CLEAN ENERGY FOR POLAND

POLISH WIND
ENERGY ASSOCIATION

CLEAN ENERGY FOR POLAND

CLEAN ENERGY FOR POLAND PSEW

Wind power is considered clean – no fuel is burned during its generation

Mary, Grandma gave me a lecture again. It started with our stove...

You should have replaced it a long time ago.

... and ended with coal power plants.

Grandpa, coal power plants emit enormous amounts of CO_2, contributing to climate change.

And your smoke-belching stove contributes to smog.

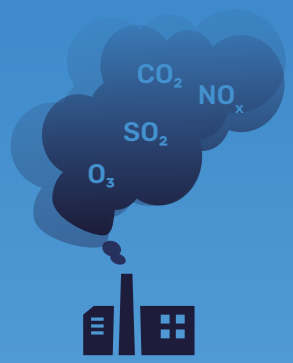
Indeed, there is more and more talk about it.

For 88% of our society, smog and climate change are serious problems.

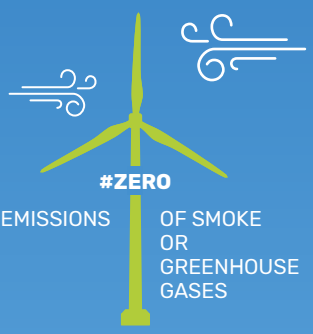
What can we do about it?

We should produce more energy from wind.

COAL POWER ⟷ WIND POWER



COAL POWER PLANT



#ZEROPOLLUTION

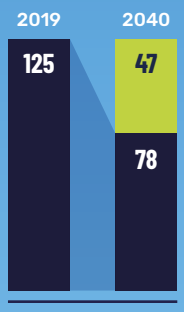
If onshore wind farms achieved

12.3 GW

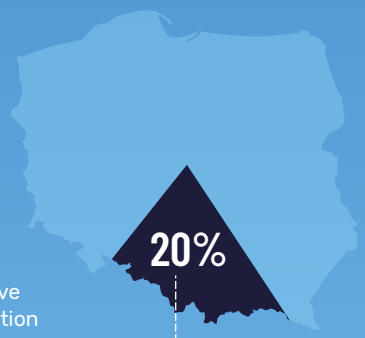
and offshore wind farms reached

12-14 GW

CO_2 emissions in the Polish electricity sector would drop by **47 million tonnes** (from 125m to 78m tonnes in 2040)



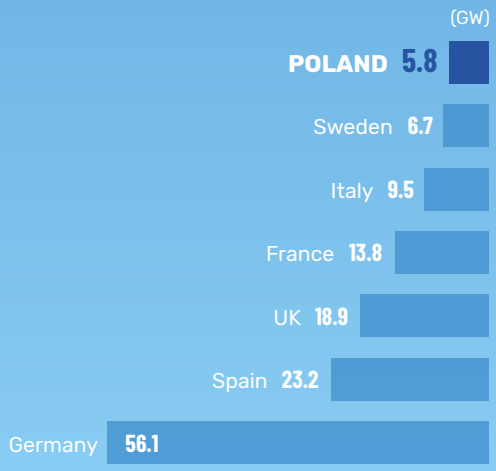
million tonnes of CO_2 per year



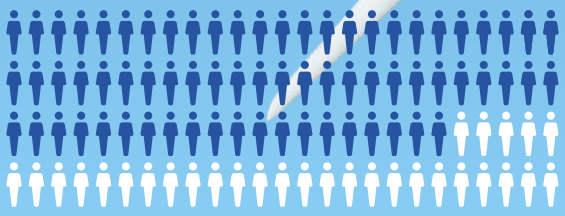
Excessive air pollution affects over **20% of Poland's territory**

5.8 GW

Wind power capacity in Poland (end of 2018)



48 million tonnes of CO_2 per year emitted by two largest coal power plants in Poland

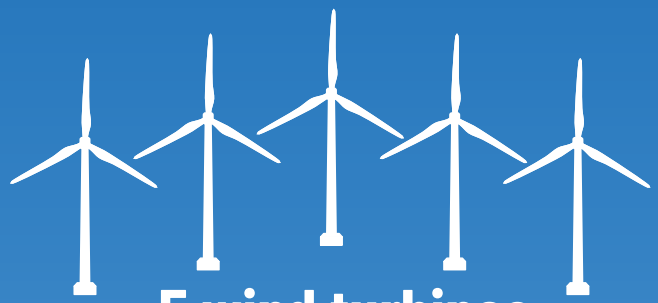


2/3 of Poles, would choose a **wind power plant**, if they only had the possibility to choose the source of energy powering their homes.

* Source: survey by Indicator Marketing Research Centre 2018.

YOUR BENEFITS FROM WIND

CLEAN ENERGY FOR POLAND PSEW



5 wind turbines (10 MW in total)

generate

43-45 GWh per year

A WIND FARM IN YOUR NEIGHBOURHOOD BRINGS POTENTIAL JOBS TO YOU OR YOUR FRIENDS AND RELATIVES!

BENEFITS

Farmers receive rent from farmland leased for wind turbines

Wind turbines do not take up the land, crops can be cultivated in their vicinity

Source: WiseEuropa data

New jobs created in Poland

Development and construction of a 10 MW wind farm:

173 jobs
(61 directly with the project)

Operation of a 10 MW wind farm:

6 jobs
(2 directly with the project)

Revenues for local governments from property tax

Funding of sports infrastructure, e.g. sports fields

Development and promotion of the region. Financial revenues and access to clean energy provide conditions for development of agrotourism

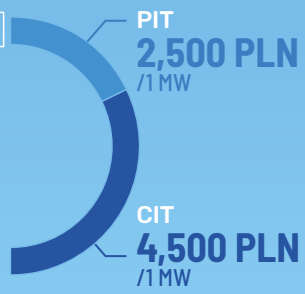
Development of local infrastructure, e.g. construction of access roads

REVENUES FOR MUNICIPALITIES WITH WIND FARMS

7,000 PLN /1 MW

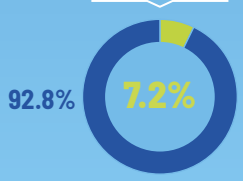
average tax revenue for the central budget

INCLUDING



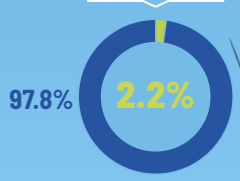
SHARE OF PROPERTY TAX REVENUES ON WIND FARMS:

IN TOTAL PROPERTY TAX REVENUES



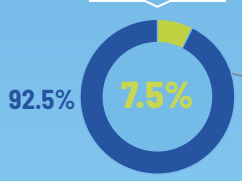
9.06m PLN
Average income from property tax in municipality

IN AVERAGE REVENUES OF MUNICIPALITY



29.18m PLN
Average revenues of municipality

IN AVERAGE REVENUES OF POOREST MUNICIPALITIES



8.73m PLN
Average revenues of poorest municipalities

Source: PwC report "Gap in implementation of the RES 2020 target"; Ernst & Young, 2012

WIND BENEFITS THE ECONOMY

Supply chain of Polish wind farms

01 Wind turbine manufacturers

02 Second/third level of distribution and delivery

03 Wind farm developers

04 Construction companies

05 Electricity generation

06 Operation and maintenance

07 Repowering

Are there any regulations for wind turbine construction?

Of course, Grandpa, there are many regulations and requirements that the investors have to meet.

In addition, there is the **Code of Good Practice**, an initiative of the Polish Wind Energy Association.

That's why I can tell you how to take part in public consultation.

Remember:

It is you, the residents, who decide if you want to have a wind farm in your municipality.

Wind turbines improve energy security and independence

A spectacular blackout

(loss of electricity supply) took place on 8 April 2008 in West Pomerania, including Szczecin. Due to heavy precipitation of wet snow high and medium voltage lines were destroyed.

Wind turbines came to the rescue, helping restore power to Wolin Island and the port in Świnoujście, and allowing for electricity to be later restored in Szczecin and the industrial plant in Police.

2 MW

Power generated by one wind turbine can power 2,200 homes

2,200 homes

FIGHTING WINDMILLS? FIGHT THE MYTHS!

CLEAN ENERGY FOR POLAND PSEW

Is it true that wind turbines are noisy? On the radio they said...

Our conversation is louder than a turbine!

I saw it on TV that wind power is unstable! Is that true?

It's not true!

Wind power is stable, and its variability can be estimated even 24 hours in advance. Precise forecasts are available 12 hours ahead, and 1 hour before we know the exact energy production with 99% certainty.

What about infrasounds from wind turbines – are they harmful to our health?

Infrasounds also exist in nature – they are generated by wind, sea waves, waterfalls and large animals. Wind turbines do not generate large volumes of infrasounds, and their level meets international standards.

If a turbine does not meet the requirements, it will not be allowed to operate.

Wind speed and the volume of electricity to be generated can be predicted well in advance.

24 hours
Approximate forecast

12 hours
Precise forecast

1 hour
99% certainty

40-45 dB
Wind turbine

400 m

55 dB
vacuum cleaner

35 dB
ticking clock

fridge
40 dB

60 dB
conversation

Source of data:
Handbook of Environmental Acoustics, James P. Cowan, New York, 1994

FIGHTING WINDMILLS? FIGHT THE MYTHS!

CLEAN ENERGY FOR POLAND PSEW

Is it true that wind turbines are a danger to birds? In the newspaper...

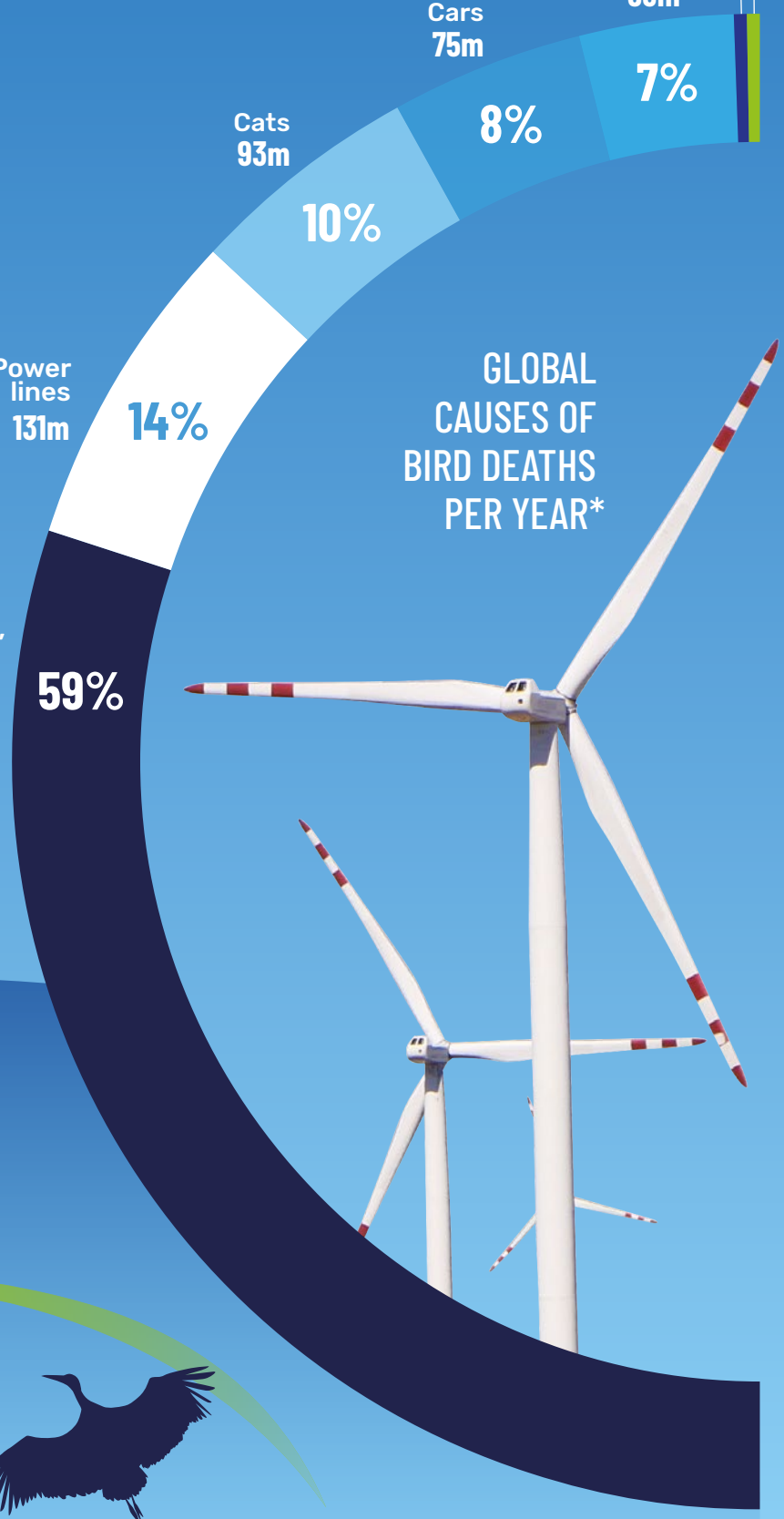
There is nothing to be afraid of, Grandpa! Look at the statistics!

We delay the start-up of turbines in the first hours after dusk, so that they do not pose a threat to birds!

There is also no reason for concern in winter! In case of icing, turbines can be switched off automatically.

Nowadays there are even radar systems that stop the turbines after detecting birds. There are already projects in Poland where such systems are required by the environmental decision.

GLOBAL CAUSES OF BIRD DEATHS PER YEAR*



Wind farms are never built in birds' migratory routes – they are always located outside of migration corridors!

* W. Erickson, G. Johnson, D. Young Jr., *A Summary and Comparison of Bird Mortality from Antropogenic Causes with an Emphasis on Collisions*, USDA Forest Service Gen. Tech. Rep. PSW-GTR-191., 2005

LIFE CYCLE OF A WIND FARM

CLEAN ENERGY FOR POLAND PSEW

Planning 3-5 years

INVESTOR

selects the site and secures the title to land for the project

PLANNING PROCEDURE

- Investor files a motion to change the local zoning study or plan (LZP)
- Public consultation

LOCAL ZONING PLAN

is a municipal council resolution defining the objectives and conditions for development of a certain area

Municipal Council

Adoption or modification of LZP

10-12 months

Examining the comments

ENVIRONMENTAL PROCEDURE

- Monitoring (bats, birds) and acoustic analysis
- Environmental impact assessment report
- Public consultation

ca. 18 months

ENVIRONMENTAL DECISION ISSUED

APPROVED BY

Regional Director for Environmental Protection

PUBLIC CONSULTATION

are required by Polish law. Your voice matters!

Who runs the consultations?

Mayor

Regional Director for Environmental Protection

How to submit comments?

- In writing
- Digitally
- Orally at a consultation meeting

LIFE CYCLE OF A WIND FARM

Construction 1-2 years

REGULATIONS APPLICABLE TO INVESTORS

3 European directives

16 national legislative acts

17 regulations

Environmental and grid guidelines

BUILDING PROCEDURE

After the adoption of LZP and environmental decision

Geological survey

Building design

Building permit

APPROVED BY

Governor (Wojewoda) previously **Head of County** (Starosta)

Operating permit

Operating permit

ISSUED BY

Regional Inspectorate for Building Supervision

ISSUED BY

County Inspectorate for Building Supervision

LIFE CYCLE OF A WIND FARM

Operation 15-25 years

Acoustic monitoring

may be performed periodically, in various conditions and seasons

Measurements are carried out at night, at various times, to ensure that the noise level does not exceed applicable norms

If the farm does not exceed admissible noise level at night, there is no risk of exceeding them during daytime

Environmental monitoring

After building the wind farm, the investor carries out detailed monitoring of birds and bats.

All accidents involving animals are recorded.

Investors

are required to keep the wind farm in proper technical condition, to ensure its maintenance, repairs and safety of operation.

Investors usually cooperate with local communities; they can also establish a

Social Benefits Fund,

acting as a participatory budget (according to the residents' decisions).

Repowering/decommissioning

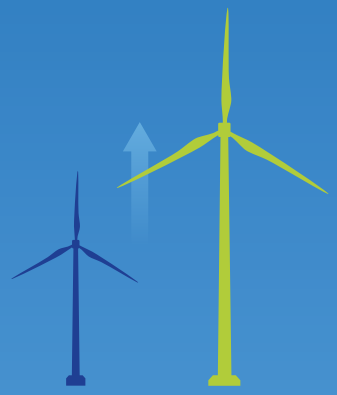
Repowering — Comprehensive modernization of the wind farm including replacement of turbines with larger capacity machines

After the end of operation period the investor may decide to:

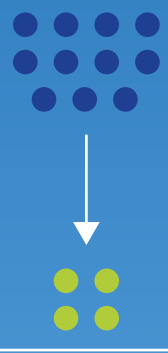
- perform a comprehensive modernization of the wind farm, or
- dismantle the wind farm and restore the area to its original (or better) condition.

REPOWERING – BENEFITS

Location restrictions introduced in Poland do not allow for existing wind farms to be redesigned with most recent turbines. Installation of new machines would have a positive impact on the environment and neighbourhood.

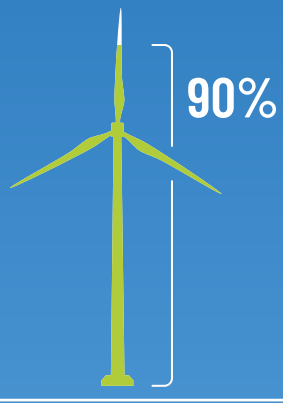


Modern turbines are taller, so **the source of noise is located further away** from the ears of residents living nearby

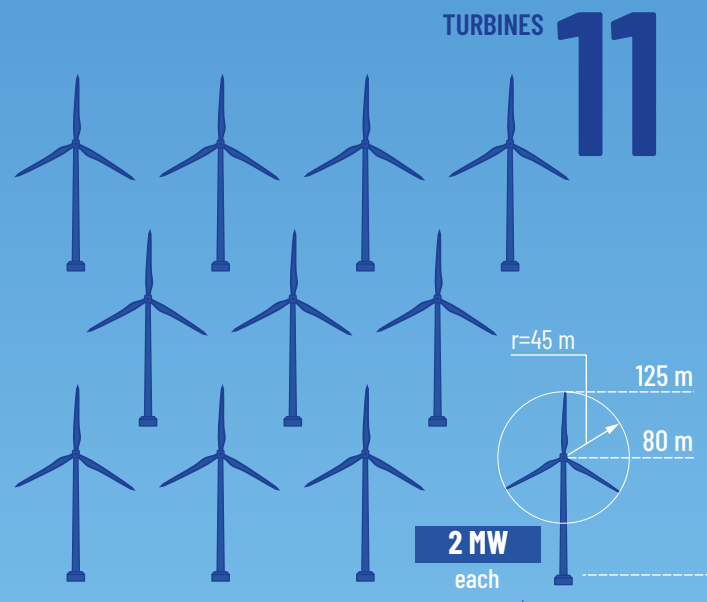


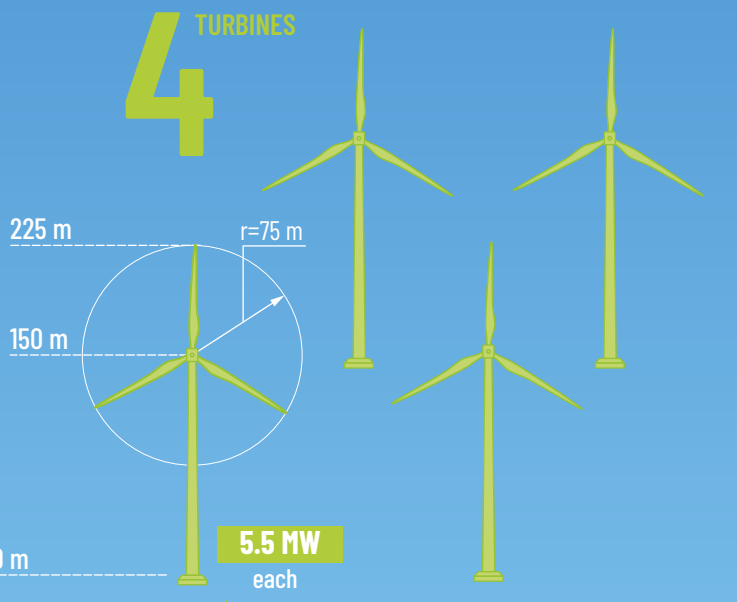
New technologies allow for increased wind farm capacity while reducing the number of turbines by more than a half – **4 turbines instead of 11**

Smaller number of turbines has a positive impact on the environment in the vicinity of the wind farm and significantly reduces risks for birds and bats



90% of materials used in a wind turbine can be **recycled**. On average, it takes half a year for the wind turbines to pay back its "carbon debt" related to CO_2 emissions for manufacturing, transportation, construction and maintenance over a 20-year operating period.





22 MW
wind farm capacity

22 MW
wind farm capacity

Same volume of electricity from a smaller number of turbines

SAVINGS FOR HOUSEHOLDS

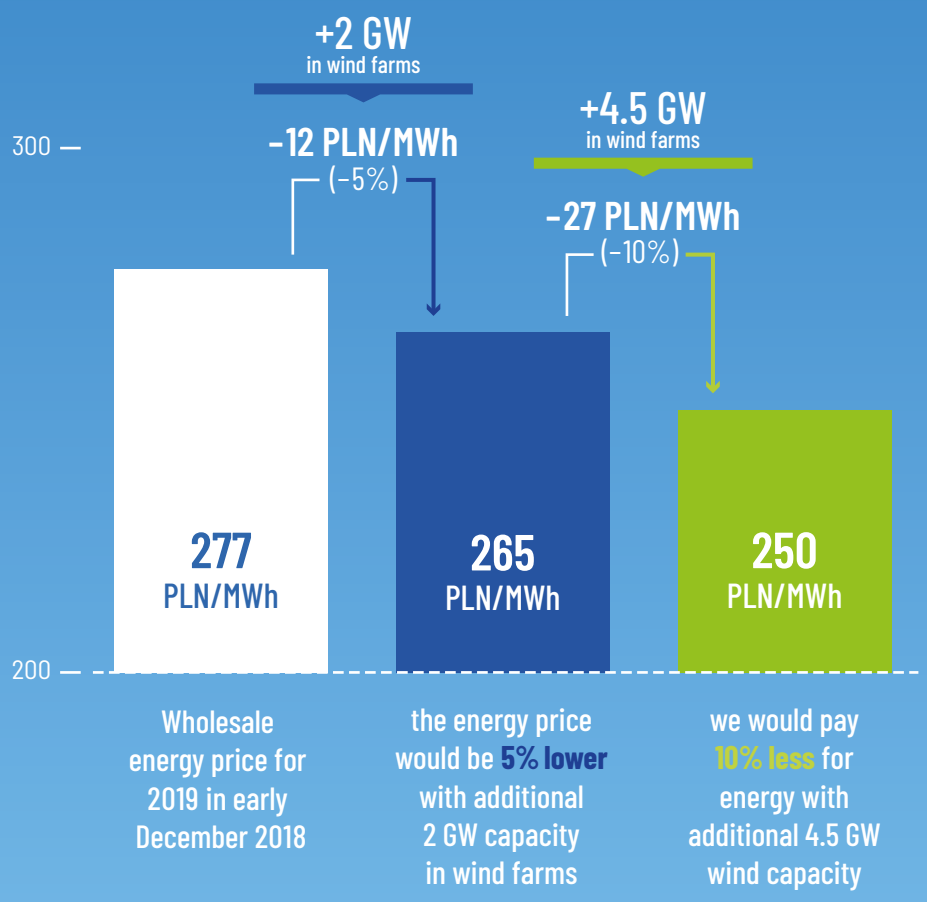
CLEAN ENERGY FOR POLAND PSEW

Do I have to pay anything extra for all this?

Grandpa, we already support the development of renewable energy sources by paying our electricity bills. But the more new wind turbines we build, the lower the wholesale energy prices.

The average cost per household is 3 PLN. It is less than a litre of petrol.

Electricity would be cheaper if we increased the share of wind farms in energy production!



< 200 PLN/MWh

average price of energy from wind contracted by the government in 2018

COMPARED TO

> 350 PLN/MWh

average price of energy from a new coal unit.

WIND POWER IS THE CHEAPEST OF ALL ENERGY SOURCES

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