

# PARTNER



LØRN.  
TECH

## LØRN 2019

## ENERGY

## TALKS

## ONS

A large, dark blue speech bubble containing the word "ONS" in white, bold, sans-serif capital letters. The speech bubble is positioned on the right side of the image, overlapping a background of concentric, light blue circles. The word "ONS" is centered within the bubble, and the bubble's tail points towards the left, towards the text "LØRN 2019 ENERGY TALKS".

ONS



# Innholdsfortegnelse

<b>Podkast #161 Grønn verdiskaping.</b> Jens Ulltveit-Moe, Umoe	4
<b>Podkast #162 Innovasjon som samfunnsansvar.</b> Kristin Færøvik, Lundin	8
<b>Podkast #163 Bærekraftig mobilitet.</b> Bernt Reitan Jenssen, Ruter	12
<b>Podkast #164 Energy Technology Markets.</b> Fridtjof Unander, Forskningsrådet	16
<b>Podkast #165 «Greening of gas».</b> Liv Hovem, DNV GL Oil & Gas	20
<b>Podkast #166 Dare to Change.</b> Ragni Rørtveit, Equinor	24
<b>Podkast #167 Total Energy Efficiency.</b> Frode Hvattum, Ruter og WWF	28
<b>Podkast #168 Data Liberation.</b> Karl Johnny Hersvik, Aker BP	32
<b>Podkast #241 Samarbeide om å innovere.</b> Ragnhild Ulvik, Equinor	36
<b>Podkast #244 Hybridteknologi.</b> Kathrine K Ryenge, ZEG Power	40



**ENERGYTECH**  
**JENS ULLTVEIT-MOE**  
CEO  
UMOE

Podcaster gjort i samarbeid med:

**UM**  
**OE**

Lytt til podcast



## Grønn verdiskaping

In this episode of #LØRN, Silvija talks to the managing owner and investor of Umoe, Jens Ulltveit-Moe. Umoe is an industrial investment company specializing in the green energy and services sectors. Ulltveit-Moe donated NOK 70 million for the creation of a climate house in Oslo to communicate research-based knowledge about global warming, especially to youth. He has held several prominent public positions and occasionally comments on climate-related issues. In the episode, Jens talks about bioethanol production, solar energy and other renewable energy. He believes that technology has solved the renewable energy challenge, but the political system is unable to implement this solution.

## Om bedriften

Umoe is an industrial investment company concentrating on green energy and services. The company seeks out high reward, high risk opportunities, while developing companies through acquisition, restructuring and organic growth. Umoe pride themselves in contributing more than just capital, and actively support their businesses in creating value. The company's long-term commitment is central to its growth and has resulted in Umoe expanding to become one of Norway's largest privately owned companies.

## Refleksjon

Hvor hardt ville PV-bransjen rammes om Kina ikke hadde tatt over? Og hva vil overtakelsen bety for de europeiske markedskontrollørene?

Tema

Perspektiv



Tema: ENERGYTECH  
Gjest: Jens Ulltveit-Moe  
Språk: ENGLISH  
Perspektiv: SME  
Innspilt: OSLO  
Vert: Silvija Seres

Du vil LØRNE om:

- Bioenergi
- Solenergi
- Viktigste konsepter i fornybar energi

Anbefalt lesing:

- Rapporter fra Adair Turners energikommisjon



“ *Umoe Bioenergi produserer bærekraftig bioetanol fra sukkerrør - et brensel som koster mindre enn konkurrerende fossile brensler, samtidig som CO2-utslippene reduseres fra biler og elektrisitetsproduksjon.*  
- Jens Ulltveit-Moe



# Intervju

**What is the most important thing you do at work?**

We work with renewable energy that replaces fossil fuels.

**Why is it exciting?**

It's exciting because we're saving the globe.

**What do you think are the most interesting controversies?**

The claim that the poorest people on the planet need energy, and then fossil is the salvation. They cannot be saved by what actually destroys their climate.

**Your own projects in your technology?**

Sugarcane ethanol in Brazil, nanotechnology for solar cells and FBR polysilicon.

**Your other favorite examples, internationally and nationally?**

The success of offshore wind.

**How do you usually explain your technology?**

Efficient conversion of solar energy, solar cells, wind, water and sugar cane.

**What do we do uniquely well in Norway from this?**

We are good at offshore wind power and materials technology.

**A favorite future quote?**

Technology has solved the renewable energy challenge, but the political system is unable to implement this solution.



# KURS SPØRSMÅL

Which year did Jens started Umoe?

- a) 1984
- b) 1948
- c) 1936

The renewable investment was made in sugarcane ethanol in Umoe Bio Energy in?

- a) Norway
- b) Canada
- c) Brazil

Norway has made an agreement with EU to reduce emission 40% by?

- a) 2035
- b) 2040
- c) 2030

Podkast #0161



**ENERGYTECH**  
**JENS ULLTVEIT-MOE**  
CEO  
UMOE

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## RIKTIG SVAR

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1984

Brazil

2030

**UM**  
**OE**



**Scann og besøk bedriften**

<https://www.uac.no/>



**ENERGYTECH**  
**KRISTIN FÆRØVIK**  
MANAGING DIRECTOR  
LUNDIN

Podcaster gjort i samarbeid med:



Lytt til podcast



## Innovasjon som samfunnsansvar

In this episode of #LØRN, Silvija talks with Managing Director in Lundin, Kristin Færøvik about the changes in the oil sector, new innovations and what it takes to be competitive in the future. They look at how technology developed for the oil sector can be transferred to the health sector and also how oil and gas are explored, developed and produced from the Norwegian continental shelf. Kristin is currently Chair of the board of directors for Norwegian Oil and Gas a role she has held since Nov 2016, having joined as a board member a year earlier.

### Om bedriften

Lundin Energy has grown from an oil and gas exploration company into an experienced Nordic energy developer and operator. Lundin explore even better ways to produce and to develop energy. This has made Lundin one of the world's leading, sustainable companies in the industry.

### Refleksjon

What are your thoughts on how we could determine what it is about the Norwegian education system that has enabled Norway to develop its natural resources so well that this field has evolved into such a huge technological hub?

Tema

Perspektiv



Tema: ENERGYTECH  
Gjest: Kristin Færøvik  
Språk: ENGLISH  
Perspektiv: ENTERPRISE  
Innspilt: OSLO  
Vert: Silvija Seres

Du vil LØRNE om:

- Hva hydrokarboner er Innovasjon i olje og gass
- Endringene i oljesektoren

Anbefalt lesing:

- <https://lundin-energy-norway.com/>



“ Når vi utvinner olje og gass bruker vi avansert datamodellering for å forstå hvordan oljen og gassen vil oppføre seg. Nå blir faktisk noe av denne teknologien overført til helsesektoren for modellering av blodstrøm i hjertet til mennesker.  
- Kristin Færøvik



# Intervju

## Who are you and how did you become interested in energy technology?

I first encountered technology when I was a petroleum engineering student in Trondheim. I've worked in the oil and gas industry ever since, and spent much of my career working on technologically complex projects.

## What is your role at work?

Put simply: I lead a company that explores for, develops and produces oil and gas from the Norwegian Continental Shelf.

## What are the most important concepts in energy technology?

Developing and using the best possible ways of understanding the sub-surface (in order to find, develop and produce oil and gas assets) demands good integration of all geo-disciplines (e.g. geology and geophysics) and the ability to embrace innovation and new ideas. This constant drive for better practices – as opposed to best practice – and curiosity about what the data really tells you are at the heart of our exploration team.

## Why is this exciting?

Hydrocarbons are a fantastic natural resource and I cannot imagine anything more exciting than discovering new resources on the Norwegian Continental Shelf.

## What do you think are the most interesting controversies?

I do find it an interesting paradox that Norway's position as a global provider of offshore technology is not more widely known or recognised among the general public. And in the same vein, why are we not more ambitious about outcompeting other oil and gas basins in light of the Paris Agreement?

## What is your own favourite example of energy technology?

Right now, it's Lundin Norway's ongoing development and refinement of seismic methods – from the BroadSeis/seismic data processing test area on the Utsira High in the North Sea to the ground-breaking TopSeis acquisition technology.

## Can you name any other good examples, nationally or internationally?

The development of subsea technology is fantastic. I am also fascinated by modern drilling technology. Thirdly, if it wasn't for the exponential growth of data processing coinciding with the reduction of data storage costs, TopSeis would have been meaningless – the amount of data gathered is simply mind-boggling.

## What do you think is the most important takeaway from our conversation?

That we have a world-leading oil and gas industry in Norway; that there is a role for Norway to play in continuing to supply oil and gas to the world in a responsible manner;

and that a small, transparent nation such as ours can be competitive if we put our weight behind it. Rapid deployment – and indeed development – of new technology plays a big part in staying competitive.



# KURS SPØRSMÅL

**Lundin is an exploration company that has the following as its core operation?**

- a) Maintenance of equipment offshore.
- b) Maritime management and ship building.
- c) Development and production of oil and gas.

**Which technology sends sound waves down to the seabed by looking at the reflection of sounds as it comes back in captured reflections?**

- a) Cinematic technology
- b) Systematic technology
- c) Seismic technology

**What has Norway been at the forefront of developing?**

- a) Surveying drilling technology.
- b) Horizontal drilling technology.
- c) High technology.



**ENERGYTECH**  
**KRISTIN FÆRØVIK**  
MANAGING DIRECTOR  
LUNDIN

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## RIKTIG SVAR

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Development and production of oil and gas.

Seismic technology

Horizontal drilling technology.



**Scann og besøk bedriften**

<https://lundin-energy-norway.com/>



**ENERGYTECH**  
**BERNT REITAN JENSSEN**  
ADMINISTRERENDE  
DIREKTØR  
RUTER

Podcaster gjort i samarbeid med:

**Ruter#**

Lytt til podcast



## Bærekraftig mobilitet

In this episode of #LØRN, Silvija talks to Ruter's CEO, Bernt Reitan Jenssen, about courageous management in the public sector, new use of energy in the transport sector and how Ruter will achieve the goal of becoming emission-free by 2028. Bernt also shares his thoughts about when an automatic payment of your public transport will take place, in addition to when you will be transported environmental-friendly and driverless from door-to-door. Bernt holds a seat in the Norwegian government's Expert Committee on Technology and Future Transport Infrastructure and leads the national strategy group Transport21, whose mandate is to recommend key areas for research and development and advise the government on how to meet the transportation challenges of the future.

## Om bedriften

Ruter AS is the public transport authority for Oslo and Akershus counties in Norway. Ruter is responsible for the administration, funding, and marketing (but not direct operation) of public transport in the two counties, including buses, the Oslo Metro, Oslo Trams, and ferry services. Ruter currently account for more than half of the country's public transport, and is aiming to make all means of transport powered by renewable energy by 2020 in order to reduce local and global climate emissions.

## Refleksjon

In your own words, what would a completely emission free transportation sector achieve for Norway, both privately and publicly?

Tema

Perspektiv



Tema: ENERGYTECH  
Gjest: Bernt Reitan Jenssen  
Språk: ENGLISH  
Perspektiv: PUBLIC SECTOR  
Innspilt: OSLO  
Vert: Silvija Seres

Du vil LØRNE om:

- Bærekraftig mobilitet
- Fremtidsperspektiver på offentlig transport
- Ledelse

Anbefalt lesing:

- <https://ruter.no/>



“Førerløse busser vil kutte kostnadene drastisk og gi nye tilbud til våre kunder. Det kan snu opp ned på dagens kollektivtrafikk. Det betyr at man ikke trenger like mange passasjerer per buss for at økonomien skal gå rundt, og på sikt legge til rette for kjøring fra dør-til-dør.  
- Bernt Reitan Jenssen

Bilde fra nab.no  
Nordre Aker Budstikke

# Intervju

## What are you doing at work?

Carving out the direction for public transport and sustainable mobility. This includes applying the UN sustainable development goals in all our work internally and externally.

## What are the most important concepts in energy technology?

How digitalisation and new technologies are challenging old business models, for example big data, Internet of Things, artificial intelligence and autonomous driving. And the electrification and the transition of public transport and future mobility solutions.

## Why is it exciting?

Because these concepts are changing our industry and the society. In other words, this is changing the way people live and move around.

## What do you think are the most interesting controversies?

The speed of change is always difficult and creates controversies. The need for a vision and a direction is important. There will always be controversies. I am more

interested in how to deal with them, than what they exactly are.

## Your own favourite projects in energy technology?

I am fascinated by the rapid change from a conventional combustion engine to a battery run electric vehicle. We see it in cars, but also on boats and bus services. It's important as Norway are so far ahead. It's a system change of both the energy and transportation industry, and if we make it here it will have positive implications for many other cities and countries .

## Your other favourite examples of energy technology internationally and nationally?

Drone and robotics technologies.

## What do we do particularly well in Norway of this?

Collaboration with each other, learning culture, and fail fast.

## A favourite energy technology quote?

If we don't procure the technology we know is needed for a sustainable development now, this future might never come.

## Most important takeaway from our conversation?

We are in a time of significant changes in technology and it's important to ensure that this change is for the better.



# KURS SPØRSMÅL

**Bernt Reittan Jenssen is the CEO of which public transport authority of Oslo?**

- a) Ruter
- b) Radisson Blu
- c) Rutten

**The ambitious target of the public sector transportation company headed by Bernt seeks to be completely emission free**

- by?**
- a) 2020
  - b) 2028
  - c) 2030

**Bernt Reittan Jenssen's approach is to the system is best described as trust in terms of?**

- a) Fining defaulters
- b) Rejecting clients with risk
- c) Building willingness to pay

Podkast #0163



**ENERGYTECH  
BERNT REITAN  
JENSSEN**  
ADMINISTRERENDE  
DIREKTØR  
RUTER

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## RIKTIG SVAR

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Ruter

2028

Building willingness to pay

# Ruter#



**Scann og besøk bedriften**

<https://ruter.no/>



**ENERGYTECH**  
**FRIDTJOF UNANDER**  
EXECUTIVE DIRECTOR  
FORSKNINGSRÅDET

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# Energy Technology Markets

In this episode of #LØRN, Silvija talks to Executive Director of Forskningsrådet, Fridtjof Unander. He is the executive director at Research Council Norway. Forskningsrådets primary task is to invest in research and innovation that builds knowledge for a sustainable future. In the episode, Fridtjof tells about which technologies are showing rapid improvements and are about to radically change parts of the energy market. Fridtjof also unveils what great market opportunities there are for those who are clear and innovative.

## Om bedriften

The Research Council (Forskningsrådet) works to promote research and innovation of high quality and relevance and to generate knowledge in priority areas to enable Norway to deal with key challenges to society and the business sector. The Research Council consists of more than 400 employees who work with the development and administration of research and research-based innovation.

## Refleksjon

What do you think about investment in research and innovation that leads to technological development?

Tema

Perspektiv



Tema:	ENERGYTECH
Gjest:	Fridtjof Unander
Språk:	ENGLISH
Perspektiv:	PUBLIC SECTOR
Innspilt:	OSLO
Vert:	Silvija Seres

### Du vil LØRNE om:

- CCS (carbon capture and storage)
- Endringer i energimarkedet
- Forskning og innovasjon i energytech
- Klimautfordringer

### Anbefalt lesing:

- IEAs Energy Technology Perspective publications



“ Om 10, 20 og 30 år vil det trolig være mye refleksjon tilbake til dette tiåret, både fordi det var vår siste sjanse til å unngå betydelige klimaendringer, men også fordi det var da innovasjon og utvikling av rene energiteknologier virkelig begynte å spre seg i markedet.

- Fridtjof Unander

# Intervju

## What are you doing at work?

Financing research and development, providing strategic analysis, advising the government, and picking the right projects.

## What are the most important concepts in energy technology?

To foster development of technologies through stimulating research and innovation to harvest value creation opportunities.

## Why is it exciting?

To see results – that our projects leads to changes. We are in the middle of a massive shift in the energy sector, things are going extremely fast. We have a completely different conversation about the energy sector now than 10 years ago. This type of dynamic landscape presents huge opportunities. We are trying to help the sharpest Norwegian researchers and businesses do well in this landscape.

## What do you think are the most interesting controversies?

Carbon capture and storage (CCS) – some still see it as an excuse for prolonging coal use. There can certainly be some truth, but as the latest WEO points out, this is the harsh reality. We are now locked into an emissions pathway that includes significant coal-based emissions from newer plants in Asia. If we get CCS commercialised, we have much more wiggle room for the really hard emission reductions in long distance transport and industry.

## How do you usually explain energy technology?

Technologies that either produce energy, transport energy or use energy in buildings, transport and industry.

## A favourite energy technology quote?

Meeting the 1.5 °C target means that we move from energy markets to energy technology markets.

## Most important takeaway from our conversation?

The view on the role of energy technologies has changed significantly over the last couple of decades. Some technologies are showing rapid improvements and are about to radically change parts of the energy markets. However, by far not fast enough and by far not in all the areas we need. Global emissions are still increasing and are at a record high this year.



# KURS SPØRSMÅL

**Fritjof Unander was a visiting scientist at?**

- a) Berneley University
- b) UC Berkeley
- c) NTNU

**Research in the energy sector can be very important for?**

- a) Value creation and for business opportunities into looking at how this technology can be applied.
- b) Scientists in industrial setups only
- c) Developing a rapid solar and photovoltaic industry

**The research based industry in Norway focuses on...?**

- a) Research only
- b) Funding and observation
- c) Research and innovation



**ENERGYTECH**  
**FRIDTJOF UNANDER**  
EXECUTIVE DIRECTOR  
FORSKNINGSRÅDET

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## RIKTIG SVAR

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UC Berkeley

Value creation and for business opportunities into looking at how this technology can be applied.

Research and innovation



**Scann og besøk bedriften**  
<https://www.forskningsradet.no/>



**ENERGYTECH**  
**LIV HOVEM**  
CEO  
DNV GL OIL & GAS

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Lytt til podcast



## «Greening of gas»

In this episode of #LØRN, Silvija seeks to find out the main trends in the oil and gas sector and how CO2 can be extracted from gas before using it. Her guest is the CEO of DNV GL Oil & Gas, Liv Hovem, and she tells her about the changes in the oil and gas sector, digital twins and why technology plays an important role in this. With more than 30 years of experience in helping the energy and maritime industries manage risk to enhance safety, reliability and efficiency, Liv works extensively with technologies and solutions geared towards enabling the energy transition and the role of gas in the sustainable future energy mix. Liv's leadership background includes strategy development and execution, innovation management, growth in emerging markets, and organizational change and development. She is a technical specialist in risk and probabilistic modelling, hydrodynamics and strength of ships and offshore structures.

## Om bedriften

As the technical advisor to the oil and gas industry, DNV GL Oil & Gas bring a broader view to complex business and technology risks in global and local markets. From project initiation to decommissioning, they enhance safety, increase reliability and manage risks in projects and operations. The organizations oil and gas experts offer local access to global best practice in every hydrocarbon-producing country.

## Refleksjon

Can you name some projects that you think the research department at DNV GL in Norway would be interested in?

Tema

Perspektiv



Tema: ENERGYTECH  
Gjest: Liv Hovem  
Språk: ENGLISH  
Perspektiv: ENTERPRISE  
Innspilt: OSLO  
Vert: Silvija Seres

Du vil LØRNE om:

- Digitale tvillinger
- Greening of gass
- Smartere subsea
- CCS

Anbefalt lesing:

- <https://www.dnvgl.com/oilgas/index.html>



“ 34 prosent, en tredjedel av industrien ser ut til å øke FoU-utgiftene i 2019, tilsvarende nivået på utsiktene for 2018. FoU-investeringer er klart kritisk for å utvikle nye teknologier som kan redusere kostnadene og muliggjøre prosjekter som ellers ikke er mulig å realisere. Imidlertid fører innovasjon og økt kompleksitet i design ofte til utvikling av teknologi, som ikke kan sertifiseres mot eksisterende standarder, regler og koder for praksis.  
- Liv Hovem



# Intervju

## Who are you and how did you become interested in energy technology?

I'm a board member of NTNU AMOS – Centre for Autonomous Marine Operations and Systems. I first became interested in energy technology when I watched films on big waves hitting offshore structures at NTNU. I now have responsibility for very strong gas competency units in The Netherlands and the UK.

## What is your role at work?

We assist customers to develop and adopt novel technology in an efficient manner, often redefining perceptions of what is technically feasible and financially viable.

## What are the most important concepts in energy technology (your sub-branch)?

Increasingly, we are seeing a need for technical services not just at the component level but also at the systems level: across whole transportation chains, across gas value chains, or within and across complex power transmission and distribution grids.

## Why is this exciting?

We are on the cusp of a technological revolution and accelerated uptake of cyber-physical systems. The coming decade will be about combining advanced technologies and implementation – where concepts such as automation, data-driven insights and grid parity acquire real meaning and scale.

## Which national and international differences exist within these technologies?

The challenge in Norway has been to demonstrate that the technology is meeting regulatory safety requirements. In a global context, it is important that Norway's legislation and use of standards do not drive technology in a direction that makes it less attractive for the global market.

## What do you think are the most interesting controversies?

Regulations in Norway have served technology development well. With functionally based regulation, there is much freedom for the industry to develop and implement new solutions. But this flexibility also leaves room for interpretations and thus uncertainty in terms of how regulators will assess new solutions.

## What is your own favourite example of energy technology?

Green gas is a key area of interest for me as our industry embraces the energy transition. I find the potential use of hydrogen and CCS particularly relevant.

## Do you have any other good examples of energy technology, nationally or internationally?

The H21 project in the UK.

## How do you usually explain energy technology, in simple terms?

When talking to new young entrants to the oil and gas industry, I explain that energy technology is helping our industry to look forward.

## What do we do particularly well in this field in Norway?

Norway excels in electric power systems, a cost-effective oil and gas industry, carbon capture and storage, automation and subsea activities, among other things.



# KURS SPØRSMÅL

## Who is Liv Hoven?

- a) CEO of DNV
- b) Founder of the Center of Excellence
- c) CEO of the DNV GL – Oil & Gas division

## How old is the company, DNV GL?

- a) 120
- b) 113
- c) 150

## Where DNV GL's new AI research centre will be located in?

- a) Norway
- b) Singapore
- c) China



Podkast #0165

**ENERGYTECH**

**LIV HOVEM**

CEO

DNV GL OIL & GAS

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## RIKTIG SVAR

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CEO of the DNV GL – Oil & Gas division      150

China



**Scann og besøk bedriften**

<https://www.dnvgl.com/oilgas/index.html>



**ENERGYTECH**  
**RAGNI RØRTVEIT**  
GRADUATE ENGINEER  
EQUINOR

Podcaster gjort i samarbeid med:



Lytt til podcast



## Dare to Change

In this episode of #LØRN, Silvija talks to Graduate Engineer in Equinor, Ragni Rørtveit, about shipping, carbon capture and storage (CCS), the technologies of the future and the courage to change. In 2016, Rørtveit was one of eight young socially engaged voices who participated in the campaign "When good advice is young". There she shared her critical view of the oil and gas industry and challenged Equinor's Executive Vice President for the Norwegian continental shelf about the company's activities. Silvija seeks to get into her mind on how a young and forward-thinking woman in Equinor would describe the company and its culture, as well as the future of the oil and gas sector.

## Om bedriften

Equinor is a broad energy company with a proud history. The company consists of 21,000 committed colleagues developing oil, gas, wind and solar energy in more than 30 countries worldwide. Equinor is the largest operator in Norway, one of the world's largest offshore operators, and a growing force in renewables. Driven by their dedication to safety, equality and sustainability and their Nordic urge to explore beyond the horizon, Equinor is shaping the future of energy.

## Refleksjon

Name one thing that you remember from Sylvia and Ragni's conversation about the complex shipping industry in Europe.

Tema

Perspektiv



Tema:	ENERGYTECH
Gjest:	Ragni Rørtveit
Språk:	ENGLISH
Perspektiv:	ENTERPRISE
Innspilt:	OSLO
Vert:	Silvija Seres

Du vil LØRNE om:

- Klimautfordringene i olje- og gassektoren
- Shipping
- CCS
- Teknologi

Anbefalt lesing:

- <https://www.equinor.com/>



“ Vi må være åpne for gode ideer i shipping-indusrien, folk kommer opp med alle disse kule ideene hele tiden og vi må prøve å forstå hvorfor dette er en god løsning. Vi i Equinor kommer ikke til å være de som driver denne forandringen, men vi må være tilpasningsdyktige og støtte opp under dem. Vi må våge å være en del av løsningen og forandringen fra en tidlig fase, fordi vi har strukturer som gjør at vi kan teste dem.

- Ragni Rørtveit



# Intervju

## Who are you and how did you become interested in energy technology?

I have always been interested in math and physics, and during my years at NTNU I also became fascinated with the shipping industry. I wanted to work with something tangible and large scale, and when I landed a job with Statoil, as it was called then, I was excited to get to combine the largest industry in the country with shipping.

## What is your role at work?

Being part of the graduate programme, I shuffle around between roles. So I worked in technical ship management during my first year, and now I'm on shuttle tanker operations. We optimise the tankers delivering crude oil from the offshore fields to the market.

## What are the most important concepts in energy technology?

I'm not exactly sure when it comes to energy technology in general. But I think the most important concept in shipping is understanding your market and your commodity,

and then optimising the fleet to maximise value and minimise cost.

## Why is this exciting?

Because it's so simple, and yet so complex, and it's an industry that deals with large sums, many cultures and unpredictability. This makes the challenges seemingly impossible to solve. But the market embraces good, commercially viable solutions, which means that disruptive technology can change the game completely.

## What do you think are the most interesting controversies?

One of the major challenges facing the shipping industry is adapting to a low carbon future. It's a global industry that entails a lot of stakeholders, making it a challenge to implement change. Additionally, the margins are slim, making it tough to be a first-mover and take the risk of testing new technologies. The vessels travel all over the world, so standardisation and cooperation are key. However, incentives vary considerably, so it's tricky to gradually implement positive change while maintaining a level playing field.

## What is your own favourite example of energy technology?

I am very interested in CCS and hydrogen as a fuel. Long-haul shipping requires vast amounts of energy, making conventional batteries unsuitable.

## Is there anything we do particularly well in Norway in relation to energy technology?

In shipping we are frontrunners in new technology, particularly with respect to batteries and hybrids for ferries and shorter voyages. We are also good at optimising offshore vessels and providing redundancy.

## What do you think is the most important takeaway from our conversation?

We must dare to look for the disruptive technologies.



# KURS SPØRSMÅL

## What does the acronym 'IMO' stand for?

- a) International Mining Organisation
- b) International Maritime Organization
- c) Institute on Mining Oil

## How does Equinor carry out their shipping operations?

- a) Charter the vessels they operate from the owners of those vessels.
- b) Contract shipbrokers to lease vessels for them to operate on their behalf.
- c) Acquire ownership of the vessels they operate.

## As a crude shipping operations officer, what is one of Ragni's key roles?

- a) Obtain licenses and certificates to operate in the oil fields.
- b) Get the oil tankers to sail to the offshore fields to load.
- c) Act as a broker on behalf of Equinor.

Podkast #0166



**ENERGYTECH**  
**RAGNI RØRTVEIT**  
GRADUATE ENGINEER  
EQUINOR

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## RIKTIG SVAR

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International Maritime Organization

Charter the vessels they operate from the owners of those vessels.

Get the oil tankers to sail to the offshore fields to load.



**Scann og besøk bedriften**

<https://www.equinor.com/>



**CLEANTECH**  
**FRODE HVATTUM**  
CHIEF OF STRATEGY OG  
STYRELEDER  
RUTER OG WWF

Podcaster gjort i samarbeid med:



**WWF**

Lytt til podcast



## Total Energy Efficiency

A discussion on how climate challenges affect the world's wildlife, this episode of #LØRN sees Silvija interact with Chief of Strategy at Ruter and chairman of The World Wide Fund for Nature, Frode Hvattum, on how we can deliver on sustainability and economic growth at the same time. They discuss how we can drive total energy efficiency by moving towards circular business models in mobility, including how WWF works to preserve natural values. Frodes passion is to drive positive change to society, focusing on mobility and environment

## Om bedriften

The World Wide Fund for Nature (WWF) is the world's largest conservation organization with over five million supporters worldwide, working in more than 100 countries and supporting around 3,000 conservation and environmental projects. They have invested over \$1 billion in more than 12,000 conservation initiatives since 1995.[6] WWF is a foundation with 55% of funding from individuals and bequests, 19% from government sources (such as the World Bank, DFID, and USAID) and 8% from corporations in 2014. WWF aims to "stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

## Refleksjon

På hvilket tidspunkt kan vi si at politikk og teknologi har sviktet i kampen for klimaendringer?

Tema

Perspektiv



Tema: **CLEANTECH**  
Gjest: **Frode Hvattum**  
Språk: **ENGLISH**  
Perspektiv: **PUBLIC SECTOR**  
Innspilt: **OSLO**  
Vert: **Silvija Seres**

Du vil LØRNE om:

- Sirkulær økonomi
- Fremtidens mobilitet
- Bærekraft og miljø
- Verdens naturfond (WWF)

Anbefalt lesing:

- Minds and machines with Andrew McAfee
- <http://www.energy-transitions.org/>



“ Den store kampen nå handler om klimautfordringene og dyrene som dør ut på grunn av den. Hvert år dør to prosent av artene og hvis disse artene dør ut, så dør også deler av økosystemet — økosystemet som vi også er en del av.  
- Frode Hvattum



# Intervju

## What are you doing at work?

Leveraging public procurement to accelerate electrification and searching for a way to steer public transportation on the societal value we create. Also, building a bridge between political visions and commercial investment in mobility and leveraging digital innovation to drive sustainable value.

## What are the most important concepts in energy technology?

Electrification and the transition to a system change, and total energy efficiency through driving toward circular business models in mobility.

## Why is it exciting?

Because the commercial business case is huge. The improvements we can do for the users of mobility is great and will be an important impact on reducing climate change and create a better world for the future.

## What do you think are the most interesting controversies?

If we can deliver on sustainability and economic growth at the same time, if we can we transform

ourselves to leverage the full potential of the circular economy, and if we find a way to understand the holistic consequence of our choices and make better decisions.

## Your own favourite projects in energy technology?

Sustainability driven customer centric mobility platform. It reduced total energy use by reducing the number of produced vehicles and increasing the use of each vehicles while increasing the user experience.

## Your other favourite examples of energy technology internationally and nationally?

Otovo's way of scale usage of solar panels on roofs of private households.

## How do you usually explain energy technology?

For me as an economist, its digital or physical technology that helps produce, distribute and use energy to serve a purpose for an individual, an organisation or the society as a whole.

## What do we do particularly well in Norway of this?

We are superusers of self-servicing digital services, big on hydropower and electric vehicles, and we are strong on circular economies in certain areas like waste.

## A favourite energy technology quote?

If technology is the answer, what is the question?

## Most important takeaway from our conversation?

Circular economy is the new big challenge and opportunity, the potential is huge, but we must think differently and collaborate more and smarter.



# KURS SPØRSMÅL

**Frode er styreleder i WWF-styret som står for?**

- a) World Wrestling Federation
- b) Verdensomspennende futurister
- c) World Wildlife Foundation

**Paris-konvensjonen (også kjent som CoP), er en avtale som fokuserer på...?**

- a) Å redusere tapet av truede arter til klimaendringer
- b) Å hjelpe WWF som den største NGO i verden
- c) Å nå klimamålet på 1,5 grader

**Hvilket grensesnitt har vært en av Ruters største fordeler med å holde dem i direkte tjeneste med sine kunder?**

- a) Implementering av SDG
- b) Øke kundebasen
- c) Ruter-appen

Podkast #0167



**CLEANTECH**  
**FRODE HVATTUM**  
CHIEF OF STRATEGY OG  
STYRELEDER  
RUTER OG WWF

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## RIKTIG SVAR

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World Wildlife Foundation

Å nå klimamålet på 1,5 grader

Ruter-appen



**Scann og besøk bedriften**

<https://www.wwf.no/>



**ENERGYTECH**  
**KARL JOHNNY HERSVIK**  
CEO  
AKER BP

Podcaster gjort i samarbeid med:



Lytt til podcast



## Data Liberation

In this episode of #LØRN, Silvija talks to CEO of Aker BP, Karl Johnny Hersvik, about visualization of data, algorithm based optimization and reorganization of the value chain. Prior to joining Aker BP, he served as head of research for Statoil. Mr. Hersvik has held a number of specialist and executive positions at Norsk Hydro and StatoilHydro. He holds a number of directorships whose objective is to promote cooperation between industry and academia. In the episode, Karl Johnny goes into detail how new technologies and access to new data will be a game changer for Norway's most aggressive oil company in the years to come.

## Om bedriften

Aker BP is a fully-fledged E&P company with exploration, development and production activities on the Norwegian Continental Shelf (NCS). Measured in production, Aker BP is one of the largest independent oil companies in Europe. Aker BP has a balanced portfolio and is the operator of the Valhall, Ula, Ivar Aasen, Alvheim and Skarv field hubs. Aker BP also holds a 11.5733 % share of the Johan Sverdrup field.

## Refleksjon

Data has always been a fundamental part of the oil and gas industry, but there has been a big problem to get the data liberated. How will making data available fundamentally change the business model in the oil and gas industry?

Tema

Perspektiv



Tema: ENERGYTECH  
Gjest: Karl Johnny Hersvik  
Språk: ENGLISH  
Perspektiv: ENTERPRISE  
Innspilt: OSLO  
Vert: Silvija Seres

Du vil LØRNE om:

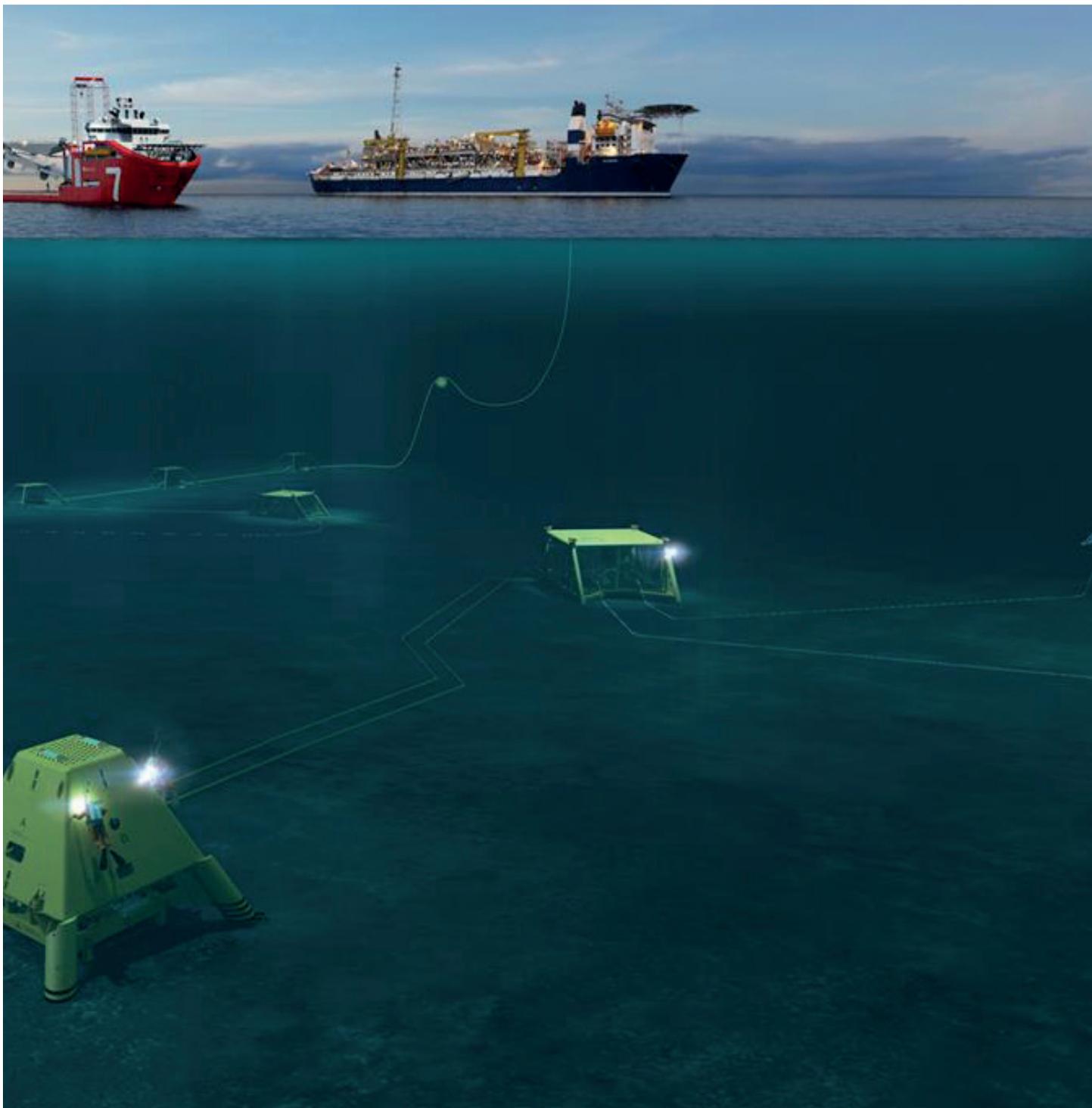
- Om Aker BP
- Ledelse
- Data liberation

Anbefalt lesing:

- <https://akerbp.com/>



**“** *Jeg tipper at kun fem til åtte prosent av dataene til et oljeselskap blir utnyttet, der de resterende blir lagret for senere bruk. Nå har vi skapt en plattform som strømmer alle Aker BP sine tidsseriedata og vi ser at visualisering og bruk av data skaper basisen for nye forretningsmodeller.*  
- Karl Johnny Hersvik



# Intervju

**What do you do at work?**

We find, develop and produce oil and gas at the lowest possible cost.

**What are the key concepts in your technology?**

Access to and visualization of data, algorithm-based optimization and reorganization of the value chain.

**Why is it exciting?**

Because it goes so incredibly fast.

**Your own projects in your technology?**

Eureka / CognIT.

**A favorite future quote?**

Data must be like air, immediately available.

**Main points from our conversation?**

I think we need to increase our pace.



# KURS SPØRSMÅL

**People often fall in love with the solutions of technology first. Why can this be a problem?**

- a) There will be too many solutions that will challenge the cyber security
- b) There is nothing saying that finding the solutions of the technologies first is a problem
- c) It's more important to focus on finding solutions for a problem than focusing on the solution itself

**What is the most valuable technology for the oil and gas industry?**

- a) Technology making it possible to share data
- b) Technology making it possible to secure data
- c) Technology making it possible to hold digital space

**The oil and gas industry in Norway have collected a lot of data since early on, but there is a big problem with the data.**

**What is this problem?**

- a) It's not connected and therefore hard to share
- b) It's shared on various platforms and therefore hard to protect
- c) It's unreadable in the new digital systems used by the Norwegian oil and gas industry



**ENERGYTECH**  
**KARL JOHNNY HERSVIK**  
 CEO  
 AKER BP

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## RIKTIG SVAR

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It's more important to focus on finding solutions for a problem than focusing on the solution itself

Technology making it possible to hold digital space

It's not connected and therefore hard to share



**Scann og besøk bedriften**

<https://akerbp.com/>



**ENERGYTECH**  
**RAGNHILD ULVIK**  
VICE PRESIDENT  
CORPORATE INNOVATION  
EQUINOR

Podcaster gjort i samarbeid med:



Lytt til podcast



## Samarbeide om å innovere

In this episode of #LØRN, Silvija seeks to find out how to solve the world's energy needs in the future and how new risky ideas from employees are developed and hatched in such an established company as Equinor. She talks to the Vice President of Corporate Innovation in Equinor, Ragnhild Ulvik, about Corporate Innovation and how we must use both hands in the future. Ragnhild is head of corporate innovation unit working with innovation communities within and outside Equinor to drive radical transformation and enable Equinor to deliver on its corporate strategy. Focus on innovation both when it comes to technology, business models and beyond energy. Prior to this, she was project head of estimation at Statoil within 4 years.

## Om bedriften

Equinor is a broad energy company with a proud history. The company consists of 21,000 committed colleagues developing oil, gas, wind and solar energy in more than 30 countries worldwide. Equinor is the largest operator in Norway, one of the world's largest offshore operators, and a growing force in renewables. Driven by their dedication to safety, equality and sustainability and their Nordic urge to explore beyond the horizon, Equinor is shaping the future of energy.

## Refleksjon

What are your thoughts on Norway's advantages in this new energy tech space?

Tema

Perspektiv



Tema: ENERGYTECH  
Gjest: Ragnhild Ulvik  
Språk: ENGLISH  
Perspektiv: ENTERPRISE  
Innspilt: OSLO  
Vert: Silvija Seres

Du vil LØRNE om:

- Innovasjon
- Energy.tech
- Inkubatorer

Anbefalt lesing:

- <https://www.equinor.com/>



“ Personlig synes jeg det både er spennende og skremmende å tenke på hvor langt teknologien kan ta oss i dag og med det hvor vi bør sette streken. Samfunnets evne til å forstå hvilken effekt teknologien vil kunne ha på samfunnet, og de etiske komplikasjonene dette fremhever, klarer ikke henge med på den teknologiske utviklingen.  
- Ragnhild Ulvik



# Intervju

## Who are you and how did you become interested in energy technology?

I grew up in Bergen and now live in Oslo with my French husband and one-year-old twin daughters. I particularly enjoy the international aspects of energy technology: meeting new people, getting to know new cultures and speaking different languages.

I am also fascinated by all the opportunities technology offers to solve the massive challenges we face as a society.

## What is your role at work?

I am head of innovation at Equinor. We explore how to solve the world's energy needs for the future. We pilot and incubate new ideas and work with start-ups and partners to learn, implement technology and develop new business models that help our business evolve.

## Why is this exciting?

I get to help solve big challenges facing not only my company but society. And we work with truly inspiring people who are passionate about what they do. That energises me.

## What do you think are the most interesting controversies?

Personally, I think it is both interesting and scary to think about how far technology can take us and where we should draw the line.

As digital technologies develop, we face unforeseeable ethical dilemmas. And technology seems to develop faster than our ability to understand its consequences.

## What is your own favourite example of energy technology?

We just finished an in-house incubation programme involving more than 60 different business model ideas from around the world.

**Can you name any other good examples, nationally or internationally?** I find Equinor's floating wind turbine, Hywind, a fascinating example.

## How do you usually explain energy technology, in simple terms?

To me, energy technology is about providing energy to people in an efficient and sustainable way. I feel the scope of energy technology is expanding. The shift from almost exclusively focusing on oil and gas, towards electrification and renewable energy, is opening up a much wider space to explore.

## Is there anything unique about what we do in this field here in Norway?

We have a unique collaborative culture and being able to collaborate in new ways will be critical to solving global challenges such as climate change and population growth.

## What do you think is the most important takeaway from our conversation?

Diverse and multi-disciplinary teams with great competencies and passion can create great things. That being said – it is everyone's responsibility to take part in the energy transition to drive our society forward. I would like to challenge our listeners today to think about how they can contribute – and then act on it!



# KURS SPØRSMÅL

**Adopting business models and technology within and outside the company is what Equinor does as?**

- a) Corporate innovation
- b) Digitalization
- c) Systems evolution

**From what is Norway a world leader in transferring some of the best technologies and ideas?**

- a) Different cultures and facets of life
- b) Existing infrastructure and offshore equipment
- c) The offshore oil sector to fields such as fisheries, energy and aquafarming

**In the internal challenge, how many ideas were awarded 1 million to develop them further?**

- a) 6 ideas
- b) 1 idea
- c) 10 ideas

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## RIKTIG SVAR

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Corporate innovation

The offshore oil sector to fields such as fisheries, energy and aquafarming

6 ideas

Podkast #0241



**ENERGYTECH**  
**RAGNHILD ULVIK**  
VICE PRESIDENT  
CORPORATE  
INNOVATION  
EQUINOR



**Scann og besøk bedriften**

<https://www.equinor.com/>



**ENERGYTECH**  
**KATHRINE K RYENGE**  
CEO  
ZEG POWER

Podcaster gjort i samarbeid med:



Lytt til podcast



## Hybridteknologi

In this episode of #LØRN, Silvija speaks with the CEO of ZEG Power, Kathrine K. Ryengen. She has extensive experience with technology start-ups and from commercializing innovative business models and technologies for industrial applications. Prior to ZEG Power, Ryengen worked 9 years in Scatec startup companies, including Norsk Titanium, a successful, global leader within additive manufacturing of structural titanium components for aerospace applications, where she was part of the original startup team and served as VP Business Development. ZEG Power works with efficient production of emission-free hydrogen with their self-developed technology. In the episode, Kathrine tells about this technology and how they are able capture CO2 from the production. She also shares her thoughts about the potential of hydrogen for Norwegian industry, in addition to the potential of what she refers to as "blue hydrogen".

## Om bedriften

ZEG Power's overall goal is to offer a clean alternative for global energy production. ZEG Power aims to do this through efficient production of clean hydrogen from hydrocarbon gases with integrated CO2 capture, based on the patented ZEG-technology. ZEG Power was established in 2008 as a spin-off from Institute for Energy Technology (IFE), Norway. The company is currently in the process of upscaling and commercialising its technology, in cooperation with key industrial partners, and supported by strong owners and positive market trends.

## Refleksjon

How would you explain the concept of transforming natural gas stations into hydrogen power stations?

Tema

Perspektiv



Tema: ENERGYTECH  
Gjest: Kathrine K Ryenge  
Språk: ENGLISH  
Perspektiv: STARTUP  
Innspilt: OSLO  
Vert: Silvija Seres

Du vil LØRNE om:

- ZEG Technology
- Energy.Tech
- Hydrogen
- CO2-fangst

Anbefalt lesing:

- <https://www.zegpower.no/>



“VI må forstå potensiale hydrogen kan ha for Norge og norsk industri, og spesielt potensialet til “blue hydrogen”.”  
- Kathrine K Ryenge

Norway - Pioneering Sustainable Energy Solutions



# Intervju

## Who is Kathrine and what drives you?

I am an engineer and I have spent a decade in technology consulting, as well as 10 years working with the development and commercialisation of new technology. I first became interested in energy technology back in 2008, while I was working for an offshore wind start-up owned by Scatec. I later became optimistic when I saw the tremendous global developments within renewable energy.

## What are you doing at work?

I am currently leading the efforts to achieve the successful commercialisation of an energy start-up called ZEG Power.

## What are the most important concepts in energy technology (your sub-branch)?

I believe that the most important concept in energy technology is the combination of technologies. By combining technologies, we can achieve green energy generation and utilisation. Renewable energy generation is critical to achieving global emission targets and a

circular economy. However, a bold renewable strategy will also need to be balanced with technologies that enable power balancing. Green hydrogen is expected to play an important role in the future energy mix.

## Why is it exciting?

Working to commercialise ZEG Power is exciting on many levels. I find commercialising Norwegian innovations and patents very rewarding. In addition, contributing to a positive environmental impact also gives meaning and substance. On top of that, you have the excitement of building a team, being exposed to new market developments – and having fun along the way.

## Your own favourite projects in energy technology?

My favourite projects have been in the application of the ZEG technology. It can be used to upgrade biogas to green hydrogen, enabling a negative CO2 footprint when utilizing the Bio-CO2. In addition, the ZEG technology provides for green hydrogen generation from natural gas, reducing CO2 emissions from industry – and that's exciting.

## Your other favourite examples of energy technology internationally and nationally?

I'm impressed with how the Norwegian company Nel has taken lead in the global Hydrogen market, and the impact of their efforts on the transport sector. I am also generally impressed by the size and maturity of solar power projects, as well as the global increase in offshore wind projects.

## How do you usually explain energy technology?

I usually start by explaining the problems associated with CO2 and how current solutions, such as CO2 capture, are costly and inefficient – and thus not viable in the long term. I go on to describe the ZEG Power Solution

for reforming hydrocarbon gas to hydrogen, which will not only reduce emissions, but also save costs and help companies of all sizes meet industry standards.



# KURS SPØRSMÅL

## From which two main sources is hydrogen produced?

- a) Residue from oil and gas
- b) ZEG Power
- c) Electrolysis of water or from gas

## What is the purpose of ZEG Power?

- a) To invest capital infrastructure in established industries
- b) To eliminate the concept of renewable energy
- c) To provide solutions to the vast emissions from gas sources, such as through generation of green hydrogen

## Why is Norway a good country for making gas greener with ZEG power?

- a) Knowledge. The companies within the oil – and gas industry keeps a strong legacy that makes the development of green hydrogen more efficient because eventual problems can be declined immediately because of the companies' long experience of what works or not
- b) Proximity. Proximity the oil – and gas resources and the oil companies with strong legacy makes development of greener oil and gas more efficient
- c) Norwegian companies are flexible, problem solvers and eager for a greener change, so no distance are stopping negotiations by keeping meetings about how to generate green hydrogen over video communication tributes to less use of oil – and gas when flying into meetings



**ENERGYTECH**  
**KATHRINE K RYENGE**  
 CEO  
 ZEG POWER

## RIKTIG SVAR

Electrolysis of water or from gas

To provide solutions to the vast emissions from gas sources, such as through generation of green hydrogen

Proximity. Proximity the oil – and gas resources and the oil companies with strong legacy makes development of greener oil and gas more efficient

**ZEG Power** 



**Scann og besøk bedriften**

<https://www.zegpower.no/>

# Lørn manifesto

Ingen bør kaste bort tid og penger på ferdigheter som snart er ubrukelige. Vi må lære relevante ting for den fremtiden vi skal inn i. En reklame spør: do you think it is about mindset or skillset? Svaret er: BOTH! Mindset uten skillset er ubrukelig; skillset uten mindset er retningsløs.

Skillsa for fremtiden vil være en kombinasjon av teknologisk kunnskap og mot til å tenke selv. Vi må tørre å mene noe om hvordan denne fremtiden skal være, for å kunne ta aktive valg. Det er for enkelt å si at «vi bare lærer kidsa å kode». Det er alle som må lære og vi må lære mer enn koding. Vi trenger å lære kidsa og alle andre, DIGITAL SKAPERKRAFT. Vi må bli noe mer enn gode forbrukere av ny teknologi – vi må kunne skape den om. Og vi voksne må ikke tåle så inderlig lett den læringen som ikke gjelder oss selv.

Men hva er de nødvendige ferdigheter for fremtiden?

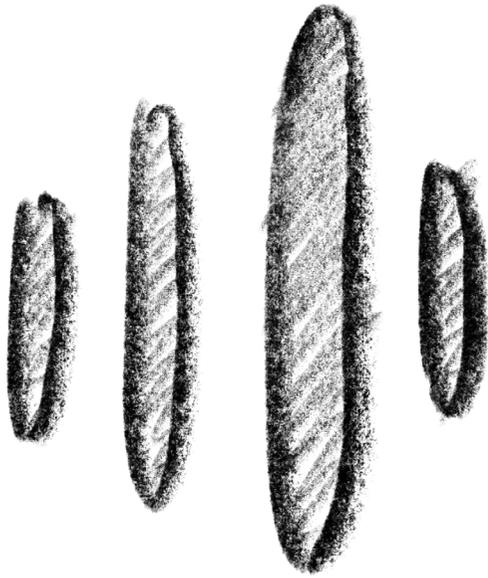
Direkte konkurranse mot roboter er en tapt kamp for mennesker. Robotar, automasjon og AI dreier seg om det maskinene er veldig gode på. Det er å kunne lese og finne mønstre i store data mengder, men det å tolke disse mønstrene på riktig måte, en måte som også er kulturelt og politisk forankret, som speiler den uhyre komplekse menneskelige psyken, det er bare mennesker som kan og bør gjøre. Bedre og billigere roboter vil kunne utføre de fleste av våre rutinemessige oppgaver som krever liten eller ingen kreativitet. Derimot oppgaver som krever fleksibel handling i uforutsigbare omgivelser, og som krever empati, vil mennesker alltid være flinkere til. AI passer godt for administrative og rutinemessige oppgaver. Mennesker er uovervinnelige på oppgavene som krever omsorg og omtanke. Uansett vil det være spennende og kreve mye ny kunnskap.

Claude Shannon, faren til Informasjonsteori, sa: «We know the past but cannot control it. We control the future but cannot know it».

Bli med og utforsk fremtiden, så vi kan sammen drive den i en god retning.

Gründer  
Silvija Seres





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