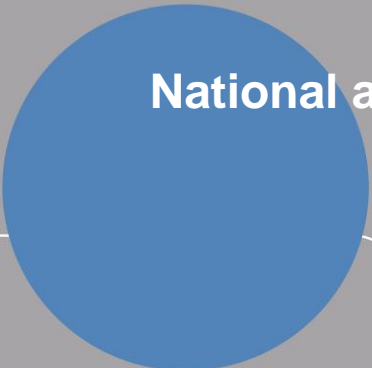




NATIONAL ENERGY INDEPENDENCE STRATEGY



National agenda

NATIONAL AGREEMENTS IN ENERGY - THE BASIS FOR SUSTAINABLE FUTURE SOLUTIONS

Butinge oil terminal



Klaipėda LNG terminal



Electrical and gas connections



Independence in the heat sector



ENERGY SECTOR

CHALLENGES IN LITHUANIA



Energy security

- ✓ Gas and oil import terminals have been built
- ✓ Electricity and gas connections have been established
- ✗ We import a large amount of electricity and other resources
- ✗ Infrastructure is vulnerable

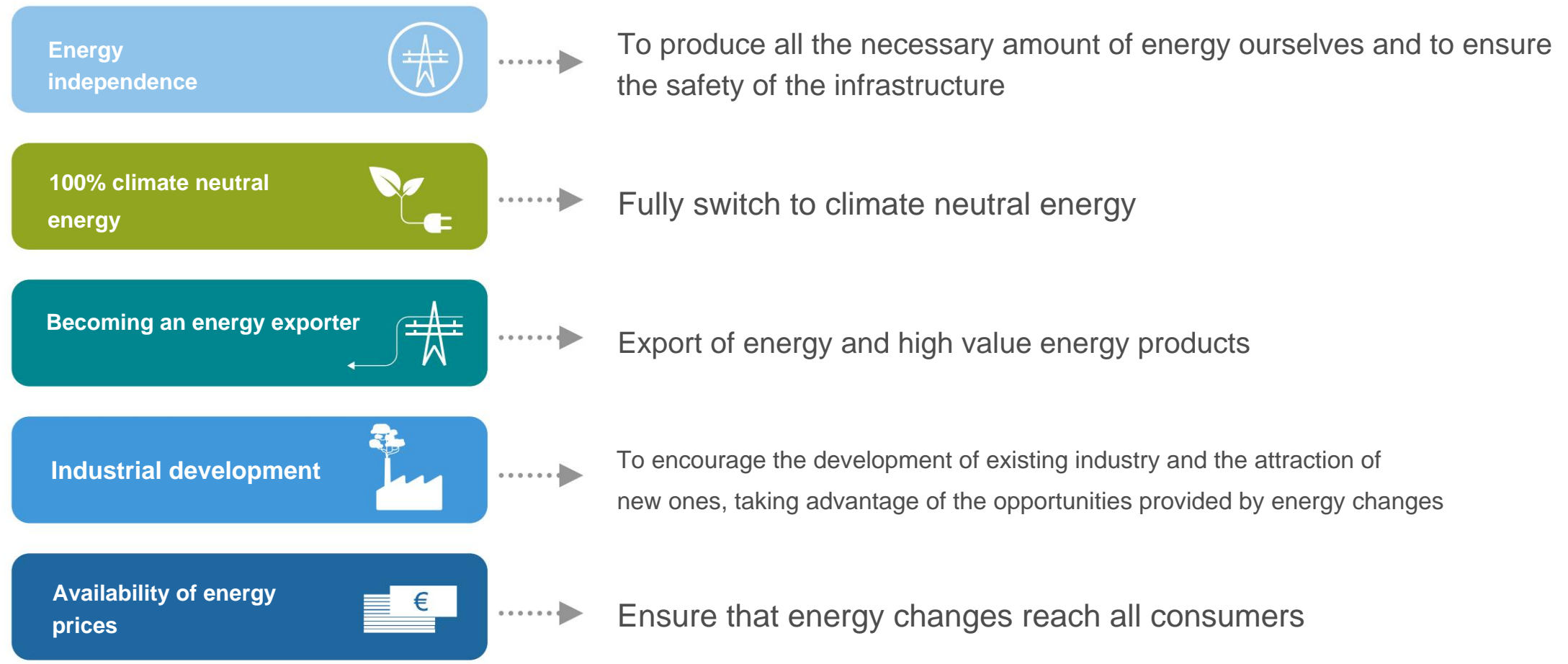


Green course

- ✓ Rapid development of RES
- ✓ Transition of the heat sector to biofuels
- ✗ The main source of energy is imported fossil fuels
- ✗ Low amount of electricity produced

Until 2030 we must achieve that 55% of energy consumption is RES. Until 2050 - 100%.

LITHUANIAN ENERGY SECTOR GOALS UNTIL 2050



ENERGY SECTOR TASKS IN LITHUANIA



Safe and reliable energy

- Completed synchronization with KET
- We produce as much energy as we consume
- Ensuring balancing capacity
- Develop reliable electricity transmission and distribution networks
- Maintaining the import capacity of energy resources
- Infrastructure protected from physical and cyber threats



Climate neutral energy

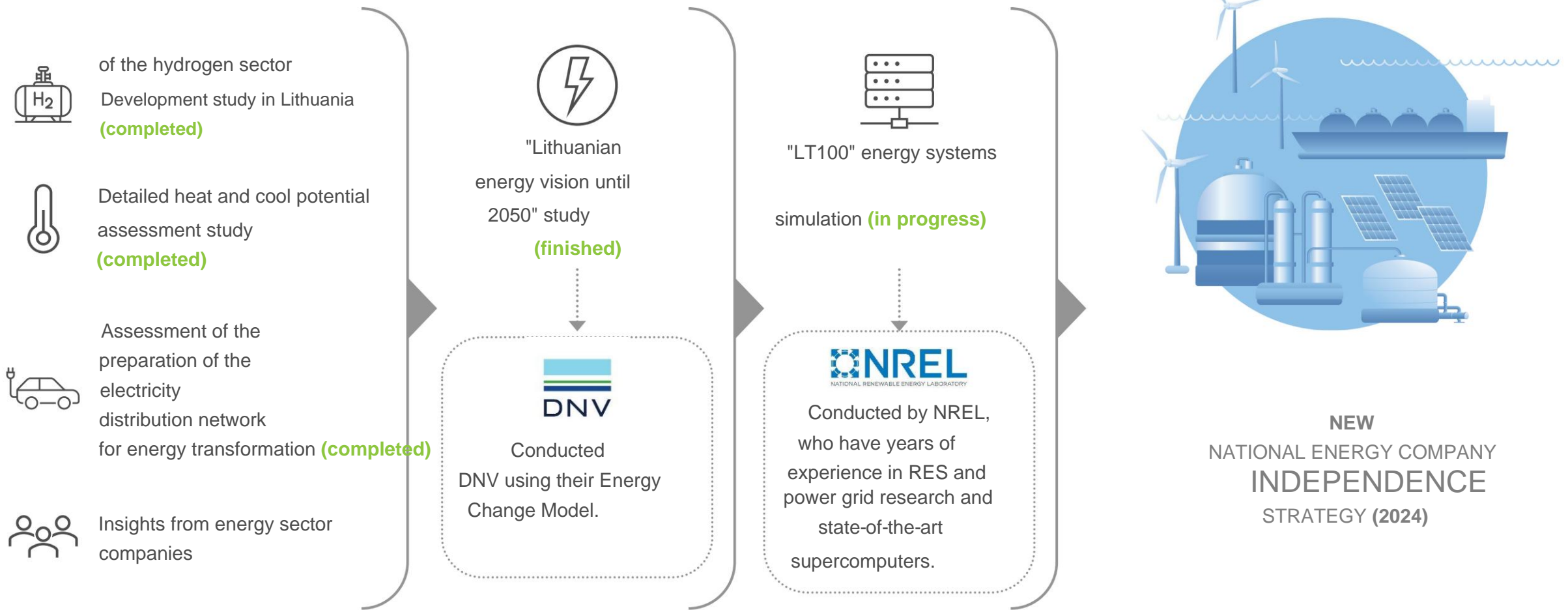
- Development of offshore wind
- Renewable energy development on land
- Assessment of the perspective of nuclear energy
- Development of the hydrogen ecosystem
- Decarbonization of the heat sector
- Decarbonization of the transport sector



Availability and competitiveness of energy resources

- Development of productive and active users
- Community energy development
- Ensuring energy prices and a competitive market
- Flexibility services market development and demand management

BACKED ON DATA AND SCIENCE NATIONAL STRATEGY



of the hydrogen sector
Development study in Lithuania
(completed)



Detailed heat and cool potential
assessment study
(completed)



Assessment of the
preparation of the
electricity
distribution network
for energy transformation **(completed)**



Insights from energy sector
companies



"Lithuanian
energy vision until
2050" study
(finished)



Conducted
DNV using their Energy
Change Model.



"LT100" energy systems
simulation **(in progress)**

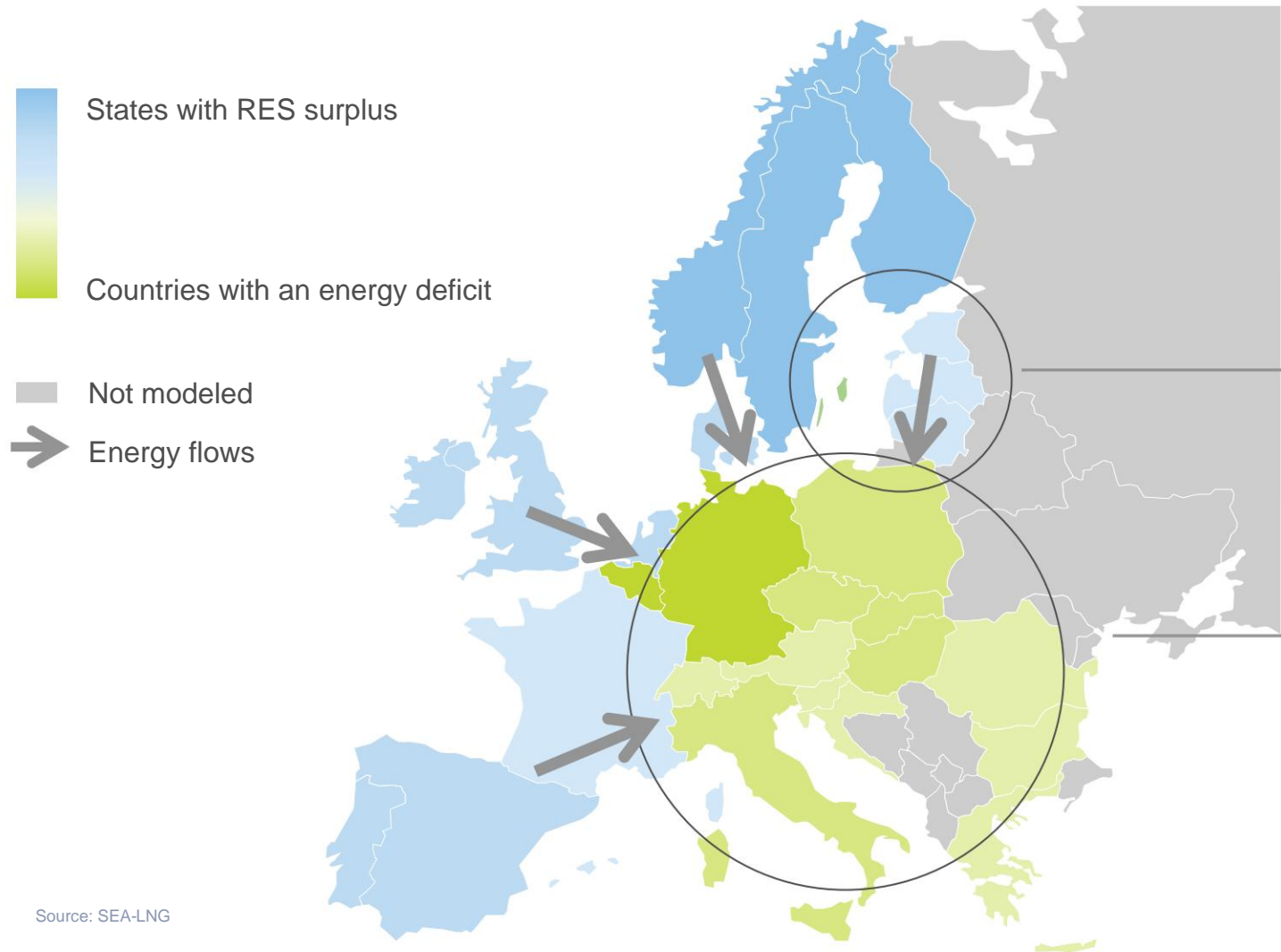


Conducted by NREL,
who have years of
experience in RES and
power grid research and
state-of-the-art
supercomputers.



NEW
NATIONAL ENERGY COMPANY
INDEPENDENCE
STRATEGY **(2024)**

GREEN COURSE - NEW OPPORTUNITIES IN NORTHERN EUROPE



2030-2035 planned energy surplus in the Baltic and Nordic countries
Due to their relatively small economies, but high RES potential, the Baltic countries will be among the first in the EU to achieve electricity surplus.

A significant energy deficit is planned in Central Europe in 2050.
Germany alone will need about 2000-3000 TWh of electricity and hydrogen per year.

BALTIC COUNTRIES ENERGY POTENTIAL



The offshore wind potential of the Baltic countries is **25.5 GW**



The onshore wind potential of the Baltic countries is **18GW**



The solar potential of the Baltic countries is **40GW**



The production capacity of hydrogen derivative products is **10GW**



150 billion EUR investment opportunity in the next 20-25 years.

Hydrogen pipeline

Electrical connections

CO2 pipelines

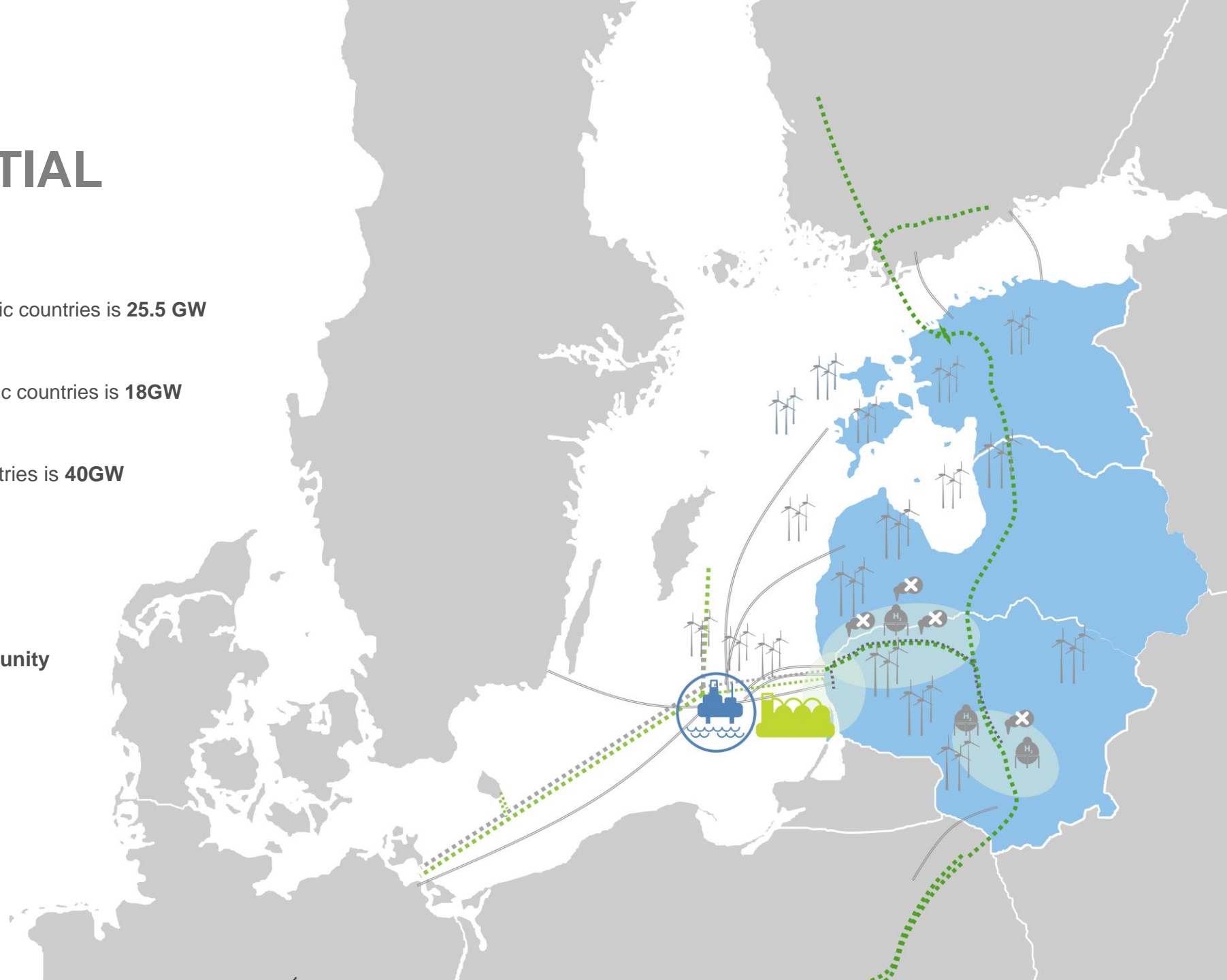
Utilization of carbon dioxide

H2 electrolyzers

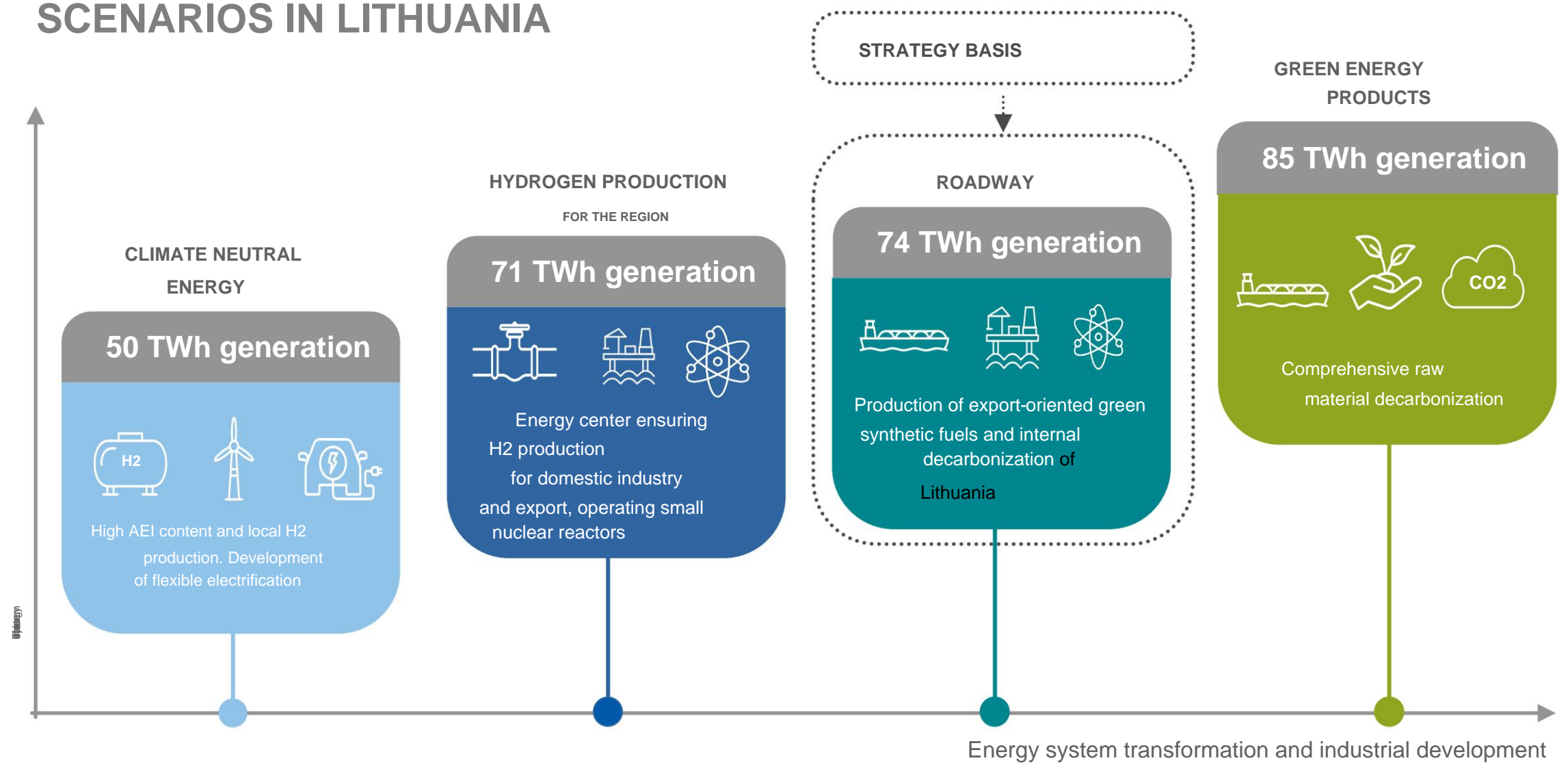
CO2 products terminal

Energy center

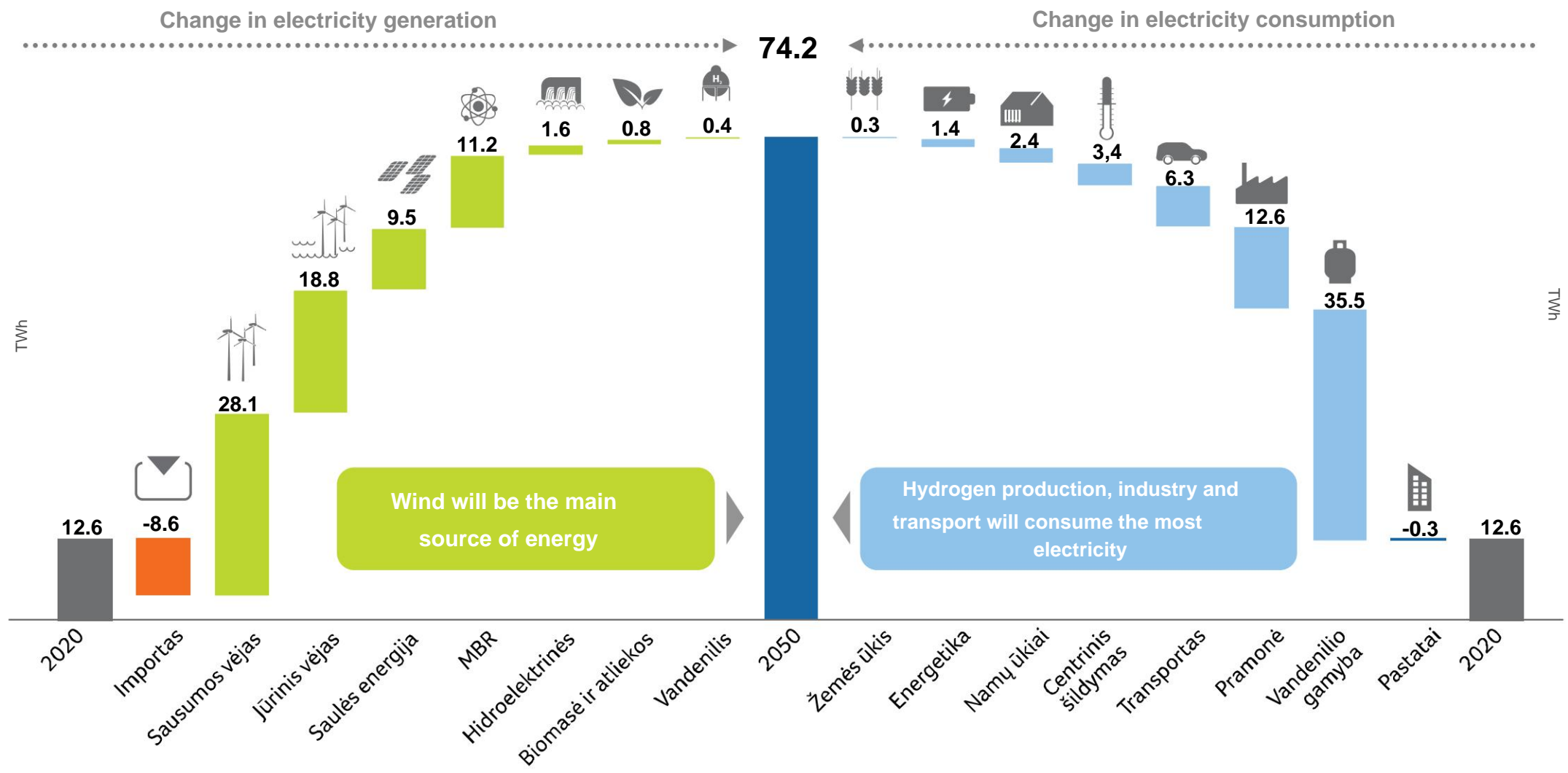
Sea/land breeze



ENERGY CHANGES SCENARIOS IN LITHUANIA




BIGGEST CHANGES – IN ELECTRICAL ENERGY



INFRASTRUCTURE DEVELOPMENT PERSPECTIVE


The need for investments is highest between 2030 and 2040.

2030




Development of onshore wind, first offshore wind farms, solar power plants, development of battery capacity, electricity connection with Poland and first hydrogen transport pipelines.

2040

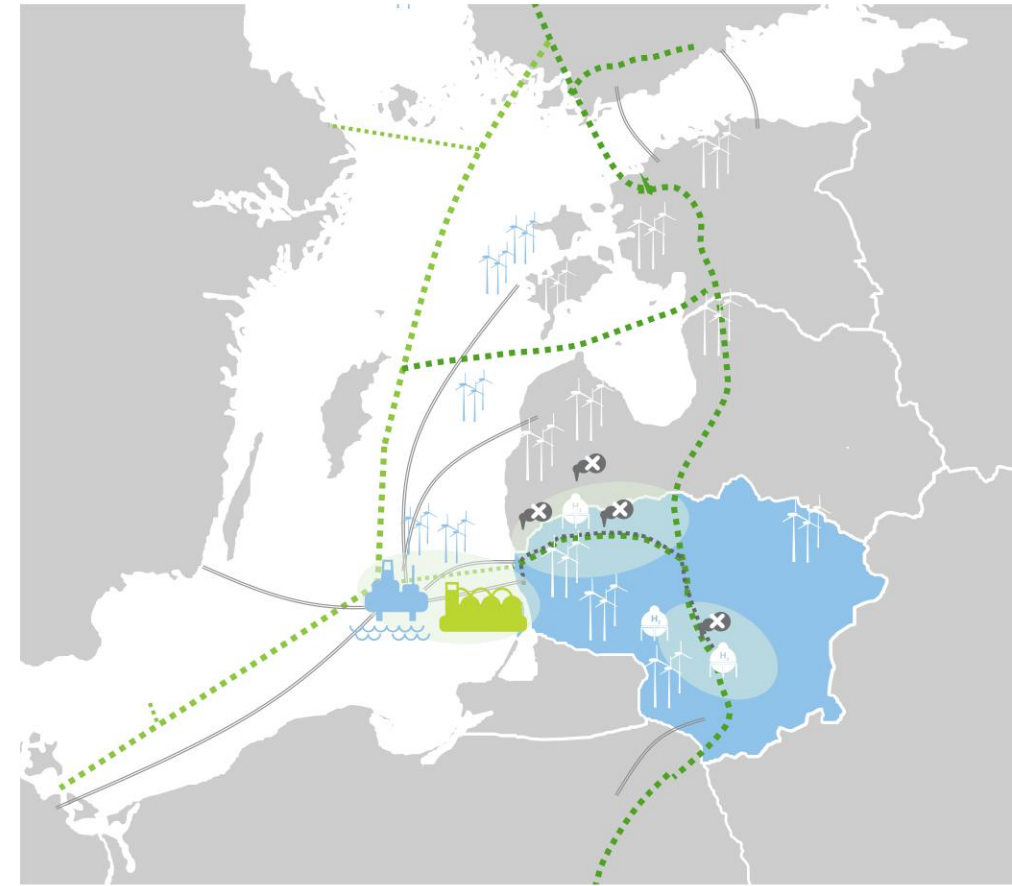


The construction of an energy center, new offshore wind farms, a possible electricity connection with Germany, MBR is starting to operate and energy industry centers are forming.

2050



Additional electricity connections with neighboring countries, growing electricity consumption in all sectors, expanding energy industry centers.



INFRASTRUCTURE DEVELOPMENT

2030

Construction of onshore wind farms, first offshore wind farms, **solar farms, battery capacity**, electricity link with Poland (Harmony Link) and first hydrogen pipeline.



The potential of onshore and offshore wind power plants is **5.9 GW**



The potential of solar power plants is **4.1 GW**



Battery parks - **1.1 GW**



Electrolysis plants - **1.3 GW**



Electricity transmission connections - **3.1 GW**



Heat production from electricity (P2H) – **1.0 GW**



Hydrogen demand – **4.3 TWh**



Potential export: •
Green synthetic fuel - **0.0 TWh**
• Hydrogen – **1.4 TWh**

— Electrical connections

CO2 product terminals

Electrolysis of H2

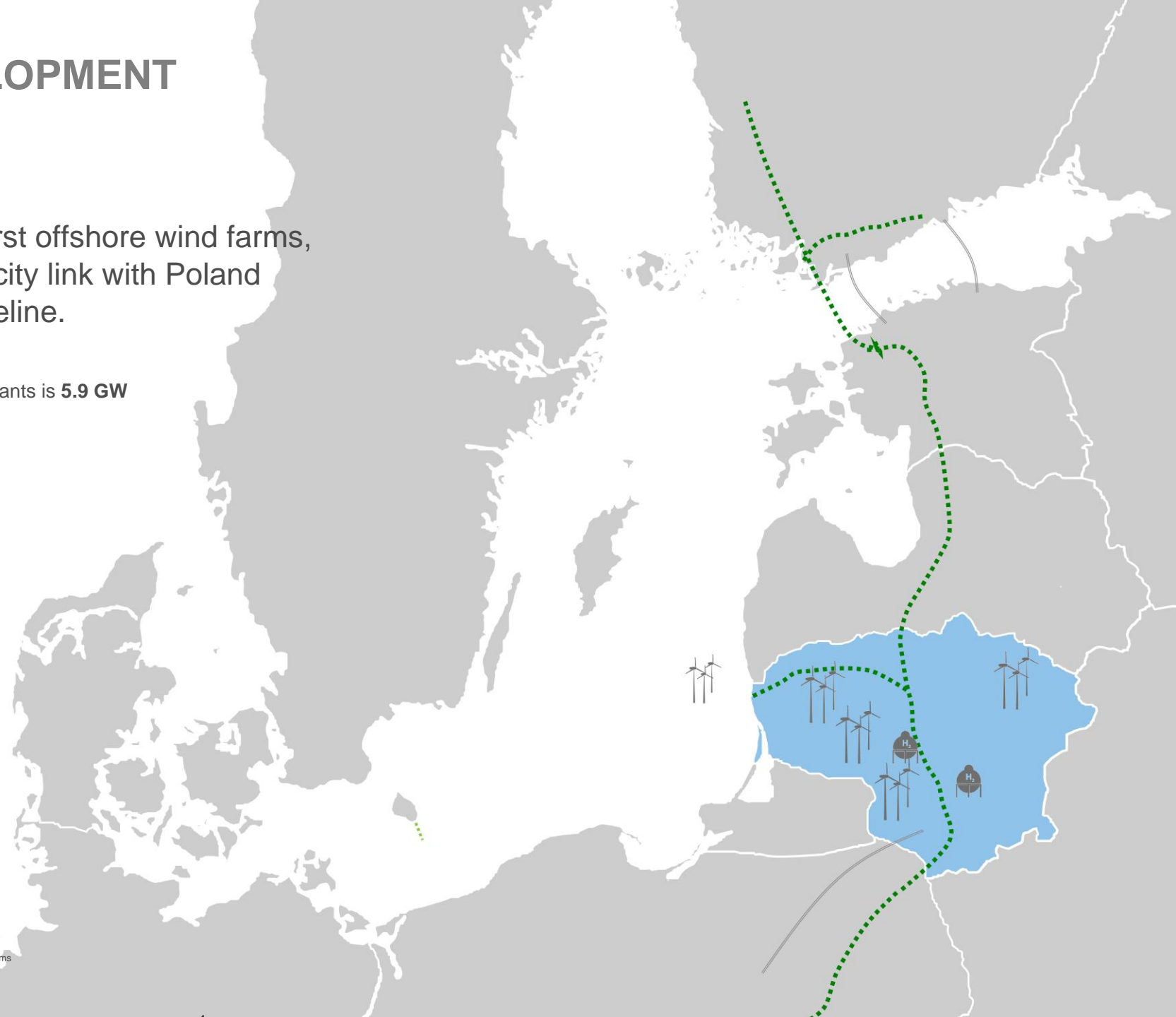
Onshore/offshore wind farms

... CO2 pipelines

Energy center









Hydrogen pipeline

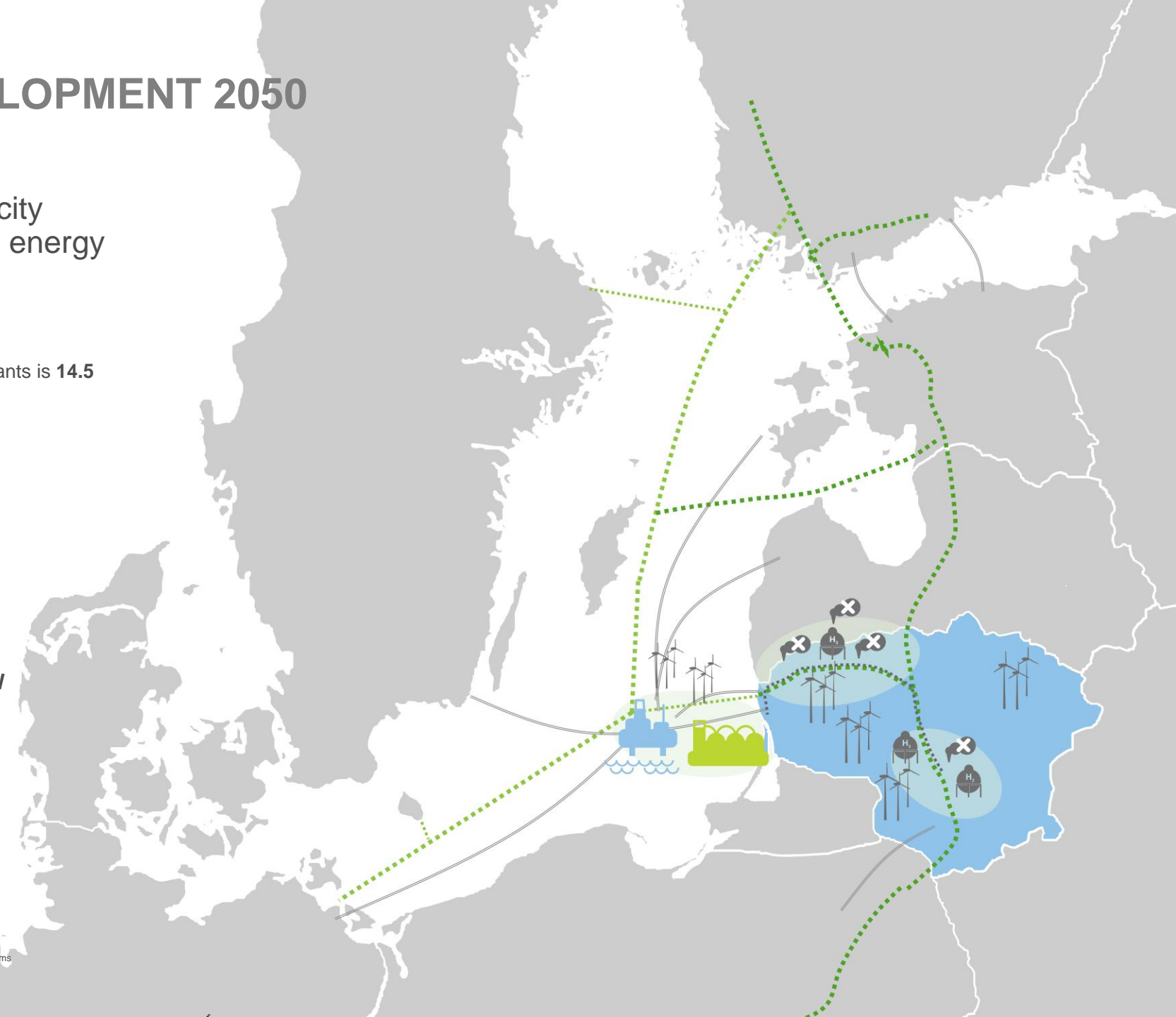
Carbon dioxide capture



INFRASTRUCTURE DEVELOPMENT 2050

Additional electricity connections with neighboring countries, growing electricity consumption in all sectors, expanding energy industry centers using hydrogen.

-  The potential of onshore and offshore wind power plants is **14.5 GW**
-  The potential of solar power plants is **9.0 GW**
-  Battery parks - **4.0 GW**
-  Electrolysis plants - **8.5 GW**
-  Electricity transmission connections - **5.1 GW**
-  Heat production from electricity (P2H) – **3.6 GW**
-  Hydrogen demand – **24.2 TWh**
-  Potential export: • Hydrogen derivative products (including synthetic fuel) – **9.0 TWh** • Hydrogen – **1.4 TWh**



DEVELOPMENT OF OFFSHORE WIND

in 2030



The power of
installed offshore
wind farms

1.4 GW



in 2040



The power of
installed offshore
wind farms

2.8 GW



in 2050



The power of
installed offshore
wind farms

4.5 GW

LAND WIND IR

DEVELOPMENT OF THE SUN

in 2030



Onshore wind farms

4.5 GW



Solar power plants

4.1 GW

in 2040



Onshore wind farms

6.5 GW



Solar power plants

7 GW

in 2050



Onshore wind farms

10 GW



Solar power plants

9 GW

HYDROGEN ECOSYSTEM DEVELOPMENT



Production of green hydrogen

in 2030

Installed electrolysis capacity and produced quantity

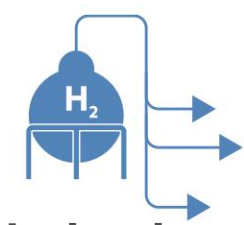
1.3 GW
129,000 tons

in 2050

Installed electrolysis capacity and produced quantity

8.5 GW
732,000 tons

732 thousand tons of hydrogen will consist of about 32 percent Lithuanian of final energy demand in 2050



Hydrogen derivatives

in 2050

CO2 potential for product production

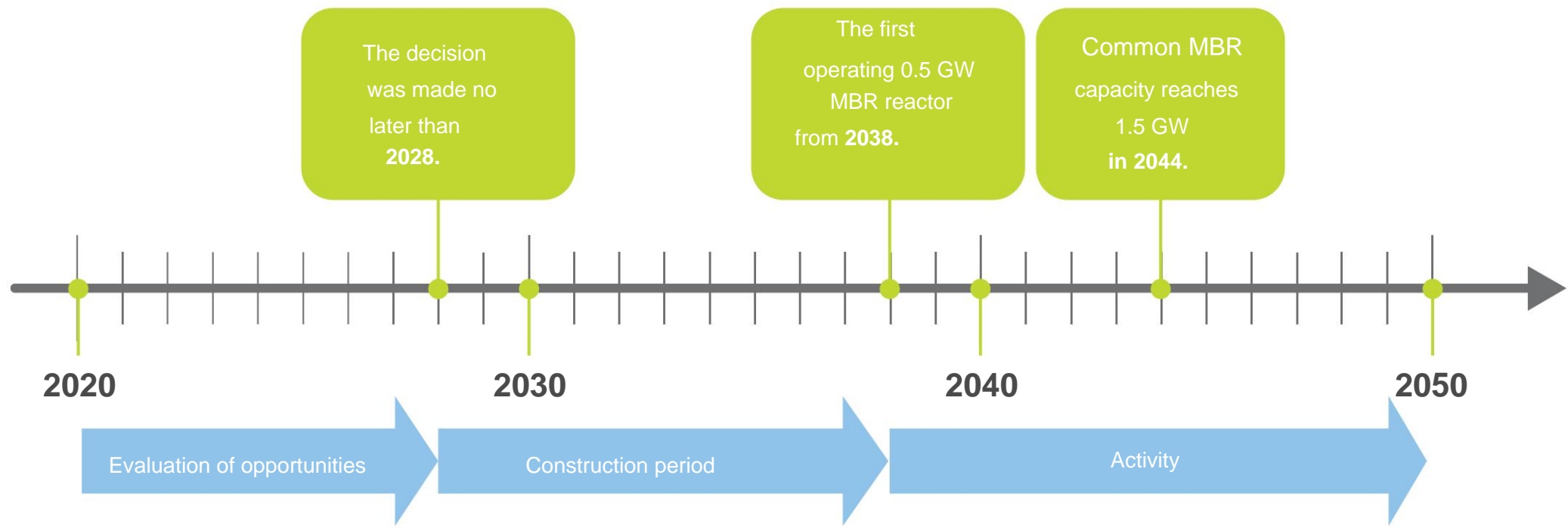
3.5 million tons

Potential amount of products produced

12 TWh

Currently, it is not yet clear on the market which hydrogen derivative products will be most in demand and which specific green fuels will be in demand in the future

NUCLEAR ENERGY PERSPECTIVE



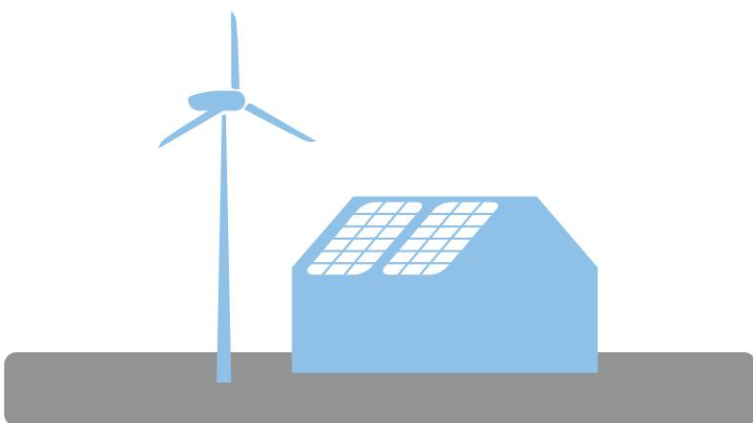
✓ Construction of 4th generation nuclear reactors

✓ Flexible manufacturing that adapts to RES

✓ Decision only after a good assessment of the market situation

MANUFACTURERS AND ACTIVE USERS

Until 2030 achieve that Lithuania has
300,000
producing and active users

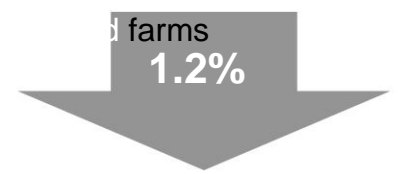


- Ensure financing for the development of producing users up to a technically and economically acceptable limit.
- Until 2026 perform an independent evaluation of the producing consumer scheme.
- To encourage residents to become not only producers, but also active consumers (who would actively participate in the electricity market).

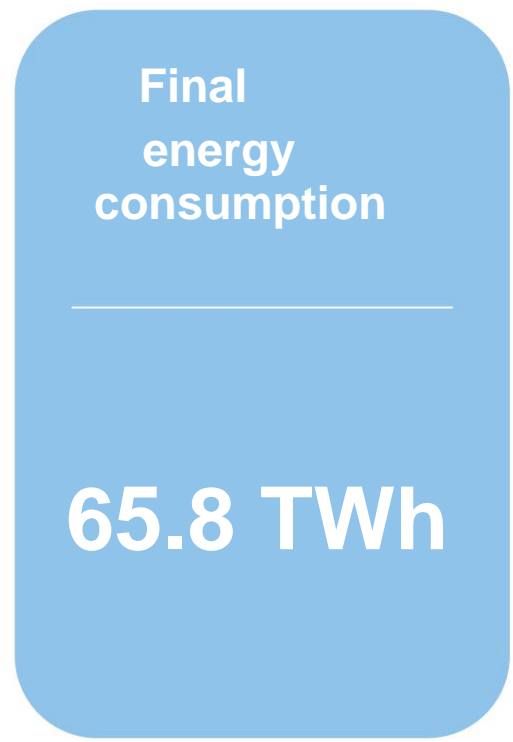
Increasing the efficiency of energy consumption

The most important goal is to save 1.2 percent each year. final energy excluding ambient heat and hydrogen production

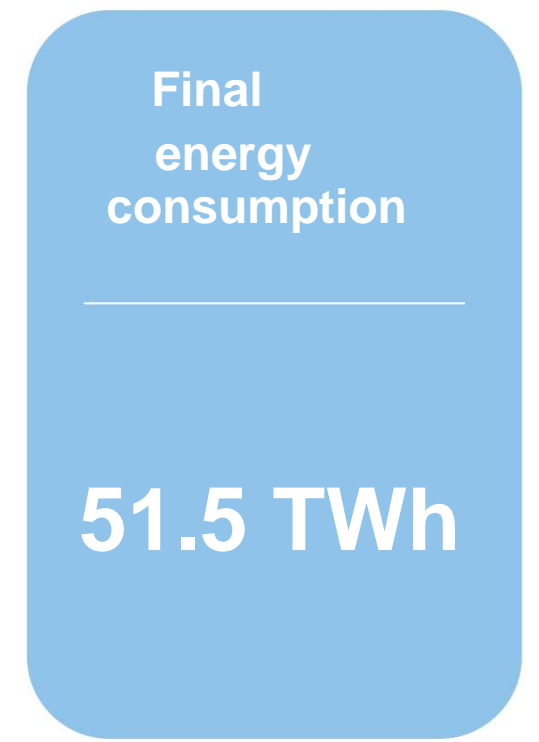
installed



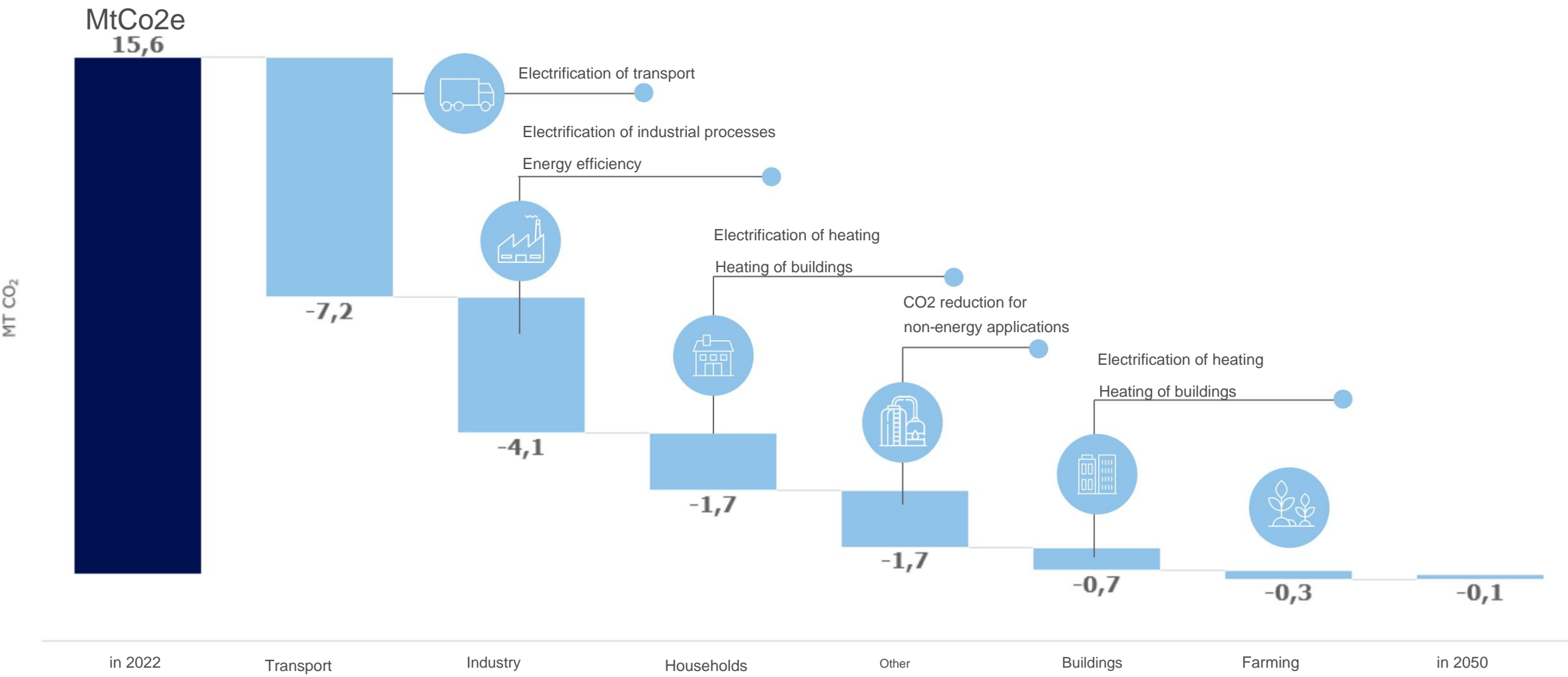
in 2021



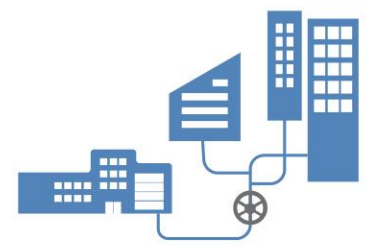
in 2030



CO2 REDUCTIONS ACCORDING TO SECTOR UNTIL 2050



DECARBONIZATION OF THE HEAT SECTOR



Centralized heat supply



Individual heating

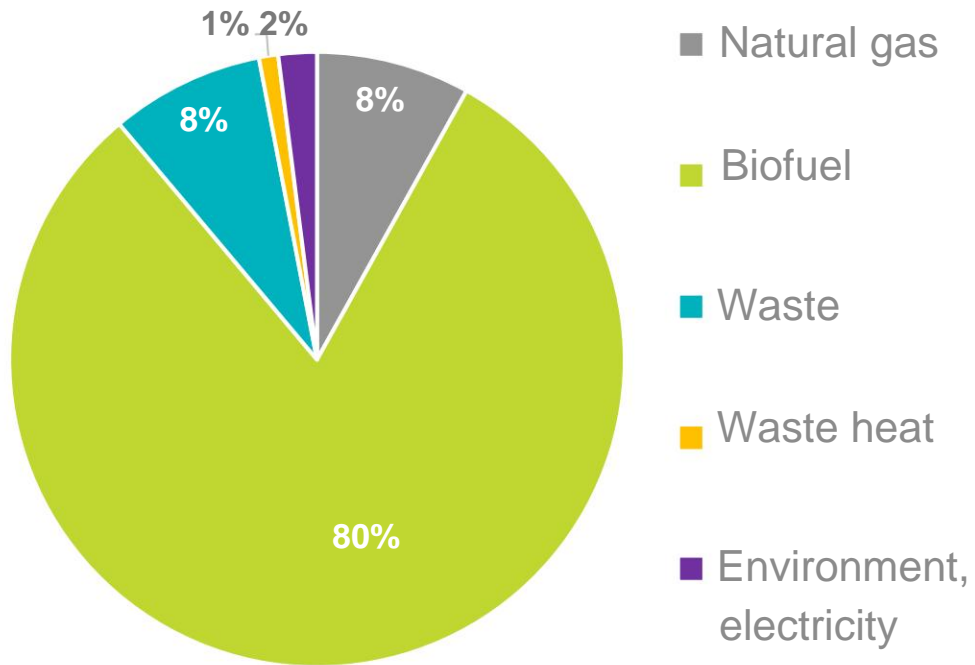
Total final energy consumption

| | in 2022 | in 2030 | in 2040 | in 2050 |
|--------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Centralized heat supply | 8.6 TWh 73% from RES | 9.9 TWh 90% from RES | 9.5 TWh 97% from RES | 9.0 TWh 100% from RES |
| Individual heating | 17.5 TWh 50% from RES | 18.0 TWh 75% from RES | 14.6 TWh 85% from RES | 10.4 TWh 97% from RES |
| Total final energy consumption | 26.1 TWh | 27.9 TWh | 24.1 TWh | 19.4 TWh |

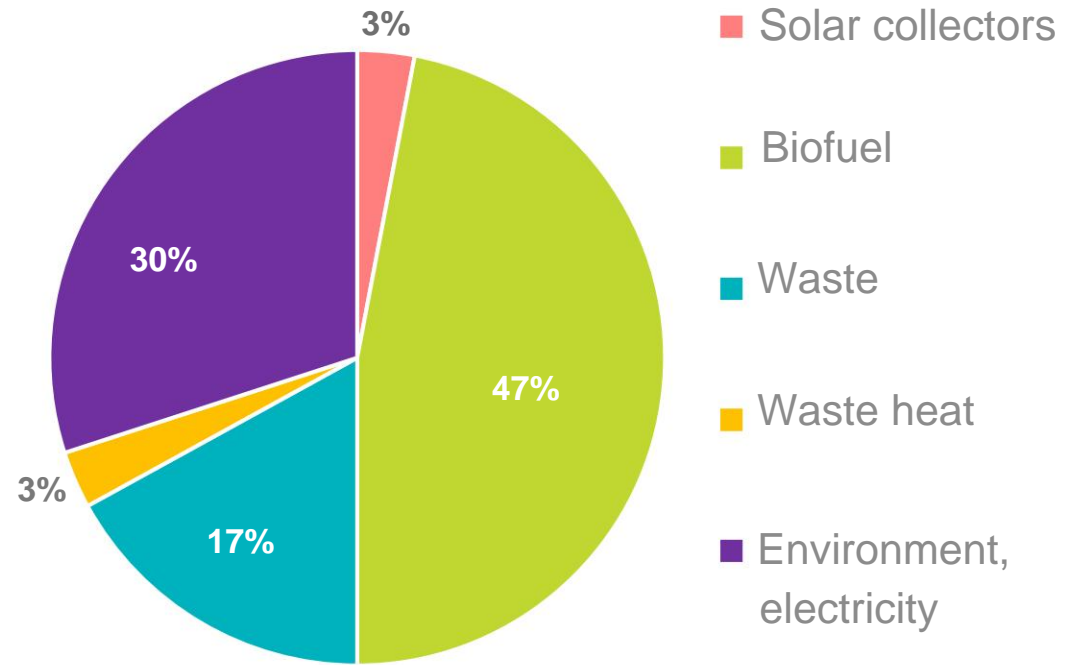
CHANGES IN CENTRALIZED HEAT SUPPLY

Forecast of CŠT fuel structure balance and primary energy demand

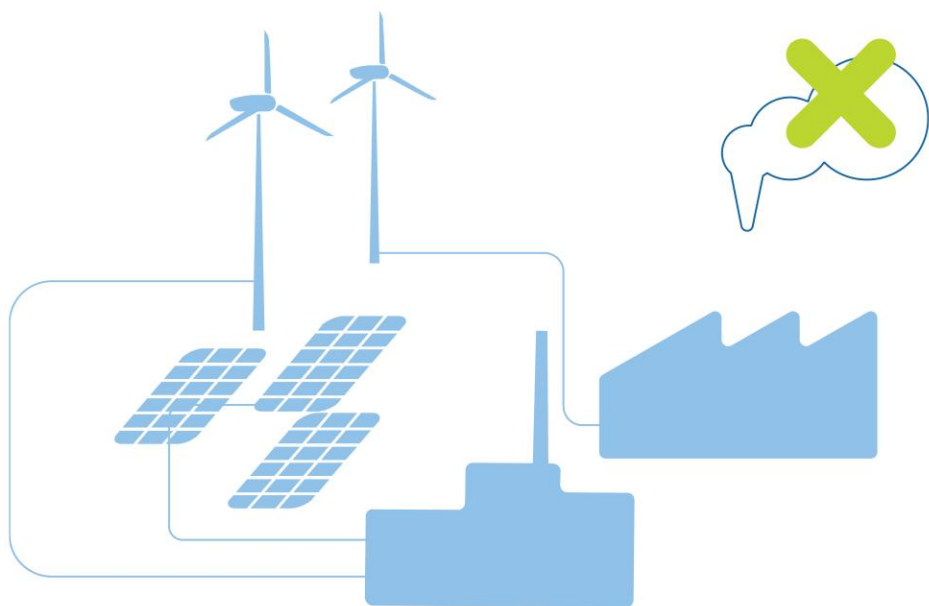
in 2030 - 9.9 TWh



in 2050 - 9 TWh



INDUSTRY DECARBONIZATION

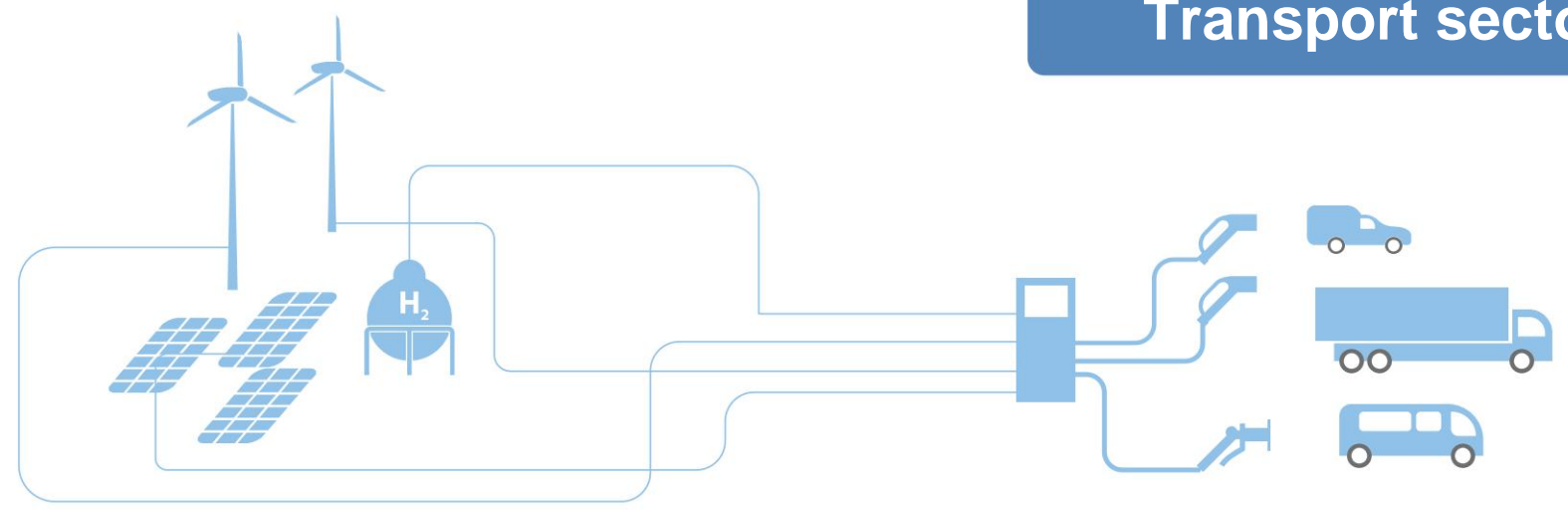


Industrial development

- Electricity consumption by industry in the sector until 2050 will increase by 12.6 TWh
- Ensuring accessible energy resources for the development and decarbonization of national industry
- Attracting new types of industry, intensive in energy resources, to Lithuania

DECARBONIZATION OF TRANSPORT

Transport sector



RES share in final energy consumption in transport:
in 2030 - 15.8 percent
in 2050 - 95 percent

Electric or hydrogen powered vehicles will include:
in 2030 - 10 percent the whole park
in 2050 this share will increase to 80 percent.

SOCIO-ECONOMIC BENEFITS IN 2050



Energy independence

100%

Electricity production in Lithuania



Export of energy resources

1.4 TWh

Hydrogen export

9.1 TWh

Export of green synthetic fuel



100% decarbonization

0 MT

GHG emissions emissions in the energy sector



Industry growth

4-11%

GDP growth

44,000-140,000

new jobs



Availability of energy prices

-6.3 billion EUR

Decreased costs for importing energy resources

NATIONAL ENERGY INDEPENDENCE

CONTENTS OF THE STRATEGY

ENERGETICS OF LITHUANIA VISION

A country that produces all the energy it needs and has created a climate-neutral and high- added-value energy industry

Safe and reliable power supply:

- Synchronization
- Ensuring balancing capacity
- Having developed reliable electricity transmission and distribution networks
- Ensuring the supply of other energy resources
- Infrastructure protected from cyber and physical threats

100 percent climate neutral energy:

- Development of offshore wind
- Development of onshore RES
- Perspective of nuclear energy
- Development of the hydrogen ecosystem
- Decarbonization of the heat sector
- Decarbonization of the transport sector

Electricity economy and development of new industry:

- CO2 collection and utilization
- Production of hydrogen derivative products
- Development of national industry and attraction of new ones

Availability of energy resources for consumers:

- Development of productive and active users
- Community energy development
- Ensuring energy prices and a competitive market
- Demand management in flexibility and balancing services markets

Increasing the efficiency of energy consumption

Preparation of energy professionals for changes

Establishment of scientific research, innovation and energy technology development centers

AFTER IMPLEMENTING THE STRATEGY, LITHUANIA IN 2050 WILL BE...

... GREEN ENERGY FOR
AFFORDABLE PRICE IS
FULLY CONCERNED
AND EXPORTING
COUNTRY.





THANK YOU FOR YOUR ATTENTION