

Hydrogen buses in Poland

Where did it all
go wrong?



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Introduction

The main aim of this report is to highlight the major issues faced by Polish local authorities and public transport operators that have adopted hydrogen-powered buses as part of their decarbonisation efforts, and are now struggling with prohibitive costs, fuel unavailability and challenges caused by market immaturity.

The publication presents several case studies from Poland and offers recommendations on how to avoid the costly mistakes observed in the development of hydrogen-based public transport in Poland. These challenges have largely resulted from a strategy aimed at artificially creating demand for hydrogen in the automotive sector through generous subsidies under various EU funding schemes, without adequate development of charging infrastructure and renewable hydrogen production.

In Poland, hydrogen-powered public transport – including refuelling stations and hydrogen production projects for transport – has been established almost exclusively through substantial public funding. However, projects that have already been suspended, cancelled or failed for financial reasons raise questions about whether the sector can survive in a market-driven environment.

The examples presented below are intended to encourage other EU Member States and public transport operators to reassess their strategic choices and promote the more efficient use of public funds by supporting direct electrification, thus delivering greater public benefit while contributing to the reduction of greenhouse gas emissions.

Photo: Solaris Urbino 12 hydrogen, Kraków (Dwxn, CC BY-SA 4.0, via Wikimedia Commons).



Hydrogen in transport decarbonisation

Transport is the largest source of greenhouse gases in the EU and one of the slowest sectors to decarbonise. In 2024, buses and trucks alone were responsible for around 20% of road transport emissions in the EU.¹ To support the clean mobility transition, the EU has introduced requirements that all new urban buses must be zero-emission by 2035, with an interim target of a 90% share by 2030.² This category includes battery electric vehicles and hydrogen-powered vehicles, most of which rely on fuel-cell technology.

In 2025, 60% of new urban buses in the EU were zero-emission, with uptake reaching 100% in five Member States and exceeding 90% in a further six. While battery electric vehicles accounted for 56% of new urban bus sales, indicating momentum towards electrification, only 4% of zero-emission urban buses sold in 2025 were fuel-cell electric vehicles.³

The main obstacles to the growth of the market for fuel-cell electric vehicles are the high cost of ownership, largely driven by the expenses associated with hydrogen production, limited access to hydrogen fuel, and the slow deployment of refuelling stations. The lack of economies of scale also contributes to the high manufacturing costs of the vehicles themselves.

While battery electric vehicles rely on direct electrification, fuel-cell electric vehicles use electricity generated on board from hydrogen stored in the vehicle. Battery electric cars are around 3.2 times more energy-efficient than hydrogen-powered fuel-cell cars. In the case of renewable hydrogen, approximately 30% of energy is lost during electrolysis, with an additional 26% lost during transport, storage and distribution. Over half of the remaining energy is then consumed during conversion of hydrogen back into electricity. As a result, the 'wind-to-wheel' energy efficiency of hydrogen-powered vehicles is just over 30%, compared to around 80% for battery electric vehicles.⁴

Fuel-cell electric vehicles are considered zero-emission due to the absence of tailpipe emissions. However, the carbon footprint of hydrogen depends on its production method and should therefore be calculated across the entire supply chain. The hydrogen supply chain is currently dominated by fossil fuels, with fossil gas remaining the largest source of hydrogen production.⁵

¹ Transport & Environment, [State of European Transport 2025](#), 21 April 2025.

² European Parliament, Council of the European Union, [Regulation \(EU\) 2024/1610 of the European Parliament and of the Council of 14 May 2024 amending Regulation \(EU\) 2019/1242 as regards strengthening the CO₂ emission performance standards for new heavy-duty vehicles and integrating reporting obligations, amending Regulation \(EU\) 2018/858 and repealing Regulation \(EU\) 2018/956 \(Text with EEA relevance\)](#), art. 3d, 14 May 2024.

³ Max Molliere, [Past the inflection point: electric now clearly dominates the city bus market](#), Transport & Environment, 20 February 2026.

⁴ Hydrogen Science Coalition, [Putting facts into perspective on hydrogen's role in the energy transition](#), 29 July 2022.

⁵ International Energy Agency, [Global Hydrogen Review 2025](#), 80, 12 September 2025.

Producing hydrogen from fossil gas through steam methane reforming results in high emissions of carbon dioxide (CO₂) and methane, a greenhouse gas over 80 times more potent than CO₂ over a 20-year time frame. Even where some CO₂ is captured through the energy-intensive process of carbon capture and storage (CCS),⁶ the climate impact of so-called ‘low-emission’ or ‘blue’ hydrogen can remain up to 20% higher than that of burning fossil gas for heat.⁷

In 2024, 90.6% of the 7.37 million tonnes of hydrogen produced in the EU were made from fossil gas. Low-emission hydrogen accounted for 0.58%, while 8.23% was obtained as a by-product from chemical processes. Only 0.57% (41,700 tonnes) was produced through water electrolysis.⁸

Renewable or ‘green’ hydrogen remains the most expensive form of hydrogen. Even the cheapest ‘grey’ hydrogen produced from fossil gas is significantly more expensive than traditional fuels, as well as the electricity needed to power electric vehicles.

The 2023 revision of the Renewable Energy Directive⁹ introduced targets for renewable fuels of non-biological origin (RFNBO), including a 1% share in transport and a 42% share in industry by 2030. Additionally, the Alternative Fuels Infrastructure Regulation (AFIR)¹⁰ requires EU countries to provide hydrogen refuelling stations every 200 kilometres along the Trans-European Transport Network and at least one station in each urban hub by 2030.

Only electrolytic hydrogen produced using electricity from renewable energy sources can be considered emission-free. However, as underlined by the European Network of Transmission System Operators for Electricity, ‘hydrogen production using an electrolyser does not automatically make it green’.¹¹ To qualify as RFNBO, hydrogen must meet specific conditions. The electricity used must come from renewable energy sources that are new (‘additional’) and must be generated at the same time and in the same area as hydrogen production.

These criteria are intended to ensure that production of RFNBO does not compete with the renewable energy needed for direct electrification or lead to increased fossil-based electricity generation, thus

⁶ Carbon capture technologies include carbon capture and storage (CCS) and carbon capture and utilisation (CCU), also referred to as carbon capture, utilisation and storage (CCUS).

⁷ Robert W. Howarth, Mark Z. Jacobson, [How green is blue hydrogen?](#), *Energy Science & Engineering*, 9(10), 1676–1687, 12 August 2021.

⁸ European Hydrogen Observatory, [Hydrogen production capacity 2024 \(Update 2025\)](#), 3 November 2025.

⁹ European Parliament, Council of the European Union, [Directive \(EU\) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive \(EU\) 2018/2001, Regulation \(EU\) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive \(EU\) 2015/652](#), art. 22a, art. 25, 18 October 2023.

¹⁰ European Parliament, Council of the European Union, [Regulation \(EU\) 2023/1804 of the European Parliament and of the Council of 13 September 2023 on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU \(Text with EEA relevance\)](#), art. 17, 13 September 2023.

¹¹ European Network of Transmission System Operators for Electricity, [Market Design and Regulatory Framework for Viable and Flexible Hydrogen Production](#), 37, 18 June 2025.

delaying an overall reduction in emissions. Hydrogen produced using grid electricity can only be counted as RFNBO if at least 90% of the electricity is generated by renewable sources, the emission intensity is less than 18 grams of carbon dioxide equivalent per megajoule (CO₂eq/MJ), or if its consumption helps reduce renewable energy curtailment.^{12,13}

Hydrogen-based public transport in Polish strategic documents

The development of hydrogen transport in Poland has been actively promoted by successive Polish governments and was first incorporated into strategic documents in 2021 as part of efforts to develop a national hydrogen economy.

Polish Hydrogen Strategy until 2030 with an outlook until 2040

The Polish Hydrogen Strategy, adopted by the Polish Council of Ministers in November 2021, prioritised hydrogen-powered public transport as a ‘low-hanging fruit’ in the development of a national hydrogen economy. It set a target of 100 to 250 hydrogen buses by 2025, increasing to between 800 and 1,000 buses over the following five years.¹⁴

Hydrogen production target covered both renewable and ‘low-carbon’ hydrogen, defined by the life-cycle emission thresholds of 1 kg CO₂eq/kg H₂ and 5.8 kg CO₂eq/kg H₂, respectively. Eligible production methods included electrolysis (using not only electricity generated by renewable energy sources but also nuclear power plants and units burning fossil fuels provided that they are equipped with CCS), biogas reforming, biomass and waste gasification, chemical processes, as well as steam methane reforming and coal gasification with CCS.¹⁵

As the Polish Hydrogen Strategy was published before the revision of the Renewable Energy Directive (adopted in 2023), it did not include an RFNBO target and instead applied its own categorisation of hydrogen types based on emission intensity. Hydrogen produced from biogas or biomethane reforming, as well as biochemical conversion of biomass, was considered renewable provided that emissions did not exceed 1 kg CO₂eq/kg H₂.

¹² European Commission, [Commission Delegated Regulation \(EU\) 2023/1184 of 10 February 2023 supplementing Directive \(EU\) 2018/2001 of the European Parliament and of the Council by establishing a Union methodology setting out detailed rules for the production of renewable liquid and gaseous transport fuels of non-biological origin](#), art. 4–7, 10 February 2023.

¹³ Under Article 2(3) of the Renewable Hydrogen Delegated Act, the definition of ‘installation generating renewable electricity’ excludes units producing electricity from biomass and storage. See: European Commission, [Commission Delegated Regulation \(EU\) 2023/1184 of 10 February 2023 supplementing Directive \(EU\) 2018/2001 of the European Parliament and of the Council by establishing a Union methodology setting out detailed rules for the production of renewable liquid and gaseous transport fuels of non-biological origin](#).

¹⁴ Ministry of Climate and Environment of Poland, [Polska Strategia Wodorowa do roku 2030 z perspektywą do roku 2040 r.](#), 16, 2 November 2021.

¹⁵ *Ibid.*, 9–10.

Measurable objectives of the Polish Hydrogen Strategy relate almost exclusively to public transport:

- 32 hydrogen fuelling stations by 2025;
- 100 to 250 hydrogen buses by 2025 and 800 to 1,000 by 2030;
- 50 megawatts (MW) of low-emission hydrogen production capacity by 2025 and 2 gigawatts (GW) by 2030;
- Annual production capacity of 193,634 tonnes of low-emission hydrogen by 2030;
- EUR 540 million allocated to the purchase of hydrogen buses; and
- EUR 60 million allocated to the construction of hydrogen refuelling stations.

By the end of 2025, approximately 100 fuel-cell electric buses had been deployed. However, low-carbon hydrogen production capacity remained almost 10 times lower than the target set in the Polish Hydrogen Strategy.

National Energy and Climate Plan

According to the transformation ‘with additional measures’ (WAM) scenario set out in the newly updated draft of the National Energy and Climate Plan,¹⁶ hydrogen buses would expand rapidly in Poland, with 1,400 deployed by 2030 and 20,000 by the end of the following decade, overtaking their electric counterparts by 8,000.¹⁷ In the business-as-usual (‘with existing measures’, WEM) scenario, the numbers are significantly lower, at 500 and 1,500 vehicles, respectively. However, battery electric buses would still maintain a sevenfold advantage over fuel-cell electric buses.¹⁸

To achieve the 2030 targets set under the 2023 Renewable Energy Directive, Poland would require approximately 250,000 tonnes of, including 91,700 tonnes for transport alone.¹⁹ This demand, however, is unlikely to be met by domestic production, which is projected to range between 20,000 and 122,000 tonnes of renewable hydrogen annually, depending on the scenario.²⁰ The deployment of 34 hydrogen refuelling stations by 2030, as required under the AFIR Regulation, would alone generate a minimum annual demand of 6,892 tonnes for all modes of road transport, including 3,600 tonnes per 500 buses.²¹

¹⁶ The updated draft of the National Energy and Climate Plan was published in December 2025. However, as of 30 April 2026, it has yet to be adopted by the Polish Government or officially submitted to the European Commission.

¹⁷ Ministry of Energy of Poland, [Załącznik 1. do aKPEiK Scenariusz przyspieszonej transformacji \(ang. with additional measures, WAM\)](#), 34, 17 December 2025.

¹⁸ Ministry of Energy of Poland, [Załącznik 3. do aKPEiK Założenia prognostyczne i metodyka prognozowania](#), 45, 17 December 2025.

¹⁹ Ministry of Climate and Environment of Poland, [Krajowy Plan w dziedzinie Energii i Klimatu do 2030 r. z perspektywą do 2040 r. \(aktualizacja Krajowego planu na rzecz energii i klimatu na lata 2021-2030 z 2019 r.\)](#), 53, 17 December 2026.

²⁰ *Ibid.*, 10.

²¹ Grzegorz Tchorek, Filip Targowski, Piotr Mikusek et al., [Prognoza zapotrzebowania na wodór odnawialny RFNBO \(Renewable fuels of non-biological origin\) w Polsce do 2030 r.](#), Institute of Power Engineering – National Research Institute, 37, 16 November 2023.

Hydrogen-based public transport in Poland

Since the first hydrogen buses were tested in Polish cities in 2021, 16 municipalities have decided to develop hydrogen-based public transport. By the end of April 2026, 153 hydrogen buses had been registered,²² 140 were in service in 12 cities, and 107 vehicles were contracted from manufacturers.

Table 1. Hydrogen buses deployed and contracted in Polish cities as of 30 April 2026.

City	Total number of buses	Deployed	Contracted
Total	247	140	107²³
Bielsko-Biała	6		6
Chełm	26	26	
Gdańsk	10	10 (leased)	
Katowice (GZM)	3	3	
Konin	21	6 ²⁴	15
Kraków	10		10
Lublin	1	1 (leased)	
Piła	5		5
Płock	18		18
Poznań	34	25	9
Rybnik	34	34	
Rzeszów	26	1	25
Świdnik	3	3	
Tychy (GZM)	5	5	
Wałbrzych	34	20	14
Wejherowo	6	6	
Małopolska	5		5

²² Polish New Mobility Association, [Licznik Elektromobilności: I kwartał 2026 ze znacznym wzrostem rejestracji „elektryków” rok do roku](#), 17 April 2026.

²³ Excludes the contract for 20 vehicles for Lublin not executed due to bankruptcy of the bus manufacturer.

²⁴ Includes one vehicle leased.

A legal obligation to decarbonise public transport has helped spark interest in hydrogen vehicles. Since 1 January 2026, the 37 Polish cities with more than 100,000 inhabitants have been permitted to purchase electric or hydrogen-powered buses.^{25,26}

In Poland, hydrogen-powered public transport – including refuelling stations and hydrogen production projects for transport – has been established almost exclusively through substantial public funding. However, projects that have already been suspended, cancelled or failed for financial reasons raise questions about whether the sector can survive in a market-driven environment.

To date, funding for projects involving the purchase of hydrogen buses or the construction of hydrogen refuelling stations have amounted to just over EUR 120.7 million in non-repayable grants and just under EUR 6.08 million in loans, financing 163 buses and 2 stations. A further 73 fuel-cell electric buses and 1 station were funded through projects that also included battery electric buses, charging stations and other investments, making it impossible to determine the exact amount allocated to hydrogen.

Table 2. Subsidies for hydrogen buses and hydrogen refuelling stations granted to Polish public transport providers (163 buses; 2 stations).*

Type of funding	Hydrogen buses	Hydrogen refuelling stations**
Non-refundable subsidy (EUR)	117 687 342	2 982 397
Loan (EUR)	1 976 239	4 101 709

*Additionally, 73 fuel-cell electric buses and 1 refuelling station were financed through integrated projects that also included electric buses, charging infrastructure and other investments.

**Public funding has also been granted to 4 companies to construct 33 more hydrogen refuelling stations.

The ZE PAK group was granted EUR 27 million from the Connecting Europe Facility for Transport, the Innovation Fund, and the Recovery and Resilience Facility (RRF) to build a 5 MW electrolyser and five hydrogen refuelling stations. Additionally, an EUR 11.66 million loan from the National Fund for Environmental Protection and Water Management, granted to PAK-PCE Polski Autobus Wodorowy, enabled the establishment of a factory for the manufacture of hydrogen-powered buses.

²⁵ Sejm of the Republic of Poland, [Ustawa z dnia 11 stycznia 2018 r. o elektromobilności i paliwach alternatywnych](#), art. 36, 11 January 2018.

²⁶ In light of the current geopolitical situation, concerns have been raised as to whether this Act conflicts with the obligations arising from the Act on the Defence of the Homeland and the Act on Civil Protection and Civil Defence. In March 2026, the Economic Chamber of Urban Transport (IGKM) appealed to the Prime Minister to exempt public transport operators – recognised as civil protection entities performing functions of strategic importance to national security – from the obligation to purchase only zero-emission buses. The Chamber argues that, in adverse weather conditions or in the event of a power cut, the limited capacity of batteries could result in electric vehicles becoming stranded, preventing the evacuation of the population and causing traffic congestion on roads and at strategic locations. See: [Economic Chamber of Urban Transport, IGKM: Albo zeroemisyjność, albo ochrona ludności i obrona cywilna](#), 10 March 2026.

The Connecting Europe Facility for Energy provided a EUR 1.98 million subsidy for Orlen Group's hydrogen purification facility at the Gdańsk refinery and two refuelling stations. The infrastructure ensures gas-based hydrogen is processed to meet the high-purity standards required for automotive fuels. Furthermore, EUR 77.1 million from the Connecting Europe Facility for Transport, alongside an additional EUR 4.6 million from RRF was granted to support 26 stations and 1 hydrogen production facility. A further grant of EUR 410 million from RRF and Innovation Fund has been allocated for hydrogen production facilities, covering both RFNBO and hydrogen produced with electricity generated from waste incineration equipped with CCS.

An additional EUR 89.6 million from RRF for the production of RFNBO and EUR 7.9 million for two hydrogen refuelling stations, has been granted to four other companies. Funding from various sources was also secured for Polenergia, despite the company subsequently withdrawing from its hydrogen projects and forfeiting the subsidies, including EUR 142.8 million from the Important Projects of Common European Interest.

Reasons provided by Polish municipal authorities and public transport companies for purchasing hydrogen buses:

- Improving air quality and reducing both greenhouse gas emissions and noise pollution.
- Meeting the requirements of the Electromobility Act, which mandates the purchase of zero-emission buses only.
- Availability of public funding that covers up to 100% of qualified costs for hydrogen vehicle procurement.
- Enhanced driving range compared to battery electric vehicles (350–400 kilometres versus 170–200 kilometres).
- Streamlined refuelling processes and significantly shorter refuelling times (15 minutes compared to 1 to 2 hours for electric charging).
- Diversification of technology to ensure transport continuity during events such as power blackouts or emergency evacuations.
- Diversification of fuel sources to minimise the impact of volatile prices associated with traditional fossil fuels.
- Embracing technological innovation to improve the public image of the city.
- The perception that failing to take advantage of public funding represents a wasted economic opportunity.
- Contributing to the national goals set out in the Polish Hydrogen Strategy and the National Energy and Climate Plan.

The hydrogen market in Poland has been largely financed by public funds. The recent boom in hydrogen buses is primarily due to the specific structure of zero-emission transport support programmes. A decisive factor for local governments and municipal transport companies in choosing hydrogen buses over further electrification is the proportion of eligible costs covered by subsidies. While grants for battery electric vehicles typically cover 60 to 80% of costs, subsidies for fuel-cell electric vehicles can reach up to 100%.

The problem with Poland's definition of zero-emission

With an annual output capacity of approximately 1.1 million tonnes, Poland is Europe's third-largest hydrogen producer. Hydrogen is currently produced and consumed locally, primarily as feedstock in the chemical, petrochemical and refining industries. Over 97% of this hydrogen is derived from fossil gas through steam methane reforming.²⁷ While electrolytic hydrogen production in Poland began in mid-2024, until the end of that year, it was used exclusively for industrial purposes.

The Polish legal definition of a zero-emission bus considers only the substances emitted directly by the vehicle, disregarding emissions generated during fuel production and the wider supply chain. Consequently, there has been limited public awareness regarding the variety of hydrogen production methods, its fossil-fuel origins or the greenhouse gas emissions associated with the hydrogen value chain. Hydrogen buses have been marketed as – and are widely perceived to be – completely emission-free, as they produce no exhaust fumes and water vapour is their only direct by-product.

This perception has been reinforced by the way hydrogen buses are marketed in Poland. For example, NesoBus is a hydrogen-powered city bus developed by PAK-PCE Polski Autobus Wodorowy (Polish Hydrogen Bus), a company owned by the Polsat Plus Group and ZE PAK. Their model was first presented in 2022, with mass production commencing at the end of 2023.²⁸ The manufacturer advertises the vehicle as 100% eco-friendly, claiming that it not only eliminates exhaust fumes but also actively improves air quality. The name 'Neso' is an acronym for the Polish phrase 'nie emituje spalin i oczyszcza', meaning 'does not emit exhaust fumes and purifies [the air]'.²⁹

Are Polish hydrogen buses really climate-friendly?

The Polish market for automotive-quality hydrogen production and refuelling is dominated by two main players: the private ZE PAK and Polsat Plus Group (via PAK-PCE), and the state-owned energy and petrochemical giant Orlen. Currently, the supply of 'green' electrolytic hydrogen remains extremely limited

²⁷ European Hydrogen Observatory, [Hydrogen Production](#), accessed 31 March 2026.

²⁸ Transport Publiczny, [Grupa Polsat prezentuje autobus wodorowy – NesoBus](#), 30 May 2022.

²⁹ NesoBus, [Polski Autobus Wodorowy](#), accessed 31 March 2026.

in Poland, with a capacity sufficient to fuel only 40 buses at most. Until the start of the production of electrolytic hydrogen in mid-December 2024, all fuel-cell electric buses in Poland were powered by hydrogen derived from fossil fuels or sourced from the chemical and refining industries. Currently, the Polish ‘green’ hydrogen used in transport does not qualify as RFNBO.

The production of ‘green’ hydrogen intended for transport was officially launched on 16 December 2024 at PAK-PCE’s facility in Konin. According to the owner, at full capacity, the 2.5 MW electrolyser could provide fuel for up to 40 buses daily.³⁰ During its first three months of operation, the facility delivered 50 tonnes of hydrogen to ZE PAK’s six refuelling stations.³¹ While 40% of the electricity for this process was supplied by solar and wind energy, the remaining 60% was sourced from woody biomass combustion at the Konin power plant.³²

Although woody biomass is legally classified as renewable under current Polish and EU frameworks, its combustion releases significant greenhouse gas emissions. Numerous scientists have raised concerns that these emissions are unlikely to be mitigated by new forest growth within a timescale relevant to tackling the climate emergency.³³ Notably, ‘green’ hydrogen produced using electricity generated from biomass does not qualify as an RFNBO under current EU legislation.³⁴

As of April 2026, ZE PAK remains the sole provider of electrolytic hydrogen for transport in Poland. Although the company has already signed delivery contracts to fuel over 100 buses, it has yet to act towards delivering its strategic plan of doubling renewable hydrogen production capacity.

Meanwhile, Orlen has adopted a strategic 2035 target of 900 MW in electrolysis capacity, with an intended annual output of over 130,000 tonnes of RFNBO. However, production is unlikely to commence until 2030. The company is clearly prioritising the decarbonisation of its own industrial processes, which will require an estimated 350,000 tonnes of RFNBO annually. Of its total production, only 12,000 tonnes will be produced exclusively for the transport sector.³⁵

³⁰ Polsat Plus Group, [Grupa Polsat Plus i ZE PAK rozpoczynają produkcję zielonego wodoru w Koninie](#), 16 December 2024.

³¹ Parkiet, [Dziś produkcja zielonego wodoru jest za droga](#), 23 March 2025.

³² Polsat Plus Group, [Skonsolidowany raport roczny za rok obrotowy zakończony 31 grudnia 2024 roku](#), 46, 10 April 2025.

³³ Andrea Camia, Jacopo Giuntoli, Ragnar Klas Henrik Jonsson et al., [The use of woody biomass for energy purposes in the EU](#), Joint Research Centre, 9, 21 January 2021. See also: Forest Defenders Alliance, [Briefing on the JRC study “The use of woody biomass for energy production in the EU”](#), May 2021.

³⁴ European Commission, [Commission Delegated Regulation \(EU\) 2023/1184 of 10 February 2023 supplementing Directive \(EU\) 2018/2001 of the European Parliament and of the Council by establishing a Union methodology setting out detailed rules for the production of renewable liquid and gaseous transport fuels of non-biological origin](#), art.2, 20 June 2023.

³⁵ Orlen, [Strategia ORLEN do 2035 roku Energia jutra zaczyna się dziś](#), 25, 9 January 2025.

Hydrogen buses embraced as zero-cost option

A primary driver for the widespread interest in hydrogen-powered buses in Poland is that beneficiaries of support schemes often receive vehicles practically for free. Polish funding programmes cover up to 100% of the purchase price for hydrogen buses, compared to between 60 and 80% for battery-powered vehicles. This discrepancy has made fuel-cell electric vehicles significantly cheaper for municipalities to acquire, even though their actual market cost remains at least 20% higher than that of battery electric alternatives.

National Recovery and Resilience Plan: Green Public Transport

Green Public Transport (Zielony Transport Publiczny) was a flagship funding programme aimed at public transport operators. It provided subsidies for the procurement of electric or hydrogen buses, trolleybuses, hydrogen refuelling stations and electric vehicle charging points.

Between 2021 and 2025, the Green Public Transport initiative granted funding for 1,239 electric buses, 214 hydrogen buses (including 20 vehicles for Lublin that were later affected by a manufacturer's bankruptcy), 33 trolleybuses, and 1,063 electric vehicle charging stations, but only 1 hydrogen refuelling station.³⁶

Hydrogen buses were contracted by Poznań and Rybnik (34 vehicles each), Chełm (26), Wałbrzych, Lublin, and Rzeszów (20 each),³⁷ Płock (18), Kraków and Konin (10 each), the Upper Silesian-Zagłębie metropolis (3 for Tychy and 5 for Katowice), Wejherowo (6), Piła (5), and Świdnik (3).

Recurring issues with feasibility studies

An analysis³⁸ of feasibility studies for nine projects secured under the third edition of the Green Public Transport programme – specifically those in Konin, Kraków, Lublin, Piła, Płock, Poznań, Rybnik, Rzeszów, and Wejherowo – revealed several recurring gaps:

- Hydrogen buses are classified as zero-emission by definition, with no distinction made between hydrogen produced from renewable sources and that derived from fossil fuels.
- Studies often use outdated data that exaggerate the limitations drawbacks of battery-electric vehicles. For instance, they cite a maximum range of 170 to 250 kilometres for electric buses, while modern models offered by manufacturers like Solaris have achieved ranges of 300 to 600 kilometres since 2022.³⁹

³⁶ National Fund for Environmental Protection and Water Management, [Inwestujemy w rozwój elektromobilności](#), 12 November 2025.

³⁷ Lublin was unable to purchase the vehicles due to the manufacturer's bankruptcy and subsequent loss of funding.

³⁸ Jacek Werder, [How Polish Cities Are Wasting EU Funds on Hydrogen Buses – Ignoring Energy Efficiency First](#), CleanTechnica, November 2025.

³⁹ By April 2026, Polish public transport providers had commissioned almost 100 hydrogen buses from Solaris. Solaris has already offered electric battery buses with a range of up to 300 kilometres on a single charge in real-world conditions since 2022, and presented a model with a range of up to 600 kilometres in late 2023. See: Solaris, [Solaris na Transexpo 2022 prezentuje najnowsze rozwiązania bateryjne](#), 12 October 2022; Solaris, [Solaris z nowościami na Busworld 2023](#), 6 October 2023.

- The superior energy efficiency of direct electrification is frequently ignored, and the ‘efficiency first’ principle is absent from the planning process.
- Incomplete assessments often compare fuel-cell electric vehicles only against traditional internal combustion vehicles, rather than conducting a robust comparison with modern battery electric alternatives.
- Calculations often rely on unrealistically low projected prices for hydrogen fuel, such as EUR 9.33 per kilogram.
- Typical total-cost-of-ownership analyses fail to consider long-term maintenance, infrastructure costs, and the high energy requirements of the hydrogen supply chain.

Municipalities favour hydrogen despite contrary evidence

In 2018, a cost–benefit analysis conducted for Kraków identified hydrogen public transport as the most expensive and immature of six analysed solutions. Consequently, electric vehicles were recommended as the preferred measure for transport decarbonisation.⁴⁰ This recommendation was reiterated three years later in the city’s 2021 strategy, which emphasised that hydrogen transport would not achieve widespread adoption until the fuel costs became competitive with conventional fuels.⁴¹

However, the local strategic landscape shifted as the availability of funding increased. Despite earlier warnings, the Kraków municipal transport provider (Miejskie Przedsiębiorstwo Komunikacyjne w Krakowie, or MPK) successfully applied for funding in 2023 for 10 hydrogen vehicles through the Green Public Transport programme. This specific scheme covered 100% of the vehicle costs, alongside funding for 37 electric vehicles and 20 charging stations.

When critics pointed out that hydrogen buses have significantly higher operating costs than battery electric vehicles, MPK countered that the expenses of electric buses must include the installation of new fast-charging stations. Conversely, since the hydrogen refuelling infrastructure was not included in this project, those costs were excluded from MPK’s financial assessment.⁴²

⁴⁰ Municipality of Kraków, [Analiza kosztów i korzyści związanych z wykorzystaniem autobusów zeroemisyjnych, w celu świadczenia usług komunikacji miejskiej na terenie aglomeracji krakowskiej](#), 30, December 2018.

⁴¹ Municipality of Kraków, [Strategia Rozwoju Elektromobilności dla Gminy Miejskiej Kraków](#), 100, 7 April 2021.

⁴² This information is based on an unpublished letter issued by MPK Kraków on 12 February 2025 in response to an inquiry regarding the economic feasibility of hydrogen bus procurement.

Exorbitant fuel costs strain local budgets

A 2024 cost-benefit analysis commissioned by the city of Wrocław revealed that even with a subsidy covering 100% of the purchase price, the cost of hydrogen fuel would result in operating expenses for fuel-cell electric vehicles exceeding the total cost of purchasing and operating a conventionally powered bus. In contrast, electric buses proved profitable with external financing at 68%.⁴³ Consequently, Wrocław revised its plan to purchase 25 fuel-cell vehicles and opted for electric buses instead. However, many other municipalities that invested in hydrogen are now struggling with prohibitive fuel costs.

During the 2022 gas crisis, Konin was forced to implement drastic cost-cutting measures, deciding to refuel its hydrogen fleet only every other day. This effectively reduced the daily operational range of the buses from 300 to just 150 kilometres.⁴⁴ Konin's municipal transport operator calculated that travelling 100 kilometres in a hydrogen bus costs four times more than using an electric bus,⁴⁵ even though the city secured one of the lowest hydrogen prices in Poland. Similarly, in Rybnik, operating hydrogen vehicles was found to be over three times more expensive than diesel and four times more than hybrid alternatives.⁴⁶

On average, a Polish hydrogen bus refuelling at a public station at a retail price of EUR 16.1 per kilogram will cost between EUR 136.4 and 160.1 per 100 kilometres. Prices offered to public transport operators can be even higher. In 2025, an invalidated tender for hydrogen supplies sparked controversy over actual fuel costs and called into question the entire hydrogen strategy for the city of Wałbrzych.⁴⁷ The only bid received, priced at EUR 18 per kilogram, proved too expensive for the transport operator to bear. As a result, the company was forced to sign a short-term supply contract at retail prices, though it maintains the hope that hydrogen fuel costs will eventually fall.⁴⁸

In Rzeszów, buses running on hydrogen priced at EUR 19.9 per kilogram were projected to incur fuel costs of EUR 184.2 per 100 kilometres – almost four times the operating cost of electric vehicles. Over a 15-year period, fuelling 20 vehicles would cost the city EUR 28.1 million, which is EUR 4.7 million more than the initial purchase price of the buses themselves.⁴⁹ The 17-month delivery contract eventually signed in 2026 exceeded Rzeszów's budget by 28%.⁵⁰

⁴³ TOR Economic Advisors Group, [Analiza kosztów i korzyści związanych z wykorzystaniem autobusów zeroemisyjnych, przy świadczeniu usług komunikacji miejskiej](#), 50, 8 May 2024.

⁴⁴ LM Local Media, [Konin. Ograniczenie kursów wodorowca. Dlaczego? Mamy odpowiedź MZK](#), 15 February 2023.

⁴⁵ Piotr Pająk, [Czy autobusy wodorowe mają sens? Takie są koszty w pierwszym mieście w Polsce](#), Gramwielone.pl, 9 December 2024.

⁴⁶ Bartłomiej Furmanowicz, [Rybnik inwestuje w autobusy wodorowe. Radni pytają: „czy to się w ogóle opłaca?” Prezydent odpowiada](#), Rybnik.com.pl, 12 December 2025.

⁴⁷ Gazeta Wałbrzyska, [91 zł za wodór dla autobusów w Wałbrzychu? MZUK unika odpowiedzi](#), 7 February 2025.

⁴⁸ Tomasz Brzeziński, [Kolejne kontrowersje przy przetargach na dostawy wodoru](#), BiznesAlert, 3 March 2025.

⁴⁹ Rzeszów News, [Autobusy za 98 milionów i wodór za 120 milionów – czy to się Rzeszowianom opłaca](#), 4 November 2024.

⁵⁰ CzytajRzeszów.pl, [MPK Rzeszów zamawia wodór do autobusów za 9,6 mln zł. Wybrano dostawcę](#), 2 January 2026.

Local governments seek operational subsidies

On 29 November 2024, the mayors of Chełm and Wałbrzych wrote to the Minister for Climate and Environment on behalf of 21 cities. The letter called for urgent action to develop and implement a financial support programme for local governments that invest in hydrogen fuel to cover the price gap between hydrogen and traditional fuels. The officials estimated that EUR 35 to 70 million would be required between 2025 and 2027 for several hundred buses, with annual costs rising to between EUR 46.7 and 116.6 million in subsequent years to sustain further development.

The authors highlighted that the cost of hydrogen fuel was significantly higher than that of traditional fuels or electricity. The appeal was led by the mayor of Chełm, where hydrogen-powered buses – refuelling at a cost of EUR 16.1 per kilogram – generate additional annual operating costs of EUR 639 445 compared to diesel vehicles. Notably, the letter drew no comparison with the operating costs of battery electric vehicles.⁵¹

Of the 21 signatories, 7 had already deployed hydrogen buses, 4 were testing vehicles, 4 had initiated tenders or signed manufacturing contracts, and 7 had secured public funding. However, the Ministry rejected the appeal, stating that no additional funds were available for such subsidies.

Cities retreat from hydrogen projects

One year on from the appeal, several of the signatories decided to move away from hydrogen by withdrawing applications or amending their funding contracts. Żory abandoned its plan to purchase 14 hydrogen vehicles, opting instead for 17 electric buses. Piotrków Trybunalski secured 11 charging stations and 10 electric vehicles in place of the 11 hydrogen vehicles originally planned. Having already purchased 18 hydrogen buses, Płock secured funding for nine more but eventually decided to buy 11 battery electric buses instead. Wrocław reallocated funding intended for 25 fuel-cell buses to purchase 25 electric vehicle charging stations, while Mława withdrew its funding application entirely. Other cities have refrained from applying for public funding for hydrogen altogether. Gdańsk chose to lease 10 hydrogen buses to test them against battery electric alternatives, while Szczecin and Łódź have not yet moved beyond the initial testing stage.

Supply chain instability and market scarcity

The limited availability of hydrogen fuel has emerged as a significant bottleneck for the development of fuel-cell electric vehicles in Poland. This scarcity introduces risks unique to hydrogen transport: any disruption to the supply chain, including technical malfunctions in the refuelling infrastructure, can result in the immediate grounding of vehicle fleets.

⁵¹ Sebastian Przybył, [Samorządowcy apelują do minister. W grze setki milionów złotych](#), Interia Wydarzenia, 21 December 2025.

In 2024, Katowice’s hydrogen refuelling station deterred users with prices of EUR 21.7 per kilogram before eventually struggling with persistent fuel shortages.⁵²

Municipalities are increasingly cancelling tenders for both vehicles and hydrogen supplies, not only due to prohibitive costs but also because of a lack of market offers. In mid-2025, a tender for hydrogen supplies in Rybnik failed to attract a single bid.⁵³ While a contract for green hydrogen delivery from Konin was eventually secured,⁵⁴ the city considers dependence on a single supplier so precarious that it is now investigating the feasibility of investing in its own hydrogen production facility.⁵⁵ Additionally, basing public transport development on fuel supplies from infrastructure projects that are not yet operational remains a high-risk strategy.

Table 3. Unsuccessful or cancelled tenders for the purchase of hydrogen fuel or hydrogen buses for Polish cities.

Target city/tendering body	Date	Status	Subject of procurement procedure	Reasons for cancellation of procurement procedure
Konin	December 2021	Cancelled	Hydrogen supplies for 1 bus	Budget exceeded
Poznań	May 2022	Cancelled	Purchase of 25 buses	Amendment to contract scope: 15 buses instead of 25
Wałbrzych	June 2023	Cancelled	Purchase of 20 buses	Only one offer, budget exceeded
Metropolis GZM ⁵⁶	September 2023	Cancelled	Hydrogen supplies for 20 buses	Only one offer, budget exceeded
Metropolis GZM	October 2023	Cancelled	Purchase of 20 buses	High cost of hydrogen fuel, no guarantee of hydrogen supply
Piła	November 2023	Cancelled	Purchase of 5 buses	Lack of offers
Lublin	February 2024	Cancelled	Hydrogen supplies for 1 bus	Lack of offers

⁵² Elektrowoz.pl, [Wróciły niższe ceny wodoru H70 w Katowicach. Teraz jest inny problem: gazu regularnie brakuje](#), 12 November 2024.

⁵³ Piotr Chrobak, [Rybnickiej komunikacji miejskiej grozi paraliż? Jest problem z przetargiem na dostawy wodoru. Miasto uspokaja](#), Dziennik Zachodni, 4 September 2025.

⁵⁴ City of Rybnik, [Jedna oferta w przetargu na wodór](#), 9 September 2025.

⁵⁵ Piotr Chrobak, [Rybnickiej komunikacji miejskiej grozi paraliż? Jest problem z przetargiem na dostawy wodoru. Miasto uspokaja](#).

⁵⁶ Górnośląsko-Zagłębiowska Metropolia (Upper Silesian–Zagłębie Metropolis) is a metropolitan association of 41 municipalities covering most of the Katowice metropolitan area, including Katowice, Tychy and Świerklaniec.

Bielsko-Biała	January 2025	Cancelled	Purchase of 6 buses	Offers failed to meet requirements
Rzeszów	January 2025	Contract not signed	Hydrogen supplies for 20 buses	Hydrogen supplier cancelled project
Wałbrzych	February 2025	Cancelled	Hydrogen supplies	Only one offer, budget exceeded
Koleje Małopolskie ⁵⁷	May 2025	Cancelled	Purchase of 5 buses	Lack of offers
Wałbrzych	July 2025	Cancelled	Purchase of 14 buses	Only one offer, technical specifications failed to meet requirements
Lublin	December 2025	Contract not executed	Purchase of 20 buses	Bankruptcy of bus manufacturer

Rzeszów: Procurement challenges and supplier churn

The city of Rzeszów began its efforts to secure hydrogen supplies as early as 2020.⁵⁸ In 2024, the city selected an offer from Polenergia, a private utility, for a 15-year fuel delivery contract and the construction of a refuelling station.⁵⁹ However, the agreement was never finalised.

In January 2025, Polenergia abruptly withdrew from the initial agreement,⁶⁰ leaving Rzeszów without a fuel supply for 26 buses scheduled for delivery in June 2026. It took the municipal transport provider nearly a year to secure an alternative supplier, ultimately at a cost 23% higher than the standard hydrogen retail price.⁶¹

⁵⁷ Koleje Małopolskie is a regional rail operator in the Lesser Poland Voivodeship.

⁵⁸ WNP.pl, [Rzeszów umawia się z Lotosem na dostawy wodoru dla komunikacji miejskiej](#), 22 October 2020.

⁵⁹ Polenergia, [Polenergia wygrała przetarg na dostawę wodoru dla MPK Rzeszów. „Rozpoczynamy ekspansję w obszarze komercjalizacji zielonego wodoru”](#), 11 October 2024.

⁶⁰ Polenergia, [INFORMACJA O ZAISTNIENIU OKOLICZNOŚCI UNIEMOŻLIWIĄJĄCYCH ZAWARCIE UMOWY W RAMACH PRZETARGU NA DOSTAWY I DYSTRYBUCJĘ WODORU W PROJEKCIE H2HUB NOWA SARZYNA](#), 9 January 2025.

⁶¹ [CzytajRzeszów.pl, MPK Rzeszów zamawia wodór do autobusów za 9,6 mln zł. Wybrano dostawcę.](#)

Polenergia: Strategic withdrawal from hydrogen despite substantial funding

Polenergia's H2 HUB Nowa Sarzyna – a green hydrogen project – originally included a 5 MW electrolyser with an annual output of 500 tonnes of renewable hydrogen, alongside a storage facility and two refuelling stations in Rzeszów and Nowa Sarzyna.⁶² The project was sufficiently advanced that, in autumn 2024, the company tested a blend of hydrogen and fossil gas at its combined heat and power plant.

Additionally, under the Important Projects of Common European Interest framework, a maximum state aid cap of EUR 142.77 million was approved for H2Silesia, a second hub planned in Upper Silesia, equipped with a 105 MW electrolyser and an annual output of 13,000 tonnes.⁶³

However, in January 2025, Polenergia unexpectedly withdrew from its initial agreement with Rzeszów, citing legal uncertainties and the risk of delayed hydrogen deliveries from the Nowa Sarzyna hub.⁶⁴ Three months later, the company terminated the project entirely, claiming limited availability of construction components and excessive delivery lead times.

The decision was made even though Polenergia had recently signed a contract for EUR 4.7 million in public funding for the Nowa Sarzyna hub as well as EUR 144.2 million from the Recovery and Resilience Facility for H2Silesia.⁶⁵ Ultimately, Polenergia decided to remove hydrogen from its corporate strategy and began divesting its hydrogen assets.⁶⁶

Poznań: Impact of fuel quality on vehicles

Operational disruptions in Poznań caused by hydrogen fuel contamination grounded 23 of the 25 hydrogen buses owned by MPK Poznań, causing two weeks of transport instability in the city.⁶⁷ A similar issue affected 6 out of 14 vehicles in Wałbrzych.⁶⁸ The affected buses required towing to depots for technical inspections and intensive cleaning of their hydrogen systems. MPK Poznań described the situation as unprecedented and has committed to closely monitoring the fleet for potential long-term damage to fuel-cell lifespans.⁶⁹

⁶² Polenergia, [PROJEKT "ZIELONY WODÓR" | Podsumowanie w języku niespecjalistycznym](#), 11 October 2024.

⁶³ Polenergia, [ZAKWALIFIKOWANIE PROJEKTU H2SILESIA DO WSPARCIA W RAMACH KRAJOWEGO PLANU ODBUDOWY I ZWIĘKSZANIA ODPORNOŚCI](#), 13 June 2025.

⁶⁴ Polenergia, [INFORMACJA O ZAISTNIENIU OKOLICZNOŚCI UNIEMOŻLIWIĄCYCH ZAWARCIE UMOWY W RAMACH PRZETARGU NA DOSTAWY I DYSTRYBUCJĘ WODORU W PROJEKCIE H2HUB NOWA SARZYNA](#).

⁶⁵ Polenergia, [ZAKWALIFIKOWANIE PROJEKTU H2SILESIA DO WSPARCIA W RAMACH KRAJOWEGO PLANU ODBUDOWY I ZWIĘKSZANIA ODPORNOŚCI](#).

⁶⁶ Jakub Ceglarz, [Spółka Dominiki Kulczyk wycofuje się z inwestycji w wodór. Jest decyzja BGK](#), Business Insider, 19 September 2025.

⁶⁷ MPK Poznań, [Autobusy wodorowe wróciły do obsługi poznańskich linii komunikacyjnych](#), 19 March 2025.

⁶⁸ Epoznan.pl, [Jest więcej informacji w sprawie awarii autobusów wodorowych. Ten sam problem mają w Wałbrzychu. To przez paliwo?](#) 4 March 2025.

⁶⁹ HydrogenPolska.biz, [Autobusy wodorowe wznowiły kursowanie w Poznaniu po awarii związanej z zanieczyszczonym paliwem](#), 20 March 2025.

The fuel supplier, Orlen, paid EUR 116 595 in compensation to the Poznań operator for incurred costs, vehicle downtime, and contractual penalties regarding the failure to deliver fuel of the required standard. Investigations revealed that the contamination was caused by a fire at Orlen's hydrogen production line in Włocławek.⁷⁰

Fuelling stations: Infrastructure gaps and market limitations

While public funding has allowed hydrogen buses to be acquired at almost no cost to municipalities, financial support programmes for infrastructure have been less comprehensive, covering no more than 50% of the construction costs for refuelling stations. Since 2022, the EUR 23.3 million made available through a programme to support electric vehicle charging and hydrogen refuelling infrastructure attracted only seven hydrogen projects, three of which were subsequently withdrawn. With only 10 refuelling stations which secured funding, the programme is set to miss its original target by 50%.⁷¹ Notably, no eligible applications were submitted during the third and final call for proposals,⁷² prompting authorities to reallocate the unused funds towards broader electromobility schemes.⁷³

Although 16 cities had opted for hydrogen transport, by the end of 2025, there were only nine hydrogen refuelling stations in Poland, six of which were owned by ZE-PAK. Since the beginning of 2026, three additional facilities have been opened by Orlen, which now operates six stations. By comparison, as of March 2026, electric vehicles could be charged at 12 543 stations located all over the country.⁷⁴

While Orlen aims to deploy 10 hydrogen refuelling stations by the end of 2027, its broader strategic plans assume the installation of over 100 stations by 2030. Of this total, 57 are planned for Poland, with the remainder slated for the Czech Republic and Slovakia.⁷⁵

The future of these projects remains uncertain. The market is currently characterised by extreme immaturity; in many locations, refuelling stations serve municipal buses almost exclusively, as there are fewer than 600 private hydrogen cars registered in the country.⁷⁶ Under these conditions, even a 50% subsidy would be insufficient to sustain many of these projects.

⁷⁰ HydrogenPolska.biz, [Orlen zapłacił wysoką karę za dostarczenie zanieczyszczonego wodoru do poznańskich autobusów](#), 20 August 2025.

⁷¹ National Fund for Environmental Protection and Water Management, [I Nabór wniosków w ramach programu priorytetowego „Wsparcie infrastruktury do ładowania pojazdów elektrycznych i infrastruktury do tankowania wodoru” – budowa lub przebudowa ogólnodostępnych stacji wodoru](#), 14 December 2022; [III Nabór wniosków w ramach programu priorytetowego „Wsparcie infrastruktury do ładowania pojazdów elektrycznych i infrastruktury do tankowania wodoru” – budowa lub przebudowa ogólnodostępnych stacji wodoru](#), 30 March 2023.

⁷² H2Poland.eu, [Informacja w sprawie programu ogłoszonego przez NFOŚiGW dotyczącego infrastruktury do tankowania wodoru](#), 14 December 2021.

⁷³ Tomasz Brzeziński, [Wodór traci blask? Niewykorzystane dotacje zostaną przesunięte na elektromobilność](#), BiznisAlert, 14 April 2025.

⁷⁴ Polish New Mobility Association, [Licznik Elektromobilności: I kwartał 2026 ze znacznym wzrostem rejestracji „elektryków” rok do roku](#).

⁷⁵ Orlen Group, [Strategia wodorowa Grupy ORLEN do 2030 roku](#), 4, 4 February 2022.

⁷⁶ Polish New Mobility Association, [PEVO Index: 2025 najlepszym rokiem w historii polskiej elektromobilności!](#), 26 January 2026.

Sustained financial losses and infrastructure instability

The challenges facing hydrogen infrastructure are best illustrated by ZE-PAK, which originally planned to open 30 commercial hydrogen refuelling stations, anticipating an 85% utilisation rate by 2032.⁷⁷

Between 2023 and 2025, the company opened six NesoBus stations in Warsaw, Rybnik, Lublin, Gdynia, Gdańsk and Wrocław, with 35% of the EUR 18 million investment covered by public funding.⁷⁸ Additionally, four mobile stations were deployed in Chełm and Konin, where ZE-PAK's 'green' hydrogen is produced.

However, in 2025, the company announced that its publicly accessible stations had been unprofitable for the second year in a row. The net loss for its hydrogen infrastructure subsidiary, PAK-PCE H2, grew from EUR 600 000 in 2023 to EUR 3.3 million in 2024. Consequently, the company shelved its expansion plans, leaving five Polish cities without local facilities to fuel their commissioned buses. To avoid the financial burden of the remaining 50% of project costs, ZE PAK returned EUR 14.9 million in non-refundable subsidies, citing fears that further investment would remain unprofitable.⁷⁹

Operational risks and logistical burden of fuel transport

The scarcity of refuelling stations means that every shutdown has serious consequences, ranging from vehicles being grounded to the necessity of using stations in other cities, which incurs significant additional costs.⁸⁰ Beyond the technical malfunctions, operators must also factor in several days of downtime required for annual maintenance. For example, when a refuelling station in Gdańsk malfunctioned, buses had to be redirected to neighbouring Gdynia for fuel.⁸¹ Similarly, Tychy purchased hydrogen vehicles that need to refuel in Katowice. This requirement not only wastes hydrogen on unnecessary travel but also generates additional annual fuel costs estimated at just over EUR 93 000.⁸²

Even when a station is available locally, the logistics of fuel delivery present a major economic and environmental dilemma. For instance, electrolytic hydrogen produced in Konin must travel approximately 260 kilometres to reach Gdańsk and Rybnik, 300 kilometres to Wałbrzych, and 550 kilometres to Rzeszów. Transporting hydrogen in diesel trucks over hundreds of kilometres is counterproductive, given that hydrogen can and should be produced locally using surplus energy.⁸³

⁷⁷ ZE PAK, Polsat Plus Group, [ZE PAK i Grupa Polsat Plus zbudują nowe stacje tankowania wodoru](#), 21 February 2023.

⁷⁸ PolsatNews.pl, [Pierwsza ogólnodostępna stacja tankowania wodoru pod marką NESO już otwarta dla kierowców](#), 11 September 2023.

⁷⁹ Tomasz Brzeziński, [Polski miliarder zawiódł się na wodorze](#), BiznisAlert, 30 August 2025.

⁸⁰ Dziennik Wałbrzych, [Awaria na wałbrzyskiej stacji tankowania wodoru. MZUK uspokaja](#), 7 January 2026.

⁸¹ Maciej Korolczuk, [Jak radzą sobie gdańskie autobusy wodorowe? Sprawdziliśmy](#), Trojmiasto.pl, 23 October 2024.

⁸² Tychy24.net, [Kosztowne autobusy wodorowe w Tychach i tłumaczenie Metropolii. Kolejnych na razie nie zamierzają kupować](#), 24 January 2026.

⁸³ Dorota Mariańska, [Polska ma producentów autobusów wodorowych, ale nie ma gdzie ich tankować](#), Strefa Biznisu, 29 August 2025.

Divergent strategies for refuelling infrastructure

Only two public transport operators considered the risks of depending on external suppliers significant enough to seek funding for both hydrogen vehicles and the construction of their own refuelling stations. While the Green Public Transport programme granted funding for 214 buses, only 1 of the 15 projects – MZK Wejherowo – included the construction of a hydrogen station. This facility will serve only six hydrogen buses, making it the most expensive station per hydrogen vehicle in Poland. Construction costs of EUR 3 million exceeded expectations, forcing the city of Wejherowo to provide an additional EUR 2 million in funding.⁸⁴

Drawing on four years of experience with hydrogen transport, the municipal transport provider in Konin has decided to equip its new bus depot with a dedicated hydrogen refuelling station. The project, supported by the Just Transition Fund, is scheduled for completion by the end of 2027.⁸⁵

Technical vulnerabilities and climate resilience

Harsh winter puts hydrogen buses to the test

Unlike battery-electric vehicles, hydrogen-powered buses are frequently marketed for their superior performance in cold weather, as they utilise the heat generated as a by-product of fuel-cell operations.⁸⁶ However, the severe frosts that occurred in Poland in January and February 2026 pushed these vehicles to the limits of their advertised cold resilience.

In Chełm, the hydrogen fleet ceased operations when temperatures dropped below -20°C , causing critical malfunctions in both the heating and hydrogen fuel systems. The vehicles required specialised repairs at a facility located approximately 60 kilometres away.⁸⁷ Similarly, authorities in Tychy decided to keep their newly purchased vehicles at the depot until March 2026 after a series of test runs ended in mechanical breakdowns.⁸⁸

⁸⁴ Tomasz Brzeziński, [Wejherowo będzie musiało dopłacić za wodorowe aspiracje](#), BiznisAlert, 19 November 2025.

⁸⁵ EU Grants Map, [Niskoemisyjny transport publiczny w subregionie konińskim](#), accessed 7 April 2026.

⁸⁶ Center for Transportation and the Environment, [An Analysis of the Association between Changes in Ambient Temperature, Fuel Economy, and Vehicle Range for Battery Electric and Fuel Cell Electric Buses](#), 11 November 2019.

⁸⁷ Piotr Bera, [Autobusy na wodór przegrały z mrozami. Prezydent miasta przeprosza](#), Money.pl, 4 February 2026.

⁸⁸ Tychy24.net, [Autobusy wodorowe już zawiodły mieszkańców Chełma. Tyskie jeszcze nie wyjechały na trasę](#), 8 February 2026.

What happened to Poland's hydrogen dream?

Market realities have dampened the enthusiasm of Polish cities that expected hydrogen buses to be as important as electric vehicles in decarbonising public transport. Consequently, several of these cities have reviewed their strategies and adopted a more cautious approach to the 'hydrogenisation' of public transport.

As of early 2026, at least eight Polish municipalities that had applied for funding for a combined total of 66 hydrogen buses have since amended their plans in favour of battery electric alternatives: Wrocław (25 vehicles cancelled), Żory (14), Piotrków Trybunalski (11), Płock (9), Włocławek (4), Mława (2), Gąbin (1) and Andrychów. Additionally, Lublin was unable to acquire 20 hydrogen vehicles following the bankruptcy of the bus manufacturer after the contract was signed.⁸⁹

Many of these cities cited the same economic and logistical barriers. Włocławek chose to focus on electric buses as early as 2022, after calculating that travelling 100 kilometres on hydrogen was 4.5 to 6 times more expensive than using electricity, with an additional EUR 900 000 to 1.4 million required to build a refuelling station.⁹⁰ Although the city resumed testing hydrogen buses in 2025, no plans to purchase vehicles have been made.⁹¹

Gdańsk and Gdynia, among the first cities to test hydrogen technology, decided to stick with electric vehicles until permanent refuelling stations were established.⁹² While these facilities opened in 2024, neither city has applied for available public funding for vehicle procurement. In 2024, Gdańsk leased 10 hydrogen buses to test the technology against battery electric vehicles.⁹³

Łódź initially tested hydrogen buses in 2023 and planned to lease up to 40 vehicles by 2030. However, after preliminary market consultations in late 2024 concerning the long-term rental of hydrogen-powered buses with full maintenance service, the city eventually settled for only four vehicles, suggesting unfavourable outcomes for the hydrogen transition.⁹⁴ As of April 2026 no tender has been announced.

In Kraków, plans to purchase 150 hydrogen buses and construct a refuelling station were thwarted by uncertainty over hydrogen supplies and a lack of infrastructure. Ultimately, the city settled on purchasing

⁸⁹ Adrian Mańko, [MPK Lublin bez milionów na autobusy wodorowe. Projekt upadł](#), Dzienni Wschodni, 1 April 2026.

⁹⁰ Piotr Wiewióra, [Włocławek odpuszcza komunikację wodorową. Za drogą i za dużo niewiadomych](#), PortalSamorządowy.pl, 24 January 2022.

⁹¹ Paulina Piziorska, [Włocławek testuje autobus wodorowy i zdradza plany na przyszłość](#), Rynek Kolejowy, 24 June 2025.

⁹² Piotr Wiewióra, [Pierwsi chwalili autobusy na wodór. Dlaczego nie wystąpili o pieniądze?](#), PortalSamorządowy.pl, 21 March 2021.

⁹³ Gdansk.pl, [10 nowoczesnych autobusów z napędem wodorowym dołączy do gdańskiej floty](#), 10 February 2024.

⁹⁴ Daniel Siwak, [MPK Łódź z autobusami wodorowymi. W trakcie konsultacje rynkowe](#), Rynek Kolejowy, 14 November 2024.

10 fuel-cell electric vehicles but has yet to secure a permanent refuelling station, continuing to rely on a mobile tanker dating back to the 2022 testing phase.^{95,96}

Other significant shifts in municipal strategies further illustrate this trend. The Upper Silesian–Zagłębie Metropolis (Metropolis GZM) decided to order only 8 hydrogen buses instead of a planned 20, citing excessive fuel costs that prompted them to fill the gap with more cost-effective electric vehicles. Similarly, Poznań significantly scaled back its ambitions, capping its project at 25 hydrogen vehicles despite an initial plan to purchase 84.⁹⁷

Even in Wałbrzych, formerly a leading advocate for hydrogen due to its challenging hilly landscape, the strategy has shifted; while the city will add 14 hydrogen vehicles to its existing fleet of 20, it has announced that the remainder of its 60-plus zero-emission fleet will be battery-powered.⁹⁸ Perhaps most tellingly, in March 2026, authorities in Płock – the home city of the Orlen Group – decided to reallocate EUR 7 million originally intended for 9 hydrogen buses to purchase 11 electric vehicles instead. Local officials pointed to rigorous cost analyses and the rapid technological development of the broader public transport sector as the primary reasons for the change.⁹⁹

Manufacturer bankruptcy costs Lublin EUR 15 million

In December 2024, Lublin selected a highly competitive offer from Arthur Bus, a Polish–German startup, to deliver 20 hydrogen buses from its local factory. However, just one year later, the manufacturer unexpectedly declared bankruptcy.¹⁰⁰ Although the vehicles were well-regarded, the contract with Lublin and a previous sale of three vehicles to Świdnik proved insufficient to sustain the company in a niche market where demand is driven almost entirely by subsidies.¹⁰¹

Because it was impossible for Lublin to initiate a new tender or source alternative vehicles in time to meet strict project deadlines, the city failed to fulfil its agreement terms and subsequently lost EUR 15 million in funding.¹⁰²

⁹⁵ Adam Bednarek, [Autobusy na wodór nie wypaliły. To może... tramwaje?](#), Spider's Web, 19 November 2025.

⁹⁶ Jakub Drath, [MPK ma 48 nowych diesli i liczy na więcej. „Nie idziemy w wodór”](#), LoveKrakow.pl, 8 April 2026.

⁹⁷ TransInfo, [MPK Poznań potwierdza: Zamiast 84 tylko 25 wodorowych autobusów i bez własnej stacji](#), 19 January 2022.

⁹⁸ Dziennik Wałbrzych, [Nie tylko wodorowe. Wałbrzych jednak kupi elektryczne autobusy?](#), 11 August 2025.

⁹⁹ WP.pl, [Płock: Miasto inwestuje w ekologiczny transport, kupi 11 autobusów elektrycznych](#), 9 March 2026.

¹⁰⁰ Filip Madejski, [Polska firma chciała podbić Europę. Zamiast sukcesu — wniosek o upadłość](#), Business Insider Polska, 28 November 2025.

¹⁰¹ PortalSamorządowy.pl, [Koniec polskiego producenta autobusów. Firma ogłosiła upadłość](#), 2 December 2025.

¹⁰² Adrian Mańko, [MPK Lublin bez milionów na autobusy wodorowe. Projekt upadł](#), Dzienni Wschodni, 1 April 2026.

Policy shifts and the move towards industrial prioritisation

Krzysztof Bolesta, the Secretary of State and Vice Minister for Climate and Environment, has indicated that interest in hydrogen-powered public transport is expected to decline. He revealed that the Ministry is planning significant structural changes to funding. Should support for hydrogen vehicles continue, municipalities will likely be required to secure hydrogen delivery contracts in advance. Furthermore, any future schemes may impose a maximum limit on the number of hydrogen buses permitted within a single fleet.¹⁰³

Addressing the growing pressure for operational subsidies, the Vice Minister stated on 30 September 2025 that the government must draw conclusions from the lesson where local governments request fuel subsidies only after receiving support for vehicle purchases, arguing that subsidising hydrogen fuel would be unfair, as the original agreements focused on vehicle procurement, not operational costs.

He noted that providing such aid would violate the principle of equal treatment, as it would be akin to paying for the electricity used by other cities' electric buses. He also emphasised the current lack of funding for these sudden requirements and the need for the Ministry to prioritise its existing planned commitments.¹⁰⁴

The broader financial landscape has also begun to shift. In spring 2025, EUR 200 million from the Recovery and Resilience Facility originally earmarked for hydrogen technologies was reallocated to small and medium-sized enterprises in Poland.¹⁰⁵ Similarly, unspent funds from the hydrogen refuelling infrastructure programme were redirected to support electromobility.¹⁰⁶

In February 2026, a new call for proposals for zero-emission public transport was announced, with EUR 163 million from the European Funds for Infrastructure, Climate, and Environment allocated to cover 85% of vehicle purchase costs.¹⁰⁷ While this funding remains open to hydrogen technology, it will become clear in the coming months whether local governments and public transport operators have opted for direct electrification over hydrogen.

Concurrently, the Polish Hydrogen Strategy is due for revision in 2026 to align with the country's updated energy policy, grid developments, and EU regulations on industry and transport. The revised strategy prioritises applications for hydrogen where direct electrification is technically difficult or unprofitable – primarily in heavy industry, chemical production and refineries – with public transport relegated to a secondary priority.

¹⁰³ Dariusz Ciepela, [Co z dopłatami do zakupu wodoru do autobusów? "To byłoby nieuczciwe"](#), WNP.pl, 30 September 2025.

¹⁰⁴ Ibid.

¹⁰⁵ Tomasz Żółciak, Grzegorz Osiecki, [Pieniądze na polskie firmy zamiast na wodór. Kolejna ważna zmiana w KPO](#), Money.pl, 25 March 2025.

¹⁰⁶ Tomasz Brzeziński, [Wodór traci blask? Niewykorzystane dotacje zostaną przesunięte na elektromobilność](#).

¹⁰⁷ Centre for EU Transport Projects, [Działanie FENX.03.01 Transport miejski – autobusy i trolejbusy](#), 20 October 2025.

Conclusions

The development of hydrogen-powered public transport in Poland serves as a textbook example of strategic miscalculation, specifically regarding the anticipated pace of renewable hydrogen deployment. The abundance of EU funding led to hydrogen being prioritised for the transport sector, driven by the false premise that implementation would be comparatively more straightforward than for other industrial applications.

In the drive to create a hydrogen economy, the fundamental objective has been overlooked: hydrogen is simply one tool to reduce greenhouse gas emissions; not an end in itself. This goal is only achievable provided hydrogen is produced from renewable energy sources.

At the local level, the technology was initially met with enthusiasm, bolstered by the ease of securing generous subsidies. However, a widespread lack of thorough cost-benefit analyses has resulted in significant financial burdens for local authorities. Despite five years of development and numerous funding schemes, hydrogen transport in Poland remains in its infancy, facing multiple technical and logistical challenges long since resolved for electric vehicles.

The current infrastructure is critically underdeveloped. Not only are refuelling stations scarce, but maintenance facilities are located almost exclusively at manufacturer sites. This requires faulty vehicles to be transported tens or hundreds of kilometres for repair, leading to prolonged service interruptions. As a result, many municipal operators only discover the practical limitations of these vehicles once they are deployed in real-world conditions. In addition, expanding already existing infrastructure for electric vehicles while simultaneously developing completely new hydrogen facilities creates unnecessary costs and risks fragmenting demand and supply chains.

Polish local authorities are currently grappling with prohibitive fuel costs and inconsistent availability – issues unlikely to be resolved in the near future. The resulting service restrictions, driven by necessary cost-cutting measures, ultimately undermine the very purpose of integrating fuel-cell electric vehicles into daily public transport. Moreover, most municipalities possess too few vehicles to be able to adapt in emergency situations, particularly when fuel supply remains insecure.

Delays in securing hydrogen contracts and the timely delivery of fuel and vehicles have resulted in the loss of precious time and resources that could have been utilised to curb emissions immediately through proven technology. Most significantly, with approximately 70% of Polish hydrogen buses currently operating on high-emission fuel, and deep uncertainty regarding the future supply of RFNBO for transport, the role of hydrogen in the effective decarbonisation of Polish transport remains highly questionable.

Recommendations

- Funding and regulatory support should be provided exclusively to electrical vehicles.
- Hydrogen-related projects should be guided by the overarching principle of efficiency first.
- Given its high production costs, low energy efficiency and limited availability, renewable hydrogen should be prioritised only for no-regret sectors where no viable alternative decarbonisation methods exist, primarily to replace existing use of fossil-based hydrogen.
- Direct electrification remains the most proven, cost-effective and energy-efficient pathway for decarbonising transport. Public transport operators and municipalities seeking funding for zero-emission hydrogen vehicles should therefore be required to conduct a robust cost-benefit analysis that considers broader socio-economic impacts and compares the purchase and maintenance costs of electric and hydrogen vehicles, including the development of the supporting infrastructure, using best available technologies and up-to-date technical data.
- If programs to support hydrogen power vehicles continue, applicants should also be required to demonstrate that:
 - vehicles will be powered exclusively with renewable hydrogen;
 - a contract for the supply of renewable hydrogen has been secured, considering factors such as distance from the production site;
 - hydrogen buses will have access to refuelling stations both on site and at the time of deployment.