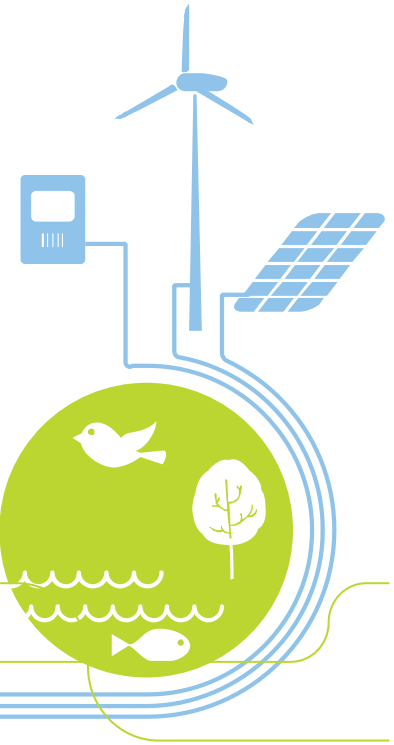
Introducing the Lithuanian Perspective, Energy Transition Journey

Deputy minister Inga Žilienė

03-10-2024

Vilnius



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LITHUANIA'S STRATEGY ENERGY OBJECTIVES

ENERGY INDEPENDENCE	Energy independent and self-sufficient by 2050
100% DECARBONISATION	Acceleration towards 100% renewable energy in cost effective way
BECOME AN ENERGY EXPORTER	Energy and higher value products supplier for the region
PURSUE INDUSTRIAL GROWTH	Energy sector transformation - opportunities for industrial growth
ENERGY COSTS & AFFORDABILITY	Ensured energy affordability and maximized export opportunities

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INTRODUCTION TO LITHUANIA'S ENERGY INDEPENDENCE STRATEGY

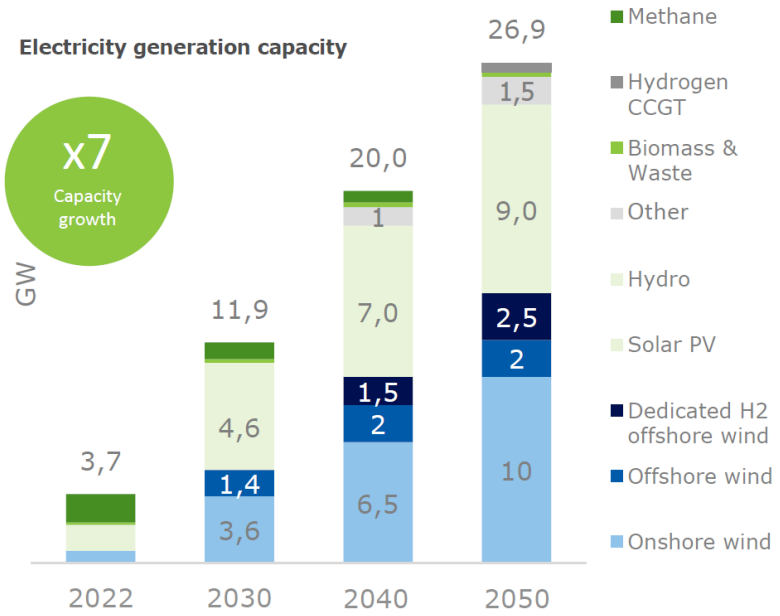
- Lithuania's energy strategy envisions a future where the country is energy independent and carbon-neutral by 2050

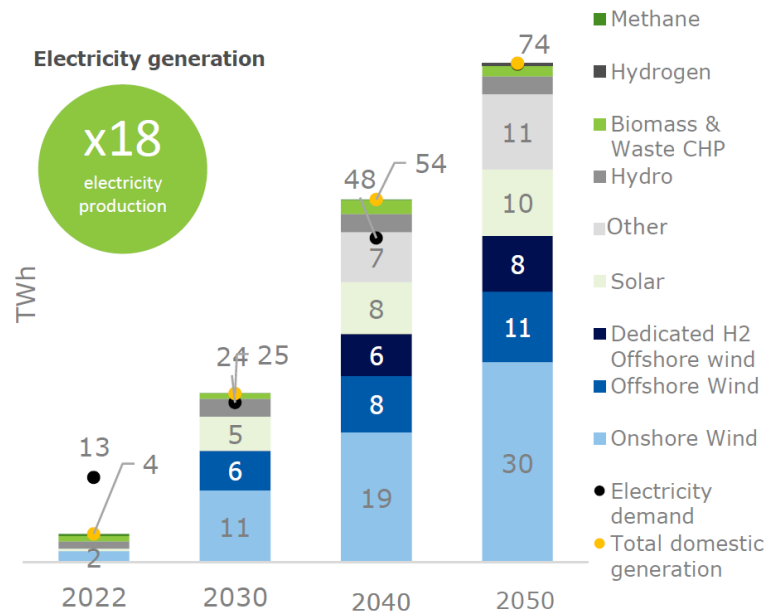
- Focus on transitioning to 100% renewable energy, reducing reliance on fossil fuels, and achieving net-zero emissions

- CCUS is a key component of the strategy, aimed at supporting decarbonization in hard-to-abate sectors like industry and energy generation

Electricity generation

Lithuania – electricity exporting country by 2030 and beyond





A 5-to-8-fold increase in installed capacity, driven by onshore & offshore wind and solar PV...

...is leading to a 10 to 20 higher electricity generation.

DNV outcomes based on Energy Transition Model

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LITHUANIA'S COMMITMENT TO REDUCING CARBON EMISSIONS

In the overall EU context, LT is singled out as significantly exceeding the objectives of the RES

Decarbonisation – Renewable Energy

Member State	RES-shares				
	2020 national binding target	2021 national SHARES value	2030 national contribution (draft updated NECP)	2030 shares in line with the formula	Ambition gap
AT	34%	36.4%	46%-50%	57%	Significantly below
BE	13%	13.0%	18%	33%	Significantly below
BG	16%	17.0%	29.9%	33%	Below
CY	13%	18.4%	26.5%	33%	Significantly below
CZ	13%	17.7%	30%	33%	Below
DE	18%	19.2%	40%	41%	Slightly below
DK	30%	34.7%	70.9%	60%	Significantly above
EE	25%	38.0%	65%	50%	Significantly above
EL	18%	21.9%	44%	39%	Significantly above
ES	20%	20.7%	47.9%	43%	Above
FI	38%	43.1%	51%	62%	Significantly below
FR	23%	19.3%	33%	44%	Significantly below
HR	20%	31.3%	42.5%	44%	Slightly below
HU	13%	14.1%	29%	34%	Significantly below
IE	16%	12.5%	34.1%	43%	Significantly below
IT	17%	19.0%	40.5%	39%	Slightly above
LT	23%	28.2%	55%	49%	Significantly above
LU	11%	11.7%	37%	37%	In line
LV	40%	42.1%	50%	61%	Significantly below
MT	10%	12.2%	11.5%	28%	Significantly below
NL	14%	13.0%	27%	39%	Significantly below
PL	15%	15.6%	23%-31%	32%	Significantly below
PT	31%	34.0%	49%	51%	Slightly below
RO	24%	23.6%	34%	41%	Significantly below
SE	49%	62.6%	65%	76%	Significantly below
SI	25%	25.0%	30%-35%	46%	Significantly below
SK	14%	17.4%	23%	35%	Significantly below

Only 7 MS (DK, EE, EL, ES, IT, LT, LU) submitted a contribution in line with the expected national contribution.*

Ambition put forward by MSs amounts to a RES share of **between 38.6% and 39.3%** in 2030 at Union level, lower than the binding target of **42.5%**.*

*under the Governance Regulation and the revised RED II.

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European Commission

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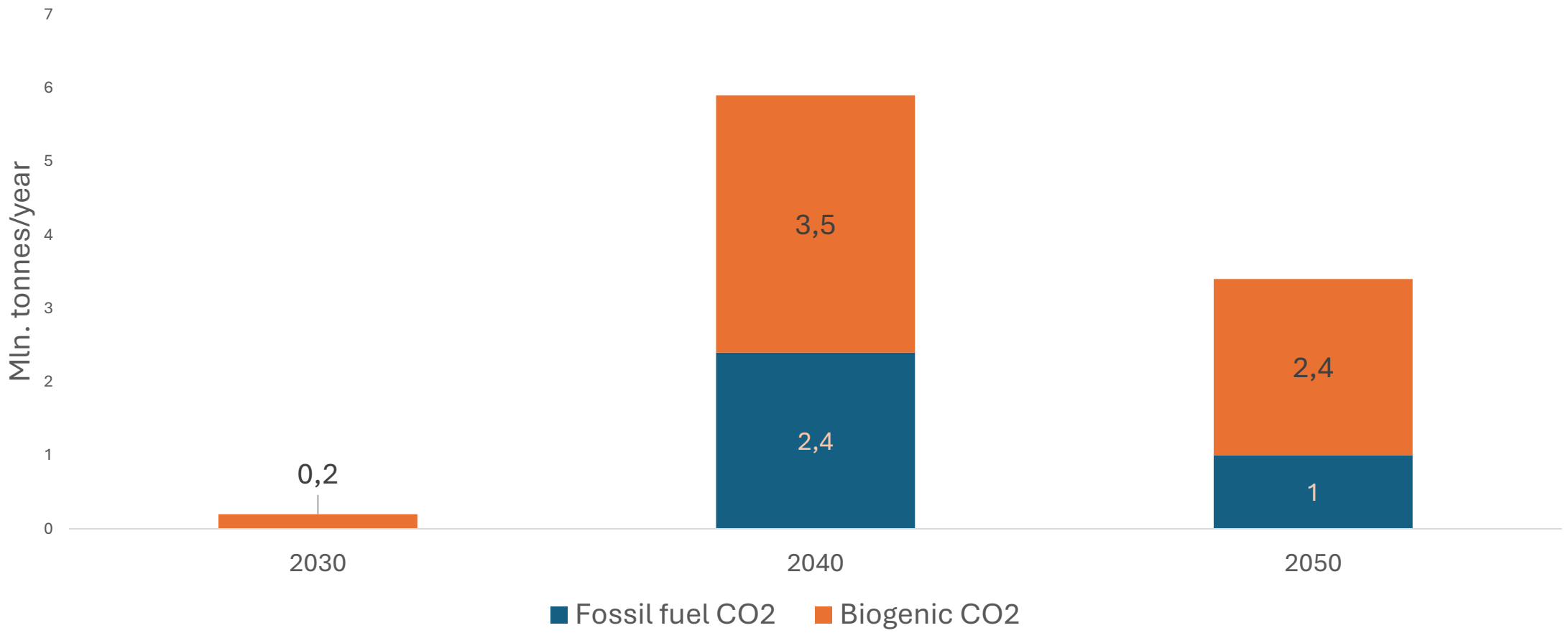
CO2 CAPTURE POTENTIAL IN LITHUANIA



Biggest potential for CO2 capturing will be around 2040.

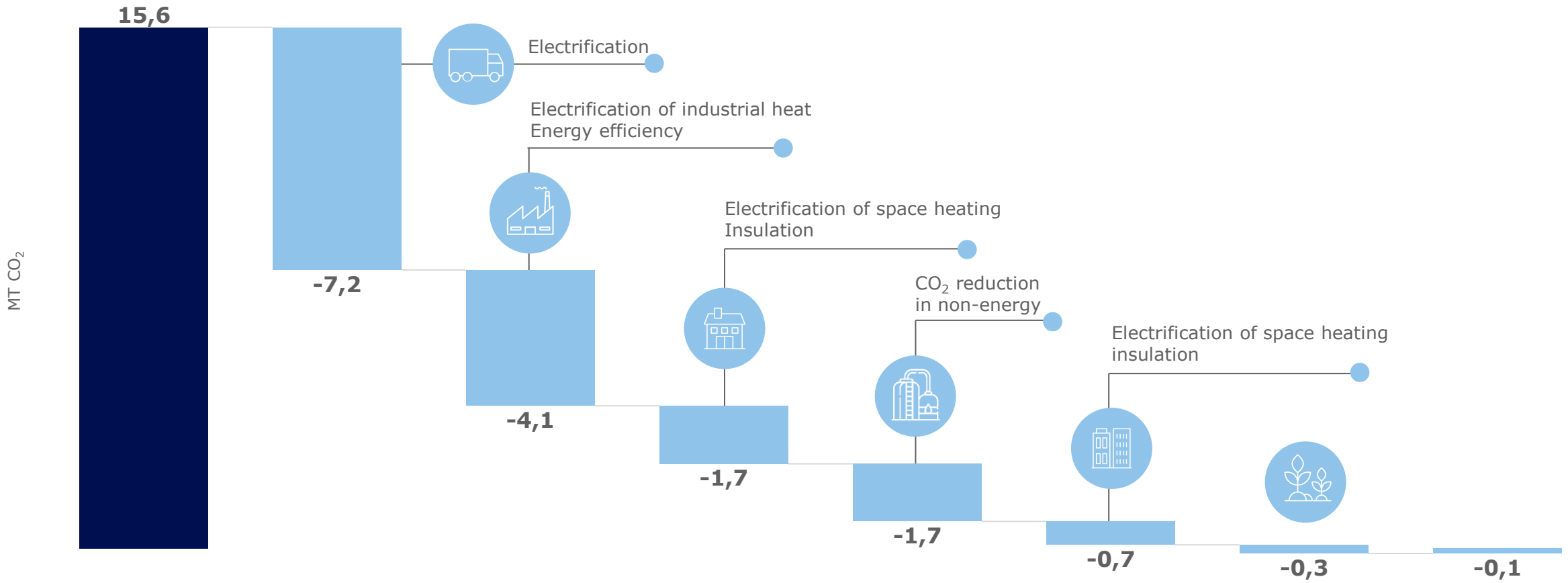
If decarbonization efforts succeeds, CO2 potential will gradually decrease over time.

Source: National Energy Independence Strategy (2024), Amber Grid CO2 potential evaluation (2024)

CO2 EMISSIONS REDUCTION PER SECTOR UNTIL 2050

Main decarbonization levers

$MtCo_2e$



Source: Lithuania Energy System Transformation to 2050

DNV outcomes based on Energy Transition Model

THE ROLE OF CCS TECHNOLOGIES IN LITHUANIA'S ENERGY TRANSITION

Key Roles of CCS in Lithuania's Energy Transition:

1. Diversifying the Energy Mix:
   - ✓ **Onshore and offshore wind**
   - ✓ **Solar power**
   - ✓ **Biomass**
   - ✓ **Hydrogen and Synthetic Fuels**

2. Contributing to Energy Security:

- ✓ **reducing reliance on imported fossil fuels**
- ✓ **building a CO_2 storage facilities**

3. Achieving Climate Goals While Ensuring Competitiveness – **Industrial carbon management**

4. Developing Cross-Border CCS Infrastructure

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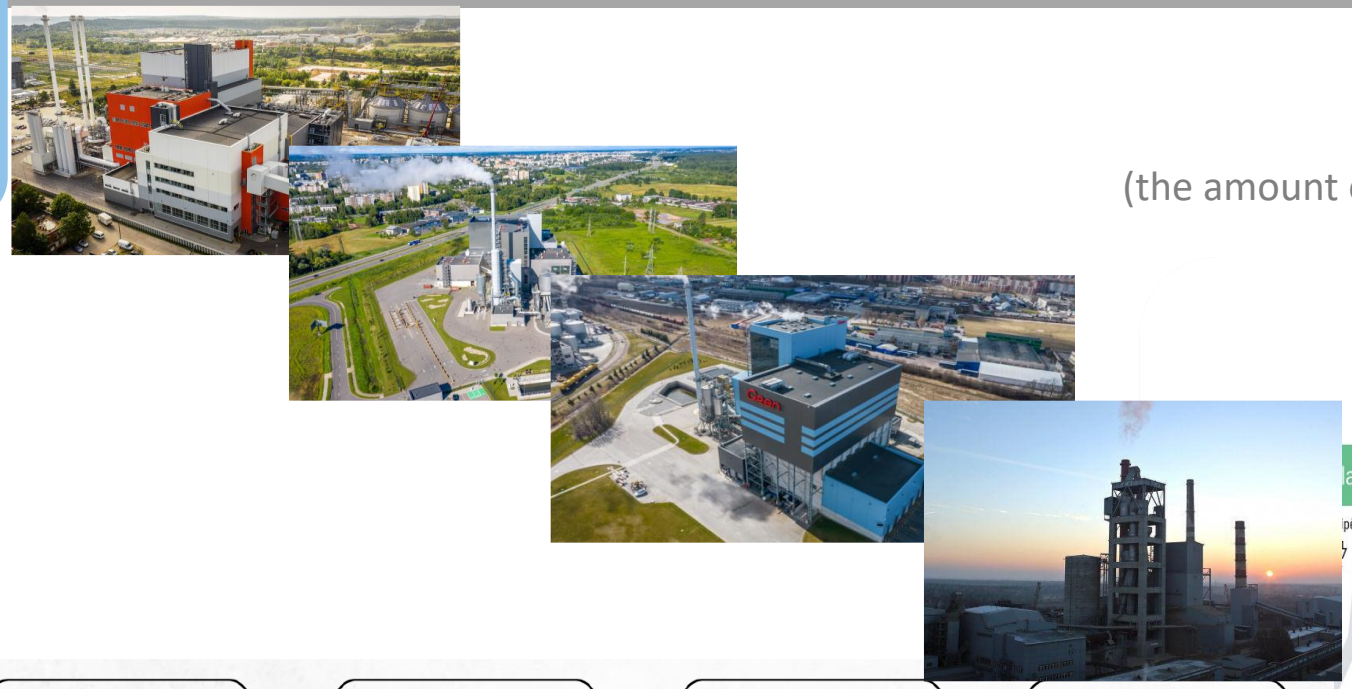
THE MOST POTENTIAL BIOMETHANE OBJECTS FOR CO2 COLLECTION IN LITHUANIA



LARGE-SCALE TO BE CONNECTED BIOMETHANE COMPANIES IN LITHUANIA

(the amount of biomethane transferred > 115 thousand tons; MWh/year)

FROM BIOMETHANE AND BIOFUEL PRODUCTION, MILLION TONNES CO_2 / YEAR	FROM BIOFUEL COMBUSTION, MILLION TONNES CO_2 / YEAR	FROM INCINERATION OF WASTE, MILLION TONNES CO_2 / YEAR	TOTAL CO_2 CAPTURE POTENTIAL, MILLION TONNES CO_2 / YEAR
2030 -----> 0,2	2030 ----> -	2030 -----> -	2030 -----> 0,2
2040 -----> 0,5	2040 ----> 2,6	2040 -----> 0,4	2040 -----> 3,5
2050 -----> 0,5	2050 ----> 1,8 - 2,6	2050 -----> 0,4	2050 -----> 2,7 - 3,5
Biomethane, biofuels production companies	Major heat supply companies and heat producers. Also, Vilnius cogeneration power plant	Hybrid objects - that capture fossil CO_2 along with biogenic CO_2	Includes all listed companies

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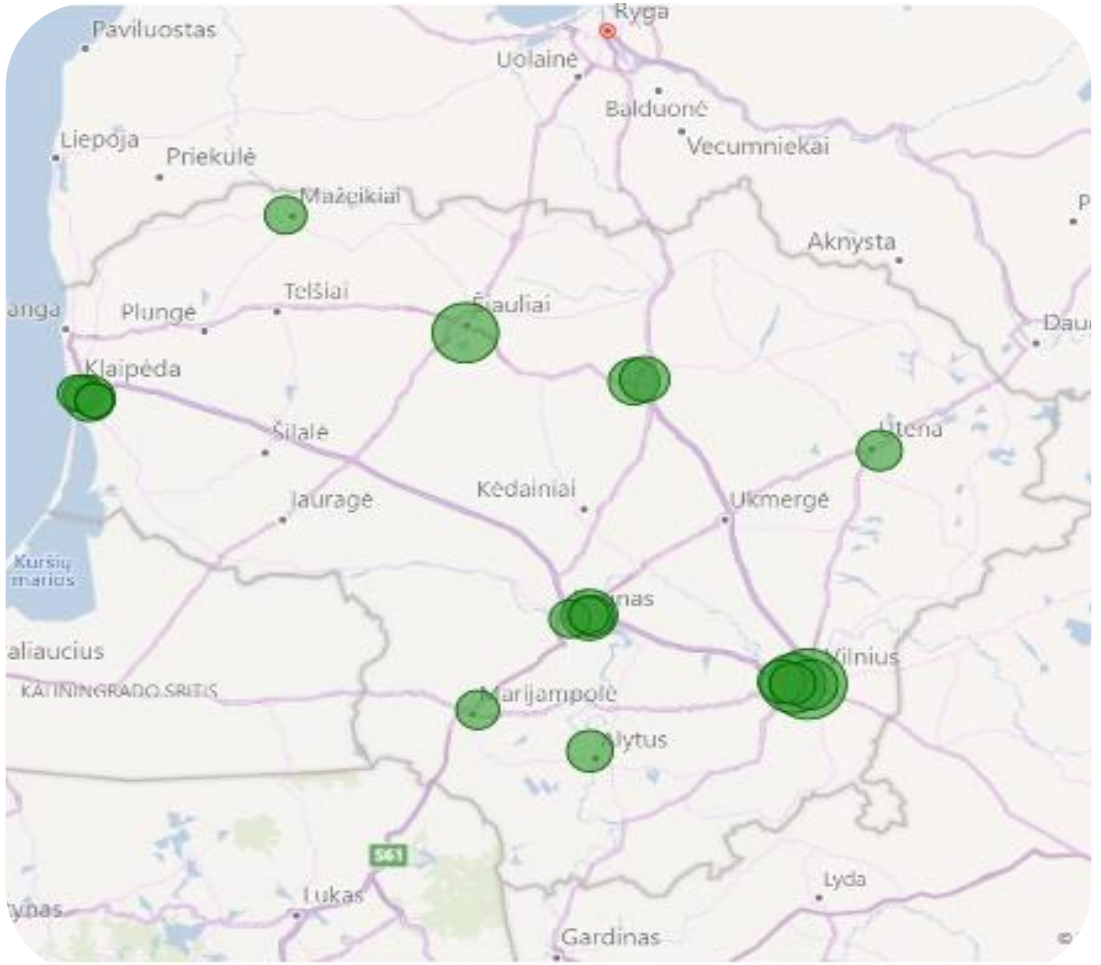
BIOGENIC CO2 CAPTURE FROM POTENTIAL CO2 SOURCES IN LITHUANIA

- Lithuania's commitment to **reducing reliance on imported fossil fuels** requires developing domestic energy resources.
- By capturing CO_2 from existing energy production facilities, CCS ensures that Lithuania's energy system remains reliable during the transition to renewables.
- Additionally, **CO_2 storage facilities** and pipelines can become part of a **regional CCS network**, allowing Lithuania to store not only its own emissions but also those from neighbouring countries, creating new economic opportunities.

THE MOST POTENTIAL BIOFUEL COMBUSTION OBJECTS FOR CO2 COLLECTION IN LITHUANIA

(the share of biogenic CO2 emitted by companies burning biofuels amounted to EUR 2.6 Mt.)



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SYNTHETIC FUEL PRODUCTION IN LITHUANIA

	Methanol	Sustainable aviation fuel and synthetic diesel (produced together)	Synthetic methane
Total production	**2,5** Mt (**14** TWh)	**1,85** Mt (**23** TWh)	**1,3 Mt** (**17** TWh)
H_2 demand	**0,48** Mt	**0,7** Mt	**0,48** Mt
Demand for electricity TWh (H2 production and CO_2 capture)	**30** TWh	**43** TWh	**30** TWh
CO_2 requirement for 1 t production	**1,4** t	**3,1 – 4,1** t	**2,8** t
H2 requirement for 1 t production	**0,19** t	**0,25 – 0,36** t	**0,38** t

POTENTIAL SYNTHETIC SYNTHETIC FUELS PRODUCERS IN LITHUANIA

ignitis grupė

ORLEN Lietuva

e-energija

EUROPEAN ENERGY

CIS clean industry solutions

Parsekas

Source: Ambergrid AB study, 2024

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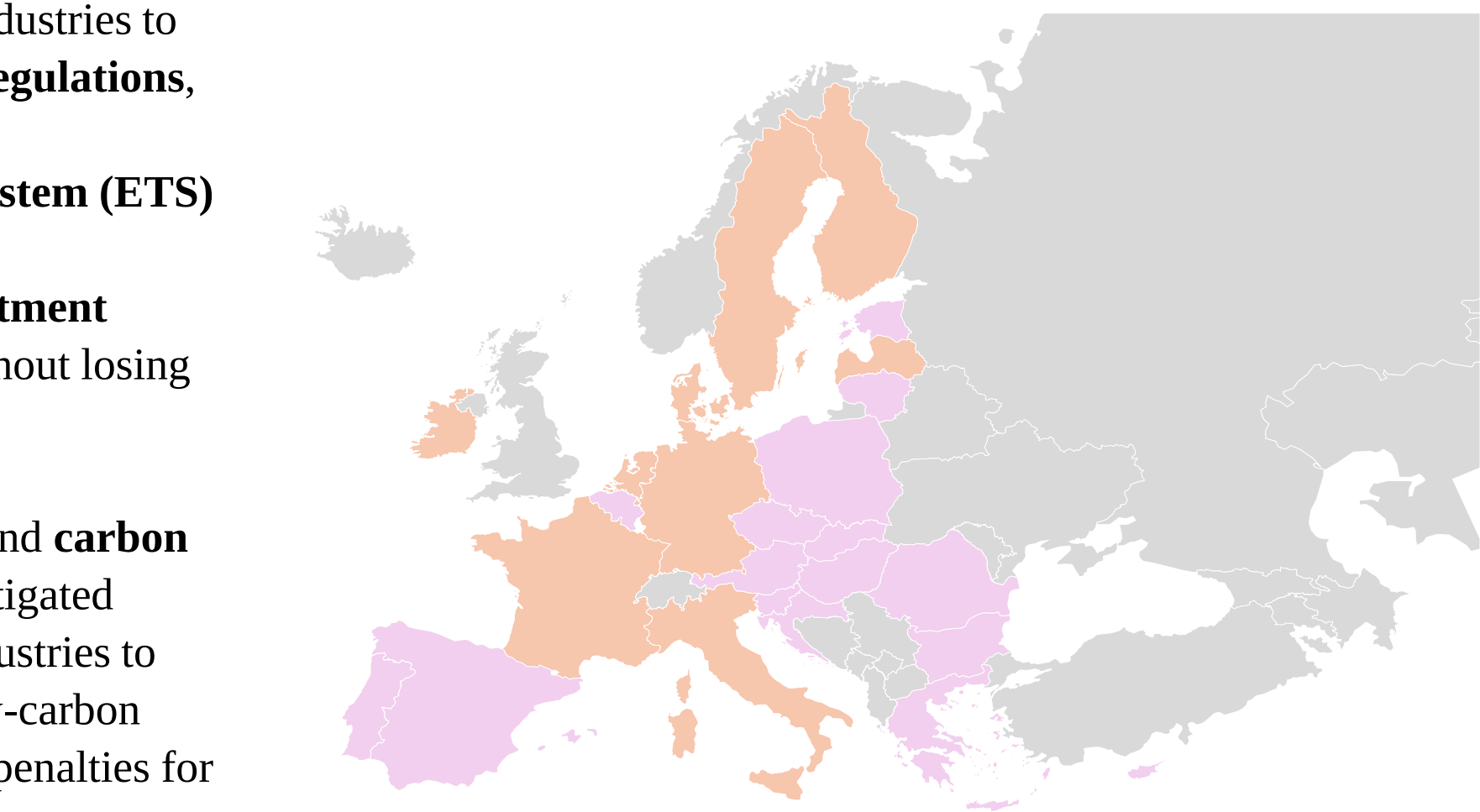
ACHIEVING CLIMATE GOALS WHILE ENSURING COMPETITIVENESS

- CCS enables Lithuanian industries to comply with **EU climate regulations**, including the
- **EU Emissions Trading System (ETS)** and
- the **Carbon Border Adjustment Mechanism (CBAM)**, without losing competitiveness

- The cost of **carbon taxes** and **carbon pricing mechanisms** is mitigated through CCS, allowing industries to remain operational in a low-carbon economy and avoid heavy penalties for emissions



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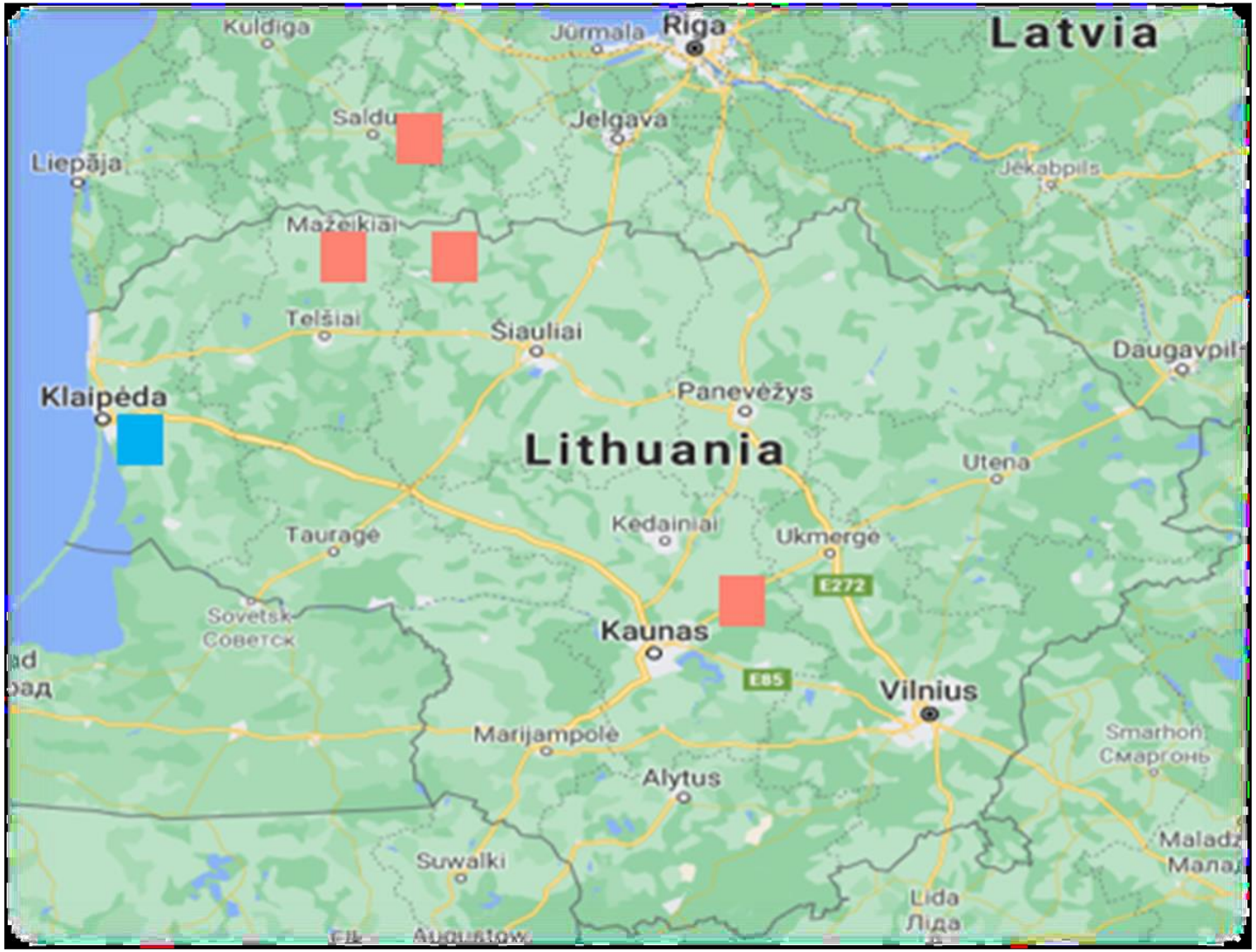
DEVELOPING CROSS-BORDER CCS INFRASTRUCTURE

- Lithuania's geographical location in the **Baltic Sea region** makes it well-positioned to develop **cross-border CO_2 transport and storage infrastructure**. By partnering with neighbouring countries, like Latvia and Poland, Lithuania could temporarily store CO_2 offshore, creating a network for regional decarbonization efforts.

- This infrastructure will also benefit from **EU funding mechanisms** like the **Innovation Fund** and **CEF**, which support the development of CCS projects across Europe.



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EU PERSPECTIVE ON CCS – NET-ZERO INDUSTRY ACT (NZIA)

- **NZIA** is a key legislative measure introduced by the European Commission to **increase the competitiveness of Europe's net-zero industries** and boost the production of clean technologies, including CCS.
- The Act establishes a framework to **promote investment** in carbon management technologies by offering **regulatory support** and **streamlined permitting** processes.
- CCS is viewed as crucial for industries that cannot easily electrify, particularly in **energy-intensive sectors** like steel, cement, and chemicals.
- NZIA also emphasizes the development of **cross-border CO_2 transport and storage infrastructure**, aiming to create a **pan-European CCS network** by 2030.

The transport network will play a crucial role in enabling CO2 to be transported to permanent storage sites
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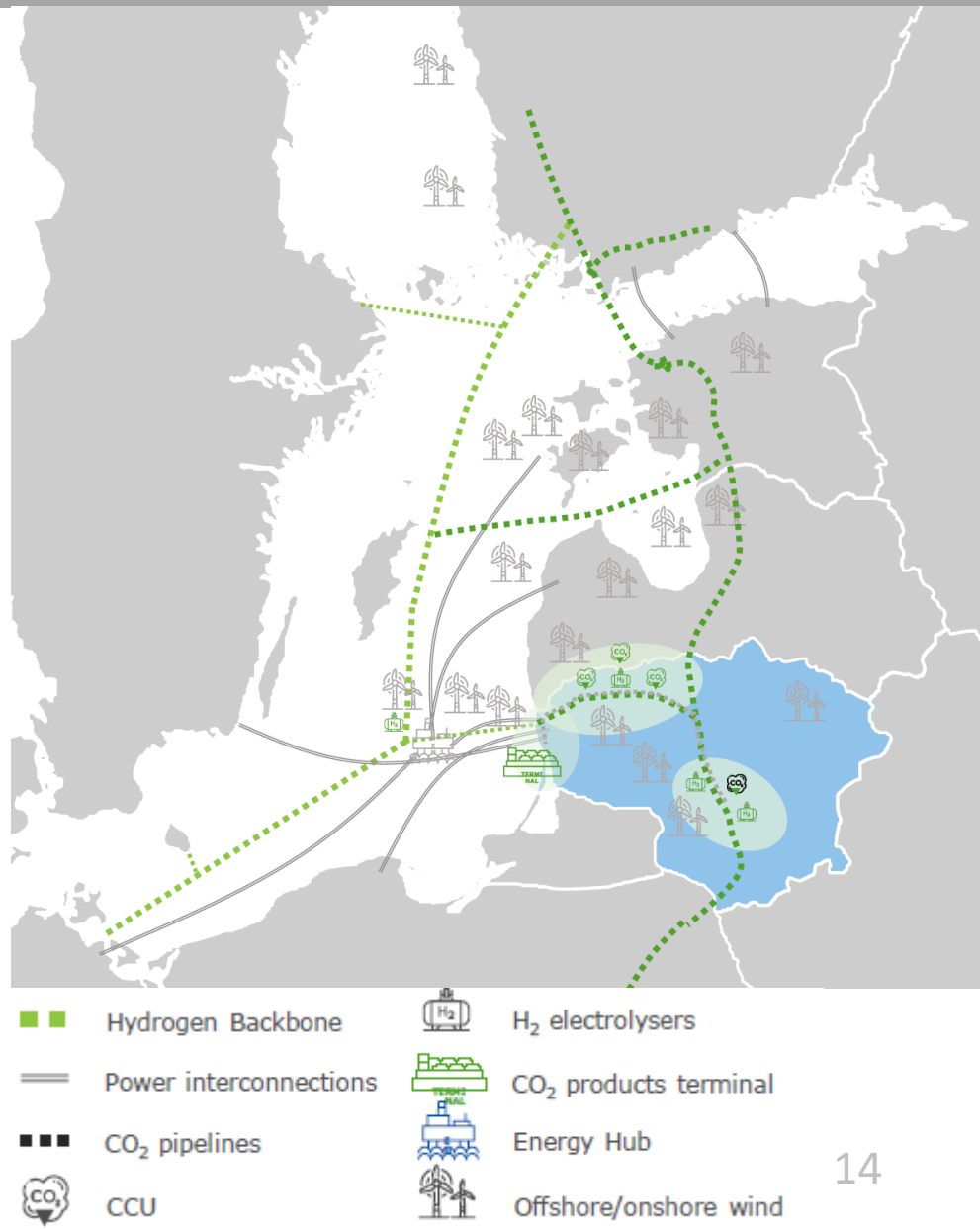
FINANCIAL IMPACT ON LITHUANIA'S ENERGY TRANSITION

- The integration of CCS into Lithuania's energy transition will require significant investment but offers **long-term economic benefits**.
- **Initial Investments**: By 2050, Lithuania is projected to invest **€1.3 billion** in CCUS technologies, primarily in developing **CO_2 transport infrastructure** (pipelines)
- These investments **will focus on**:
  - Expanding **renewable energy capacity** (onshore/offshore wind and solar).
  - Building a robust **CO_2 transportation** infrastructure.
  - Developing **CCUS temporary storage** to decarbonize industries.



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SOCIO-ECONOMIC BENEFITS BY 2050

Energy independence

100%

Electricity independency

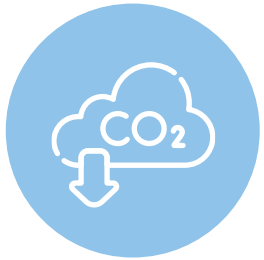
Energy export

1.4 TWh

Hydrogen exports

9.1 TWh

Zero carbon product exports



100% decarbonisation

0 MT

Carbon emissions reached

Industrial growth

4-11%

GDP growth

44,000-140,000

Jobs created

Energy costs & affordability

-6,3 bln EUR

Reduction in annual operational costs (energy carriers & O&M)

Source: Lithuania Energy System Transformation to 2050

DNV outcomes based on Energy Transition Model

CURRENT AND FUTURE CCUS PROJECTS

CCS BALTIC CONSORTIUM

The first CO_2 capture during cement production in the Baltic States

Akmenės CEMENTAS

KN ENERGIES

SCHWENK

LarvikShipping MOL

VILNIAUS KOGENERACINĖ JĖGAINĖ (VKJ)

Source: waste incineration and combustion of biofuels
Total CO_2: 527 kt CO_2 / year
Bio-CO_2: 445 kt CO_2 / year
(not before 2032)

KAUNO KOGENERACINĖ JĖGAINĖ (KKJ)

Source: waste incineration
Total CO_2: 206 kt CO_2 / year
Bio-CO_2: 87 kt CO_2 / year
(not before 2032)

AKMENĖS CEMENTAS

Source: cement production and waste incineration
Total CO_2: 800 kt CO_2 / year
Bio-CO_2: 120 kt CO_2 / year
(not before 2033)

GREN KLAIPĖDA

Source: waste incineration
Total: 270 kt CO_2 / year
Bio-CO_2: 121 kt CO_2 / year
(timeframe not defined)

- Lithuania is actively pursuing CCUS pilot projects, such as those integrated with hydrogen production and heavy industries.
- By 2050, Lithuania aims to invest approximately **€9 billion** in H2 production, CCUS technologies, including the development of **CO_2 pipelines** and **storage sites**.
- These projects will enable Lithuania to meet its **energy independence** and **carbon-neutrality goals** while also supporting regional efforts to reduce emissions.

CO_2 CAPTURE FROM HYBRID OBJECTS, million t CO_2/year

2030 -----> -
2040 -----> 1,8
2050 -----> 1,8

€ 1,2 billion

Indicative level of investment for the capture of **1.8 Mt CO_2/year** of fossil and biogenic CO_2 from hybrid objects

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CONCLUSION AND NEXT STEPS

- **CCUS is critical** to Lithuania's energy future, enabling the country to meet its decarbonization targets while maintaining economic growth and industrial competitiveness.
  - "*Feasibility study on the use of CO_2 capture and storage, hydrogen and other innovative technologies in Lithuanian industrial enterprises operating in the most negatively affected areas" (Ministry of Economy and Innovations)*
- Continued investment, international cooperation, and policy support will be needed to scale CCUS technologies.

Stages of the CO_2 capture, transport, storage and utilisation value chain:

- **by 2030 -** the first biogenic carbon capture and deployment projects for synthetic green fuels have been implemented;
- **by 2040 -** the first projects for the capture of carbon dioxide at large combustion plants of biofuels and/or waste have been implemented;
- **by 2050 -** fossil fuel carbon emissions from hard-to-abate companies, are equal to the carbon content they capture (becoming climate-neutral companies);

National Strategy for Energy Independence, 2024

Lithuania is well-positioned to become a **regional leader** in **carbon management** and **renewable energy**.

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Thank you for your attention