Wind energy in Denmark

Head of International Business Development & Events

Anders Dalegaard

DANISH WIND INDUSTRY ASSOCIATION

Agenda

- **Who is** The Danish Wind Industry Association?
- **Wind power in Denmark** – a brief history of where it all began and where we are going
- **New energy agreement** – the offshore elements
- **The Danish wind industry** – status today
- **Technological development** - why wind is the natural choice

DANISH WIND INDUSTRY ASSOCIATION

About DWIA

DWIA:

- BREAKING NEWS: Wind Denmark
- Started 1981 organizing only turbine manufactures Today, we cover the entire value chain
- 25 employees and four offices in Denmark
- Denmark's largest interest and business organisation focusing only on wind energy
- app. 200 members from one person companies to Siemens Gamesa, Envision and Vestas with global footprint and 5,000+ employees each. Represents the full supply chain incl. project developers, turbine owners and utilities and investors
- Facilitate networks, cooperation and generate market knowledge and distribute facts for our members and to the public
- Do lobbying work regarding energy policy and industrial policy

Vision:

- To be the cost competitive home for the global wind industry

Anders Dalegaard:

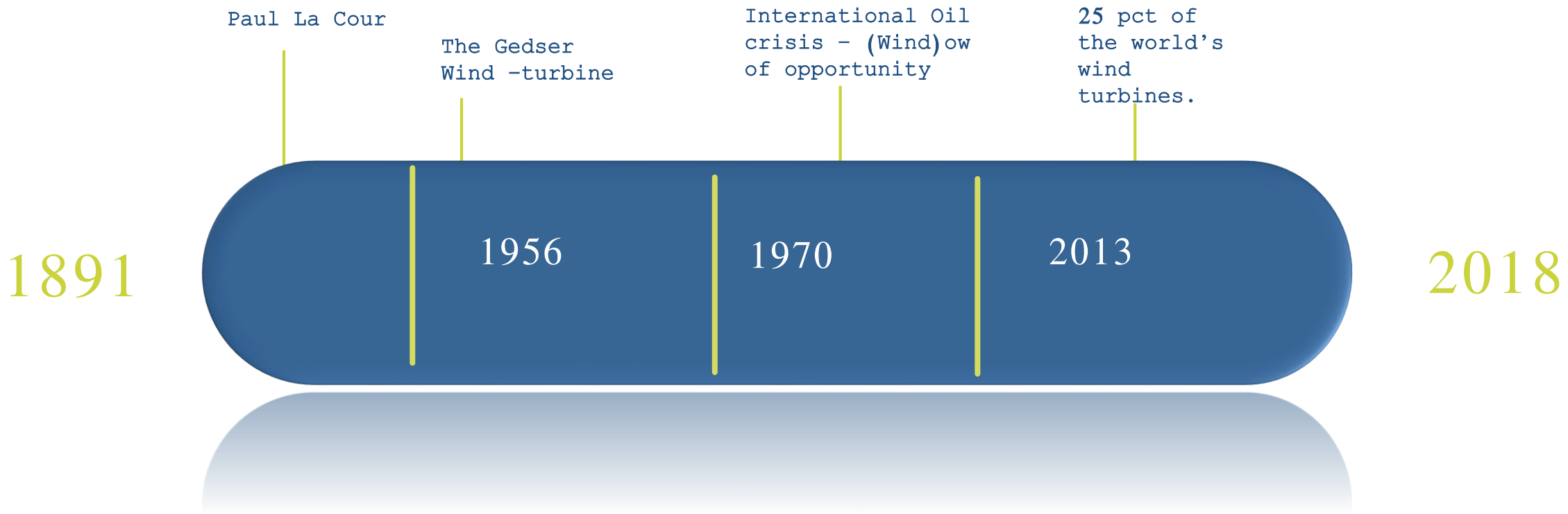
- Part of DWIA since 2006
- MSc in environmental planning & renewable energy
- Head of International Business Development & Events

DANISH WIND INDUSTRY ASSOCIATION

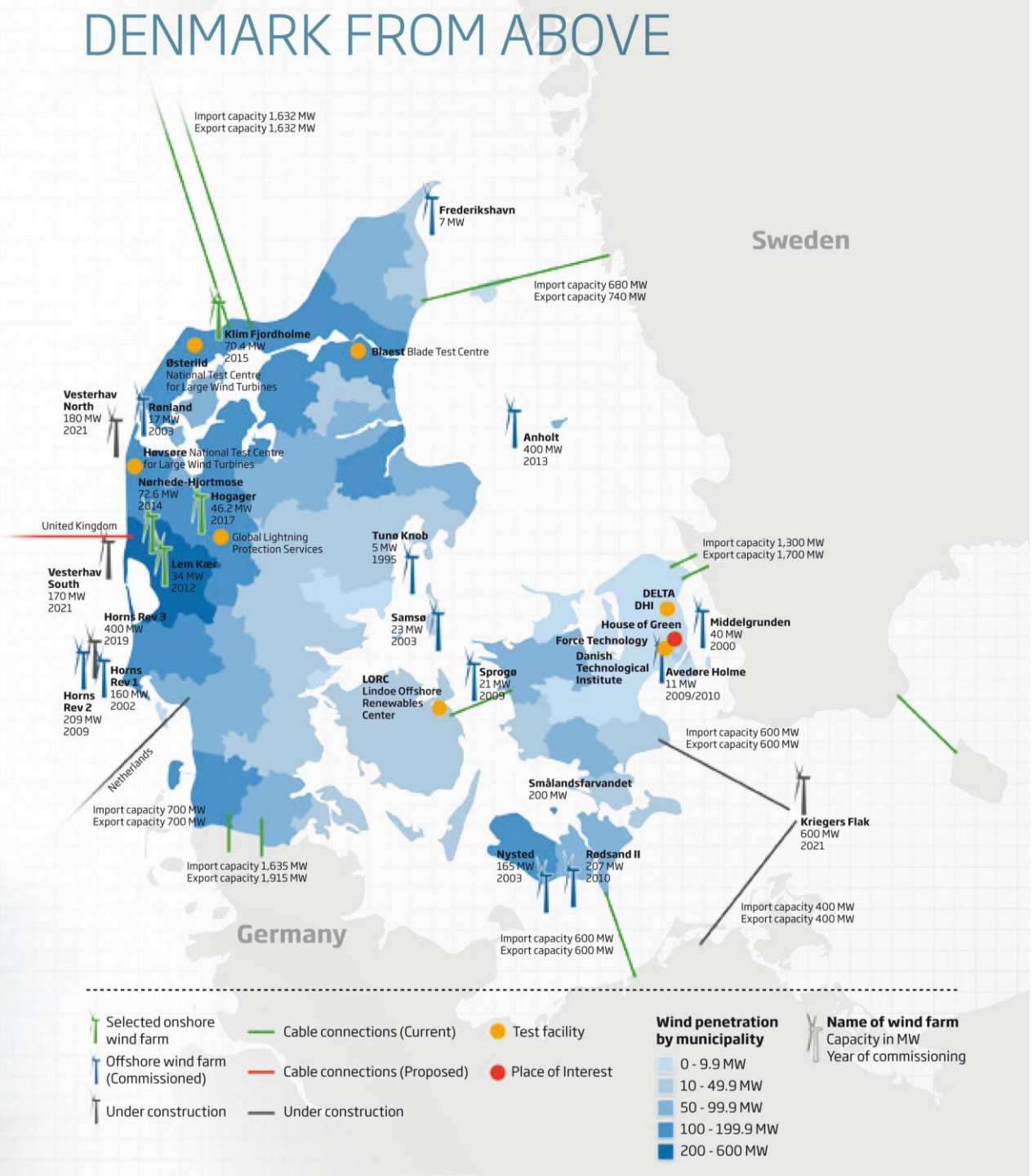
History and current status of wind energy in Denmark

DANISH WIND INDUSTRY ASSOCIATION

Where we came from



DANISH WIND INDUSTRY ASSOCIATION



Denmark has 1,3 GW offshore wind capacity going up to approx. 2,6 GW by the end of 2021 and minimum 5 GW by 2030.

4 large offshore wind farms are under construction.

Onshore capacity of roughly 4,400 MW. This capacity will increase while no. of turbines will go down.

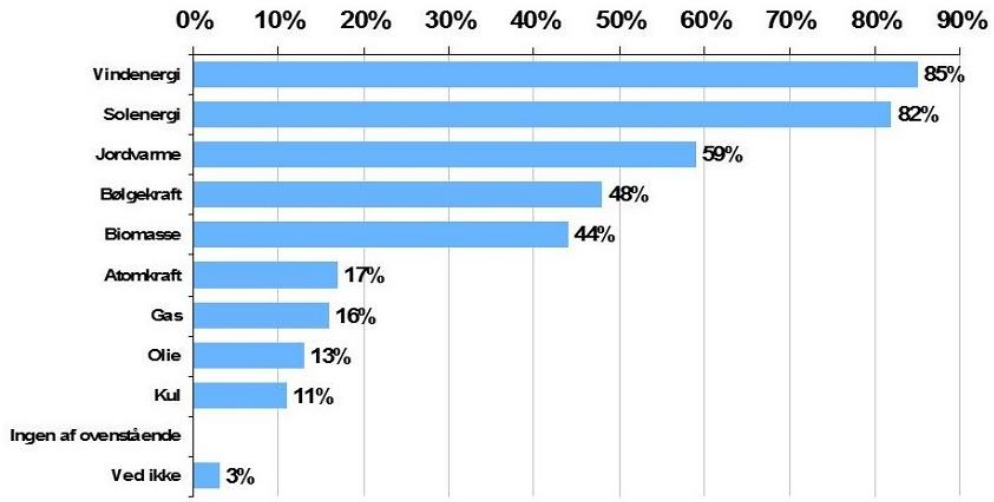
Strong interconnections to neighboring countries.

DANISH WIND
INDUSTRY ASSOCIATION

Strong commitment in the public

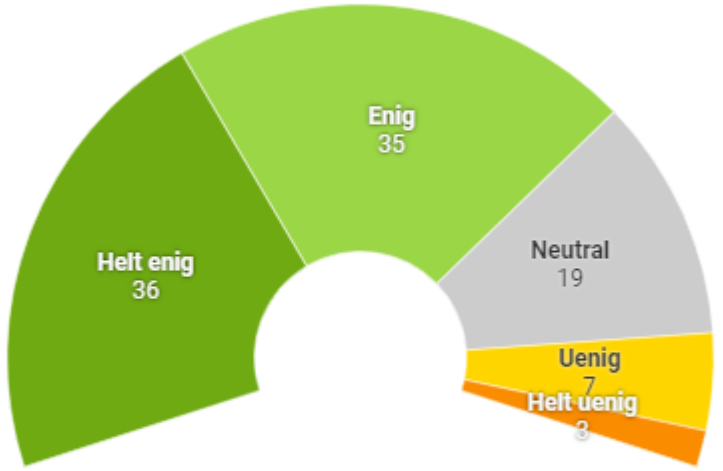
01. Hvilke af følgende energiformer mener du Danmark bør satse på at udbygge frem til 2030? Du bedes prioritere de forskellige energiformer efter, hvor vigtige du synes de er at udbygge?

4243 besvarelser



MEGAFON

Det er vigtigt, at der opstilles vindmøller på land i Danmark både nu og i fremtiden?

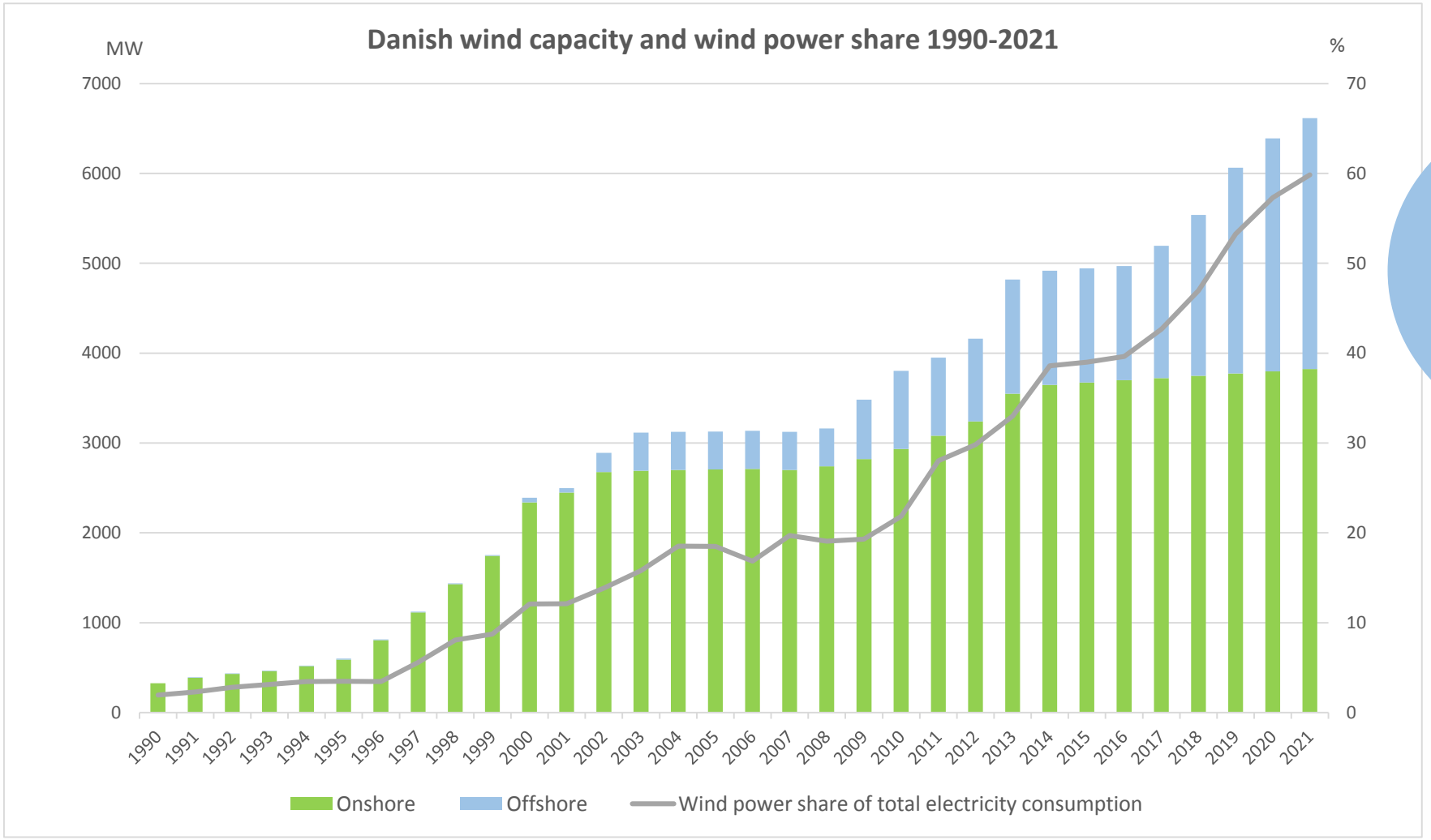


Meningsmåling, juni 2018, gennemført af Wilke for Vindmølleindustrien. 1.016 repræsentative respondenter

Get the data · Created with Datawrapper

DANISH WIND INDUSTRY ASSOCIATION

World record in share of electricity consumption

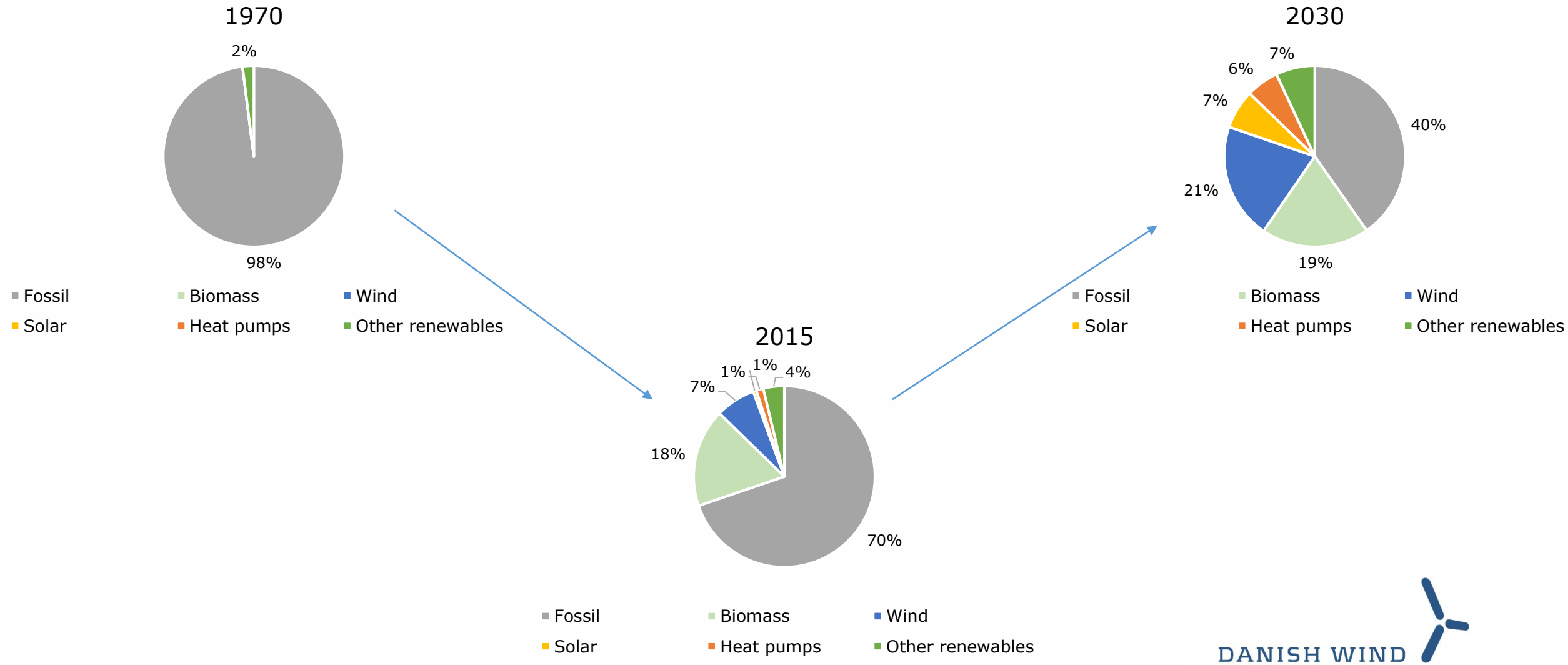


43,7 % in 2017

~ 60 % by end of 2021

DANISH WIND INDUSTRY ASSOCIATION

Zooming in on the Danish energy system



DANISH WIND INDUSTRY ASSOCIATION

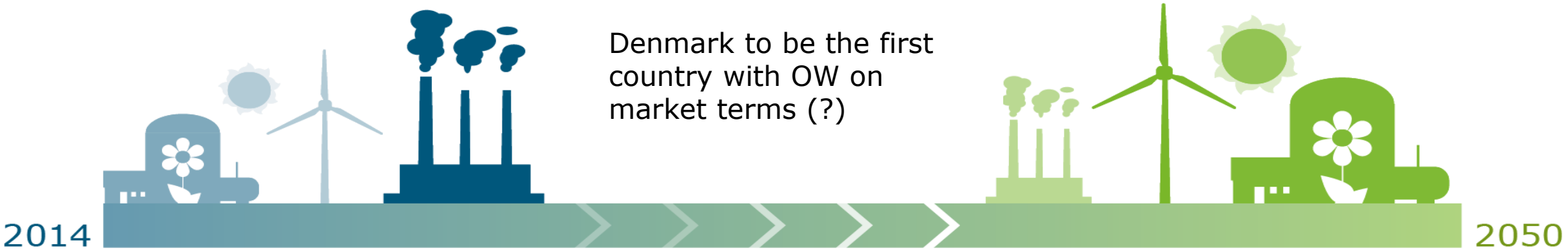
Danish targets and commitments

On track to outperform the ambitions for 2020

Minimum 55% RES in energy consumption by 2030

Denmark to be the first country with OW on market terms (?)

Denmark as a low emission society independent of fossil fuels no later than 2050



Means to enable an efficient green transition

SHORT TERM

- International connections
- Cross-border markets

MEDIUM TERM

- Smart Grid
- Integration of electricity, gas, heat and transport

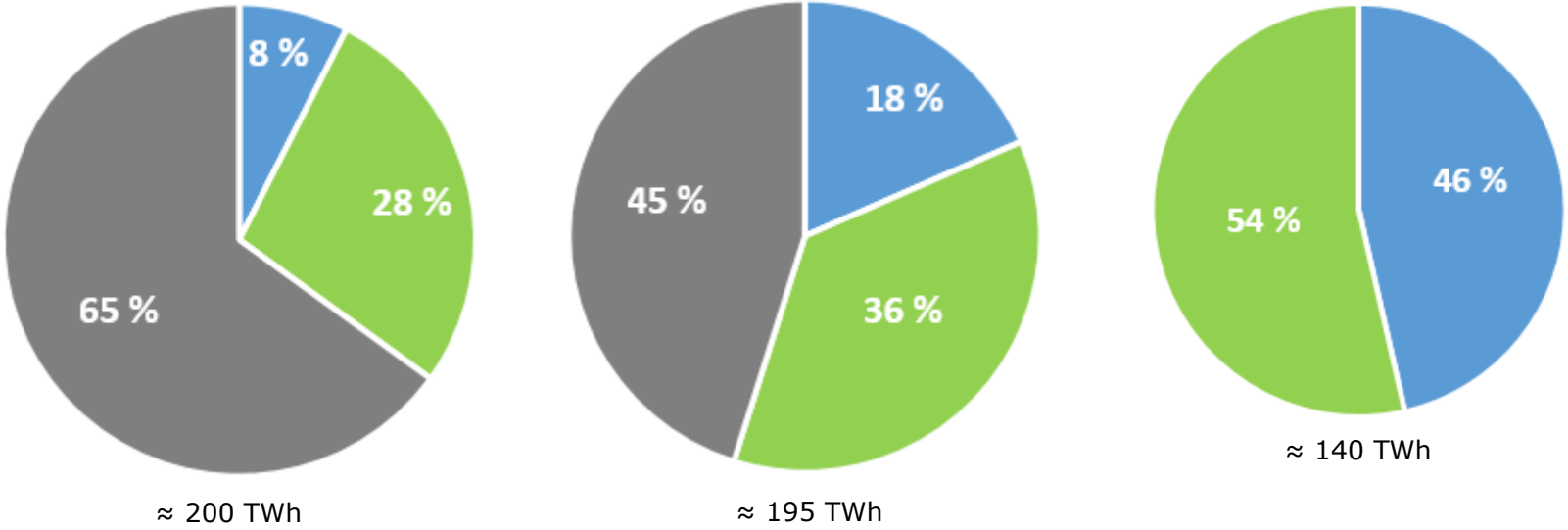
LONG TERM

- Storage of wind power
- Green gases

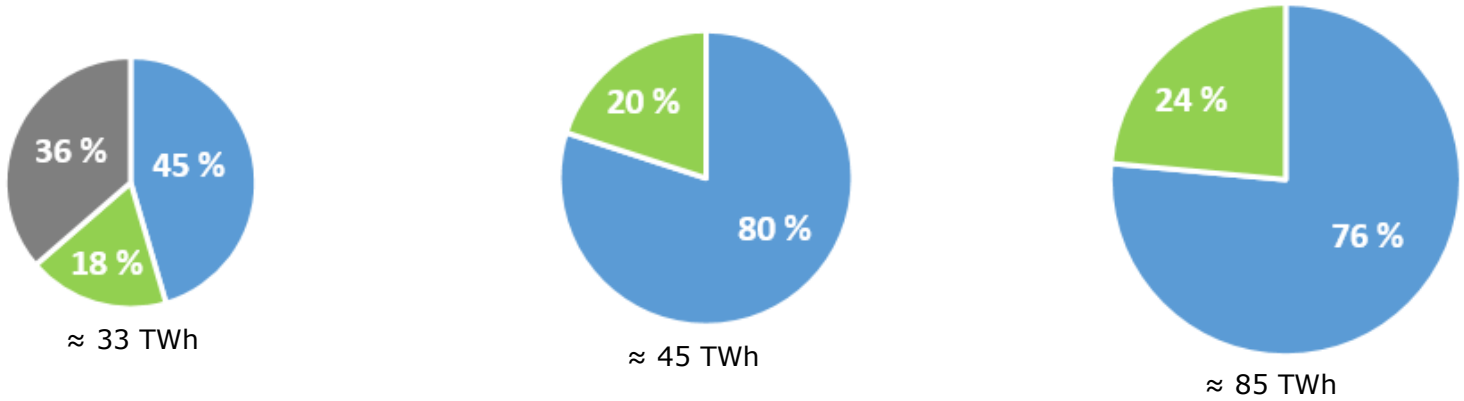
DANISH WIND INDUSTRY ASSOCIATION

Electrification is the key to a green energy system

Renewables' share of the *energy* consumption



Renewables share of the electricity consumption



Wind Other renewables Fossil

DANISH WIND INDUSTRY ASSOCIATION

A new energy agreement

DANISH WIND
INDUSTRY ASSOCIATION

New Danish Energy Agreement

- Parties: Agreement reached on June 29, 2018 by all parties in the Parliament.
- Short term commitment: 55% RE in energy sector in 2030
- Effect: 100% RE in electricity by 2030. ~80% wind!
- Long term commitment: Net zero emission society by 2050 at the latest.
- Further content:
  - DKK 4.2 billion (EUR 564 million) for technology neutral tenders 2020-24
  - DKK 4 billion (EUR 537 million) is allocated to expand the production of green biogas
  - From 2021 to 2024, DKK 500 million (EUR 67 million) annually will be allocated to a market-based grant pool focused on energy savings
  - A reserve of DKK 400 million in 2025 (EUR 54 million) and then DKK 500 million (EUR 67 million) annually will be allocated to further enhancing the use of renewable energy after 2026.
  - Immediate relaxation in electricity and electric heating taxes, which amounts to approximately DKK 2 billion (EUR 268 million) in 2025 (excl. VAT).
  - DKK 500 million (EUR 67 million) is allocated to green transportation in 2020-2024, in order to enhance green mobility and transportation.
  - The parties agreed on phasing out coal in the Danish electricity production by 2030, hereby joining the international initiative with the same purpose.
  - Energy and climate research will receive a cash injection with a target of DKK 1 billion (EUR 134 million) by 2024.

DANISH WIND INDUSTRY ASSOCIATION

Onshore wind post 2020

Technology neutral auctions

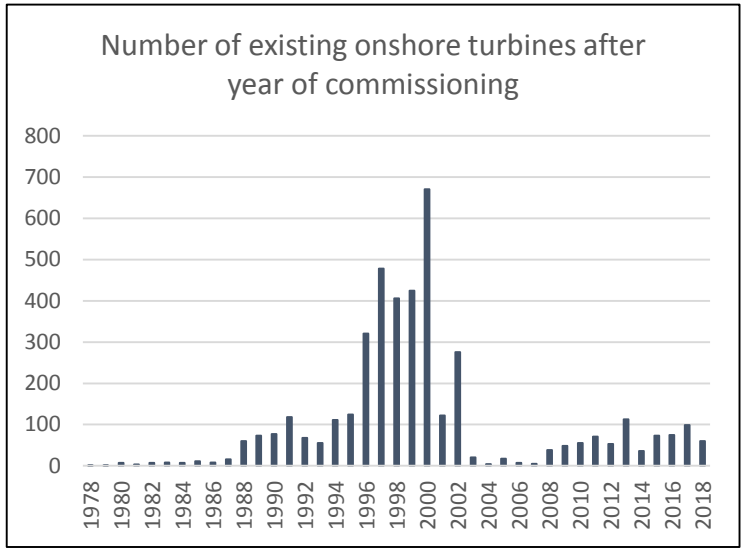
- Onshore wind is part of yearly technology neutral auctions 2020-24 – overall budget of DKK 4.2 billions (EUR 564 million)

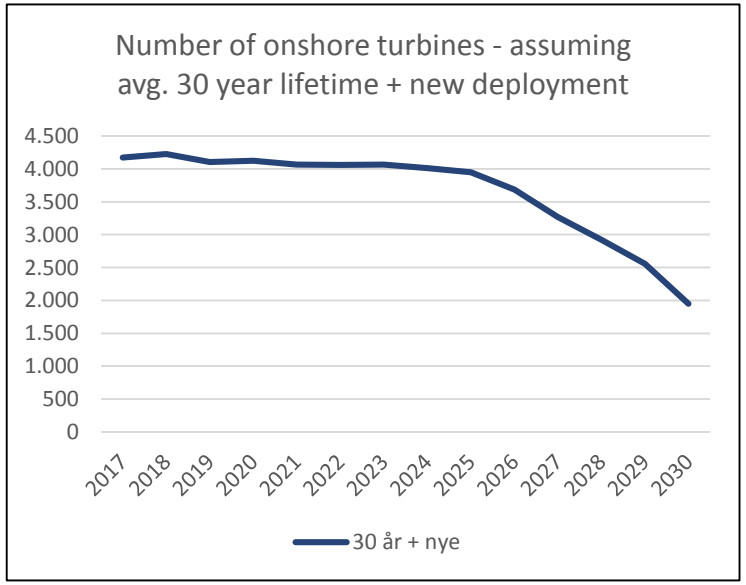
Development of a repowering strategy

1) Political goal of reducing the number of turbines onshore with more than 50% by 2030

2) Improved regulatory framework for planning

- 150-meter tip height restriction to be removed
- New economic incentive to municipalities and communities
- Introduction of a residential property "take over option" for neighbors
- Review of the 20% local ownership regulation





DANISH WIND INDUSTRY ASSOCIATION

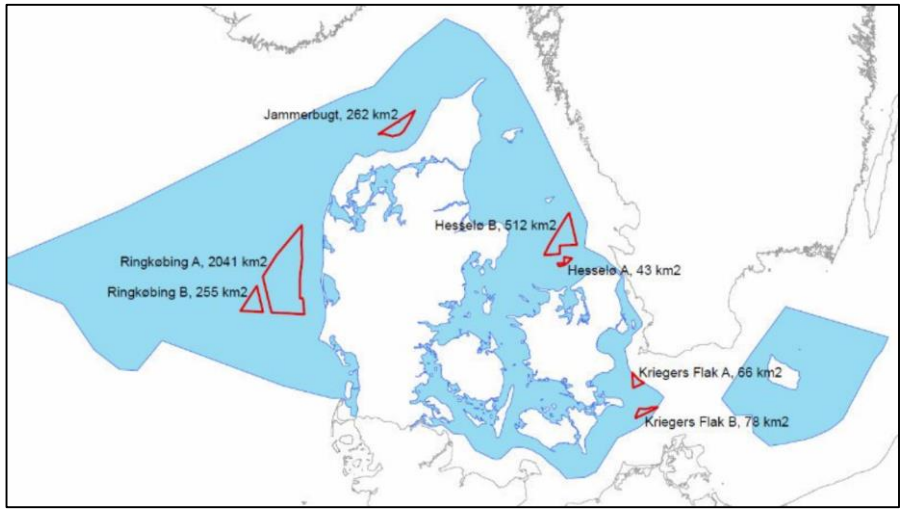
Offshore wind post 2020

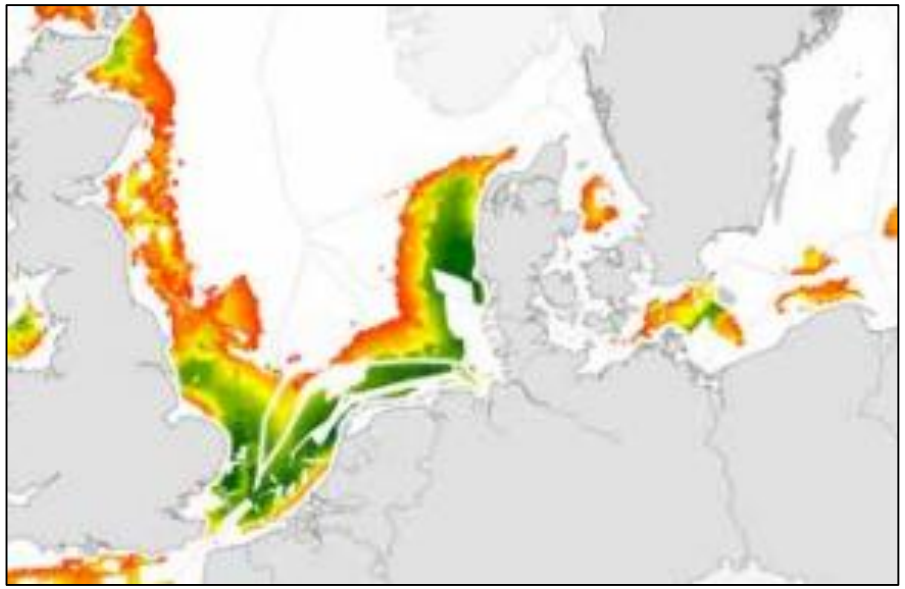
Screenings and potentials

- Screening for the planned 2,400 MW (3 parks before 2030) includes potential of 14-17 GW
- Additional '10 GW screening' planned
- Vast economically attractive resource potential exceeding domestic needs

Analysis to identify optimal framework conditions for utilizing the vast offshore wind potential

- How to pave the way for merchant marked driven deployment?
- How to secure healthy competition and maximize socio-economic benefit?



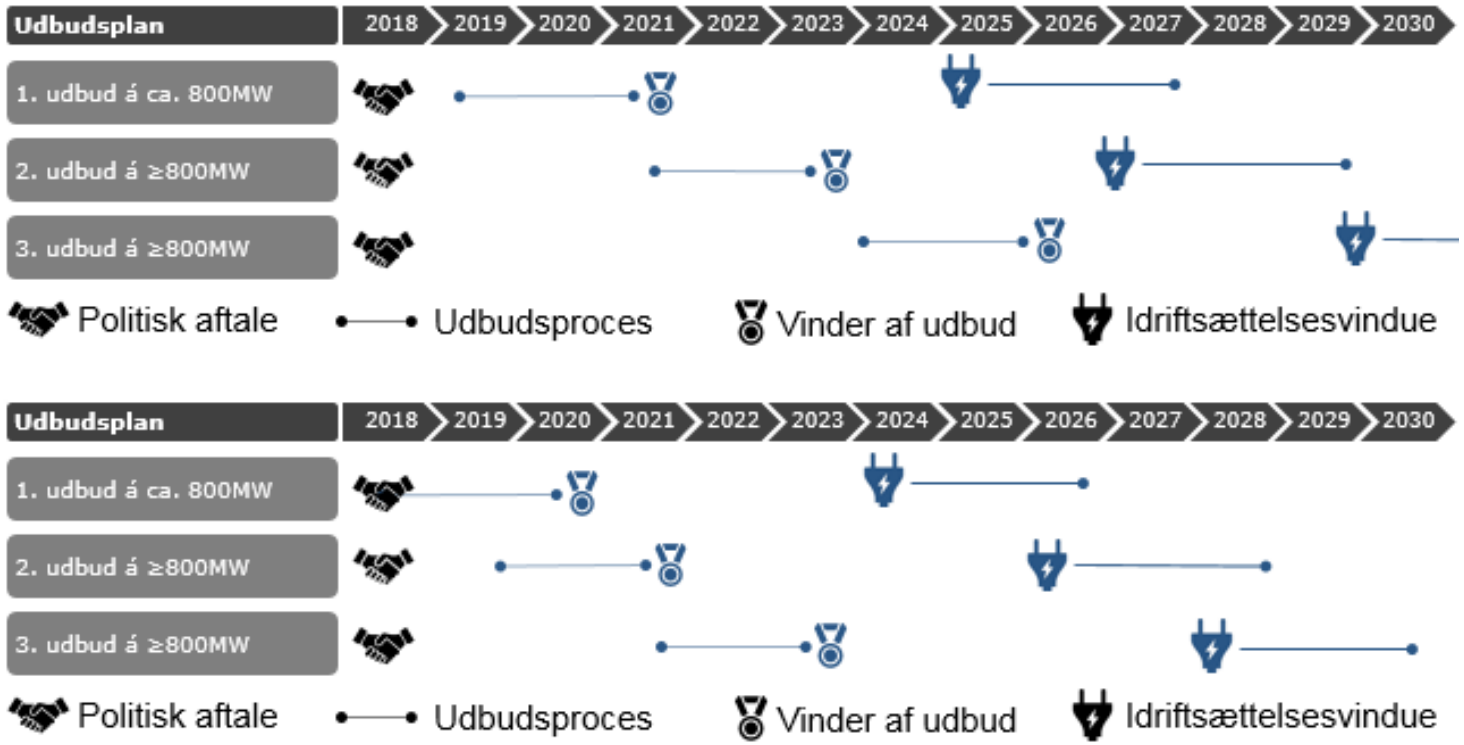


DANISH WIND INDUSTRY ASSOCIATION

A few recommendations from the industry

DANISH WIND
INDUSTRY ASSOCIATION

Stable market outlook, volume and timelines



Expected official timeline

Recommondations from DWIA

DANISH WIND INDUSTRY ASSOCIATION

Anholt Offshore Wind Farm created ripple effect

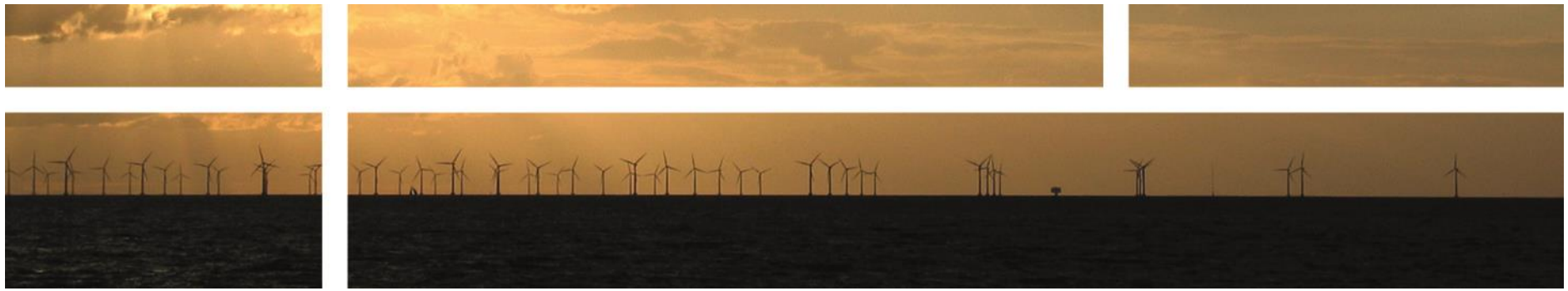
- The project creates approximately 8,000 jobs in the construction period*
- Orders for almost 7 billion DKK with Danish-based companies
- Orders for more than 450 million DKK and 330 jobs with local suppliers
- Operation crew of 70 employees in Grenaa
- Conscious use of local companies as sub supplier to our main suppliers was a success, e.g. through Djurs Wind Power
- Creating the right network was the key to success

*The Danish Energy Agency and Danmarks Statistik have estimated the total net employment effect in Denmark at 8,000 jobs in the construction phase.

DANISH WIND INDUSTRY ASSOCIATION

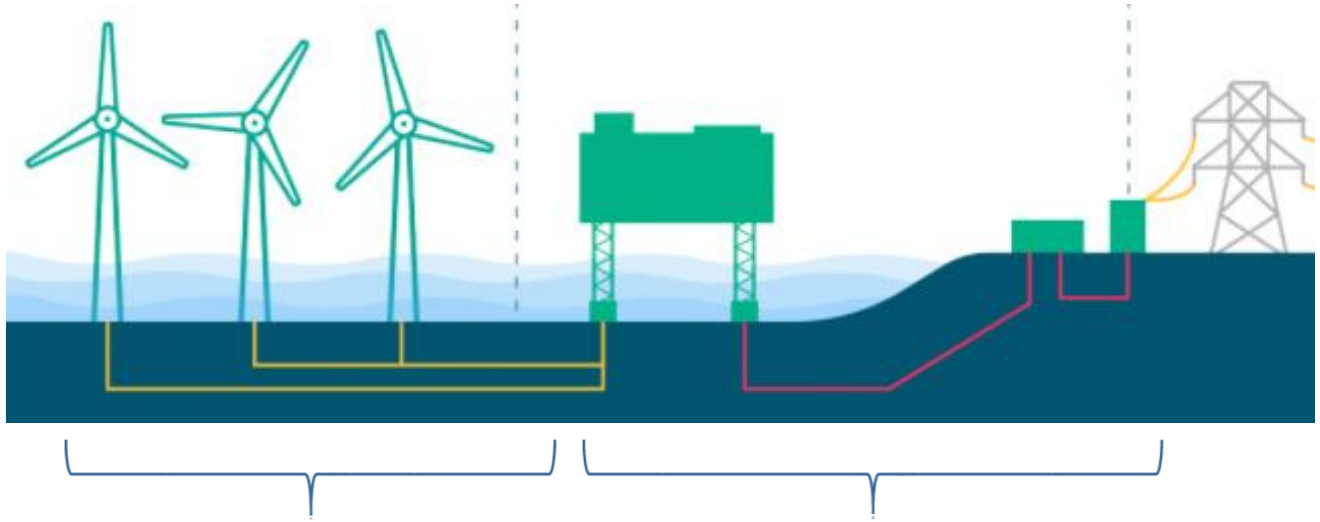
Local clusters

- Establish local business clusters around the installation and service ports (20-40 companies)
- Elect a board / steering committee
- Hire coordinator / representative for the cluster
- Establish ”One point of contact”
- Offer 24 / 7 service
- Team up in logical cooperation's and consortiums
- Cooperation within the agreed framework conditions
- Together your are strong



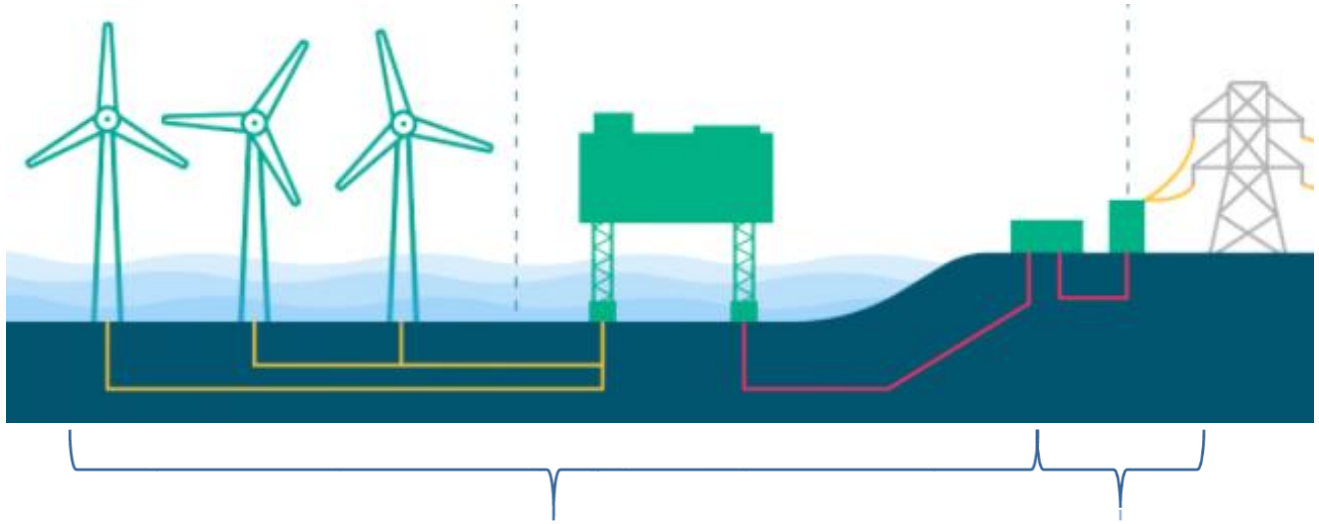
DANISH WIND
INDUSTRY ASSOCIATION

Full scope – a potential cost saver



Wind farm - developer

Grid & transmission: TSO, builds, owns & operate



Park + grid + transmission - developer

Onshore grid connection - TSO

DANISH WIND INDUSTRY ASSOCIATION

The Danish wind industry

DANISH WIND
INDUSTRY ASSOCIATION

Where we are now

Almost 33,000 employees in the wind industry = 2,3% of the total private workforce (85,000 jobs incl. indirect jobs)

19,4 billion Euro turnover

Export of 7,1 billion Euro, up 38% since 2006.
The wind industry accounts for 3,9% of all Danish exports

Denmark houses some of the most experienced, competitive and globally oriented wind companies in the world

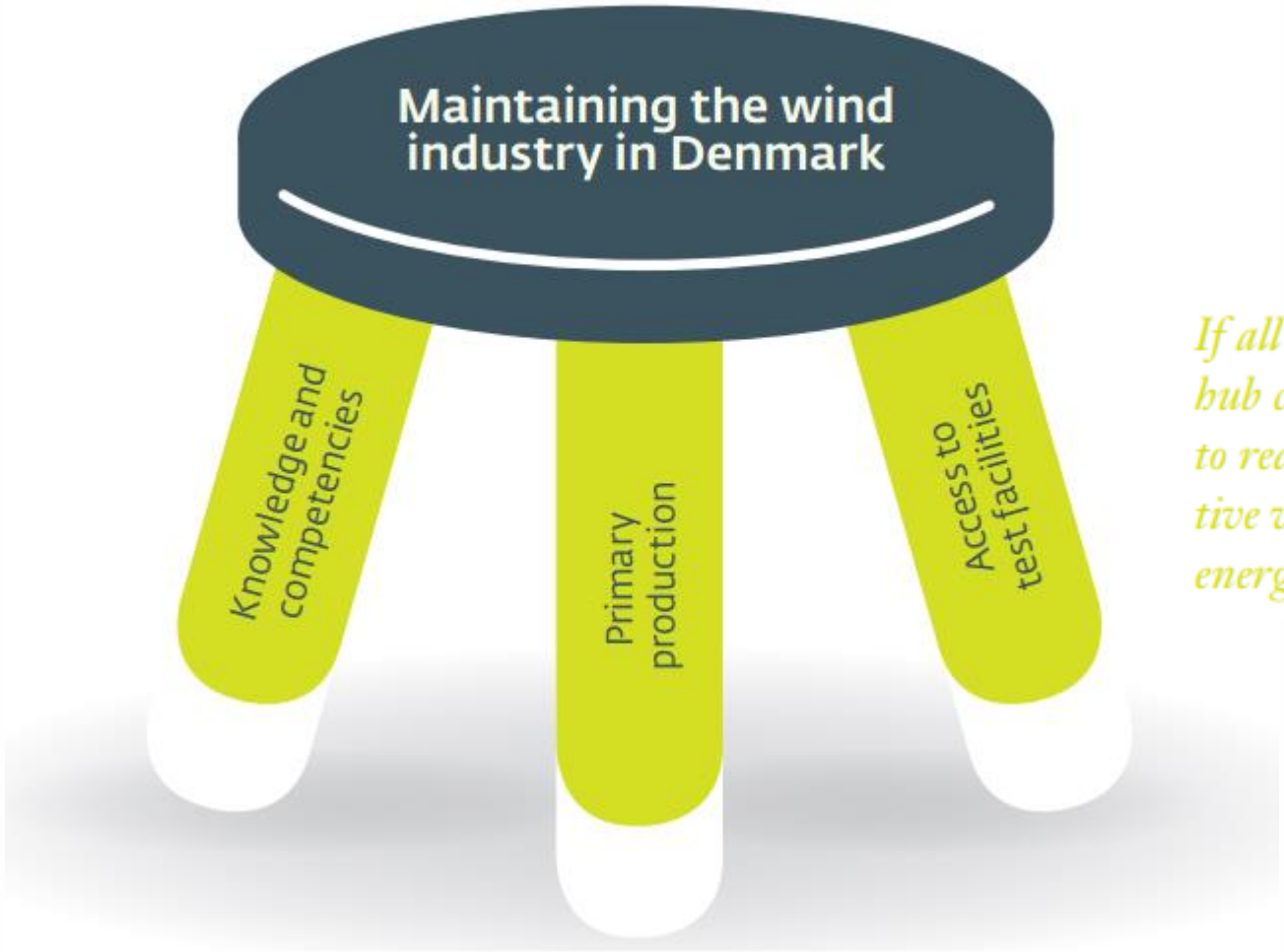
World class test facilities, easy market access, extensive expertise and unique knowledge

The Danish supply chain has been strongly involved in most offshore wind farm projects in the world

Strong tradition of welcoming companies from outside Denmark, such as Envision, Alstom, GE and Goldwind who have development facilities in Denmark.

We define today's best practice and standards in the industry and the global industry follows

DANISH WIND
INDUSTRY ASSOCIATION



If all three legs are regularly re-enforced, the position as leading hub can remain strong, and will accelerate the industry's ability to reduce cost of energy and be in the race to deliver the competitive wind energy solutions on market terms in the principal wind energy markets.

DANISH WIND
INDUSTRY ASSOCIATION

Megatrends impacting the supply chain

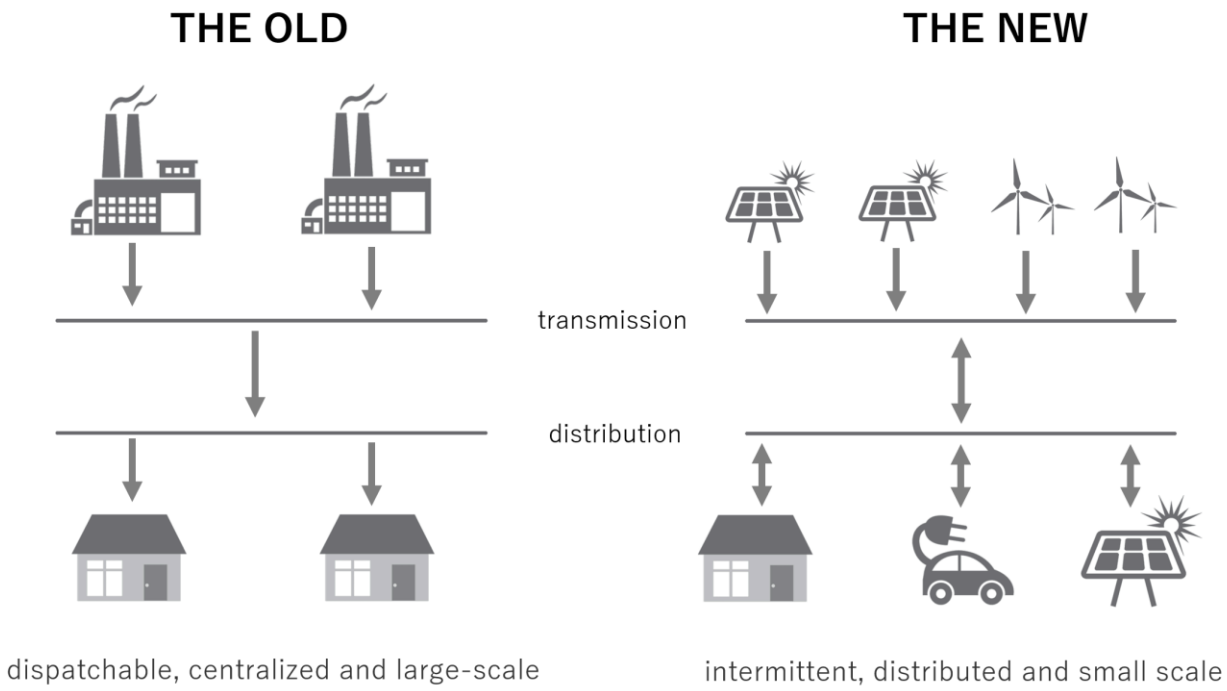
Globalization

Integrated energy systems

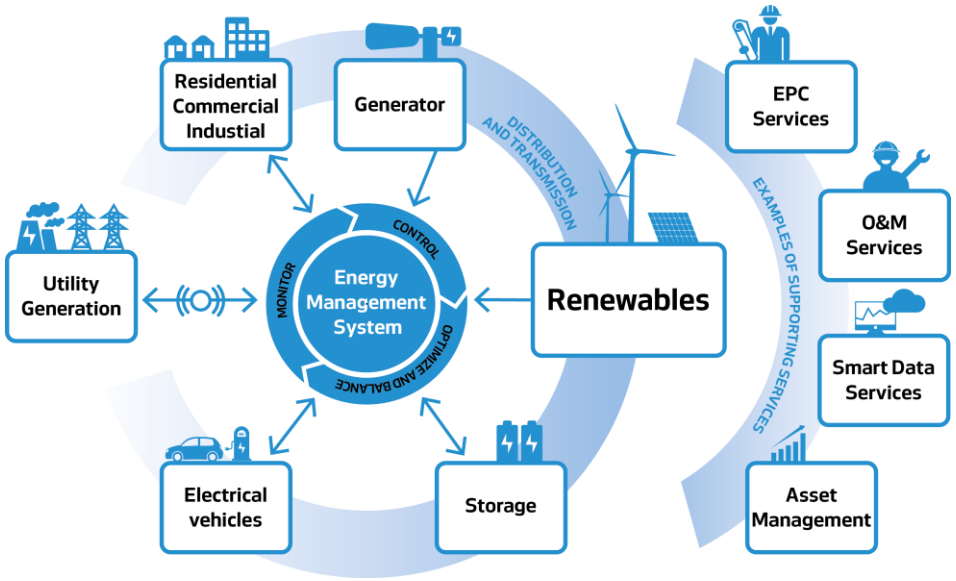
DANISH WIND INDUSTRY ASSOCIATION

The new energy system looks different

Through challenges…



…possibilities are created



DANISH WIND INDUSTRY ASSOCIATION

The main supply chain challenge!:

Reducing Cost of Energy

DANISH WIND INDUSTRY ASSOCIATION

Three noticeable trends in the supply chain

- **Consolidation throughout the supply chain**
- **System suppliers**
- **Standardization of procedures and components**

DANISH WIND INDUSTRY ASSOCIATION

Technological development

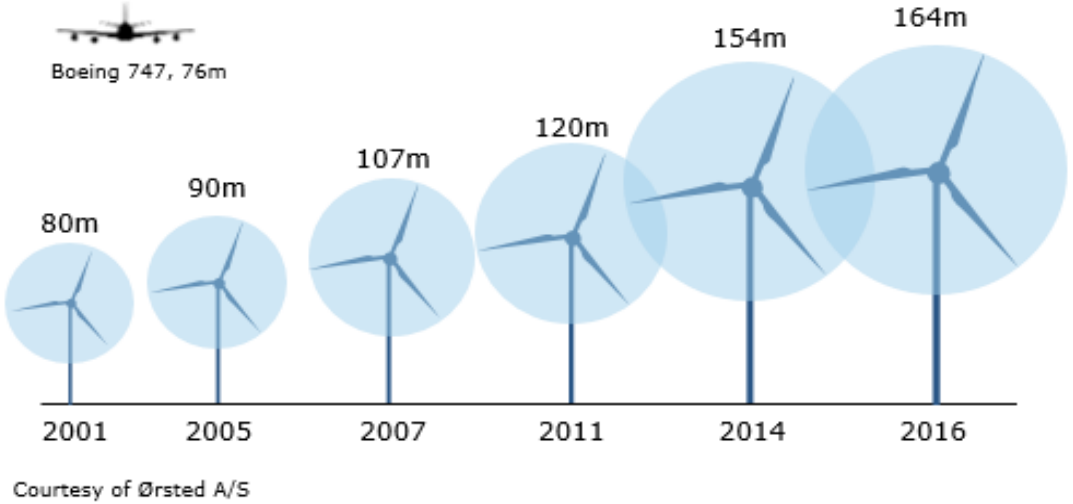
Price of wind is coming down - fast

The price reduction of wind energy

The price of wind has seen large price reductions in the last couple of year. The main keys to this development is:

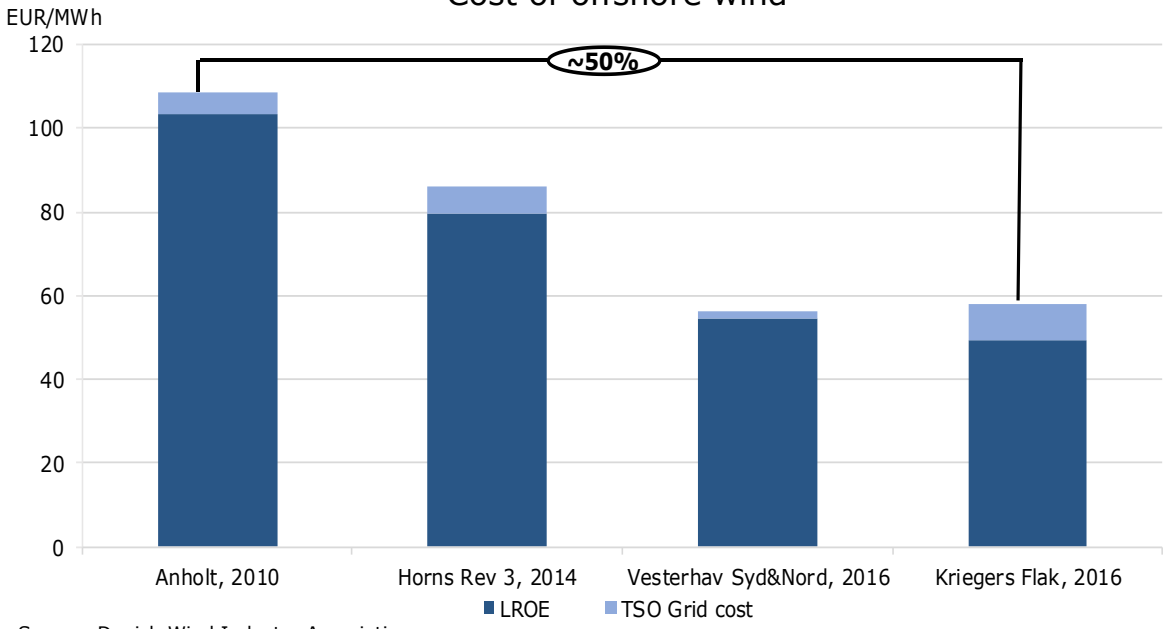
- Bigger wind turbines
- Market volume, industrialization and scale
- Intensified competition in successful tenders

Rapid technological development



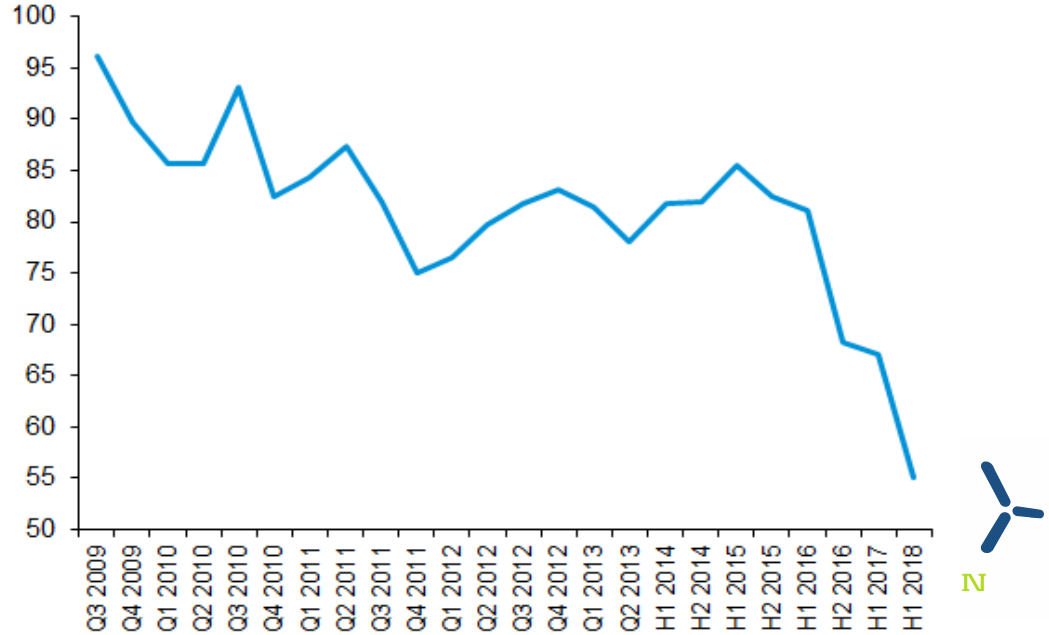
Courtesy of Ørsted A/S

Cost of offshore wind

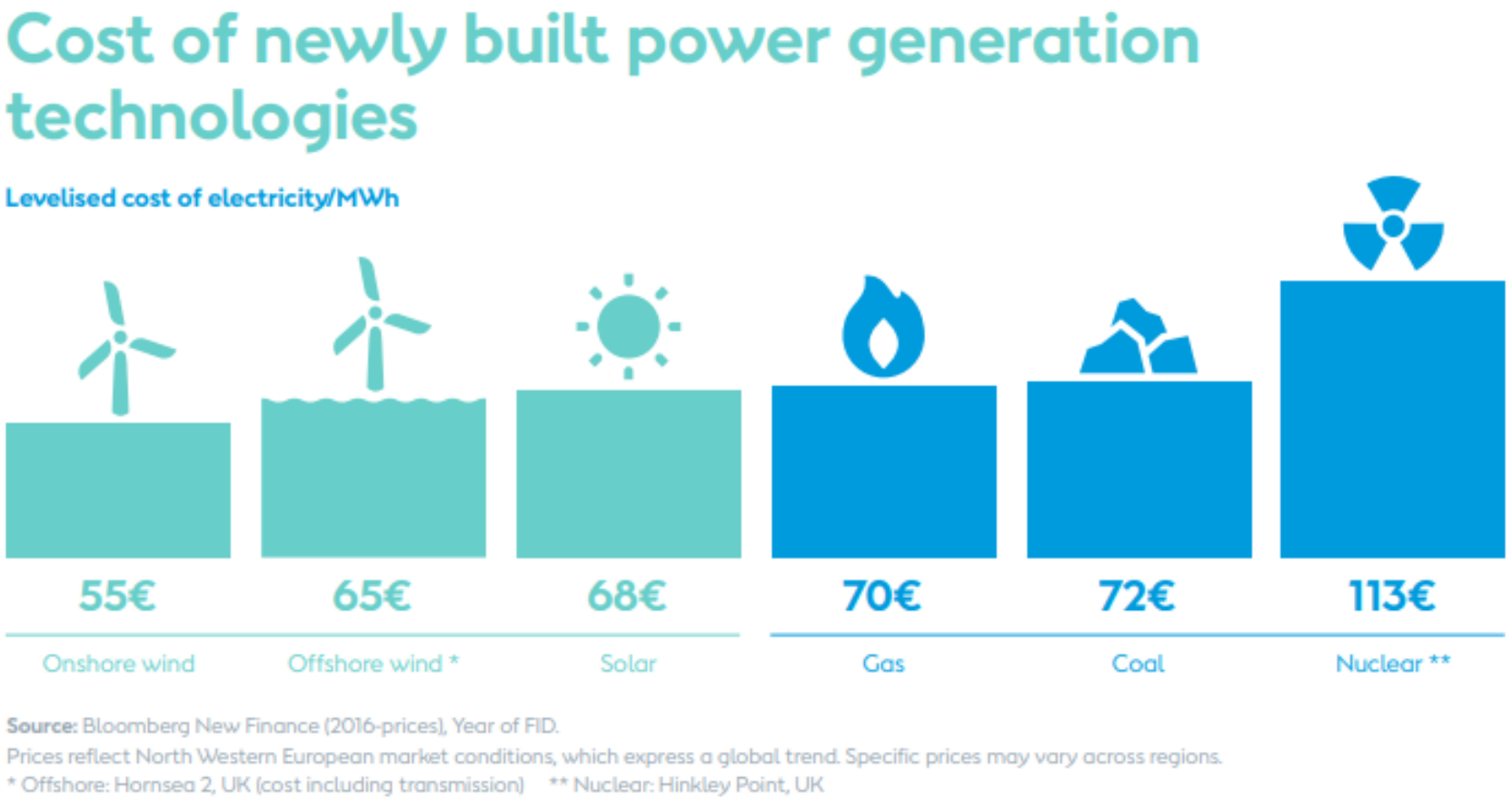


Source: Danish Wind Industry Association
LCOE*: Revenue estimate at final investment decision
LROE: Levelized revenue of electricity

Cost of onshore wind, LCOE, $/MWh



Renewables are cheaper



DANISH WIND INDUSTRY ASSOCIATION

- FiD-year is set to 2017. COD depends on the respective technologies
- Source: Ørsted

Not just in Denmark

Wind is the dominating power generation technology in Europe

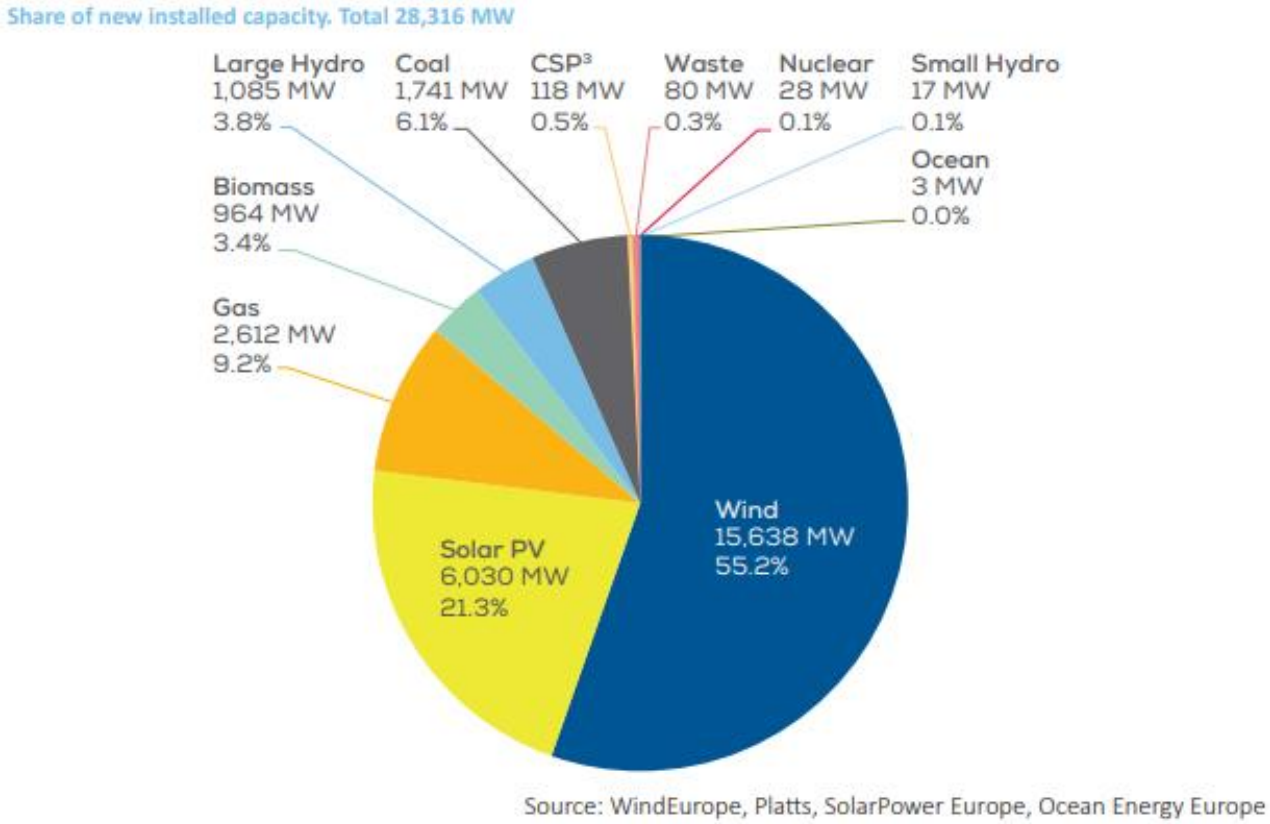
- 55% in 2017!

Share of electricity consumption, 2017:

- 12% i EU
- 43,4% i Denmark
- Above 100% under certain conditions

Share of the energy consumption:

- 8% in Denmark



DANISH WIND INDUSTRY ASSOCIATION

Thank you

amd@windpower.org
www.windpower.org

DANISH WIND
INDUSTRY ASSOCIATION

http://www.videnomvind.dk/film.aspx?media_id=1049

https://energinet.dk/

DANISH WIND
INDUSTRY ASSOCIATION