

2nd International Summer School on UHS
4 – 7 July 2023



Hydrogen accelerates the path of negative emission. For that to happen underground storage is essential!
We welcome all scientists, researchers, engineers & policy makers to the UHS Summer School in Delft!

2nd International Summer School on UHS

Department of Geoscience & Engineering

TU Delft, The Netherlands

4 – 7 July 2023

🌿 Please do not print this booklet, to protect the environment! Thank you! 🌿



Welcome!

Welcome to TU Delft, [Department of Geoscience and Engineering](#), whether in-person or virtual, for the [2nd International Summer School on Underground Hydrogen Storage](#). These schools are supported by the Ministry of Economic Affairs and Climate of The Netherlands, and the IEA Technology Collaboration Programme (TCP) Task 42 on Underground Hydrogen Storage. We aimed to design an environment for innovation, by bringing together multidisciplinary and multi-sector representatives, experts, and researchers. Together with the per-invitation-only lecturers and moderators, we aimed to form a unique program for exchange of experiences on UHS. We are excited to host again nearly 300 participants and we aim to broaden our network and community to 1000 in near future.



This year we are also celebrating the public release of [IEA TCP Task 42 Technology Monitoring Report](#). This successful task has been possible for the teamwork of the entire dedicated UHS community, led by my friend and colleague **Serge van Gessel** at TNO and strong project management hands of **Dries Hegen** (also from TNO) as well as plenty expert colleagues who contributed in it. I would like to extend my special thanks to the organizing team at TU Delft, especially **Nicole Fontein**, **Maartje Boon**, **Willemijn van Rooijen**, **Milad Naderloo**, **Sara Shokrollahzadeh Behbahani**, **Thejas Hulikal Chakrapani**, **Deyan Draganov**, and **Herminio Hermínio Tasinafo Honório**. Also, many thanks to **TU Delft**, **GasUnie** and **TNO** for the help with visits on the last optional day. Thanks also to our **sponsors**! Last, but not least, thanks to **all of you** for making this event happen! This school has formed a valuable community for the emerging UHS technology. I am also delighted to inform that some of the lectures of the 1st summer school are available at ADMIRE Channel (<https://www.youtube.com/@ADMIRE1>), [Summer School Playlist](#).

Enjoy the event!

Hadi Hajibeygi, TU Delft.

We highly appreciate our sponsors' supports!

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Program

TUESDAY, 04 July 2023

08:45-09:15	Check-in / Welcome
09:15-09:30	Opening statements (Hadi Hajibeygi , TU Delft, Chair)
09:30-09:40	EU Clean Hydrogen Partnership (Nikolaos Lymperopoulos , Clean H2 JU)
09:40-10:00	IEA TCP 42 on UHS (Serge van Gessel , TNO)
10:00-10:30	Why Hydrogen? (Ad van Wijk , TU Delft)
10:30-11:00	Break
11:00-11:10	GroenvermogenNL (Paulien Herder , TU Delft)
11:10-11:30	Lessons learned from UHS operations in UK (Evan Passaris , Atkins)
11:30-11:50	Pilot Demonstration in Salt Caverns (Bert Stouwie , GasUnie)
11:50-12:10	Pilot Demonstration in Salt Caverns (Carsten Reekers , H2Cast)
12:10-13:20	Lunch
13:20-13:50	UHS in Porous Rocks (Anitha Andiappan , RAG Austria)
13:50-14:10	UHS in Porous Rocks (Silke van Klaveren , EBN)
14:10-14:40	Discussion: existing UHS industrial-scale experiences, what do we know? Moderator: Eric Mackay (Heriot-Watt University)
14:40-15:20	Coffee Break
15:20-15:55	UHS for a sustainable energy future; lessons learned from CCS (Sam Krevor , Imperial College London)
15:55-16:30	Underground Gas storage operations, from UGS to UHS (Ming Ongkwan , Halliburton)
16:30-17:00	Break
17:00-17:30	GTI on UHS since 70's! Today: H ₂ leakage detection (Shadi Salahshoor , GTI)
17:30-18:00	Discussion: What makes UHS different than CCS/UGS? Moderator: Giovanni Grasselli (U Toronto)

WEDNESDAY, 05 July 2023

08:30-08:45	Arrive & Grab your Coffee
08:45-09:05	Technical Feasibility Studies (ADMIRE, Hadi Hajibeygi , TU Delft)
09:05-09:25	Technical Feasibility Studies (HYSTORIES, Arnaud Reveillere , Geostock)
09:25-09:45	Technical Feasibility Studies (HyStorPor, Katriona Edlmann , Edinburgh)
09:45-10:05	Technical Feasibility Studies (HyUSPRe, Remco Groenenberg , TNO)
10:05-10:30	Discussion: remaining reservoir performance research questions Moderator: Karin de Borst (Shell)
10:30-11:00	Coffee Break
11:00-11:30	Diffusion, Dispersion & mixing relevant to UHS (Marco Dentz , CSIC)
11:30-12:00	Pitch new projects, each 10min: SHINE (David Iacopini), HyUSPRe (Joaquim Juez-Larré), H2Transport (Kamaljit Singh)
12:00-13:00	Lunch
13:00-13:30	Geo-Microbiology of UHS (Nicole Dopffel , NORCE)
13:30-14:00	Geo-Chemistry of UHS (Catherine Peters , Princeton University)
14:15-14:30	Discussion: geo-biochemistry of UHS! Moderator: Stefan Jansen (Deltares)
14:30-15:00	Coffee Break & Posters
15:00-15:30	Geo-mechanics of salt caverns for UHS (Hermínio Honório , TU Delft)
15:30-16:00	Geo-mechanics of porous rocks for UHS (Auke Barnhoorn , TU Delft)
16:00-16:30	Discussion: can we avoid H2 leakage? Moderator: Adriana Paluszny (Imperial College London)
16:30-17:00	Coffee Break & Posters
17:00-17:20	Techno-economics of UHS (Bastiaan Jaarsma , EBN)
17:20-17:40	Wells & Surface Facilities (Christine Yallup , Halliburton)
17:40-18:00	Thermodynamics of H2 and its mixtures (Thijs Vlugt , TU Delft)
18:00-18:20	Discussion: let us identify the weakest link of the chain! Moderator: Suzanne Hurter (TNO & UQ)

We thank all our sponsors!



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THURSDAY, 06 July 2023

08:45-08:50	Arrive & Grab your Coffee
08:50-09:10	Mechanics of UHS in Cluster Salt Caverns (KEM-28 Project , Benoit Brouard)
09:10-09:30	Pilot Test in Salt Cavern, France (HYPSTER , Murielle Grange)
09:30-10:05	UHS Monitoring (Chris Willacy , Shell)
10:05-10:30	Discussion: Monitoring UHS, what and how to monitor? Moderator: Deyan Draganov (TU Delft)
10:30-11:00	Coffee Break
11:00-11:30	Policy & Research (Carla Robledo , Dutch Ministry)
11:30-12:00	Societal Embedding of UHS, will it happen? (Marit Sprenkeling , TNO)
12:00-13:00	Lunch
13:00-13:30	Licensing & monitoring of UHS (Debby van der Pluijm & Heijn van Gent , SoDM)
13:30-14:00	UHS in Australia (Matthias Raab , CEO of CO2CRC)
14:00-14:30	Concluding Session: Priorities to enable UHS, final statements & follow up (Hadi Hajibeygi , TU Delft)