submission deadline
31 October 2018	Registration deadline and final agenda published
3-4 December 2018	Exchange Forum 8

Further Information

Further information will be added to the IGD-TP website as it becomes available (www.igdtp.eu). For any other questions please contact secretariat@igdtp.eu

Ongoing Technical Projects - CEBAMA

JA6 - Confidence Increase in Safety Codes: Material Interaction

CEBAMA

The HORIZON 2020 EURATOM Collaborative Project "Cement-based materials, properties, evolution, barrier functions (CEBAMA)" is a research and innovation action granted by the European Atomic Energy Community in support of the implementation of the first-of-the-kind geological repositories. The 4-year project started 1st of June 2015 and is carried out by a consortium of 27 partners consisting of large Research Institutions, Universities, one TSO (Technical and Scientific Support Organisations), and one SME (small medium enterprise) from 9 EURATOM Signatory States, Switzerland and Japan. National Waste Management Organisations support CEBAMA by co-developing the work plan, participating in the End-User Group, granting co-funding to some beneficiaries, and providing for knowledge and information transfer. In June 2018, CEBAMA is entering the final project year, with the RD&D activities scheduled to be finalised at the end of the year.

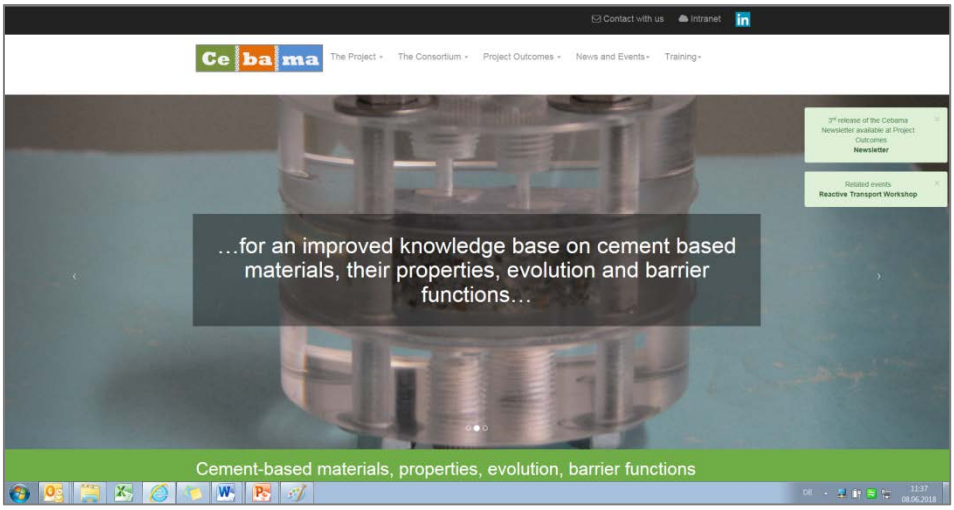


Fig 1. Key information on CEBAMA is made available at the project website at www.cebama.eu

During the past 36 months of the CEBAMA project, the main effort was centered on the experimental programme. Work was devoted to investigate processes taking place at the interface between cement-based materials and potential host rocks. Additional experimental studies have assessed the impact of chemical alterations on radionuclide retention. Data interpretation was supported by modelling studies. A comprehensive summary of the work performed by the research groups involved in CEBAMA was presented at the three Annual CEBAMA Workshops and is summarised in the related Workshop Proceedings, which are made available at the CEBAMA website and as reports at KIT Scientific Publishing. Public Deliverables featuring additional technical details are similarly made available via the CEBAMA website.

CEBAMA has the overall objective to support the implementation of nuclear waste disposal in deep underground facilities. Cement-based materials are highly relevant for the nuclear waste disposal Safety Case, because they are widely used in a repository, e.g. as waste matrix, liners and structural components or sealing materials. In order to assess the potential evolution and performance of a repository with time, it is important to understand the specific chemical>>

Fig 2: Participants at the 3rd CEBAMA Workshop, May 2018, Nantes, France.

Ongoing Technical Projects – CEBAMA *(continued)*

>> and physical processes affecting cement materials and their effect on radionuclide behaviour and migration. CEBAMA addresses specific technical objectives in order to give answers to key questions:

- How do cement-based materials affect the isolation properties of other barriers, like the host rock and the clay backfill material? Experimental studies are performed in CEBAMA to understand the interface processes between cement-based materials and the host rocks (crystalline rock, Boom Clay, Opalinus Clay, Callovo-Oxfordian) or bentonite backfill and assess the impact on physical and geochemical properties.
- How do specific radionuclides or toxic elements of interest behave in the presence of cement-based materials, or in media altered by the presence of these materials? Experimental investigations study the behaviour of elements which have high priority from the scientific and applied perspective in cementitious environments (Be, C, Cl, Ca, Se, Mo, I, Ra).
- How well can we predict/model changes in transport properties coupled with chemical and physical processes on the cementitious matrix or in the cement / host rock interface? Modelling work performed in CEBAMA is supporting advanced data interpretation and process modelling, covering mainly physical and chemical processes responsible for the changes in transport properties and extrapolate the models to different scales for application to safety/performance assessment.

The studies performed in CEBAMA progress beyond the current state of the art in this field, e.g. by including the use of new methodological approaches to study changes in microstructure and impact on transport properties. Advanced modelling approaches are developed which allow predicting the transport characteristics such as porosity, permeability and diffusion parameters of cement-based materials in contact with the engineered and natural barriers of repositories in crystalline and argillaceous host rocks and the retention of radionuclides by cement-based materials. These improved models may be applied for high level waste disposal but also for scenarios in low and intermediate level waste disposal, currently implemented in several countries. CEBAMA thus enhances the publically available knowledge on the performance and reliability of the barrier systems for nuclear waste repositories. The experimental and modelling work in CEBAMA is to a significant degree performed within PhD theses. This contributes to the continuing availability of highly trained specialists for implementers and regulators.

Fig 3: The Final CEBAMA Workshop will be held in Karlsruhe, Germany, in March 2019.

The Final CEBAMA Workshop, hosted by KIT-INE in Karlsruhe, Germany, will be open to the public and is organised in connection to the 5th International Workshop on Mechanisms and Modelling of Waste/Cement interactions in the week of 25-29 March 2019. As the first three days will feature the 5th Edition of this International Workshop Series, also including presentations on research performed within CEBAMA, Thursday and Friday are exclusively focused on the CEBAMA project. Coupling the International Workshop and the Final CEBAMA Workshop offers an ideal platform for dissemination of CEBAMA results to a broad international audience. Further information on these events will be made available at the CEBAMA and KIT-INE websites, as well as via flyers and email announcements.

Further information is available at: http://www.cebama.eu/

The research leading to these results has received funding from the European Union's European Atomic Energy Community's (Euratom) Horizon 2020 Programme (NFRP-2014/2015) under grant agreement, 662147 – Cebama.

Ongoing Technical Projects – Modern2020

JA7 - Monitoring Programme

Modern2020

Development and Demonstration of monitoring strategies and technologies for geological disposal

Initiated in June 2015, the Modern2020 project aims to provide the means for developing and implementing an effective and efficient repository operational monitoring programme, that will be driven by safety case needs and that will take into account the requirements of specific national contexts and public stakeholder expectations.

WP2 Monitoring strategies

WP2 has been established to understand what should be monitored within the frame of the wider safety cases, and to develop the methodology on how monitoring information can be used to support decision-making and to plan for responding to monitoring results during the GDF's operational phase.

All the main WP2 technical workshops are finished. Two deliverables are being produced this year:

- *D2.2: Monitoring Parameter Screening: Test Cases:* The report will document the screening methodologies applied in each national programme and the outcome of their application.
- *D2.3: Decision Making, Performance Measures and Response Planning:* This report will describe decision-making approaches, the development of performance measures and potential responses for the monitoring programmes considered in WP2.

WP3 Research and development of relevant monitoring technologies

A workshop was held in Helsinki (28-29 November 2017, VTT facilities) with a focus on long-term power supply sources (wireless inductive transfer power).

Wireless inductive transfer power using LF frequencies such as 125 kHz is a valid concept for powering repository-monitoring sensors through bedrock. The field attenuation caused by 7m-thick bedrock wall is minor and generally lower than the measurement accuracy of the pilot test set-up.

Figure: The pilot system in co-axial antenna configuration in the bedrock cave at VTT Otaniemi. The leftmost photo presents the reader antenna and the rightmost photo the sensor part.

Five WP3 deliverables will be produced this year:

- *D3.2 Wireless data transmission systems for repository monitoring* (NRG)
- *D3.3 Long term power supply sources for repository monitoring* (VTT)
- *D3.4 New sensors for repository monitoring* (ANDRA)
- *D3.5 Geophysical methods for repository monitoring* (ETH Zurich)
- *D3.6 Qualification methodology for repository monitoring equipment* (IRSN)

2nd International Conference on

MONITORING IN GEOLOGICAL DISPOSAL OF RADIOACTIVE WASTE

09-11 April 2019, Paris

WP4 Demonstrators

The monitoring system was successfully installed in the Bure URL (France) on the external part of the metallic liner of the HA Cell prototype.

WP5 Effectively engaging local citizen stakeholders in R&D/RD&D on monitoring for geological disposal

Preparation of the monitoring handbook is expected this year: this deliverable consists of a comprehensive overview document for local public stakeholders on repository monitoring technology.

Further information is available at: http://www.modern2020.eu/

The project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement number 662177.

Meeting Announcements

SALTMECH IX SEPT 12-14 2018 BGR HANNOVER I GERMANY	**9th Conference on the Mechanical Behaviour of Salt (SaltMech IX)** Date: 12-14 September 2018 Location: Hannover, Germany
MIND	**Advanced training course: Geomicrobiology in radioactive waste disposal** Date: 8-11 October 2018 Location: Mol, Belgium
OECD BETTER POLICIES FOR BETTER LIVES	**Integration Group for the Safety Case (IGSC) Symposium 2018** Date: 10-11 October 2018 Location: Rotterdam, The Netherlands
SKB	**SKB School of Geological Disposal** Date: 22-26 October 2018 Location: Äspö Hard Rock Laboratory, Sweden
igd·tp safe solutions for radioactive waste	**IGD-TP Exchange Forum 2018** Date: 3-4 December 2018 Location: Berlin, Germany
Ce ba ma	**Final CEBAMA Workshop organised in connection with the 5th International Workshop on Mechanisms and Modelling of Waste/Cement interactions** Date: In the week of 25-29 March 2019 Location: Karlsruhe, Germany
MODERN 2020 Development and Demonstration of monitoring strategies and technologies for geological disposal	**Second International Conference on Monitoring in Geological Disposal of Radioactive Waste** Date: 9-11 April 2019 Location: Paris, France
MIND	**Final MIND Annual Project Meeting** Date: 7-9 May 2019 Location: Stockholm, Sweden
BEACON Bentonite Mechanical Evolution	**Second BEACON Annual Project Meeting** Date: 21-22 May 2019 Location: Prague, Czech Republic
MODERN 2020 Development and Demonstration of monitoring strategies and technologies for geological disposal	**First Modern2020 Monitoring Training School** Date: 4-8 June 2019 Location: Äspö, Sweden
MODERN 2020 Development and Demonstration of monitoring strategies and technologies for geological disposal	**Modern2020 WP4 Workshop** Date: 2-4 October 2019 Location: Bure, France

For more information see www.igdtp.eu