European Commission
Research & Innovation
Research Fund for Coal and Steel

UNIVERSITY of GLASGOW

MINUTES OF MEETING

8th September, 2016, School of Engineering, University of Glasgow, UK

1. List of attendees:

- Neil Burnside, University of Glasgow
- David Banks, University of Glasgow
- Adrian Boyce, University of Glasgow
- Nieves Roqueñí, Universidad de Oviedo
- Covadonga Loredo, Universidad de Oviedo
- Keith Parker, Alkane Energy
- Anup Althresh, Alkane Energy/ NTU
- Adrián Peña Fernández, HUNOSA
- Albino González, HUNOSA
- Amin Al-Habaibeh, Nottingham Trent University
- Grzegorz Gzyl, GIG
- Ewa Janson, GIG
- Bjorn Debecker, RFCS, EU Comission

2. Main conclusions

Introduction & Feedback from Midterm report

0915: Bjorn Debecker, Research Officer, RFCS, EU Commission

- Brief Introduction
  - Manages 40 projects with RFCS
  - Background as mining engineer
- 10-minute demonstration of RFCS website
  - Where to make new proposals, project summaries and highlights
  - Details on evaluation pool, demonstration of registration and invite to do so
- Advice on RFCS grant award structure
  - 120% rule- don't spend any more than this on staff time
  - Staff costs flexible given sound reasoning
  - Don't place budget into staff if not spent elsewhere

0930: Feedback from Midterm Report- Grzegorz Gzyl (GIG)

- General
  - TGC1 Group after review of LoCAL Midterm Report
  - Start final reports ASAP (to be completed before June)
  - Feedback compiled by evaluating experts from Germany (Dalbert) and Spain (Galera)
- Report specifics
  - Report is broadly accurate, text covers deliverables
  - More precision on results would be desirable
  - Reviewers would like more information- industrial partners in particular often too concise
  - One Shortcoming- B2 proposal description (aims of project)- CO2 storage text
    - Does not relate to deliverables in technical annex- have to address
  - Some figures are too small (Task 1.2- 4 & 5, Task 2.2- 38 & 40)
  - No technical sketch for Caphouse Colliery
  - Some delays in project progress
    - tasks that depend on previous tasks delayed (more detail to follow in task reviews)
  - no need to rewrite report, but comments need to be taken into account for future reports
    - Bjorn comment- for next/final report include potential impacts/beneficiaries of work
- Spending with project
  - Project spend slightly low (37.5%)
  - 4 partners expected to incur higher expenditure during second half of project either as staff costs or drilling costs
- To date project has resulted in publication of 6 technical papers
- Apologies for Armada non-attendance

- Challenges with Armada participation (change in CZOK pumping plans)

WP 1 -Bespoke tools for investigating flow and heat transfer in flooded mineworkings

1000: Task 1.1 Update- Covadonga Loredo (UoO)

- 2 models produced in order to provide an integrated tool for 2 separate scenarios
  - Dave Banks (UoG) and Pavel (GIG) big help in development
- Scenario 1: LoCAL PANR (pump & discharge)
- Scenario 2: LoCAL PAAR (dipole system)
  - 2 boreholes
  - Recharge from injection to abstraction point
  - Can be several kilometers and several pathways (very complex)
- Both models want to know 1. temperature evolution of water, 2. Sustainability of geothermal system
- Deliverables & milestones
  - One additional (Ogata Banks equation)
  - Slight changes as GRAM code doesn't work
- 1 paper published, 1 ready to submit, 1 more related to task 1.2
- Tasks 1.1 (development) and 1.3 (application) closely related

1020: Task 1.2 Update- Neil Burnside (UoG)

- Short update due to task 1.2 workshop the previous day
  - Workshop very productive for all partners
- Good publication progress
  - Focused: 3 published, 2 submitted, 5 in preparation
  - Contribution to general papers: 1 published, 1 submitted
- Mile stones & Deliverables
  - Challenges with Manvers site for Tracer test
    - Delay of deliverable
    - Discussion of possible alternatives aligned with Task 1.1 models (Markham and Shettleston)

1040: Task 1.3 Update- Greg (GIG)

- Deliverable 1.6 (First Lessons from application tools at Bytom site) completed and results discussed
- Showcase and explanation of input parameters and user interface
- Using steady flowrate and temperature predictive results show that cooling effect will reach 46 meters within 200 years
  - No significant depletion of pumped mine water temperature is expected within 200 year timeframe (largely result of Szombierki depth)
- Deliverable 1.7 in progress

1100: WP1 Summary- Neil Burnside (UoG)

- Everything progressing nicely bar tracer test- but preliminary plans in place to deal with this should Manvers not be possible
- Publication record good so far and plenty more possibilities to come
- Advise Bjorn of any LoCAL outreach related work (such as EU researcher's night)

WP2 - Overcoming the hydrochemical barriers to effective heat transfer from raw and treated mine waters

1150: Task 2.1 Update- Anup Athresh (Alkane)

- Schematic of Caphouse (will be included in final report)
- Picture show of dosing plant to halt ochre formation on exchangers at Caphouse
- Pictures of pipeline inspections
- Comparisons of Markham and Caphouse
  - Markham COP 3.6
  - Caphouse COP 4.1 (lessons learnt from Markham)
- Publications: 1 published, contribution to Banks et al Task 2.2 paper, Ochre suppression paper planned

1210: Task 2.2 Update- Dave Banks (UoG)

- Details on closed loop heat exchanger at Caphouse
    - Data logger results
    - Energy blade and infrastructure
    - October heat transfer coefficient
        - Without flow- 900 to 1000 W/^{o}C
        - With flow 1100 to 1200 W/^{o}C
    - April (post dredging of pond)
        - Without flow 900 W/^{o}C
        - With flow 1000 W/^{o}C
- Details on Adam Raftery's masters thesis results and pictures of experiments
    - Temperature speeds up ochre formation
    - Temperature doesn't affect particle size
    - Adam's thesis now available online
- Greg's comments
    - LoCAL science approach is good (papers)
    - Need to get wider outreach and help break mental barriers (especially with respect to Fe rich water)
    - Not only purely scientific dissemination
- Keith Parker's (Alkane) comments
    - pH effects- Wheeljane mine example- development opportunity
    - pH well known, bring out existing literature to inform our work

1230: WP2 Summary- Nieves (UoO)

- Everything progressing nicely
- Good publication record

WP3 -Models for efficiency of energy extraction and distribution

1350: Task 3.1 Update- Greg (for Marcin Głodniok, GIG)

- STEEP analysis- Micmac technique
- Concept for CBA and DGC analysis (digital cost calculation)
- Financial aspects- flow chart detailing variables
- Algorithms incorporating financial models

1410: Task 3.4 Update- Greg (for Marcin, GIG)

- Lead on directly from 3.1
- Ownership, management and financial models
- Demonstration of excel tool- useful and readily accessible for users
- What is lower limit of ground source heat for economic case
- Keith comments
    - Alkane have algorithms for boreholes and heat pumps to integrate in
    - Pick up and application…need local council and developer engagement (and desire)
    - Desire is a big challenge
        - Need appetite from end users to engage at early stage
        - Really need local authority champion/ high level buy in

1430: Task 3.2 and 3.3- Dave Banks/ Neil Burnside (UoG)

- Neither task started. Due to commence soon (within project deliverable time tables)
- Will produce concise report- first half theory, second half examples and schematics
- Bjorn comments
    - Key to bring in future users

1440: WP3 Summary-

- Everything progressing as planned
- Task 3.2 and 3.3 due to start on schedule

WP4 - Pilot Implementations

1500: Task 4.1 Update- Anup Athresh (Alkane)

- Markham progress from last meeting
    - Water level rise- 3m/month (up from 2 m/month)
    - Natural gas base generators- heating system to keep engines warm and ready for use at short notice
    - Relation to UK energy demand
    - Thermal pics of towers and engines
    - Details of plans for winter operations and schedule
- Manvers details / progress
    - Environmental Agency section 32 permit secured
    - 1 more permit required (hopefully within 6 weeks)
- Publications: 1 accepted, 1 ready to submit, 2 future possible papers at the moment

1520: Task 4.2 Update- Adrian Pena (Hunosa)

- New data from Barredo
    - Resistance in pipes depends on scaling and flow
    - Ochre cleaning schedule: university twice per year, hospital once per year
    - Details on slaughterhouse client- using waste water to heat water
    - Exchanger cleaning comparison for waste water4 (blood, hair, fat)

1540: Task 4.3 Update- Greg (for Anna Hydra, ARMADA)

- Issues with CZOK public company
    - Changes in pumping locations
    - Challenges with permits
    - Don't want private companies to get any value or make money

1600: WP4 Summary- Greg

- Deliverables not optimal
    - Wording/structure in proposal not ideal
    - We can provide information but best to package it in a different way

Any other matters

- Organisation of WP3 workshop on 20th October
- Rough dates for next 6 monthly meeting in Oviedo and final meeting in Katowice