ANGVA2U Info aims to share information, data, and news related to low carbon, carbon neutral, and zero carbon fuels towards Net Zero Emissions target and limiting earth temperature rise to 1.5 ^{0}C by the year 2100. These information, news, and insights, are shared in good faith, without any guarantee of accuracies. ANGVA members are advised to use these information, news, and insights, prudently and at their own risks.

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1.0 Introduction

This newsletter aims to keep members abreast with the latest news on NGVs, Renewable Natural Gas (RNG) / Biomethane, Renewable Fuels, and other related news. Members can contact ANGVA Secretariat if they have any comments related to this newsletter.

2.0 Natural Gas – Low Carbon Fuel

2.1 India

India is expected to have around 17,500 CNG stations & about 120 million PNG connections by 2030: Hardeep S. Puri

12th March 2025. •PSU CONNECT

The meeting reflected the positivity and confidence with which global energy majors now view India.

New Delhi: India's Union Minister for Petroleum & Natural Gas Shri Hardeep Singh Puri today chaired a meeting where a delegation from Shell, an energy and petrochemical company led the meeting by Senior Vice President, LNG Marketing & Trading Mr Tom Summers. They presented the Shell LNG Outlook2025 to the team.

The meeting reflected the positivity and confidence with which global energy majors now view India. In the presentation, Shell highlights their global outlook that LNG demand for India features separately.

Minister Hardeep Singh Puri said, "Under the CGD bidding rounds, India is expected to have around 17,500 CNG stations & about 120 million PNG connections by 2030 which will help in creation of job opportunities & strengthening the Make In India initiative.

Huge Investments are being made in India's gas grid to complete PM Narendra Modi Ji's vision of One Nation-One Grid."

Source: *https://www.psuconnect.in/ministry-of-india-news/india-is-expected-to-have-around-17500-cng-stations-and-about-120-million-png-connections-by-2030-said-hardeep-s-puri*

2.2 Bangladesh

Dhaka CNG stations shut 2:30-7:00pm in Ramadan

6th March 2025. FE REPORT

The government has instructed the CNG (compressed natural gas) filling station owners to keep their stations shut from 2:30 pm to 7:00 pm in the capital city during Ramadan in order to ensure smooth supply of natural gas to other consumers, especially the households.

The Energy and Mineral Resources Division under the Ministry of Power, Energy and Mineral Resources ordered state-run Petrobangla to take steps necessary to this end.

Currently, the CNG filling stations throughout the country remain shuts for five hours, from 6:00 pm to 11:00 pm, every day to facilitate smooth natural gas supplies to other gas guzzling consumers, including industries and power plants.

The country's overall natural gas supply is now hovering around 2,885 million cubic feet per day (mmcfd), including 982 mmcfd of re-gasified liquefied natural gas (LNG), against the demand for over 4,000 mmcfd, according to Petrobangla.

Azizjst@yahoo.com
Source: *https://today.thefinancialexpress.com.bd/last-page/dhaka-cng-stations-shut-230-700pm-in-ramadan-1741199501#google_vignette*

2.3 IR of Iran

13 new CNG stations to be launched across Iran

25th February 2025. News.

NIOPDC has now established a total of 2,360 CNG stations nationwide.

February 17, 2025. National Iranian Oil Products Distribution Company (NIOPDC) announced the launch of 13 new compressed natural gas (CNG) filling stations across the country.

Saeed Rahman Salari, the Project Manager for CNG at NIOPDC, stated that the company has now established a total of 2,360 CNG stations nationwide.

He added that 4.4 million vehicles have been converted to run on natural gas, and a total of 117 billion cubic meters of CNG has been distributed in Iran so far.

Salari emphasized that over 90 percent of the country's taxis and 50 percent of pickup trucks are now equipped with CNG engines.

He also noted that the country's daily gasoline consumption stands at 124 million liters, but without the use of CNG-powered vehicles, this figure would rise to 143 million liters. He concluded that the launch of these new CNG stations will prevent the consumption of 126 million liters of gasoline annually.
Source: *https://www.gnvmagazine.com/en/13-new-cng-stations-to-be-launched-across-iran/*

2.4 Uzbekistan

Restrictions on CNG stations in Uzbekistan to be gradually lifted

5th March 2025.

Tashkent, Uzbekistan (UzDaily.com) — Restrictions on the operation of compressed natural gas (CNG) stations in Uzbekistan will be gradually lifted, according to the country's Ministry of Energy.

The ministry explained that the sharp drop in temperatures in early March led to an increase in natural gas consumption, which affected gas pipeline pressure levels.

Given the circumstances, ensuring uninterrupted gas supply to households and social facilities became the top priority. As a result, a decision was made to temporarily suspend the operations of automotive gas filling compressor stations (CNG stations), the ministry stated.

According to the Ministry of Energy, thanks to prompt measures taken in recent days, gas pipeline pressure has been stabilized, allowing conditions for the gradual resumption of CNG station operations.

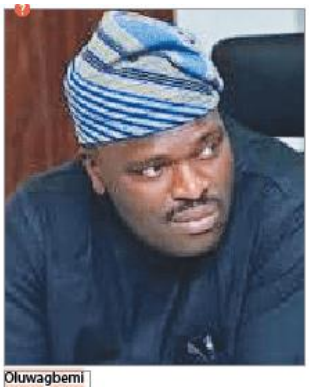
Starting from 9:00 AM on 6 March, CNG stations across all regions of the country will progressively resume operations, the ministry confirmed.

The Ministry of Energy apologized to consumers for any inconvenience caused.
Source: *https://www.uzdaily.uz/en/restrictions-on-cng-stations-in-uzbekistan-to-be-gradually-lifted/*

2.5 Nigeria

Nigerians shunning CNG over safety concerns, skepticism, cost, say Experts

3rd March 2025. By Paul Ogbuokiri


Oluwagbemi


Alkali

There has been a massive promotion of Compressed Natural Gas (CNG) as solution to the outrageous hike in transport cost in the country since the removal fuel subsidy by the President Bola Tinubu's administration. But PAUL OGBUOKIRI reports that the adoption of CNG as a cheaper source of fuel has been greeted by widespread apathy among motorists. Experts explain why

CNG conversion stalls in Lagos, others

Widespread apathy among commercial drivers in Lagos has significantly stalled the conversion of vehicles to Compressed Natural Gas (CNG). That was even after the Federal Government through the Presidential Compressed Natural Gas Initiative (PCNGi) distributed free kits to conversion partners in the state.

The PCNGi, is a component of the palliative intervention of the President Bola Ahmed Tinubu's administration directed at providing succour to the masses occasioned by the transitive hardships of the fuel subsidy removal policy of the Federal Government.

The agency aims to raise $25 million to cover its pilot phase, $75 million by the end of 2024, and $250 million by 2027 to support the development of CNG infrastructure for Nigeria.

The pilot programme started with 21,000 units and 10 participants' workshops and it had projected that by the end of 2024, it will reach 150,000 units and 250 participants' workshops.

Although it was reported that about 100,000 conversions had been carried out as at November 2024, the partners said that they could not confirm the figure, even as they have complained of "unresponsiveness on the part of targeted beneficiaries."

An assessment of the project carried out by Sunday Telegraph showed a lack of interest among commercial vehicle operators, who were offered the conversion kits free of charge through PCNGi partners.

Insufficient filling stations slow FG's CNG project

The Nigerian government's push for the utilisation of Compressed Natural Gas (CNG) as a cheaper and cleaner alternative to fuel is being challenged by the lack of sufficient filling stations.

However, motorists, who have converted their vehicles to CNG have described the difficulty in getting their cars refilled as 'moving from pan to fire.'

"You will not believe that I have been making efforts to refill my car for the past four days but there is no gas in the station close to me at Durumi, Abuja, except I drive to Airport Road," Aisha Umar, an Abuja resident, said.

"How can the government be pushing people to convert their cars without adequate preparation on how these cars will be refilled? We are having conversion centres everywhere but no refilling station."

The Federal Government, in July 2024, commissioned six refuelling stations to serve residents of Abuja.

It also commissioned others in Lagos State.

Sunday Telegraph reports that these stations have become inadequate, as motorists drive long distances before getting to these stations. In some areas, CNG filling stations can't be found.

Henry Orji, a businessman and a commercial tricycle operator (Keke driver) in Yaba, Lagos, said that he has returned to using petrol to power his Keke due to unavailability of CNG stations.

"Refilling my Keke with CNG is really cheap compared to fuel and I can tell you that I have saved some amount since I started using it. But getting it to buy is not as convenient as fuel. We have just this station here serving the whole of these areas," Orji said.

Although, Nigeria has abundant natural gas reserves, domestic distribution has historically been unreliable due to issues in supply chains, infrastructure, and government policies. There have been periodic shortages of natural gas, and disruptions in the gas supply chain could make CNG less reliable for daily use. This inconsistency impacts potential users, especially businesses that rely on a dependable fuel source for their operations.

It was also revealed that the high cost of conversion is a disincentive to many Nigerians. Currently, conversion cost ranges from N600, 000 to N1, 200,000 depending on size of the vehicle.

Speaking on the cost of conversion, Micheal Oluwagbemi, the programme coordinator, Presidential Compressed Natural Gas Initiative (PCNGI), assured Nigerians that various products were now being provided by the private sector to make CNG conversion affordable. He added that the government was working on credit facilities that can reduce the cost of conversion.

Nigerian Consumer Credit Corporation (CREDICORP) and the Presidential Compressed Natural Gas Initiative (PCNGI) recently signed a partnership agreement to launch a N10 billion Credit Access for Light and Mobility (CALM) fund.

But a developmental economist, human rights promoter and public affairs commentator, Dr. Tunde Elebute, observed that Malaysia and some other countries are phasing out CNG vehicles, wondering why Federal Government is insisting on introducing what other countries were banning.

"The CNG cars are not safe with all the bumps on our roads, the traffic hold-ups, the heat in our environment. CNG cars are not safe in Nigeria. I advise the government to back out from the introduction of CNG cars. I will not enter a CNG vehicle. Gas is too dangerous if it explodes," he warns.

Government initiatives and public skepticism

Despite government's efforts, including subsidies and the establishment of credit facilities, public skepticism persists. Many Nigerians doubt the government's commitment and the long-term viability of CNG, further delaying widespread adoption.

In conclusion, the delay in CNG adoption in Nigeria stems from a combination of safety concerns, high conversion costs, inadequate infrastructure, and public skepticism. Addressing these challenges requires comprehensive strategies, including enhancing public awareness, expanding infrastructure, reducing conversion costs, and building public trust in government initiatives.

Lack of infrastructure and high cost of conversion

Meanwhile, experts in the automotive industry have said that the biggest challenges for CNG adoption in Nigeria was the lack of refueling infrastructure. According to them, Nigeria has very few CNG refueling stations, which limits accessibility for drivers interested in switching to CNG. Unlike gasoline and diesel, which have refueling points across the country, CNG infrastructure remains concentrated in a few regions, leaving much of the country without access.

They said this situation creates significant inconvenience for potential users, particularly those who commute long distances or work in remote areas.

They also pointed out that the financial burden of converting vehicles to CNG deters many Nigerians that would be interested in converting their vehicles to CNG.

Conversion costs range from N700, 000 to N1.5 million, a substantial expense for average citizens. Although the government offers subsidies to reduce these costs, many still find the investment prohibitive, especially in the current economic climate.

Similarly, while CNG is cheaper than petrol, selling at N230 per litre, compared to petrol's N1,000 per litre, the initial conversion cost remains a significant barrier. Additionally, concerns about potential future increases in CNG prices contribute to public hesitation.

Safety concerns and public perception

Safety is another major issue surrounding CNG. Many Nigerians harbour concerns about the safety of CNG vehicles, fueled in part by limited awareness and knowledge about the fuel.

CNG is stored at high pressure, and any system failure can lead to potentially dangerous situations if proper safety measures were not followed.

Safety apprehensions significantly impede CNG adoption in Nigeria. Incidents like the October explosion in Benin, which injured three people, have heightened public fear. The government attributes such accidents to unlicensed conversion mechanics and emphasises that, when properly installed, CNG systems are safe. Nonetheless, public mistrust persists.

Why CNG should not replace conventional fuel

With the upsurge of price petrol from May 29, 2023, which has raised the cost of transportation in the country by over 200 per cent, promoting Compressed Natural Gas (CNG) as an alternative to petrol and diesel, may seem like an opportunity for savings, economic relief; but sociopolitical commentator, Adedotun Ogunyemi, said that adopting CNG comes with significant risks that far outweigh the perceived benefits—especially in a country like Nigeria, where critical factors such as infrastructure, traffic, and safety are deeply intertwined.

He said: "On the surface, CNG appears cheaper. But are we considering the full picture?

"Firstly, converting vehicles to run on CNG involves a significant upfront investment. Installation costs for CNG kits can be prohibitive for ordinary citizens and small business owners, many of whom are already struggling to meet basic needs. Additionally, CNG-powered vehicles require specialized maintenance, which could lead to further strain on Nigerians' already thin wallets."

He noted that the availability of CNG filling stations across the country was grossly inadequate.

"Fueling infrastructure is concentrated in certain areas, and it's unlikely to expand rapidly given the current state of Nigeria's economy. For those who travel long distances, especially truck drivers and logistics companies, this lack of infrastructure could lead to operational downtime and increased transport costs. These economic burdens, in the long run, could cancel out any initial savings," he said.

As regards to the safety and the risk to lives, he disclosed that CNG carries serious safety risks that cannot be ignored.

"CNG is stored under high pressure in cylinders. Any fault in the cylinder or the vehicle's conversion can lead to devastating consequences, including explosions. In a country like Nigeria, where vehicle maintenance is often inconsistent, the risk of malfunction is heightened. Poorly trained mechanics, substandard conversion kits, and the general lack of awareness among drivers about CNG safety protocols further amplify this danger.

"Moreover, traffic congestion in major cities like Lagos, Port Harcourt, and Kano poses an additional threat. Traffic generates excessive heat, especially when vehicles are stationary for long periods. The extreme Nigerian heat, combined with over-pressurised CNG tanks in vehicles increases the likelihood of accidents. A single explosion in a packed area like Oyingbo or Idumota could lead to catastrophic loss of life and property," he warned.

Environmentalists have argued that CNG burns cleaner than petrol or diesel, emitting fewer greenhouse gases. While this is true in controlled environments, the Nigerian context, according to a Natural Gas Technician, Randal Thompson, adds layers of complexity that undermine this argument.

According to him, many fuel stations in Nigeria are not equipped to handle the environmental risks associated with large-scale CNG adoption, saying improperly maintained CNG systems could lead to gas leaks, posing serious health risks to the public.

He noted that Methane, the primary component of natural gas, is far more potent as a greenhouse gas than carbon dioxide if released into the atmosphere unchecked.

"In essence, improper CNG handling could cause more harm to the environment than petrol," he stressed.

He also said that the nature of Nigeria's bad roads cannot be overstated. Vehicles repeatedly bumping along potholed roads would face increased wear and tear, increasing the chance of equipment failure—especially for high-pressure CNG systems. The risks of a CNG tank malfunction due to the poor condition of our roads are far too great to ignore.

Additionally, he said that Nigerian roads, particularly in cities like Lagos, are characterized by endless traffic jams. In such congested conditions, vehicles generate immense amounts of heat. For CNG-powered vehicles, prolonged exposure to high temperatures could weaken the integrity of pressurized tanks, increasing the risk of gas leaks or, in worst cases, explosions.
Source: *https://newtelegraphng.com/nigerians-shunning-cng-over-safety-concerns-skepticism-cost-say-experts/*

2.6 Nigeria

Lagos targets 400,000 CNG vehicles by 2028

3rd March 2025. By Dotun Omisakin

The Lagos State government has disclosed its plan to convert 400,000 Premium Motor Spirit (PMS) vehicles to Compressed Natural Gas (CNG) before 2028.

LAGOS STATE GOVERNMENT

The governor, Babajide Sanwo-Olu stated this during the grand opening of Portland Gas Limited's CNG mobile refill unit situated in Ojota, expressing readiness to reduce emissions and fuels consumption by 10 percent in the state.

"Lagos as Nigeria's commercial nerve centre is home to over 4 million vehicles, contributing significantly to the country's fuel consumption and emissions.

"The government's CNG transition strategy is aimed at addressing this challenge through the conversion of at least 10% of our vehicle fleet, 400,000 vehicles, over the next three years at designated CNG conversion centres in partnership with the original equipment manufacturers," he said.

The governor who was represented by the Managing Director, Lagos Metropolitan Area Transport Authority (LAMATA), Engr. Abimbola Akinajo added that 2,000 vehicles within the state fleet would be converted to CNG by the second quarter of 2025.

"Our target is to ensure that 2,000 vehicles within the Lagos State fleet, including first and last mile buses, security emergency vehicles and other government services are converted to CNG by the second quarter of 2025," he said.

The CEO of Portland Gas Limited, Folajimi Lai-Mohammed said the firm targets to close the gap of limited conversion centres, expressing readiness to partner with the state government to achieve its CNG plans.

"We will very much partner with you in respect to your mass transportation. We will like to delve into that part to see upon your plan between second and fourth quarters, how can we be the provider of your gas," he said.

The programme director, (PCNGi), Engr. Michael Oluwagbemi stressed the need for partnership with the private sector in an effort to ease the cost of transportation and ensure a clean environment.

Source: https://dailytrust.com/lagos-targets-400000-cng-vehicles-by-2028/

2.7 India – Liquefied Natural Gas (LNG)

GreenLine expands LNG network in India

3rd March 2025. GreenLine Mobility

Photo Source: GreenLine Mobility Solutions

GreenLine Mobility Solutions is expanding its LNG fuel station network in India, going from three to 10 outlets this year. The Indian transport solutions company also aims to reach 1,000 LNG-powered trucks by the end of this year, doubling the current amount.

Founded in 2021, GreenLine Mobility Solutions – an Essar Group subsidiary – brings liquefied natural gas (LNG) and compressed natural gas (CNG) to corporations in off-gas-grid locations.

LNG and CNG

As a leader in the green logistics space, the company's mission is to help make transportation in India sustainable, and it does so by offering LNG and CNG as eco-friendly alternatives to mainstream fossil fuels like petrol and diesel.

GreenLine's own fleet of LNG-powered trucks allows Indian companies to pursue the decarbonization of their trucking fleets. By expanding its network of LNG fuel stations, the company adds a crucial lever to its strategy, allowing more companies to transform their fleet, reduce emissions, and uncouple from the reliance on mainstream fossil fuels.

10,000 vehicles

The fuel used for GreenLine's trucks emits greenhouse gases at a much reduced level, making them a better option than conventional diesel trucks. This key fact is the motivation behind the growth of both the company's truck fleet and fuel stations.

"As GreenLine's fleet expands, its subsidiary, Ultra Gas & Energy Ltd (UGEL), is accelerating efforts to grow its network of LNG fuelling stations", the company said in a statement. "The goal is to increase the number of outlets to 10 by 2025, ensuring the infrastructure needed to support the growing fleet while reducing emissions and curbing India's dependence on diesel."

In the longer term, GreenLine aims to decarbonize heavy freight transportation in India, resulting in a 1-million ton CO2 emission reduction in three years, and this by deploying 10,000 LNG & EV vehicles.
Source: *https://www.globalfleet.com/en/safety-environment/global/features/greenline-expands-lng-network-india?t%5B0%5D=GreenLine%20Mobility&t%5B1%5D=Decarbonisation&curl=1*

3.0 Biomethane / Renewable Natural Gas (RNG) – Carbon Neutral Fuel

3.1 Japan

Anaergia and JGC Holdings Corporation Partner on RNG Project in Japan

21st February 2025. Press Release.

SCHARFSINN / ALAMY STOCK PHOTO

KANAGAWA, Japan & BURLINGTON, Ontario -- Anaergia Inc. ("Anaergia", the "Company", "us", or "our") (TSX: ANRG), announced that its subsidiary, Anaergia Singapore Pte Ltd., entered into a Letter of Intent (LOI) to supply technology and equipment to JGC Holdings Corporation (JGC) for a renewable natural gas (RNG) project.

The equipment to be provided by the Company under the LOI includes Anaergia's feedstock pretreatment solution, anaerobic digestion with its unique digester design for high throughput and efficiency, and digestate management solution. The facility is expected to take in more than 56,000 tons per year of cow manure and more than 5,000 tons per year of food waste. These organic waste streams are to be converted into approximately 1,700,000 cubic metres per year of biomethane equivalent of renewable natural gas as well as fertilizer.

"Anaergia's integrated technical solutions will enable JGC to develop a unique facility that will take in two different waste streams and will generate renewal gas that can significantly decarbonize fuel supply," said Masahiro Aika, Executive Vice President of JGC. "Therefore, this facility will reflect our commitment to enhancing the intertwined health of humans and the Earth," added Mr. Aika.

"This project is another example of Anaergia's differentiated capabilities being used to support development of large-scale RNG infrastructure projects," said Assaf Onn, CEO of Anaergia. "Furthermore, I believe this facility will be an important reference site in Japan, a market in which we see exciting potential," added Mr. Onn.

About JGC Holdings Corporation

Since its founding in 1928, JGC Holdings Corporation has delivered plants and facilities serving a wide range of purposes, mainly in the energy industries, such as LNG, oil, natural gas and petrochemical plants, but also other energy and industrial infrastructure. JGC Holdings Corporation has executed some 20,000 projects in more than 80 countries and its proven capabilities have established its reputation as a leading engineering contractor worldwide. With our corporate purpose "Enhancing planetary health", we intend to further promote the expansion of our business fields and contribute to economic progress, industrial advancement and sustainable growth throughout the world.
Source: *https://www.waste360.com/industry-insights/anaergia-and-jgc-holdings-corporation-sign-loi-for-new-rng-project-in-japan*

3.2 Europe

Affordable biomethane through SEMPRE-BIO project innovations

10th March 2025. Guest Contributor

SEMPRE-BIO is a pioneering European project developing new cost-efficient solutions for biomethane production.

In May 2022, the European Commission launched REPowerEU, a bold plan to save energy, diversify energy supplies and produce clean power.

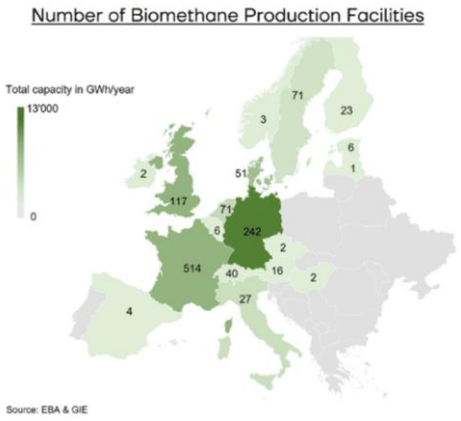
This initiative aims to phase out Russian fossil fuel imports and boost the EU's independence in this sector. Achieving this energy transition requires a diverse mix of renewable sources, including hydro, biomass, solar and wind power.

The potential of biomethane

While hydro, solar and wind power are well-known, biomethane remains relatively unknown to the general public.

This versatile solution is gaining traction due to its wide range of applications, from home heating to vehicle propulsion and electricity generation. Biogas and biomethane, in particular, are emerging as promising alternatives to traditional fossil fuels.

Biomethane, a purified form of biogas, is a game-changer for renewable energy. It's already available today and plays a vital role in reducing the EU's carbon footprint. Made from organic waste like manure, food scraps and damaged crops, biomethane also offers a modern solution for waste management.



Number of biomethane production facilities in Europe. Source: EBA & GIE

Challenges in biomethane deployment

Despite its potential, several obstacles hinder biomethane's full deployment.

There is an urgent need to form industrial partnerships to promote its sustainable production and use. Accelerating investment in biogas and biomethane technologies is crucial, as is offering incentives to make upgrading biogas to biomethane more affordable for companies.

Additionally, infrastructure issues and barriers that could hinder the cost-effective deployment of biomethane must be tackled.

Addressing these challenges is essential for biomethane to become a cornerstone of the EU's clean energy future.

The SEMPRE-BIO project

To tackle the challenges of biomethane deployment and bolster the EU's clean energy ambitions, the SEMPRE-BIO project was initiated.

This European-financed initiative, spanning from November 2022 to April 2026, unites 17 partners from seven countries, each bringing diverse expertise across the entire biomethane value chain, from production to utilisation.

SEMPRE-BIO is a groundbreaking effort to introduce new and cost-efficient solutions for biomethane production. The project supports the circular economy and aims to reduce dependence on fossil fuels, aligning with the REPowerEU strategy.

SEMPRE-BIO's goals include enhancing the cost-effectiveness of biomethane conversion processes, diversifying production technologies and facilitating market uptake.

The core objective of SEMPRE-BIO is to transform theoretical models into practical applications within three European biomethane innovation ecosystems (EBIEs) or case studies.

SEMPRE-BIO EBIEs

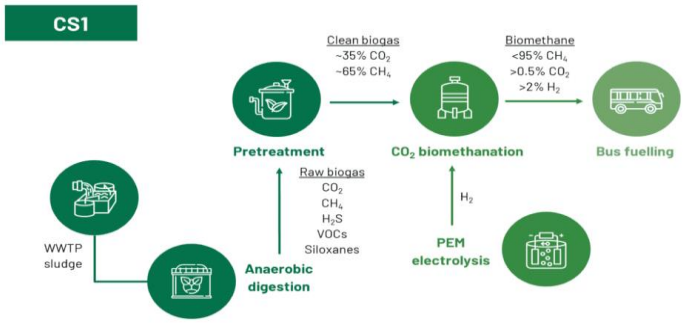
Each EBIE showcases different innovative technologies tailored for specific feedstocks and biomethane valorisation routes.

Case study 1: Baix LLobregat, Spain

In Case Study 1, SEMPRE-BIO employs electrolysis and CO2 biomethanation to convert wastewater into valuable biomethane. This biomethane is then utilised for public transportation.

The process starts with the pretreatment of biogas produced by the wastewater treatment plant (WWTP) to maintain low concentrations of H2S, VOCs and siloxanes. Once the biogas is clean, it is fed into the reactor along with H2.

The reactor operates at a thermophilic temperature and at different pressure levels, with key parameters monitored to optimise the methane productivity. The goal is to produce high-quality biomethane, which is then compressed and stored as compressed natural gas (bio-CNG) for later use in refueling public transport buses.



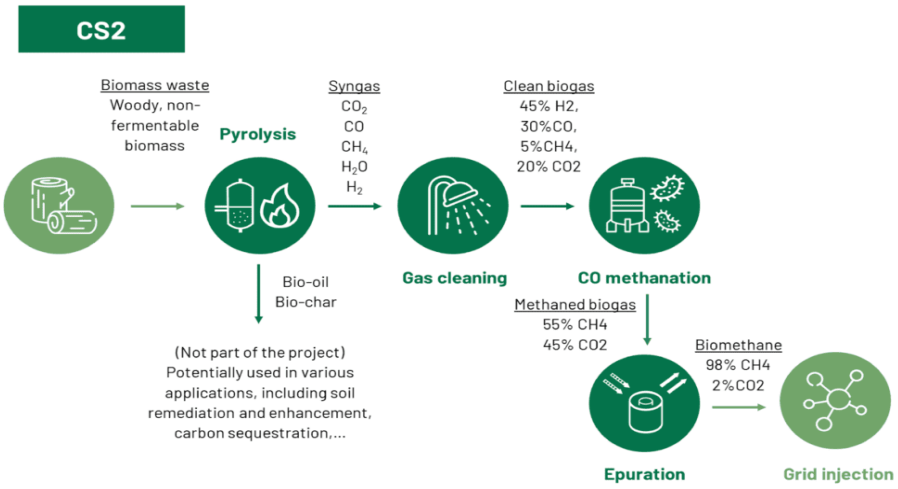
Case study 1 process.

Case study 2: Bourges, France

In Case Study 2, SEMPRE-BIO transforms green waste into sustainable biomethane for grid injection through pyrolysis and CO methanation.

In this case, woody biomass is collected from green waste, separated and shredded. This biomass is processed in a high temperature pyrolysis unit, converting it into syngas (H, CO and CO2).

The syngas is purified to remove impurities like tars and oils, then injected into bio-methanation reactors. In these reactors, the syngas is converted into CH4 and CO2 by a bacterial consortium, producing biogas. After an epuration process, the resulting biomethane is injected into the grid to supply renewable gas.



Case study 2 process.

Case study 3: Adinkerke, Belgium and CO2 valorisation

In Case Study 3, SEMPRE-BIO converts cattle manure from a dairy farm into biomethane and a liquefied CO2 stream using a cryogenic separation process, a cutting-edge technology that utilises low temperatures to purify and separate the components of biogas, mainly CH4 and CO2.

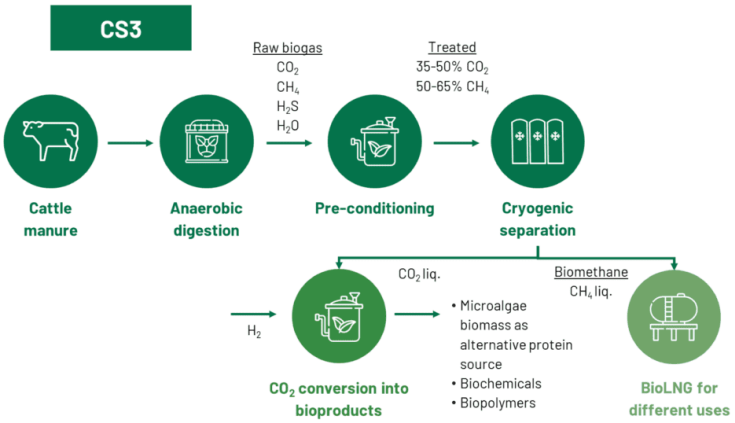
This initiative aims to meet the farm's energy demands and convert surplus biogas into liquid biomethane (BioLNG) and liquefied CO2.

Initially, cattle manure is transformed into biogas through anaerobic digestion, followed by a purification stage to remove impurities. Using an advanced cryogenic upgrading process, the key components – CH4 and CO2 – are separated and liquefied.

The resulting BioLNG can be stored in dedicated tanks locally for subsequent uses and valorisation, ensuring flexible energy management.

Meanwhile, the liquefied CO2 is repurposed into valuable products such as biopolymers, biochemicals and alternative protein sources, utilising innovative pilot-scale technologies like a hybrid fermenter and a solar photobioreactor.

Hybrid Fermenter



Case study 3 process.

Project goals and outcomes

The SEMPRE-BIO project aims to improve the efficiency and economics of the biomethane sector with several key outcomes and ambitious goals. It seeks to achieve a competitive biomethane price range of €55-75/MWh, significantly reducing capital expenditure by 10% through advanced modularisation techniques.

Additionally, it will create new revenue streams by capturing and utilising liquid CO2, further enhancing the economic viability of operations.

To drive innovation, the project plans to increase production by 15% using non-dominant technologies and diverse feedstocks, ensuring a more resilient and sustainable supply chain. The strategy includes boosting market uptake and actively participating in the Biorefine Cluster Europe, fostering collaboration and knowledge sharing within the industry.

Aligned with the REPowerEU initiative, this project supports the EU's goal of reducing dependence on fossil fuels and accelerating the transition to renewable energy sources.

The long-term goals are equally ambitious. The project aims to establish 10 CS1 plants, 65 CS2 plants, and 150 CS3 plants within the next decade. By 2050, it targets a production capacity of 4.5 billion m3, which will represent 3.2% of the total biomethane market.

This comprehensive approach addresses current challenges, positioning the project as a critical driver in Europe's shift towards more sustainable energy solutions.
Source: *https://www.enlit.world/renewable-energy/affordable-biomethane-through-sempre-bio-project-innovations/*

3.3 Finland

Gasum powers Equinor's tugboats with bio-LNG

20th February 2025. By Ajsa Habibic

Courtesy of Gasum

Finland-based energy company Gasum has delivered bio-LNG to two tugboats operated by Norwegian energy major Equinor as part of their ongoing collaboration toward increasing the use of bio-LNG.

Under the agreement, Gasum will bunker Equinor's tugboats Borgøy and Bokn with bio-LNG throughout 2025. The first bunkering of Borgøy was already conducted at Kårstø on February 14, Gasum revealed.

This latest agreement between Gasum and Equinor represents a further extension of their continuing collaboration. The companies' bunkering collaboration was already extended in 2024 with a long-term contract whereby Gasum will continue to supply LNG to Equinor's dual-fuel chartered fleet of vessels. Building on their previous contract, the deal includes additional support services such as cooling down and gassing up.

Following up on the agreement, in 2024, Gasum supplied bio-LNG to Equinor's chartered platform supply vessel, Island Crusader, in the Port of Dusavik, Stavanger.

"Expanding the use of bio-LNG to the fuel of choice for powering these tugboats is another step on the journey towards Equinor's sustainability goals," Gasum said.

Source: *https://www.offshore-energy.biz/gasum-powers-equinors-tugboats-with-bio-lng/?cdmwt=QAAAhBIMmIBC0YFdtguUMgbsMgRqmyI6LOkgig*

3.4 Sweden

Furetank concludes its first bio-LNG bunkering

26th February 2025. By Ajsa Habibic

Swedish shipping company Furetank has completed its first bunkering of ISCC-certified bio-LNG as a step toward complying with the heightened EU environmental requirements.

Courtesy of Furetank

Furetank conducted this milestone operation in collaboration with LNG supplier Molgas and environmental commodity trader STX Group, delivering 200 tonnes of bio-LNG to tanker vessel Fure Viken outside Mongstad, Norway.

As disclosed, STX Group and Molgas collaborated to source, liquify, and deliver the ISCC-certified bio-LNG, fully recognized under the EU Renewable Energy Directive (REDII). The operation also marked the first time that Molgas has delivered a mass-balanced bio-LNG bunker to a maritime customer in Norway.

According to Furetank, the bio-LNG bunker delivery will help comply with the FuelEU Maritime regulation which requires a 2% reduction in marine fuel's greenhouse gas (GHG) intensity by 2025.

Bio-LNG is a mass-balanced product where biomethane of certified origins is purchased and injected into the gas grid, while the corresponding amount of gas is withdrawn from the grid and liquefied into maritime fuel. Since the new regulation makes no distinction between mass-

balanced and off-grid-produced biomethane, a new path for shipping in the transition to renewable energy opens up, surpassing some of the hurdles of lack in biomethane supply and delivery infrastructure, Furetank explained.

"We used biomethane of the highest environmental standard available in the market. This transaction marks a milestone in our transition to clean fuels, while also supporting European agriculture and biogas production. Furetank has worked for several years with fuel suppliers and ports to realize larger-scale liquefied biogas deliveries on several European destinations. This is a very positive development," said Furetank's CEO Björn Stignor.

STX Group described the transaction as one of the first signs of a new fuel market being born. "Bio-LNG is an efficient answer to FuelEU Maritime: a market-based regulation which rewards those who blend in biofuels and penalizes those who don't. Together with the EU ETS, it builds a business case for renewable fuels. This transaction is proof of how Bio-LNG can be a powerful tool when lowering emissions from the transport sector," said Sead Keric, Managing Partner of Renewable Gas at STX Group.

Furetank is currently working on renewing and updating its fleet with a series of dual-fuel Vinga product tankers.

As described, the Vinga series is designed for the intense and demanding trade in the North Sea and Scandinavia, well suited to meet the growing European demand for biofuels and renewable feedstocks.

The ships are ice class 1A 17,999 dwt product tankers designed by Furetank together with FKAB Marine Design. They all have dual-fuel capability, run on LNG/LBG or gasoil, and are fully equipped for shore power.

They are designed with a battery hybrid solution and several innovative features that reduce fuel and energy consumption, resulting in extensively lowered emissions of CO2, sulfur oxide, nitrogen oxide, and hazardous particles.
Source: *https://www.offshore-energy.biz/furetank-concludes-its-first-bio-lng-bunkering/?cdmwt=hAIcGIFAxYFFt2qSIxz8kkfpFyZGLHkmiq*

3.5 Spain

Baleària, Axpo: First bioLNG operations completed at Enagás terminals

10th March 2025. By Naida Hakirevic Prevljak

Spanish ferry operator Baleària and compatriot renewable energy supplier Axpo Iberia have wrapped up the first bioLNG bunkering operations at the two Enagás terminals in Huelva and Barcelona.

Courtesy of Baleària

The operations come after Enagás recently said it was ready to launch bio-LNG supply at its two regasification terminals, in line with the Spanish energy company's efforts to contribute to achieving European decarbonization objectives.

Business Developments & Projects

On March 3, 2025, the Huelva terminal supplied the Port of Málaga, where Baleària operates the Málaga to Melilla route with the Rusadir, an electric and dual gas-powered ferry that joined the company in late 2023.

On March 6, bioLNG was supplied from the Barcelona terminal to the 2024-delivered LNG dual-fuel fast ferry Margarita Salas which connects Barcelona with Mallorca and Menorca.

As explained, bunkering the ships directly with bioLNG was possible thanks to the adaptation of the terminals to process bioLNG, which is obtained from biomethane injected into the gas network and processed in liquid form. In this sense, Baleària and Axpo have demonstrated the viability of creating green corridors between European ports, or even connecting two continents, as in the case of the voyage in the Alboran Sea.

The biomethane supplied and certified by Axpo comes from the treatment of agricultural waste at the Noguera Renovables plant (Lleida), the first in Spain to produce biomethane from cattle manure, and from the use of organic waste at the Valdemingómez Technology Park (Madrid).

"This new milestone demonstrates Axpo's firm commitment to the decarbonisation of maritime transport, opting for biomethane and bioLNG as alternative fuels to help meet European energy transition objectives," Jacobo Canseco, Director of Green Energy at Axpo Iberia, highlighted.

Baleària's General Manager, Georges Bassoul, pointed out that these supplies represent another step towards Baleària's objective of reducing its carbon footprint. He added that, four years ago, Baleària already made the first pilot voyage with a fast ferry powered by 100% renewable fuel.

Back in 2021, Baleària's LNG-powered ferry Eleanor Roosevelt made a test crossing using renewable biomethane certified by Axpo Iberia. This represented an important milestone for zero-emission shipping as, for the first time in Europe, a high-speed ferry crossed the route of 133 nautical miles between Barcelona and Ciutadella using only fuel made from 100 percent renewable sources.

"The plan is to increase the use of this energy in our fleet, which will allow us to make decarbonised trips," Bassoul continued.

Baleària has an eco-efficient fleet strategy with dual gas engines, a technology that it has been investing in for almost a decade and that also allows it to consume 100% biomethane, as well as green hydrogen blends of up to 25%. In this sense, the shipping company has a fleet of eleven ships with dual gas engines and has pioneered the use of electric energy with two electrically propelled vessels.

In January this year, the shipping company embarked on a project to implement the first green corridor between Spain and Morocco, which will be served by two 100% electric, zero-emission fast ferries. In the future, the entire route between Europe and Africa will be crossed by the two ships using electric energy only.
Source: *https://www.offshore-energy.biz/balearia-axpo-first-biolng-operations-completed-at-enagas-terminals/*

4.0 Hydrogen – Zero Carbon Fuel

4.1 Malaysia

Kuching's public transport to be fully hydrogen-powered by 2026, says Abg Jo

25th February 2025. By GALILEO PETINGI. Sarawak.

Kuching's public transport to be fully hydrogen-powered by 2026, says Abg Jo

Abang Johari giving his keynote address. — Screengrab via Ukas

KUCHING (Feb 25): Public transportation in Kuching will be fully powered by hydrogen through the Kuching Urban Transportation System (KUTS) initiative by next year, said Premier Datuk Patinggi Tan Sri Abang Johari Tun Openg.

He said this is featured in the hydrogen buses and upcoming autonomous rail transit (ART) and is done to encourage and promote domestic offtake of clean hydrogen.

"Forging ahead, Sarawak is actively exploring Power-to-X projects and leveraging our abundant renewable energy resources to generate clean hydrogen.

"By combining hydrogen with carbon dioxide, we can produce a range of synthetic fuels and chemicals, including green methanol, sustainable aviation fuel, green ammonia and even polyesters.

"These polyesters can be processed into various forms such as green fibres, bottles or films — contributing to a more sustainable future," he said when officiating the EIC Connect Energy Borneo 2025 at the Hikmah Exchange Convention Centre here today.

Abang Johari said Sarawak is poised to play a pivotal role in Malaysia's ambition to develop its clean hydrogen industry.

He said by leveraging on Sarawak's abundant renewable energy resources, particularly hydro and solar power, along with natural gas resources and carbon capture and storage capabilities, the state aims to become a cost-competitive clean hydrogen hub with large-scale production capacity.

"We have begun the journey with the development on the Sarawak Hydrogen Hub in Bintulu which will site major projects like the H2onbill and H2biscus with our international partners from Japan and South Korea, respectively," he said.

Abang Johari also announced that the state had already initiated its first green methanol project through Sarawak Petchem, which not only underscores the state's commitment to innovative energy solutions but also positions Sarawak as a leader in the transition towards cleaner and more sustainable energy systems.

Also present were Sarawak Deputy Minister for Energy and Environmental Sustainability Datuk Dr Hazland Abang Hipni, Deputy Minister at the Prime Minister's Office Energy of Brunei Darussalam Dato Seri Paduka Awang Mohamad Azmi Mohd Hanifah and Energy Industries Council United Kingdom chief executive Stuart Broadley.

Source: *https://www.theborneopost.com/2025/02/25/kuchings-public-transport-to-be-fully-hydrogen-powered-by-2026-says-abg-jo/*

4.2 Germany

More than a quarter of Germany's hydrogen refuelling stations will be permanently closed by the end of June

4th March 2025. By Leigh Collins. Editor, Hydrogen Insight

The 22 filling stations operated by H2 Mobility were all built for passengers cars only and therefore 'no longer meet today's technical and economic requirements'

H2 Mobility's car-only hydrogen refuelling station in Herten, North Rhine-Westphalia, which could be among the 11 to close by the end of June.Photo: Shutterstock

Europe's largest operator of hydrogen refuelling stations (HRSs) will permanently close 22 of its German sites by the end of June, slashing the number of HRSs available in the country by more than a quarter.

H2 Mobility will shut down 11 of its 700-bar refuelling stations on 31 March, with a further 11 to follow in the second quarter.

All 22 were built for passenger cars only, and cannot serve large commercial vehicles such as buses and trucks, which usually accept hydrogen at 350 bar and are widely believed to have a brighter future than fuel-cell cars.

The company had closed another six 700-bar HRSs on 31 December 2024.

"For some years now, our strategic focus has been on a regional, demand-based expansion of the hydrogen infrastructure for light and heavy commercial vehicles, said H2 Mobility managing director Martin Jüngel.

"Older, small refuelling stations with a focus on passenger cars, some of which were built more than 10 years ago and no longer meet today's technical and economic requirements, must be removed from the network where this is unavoidable."

This transformation is primarily due to the muted market ramp-up for passenger cars and small commercial vehicles

The Berlin-based company added: "The refuelling of commercial vehicles requires technical and structural measures, such as higher filling station roofs, larger aprons for the towing curves of trucks and the ability to store and refuel significantly larger quantities of hydrogen. These requirements cannot be realised at many older locations originally designed only for passenger cars."

There are currently 79 HRSs open in Germany today, and the closure of 22 will leave 57 in place — still far more than any other country in Europe, with the Netherlands in second place with 18, followed by Switzerland (17) and France (14).

"H2 Mobility's strategic orientation is geared towards regional demand-based expansion for light and heavy commercial vehicles," it explained. "The company is focusing on regional hydrogen hubs in areas with high demand, such as urban centres or along major transport routes."

It is opening two new refuelling stations in Düsseldorf and Ludwigshafen with 250-, 500- and 700-bar pumps over the next six months, and opened three large HRSs in Heidelberg, Mannheim and Frankenthal last year.

"This transformation is primarily due to the muted market ramp-up for passenger cars and small commercial vehicles," the company stated.

Jüngel added: "The proportion of 350-bar refuelling for buses and commercial vehicles is rising continuously. By the end of the year, we expect the majority of our sales to be generated by 350-bar demand. By bundling demand in a targeted manner, we are creating an infrastructure that is economically viable and at the same time actively promotes the transport transition."

The 11 HRSs to be closed on 31 March are in Neuruppin, Bonn, Flensburg, Geisingen, Potsdam, Ulm, Siegen, Aachen, Bad Rappenau, Heidelberg (Speyerer Straße) and Mönchengladbach.

The next 11 have not yet been identified.

H2 Mobility said it was operating "around 70" public HRSs in Germany in September last year, but as previously mentioned, closed six of these at the end of last year.

The EU's Alternative Fuels Infrastructure Regulation, which became law in 2023, requires member states to install publicly accessible gaseous H2 filling stations capable of serving both heavy-duty and light vehicles at every "urban node" and every 200km along the core routes of the TEN-T by the end of 2030.

The TEN-T core network links "urban nodes" — an EU term for 424 major cities in the bloc with ports, airports and rail terminals — across Europe and is expected to be completed by the start of next decade.

Source: *https://www.hydrogeninsight.com/transport/more-than-a-quarter-of-germany-s-hydrogen-refuelling-stations-will-be-permanently-closed-by-the-end-of-june/2-1-1787648*

5.0 Electricity – Electric Vehicles (EVs)

5.1 United States of America

Michigan firefighters dumped 3,000 gallons of water on burning Tesla

6th March 2025. By Scott McClallen

State plans call for 2 million electric vehicles five years from now

Tesla vehicle after catching fire in a California junkyard Sacramento Metropolitan Fire District

Firefighters and public safety officers in Washtenaw County got a searing experience with electric vehicle safety last autumn while battling a tragic automotive fire.

Firefighters who responded to a Sept. 18, 2024, fire near Plymouth dumped 3,000 gallons of water on a white 2020 Model 3 Tesla after it was struck by another vehicle. They also applied a fire blanket, which the fire consumed within 30 minutes.

The crash happened when a 2024 silver Nissan Rogue driving the wrong way on eastbound M-14 turned into the entrance ramp from Gotfredson Road, according to documents Michigan

Capitol Confidential obtained through a records request from local and state agencies. The Rogue was going about 69 miles per hour when it struck the Tesla, killing both drivers and a passenger in the Nissan vehicle.

A bystander called 911 within two minutes of the crash, and an off-duty officer was one of the first people on the scene. One of the victim's family members was notified immediately through a crash notification program on the Tesla, according to an emergency report.

About 16 minutes after the crash, the Tesla caught fire.

Firefighters spent more than four hours trying to put out the fire and cut out a body from the Tesla. One firefighter was hurt while removing the body, according to an official report.

"Shortly thereafter the battery pack caught fire and the vehicle began to burn rapidly," said a Michigan State Police report. "The Model 3 had extensive fire damage and was burnt down to the frame."

Responding to an electric vehicle fire is a relatively new challenge for first responders.

Gasoline-fueled vehicles can catch fire, but those fires end relatively quickly as the gas burns up or evaporates, said Jason Hayes, director of energy and environmental policy at the Mackinac Center for Public Policy. But an EV can reignite and burn for hours.

Fires involving internal combustion engines "tend to burn very hot and go out relatively fast," Hayes wrote in an email to CapCon. "EV fires burn hot and are next to impossible to put out because the chemical reactions in the battery create a mix of oxygen and toxic fumes that can keep the fire burning, even when water is present. We wrote about one wrecking yard digging a pit and (literally) submerging an EV that caught fire in their yard to put it out."

When lithium-ion battery cells catch fire, are punctured, or reach an extreme temperature, the fire can repeatedly reignite in a phenomenon called thermal runaway. This causes the fire to burn hotter, faster, and even reignite after initially being extinguished, according to Underwriters Laboratories.

About 50,000 electric vehicles are registered in Michigan, according to the federal government. Although they account for a small percentage of Michigan's vehicles, they present unique fire risks. An EV fire burns at roughly 5,000 degrees Fahrenheit, while a gasoline-powered vehicle on fire burns at 1,500 degrees Fahrenheit, according to the University of Clemson's College of Engineering, Computing and Applied Sciences.

Current EV technology isn't ready for mass adoption, Hayes said.

"The examples in the documents CapCon received prove that EVs are not what we have been promised," Hayes wrote.

Michigan policy mandates that there must be two million electric vehicles on state roads by 2030, but these vehicles are fraught with high costs and concerns about their environmental impacts, reliability and safety, Hayes said.

The state of Michigan has 30 EVs in its own vehicle fleet, CapCon has reported. The total fleet has about 14,482 vehicles.

Source: https://www.michigancapitolconfidential.com/news/michigan-firefighters-dumped-3000-gallons-of-water-on-burning-tesla

End