



Celebrating 40 Years of the SPE Copenhagen Section: A LEGACY OF INNOVATION AND COLLABORATION

FROM THE SECTION CHAIRMAN

DEAR MEMBERS,

In the heart of Copenhagen, where the Baltic Sea meets the city's vibrant energy, lies a community of professionals who have shaped the landscape of the oil and gas industry. This year, we raise our glasses to **40 years** of the **Society of Petroleum Engineers (SPE) Copenhagen Section** — a remarkable journey marked by innovation, camaraderie, and unwavering commitment to advancing our field.

I am so proud to be a member of this esteemed section and even more so as we celebrate 40 years! It is also a personal honor to be the Board Chairperson at this moment in time. I feel lucky!

Founding and Purpose

The year was **1984**. The world was witnessing seismic shifts in oil and gas exploration, and Copenhagen emerged as a hub for cutting-edge research and collaboration. A group of visionary engineers, scientists, and managers came together to establish the SPE Copenhagen Section. Their mission? To bridge the gap between academia, services industries, and the oil and gas sector. They envisioned a platform where knowledge could flow freely, ideas could flourish, and solutions could be forged.

A Home for Professionals

Since its inception, the SPE Copenhagen Section has been a home for professionals from diverse backgrounds. Engineers, geologists, project managers, and educators—all found common ground within these walls. Our quarterly newsletter

became a beacon, sharing technical insights, industry updates, and success stories. We celebrated each other's achievements, debated the latest trends, and enriched our understanding of petroleum engineering, carbon capture, utilization and storage, and geothermal energy.

Industry Transformation

Over the past **40 years**, the oil and gas industry has undergone significant transformations, adapting to technological advancements, market dynamics, and environmental concerns. Some of the key changes include:

TECHNOLOGICAL INNOVATIONS

- **Exploration and Drilling:** Advances in seismic imaging, directional drilling, and well completion techniques have revolutionized exploration and production. Deepwater drilling, subsea robotics, and intelligent well systems are now commonplace.
- **Digitalization:** The industry has embraced digital technologies—IoT sensors, data analytics, and machine learning—to optimize operations, enhance safety, and improve efficiency.
- **Reservoir Modeling:** Sophisticated reservoir simulation tools allow engineers to predict reservoir behavior accurately, leading to better field development decisions.





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ENVIRONMENTAL AWARENESS AND SUSTAINABILITY

- **Climate Change:** Growing awareness of climate change has pushed the industry toward cleaner practices. Companies have invested in carbon capture, utilization, and storage (CCUS) technologies.
- **Renewables:** Some oil and gas companies diversified into renewable energy sources like wind, solar, and geothermal helping the transition to a low-carbon future.
- **Emissions Reduction:** Stricter regulations and public pressure drive efforts to reduce greenhouse gas emissions. Methane detection and flaring reduction initiatives gained prominence.

MARKET DYNAMICS

- **Price Volatility:** The industry has weathered oil price fluctuations—from highs in the 1980s to lows in the 1990s and early 2000s. Adaptability and cost management are critical.
- **Shale Revolution:** The rise of unconventional resources (shale gas and tight oil) transformed global energy markets. Hydraulic fracturing (fracking) unlocked vast reserves.
- **Globalization:** International collaborations, mergers, and acquisitions have reshaped the industry landscape. National oil companies have played a significant role.

SAFETY AND OPERATIONAL EXCELLENCE

- **Safety Culture:** Improved safety practices and rigorous standards have reduced accidents. Companies prioritize worker well-being and environmental protection.
- **Automation:** Automation and robotics enhance safety by minimizing human exposure to hazardous environments.

GEOPOLITICAL SHIFTS

- **Supply and Demand Dynamics:** The balance of power shifted from OPEC dominance to increased production from non-OPEC countries.
- **Energy Security:** Diversification of energy sources and supply routes became critical for global energy security.

SOCIAL RESPONSIBILITY AND STAKEHOLDER ENGAGEMENT

- **Community Engagement:** Companies engage with local communities, addressing concerns about environmental impact, land use, and indigenous rights.
- **Transparency:** Stakeholders demand transparency in operations, financial reporting, and ethical practices.

In summary, the oil and gas industry has evolved significantly, embracing technology, sustainability, and collaboration. At SPE Copenhagen Section, we recognize the industry's importance, resilience and commitment to shaping a sustainable energy future and this has been reflected in the types of events we have organized for our members.

Looking Ahead

Now in **2024** as we celebrate four decades, we look to the future. Just like in 1984, the challenges are formidable but of a different type — decarbonization, digitalization, talent pipeline and the quest for renewables while overall energy demand increases. We will be in that mix and we will maintain our relevance. We stand united, armed with knowledge, experience, know-how, teamwork, 'can do' attitude, resilience, and the spirit of collaboration. We know that our legacy is not just in the past; it is in the innovations we nurture today and the solutions we'll pioneer tomorrow. It is in the students and young professionals coming after us who will continue to shape our energy landscape.

So, let's raise our glasses, fellow SPE members! Let's toast to 40 years of excellence, friendship, and the unwavering pursuit of a sustainable energy future.

Yours Sincerely,

Adebowale Solarin
SPE Copenhagen Section Chairman

About the SPE Copenhagen Section: Founded in 1984, the SPE Copenhagen Section brings together professionals in the oil and gas industry, services sectors, and academia. Through networking events, knowledge sharing, and informal engagements, we contribute to solutions that benefit society. Join us in celebrating our 40th anniversary!



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THE BOARD

2023-2024 SEASON

THE BOARD

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NET ZERO BY 2050: PIONEERING THE REDUCTION OF GHG EMISSIONS

Speaker : Susanne Frederiksen, TotalEnergies

Susanne Frederiksen is the Carbon Footprint Reduction Manager for TotalEnergies Denmark in Esbjerg. Susanne has 22 years industry experience and has held multiple positions working with operations and exploration. Through her career Susanne has worked in Denmark, Qatar and Scotland. She holds a MSc in Geology and PhD in Natural Science from Aarhus University.



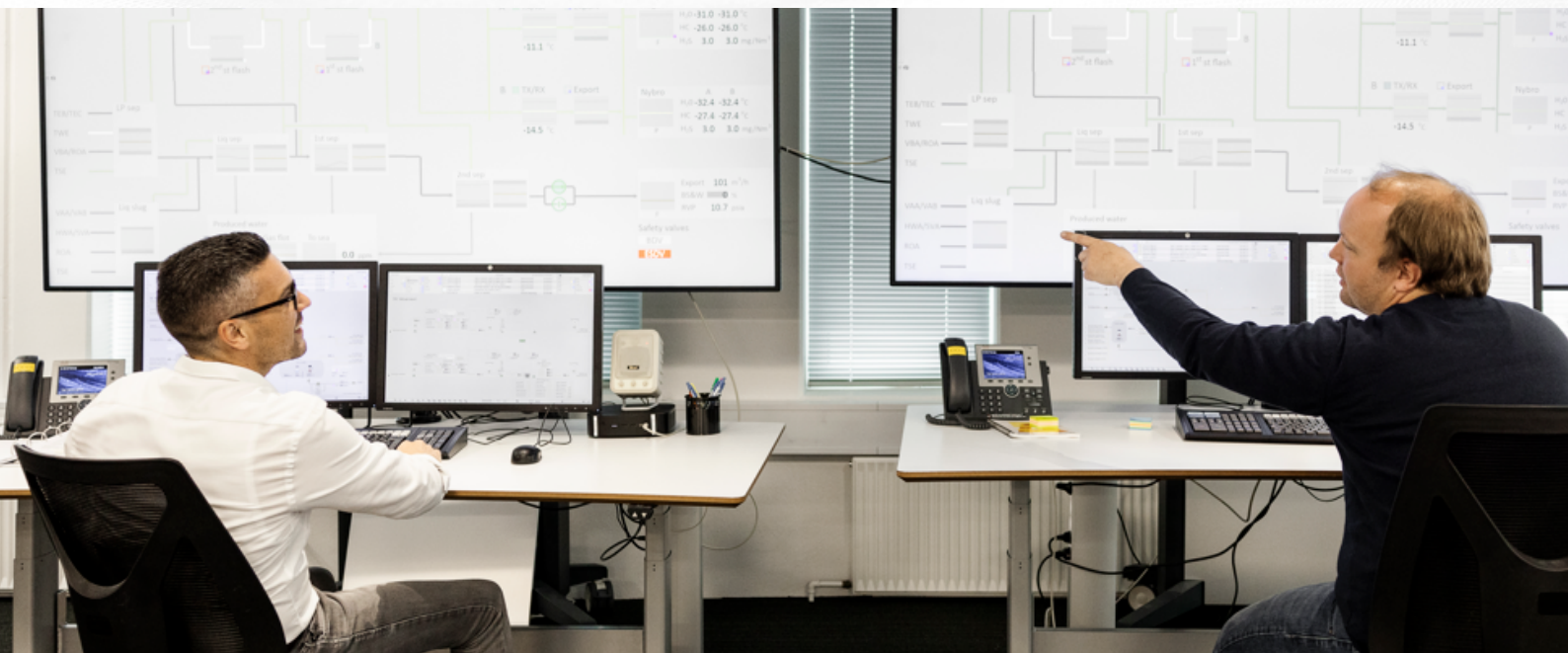
TotalEnergies works diligently to reduce its Green House Gas (GHG) emissions and is committed to achieve net zero by 2050 together with the society.

To support this overall goal, TotalEnergies has defined comprehensive roadmaps for flaring, methane & venting, fuel gas and liquid fuel that define what the different business units are expected to deliver.

The company set interim targets for flare, methane, and Green House Gas (GHG) emission for 2025 and 2030 which are closely tracked and reported as part of the global Sustainability & Climate progress report.

Join the SPE event on 20 March to learn more about what TotalEnergies in Denmark is doing to play their role in achieving set targets.

WEDNESDAY, 20 March



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LEGION OF HONOR



SPE Copenhagen wishes to recognize our first Legion of Honor member for 50 years of continuous membership in SPE.

Big Congratulations to *Stein Christiansen* on this special achievement!

Longest Serving Members of SPE Copenhagen Section



**STEIN
CHRISTIANSEN**

Name	Years of Membership	Member Since
Mr Stein H Christiansen	50	1 Nov 1975
Mr. Even Krohg	48	1 May 1977
Mr. Vagn Holstein	46	1 Oct 1979
Dr. Ole K Jensen	45	1 Jan 1980
Mr Preben Jensen	43	1 Sep 1982
Mr. Joergen E. Knudsen	43	1 Oct 1982
Mr. Niels Bech	42	1 Mar 1983
Mr. Philip Wodka	42	1 Jul 1983
Mr. William R Ginty	42	1 Oct 1983
Mr. Carsten Borch	42	1 Nov 1983
Dr. Karen Schou Pedersen	41	1 Mar 1984
Mr. Rolf Kallesoe	41	1 Apr 1984
Mr Nils L Jacobsen	41	1 Jun 1984
Mr Steen Koefoed	41	1 Jun 1984
Mr. Poul R Sorensen PRS	41	1 Jun 1984
Mr Anders P Damgaard	41	1 Sep 1984
Dr. Ida Lykke Fabricius	41	1 Sep 1984
Mr. Niels Springer	41	1 Dec 1984
Mr. Neil Goldsworthy	40	1 Dec 1985
Mr Henrik Olsen	40	1 Dec 1985



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A LITTLE HISTORY FROM THE OLD DAYS

BY JØRGEN KNUDSEN

The serious oil story in Denmark started with the 'Eneretbevillingen' (the sole right license) awarded to Mærsk for exploration for oil and gas in the total Danish North Sea area. Consequently, early petroleum activities were centered around Mærsk and partners in the DUC, in particular with the development of the Dan, Gorm and Tyra fields. This took place within in a rather closed circle of professional people from the DUC group as essentially no tradition within and absolutely no schooling of petroleum engineering was present in Denmark.

The sole right of DUC was lifted partly in 1981 and new (and old!) licenses were opened for tender a couple of years later, formally in 1984 as far as I remember. This opened up for a much broader range of participants, and a large interest was awakened. There was an atmosphere of curiosity among Danish engineers and other academics, few had adequate background, this all birthed the formation of the Danish section of the SPE in 1984. Here we met international professionals from other companies and colleagues from various institutions, forming the beginning of a framework of a future community of mutual interests.

Danish Section Of SPE

A founding meeting of a Danish section of SPE was held at Hotel Admiral in the autumn 1984 with participation of say 20-30 interested people and there was great support for the proposal.

My personal entry into the underground world was in 1982 where I was employed at DONG as a reservoir engineer, entering as a physicist from a purely academic background. Main project during the first years was the exploration for and development of underground gas storages in the Danish area, to secure the supply of the newly opened Danish gas system, being at that time almost completely dependent on the integrity of a sole North Sea pipeline to the Tyra field.

The attempts to develop a staff of Danish people had to search for untraditional ways as only few had the relevant schooling for not to say professional experience. Other Danish engineer colleagues came with background for instance in hydrology, drilling expertise was scarce and critical. We were sent to training in London on various short-term courses, UK being a leading locus of petroleum knowledge in Europe at that time. Later when licenses in the North Sea were opened up, the Danish staffs were sent on the job training for a year or two at the bidding companies, a few were sent to schooling at US and UK.

Reservoir Simulation

My initial job was to prepare and get acquainted with the new topic called reservoir simulation which few had heard about. This took place in close cooperation with DTU and Risø which were fore-runners on the topic, with relations to Norwegian institutions, from where we managed to acquire usable software! An attempt to develop Danish reservoir simulation software over the years was made by Risø with success, but competition with the world market turned out too strong. This was at the time of the large main-frame computers, at a continuous fight for sufficient access!

Another topic up in time was chemistry of hydrocarbons excelled by DTU, which I believe is still under the auspices there, now made commercially available.

The opening of new Danish licenses after 1984 and the Mærsk successes with Dan, Gorm and Tyra fields sparked an interest for the petroleum engineering at young students, inspiring the creation of new educations in particular at the DTU and (for geo-topics) at Aarhus University. However, for many years job vacancies were filled in with engineers from abroad, in particular the leading jobs at managing level.

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The development of new fields in the Danish North Sea by a variety of new operators took pace from about 1990 initiating a golden period of high activity and opportunity of international contacts.

For the SPE this was also a golden period, with the constant drive for exchange of ideas on an international level, after the initial period of pure curiosity during the 1980'es. SPE contributed to the promotion of the interests of next generation by the admission of junior members and by rewarding outstanding excellence among the junior community.

The rest of the story is known by most people in the SPE.

I retired from the oil industry in 2012, at that time most of my colleagues at DONG had now Danish background, but many were still educated elsewhere, such as UK or US.



JØRGEN
KNUDSEN

Jørgen Knudsen (1942) is one of the longest-time SPE members of the SPE Copenhagen section, and joined SPE in 1982. He obtained cand. scient. in physics and math from Niels Bohr Institute in 1969, and lic. tech. in experimental nuclear physics from DTU. Between 1982 and 2012, Jørgen was employed at DONG, specializing in reservoir engineering and petrophysics. From 2020, Jørgen is a Senior Scientific Adviser at Explicit ApS (Lyngby), working on drone monitoring of emissions of greenhouse gasses.

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You're Invited to Celebrate 40 Years of Copenhagen SPE with us on March 20th!

DEAR SPE MEMBERS

AS WIDELY ADVERTISED, WE WILL
COMMEMORATE A MOMENTOUS
OCCASION - OUR 40-YEAR JUBILEE!

TOTALENERGIES OFFICE
MARCH 20th, 2024

The past 40 years have been an incredible journey for the Copenhagen chapter of SPE, filled with many shared accomplishments, and we couldn't be more excited to celebrate this milestone with each and every one of our members.

Be inspired by our special guests, some of the chairpersons who were in charge of the Copenhagen chapter over the decades, who will share their insights and reflections on our society's journey in the past, and by Totalenergies who will give us an impression of how the energy industry in Denmark will continue to develop in the future.

This jubilee event promises to be an evening of joy, reminiscences, and celebration as we honor the legacy of our society and look forward to the exciting chapters yet to come.

Don't Miss it!





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Former SPE Copenhagen Section Chairman Interview

Bjarne Skovbro was the Chairman of the Copenhagen section between 1991 and 1993. On the occasion of the 40th anniversary of the section, Bjarne kindly agreed to answer our questions.

What was the oil industry in Denmark like in the early 90's? Which companies were here?

In 1982 the new legislation with respect to the oil and gas area was approved by Folketinget and in 1984 the first licenses were awarded. Many new companies were established and in the early 90's 18 groups were active. Today, the number of groups can be counted on one hand. During the 80s and 90's the SPE CPH was developed with monthly meetings (not July and August). Meeting place was Molkes Palæ in Dronningens Tværgade, all meetings were sponsored by the operating companies and there was meeting plans established for the whole year starting in September. Number of participants could be up to 120.

What advice would you offer to the current board?

My advice to the SPE board is to prepare a program for the whole year or 6 months. For me, it is a concern that the group of old-timers is becoming smaller and smaller.

OIL, SHAME, PROSPERITY, AND SURVIVAL: “THE STORY OF AN AFTER DINNER SPEECH”

BY ALI A. EFTEKHARI

Three years ago, I gave an after-dinner speech at an SPE event at DTU. It was the story of Mette, a Danish environmentalist, who dates a Petroleum Engineer. She struggles with a moral dilemma: is it right to move in with someone who is damaging the planet by helping oil and gas companies? The talk was a dramatized version of a real event. During a date, a Danish lady had asked my colleague sympathetically *“don’t you feel bad about yourself”* referring to his job in a hydrocarbon research centre. I imagined their conversation taking a scientific turn; not that it often happens in real life!

Following *“sustainable energy: without the hot air”* by David MacKay, I quantified the energy demand of Denmark, the renewable energy resources, and current state of technology to go from renewable *“resource”* to *“reserve”*. I concluded that even if we cover the whole Denmark and its coastal area with farms, windmills, and solar panels, while electrifying heat and short distance transport, we still fail to provide enough liquid fuels *“to sustain our current lifestyle”*. I did not even include the imported “stuff”, which can be a whole new story. The title of my last slide was *“it’s not only about Mette”*. What happened afterwards, particularly the Russian invasion of Ukraine, taught me other lessons that I want to share with you.

In the energy transition debates, we constantly hear the words *“energy trilemma”* which refers to energy security, energy cost, and environmental impact. I could never reconcile the first two terms. In my mind, *“unaffordable secure energy”* is an oxymoron. Energy supply is only secure when it is affordable. The war in Ukraine and the disruption of the supply of two very important resources, cheap natural gas, and consequently fertilizers, was a demonstration of unaffordable secure supply. We all observed the temporary vanishing of some vegetables

from the supermarket shelves and heard death reports partially linked to energy poverty during a harsh winter, in Europe (in 21st century mind you). The shortage of fertilizers was a darker story.

Hydrogen, the supposed savior of mankind from climate change, is the molecule that sustains human life on the planet via ammonia and fertilizers. Without synthetic nitrogen fertilizers, half the population would starve and perish[2]. Over 95% of the hydrogen that makes fertilizers comes from fossil fuels: natural gas, and coal. The sudden disruption of natural gas and fertilizer from Russia doubled the price of fertilizers[1] in many African countries. A price increase that most farmers cannot afford, so they had to switch back to organic fertilizers; a switch that is deemed to fail[3] as was exercised by the Sri Lankan government with -perhaps- good intention (and low foreign cash reserves) and limited understanding of the consequences. Banning the import of synthetic fertilizers in April 2021, a revolutionary rather than transitional change, was followed by a shortage of grains and widespread demonstrations in March 2022, or as the Sri Lankans called it Aragalaya: *“the struggle”*[4]. This struggle will continue across the world with millions expected to die or suffer from undernutrition if the fertilizers cost keeps rising.

Repeating the calculations for my Brazilian colleagues and some EU countries gave me a very important lesson: Denmark is truly exceptional. It is one of the few countries with enough resources (arable land, water, and energy) to independently support a European diet for its entire population. It has an exceptional amount of wind -that makes me suicidal when biking to work- and even -yes you are hearing it right-sunshine. These circumstances allow Denmark to go faster and afford to take some risks. However, even Denmark, with its

[1] https://en.wikipedia.org/wiki/Haber_process

[2] <https://ourworldindata.org/grapher/world-population-with-and-without-fertilizer>

[3] <https://www.nytimes.com/2023/10/15/business/nigeria-fertilizer-shortage.html>

[4] https://en.wikipedia.org/wiki/2022_Sri_Lankan_protests



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exceptional resources, faces challenges in transitioning to a fully renewable energy future. Nuclear power, often considered politically undesirable, might need to be part of the solution. When we talk about ***“inspiring other nations to follow the footsteps of Denmark in decarbonization and energy transition”***, what we forget is how lucky we are to live on this land, and the fact that not everything is about Mette and her perception of a Petroleum Engineer. We must keep in mind that energy transition is -as the name implies- a transition and not a revolution. My colleague Larry Lake, one of the giants of reservoir engineering recommends to his students to say, ***“we are in the business of prosperity”*** referring to the strong correlation between the energy consumption and GDP per

capita. To answer Mette’s concern whether SPE members should feel bad about themselves, I go one step further and say until a more sustainable solution is found and properly planned, SPE members are in the business of survival, and they are proud of it.

Of course, both our pride and prosperity, and the privileged lifestyle we can afford, must come with a keen sense of responsibility. Driving the energy systems -steadily, gradually, carefully, and not revolutionarily- towards a more sustainable future requires energy and capital, both of which are in the hands of -perhaps few- SPE members!

The goal is clear:

We must stop committing the stupid thermodynamic crime of “burning” fossil fuels (a million-year-old technology) and treat them as the precious commodity they are, essential for the survival of millions. That is how we can become the driving force and stop being the motivation (out of fear) for a positive very required change.

RECENT DEVELOPMENTS IN AI AND THEIR IMPACT ON THE ENERGY INDUSTRY

BY PATRYK BIJAK

The rapid advancements in generative AI tools are revolutionizing productivity across various industries, significantly influencing potential future work scenarios. As some experts suggest, AI represents a new wave of robotization, specifically applied to information processing.

In the energy industry, we generate a vast amount of data. When processed and analyzed, this data can yield valuable insights and enhance decision-making processes. Let's review some of the AI applications that energy companies are currently utilizing.

AI Applications in the Energy Industry

The most prevalent use of AI in many operating fields is predictive maintenance. This approach significantly reduces unplanned downtime and labor costs. It involves installing connected sensors on oil and gas equipment and deploying algorithms that learn to recognize normal operational behavior. AI can then identify any abnormal patterns, enabling plant managers to replace parts before they fail.

The key to success lies in implementing AI solutions that assist specialists in making informed decisions quickly. For instance,

Foton – an Azure-based web application developed by Equinor – analyzes live data feeds from fibers installed in producing wells and provides automated interpretations.

Another example comes from field development planning. Machine learning models analyze seismic mapping through image recognition, achieving higher accuracy and speed than manual interpretation. These computer-generated models save time, allowing geologists to conduct more in-depth analyses.

AI for Safety and Risk Mitigation

AI is not only used for engineering purposes but also for identifying hazards and mitigating risks. Image recognition technology analyzes camera feeds from worksites, identifying unsafe behaviors based on past incidents, and helps prevent accidents. Similar technology, used with LiDAR lasers for methane emission detection, is also implemented across production plants.





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EVENT CALENDAR

JANUARY 18 | 17:00 - 21:00 | INEOS | Face to Face

TOPIC CO₂ Geological Storage from 8 Years of Dynamic Injection at the Aquistore CO₂ Storage Site
SPE DL Rick Chalaturnyk
HOST INEOS | Teknikerbyen 5, 1. sal. 2830 Virum

FEBRUARY 7 | Field trip to Esbjerg

TOPIC Guided tours at Highlander Rig and Welltec
HOST Welltec & Noble Corp. | Field trip to Esbjerg

FEBRUARY 28 | 17:00 - 21:00 | DTU | Face to Face

TOPIC "The Danish Offshore O&G industry and the energy transition"
"Development of sensor technology for the offshore industry"
SPE DL Charlotte Nørgaard Larsen | Simon Ivar Andersen
HOST DTU

MARCH 20 | 17:00 - 21:00 | SPE CPH 40 Birthday Celebration | Face to Face

TOPIC SPE CPH 40th Birthday Celebration
HOST TotalEnergies

APRIL 18 | 17:00 - 20:00 | Rystad Energy | Face to Face

TOPIC Facts and Figures Evening with Rystad Energy
HOST Rystad Energy | Bredgade 6, 1260 Copenhagen

MAY 16 | Noble Drilling | Face to Face

TOPIC Early Kick Detection: Sensors, Data Acquisition, and Analysis
SPE DL Jaideva Goswami
HOST Noble Drilling | Lyngby Hovedgade 85

JUNE 1

TOPIC Annual General Meeting
HOST SPE Copenhagen at Rebel Workspace

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Denmark's long-term energy partner

We are in the middle of a global energy and climate crisis that highlights the need for energy solutions here and now. As one of the world's largest energy companies, TotalEnergies knows that the future belongs to renewables. This is why we are in full swing transforming our business to help secure a green future for Denmark.

Our focus is on maintaining an energy-efficient and safe production of oil and gas, with the redeveloped Tyra field at the center, while leveraging our many years of experience as an energy supplier in Denmark. We will do this by expanding our activities to wind, solar, and Carbon Capture and Storage (CCS).

TotalEnergies has great ambitions to be at the forefront of green energy production with the objective of being among the world's top five players in renewables by 2030.



 Follow us on Facebook: @TotalEnergiesDenmark

 Learn more about the company: <http://corporate.totalenergies.dk>

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