

Best Practices Demonstrating the Potential of Hydrogen Technologies for Poland, Bulgaria, Lithuania, and Albania

This report presents 15 best practices showcasing hydrogen technology demonstration plants across Poland, Bulgaria, Lithuania, and Albania. Each section includes a detailed description of the technology, size, integrated systems, applications, and sources for verification.

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Authors: The Institute of Power Engineering - National Research Institute , Lithuanian Energy Institute, Regional economic development agency – Stara Zagora

Contact Person: Marcin Blesznowski

Institution: The Institute of Power Engineering - National Research Institute

1. HYDROGIN – 10 kW rSOC installation

Location: Elbląg, Poland

Owner: Consortium of Hydrogin project, CBRF S.A.

Commissioning: 2023

Technology Type:

reversible Solid Oxide Cell – switching between electrolysis and fuel cell modes

Size/Parameters:

10 kW in electrolysis mode and 5 kW in fuel cell mode

Integrated Technologies:

reversible Solid Oxide Cell with biomass plant and compressed (200 bar) H₂ storage

Applications:

Power sector; energy storage; increase of biomass boiler flexibility

Source:

<https://www.orklen.pl/content/dam/internet/orklen/pl/en/sustainable-development/transition-projects/hydrogen/Hydrogen-Projects-Portfolio-ORLEN.pdf>

<https://media.energa.pl/pr/806299/pierwsza-na-swiecie-instalacja-produkcji-wodoru-w-elektrolizerze-zintegrowanym-z-elektrocieplownia-pracuje-w-elblagu>



2. VETNI – 30 kW SOC electrolysis installation

Location: Jasto, Poland

Owner:

Consortium of VETNI project, Orlen S.A., Institute of Power Engineering – National Research Institute and AGH University of Science and Technology

Commissioning: 2023

Technology Type: Solid Oxide Electrolysis

Size/Parameters:

30 kW in electrolysis mode (capacity of approx. 18 kg H₂/day)

Integrated Technologies:

Solid Oxide Electrolysis with old refinery, usage of the process steam, compressed (200 bar) hydrogen storage

Applications: refinery

Source:

<https://www.orken.pl/content/dam/internet/orken/pl/en/sustainable-development/transition-projects/hydrogen/Hydrogen-Projects-Portfolio-ORLEN.pdf>

<https://ien.com.pl/baza-wiedzy/aktualnosci/zakonczona-z-sukcesem-realizacja-projektu-vetni>

<https://www.orken.pl/pl/o-firmie/o-spolce/dotacje/projekty-BR/POIR/Projekt-VETNI/Projekt-VETNI-zakonczony>



3. Prototype MEGA SOE – 400 kW SOE installation

Location: Warsaw, Poland

Owner:

Consortium of MEGA SOE project, Orlen S.A. and Institute of Power Engineering – National Research Institute

Commissioning: 2025 (II phase of the project)

Technology Type:

Solid Oxide Electrolysis and Solid Oxide Fuel Cell (rSOC system)

Size/Parameters:

400 kW in electrolysis mode and ca. 150 kW in fuel cell mode

Integrated Technologies:

Solid Oxide Electrolysis that will be combined with refinery/petrochemical plant

Applications: petrochemical and chemical sector; energy storage;

Source:

<https://www.orklen.pl/pl/o-firmie/o-spolce/dotacje/projekty-BR/programy-krajowe-NCBR/megasoe/projekt-megasoe>

<https://ien.com.pl/baza-wiedzy/projekty/realizowane/krajowe/opracowanie-i-wdrozenie-wielkoskalowego-systemu-wytwarzania-wodoru-wysokiej-czystosci-z-wykorzystaniem-oze-w-elektrolizerze-stalotlenkowym>

4. ORLEN – Multifuel Technology Platform

Location: Poland (market deployment, ORLEN infrastructure)

Owner / Operator: ORLEN S.A.

Commissioning: 2024

Technology Type:

Multifuel system integrating hydrogen, biomethane, LNG, electricity, and synthetic fuels in a single refuelling platform.

Size / Technical Parameters: Hydrogen dispensing pressure: 350/700 bar

- Scalable for heavy-duty and light-duty transport;
- Integrated Technologies: Electrolysis for hydrogen production, Compression and storage of H₂, Distribution of biomethane and LNG, EV charging points, Energy and safety management system

Applications:

Road transport (buses, trucks, passenger cars), Logistics and multimodal transport
Emission reduction in mobility sector

Source:

<https://www.orklen.pl/en/about-the-company/media/press-releases/current/2025/june-2025/groundbreaking-multifuel-technology-introduced-to-market-by-orklen>

<https://www.orklen.pl/content/dam/internet/orklen/pl/en/sustainable-development/transition-projects/hydrogen/Hydrogen-Projects-Portfolio-ORKLEN.pdf>



5. ORLEN H₂ Hub Trzebinia

Location: Trzebinia, Poland

Owner: ORLEN S.A.

Start Date: 2021

Technology Type: Hydrogen production hub and quality lab

Size/Parameters: Automotive-grade H₂, ISO 14687 accreditation

Integrated Technologies: Production + lab + green glycol

Applications: Transport, chemical industry

Source:

<https://ceenergynews.com/hydrogen/orlen-hydrogen-hub-trzebinia>

<https://www.orken.pl/pl/zrownowazony-rozwoj/projekty-transformacyjne/wodor/aktualnosci-o-wodorze/orken-poludnie-roz poczyna-produkcje-zielonego-ekologicznego-glikolu>



6. Promet-Plast Trigeneration & Green Hydrogen System – Gaj Oławski

Location: Gaj Oławski, near Wrocław, Poland

Owner: Promet-Plast s.c. (Elżbieta & Andrzej Jeżewski)

Start Date: Mid-2024 construction, operational since 2025

Technology Type:

Green hydrogen production (PEM electrolyzer), trigeneration (heat, power, cooling), compression, storage, reduction

Size/Parameters:

Electrolyzer 5 MW (~1 ton/day), compressor 50 kg/h, storage 35 m³ at 500 bar, cogeneration engine 1 MWe + 1.2 MWt, absorption cooling 0.85 MWt, battery storage 1.5 MW / 3 MWh, adjacent renewables ~22–25 MW wind + 9.1 MW agro-PV + 1 MW rooftop PV

Integrated Technologies:

PEM electrolyzer + PV/wind + HP compression/storage + cogeneration + lithium-ion batteries + planned H₂ refuelling station

Applications:

Industrial power/heat/cooling, grid balancing, zero-emission refuelling for cars, trucks, buses, forklifts; future municipal bus supply.

Source:

<https://sbbenergy.pl/realizacje/instalacja-trigeneracji-z-wykorzystaniem-zielonego-wodoru-promet-plast-spolka-cywilna-gaj-olawski/>

<https://dolinah2.pl/instalacja-wodoru-odnawialnego-w-firmie-promet-plast/>

<https://promet-plast.pl/#eko>

<https://www.teraz-srodowisko.pl/aktualnosci/pierwsza-polska-hybryda-oze-z-koncesja-pokazujemy-instalacje-z-bliska-14766.html>



7. Clean Cities – Hydrogen mobility in Poland project

Location: Poznań, Kraków, Włocławek, Poland

Owner: ORLEN S.A.

Start Date: 2024

Technology Type: Hydrogen refuelling station

Size/Parameters: 350/700 bar, 24/7, 40-50 kg/day

Integrated Technologies: Hub + HRS

Applications: Public transport (buses, trucks)

Source:

<https://fuelcellsworks.com/news/poland-orlen-opens-a-hydrogen-station-in-poznan-2>



8. Solbet Green Hydrogen Production & Refueling Station – Solec Kujawski

Location: Solec Kujawski (ul. Toruńska 71), Poland

Owner: SOLBET Sp. z o.o.

Start Date: October 2023 (testing since July 2023)

Technology Type:

PEM electrolyzer powered by wind & solar, hydrogen compression and storage, dual-pressure refueling station

Size/Parameters:

~80 kg/day production, 350 bar for forklifts, 700 bar for cars, integrated with 1.7 MW wind and 15 MW PV

Integrated Technologies:

PEM electrolyzer + renewable energy + HP compression + dual dispensing units

Applications:

Refuelling forklifts and company cars, future use in cellular concrete production

Source:

<https://solbet.pl>

<https://h2poland.eu/pl/kategorie/produkcja/zielony-wodor-z-oze/wlasne-zrodla-energii-odnawialnej/>



9. ZE PAK Green Hydrogen Electrolyzer & NESO Stations

Location: Konin, Poland (Państw-Konin Power Plant)

Owner: ZE PAK S.A. in partnership with Polsat Plus / PAK-PCE / NESO network

Start Date:

Initial PEM electrolyzer signed April 2020, pilot operational Jan 2024, full-scale 2.5 MW commissioned Dec 2024

Technology Type:

PEM electrolyzer producing green hydrogen from biomass-sourced electricity, 350 bar compressor, mobile storage trailers, public NESO hydrogen stations

Size/Parameters:

Electrolyzer 2.5 MW (~1,000 kg/day), future scale-up to 5 MW (~710 t/year), compressor 350 bar, 10 trailers (9×1,024 kg, 1×371 kg)

Integrated Technologies:

PEM electrolysis powered by biomass and PV/wind, mobile storage system, NESO public stations for buses, trucks, cars

Applications:

Daily refuelling of ~40 city buses, supply for zero-emission public transport, TEN-T network hydrogen stations

Source:

<https://www.zepak.com.pl/pl/stowarzyszenie-lepsza-polska/produkcja-wodoru-w-ze-pak-sa.html>

https://climate.ec.europa.eu/system/files/2022-07/if_pf_2021_zepak_en.pdf

<https://biznes.pap.pl/wiadomosci/firmy/polsat-plus-and-ze-pak-groups-start-green-hydrogen-production-konin>

<https://www.stockwatch.pl/wiadomosci/grupa-polsat-plus-i-ze-pak-rozpoznajaja-produkcje-zielonego-wodoru-w-koninie,akcje,339252>



10. First H₂ Station Sofia

Location: Sofia, Bulgaria

Owner: BAS / HITMOBIL

Start Date: 2023

Technology Type: Refuelling station + electrolyser

Size/Parameters: 8-8.5 kg/day, 350/700 bar

Integrated Technologies: PV + electrolyser + HP buffer

Applications: Public transport

Source:

<https://fuelcellsworks.com/news/bulgarias-first-hydrogen-charging-station-opened>

https://ec.europa.eu/regional_policy/whats-new/newsroom/13-05-2024-bulgaria-s-first-hydrogen-charging-station-inaugurated-a-significant-milestone-towards-green-mobility_en



11. Klaipeda Port – Green H₂

Location: Klaipeda, Lithuania

Background and purpose

The project is part of Lithuania's Recovery and Resilience Plan "Next Generation Lithuania", financed by the European Union's NextGenerationEU facility. It supports national goals to expand electrolyzer capacity and decarbonize transport and port operations. Klaipėda State Seaport Authority positions the hub as a flagship step toward climate neutrality and a model for other Baltic ports.

Owner and partners: Klaipeda State Seaport Authority. Key industrial partners include MT Group (station EPC and equipment), IMI (electrolyzer systems), Nord Steel (storage tanks), and transport/terminal partners such as Bega and LTG Group for early hydrogen use in port and rail operations.

Start Date: 2025, commissioning planned 2026

Technology Type: Hydrogen production for shipping

Size/Parameters: PEM 2.5 MW, 127 t/year

Integrated Technologies: Electrolyser + station + PV

Applications: Marine and land transport

Approximate project cost: ~€12 million, with ~€5.7–6 million from NextGenerationEU funds.

Source:

<https://hydrogeninsight.com>

<https://portofklaipeda.lt/en/port-authority/projects/green-port-hydrogen-production-and-refuelling-stations/>

<https://fuelcellsworks.com/2025/01/23/fuel-cells/lithuania-launches-first-hydrogen-powered-vessel-at-klaipeda-port>

<https://portofklaipeda.lt/en/port-authority/projects/green-port-hydrogen-production-and-refuelling-stations/>



12. Pilot H₂ Bus – Vilnius/Kaunas

Location: Vilnius/Kaunas, Lithuania

Owner: City operators

Vilnius Gijos Green Hydrogen Project is a 3 MW urban green hydrogen plant being developed in Vilnius by Miesto gijos (brand name Gijos), in partnership with EPC contractor MT Group and Vilnius City Municipality. It is one of the first dedicated urban hydrogen plants in Lithuania, designed to decarbonize public transport and integrate with the city's district heating network.

Start Date: 2024, operation planned 2026

Technology Type: Hydrogen bus

Size/Parameters: 3 MW electrolyzer, ~3.45 million m³ H₂/year, hydrogen compressor, mobile hydrogen storage and transport tanks.

Integrated Technologies: Refuelling + operation

The core offtake is urban public transport: hydrogen from the plant will fuel 16 municipal buses, replacing diesel vehicles and cutting CO₂ emissions by an estimated 1,414 tonnes per year. The project is also planned to offer public access hydrogen refuelling, enabling use by other fleets or private vehicles and helping build a local hydrogen ecosystem

Applications: Public transport and district heating

Capex & funding: ~€10 million, up to ~70% EU structural funds.

Source:

<https://www.h2-international.com/mobility/baltic-states-sixteen-buses-vilnius-run-green-hydrogen>

<https://h2-tech.com/news/2025/05-2025/vilnius-city-municipality-lithuania-to-construct-3-mw-green-h2-plant/>

<https://miestogijos.lt/en/zaliasis-vandenilis/>

<https://miestogijos.lt/en/2025/05/vilniuje-iskils-zaliojo-vandenilio-gamykla-pasirasys-tatybu-sutartis/>

<https://e-greenify.com/news/green-hydrogen-in-vilnius-by-2026-new-plant-with-eu-support/>





13. ZAHYR – Zagora Sustainable Hydrogen Region

Location:

Stara Zagora region, Bulgaria — a strategic logistics and energy centre in southeastern Bulgaria and the Balkan Peninsula, near the Maritsa East power complex

Owner:

Coordinated by Trakiyski University (Trakia University) with multiple partners across industry and research including Bulgarian and European entities involved in hydrogen technology and hydrogen-valley development.

Start Date:

1 January 2024 (project duration through 31 December 2028)

Technology Type:

Green hydrogen production via electrolysis powered by renewable electricity from a new photovoltaic (PV) plant.

Size/Parameters:

- 5 MW combined installed capacity of electrolyzers.
- 20 MW PV plant to supply green electricity.
- Includes hydrogen refuelling infrastructure for vehicles and demonstration units such as a bi-fuel gas turbine and fuel cell.

Integrated Technologies:

- Electrolysers for hydrogen production
- Solar PV generation (20 MW)
- Two hydrogen refuelling stations
- Bi-fuel gas turbine (hydrogen + natural gas blending)
- 1 MW fuel cell for public lighting
- Hydrogen Valley development and education/training programmes. The **H2START** project is a **separate but synergistic EU-funded initiative** underway in Stara Zagora. It aims to establish a **Hydrogen Centre of Excellence** to lead research, innovation, and education in hydrogen technologies. Facilities include state-of-the-art labs and industry-linked research platforms, with a project timeline of January 2025–December 2030.

Applications:

- Hydrogen refuelling for transport (10 city buses, heavy and light vehicles)
- Testing hydrogen blending in turbines for electricity generation
- Public lighting via fuel cell power
- Training, education and replicability to support regional hydrogen ecosystem development.

Source:

https://www.clean-hydrogen.europa.eu/projects-dashboard/projects-repository/zahyr_en

14. Project HySPARK in Poland

Location:

Central Poland — with primary activities in Warsaw and the Warsaw Chopin Airport area. Hydrogen supply will be sourced from ORLEN's hydrogen hub in Włocławek.

Owner or partners:

International consortium coordinated by ORLEN S.A. and the Institute of Power Engineering – National Research Institute (IEN-PIB), involving ~15–17 partners from Poland, Germany, Italy, Ireland, and the United Kingdom, including Warsaw University of Technology, ARTHUR BUS, LS Airport Services, Ennovation Technology, ATENA, RINA, Bureau Veritas Polska, the City of Warsaw, and airport partners (SEA Milan Airports, Aer Arann Islands).

Start Date:

Project activities and grant agreement commenced in late 2024 / early 2025 with inauguration on 15 January 2025; implementation timeline runs approximately 2025–2029

Technology Type:

Clean hydrogen mobility ecosystem including hydrogen production, distribution, storage, and use in vehicles. Hydrogen produced and supplied zero-emission vehicles (public and airport transport) and logistics.

Size / Technical Parameters:

- Total project budget ~€11.674 million, with nearly €9 million EU funding from the Clean Hydrogen Partnership.
- Hydrogen production target of 2 500–3 000 t/year (automotive-quality) to supply mobility use cases.
- Six technology testbeds covering buses, trucks, ground handling vehicles, and hydrogen refuelling infrastructure.

Integrated Technologies:

- Hydrogen production and supply chain (ORLEN Włocławek hub).
- Hydrogen refuelling station near Warsaw Chopin Airport (planned 2026).
- Hydrogen-powered vehicles: municipal buses, heavy-duty trucks, and airport ground-handling vehicles.
- Digital tools (energy planner) for optimising supply chains and logistics.

Source:

- Official HySPARK project fact sheets and EU CORDIS description and HySPARK Project Website

<https://cordis.europa.eu/project/id/101192536?utm>

<https://www.hyspark.eu/>



15. The fleet of hydrogen buses in Konin (Poland)

Location:

Konin, Wielkopolska region, Poland — public transport network operated by Miejski Zakład Komunikacji (MZK).

Owner or partners:

- MZK Konin – municipal transport operator.
- PAK-PCE Polski Autobus Wodorowy – supplier of NesoBus hydrogen buses.
- Solaris Bus & Coach – manufacturer of Urbino hydrogen buses.
- Funding support from National Fund for Environmental Protection and Water Management (NFOŚiGW) and EU programmes (e.g., *Zielony Transport Publiczny / KPO*).

Start Date:

- 2022: First hydrogen bus (Solaris Urbino 12 hydrogen) introduced — first in Poland.
- 2025: Three new NesoBus12 hydrogen buses entered service early January.
- New vehicles (Solaris Urbino 18 hydrogen articulated) expected from 2026, with further delivery by 2027.

Technology Type:

Zero-emission hydrogen fuel cell buses using hydrogen to generate electricity through fuel cells, producing only water vapor as a by-product.

Size / Technical Parameters:

- NesoBus12 hydrogen: 12-meter, single-unit city buses (MAXI class), zero-emission.
- Solaris Urbino 18 hydrogen: 18-metre articulated buses with:
 - ~100 kW hydrogen fuel cell,
 - ~50 kg hydrogen stored in composite tanks at 350 bar,
 - Solaris High Power batteries and ~240 kW traction motor,
 - Range > 600 km (test estimate).

Integrated Technologies:

- Hydrogen fuel cell systems integrated with electric drive and battery support.
- Public transport fleet management and depot hydrogen refuelling.

Applications:

- Public urban transport — regular city bus routes in Konin and surrounding areas.
- Part of broader zero-emission transport and air quality improvement strategy.

Source

- Konin municipal news and transport press releases.
- Vehicle supplier information from Solaris Bus & Coach.
- Transport Publiczny report on hydrogen procurement.

<https://mzk-konin.com.pl/aktualnosci/umowa-na-8-autobusow-wodorowych-nesobus>

<https://www.solarisbus.com/en/press/more-hydrogen-powered-buses-for-konin-solaris-to-supply-the-bus-of-the-year-2025-2248>

<https://www.transport-publiczny.pl/wiadomosci/konin-bedzie-rozbudowywal-zajezdnie-do-ladowania-wodorem-87416.html>

<https://www.transport-publiczny.pl/wiadomosci/konin-z-dwiema-ofertami-na-autobusy-wodorowe-86856.html>



fot. Kamil Wódczak NesoBus12 typu MAXI w taborze Konina

16. The fleet of hydrogen buses in Rybnik (Poland)

Location:

Rybnik, Silesian Voivodeship, Poland — municipal public transport network.

Owner or partners:

- Komunikacja Miejska Rybnik (city municipal transport operator)
- PAK-PCE Polski Autobus Wodorowy (Polsat Plus Group / ZE PAK) — supplier of NESO hydrogen buses
- Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej (NFOŚiGW) — financing partner via grant programs (e.g., *Zielony Transport Publiczny* and KPO)

Start Date:

- March 2023: Contract signed for 20 hydrogen buses (first vehicles delivered and operating from Q2–Q3 2023).
- Q2 2026 (planned): Additional 14 hydrogen buses scheduled to enter service.

Technology Type:

Zero-emission hydrogen fuel cell buses (electric drive powered by on-board fuel cells using compressed hydrogen).

Size / Technical Parameters:

- 20 hydrogen buses currently in service — 12-meter, city-bus class (first phase).
- Additional 14 buses ordered for delivery ~2026:
 - 11 buses of 12 m length (standard)
 - 3 buses of 18 m length (articulated)

Integrated Technologies:

- Hydrogen refuelling station (NESO brand) — publicly accessible filling station in Rybnik serving both buses and other hydrogen vehicles, built by Polsat Plus Group & ZE PAK.
- On-board fuel cell systems and battery management integrated with electric traction.

Applications:

- Public urban transport — regular bus services operating on zero-emission hydrogen technology.
- Part of Rybnik's broader strategy for zero-emission mobility and air quality improvement as part of the regional hydrogen ecosystem.

Source:

- Rybnik municipal announcements and transport press reports.
- HydrogenPolska.biz coverage of fleet expansion.
- Grupa Polsat Plus information on NESO refuelling and hydrogen buses.

<https://www.rybnik.eu/dla-mieszkancow/aktualnosci/aktualnosc/455-mln-zl-na-autobusy-wodorowe-umowa-podpisana>

<https://hydrogenpolska.biz/rybnik-rozbudowuje-flote-zeroemisyjna-o-14-nowych-autobusow-wodorowych>

<https://grupapolsatplus.pl/en/archive/first-silesia-hydrogen-refueling-station-has-been-launched-rybnik-under-neso-brand>

