

SUMMARY

SOUTH BALTIC FARMS
AN ESSENTIAL PART OF RENEWABLE ENERGY SYSTEMS



Interreg
South Baltic



Co-funded by
the European Union



**D2.2 REPORT ON THE POTENTIAL OF USING RENEWABLE ENERGY
IN THE SBS REGION, INCLUDING A JOINT GREEN POLICY STRATEGY**

STUDY AREA AND SCOPE



GERMANY

Mecklenburg-Western Pomerania has the largest average farm size in Germany at 283 hectares (2023), with 4,750 farms categorized by size classes. Large-scale operations dominate the landscape, with significant portions of land used for cereals (50.5%) and rapeseed (19.1%).

50.5% used
for cereals

POLAND

The Pomeranian, West Pomeranian and Warmian-Masurian Voivodeships, include a mix of small (under 15 ha), medium (15–50 ha), and large farms (over 50 ha). In 2020, small farms made up 71.9% of the total, although large farms—only 9.2%—covered substantial land areas (avg. 151.2 ha).

71.9% of farms
under 15 ha

LITHUANIA

The region includes Klaipėda, Tauragė, and Telšiai counties, with a combined total of over 35,700 farms. Farm sizes have increased over the years, with an average of 22.2 hectares in 2020. Crop production dominates agriculture, accounting for 68% of output in 2023, primarily cereals (34.9%) and rapeseed (12.1%).

68% crop
production

BIOMASS & RESIDUES

GERMANY: The region is a major contributor to Germany's sustainable straw potential, generating 2,839 tons of cereal straw (fresh matter). Livestock populations also produce substantial solid manure, supporting biogas and biomass energy applications.

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RENEWABLE ENERGY USE

GERMANY: Farms in the region increasingly use photovoltaic systems, biogas, and CHP (combined heat and power) units for energy. In 2021, wind (3,514.6 GWh), solar (2,688.8 GWh), and biomass (390.9 GWh) were key contributors to renewable electricity generation.

POLAND: The region is investing in solar, wind, biogas, and geothermal systems. Biogas plants like Biogazownia Kołczygłowy and solar-powered farms such as "Pod Lipami" are notable examples. Waste is managed via composting, anaerobic digestion, and energy recovery, with landfill use minimized due to environmental concerns.

LITHUANIA: Lithuanian farms increasingly use solar panels, biogas systems, wind turbines, and biomass boilers. Renewable energy shares vary regionally—Tauragė leads with 76.7%, followed by Telšiai (59.27%) and Klaipėda (20.2%). Agroforestry and energy crop cultivation (e.g., miscanthus) support sustainable bioenergy production.



FARM ENERGY DEMAND

GERMANY: Large dairy and livestock farms, common in Mecklenburg-Western Pomerania, drive high energy consumption—primarily for heating, ventilation, and milking operations. Energy use is most intense during peak load periods, especially in summer due to ventilation demands.

POLAND: Small farms consume 750–1,400 kWh/month, while large farms can use up to 10,000 kWh/month. Peak energy demand occurs in winter (Dec–Feb) due to heating and ventilation needs in livestock buildings and greenhouses. Farms with biogas or solar systems manage peak loads better and reduce reliance on grid electricity.

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TARGETS AND TRENDS IN THE REGION

GERMANY

➤➤➤ AMBITIOUS CLIMATE TARGETS

Germany aims for net zero emissions by 2045, with 80% renewable electricity by 2030 and 100% by 2035. The 2023 nuclear phase-out and planned coal exit mark major milestones in its energy transformation.

➤➤➤ MASSIVE RENEWABLE DEPLOYMENT

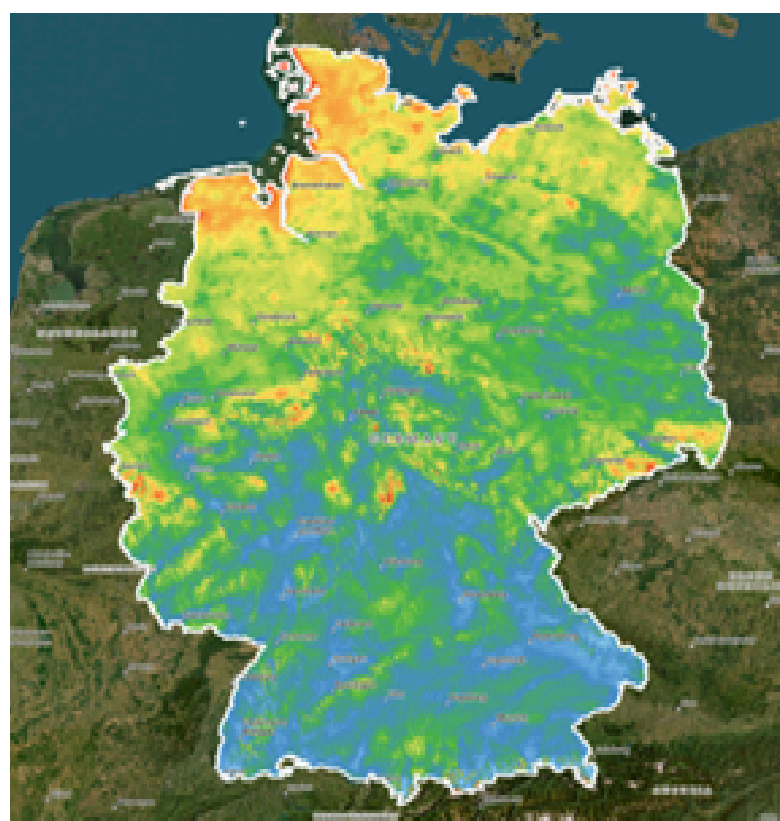
By 2030, targets include 100–110 GW onshore wind, 30 GW offshore wind, and 200 GW solar PV, alongside 10 GW of green hydrogen capacity. These goals are supported by strong policy frameworks and regulatory reforms.

➤➤➤ SIGNIFICANT PROGRESS & EFFICIENCY GOALS

Renewables now supply nearly 50% of electricity, up from 6% in 2000. Germany also plans to reduce energy consumption by 500 TWh by 2030 (around 20% of 2022 levels), aligning supply growth with demand-side efficiency.

➤➤➤ REGIONAL LEADERSHIP & COOPERATION

As a technological and policy leader in the SBS region, Germany drives innovation in offshore wind, hydrogen, and grid modernization, supporting cross-border energy integration and harmonized regional strategies.



Long term average photovoltaic output (Global Solar Atlas)
and mean wind power density at 100m (Global Wind Atlas)

TARGETS AND TRENDS IN THE REGION

POLAND

»»» COAL-HEAVY LEGACY, NUCLEAR FUTURE

With coal still generating ~70% of electricity, Poland faces a steep decarbonization path. Six large nuclear reactors are planned for 2033–2043, alongside early SMR projects led by industry players like KGHM and NuScale.

»»» WIND POWER EXPANSION

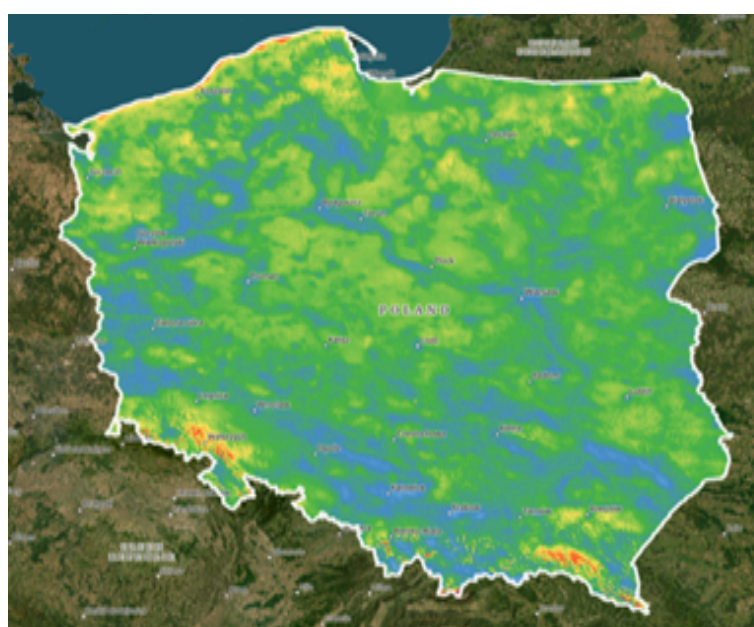
While underutilized (9% of electricity in 2021), wind energy is set for major growth. Poland targets 5.9 GW of offshore wind by 2030 and 11 GW by 2040, building on an expanding base of onshore wind farms.

»»» BIOGAS AND BIOMETHANE - UNDERDEVELOPED POTENTIAL

Despite vast agricultural capacity, biogas remains limited to around 350 small plants. Recent legislative reforms, including biomethane grid access and streamlined permitting, aim to unlock significant sector growth.

»»» SHIFTING POLICY LANDSCAPE

New energy laws, biomass waste rule changes, and grid infrastructure support, signal a turning point for Poland's renewable sector, particularly for rural and agricultural energy integration.



Long term average photovoltaic output (Global Solar Atlas)
and mean wind power density at 100m (Global Wind Atlas)

TARGETS AND TRENDS IN THE REGION

LITHUANIA

»»» FROM DEPENDENCY TO INDEPENDENCE

Lithuania has dramatically reduced electricity imports (once up to 70%), replacing them with a secure, diversified energy system focused on independence from Russian energy sources.

»»» RENEWABLE ENERGY PIVOT

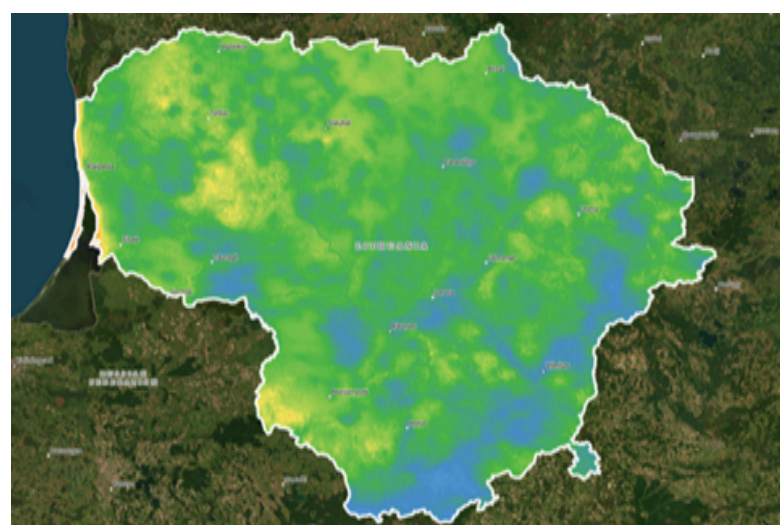
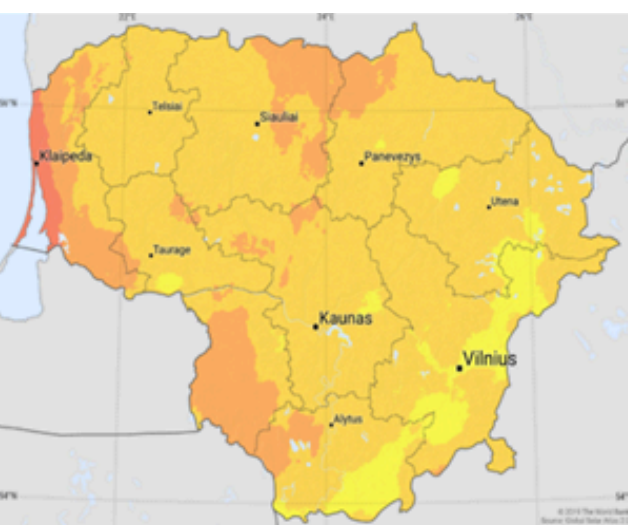
A decisive policy shift from nuclear to renewables has been supported by technology-neutral auctions and regulatory reforms. Wind leads the way, while solar holds significant untapped potential.

»»» DECENTRALIZATION & PROSUMERS

The government promotes decentralized energy through incentives for households and small producers, fostering a growing base of prosumers and enhancing energy democratization.

»»» REGIONAL INTEGRATION POTENTIAL

Lithuania's experience in auction design, policy reform, and public engagement positions it to lead within the SBS region—especially in cross-border cooperation, grid integration, and joint energy strategies.



Long term average photovoltaic output (Global Solar Atlas)
and mean wind power density at 100m (Global Wind Atlas)

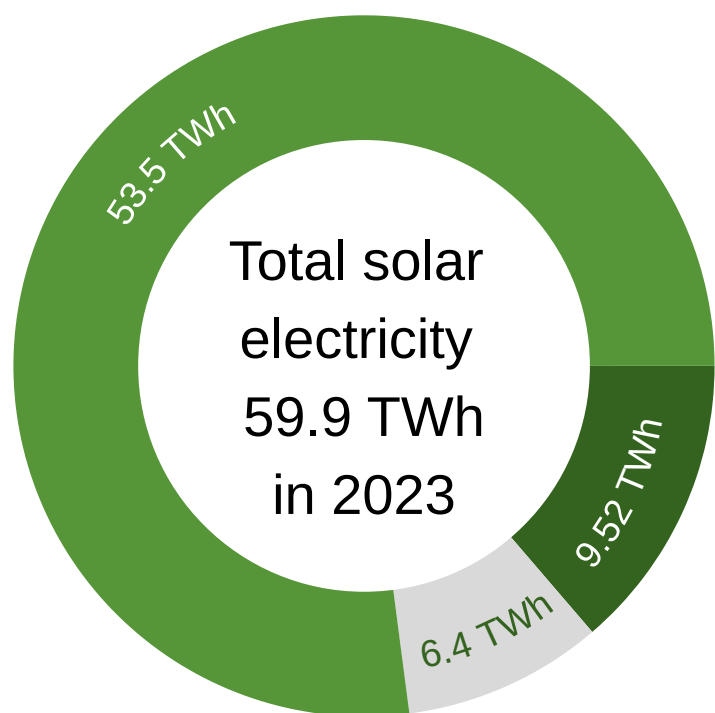
SOLAR, WIND AND BIOMASS ENERGY

SOLAR ENERGY

GERMANY

Germany reached ~81 GWp of PV by 2023, with farmland providing 15.9% (~12,870 MWp). Farm PV produced ~9.52 TWh in 2023, within the national 59.9 TWh total; 53.5 TWh went to the grid and 6.4 TWh was self-consumed.

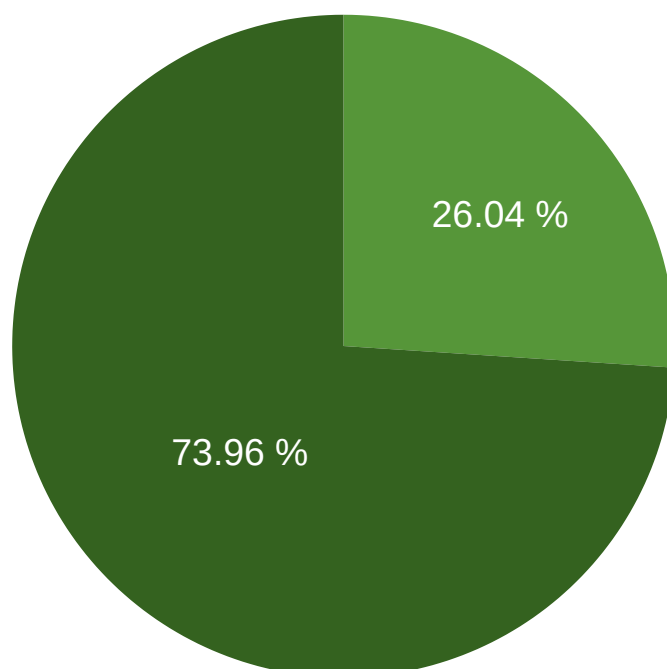
- Fed into the public grid
- Generated on farms
- Self-consumed



POLAND

Poland's technical PV potential is 42.634 TWh, about 26% of national electricity demand. As of June 2023, Pomeranian Voivodeship has 132 installations (50–1000 kW) and 7 above 1 MW; nationally there are 3,080 smaller and 148 large systems.

- Potential of PV production
- Other electricity sources



LITHUANIA

Lithuania has ~3,000 farm PV systems (50–1000 kW) and 44 >1 MW sites, totaling ~50 MW of capacity. Across Klaipėda, Telšiai, and Tauragė combined, generation is ~12.30 GWh (12,295.45 MWh). Available space is substantial: ~2,414,679 m² of rooftops and ~11,403.71 ha of ground area for further solar expansion.

Available potential space for rooftop PVs

Region	Available potential space for rooftop PVs (m ²)
Klaipėda	1,518,990
Telšiai	568,175
Tauragė	327,514



SOLAR, WIND AND BIOMASS ENERGY

WIND ENERGY

GERMANY

The total wind energy capacity installed on farmland in the SBS region is estimated at 1,302 MW. Under federal regulations, at least 2.1% of the land area must be designated for wind energy by 2032, which equates to approximately 269.7 km². All wind turbines must be connected to the grid, as the “Bundesnetzagentur” oversees the sale of electricity generated by renewable energy sources.

POLAND

Poland operates ~1,400 wind turbines, with Pomeranian among the leading regions—especially in coastal and rural zones—supported by auctions and EU funds. Expansion is constrained by the “Distance Act” (10× turbine-height setback from homes) and grid-integration challenges like balancing supply/demand, voltage stability, and wind variability.

LITHUANIA

Lithuania’s wind capacity reached ~1,740 MW in 2024, up by ~84% from 946 MW in 2022, with wind generation totaling 1,703.1 GWh in the first half of 2024—clear evidence of rapid growth and a larger role in the power mix. Further expansion is uneven because grid-connection feasibility varies by region.

At least 2.1%
of the land area must be
designated for wind energy
by 2032

~1,400
wind turbines
in the Pomeranian region

~84%
increase
in wind power capacity
since 2022



SOLAR, WIND AND BIOMASS ENERGY

BIOMASS ENERGY

GERMANY

Germany operates 11,492 biogas plants, but new-builds have fallen sharply. Cuts to feed-in tariffs in the 2014/2016 EEG amendments and the 2017 shift to auctions with lower tariff caps reduced incentives, leading to a steady drop in newly commissioned plants.

POLAND

Ten regional plants (100–2,500 m³/day) plus two >2,500 m³/day. Nationally (end-2021), agricultural biogas topped 513 million m³/year; 342.913 million m³ was fermented, with 335.335 million m³ used for power. Total installed electric capacity: 125.323 MWe.

LITHUANIA

Klaipėda's AB Klaipėdos vanduo plant is 654 kW (~2,616 m³/day). The region has no >2,500 m³/day sites and farm data are unavailable; nationally, sludge digestion produced 2.063 million m³ in 2020, mostly used for electricity/heat via CHP with occasional grid injection.

11,492
biogas plants
operating at various capacities

513
million cubic meters
produced by biogas
plants annually

2,616 m³
produced per day,
by AB Klaipėdos vanduo"



GREEN POLICY STRATEGY

»»» CRISIS-DRIVEN TRANSITION AND STRATEGIC ROLE:

The SBS region is accelerating its shift to a resilient, low-carbon economy in response to energy security concerns intensified by the war in Ukraine and the sharp drop in Russian gas supplies. As part of the broader Baltic Sea Region, it serves as a testbed for innovative energy policies with relevance beyond its borders.

»»» REGULATORY AND SOCIAL REFORM FOR ENERGY DEPLOYMENT:

Streamlining legal and financial instruments is essential to speed up renewable energy projects. Harmonized permitting, simplified bureaucracy, and socially inclusive frameworks are needed to reduce project risks and ensure that the transition is both feasible and equitable.



»»» EMPOWERING CITIZENS AND BUILDING SOCIAL ACCEPTABILITY:

The energy transition must go beyond technical change to foster genuine public support. Policies should protect prosumers, ensure fair access, and promote transparency, particularly for marginalized groups, while avoiding regressive measures like fees on self-consumed electricity.

»»» INVESTMENTS IN EDUCATION, INNOVATION, AND RESILIENCE:

The SBS region must prioritize cross-border education, vocational training, and public awareness campaigns alongside investments in pilot projects. Emphasis on innovation and resilience—especially in offshore wind, storage, and cybersecurity—will be key to a sustainable energy system.

»»» COOPERATION AND ADAPTIVE GOVERNANCE:

Effective multilateral collaboration between governments, civil society, and industry is vital to avoid redundancies and align with EU goals. Transition strategies must remain flexible, balancing centralized planning with grassroots initiatives and tailored local engagement to ensure long-term legitimacy and success.

