



Project acronym and title:
SECURE – Subsurface Evaluation of Carbon capture
and storage and Unconventional Risk

**MINUTES OF SECURE FIRST GENERAL ASSEMBLY, MANAGEMENT
BOARD AND ADVISORY BOARD MEETINGS**

11 – 12 JUNE 2019

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Disclaimer

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Dissemination Level

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Public introduction

Subsurface Evaluation of CCS and Unconventional Risks (SECURE) is gathering unbiased, impartial scientific evidence for risk mitigation and monitoring for environmental protection to underpin subsurface geoenergy development. The main outputs of SECURE comprise recommendations for best practice for unconventional hydrocarbon production and geological CO₂ storage. The project is funded from June 2018–May 2021.

The project is developing monitoring and mitigation strategies for the full geoenergy project lifecycle; by assessing plausible hazards and monitoring associated environmental risks. This is achieved through a program of experimental research and advanced technology development that includes demonstration at commercial and research facilities to formulate best practice. We will meet stakeholder needs; from the design of monitoring and mitigation strategies relevant to operators and regulators, to developing communication strategies to provide a greater level of understanding of the potential impacts.

The SECURE partnership comprises major research and commercial organisations from countries that host shale gas and CCS industries at different stages of operation (from permitted to closed). We are forming a durable international partnership with non-European groups; providing international access to study sites, creating links between projects and increasing our collective capability through exchange of scientific staff.

Executive report summary

This deliverable comprises the minutes of the SECURE first annual meeting and General Assembly, July 2019 Management Board and feedback from the Advisory Board. The meeting was held at the Mercure Hotel, Wroclaw, Poland, 11 – 12 June 2019, with an optional site visit to the Borzeczyn Acid Gas storage facility on 13 June. The 16 consortium beneficiaries were represented by participants (42 in person, 1 via remote connection) from 6 member states of the EU and Norway. The Advisory Board was represented by 6 participants (one remote connection). Tuesday 11th commenced with a welcome from host Jan Lubas from INiG. The afternoon comprised a series of parallel work package meetings and an Advisory Board meeting. This was followed by a face-to-face management board meeting, giving delegates the opportunity to network and meet the Advisory Board.

Day 1 closed with a networking evening dinner.

Wednesday 12th commenced with a review of the relevance of SECURE in the present day from Jonathan Pearce (BGS and WP6 lead). This was followed by a summary of project logistics by Ed Hough (Co-ordinator). There then followed a session focussing on the SECURE communications strategy, dissemination and exploitation led by the Scottish Centre for CCS (UEDIN). Work packages were introduced by WP leads, with additional time given to presentations on ethical RRI (Corin Jack, UEDIN and Katarzyna Iwinska, AMU), and the North American mission (Helen Taylor-Curran, BGS and Kevin Parks, Alberta Energy Regulator). Matt Beeson (Risktec) led a session looking at the Bowtie risk assessments. Short presentations then focussed on Innovation and SECURE (Rhian Kendall, BGS) and experimental activities and research sites (Ed Hough, BGS). The Advisory Board offered feedback and observations on the meeting, with Jonathan Pearce (BGS) giving a final summary and thanks.

An optional site visit to the Borzeczyn Acid Gas storage facility was attended by 35 delegates. Data from this site is being used in various tasks from WP 2, 3 and 4.



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1 Introduction

The SECURE project was developed in response to the European Commission-INEA Horizon 2020 2016-7 'Secure Clean and Efficient Energy' work programme, LCE-27-2017 'Measuring, monitoring and controlling the potential risks of subsurface operations related to CCS and unconventional hydrocarbons'.

The potential environmental impacts of shale gas and CCS technologies need to be better understood. The recent expansion of the unconventional gas industry in North America and its potential advent in Europe has generated public concern regarding the potential detrimental impacts on air, water and the land. Mitigation of the steep rise of greenhouse gas emissions and the related climate changes will need to include CO₂ storage in deep geological reservoirs. Both activities utilise deep-lying geological formations and may induce similar impacts via similar pathways, including induced seismicity, detrimental fluid migration and displacement of brines.

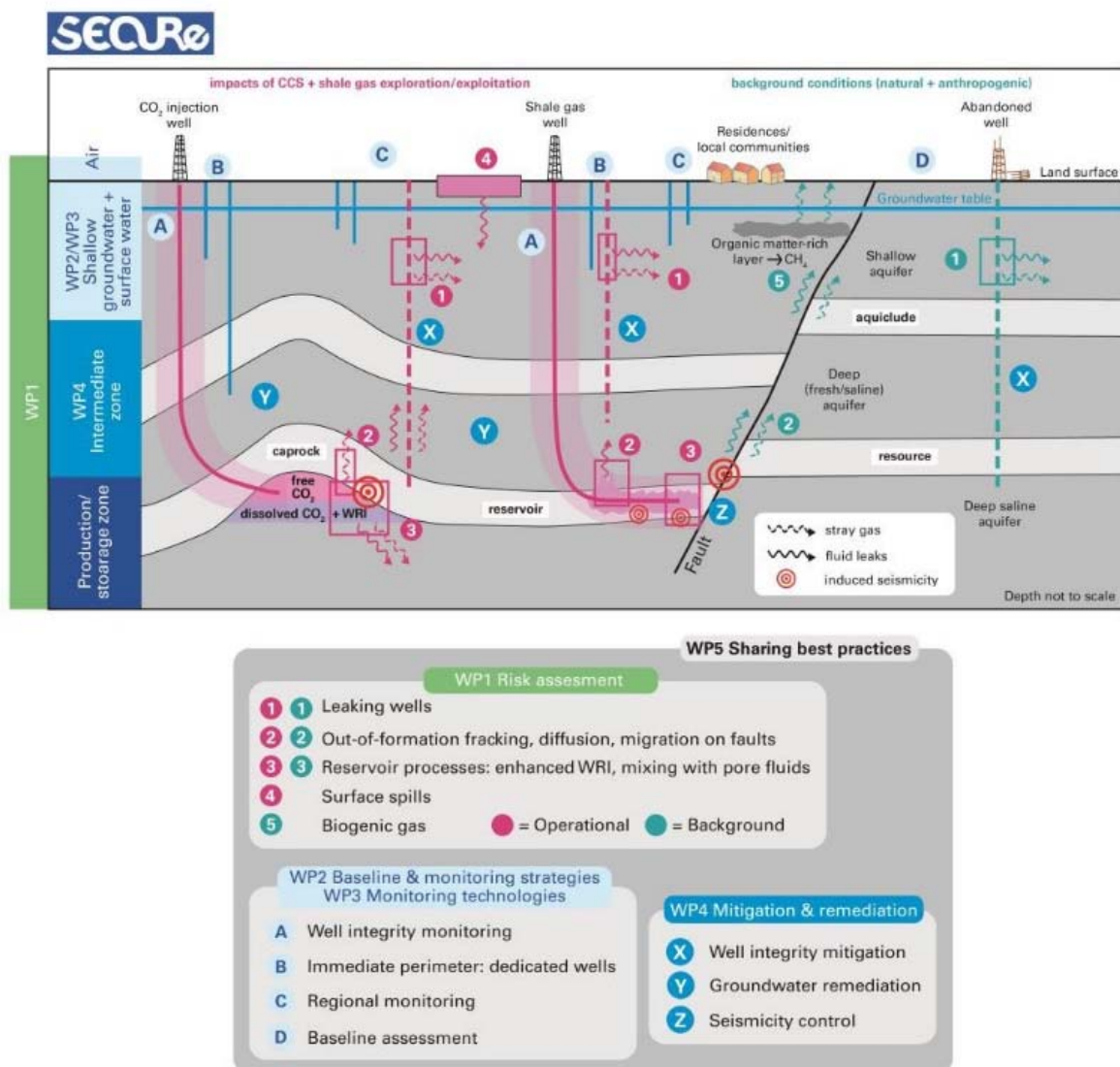


Figure 1 The SECURE Concept – providing best practice recommendations across these domains for the protection of groundwaters, surface environments and local communities. Courtesy W. Kloppmann



A key objective of SECURE is to integrate the broad expertise that the consortium maintains in the fields of both CO₂ storage *and* shale gas monitoring across the key spatial and temporal domains relevant to geoenery project development (Figure 1). The membership of the SECURE partnership is a major asset as it includes several National Geological Surveys and major research organisations from EU member states that host shale gas and CCS projects at different stages of operation (from permitted to closed), as well as companies actively involved in the deployment of CCS and exploitation of unconventional gas.

The SECURE project has the following specific objectives:

1. To produce a risk assessment framework for assessing the hazards and likelihoods of specific risks that relate to the protection of the environment in CO₂ storage and shale gas operations.
2. To demonstrate best practice in establishing baseline conditions for subsurface geoenery operations by working across a network of both commercial, pilot and research-scale sites in Europe and internationally, underpinned by laboratory measurements and model up-scaling to the field scale.
3. To develop new technologies to improve the detection and monitoring of environmental impacts related to geoenery projects.
4. To investigate new methods for remediating potential environmental impacts of geoenery projects specifically to reduce leakage from wells or naturally occurring permeable pathways.
5. To develop best practice guidelines for the shale gas and CO₂ storage industries specifically in environmental baseline assessment and monitoring; the intention is that these will not unduly delay the development of new technologies or innovations.
6. To understand the needs of a range of stakeholders, including local communities, and to engage them through the development of appropriate communication strategies, including participatory monitoring and through the education of early-career researchers.
7. To leverage best practice through collaboration with leading groups in the USA, Canada and Australia.

SECURE will achieve this by:

1. Developing frameworks for quantifying and managing risks including impact assessment (monitoring and characterisation) for developing and implementing effective remedial strategies and to contribute to the evidence base underpinning policy making;
2. Investigating leakage processes and impacts at the laboratory and field-scale using a portfolio of existing European and North American facilities and field sites to better characterise and quantify relevant risk factors;
3. Developing, applying and testing a range of monitoring technologies, systems and strategies to contribute to effective (best practice) risk evaluation, establishment of baseline conditions and monitoring and management of impacts;
4. Explore opportunities of participative monitoring as an aspect of public engagement.
5. Provide a series of recommendations for best practice that can be used as a dataset to inform effective regulation and monitoring strategies for shale gas and CCS sites.

The SECURE project is funded June 1 2018 – May 31 2021, and this report is the minutes of the first General Assembly meeting, held at the Mercure Hotel in Wroclaw, Poland, 11-12 June 2019.



2 H2020 SECURE project First Annual General Assembly meeting, 11-12 June 2019

Papers circulated prior to the meeting are given in Appendix 1. A signature sheet and photograph of the general assembly are given in Appendix 2. Appendix 3 gives minutes of the June 2019 face to face management board meeting.

2.1 AGENDA

Subsurface Evaluation of Carbon capture and storage and Unconventional Risk (SECURE), grant agreement reference: ENER/H2020/764531/SECURE

Held at the Mercure Wroclaw Centrum, PI Dominikanski 1, 50 – 149 Wroclaw, Poland, 11-12 June 2019.

Item	Day	Time
	Workshop on gas tracers sampling and analysis	Tuesday 11 June 09.00
	Networking lunch	Tuesday 11 June 13.00
1	Welcome	Tuesday 11 June 14.00
2	Housekeeping then to run concurrently: Work package meetings (WP2, WP3, WP4, WP5, WP6)	Tuesday 11 June 14.10
3	Parallel session of advisory board (with WPs from 15.00; closed session following coffee)	Tuesday 11 June 14.10
	COFFEE	16.00
4	SECURE management board- face-to-face meeting	Tuesday 11 June 16.15
5	Networking opportunity	
	Networking evening meal	Tuesday 11 June
	Coffee on arrival	Wednesday 12 June
6	Welcome	Wednesday 12 June 09.00
7	SECURE project- overview, status, progress, data management	Wednesday 12 June 09.15
8	Communications strategy: Dissemination and exploitation	Wednesday 12 June 10.00
	COFFEE and photograph	Wednesday 12 June 10.30
9	Work package reports: Work packages 2, 3	Wednesday 12 June 11.00
10	Work package reports: Work packages 4, 5	Wednesday 12 June 11.45
	Networking lunch	Wednesday 12 June 12.30
11	Work package report: Work package 6 and report of ethical RRI and participatory monitoring	Wednesday 12 June 13.15
12	Bowie session	Wednesday 12 June 14.00
13	Innovation and SECURE	Wednesday 12 June 14.30
14	Experimental activities and research sites	Wednesday 12 June 15.00
	COFFEE	Wednesday 12 June 15.30
15	Advisory Board- feedback and comment	Wednesday 12 June 16.00
16	Summary and close	Wednesday 12 June 16.30
	Introduction to Borzecin site visit	Wednesday 12 June 16.45



2.2 ATTENDEES

A scan of the attendance sign-in list and group photograph taken on the morning of Wednesday 12 June is given in Appendix 2.

<u>Co-ordination</u>			
Ed Hough (EH)	BGS; acting chair	Karen Kirk	BGS
Rhian Kendall (RK)	BGS	Mary Mowat (MM)	BGS
<u>WP leads</u>			
Jens Wollenweber (JW)	TNO	Wolfram Kloppmann (WK)	BRGM
Matteo Icardi (MI)	UNOTT	Pierre Cerasi (PC)	SINTEF
Jonathan Pearce (JP)	BGS		
<u>Beneficiaries</u>			
Carsten Nielsen	GEUS	Andrzej Golabek	INIG
Jan Lubas	INIG	Piotr Letkowski	INIG
Marcin Warnecki	INIG	Mirosław Wojnicki	INIG
Joanna Fajfer	PGI-PIB	Monika Konieczynska	PGI-PIB
Olga Lipinska	PGI-PIB	Adam Wojcicki	PGI-PIB
Andreas Busch	Heriot Watt	Yihuai Zhang	Heriot Watt
Katarzyna Iwinska (KI)	Adam Mickiewica	Krzysztof Maczka	Adam Mickiewica
Armand Karimi	IFPEN	Corin Jack (CJ)	UEDIN
Philippa Parmiter (PP)	SCCS/UEDIN	Vanessa Mather (VM)	SCCS/UEDIN
Matt Beeson (MB)	Risktec	Emma Hurdle	Risktec
Tatiana Goldberg	GFZ	Eunseon Jang	GFZ
Laurant Cazes	TOTAL	Jan Ter Heege	TNO
Jurgen Foeken	TNO	Frederik Gal	BRGM
Thomas le Guenan	BRGM	Federico Municchi	UNOTT
Veerle Vandeginste	UNOTT	Laura Edvardsen	SINTEF
Amir Ghaderi	SINTEF	Helen Taylor-Curran	BGS (remote)
Ceri Vincent (CV)	BGS	Robert Ward	BGS
<u>Advisory Board</u>			
Kevin Parks (KP)	Alberta Energy Regulator	Katherine Romanak	Bureau of economic geology, Texas (remote, 11 June only)
Alwyn Hart (AH)	Environment Agency (UK)	Gerhard van der Linde (GVDL)	Golder Associates
Jose Bermudez Menendez (JBM)	UK Department for Business, Energy and Industrial Strategy	Marcella Dean (MD)	Shell Global Solutions International B.V.
<u>Apologies</u>			
Simon Shackley	UEDIN	Steve Thompsett	UKOOG (Advisory Board)
Hanneke Puts	TNO		



2.3 MINUTES OF H2020 SECURE PROJECT FIRST ANNUAL GENERAL ASSEMBLY MEETING, 11-12 JUNE 2019

Tuesday June 11, meeting started at 14.00.

Item 1: Welcome (Prof Lubas, INiG)

A welcome was given by **Prof Lubas**. He highlighted the importance of the SECURE project to all partner organisations in the journey to lower carbon, and also gave a review of the development of shale gas and CCS/gas storage in Poland.

Item 2, 3: Housekeeping (Ed Hough, EH, SECURE co-ordinator)

EH introduced the format of the meeting. **EH** also emphasised the importance of dissemination and exploitation within the project, which although may not form individual subtasks, should be acknowledged by all researchers in the project. The stakeholder matrix that delegates would work on during their WP meetings was explained.

Individual work package face-to-face meetings and a parallel session of the Advisory Board (with Ed Hough, Rhian Kendall and Karen Kirk, all of BGS) were held.

Item 4.5: Work package meetings: Advisory Board meeting

The June 2019 SECURE management Board- face-to-face meeting was held (minutes reported separately). During this time, delegates not involved in the management board had the opportunity to network and meet the Advisory Board.

Networking evening meal

A networking evening meal was held at the Mercure Wroclaw Centrum, Pl. Dominikanski 1, 50 – 159 Wroclaw, Poland, attended by 45 SECURE participants.

Wednesday 12 June 2019

Item 6: Welcome (Jonathan Pearce, BGS, Work Package 6 lead)

JP gave a welcome, highlighting the relevance of SECURE in a decarbonised world. He said the project was relevant to the development of new energy technologies in Europe including CCS implementation for power, heat and transport, the hydrogen economy. Shale gas was less active in Europe (essentially restricted to England), although the technologies, methods and approaches developed in the project would remain relevant to other parts of the world where shale gas was more developed. **JP** also emphasised the importance of innovation within the project, and that the legacy of the SECURE project would be greatly improved if the relevance of the research was understood by non-experts- something that work package 6, with the support of all other work packages and all researchers, is striving to achieve.

Item 7: SECURE project- overview, status and progress- Ed Hough (EH, SECURE co-ordinator, BGS), Mary Mowat, (MM, SECURE project data manager, BGS)

EH presented on some of the logistical aspects of the project.

VOTE: The papers circulated prior to the meeting were accepted by unanimous vote.



EH explained that some of the aims of the project were not the sole responsibility of a particular work package or task. Particular points discussed included:

- Need to maintain effective links between work packages;
- External review of outputs by an expert panel;
- Finalisation of a communication strategy;
- Requirement for effective dissemination across the EU and beyond;
- Need to demonstrate knowledge transfer between the shale gas and CCS communities;
- Requirement to organise a final-year research conference;
- Requirement for a second full project meeting in a year (this will be amalgamated with the Advisory Board's January meeting);
- Approach and development of innovation within the project;
- Maintenance of the project risk register.

Standing items presented included:

- Ethics within the project;
- Review of potential harm to the environment arising from SECURE project activities;
- Whether revisions to the project management plan were foreseen;
- Data management (discussed separately by Mary Mowat, SECURE data manager).

EH reviewed the procedure for project outputs and reminded delegates that the approval of outputs by co-authors, WP lead, independent management board member prior to upload by the co-ordinator was a time consuming process and therefore encouraged delegates responsible for outputs to circulate drafts of reports early (6-8 weeks before the due date).

EH said there were a couple of months where numerous deliverables are due, and effective planning and scheduling of these is required as reports need to be reviewed as detailed above, and this can be a lengthy process.

ACTION: WP leads to suggest a reasonable time table for deliverables in May 2020 and November 2020.

EH reminded delegates of the requirement to acknowledge H2020 funding and support on all outputs, and to send **EH** a link via WP leads to the outputs that can be embedded on the website. The use of outputs as the evidence base from which good practice can be developed in WP6 was also explained.

EH asked that the finance departments of partner organisations complete a year 1 finance report to enable effective project monitoring and planning.

ACTION: Delegates to pass on the finance reporting form to respective finance contacts for completion by the end of July.

EH explained the approach to the mid-project reporting, which would follow the established procedure for H2020 projects. The importance of following H2020 rules for procurement and subcontracting was explained. Finally, **EH** reminded all of the need to confirm field sites and research materials (samples, data) if not already done as agreements (where required) could be time consuming to finalise.



MM gave an overview of data management within the SECURE project. The main messages were of:

- FAIR (data should be findable, accessible, interoperable and reusable) and open access to data (acknowledging data could be held closed due to reasons of privacy, IPR and if open access to data may jeopardise the projects main objectives);
- The data management plan can be refreshed as necessary throughout the lifetime of the project;
- Importance of metadata;
- Requirement to archive data in recognised repositories (BGS can advise if partners are unsure of how to access a recognised data repository);
- Data management- email contact: secure.data@bgs.ac.uk
- Use Open Text Core for sharing data within the project

ACTION: feed revisions to the data management plan to **MM** via WP leads

ACTION: Inform **MM** of archived datasets

Laurent Casez (LC) asked for clarification of what should/should not be open/archived. **MM** said this depends on the type of data and if it is covered by the consortium agreement with respect to innovation.

Item 8: SECURE communications strategy: dissemination and exploitation (Philippa Parmiter, Vanessa Mather, SCCS/UEDIN)

PP introduced the approach to communications within the project, including the website and the support that can be given to individual work packages (e.g., with social media). **PP** said the stakeholder matrix will be useful to gauge who to communicate some of the important project outputs to. Advice was given on tweeting. The approach to external communications was explained, including a biannual newsletter, blogs and content for the website.

ACTION: **ALL** to supply the SCCS team with news snippets, images of research (field or lab)-remembering GDPR requirements.

VM gave a live demonstration of the Open Text core file sharing software.

ACTION: register and use the Open Text Core software for file sharing within the SECURE project.

Item 9,10: Work package reports

Work Package 2- Jens Wollenweber (JW, TNO)

In **WP2** well integrity, fractures, fault permeability, induced seismicity and water quality impacts will be evaluated in geological settings typical for CO₂ injection and unconventional gas exploitation. In this context, numerical models that predict leakage and induced seismicity threats will be produced. Ultimately, this will result in a set of guidelines that permit conducting transparent and verifiable risk assessments.



JW gave an appraisal of the WP structure, with the first deliverable D2.1 completed by BRGM in April. Highlights include:

- 2.1.2- data collection and processing data from the Borzecin site, resulting in a reservoir model;
- 2.1.3- Drafts of 9 bowtie risk assessments now complete, following a workshop in Utrecht (22-23 May 2019); literature review nearing completion;
- 2.2.1- Collaboration between WP2 and 5 established, investigating assessment of how thermal stress may affect well and cement integrity;
- 2.2.2- Data acquisition for two sites in Poland complete; integration of SECURE results into TNO leakage tool;
- 2.3.1, 2.3.2- Sample selection complete and data being assessed to understand experimental boundary conditions;
- 2.3.3- Data acquisition and processing underway;
- 2.4.2- Data acquisition progressing well;

Work Package 3- Wolfram Kloppmann (WK, BRGM)

WP3 will develop multi-scale strategies for environmental baseline assessment and operational to post operational monitoring. Synergies between approaches designed for CCS and unconventional gas operations will be explored. Emphasis will be on cost-effective monitoring of the whole lifecycle of both subsurface energy operations.

WK gave an overview of developments within WP3. The WP includes field based research at numerous sites in Europe and North America (the latter in collaboration with CMC Research Institutes, University of Calgary, Alberta and Duke University, North Carolina. WK also emphasised the natural linkages with WP4. Specific highlights include:

- 3.1.4- Microseismic data acquisition underway at Stenlille gas storage facility;
- 3.2.1- Preliminary work completed for gas monitoring and fingerprinting using a natural gas seep in the French Subalpine region. This site will also be used in WP4 (for microbial-based monitoring sensors);
- 3.3.1- Modelling (geochemical and numerical) is underway using the Ketzin CCS site as a case study, including work on brine-mineral interactions and the impacts on porosity

Ceri Vincent (BGS) pointed out natural links with ENOS, and that SECURE-ENOS should consider joint outputs/meetings for certain WP objectives.

Work Package 4- Matteo Icardi (MI, University of Nottingham)

WP4 enhanced seal and fracture characterisation by developing state-of-the-art sensors to monitor flow leaks and geomechanical stresses. Within the scope of WP4, new technologies will be tested to improve sensor measurement thresholds for toxic quantities that fall below the detection limit of current state-of-the-art sensors.



MI gave an update on progress within WP4. Many field sites are being used, with discussions underway with a few others; in general MI said more CO₂ research sites need to be available in the EU. A highlight of the WP was the Modelling, simulation and risk assessment workshop held March 27-29 2019 in Nottingham, UK, which would feed into some of the UNOTT-led outputs from WP6. Points of note include:

- 4.1.1- Working with WP3 on the field campaign for UAV development;
- 4.1.2- Samples selected for the determination of geochemical element mobilization in UK-shale systems;
- 4.1.3- appraisal of field sites progressing as part of the development of a downhole sampler for noble gas evaluation;
- 4.1.4- working with WP3 on seismic monitoring at Stenlille;
- 4.2.1- Model development has resulted in the first SECURE-funded peer-reviewed paper: arXiv:1906.01316v1; Data from Borzecin had been collated and analysed for input to a reservoir flow simulator model;
- 4.2.2- sensors had been installed, a seismic survey completed and specifications finalised for CO₂ injection equipment at the GeoEnergy Test Bed site in Nottingham, UK;
- 4.2.3- dataset selection nearing completion, with appropriate permissions being discussed (Borzecin data may not be optimal, so data from Ketzin/FRS is being investigated); microbial based monitoring sensors work is collating data from Vale of Pickering and Stenlille field sites;
- 4.3.3- materials confirmed and some acquired; initial experiments initiated

Work Package 5- Pierre Cerasi (PC, SINTEF)

WP5 contributes to the development and implementation of effective remedial and mitigation strategies for subsurface geoenergy operations. The focus in WP5 lies on near well and far-field leakage monitoring and seismicity prediction and mitigation.

PC gave an overview of the aims and objectives of WP5, and highlighted progress:

- 5.1.1- initial experiments underway; follow-on experiments planned for Q3 and Q4 of 2019
- Materials identified for testing (cements);
- Plans in place for other WP activities, with work on upscaling from lab to field now under consideration.

Item 11: Work Package 6 report and report of ethical RRI, international missions and participatory monitoring- Jonathan Pearce, Helen Taylor-Curran (JP, HTC, BGS), Corin Jack (CJ, University of Edinburgh) & Katarzyna Iwinska (KI, AMU)

WP6 ties together the lessons learned in WPs 2–5 and will result in recommendations on best practice for maintaining and re-establishing baseline conditions on surface and in the subsurface. It will also provide models and best practice guidelines for participatory monitoring. WP6 aims to contribute to the development of commercial CCS and the responsible exploitation of shale gas reserves in Europe and the dissemination of information on these geoenergy operations to non-technical audiences such as policymakers and European citizens.

JP introduced the review of WP6 activities, emphasising that it is essential that the lessons learned and outputs from WP2-6 are fully integrated, with major outcomes for the project being the good practice advice applicable to Shale gas and CCS communities (forming WP6.1); a possible structure and approach to their completion was discussed. To facilitate this, JP asked that WP6 be informed of workshops in other WPs as WP6 will try to get someone to join those.

ACTION: Organisers of future workshops to inform JP to try to get a representative from WP6 to attend.



JP summarise activities in WP6, noting:

- 6.2- A review of Ethics in shale gas and CCS was given by **CJ** and **KI**, building on the D6.1 report;
- 6.3- A workshop for approaches to participatory monitoring was held in Den Haag on March 4-5 2019, which formed D6.2, with a high-level framework agreed (Milestone M3); the programme has been developed but as yet, not deployed;
- 6.4- Collaborations with North American and other international researchers and stakeholders had been initiated during the first year of the project, which achieved Milestone M2;
- An overview of the developing north American missions was given by **HTC and Kevin Parks**, SECURE researchers interested in going should contact Helen Taylor Curran (htaylor@bgs.ac.uk) and Jonathan Pearce (jmpe@bgs.ac.uk). The dates of the trip will be 16 – 28 September 2019 and will involve study visits to CCS and shale gas sites and discussions with several stakeholder groups and organisations.

ACTION: those interested in joining the north American mission, please contact Helen Taylor-Curren/Jonathan Pearce with a short biography, and also let them know if Duke University should be included, or if NETL/North Dakota/Oklahoma should be included in the itinerary, or if there are other facilities that should be considered as part of the schedule.

ACTION: WP leads to upload overview presentations to OpenText Core.

Item 11: Bowtie session (Matt Beeson, MB, Risktec)

MB presented an overview of the Bowtie approach to risk assessment, which has been applied separately to Shale Gas and CCS in the SECURE project. The 9 bowties being developed identify potential leak pathways, and the analysis is important in developing the risk framework and barrier performance indicators. Barriers have been identified and classified according to type (e.g., natural feature vs. a corrective action by humans). The intention is that these bowtie analyses will form the basis of a risk assessment tool that can be applied to any site. The hazards and scope for Unconventional Hydrocarbons and CCS were described. Delegates were invited to make comment on the draft bowties during the remainder of the meeting.

ACTION: WP leads to discuss with **MB** how best to input to this process from individual work packages.

Item 12: Innovation and SECURE (Rhian Kendall, RK, BGS – SECURE innovation manager)

RK gave an overview of the importance of innovation within SECURE, and the proposed methods that will be used to demonstrate progress of TRL levels of selected innovations within the project. Interviews had been held with task leads for 7 innovations, with the remaining 5 interviews to be scheduled over the summer.

Item 13: Experimental activities and Research sites: All

EH asked if there were any problems foreseen with the identification of research field sites, or materials for experimental testing. None were identified, but all are encouraged to raise concerns at the earliest opportunity to allow for substitute sites or materials to be identified. **EH** encourages task leads to communicate across the project to ensure similar samples are analysed where appropriate in different tasks (there is evidence that this is already happening in many areas).



Item 14: Feedback from the Advisory Board

EH invited feedback from the members of the Advisory Board who were present:

Marcella Dean (MD)

Shell Global Solutions International B.V.

MD commended the use of the Bowtie method of risk assessment as it had successfully been used in many projects. She noted that microseismic monitoring was being studied in WP 3 and 5, and encouraged close co-operation between WP's. She suggested the use of a single use-case may be useful to test some of the findings of the microseismic research. **MD** suggested effective integration between WP2 and 4 would remove the chance of duplication of effort. **MD** summarised her impression of the state of the art of CCS/CCUS: the scale of the problem is vast, and a massive deployment of CCS would be required to achieve a significant impact on global levels of Carbon. She suggested highlighting the differences between Shale Gas and CCS- with hydraulic fracturing intentional for the former and potentially unintentional in the latter. **MD** asked that outputs from the North American mission need to be effectively disseminated.

Alwyn Hart (AH)

UK Environment Agency

AH recommended better links to other H2020 funded projects looking at similar issues, especially S4CE. He advised that risks vs benefits of unconventional hydrocarbons and CCS, vs alternatives, are drawn out as part of WP6. AH said that environmental baselines are a relevant topic and his organisation is interested in environmental change- and an understanding of when a change is significant- and if those changes are or are not acceptable to different stakeholders; this understanding will help shape good practice recommendations that are adequate and not overbearing. **AH** said alternative methods of delivery of project outcomes should be considered (e.g., webinars, webex).

Gerhard van der Linde (**GvdL**)

Golder Associates

GvdL commented on the workshop that preceded the meeting, and that different analytical techniques could result in different results. Given that, he asked how good practice will emerge in the project, and how we will identify what is acceptable as good practice. He also stressed the importance of communications between all work packages.

Jose Bermudez Menendez (**JBM**)

UK Department for Business, Energy and Industrial Strategy

JBM summarised the current position of CCS/CCUS in the UK, which was looking towards industrial clusters for hydrogen over the next 1-2 decades. The shale gas landscape was noted as more complex, partly due to intense public scrutiny, although it remains the only country in Europe with active exploration.

Kevin Parks (**KP**)

Alberta Energy Regulator | Alberta Geological Survey

KP said that proportionality would be important in any risk management frameworks developed within the project. He also advised that if risks are deemed below acceptable tolerance levels then they research into them may be difficult to justify. He also noted that there was obvious benefit from collaborations between tasks in different work packages.

Item 15: Summary and close (Jonathan Pearce, JP, BGS)

JP summarised the main points of the meeting, and thanked INiG for help in hosting the meeting, the Advisory Board for their enthusiasm for the project, and delegates for making the trip to Poland.

The meeting closed at 16.30, Wednesday 12 June 2019.



Appendix 1 Papers circulated prior to the meeting



**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

Keyworth
Environmental Science Centre
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Nottingham
United Kingdom
NG12 5GG

To delegates to the SECURE General Assembly- First annual meeting

Call for SECURE General Assembly first annual meeting, Wroclaw, 11-13 June 2019.

Venue: Mercure Wroclaw Centrum
Pl. Dominikanski 1,
50 – 159 Wroclaw, Poland
(<https://www.accorhotels.com/gb/hotel-3374-hotel-mercure-wroclaw-centrum/index.shtml>)

Schedule:

Tuesday 11th June

09.00: Technical workshop on the topic of gas tracers sampling and analysis
13.00 Networking lunch
14.00: WP2 – 6 face to face meetings concurrent with Advisory Board session
16.30: SECURE management board face-to-face meeting

Wednesday 12th June

09.00 SECURE General Assembly

Thursday 13th June

Site visit to Borzecin acid gas facility (optional)

Attached: agenda and documents for the meeting

Yours sincerely

Mike Stephenson
Director, Science & Technology, BGS

Ed Hough
Co-ordinator, SECURE



Tuesday 11 June 2019

Item 1

Welcome (Prof Lubas, INiG)

Item 2

Housekeeping (Ed Hough, SECURE co-ordinator)

- Schedule
- Facilities
- Lunch and refreshments
- Fire alarms
- Networking meal
- Taxis and transport

Technical WP leads:

Work package 2	Jens Wollenweber	TNO
Work package 3	Wolfram Kloppman	BRGM
Work package 4	Matteo Icardi	UNOTT
Work package 5	Pierre Cerasi	SINTEF
Work package 6	Jonathan Pearce	BGS

Item 3

Parallel session of the Advisory Board; Advisory Board will be invited to join the latter stages of WP meetings.

Item 4.5

SECURE management Board- face-to-face meeting
Closed session of Advisory Board
Networking opportunity

Networking evening meal

Venue: Mercure Wroclaw Centrum, Pl. Dominikanski 1, 50 – 159 Wroclaw, Poland



Wednesday 12 June 2019

Item 6: Welcome

Relevance of SECURE in a decarbonised world- Jonathan Pearce, WP6 lead (BGS)

Item 7

SECURE project- overview, status and progress- Ed Hough (SECURE co-ordinator, BGS)

Approval of meeting invitation, agenda, list of delegates and Advisory Board

Data management- Mary Mowat (SECURE data manager, BGS)

Proposed conclusion:

The General Assembly approves the invitation, agenda, list of delegates and Advisory Board for SECURE.

Item 8

SECURE communications strategy: dissemination and exploitation (Philippa Parmiter, SCCS)

Item 9,10: Work package reports

Work Package 2- Jens Wollenweber (TNO)

In **WP2** well integrity, fractures, fault permeability, induced seismicity and water quality impacts will be evaluated in geological settings typical for CO₂ injection and unconventional gas exploitation. In this context, numerical models that predict leakage and induced seismicity threats will be produced. Ultimately, this will result in a set of guidelines that permit conducting transparent and verifiable risk assessments.

Work Package 3- Wolfram Kloppmann (BRGM)

WP3 will develop multi-scale strategies for environmental baseline assessment and operational to post operational monitoring. Synergies between approaches designed for CCS and unconventional gas operations will be explored. Emphasis will be on cost-effective monitoring of the whole lifecycle of both subsurface energy operations.

Work Package 4- Matteo Icardi (University of Nottingham)

WP4 enhance seal and fracture characterisation by developing state-of-the-art sensors to monitor flow leaks and geomechanical stresses. Within the scope of WP4, new technologies will be tested to improve sensor measurement thresholds for toxic quantities that fall below the detection limit of current state-of-the-art sensors.



Work Package 5- Pierre Cerasi (SINTEF)

WP5 contributes to the development and implementation of effective remedial and mitigation strategies for subsurface geoenergy operations. The focus in WP5 lies on near well and far-field leakage monitoring and seismicity prediction and mitigation.

Item 11: Work Package 6 report and report of ethical RRI, international missions and participatory monitoring- Jonathan Pearce, Helen Taylor-Curran (BGS) & Corin Jack (University of Edinburgh)

WP6 ties together the lessons learned in WPs 2–5 and will result in recommendations on best practice for maintaining and re-establishing baseline conditions on surface and in the subsurface. It will also provide models and best practice guidelines for participatory monitoring. WP6 aims to contribute to the development of commercial CCS and the responsible exploitation of shale gas reserves in Europe and the dissemination of information on these geoenergy operations to non-technical audiences such as policymakers and European citizens.

Item 11: Bowtie session (Matt Beeson, Risktec)

Item 12: Innovation and SECURE (Rhian Kendall, BGS – SECURE innovation manager)

Several innovative approaches to monitoring and modelling will be progressed during the SECURE project; the approach to innovation and some of the innovative technologies will be described.

Item 13: Experimental activities and Research sites All

Opportunity to discuss approaches to experimentation (e.g., use of common samples), linkages between some activities from different work packages. Opportunities for making best use of research sites; Permissions to access sites.

Item 14: Feedback from the Advisory Board

Item 15: Summary and close (Jonathan Pearce, BGS)

Optional site visit to Borzecin acid gas storage facility site visit

Minutes will be circulated for comment within 15 calendar days of this meeting.

After which, members have 15 days to send through comments/corrections.

Once accepted, minutes will be circulated as final and stored.



1 Consortium Agreement)

Annex 1- General Assembly (from draft

The General Assembly shall be free to act on its own initiative to formulate proposals and take decisions in accordance with the procedures set out herein. In addition, all proposals made by the Management board shall also be considered and decided upon by the General Assembly.

The following decisions shall be taken by the General Assembly:

Content, finances and intellectual property rights

- Proposals for changes to the Consortium Agreement, to be further approved by each Party
- Proposals for changes to Annexes 1 and 2 of the Grant Agreement to be agreed by the Funding Authority
- Changes to the Consortium Plan including the Consortium Budget,
- Modifications to Attachment 1 (Background Included)
- Additions to Attachment 3 (List of Third Parties for simplified transfer according to Section 8.3.2)
- Additions to Attachment 4 (Identified Affiliated Entities)

Evolution of the consortium

- Entry of a new Party to the consortium and approval of the settlement on the conditions of the accession of such a new Party
- Withdrawal of a Party from the consortium and the approval of the settlement on the conditions of the withdrawal
- Identification of a breach by a Party of its obligations under this Consortium Agreement or the Grant Agreement
- Declaration of a Party to be a Defaulting Party
- Remedies to be performed by a Defaulting Party
- Termination of a Defaulting Party's participation in the consortium and measures relating thereto
- Proposal to the Funding Authority for a change of the Coordinator
- Proposal to the Funding Authority for suspension of all or part of the Project
- Proposal to the Funding Authority for termination of the Project and the Consortium Agreement



Appendix 2 Signature list and group photograph, Tuesday 11 and Wednesday 12 June 2019

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Secure General Assembly, Wroclaw 11-12.06.2019

* By signing the GDPR box you agree to allow the SECURE project to use photographs taken of you at this event. Photographs and attendee registration information will be managed in line with the General Data Protection Regulation. They will be used in relation to the SECURE project only as a record of the event, in project reports or promotional material on partnership websites and on social media e.g. Facebook, Twitter and LinkedIn.

Last Name	First Name	Organisation	Signature to confirm attendance	Signature for GDPR terms *
Kirk	Karen	British Geological Survey		
Wojnicki	Miroslaw	Oil and Gas Institute – National Research Institute		
Hough	Edward	British Geological Survey		
Cerasi	Pierre	SINTEF		
Hart	Alwyn	Environment Agency		
Bermudez	Jose M	Department for Business, Energy & Industrial Strategy		
Icardi	Matteo	University of Nottingham		
Lipińska	Olga	Polish Geological Institute - National Research Institute		
Gal	Frederick	BRGM		
Vincent	Ceri	British Geological Survey		
Le Guenan	Thomas	BRGM		
Karimi	Armand	IFP Energies nouvelles		
Mowat	Mary	British Geological Survey		
Dean	Marcella	Shell Global Solutions International B.V.		
Jang	Eunseon	GFZ-Potsdam		
van der Linde	Gerhard	Golder Associates		
Vandeginste	Veerle	University of Nottingham		
Beeson	Matt	Risktec Solutions Ltd		
Hurdle	Emma	Risktec Solutions Ltd		
Busch	Andreas	Heriot-Watt University		
Parmiter	Philippa	SCCS		
Koniecznyńska	Monika	PIG-PIB		
wójcicki	adam	PGI-NRI		
Fajfer	Joanna	Polish Geological Institute - National Research Institute		
Warnecki	Marcin	Oil and Gas Institute - National Research Institute		
Jan	Lubas	Oil & Gas Institute		
ter Heege	Jan	TNO		



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Last Name	First Name	Organisation	Signature to confirm attendance	Signature for GDPR terms *
Parks	Kevin	AER Alberta Geological Survey		
Łętkowski	Piotr	INIG - PIG		
Gołębek	Andrzej	INIG - PIB		
Stephenson	Mike	British Geological Survey		
Edvardsen	Laura	SINTEF		
Foeken	Jurgen	TNO - Netherlands Organisation for applied scientific research		
Bermudez	Jose Miguel	BEIS		
Iwinska	Katarzyna	Adam Mickiewicz University in Poznan, AMU		
Wollenweber	Jens	TNO		
Vincent	Ceri	British Geological Survey		
Nielsen	Carsten M.	Geological Survey of Denmark and Greenland (GEUS)		
Jack	Corin	University of Edinburgh		
Maczka	Krzysztof	Adam Mickiewicz University in Poznan		
ZHANG	YIHUAI	Heriot-Watt University		
Mather	Vanessa	SCCS		
Goldberg	Taham	GFZ		
WARA	ROB	BGS		
KLOPPANU	Wolfram	BGR		
GHADERI	AMIR	SINTEF		
PEARCE	SONATHAN	BGS		
Adam Wojcien			PI-NAI	
Wojcien	Adam			
Marcin	Wernicki			INIG
Monichi	FEDERICO			UNOTI
KENDALL	RHIAN			BGS
CAZES	Laurant			TOTAL





Appendix 3 Minutes of the June 2019 face to face Management Board meeting



Management Board meeting: June 11 2019, 16.30 CET

Venue Face-to-face, Mercure Hotel, Wroclaw
 Present: Chair: Ed Hough, (BGS)
 WP2: Jens Wollenweber (TNO)
 WP3: Wolfram Kloppmann (BRGM)
 WP4: Matteo Icardi (UNOTT)
 WP5: Pierre Cerasi (SINTEF)
 WP6: Jonathan Pearce (BGS)
 BGS: Karen Kirk

Item	Lead
Update on project status: WP text for web, photographs Upcoming meetings and workshops	EH
Any major points arising from WPs?	All
Discuss General Assembly- see points below this table	EH
WP7: Management and co-ordination Subcontracts Communications Non-work package deliverables Research sites	Edward Hough, BGS
WP1: ETHICS (standing item)	EH
Standing items: Data management Innovation Project management plan Rick Register	ALL
Upcoming deliverables Milestones	EH

General Assembly- points to be discussed either at General Assembly or in individual work package meetings:

WP face to face meetings

1. Think about questions for the Advisory Board, or points of advice you would like from them (we have the following coming along: Kevin Parks, Alberta Energy Regulator; Katherine Romanak, Bureau of economic geology, Texas (remote); Alwyn Hart, UK Environment



Agency; Gerhard van der Linde, Golder Associates, Jose Bermudez Menendez, UK Department for Business, Energy and Industrial Strategy; Marcella Dean, Shell Global Solutions International B.V.). The Advisory Board members will be invited to join the final stages of your WP meetings.

2. Stakeholder matrix- please include some time to think about the stakeholders relevant to your work package, using the attached matrix- I'll bring large plots of this plus some post it notes.
3. Prepare for point (9), below.
4. Remind partners of their deliverables and milestones.
5. Remind partners of subcontract obligations (only applies to BGS (WP3 and 4), PIG-PIB (WP3) and IFPEN (WP4)).
6. Please check if there are any changes anticipated to the project management plan (the plan is due to be revised at month 18- December 2019)- this may link to point (9) below.
7. Please check when SECURE datasets might be ready for upload to the data sharing platform.
8. Photographs- suitable for publicizing the project- of experiments, fieldwork (remember to obtain written permission to use if there are people in the images).

General Assembly meeting

9. Experimental activities and research sites. I've included half an hour (followed by a coffee break) for an open discussion to identify if there are any issues or problems with proposed activities- either with the sourcing of materials, data or research field sites (also- should the same materials be used for different activities- I know this is happening with some tasks). If you can ask partners during your WP meeting then we can have a good discussion during the GA meeting. Can each WP lead be prepared to input to this from their respective WPs?
10. WP reports- you've each got about 20 mins to give an appraisal of your WP progress to date (this can be with PPT or without).

Notes of meeting:

1. EH welcomed all to Wroclaw. After a brief overview of the project status, EH invited major points arising from individual work packages:
2. WP2 (JW)- Activities progressing well, much research now focussed on research sites in Poland;
WP3 (WK)- The Polish sites may be problematical for WP3 as no further data collection is feasible, so there would be focus on sites in the UK (Vale Of Pickering) and the sub-Alpine natural gas seep near Grenoble. Progress was still to be finalised regarding the appointment of two post-doctoral positions between BRGM and Canada.
WP4 (MI)- Good progress; first peer reviewed paper published (Municchi & Icardi). IFPEN still to identify an acceptable field research site to test their down-hole noble gas sampler.
WP5 (PC)- Cement samples had now been agreed; good interaction with WP2 established.
WP6 (JP)- Following the Hague workshop on participatory monitoring, there is discussion about whether case studies would now new sites rather than established field sites (with shale gas sites only available in the UK and Poland).

ACTION: EH to ask JP if there are any recommendations for communicating with individuals coming forth from the Participatory Monitoring Workshop (D6.2)

ACTION: EH said JP should interact with GEUS to see if coordination of the excursions proposed by GEUS with the WP6 missions is possible



EH said overall there was improved communication between work packages, but requested WP ask task leads to speak to co-researchers in other tasks in a bid to avoid any duplication of effort, especially in tasks associated with deliverables involving seismicity and monitoring.

WP leads asked that individual contacts be identified for each deliverable.

ACTION: WP leads inform EH of individuals within research organisations who will take responsibility for report delivery.

PC asked for clarity on the North America mission being arranged by WP6. JP said this would be discussed at the general assembly the following day.

WK said the CMC site is now likely to charge a monetary amount for site access. EH advised a review of the letter of support, but that the consortium can't pay for access to a particular site.

EH asked for photographs and images for use on the website (will require GDPR compliance). EH said it was also intended for a thumbnail image to be associated with each deliverable, along with a short explanatory text describing the relevance of each deliverable. These should be submitted along with the final deliverable.

EH reminded all of the importance of compliance with H2020 and individual institute advice concerning procurement and subcontracts.

EH reviewed the standing items (these will be discussed at the General Assembly tomorrow). No related points were raised by the management board.

EH listed the current project risk register; he would circulate this prior to the next management board where it could be considered in more detail.