

# ATV-MEETING

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**Organizer** ATV's Operating Group Electro- and Information Technology

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**Time** September 28, 9.30-17.00

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**Venue** Glassalen, Technical University Denmark  
Anker Engelundsvej 1, Building 101 A  
DK-2800 Kgs. Lyngby

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## Energy storage – a must for successful conversion to green energy

In Denmark, we aim to become independent of fossil fuels and to be able to produce enough renewable energy to cover the total Danish energy consumption - including transportation by 2050. To achieve the goal of a full conversion to green energy, it is crucial to develop effective and economically sustainable solutions for storing energy.

At a meeting on September 28, ATV will gauge Denmark's performance as to energy storage and discuss what is needed to develop better solutions that can be implemented in both the major utility corporations, in industry and in the consumer chain.

The meeting is intended primarily for researchers, businesses, government agencies, interest groups and decision-makers in the field.

Registration and refreshments from 9.30 am.

*Moderator: Head of Department, Prof. Søren Linderøth, DTU Energy*

## Programme

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### SETTING THE SCENE

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**10.00**      **Welcome**  
*ATV President Carsten Orth Gaarn-Larsen*

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**10.10**      **The upcoming role of energy storage in Denmark and Europe**  
*Head of Section Allan Schrøder Pedersen, DTU Energy*

Energy storage will expectedly be a central part of the future sustainable energy system, where we can no longer rely on dispatchable fossil resources. Transport, electricity grid services, heat and gas supply are important parts of our energy system and will all require energy storage to optimize the total system and make it more efficient. The presentation will briefly introduce the services storage can provide to different sectors of the energy system in a Danish and European perspective.

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**10.30 Power Transmission – National and International Perspectives**

*Chief Engineer Anders Bavnhøj Hansen, Energinet*

Analysis of scenarios of the energy system towards 2025, 2035 and further shows that the power-transmission system together with other assets is beneficial to balance the fluctuating wind- and solar energy. The presentation will illustrate national and European perspectives when the transmission system is used to balance wind- and solar energy. Transmission-system is also presented in combination with other power system balancing assets.

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**10.50 Energy Storage in the Distribution Grid – Potentials and Barriers**

*Majbrit Høyer – Director, Grid Strategy, DONG Energy Distribution.*

What are the challenges faced by Danish DSOs in the future renewable based energy system?

What is the potential role of energy storage in the future distribution grid? What are the barriers for large-scale commercial deployment of energy storage in the Danish distribution network?

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**POSSIBILITIES**

**11.10 Electricity Storage in Batteries**

*Professor Tejs Vegge, DTU Energy*

Electrochemical energy storage in batteries provides a highly efficient method for storage of energy from renewable sources, but high cost and low energy density remains a challenge. Emerging battery technologies will be presented and evaluated, with particular focus on meeting the future needs of the transportation sector as well as the challenges associated with grid-scale storage.

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**11.35 Power to Gas Storage**

*Professor Peter Vang Hendriksen, DTU Energy*

Contribution schemes for converting “power to gas” via electrolysis will be presented and the potential of such to solve the storage challenge of the future Danish energy systems will be discussed. Different electrolysis technologies will be introduced and some of the key challenges facing them presented. On the electrolysis part, the main emphasis will be on solid oxide electrolysis (SOEC). This is the least mature of the currently pursued electrolysis schemes, but the technology has distinct advantages in terms of reversibility, efficiency and potential for low cost.

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## SOLUTIONS – 4 SHOWCASES

- 12.00**      **The innovation process within Maersk Drilling and how energy storage can support our business objectives**  
*CTO og Vice President Frederik Smidth, Maersk drilling*

Maersk Drilling will present their innovation process, how the process focus both on adding new value propositions for clients as well as how technical innovation can improve leading edge on safe drilling performance and efficiency.

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**12.25**      **LUNCH**

- 13.15**      **World leading Danish frontier within wave power generation**  
*CEO, founder Erik Friis-Madsen, Wave Dragon*

Where is Wave Power generation today, what are the primary objects limiting this power generation source today? Can any lessons be learned from the wave power generation market introduction?

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- 13.40**      **Experience with primary reserve supplied from energy storage system**  
*Chief Specialist, Electric Power Technologies, Philip Carne Kjær, Vestas Wind Systems*

A 1.6MW/0.4MWh Li-ion battery energy storage system has been operated for three years in Western Denmark. The system has originally been used to experiment with functionality coordinated with the adjacent wind farm, later for provision of frequency regulation and participation in the primary reserve market. The presentation covers practical experience obtained during the first years of operation, such as: recorded performance during operation, identifies losses in main power conversion and auxiliary power supply, and a proposed battery charging strategy that allows compliance with the technical performance requirements from the transmission system operator.

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- 14.05**      **Mobil and stationary battery energy storage solutions – Status and Trend**  
*Daniel Aggeler, Dr. sc. ETH, Global Research Program Manager, ABB*

The trend on battery energy storage solutions is ongoing and shows even a clear trend in heavily growing market in future. There are various different functions as frequency regulation, peak shaving and integration of renewables on battery storage applications and each of them has its own challenging field. Within the talk different battery technologies their status and trend will be addressed as well as one pilot installation on stationary side will be presented.

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**14.30**      **COFFEE BREAK**

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## PANEL DEBATE

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**14.55**

**Panelists:**

- *Director General Morten Bæk  
Danish Energy Agency TBC*
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- *Scientific Officer Niels Languvad  
Innovation Fund Denmark*
- *Director, Grid Strategy, Majbrit Høyer  
DONG Energy Distribution*
- *Chief Engineer, Anders Bavnhøj Hansen  
Energinet*
- *CEO, founder Martin Speierman  
WattsUp Power*

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**15.50**

**Closing remarks**

*Head of Department, Prof. Søren Linderøth, DTU Energy*

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**16.00-17.00**

**Networking**

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