



The European Project TWINN2SET

NEWSLETTER #01 – September 2023



The project TWINN2SET is implemented as a partnership between the Greek Institute of Geoenergy of the Foundation for Research & Technology – Hellas (FORTH/IG), the Norwegian University of Stavanger (UiS) and the French Research Center IFP Energies Nouvelles (IFPEN), in the domains of 1) Carbon Capture and Storage (CCS), 2) Deep Geothermal Energy and 3) Subsurface Hydrogen Storage. It consists of a capacity building & mentoring program in the above three areas which will be complemented by an exploratory project focusing on Hydrogen storage in Geological formations, fostering interdisciplinary competencies at the interplay of a promising energy vector with subsurface reservoir characterisation, modelling and monitoring.

Twinning aims to enhance networking activities between a research institution of a Widening countries and top-class leading counterparts at EU level by linking it with at least two research institutions from two different Member States or Associated Countries. Therefore, building on the huge potential of networking for excellence through knowledge transfer and exchange of best practice between research institutions and partners. The current twinning action intends to help raise the research profile of FORTH/IG, as well as the research profile of its staff including a special focus on strengthening the research management and administrative skills of the coordination institution (FORTH/IG) from the Widening country.

During the kick-off meeting, management & administrative aspects and procedures (reporting, communication between partners, etc.) were addressed in sufficient detail, together with project's Capacity Building plan and Research Plan.

During the 1st Year of TWINN2SET action, a targeted 11-week program of *Massive Open Online Courses (MOOCs)* took place on the following topics:



- [Introduction to energy transition \(14-18/11/22\)](#), Prof. Jean Pierre Deflandre
- [Geothermal Systems \(09-13/01/23 & 16-20/01/23\)](#), Assistant Professor, Mathilde Adelinet
- [Underground gas storage 1st part \(13-17/02/23 & 20-24/02/23\)](#), Director of the Georesources and Energy Center at IFP School, Fournier Frederique, Associate Professor, Lerat Olivier
- [Underground gas storage 2nd part \(06-10/03/23\)](#), Director of Georesources and Energy Center at IFP School, Fournier Frederique (EZT)
- [Underground gas storage 3rd part \(20-24/03/23\)](#), Associate Professor, Lerat Olivier
- [Underground gas storage 4th part \(27/03-07/04/23\)](#), Senior Researcher and Project Manager, Douarche Frederique
- [Subsurface Gas Systems-Gas Systems of the Earth \(24-28/04/23\)](#), Professor at Georesources and Energy Center of IFP Scholl Eric Deville
- [Reservoir Monitoring \(physically 19-21/06/23 & on-site 22-23/06/23\)](#), Assistant Professor in Geophysics Mathilde Adelinet

The MOOCs were organized by IFPEN aiming to raise the research profile of FORTH/IG and its staff.

In addition, during the 1st Year of TWINN2SET action, 2 *internships* regarding research staff of FORTH/IG have taken place as follows:

[1st internship at UiS](#) May 2023: Dumux^x training, an open-source simulator for flow and transport processes in porous media. The internship focused on the underground gas storage, considering biochemical processes that may occur, with focus on methanogenic microorganisms

[2nd internship at IFPEN](#) July 2023: Characterization of hydrogenotrophic microbes using cultivation methods and molecular biology techniques (e.g quantitative PCR).

The first *paper* entitled "A new path towards Sustainable Energy Transition: techno-Economic feasibility for a complete hybrid Small Modular Reactor/Hydrogen (SMR/H₂) energy system" with acknowledgement on TWINN2SET was also published.

Moreover, 2 *workshops* have been successfully organized so far, the first during the 1st KOM on "Gender Aspects", the second during the Norwegian Energy Week in UiS on "Open Science, with focus on the reproducibility on the results".

Finally, a number of dissemination actions have also been taken during the first year of project implementation, such as:

- an official website of TWINN2SET has been established (<https://twinn2set.ig.forth.gr/>)
- Project's Facebook and LinkedIn page
- Project *presentations* in conferences & online webinars (13th FORTH Retreat 2022, Heraklion Crete, Greece, July 2022, 8th Balkans Energy Summit Athens, Greece, March 2023, IG/FORTH at the Norwegian Energy Week, March 2023, 1st Hydrogen & Green Gases Forum, September 2023, "How to prepare a successful proposal for widening actions (TWINNING&HOP-ON)", July 2023, 2nd International Conference on Raw Materials and Circular Economy, August 2023)
- *announcements* in topics connected to the TWINN2SET project in Greek websites,
- *targeted bilateral and technical meetings*
- *Publication of the research paper* entitled "A new path towards Sustainable Energy Transition: techno-Economic feasibility for a complete hybrid Small Modular Reactor/Hydrogen (SMR/H₂) energy system", Journal Energies, Volume 16, Issue 17, <https://doi.org/10.3390/en16176257>



TWINN2SET: The Kick-Off meeting in Chania, Crete (02 - 04/10/2022)



The Kick-Off meeting of the project: “Twinning to Sustainable Energy Transition (TWINN2SET)” took place in Chania, on 02/10-04/10/22. The partnership of the project was established between the Greek Institute of Geoenergy of the Foundation of Research and Technology-Hellas (IG/FORTH), the Norwegian University of Stavanger (UiS) and the French Research Center IFP Energies Nouvelles (IFPEN). The main discussion of the meeting

focused on the management and administrative procedures.

[Read more here](#)

TWINN2SET / 1st Massive Online Open Course: “Introduction in the Energy Transition” (14-18/11/2022)

The first Massive Online Open Course (MOOC) by IFP School of IFPEN regarding the TWINN2SET project took place virtually between 14/11/2022 - 18/11/2022. The main speaker of the online courses was Professor Jean-Pierre Deflandre from IFP School. The topic of the first MOOC was “Introduction in the Energy Transition”. Apart from the fully organized every-day presentations, an online platform with extra documents, videos and tests from IFP school was provided to the participants in order to delve into the MOOCs topic.

[Read more here](#)

TWINN2SET / 2nd Massive Online Open Course: “Geothermal Systems” (09-13/01 and 16-20/01/2023)



The second Massive Online Course regarding the European Project, Twinning to Sustainable Energy Transition (TWINN2SET) took place virtually by IFP School of IFPEN Energies nouvelles on 09/01-13/01 and with on-site sessions on 16/01-20/01 by the Assistant Professor in Geophysics Mathilde Adelinet. The educational program was dedicated to “Geothermal Systems”. The courses were conducted in two parts, (i) theory and (ii) exercise. The aim of the first week was to delve into the geothermal system aspects theoretically and by simple and more complicated calculations. The second week’s courses took place at the premises of the Institute of Geoenergy/FORTH in Chania by the Assistant Professor in Geophysics Mathilde Adelinet.

[Read more here](#)



TWINN2SET / 3rd Massive Online Course: Underground Gas Storage (1st part, 13-17/02 and 20-24/02/2023)

The first part of the 3rd Massive Online Course (MOOC) organized by the IFP School regarding to the European Project "Twinning to Sustainable Energy Transition" took place virtually on 13-17/02 and 20-24/02. The 2-week seminar was dedicated to the Underground Gas Storage. The Director of the Georesources and Energy Center at IFP School Fournier Frederique and the Associate Professor Lerat Olivier were the main instructors of the webinars.

[Read more here](#)

Dr. Spyridon Bellas (IG/FORTH) at 8th Balkan Energy Summit Conference (1-2/3/2023)



Principal researcher of the IG/FORTH Dr. Spyridon Bellas participated as Invited Speaker in the 8th Balkan Energy Summit Conference in Athens (March 1-2, 2023) organized by IN-VR. His talk in Session 3 (The time is now: Decarbonising oil and gas sector), titled "Bridging the Low-Carbon Energy Transition and Hydrocarbons Exploration by Geologic Storage: Looking for Potential in Greece" provided a view for the role of the underground storage potential of Greece in

respect to the decarbonization and the Net Zero by 2050.

[Read more here](#)

TWINN2SET: On-site seminar by Director of Georesources and Energy/IFP, Fournier Frederique (06-11/03/2023)



The first part of the on-site seminars regarding the European Project, Twinning to Sustainable Energy Transition (TWINN2SET) took place by IFP School of IFPEN Energies Nouvelles on 06-11/03/2023 in Chania by the Director of the Georesources and Energy Center at IFP School, Fournier Frederique. The workshop focused on data from Utsira reservoir, at Sleipner Area, North Sea.

[Read more here](#)



TWINN2SET: on site seminar by the Associate Professor and Program Supervisor, Lerat Olivier (20-24/03/2023)



The second part of the on-site seminars regarding the European Project, Twinning to Sustainable Energy Transition (TWINN2SET), took place in the Institute of Geoenery-Foundation for Research and Technology Hellas-(IG/FORTH) in Chania, by the IFP School of IFPEN during 20-24/03/2023. The courses were conducted by the Associate Professor and Program Supervisor Master of Science in "Petroleum Geosciences" Georesources and Energy Center, Lerat Olivier.

[Read more here](#)

FORTH/IG participated in the Energy Norway 2023 Congress (March 13-15)



Project-related actions at Energy Norway 2023:

- Participation in the Workshop (Day 1st, March 13th): Water Management Challenges (relevant to produced water, smart water, etc.)
- Presentation by Principal Researcher S. Bellas at the Energy Norway 2023 (Day 3rd, March 15th): Trapping the Gases: Exploration for Potential On- and Offshore Underground Geo-Storage Sites (CO₂, CH₄, H₂) in Greece; An Overview (Authors, Spyridon Bellas, Emmanuel Stamatakis)
- A panel discussion was followed the presentation with the other speakers of the Session 2 (Subsurface Storage Opportunities), Dr. Viktoriya Yarushina (IFE) and Prof. Sverre Planke (CEO of Volcanic Basin Energy Research, VBER).
- Session 2 : Subsurface Storage Opportunities , with an invited talk "Exploration for potential on – and offshore underground geo-storage sites in Greece" [Researchers: S. Bellas, E. Stamatakis]
- For the complete conference program please see at the following link: [Energy Norway 2023 Subsurface for energy security and sustainability-Norsk Petroleumsforening \(npf.no\)](https://www.norsk-petroleumforening.no/energy-norway-2023-subsurface-for-energy-security-and-sustainability)



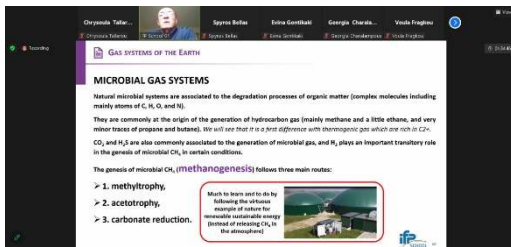
TWINN2SET: on site seminar by Dr. Douarche Frederic, Research Engineer in Geosciences at IFPEN (27/03-07/04/2023)



The third and final part of the on-site seminars regarding the European Project, Twinning to Sustainable Energy Transition (TWINN2SET), took place at the Institute of Geoenergy-Foundation for Research and Technology Hellas-(IG/FORTH) in Chania, by the IFP School of IFPEN during 27/03-07/04/2023. The 6-week seminar was dedicated to the Underground Gas Storage. The courses were conducted by Dr. Douarche Frederic, Research Engineer in Geosciences at IFPEN.

[Read more here](#)

TWINN2SET Massive Online Course: 'Subsurface Gas Systems' with Professor Eric Deville (24/04-28/04/2023)



The 10th Week of the Massive Online Courses regarding the European Project, Twinning to Sustainable Energy Transition (TWINN2SET) took place virtually by IFP School of IFPEN during 24/04-28/04 by the Professor at Georesources and Energy Center of IFP School, Eric Deville. The educational program was

dedicated to 'Subsurface Gas Systems- Gas Systems of the Earth'. The courses were conducted in two parts, (i) theory and (ii) exercises.

[Read more here](#)

Internships (May, July 2023)



The PhD Student and Scientific Associate of IG/FORTH Efsevia Fragkou (Chemical Engineer) visited the UiS in May 2023 supervised by Professor Raouf Gholami and her internship focused on Dumuxx training, an open-source simulator for flow and transport processes in porous media. The internship focused on the underground gas storage, taking into account biochemical processes that may occur, with focus on methanogenic microorganisms.

The PhD Student and Research Associate Georgia Charalampous (Biologist) visited IFPEN Energies Nouvelles in July 2023 under supervision of Dr. Simon Poirier (Research Engineer at the Environmental Microbiology laboratory). Her internship focused on the characterization of hydrogenotrophic microbes using cultivation methods and molecular biology techniques (e.g quantitative PCR). These categories of subsurface microorganisms affect the capacity of hydrogen storage systems in terms of quantity and composition of the gas injected during seasonal injection/withdraws cycles.



TWINN2SET Massive Online Courses: Reservoir Monitoring by the Assistant Professor Mathilde Adelinet (19/06-23/06/2023)



The 11th and final week of the Massive Online Courses (MOOCs) regarding the European Project TWINN2SET took place by IFP School of IFPEN physically on 19/06-21/06 and with on-site sessions at the premises of IG/FORTH in Chania, on 22/06-23/06 by the Assistant Professor in Geophysics Mathilde Adelinet. The educational program was dedicated to "Reservoir Monitoring" and the courses were conducted in two parts, (i) theory and (ii) exercise.

[Read more here](#)

Publication on SMR/H₂ Hydrogen Energy System by IG Assistant Researcher Emmanuel Stamatakis

Article "A New Path towards Sustainable Energy Transition: Techno-Economic Feasibility of a Complete Hybrid Small Modular Reactor/Hydrogen (SMR/H₂) Energy System" has been published in *Energies* as part of the Special Issue Hydrogen and Fuel Cells Technologies for the Realisation of a Resilient and Zero-Carbon Economy and is available online.

[Read more here](#)

The Coordinator of TWINN2SET, Dr Emmanuel Stamatakis at the 1st Hydrogen & Green Gases Forum (23/06/23)



The Coordinator of TWINN2SET, Dr Emmanuel Stamatakis participated at the 1st Hydrogen & Green Gases Forum as TWINN2SET Ambassador in Athens, 23/06/23.

[Read more here](#)

Dr Spyros Bellas, Principal researcher IG/FORTH, at the 2nd International Conference on Raw Materials and Circular Economy (28/8/2023)

On 28th of August 2023 Dr Spyros Bellas (Principal researcher IG/FORTH) participated at the 2nd International Conference on Raw Materials and Circular Economy with the following presentation "Energy Transition and Evaporitic formations utilization as potential subsurface storage for H₂ and CO₂", [Spyridon Bellas, Emmanuel Stamatakis, Ioannis Vakalas].