



FROM THE SECTION CHAIRMAN



DEAR SPE COPENHAGEN MEMBERS,

Welcome to the second newsletter issue of season 2022/23!

It has been an eventful season so far with our monthly events and various engagements within the student chapter. The SPE CPH board will continue to work hard to organize events and activities that align with our goals.

A few notable events occurred within our ever changing and dynamic energy industry. The merger between Maersk Drilling and Noble Corporation was finalized in October. The new combined company is now called Noble as from October 3rd. As we all know, one of the consequences of corporate combinations is usually organizational restructuring and two of our Board members were affected. However, the good news is they have found employment elsewhere and will continue their work on the SPE CPH Board. One other unintended consequence is a reduction in the number of corporate sponsors for SPE CPH, since the new combined company does not plan to maintain a long-term presence in Denmark. This means there is a lot of work to do regarding funding for our section.

COP 27 is over in Egypt where world leaders have congregated to discuss climate change. This time however, they are faced with the reality that the world needs hydrocarbons, and any carbon dioxide emissions reduction targets need to take this into consideration. Basically, it is impossible to live without oil and gas for the foreseeable future with current available technology and methods. Additionally, developed countries have also been faced with the question of culpability for the already observed damage due to climate damage that has already taken place. The poorer, less developed countries are demanding financial restitution. SPE will continue to support the energy industry as the world navigates these challenges.



MEMBERSHIP RENEWAL

We look forward to you continuing your SPE membership. There is no doubt that we are all facing the effects of inflation, war and the energy crisis among other challenges but through it all, we have continued to inspire and support each other. We as a board will continuously work towards bringing greater value to your membership.

To renew your membership, visit:

spe.org

or click on the link:

<http://go.spe.org/sectionrenew>

Finally, as we all look forward to Christmas and New Year celebrations, I would like to remind us to remain safe especially as it pertains to road travel in wintry conditions. Please take care of each other and see you at the next event. Looking forward to more events and interactions with you!

Yours Sincerely,

Adebowale Solarin
SPE Copenhagen Section Chairman



Adebowale Solarin
SPE Copenhagen Section Chairman

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THE MAJOR DECOMMISSIONING OF THE OLD TYRA COMES TO AN END WHILE THE BUILD-UP OF TYRA II ENTERS ITS FINAL PHASE



In September 2022, the two massive jackets which carried the old integrated accommodation and process platforms Tyra East and Tyra West, arrived at the Modern American Recycling Services' (M.A.R.S.) recycling yard in Frederikshavn. The jackets are the final old Tyra modules which are currently recycled onshore.

"I'm pleased that M.A.R.S. will help us to also recycle the two final pieces of the old Tyra – the two jackets. I'm confident that they are the right ones for this task after already having successfully processed the old Alpha topsides - the old integrated accommodation and process platforms from Tyra East and Tyra West. We have set high demands on the recycling yards, and we will continue to follow our target to recycle and reuse more than 95% of the old Tyra modules which we have stayed well above with all other old structures so far", explains Lars Bo Christiansen, Project Director Deputy for Tyra Redevelopment at TotalEnergies EP Denmark.

TotalEnergies started the physical decommissioning process when production from Tyra was temporarily shut-in from September 2019 – a first of its kind in Denmark.

"The decommissioning of Tyra is the first ever executed offshore in Denmark. The large scope included the removal of more than 50,000 tons of steel in form of eight topsides, five jackets, eight bridges and two flare stacks. Before kicking off the removal, we had to build many processes and guidelines from scratch as no regulations existed in Denmark by this time. Our output and learnings from the decommissioning of the old Tyra did not only benefit the Tyra Redevelopment Project, but we contributed to form a whole new governmental framework and benchmark in Denmark which can be used by further decommissioning projects in the Danish North Sea", says Jens Kloster, Transport, Installation and Decommissioning Manager for Tyra Redevelopment at TotalEnergies EP Denmark.



The thorough planning for the decommissioning included among other things extensive environmental impact assessments, inventory mapping and comparative assessments. Doing so, allowed the team to come up with the best decommissioning solution which considers both environment, safety, and technical criteria.

But not only the recycling of the old Tyra comes to an end. Also, the build-up of Tyra II is entering the final phase with all eight platforms successfully installed at the Danish North Sea. This means that all focus offshore is now on completing and powering up the installed platforms and reconnecting them to the existing North Sea infrastructure towards first gas from Tyra II in the winter season 2023/24.



Register here for the event at TotalEnergies on Dec 8th

Tyra II - Final Shape



SPE Meeting

THE TYRA REDEVELOPMENT AND ITS UNIQUE DECOMMISSIONING AND RECYCLING SCOPE – SOLVING A MAJOR INDUSTRIAL CHALLENGE

Speaker

Lars Bo Christiansen

Project Director Deputy for Tyra Redevelopment at TotalEnergies EP Denmark

He will frame the Tyra Redevelopment and give a brief update on recent milestones, current status and time ahead until first gas.



Speaker

Jens Kloster

Tyra Decommissioning, Transport & Installation Manager at TotalEnergies EP Denmark

Jens will go more into depth with the Tyra decommissioning matter and how the Tyra Redevelopment established new guidelines, knowledge and standards for TEPDK.



PROGRAM

17:00 - 18:00

Networking and drinks

There will also be the opportunity to visit the new Tyra II with a Virtual Reality experience.

18:00 - 19:00

Presentation

19:00 - 21:00

Buffet Dinner

SPEAKERS

Lars Bo Christiansen

Jens Kloster

ENTRANCE FEE

None

Thursday, 8 December

Please sign-up no later than 4 December 2022

[Register HERE](#)

TOTALENERGIES, AMERIKA PLADS 29, 2100 COPENHAGEN

WELLTEC'S NEW TEST FACILITY PROVIDES EFFICIENT SOLUTION FOR CO₂ REDUCTION

The whole world is grappling with the energy transition, and there is no doubt that CO₂ storage is part of the solution to the challenges being faced. After officially opening the most advanced and flexible Test Flow Loop in Europe, Welltec's New Energy and Climate Technology team is now set to enable the utilization of a variety of reservoirs for Carbon Capture and Storage (CCS), and play a crucial role in developing this key climate technology.

Support for CCS projects has already begun with enhanced testing of materials for Project Greensand: the most mature initiative of its kind in Denmark, with the potential of storing up to 1.5 million tons of CO₂ per year by the end of 2025, and up to 8 million tons of CO₂ per year by 2030.

In the loop

The newly constructed Test Flow Loop – which is housed at Welltec's Esbjerg base – was designed and built from scratch, is fully customizable, and works by replicating extreme environmental conditions to ensure that materials have the required durability and wear resistance for their intended use, e.g., securing CO₂ in a subsoil reservoir, or for application elsewhere in CCUS infrastructure. This is achieved by flowing chosen impurities over materials for an extended period of time, the results of which are used to inform decision-makers and qualify appropriate solutions.

In the long term, there will also be an opportunity to test materials for Power-to-X and other segments of renewable energy, which will enable Welltec to play an important role in the energy transition.

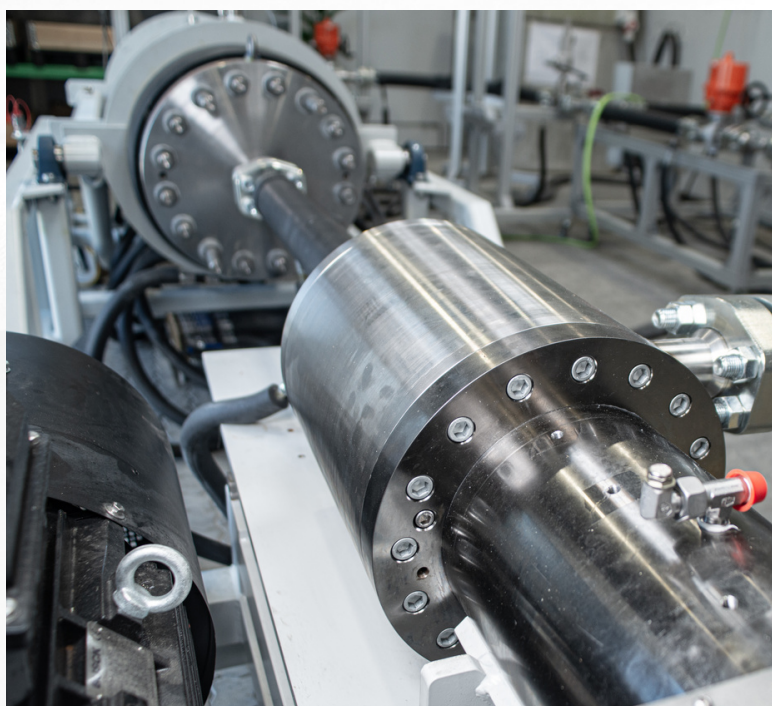
Customized testing

Practically every aspect of testing is customizable, with the addition of up to eight impurities made via precise injection to maintain the required levels. Sampling is carried out to a specified schedule, utilizing a Fourier-Transform Infra-Red (FTIR) spectroscopy to monitor impurity levels in the test medium down to 1 ppm.

The current test ranges in terms of temperature and pressure are -15°C to 150 °C, and up to 350 bar respectively. The main test chamber where materials are placed can accommodate between 30 and 40 coupons or indeed a complete product depending on the size, but again the compartmental nature of the loop means there is always the possibility for modification or optimization of the configuration and setup.

Project Greensand testing continues

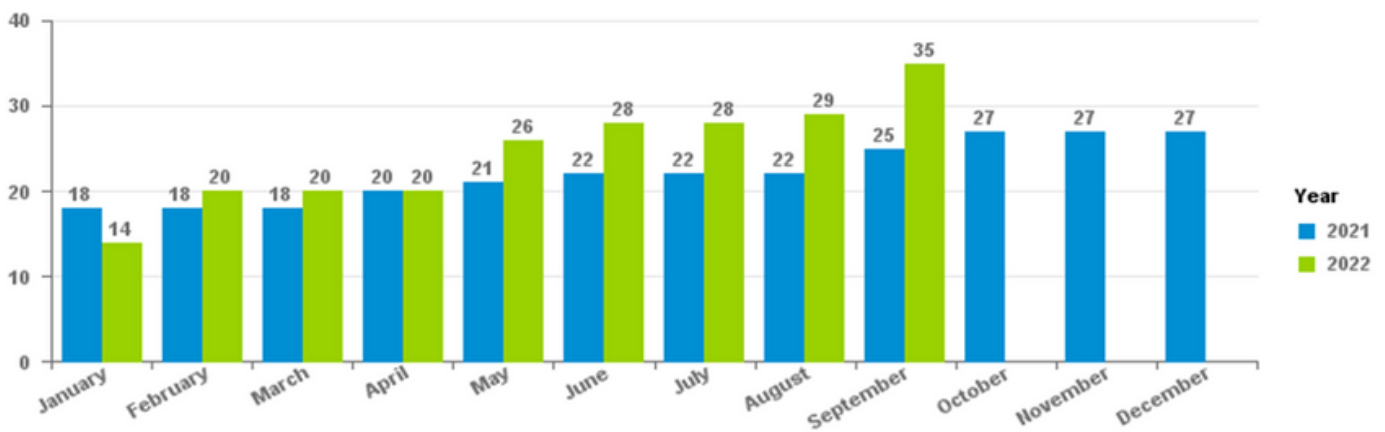
The first tests have been performed in support of Project Greensand, simulating conditions of an injector well during a shut-in period when a backflow of formation fluid with supercritical CO₂ might occur. This phase exposed five different materials to stress conditions to reflect pilot phase CO₂ properties (i.e., pure), performed with reservoir conditions. While post-test analysis is ongoing at time of publishing, the next test phase is expected to be complete by the end of 2022, this time involving dynamic conditions (flow) with impurities added into the CO₂ phase.



Welltec's unique Test Flow Loop for CCUS, designed and built from scratch, plays a crucial role in the energy transition journey."

Copenhagen Section Student Chapter News

Membership by Month



SPE DTU STUDENT CHAPTER UPDATE

The SPE Student Chapter had a new Board in May 2022 and since then, it has organized different activities to help students engage with the industry. Our main activities have been:

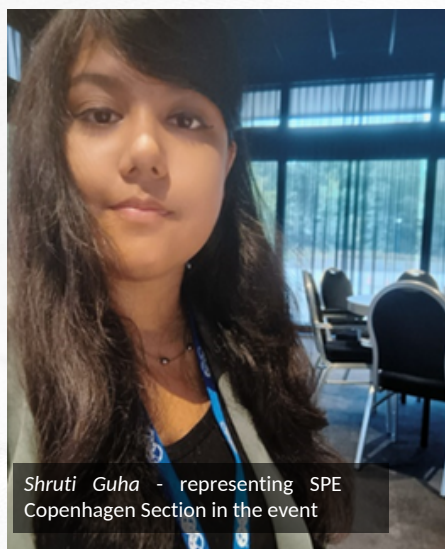
- June 22: Visit to Maersk's Drilling Simulator, where Drillers are trained and certified
- June 22: Student participation in the SPE Oilfield Scale Conference and Exhibition in Scotland
- Sep 22: Kick-Off Meeting with students at DTU and the MSc. of Petroleum Engineering Authorities
- Sep 22: Student participation in SPE Workshop, in The Netherlands
- Sep 22: First mock interview session in Maersk Drilling. Mock interviews were performed for a position in the O&G business. Valuable feedback was provided to help prepare students for real-life interviews
- Nov 22: Second mock interview session in Noble Corporation. Mock interviews were performed for a position in the O&G business
- Nov 22: Visit to GEO

We are happy to see that our member base has tripled since the beginning of the year, and we will do our best to continue this trend. We are planning an end of the year meeting with student members that will take place in December and more company visits. The current plan is to find students in other study lines that can actively participate and benefit from SPE Student Section.



STUDENT MEMBER SPONSORED BY SPE CPH ATTENDED WORKSHOP IN NETHERLANDS

By Shruti Guha



Shruti Guha - representing SPE Copenhagen Section in the event

This year, on the 8th and 9th of September 2022 there was a SPE workshop on “Optimization in Oil and Gas Assets”, at The Hague, Netherlands. This workshop focused on Late Life Production Optimization, Data Driven Production Optimization and Chemicals in Production Optimization, and had breakout sessions with discussions of the Diversification of Production Optimization—discussing the challenges, gaps, and the way forward for CCS, geothermal production, hydrogen storage.

Several reputed organizations like Baker Hughes, One Dyas, EBN, Aramco Gulf Operations, Fangmann Energy Services, Champion X, presented in this workshop. It was very inspirational to see how each company faces real life problems and finds solutions to them. It was very intriguing to get updated with the latest technologies that are being developed for optimization of production of the existing oil and gas assets.

Shruti Guha, from DTU SPE Student Chapter was sponsored by SPE Copenhagen to attend this workshop in The Netherlands. SPE gave her the opportunity to act as a Scribe for this event, she was responsible for noting down the key points of the several discussions that took place at this event. Apart from the knowledge gained from attending this event, there was an excellent opportunity to network with professionals from all over the world in this event.



SCHLUMBERGER BECOMES SLB, A TECHNOLOGY COMPANY DRIVING THE FUTURE OF ENERGY



We are SLB
and we are going further.



Olivier Le Peuch, CEO

The new identity focuses on energy innovation and decarbonization to address the world's energy needs today and to forge the road ahead for the energy transition.

On October 24, Schlumberger announced its new name—SLB—underscoring the company's vision for a decarbonized energy future and affirming its transformation from the world's largest oilfield services company to a global technology company focused on driving energy innovation for a balanced planet.

"Today we face the world's greatest balancing act—providing reliable, accessible and affordable energy to meet growing demand, while rapidly decarbonizing for a sustainable future", said Olivier Le Peuch, chief executive officer, SLB. *"This dual challenge requires a balance of energy affordability, energy security and sustainability".*

The new SLB logo, reflecting the world's journey to net zero, underscores its ambitions for a lower-carbon future.

"Our new identity symbolizes SLB's commitment to moving farther and faster in facilitating the world's energy needs today and forging the road ahead for the energy transition", said Le Peuch.

Managing Director for SLB in Scandinavia, Raphael Guerithault, said SLB is uniquely positioned to address these challenges in Norway and Denmark by delivering results-driven solutions.

"Our recently announced joint venture with Aker Solutions and Subsea 7, our partnership with Cognite, and our investment in clean hydrogen innovator ZEG Power in Norway, all highlight the central role of Scandinavia today and in the future", he said.



CO₂ STORAGE IN STENLILLE

By Anton Enghoff-Poulsen, Mikael Lüthje, Martin Patrong Haspang (Gas Storage Denmark) & Carsten Møller Nielsen (Geological Survey of Denmark and Greenland)

Gas Storage Denmark A/S (GSD) plans to build the first onshore CO₂ storage facility in Denmark to help accelerate a full carbon capture and storage (CCS) value chain to achieve valuable experiences and know-how for others to learn from. In June 2020, a majority in the Danish Parliament agreed upon the Danish Climate Agreement for Energy and Industry, in which CCS was clearly identified as an essential element in achieving the Danish climate goals. To assist in starting this new market, a total of DKK 16 billion in CCS funds were scheduled for deployment between 2024 – 2048 in two phases. The first phase includes DKK 8 billion to cover the entire value chain of capturing, transporting, and storing of 400,000 tons of CO₂ per year for 20 years starting in 2026.

With the tight deadline of establishing a subsurface storage facility before 2026, the Stenlille Structure provides a great starting point with more than 30 years of experience from storing natural gas and an accepting local community. The Stenlille Structure is a so-called salt-induced anticlinal structure. In other words, it is a thick succession of deposits (mainly sand and clay) forming a pillow-shaped structure caused by salt movements pushing from below a couple of hundred million years ago. Within this structure, the perfect conditions are found for injection and storage of media such as natural gas or

CO₂. Sandy layers provide the pore space needed to contain the medium in question; clay layers provide the sealing capacity to keep it from getting back up to the surface, and the pillow-shaped structure retains it within a defined subsurface area to ensure full control of its migration.

The data from Stenlille is considered the most comprehensive onshore dataset in Denmark and includes 2D and 3D seismic as well as 20 wells used for injection, production, and monitoring. These data, as well as the experiences and understanding of the subsurface from running the gas storage facility, are an ideal starting point to quickly establish a CO₂ storage demonstration project in the same structure.

The main reservoir in the Stenlille Structure is the approximately 150 m thick Gassum Formation, comprised of mainly late Triassic – early Jurassic sandstones with some interbedded clay stringers. The top Gassum Formation is found c. 1500 m below the surface with c. 300 m mud-dominated Jurassic Fjerritslev Formation, c. 1100 m limestone-dominated Cretaceous–Paleocene Chalk Group and less than 100 m of Quaternary deposits above it. These successions, as well as the many wells, are visualized in the illustration below.



Figure 1. Artist drawing of the Stenlille subsurface, showing a cross sectional view of the different underground layers.

The Gassum Formation has excellent reservoir properties such as porosities and permeabilities up to 28 % and 7000 mD, respectively, and an average porosity of around 24 %. The reservoir properties of the Gassum Formation are also known from geothermal energy for district heating in Sønderborg and Thisted, and it has been highlighted by The Geological Survey of Denmark and Greenland (GEUS) as a particularly suitable formation for storage of CO₂ in the Danish subsurface.

The main cap rock above the Gassum Formation is the Fjerritslev Formation. The several hundred meters thick mud-dominated succession acts as an overall impermeable succession. The sealing capacities of the Fjerritslev Formation have been proven tight during the entire duration of operating the gas storage facility in Stenlille. The additional c. 1100 meters of low porosity chalks above the Fjerritslev Formation only adds to the security.

The CO₂ storage project in Stenlille is designed to take advantage of the comprehensive knowledge of the Stenlille Structure and its proven reservoir qualities. The storage operation is located down flank of the structure to secure a safe distance between the injected CO₂ and the existing gas storage operation. This is done to prevent natural gas contamination and preserve the integrity of the existing wells. The current gas storage operation is centered around the top of the structure, leaving parts of the structure unused. Specifically, it is the North-Eastern flank that is intended to be used for injection of CO₂ and computer simulations carried out by GEUS during early feasibility studies showed that 2.5 mio. tonnes of CO₂ injected over five years would not reach the natural gas in the expected lifetime of the gas storage operation. However, recent sensitivity studies by GEUS indicate that even more CO₂ should be possible to inject without compromising the existing natural gas operation. Additionally, GSD is looking into the potential of expanding the CO₂ storage capacity at a later stage by including deeper formations in the Stenlille Structure.

Despite the large amount of knowledge of the Stenlille Structure already available, further studies are needed to improve the knowledge specific to the north-eastern flank of the reservoir and to improve the modelled migration of the CO₂ after injection. Specifically, better seismic data was needed, since the existing 3D-seismic does not cover the region of interest in the north-eastern part of the reservoir.

Therefore, a seismic survey campaign was launched in late 2021 and new seismic data were acquired over the North-Eastern flank of the structure to constrain geological and dynamical modelling of the planned CO storage operation. The acquisition campaign was a collaboration between the Universities of Uppsala and Copenhagen and GEUS.



Figure 2. Two vibrators were used for the seismic campaign. The seismic data was acquired along all accessible roads in the area.

EVENT CALENDAR

SEPTEMBER 13 | 17:00 | Strædet 13, 1208 K

SPEAKER Hong Chung Lau
TYPE Combined: DL & Summer Events
SPONSOR SPE CPH

SEPTEMBER 28 | 17:00 | Maersk Drilling

TOPIC Reducing the Carbon Intensity of Drilling Operations: A Maersk Drilling Journey
SPEAKER Lola Caballero
TYPE Face to Face
SPONSOR Maersk Drilling

OCTOBER 27 | 17:00 | Rebel Work Space

TOPIC Leading the way to a carbon neutral future by building world scale clean ammonia production and carbon storages
SPEAKER Rasmus Holmer
TYPE Face to Face
SPONSOR Horisont Energy

NOVEMBER 14 | 12:00 | Online

TOPIC From Digital Rocks to Gigatonne Scale CO₂ Storage: Two Revolutions in One
SPEAKER Samuel Krevor
TYPE DL
SPONSOR SPE DL

DECEMBER 8 | 17:00 | TotalEnergies

TOPIC The Tyra Redevelopment and its unique decommissioning and recycling scope – solving a major industrial challenge
SPEAKER Lars Bo Christiansen & Jens Kloster
TYPE Face to Face
SPONSOR TotalEnergies

DECEMBER 15 | 17:00 | Online

TOPIC A Case Study of Design Choices and their Economic Impact in a Low Temperature Geothermal Project
SPEAKER George C. Brindle
TYPE DL
SPONSOR SPE DL

JANUARY | TBD

TOPIC
SPEAKER
TYPE
SPONSOR

FEBRUARY | TBD

TOPIC
SPEAKER
TYPE
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UPCOMING CONFERENCES

SPE Copenhagen section would like to attract your attention to the following upcoming conferences



22 - 25 MAY 2023
EDINBURGH, SCOTLAND

The 15th Annual international Conference on Porous Media includes a wide variety of sessions on fundamental and applied research in porous media. Abstract submission deadline is **13 December 2022**.

<https://events.interpore.org/event/41/overview>

A major geosciences conference in Europe invites contributions until **15 January 2023**.

<https://eageannual.org>



5-8 JUNE 2023
VIENNA, AUSTRIA



19 - 21 JUNE 2023
TRONDHEIM, NORWAY

The 12th Trondheim Conference on CO₂ Capture, Transport and Storage is a globally leading scientific CCS technology conference. Abstract submission deadline is **10 February 2023**.

<https://www.sintef.no/projectweb/tccs-12>

This conference aims to stimulate the exchange of ideas among the scientists with special interests in flow in porous media and geophysics. Abstract submission deadline is **19 December 2022**.

<https://www.siam.org/conferences/cm/conference/g23>



19 - 22 JUNE 2023
BERGEN, NORWAY



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by **calsep**