

## DRAGLOW PROJECT

The DRAGLOW project is on full throttle. Different Results are started and the first results and milestones are achieved already.

In this newsletter we will have a lookback at previous events and meetings, Forecast to future events and planning, Summary of project developments, Introduction of our Strategic Advisory Board and our upcoming events.

### Project Results in execution:

Result 1, Fit for purpose material selection

Result 3, Impact of DRA's on the geothermal reservoirs

Result 4, Simulation models, DRA parameter implementation

Result 6, Techno Economics Benefits, Werner Boom

## SUMMARY

Project progress

Results planning

Event planning

SAB Introduction



Flowloop installation, TNO Rijswijk

DRA Performance assessment in turbulent pipe flows

For more information:

<https://www.draglow.nl/>

### Summary of Results:

In **Result 1**, the DRAGLOW team has made a significant effort to collect information and data on the operation of geothermal and district heating assets to define the system requirements in terms of operational conditions and environmental aspects for the introduction of drag reducing agents (DRA) in these systems. A broad literature review and several interviews with the different stakeholders in the sector were performed to collect the system requirements. A workshop was organized in September 2021 to validate and finalize the system requirements in terms of various geothermal fluid compositions, district heating fluid, temperatures, flow rates, pipe diameters and other existing chemicals in the systems. The system requirements have been intentionally chosen in such a way that the application of DRA is being investigated for a broad ranges of geological and district heating conditions in the Netherlands and Worldwide. Currently we are exploring and pre-screening available environmentally friendly DRA which are capable of handling the conditions in the geothermal and district heating conditions.

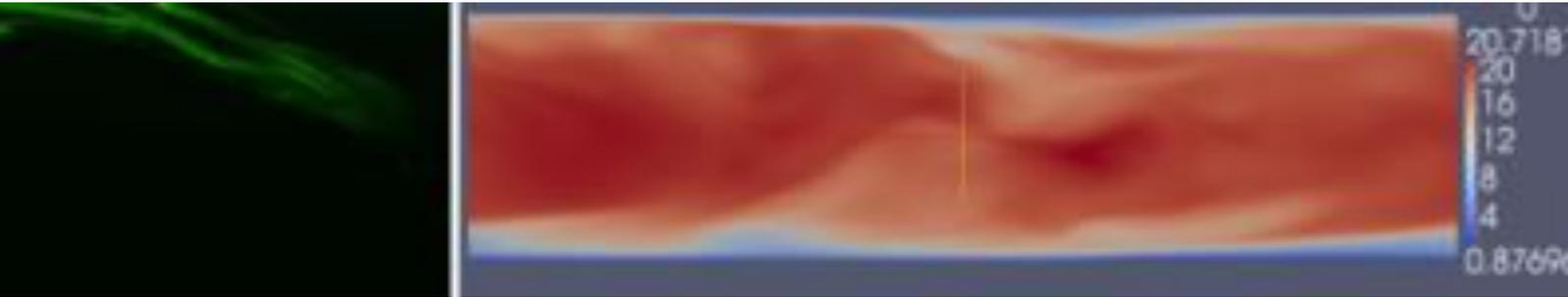
In the meantime we are busy with preparing the experimental setups to assess the DRA performance and compatibilities in **Results 2 and 3**. The first design of large scale high salinity and high temperature flow loop setup to be commissioned in Rijswijk Center for Sustainable Geo-energy (RCSG) is made to enable testing DRA performance in realistic flowing conditions. In addition, at TUDelft a representative core-flood experiments are prepared to assess the long-term impact of DRA in the subsurface.

In **Result 3**, the group has made progress on sections 3.1, 3.2 and 3.3. The review of the models using standard problems has been carried out and the software packages to be used for the modelling have also been reviewed. The MRST (SINTEFF) packed was determined to be the most suitable and an initial set-up for the modelling of the polymers has been made. The new Post-Doc with responsibility for the laboratory testing joined the group in August. Since then, preliminary core-flood tests have been carried out to get baseline results and to finalise the set-up for testing with DRA chemicals.

In collaboration with TNO (**Result 1**), consultation meetings have been carried out with Nouryon, Roemex and ECW to receive inputs for the characterization tests moving forwards. The first DRA samples have been received from Nouryon, and corrosion inhibitors have also been received from Roemex. The plan for the next quarter is to liaise with TNO (**Result 1**) to carry out the necessary screening and stability test of DRAs for conditions in both the geothermal wells and the district heating systems.

The DRAGLOW team made a huge progress in **Result 4**. The team has been able to gather a whole lot of area information of the reference project. Data has been received from different sources like the municipality, housing associations, public available databases. The data has been assessed by the team and integrated in the hydraulic network model. The team integrated the data in the hydraulic model and developed a reliable base reference model for this area. A typical area district heating project roll-out does require pre-installation and over dimensioning of network piping. The team managed to build a flexible phased model to asses the minimum and maximum network diameters in time with a interaction with the techno-economic model(s) from **Result 6**. Next challenge is to develop the hydraulic model on the technical results and specifications of DRA's. The team is working towards the stage where they want to create scenario's to simulate Non-DRA vs DRA System. To achieve this, a significant change in the modelling tool is necessary.

In **Result 6** we are focusing on the techno-economics benefits of the drag reducers. It's our goal to have a integrated project approach where we are able to asses both the production and the grid part of the project. Our first milestone was to gather as much as possible financial models which are used for both geothermal as district heating grids. The DRAGLOW team has made a significant effort to collect data and financial models. The team did manage to gather 7 different financial models and accompanying results, 2 geothermal models and 5 network models. We did asses and analyze these models on input, output and results. We did start the process to access the possibilities to integrate a geothermal and network model.



# STRATEGIC ADVISORY BOARD

*Recently our respected Strategic Advisory board were stated*

Emil Heeren  
Shell



“With a background in aerospace engineering, Emil has had various technical and commercial roles in Shell before starting his current role in Shell Geothermal. As a commercial advisor and business developer he is kickstarting geothermal projects while working on sustainable partnerships in the heat transition.”

“As part of the SAB I’m looking forward to contribute towards draglow’s promise of reducing both OPEX and CAPEX of district heating networks as well as geothermall wells,

Hans Otten  
Market Director  
Fakton Energy



After his study business economics Hans has started up and sold different companies. The last 12 years Hans is developing sustainable energy projects, in where the last 7 years district heating only. In these projects Hans is responsible for the strategy, stakeholders and finance For the draglow project Hans will bring his expertise in the business case and preparation of the solution to the market. and preparation of the solution to the market.

Kees van der Zalm



Warmtewaard

For over a period of 40 years experience in all kind of infrastructural networks. Due to financing, engineering, realization and maintenance.

Last 20 years especially in developing sustainable energy projects related to reducing carbon dioxide and introducing heat solutions without using fossils.

Birol Kilkis



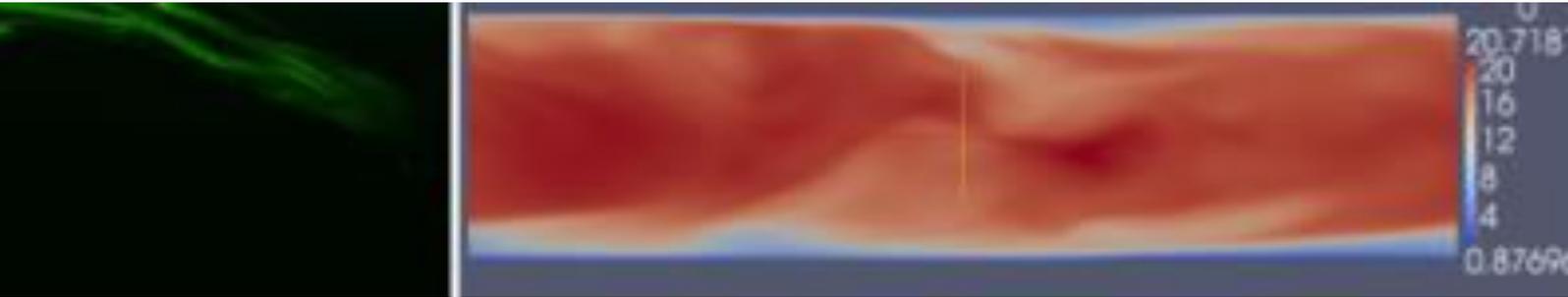
Ostim Technical University

Experienced Supervisor with a demonstrated history of working in the higher education industry. Skilled in Mathematical Modeling, E-Learning, Energy, Renewable Energy, and Strategic Planning. Strong professional with a Doctor of Philosophy (Ph.D.) focused in Mechanical Engineering, Plasticity and Materials from Orta Doğu Teknik Üniversitesi / Middle East Technical University.

## Quote

*“Draglow could be a true enabler in the transition to renewable heat.”*  
Emil

*“DragLow will make it possible to reduce lifecyclecosts and will stimulate a lower overall costprice using heat”*  
Kees



## Project team meeting

Just in between the lockdown regulations we have been able to have a hybrid project meeting. This was the first time that most of the team members did meet physically. This meeting took place in The Hague. Sadly not all the international team members were able to travel and join. But with all our experience with working from home the hybrid solution did work well.

Within this meeting all project leads presented the actual status of the results, which was impressive. RVO joined our meeting digitally as well.



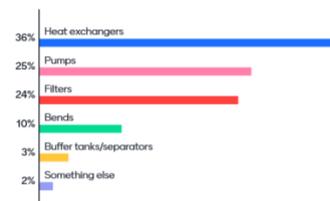
## Workshop

After this formal part of the meeting TNO prepared a workshop meeting. A workshop was held to determine the conditions representative for geothermal and district heating systems for the future experiments and simulations, based on the outcome of the Result 1 survey and interviews on the system requirements. The main goal of the workshop was to inform the participants on the outcome of the interviews and system requirements and discuss the key parameters which need to be further investigated in DRAGLOW project. The workshop was planned as a part of activity 1.2 system requirement validation. With the use of multimeter all participants were able to actively join the workshop.

## Upcoming events

- TUDelft Geothermal Get Together January 19<sup>th</sup> 2022
- Yearly project event, April 14<sup>th</sup> 2022
- Consortium meeting June 2022
- SAB Meeting June 2022
- Attending European Drag Reduction and Flow control conference, September 2022

Which components, apart from pipelines, do you find most important? Mentimeter



Dit project wordt uitgevoerd met subsidie van het Ministerie van Economische Zaken en Klimaat en het Ministerie van Binnenlandse Zaken en Koninkrijksrelaties.