

# Rivers reimagined

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The **Greening Lithuania's Transport Chain** report, by the EU-supported **Blue Supply Chains** project, reviewed the Baltic State's ongoing project tasked with shifting road traffic onto inland waterways – along the Nemunas River. At the core of the initiative is the electrification of pushboats operating between Klaipėda and Kaunas, supported by a public tender that has attracted domestic and international stakeholders. The project not only advances the country's environmental agenda but also establishes Lithuania as a test site for green transport solutions.

Lithuania's road-to-river strategy is consistent with broader maritime aims in the EU. Because the shipping sector still relies almost entirely on fossil fuels for energy (and contributes nearly 3% of worldwide greenhouse gas emissions), (sea & river) ports that quickly develop low-carbon solutions and infrastructure can gain a lasting competitive advantage. Further, the EU's Fit for 55 package, which extends carbon pricing to shipping and sets binding targets for alternative fuels, makes early action particularly valuable.

Taking advantage of Europe's sustainability push, Lithuania is positioning its rivers at the centre of a modern logistics strategy. By utilising inland waterways, the state intends to reduce road congestion, lower emissions, and enhance sustainable transport.

## The revival

What had begun under the Project EMMA developed into a flagship programme of the Lithuania Inland Waterways Authority (LIWA) to revive the Nemunas and the E41 waterway as viable commercial routes. Between 2019 and 2023, €27 million was invested to restore the latter (plus some €300,000 spent on light and GPS-equipped buoys). The first field test in 2021 showcased the potential of the project when a barge carried a 164.5-tonne General Electric transformer from Klaipėda to Kaunas. By 2022, over 200t of freight had been transported, showing that it is both practical and sustainable to move goods from highways to rivers.

Modernisation and infrastructure development around the Nemunas River have been necessary to ensure that this early success could continue. Over 550 groynes were built to regulate water flow and manage sedimentation and erosion. As part of the EU TEN-T upgrades, these improvements guaranteed the Nemunas is fit for commercial navigation. Moreover, E41 was upgraded to ensure year-round operation to transport at least 100,000t/year. In the second half of 2023, regular deliveries were underway on the Nemunas River, and from 2024, LIWA started bulk cargo transports (grain and rubble). Each barge trip replaces about 106 trucks, reducing CO<sub>2</sub> emissions by 21t.

## Powering the progress

The next phase of the programme focuses on innovation. In partnership with the European Investment Bank, LIWA completed a feasibility study for electrifying its fleet. The research looked at market demand, vessel needs, river conditions, port infrastructure, and alternative energy systems (including hydrogen, methanol-electric, and battery-electric options). The results show that battery-electric vessels are most viable at the moment. Supported by €14.6m in grants, the initiative includes ordering six pushers, 12 barges, and 27 battery containers to be introduced over six years. The transition to rivers enabled by these assets could replace around 49,000 truck journeys annually.

A resilient charging network is essential to provide enough power for this brand-new

tonnage. The initial grid connections provided only 350kW, insufficient for pushboats, so a dual-link system was introduced, raising capacity to 750kW per vessel. But more is needed, thus charging points are being set up at three key locations: Klaipėda (as the hub), Jurbarkas (mid-route charging and battery exchange stop), and at the Kaunas Marvelė Port (multi-purpose energy centre supporting both vessels and heavy-duty trucks). The last offers specific advantages, including direct access to a nearby high-capacity transformer. Under a long-term agreement, the Lithuanian government has pledged €500,000 to enhance the grid, while the port operator will cover 10% of the expenses and set the electricity rate at €3.0/kW.

## Peeling the layers of complexity

Another key finding from the report is that while electrification is moving along swiftly in road transport, the same cannot be said about maritime, where charging infrastructure is scarce. Only a few European ports are able to provide a large-scale alternative energy supply. Establishing hubs like Klaipėda and Kaunas with long-term, stable grid connections is instrumental in enabling the maritime sector to decarbonise.

However, deploying high-power charging technology is still a tall order. The commercially available solutions at the required scale are insufficient. Thus, a phased method has been adopted in the Lithuania project to allow for infrastructure improvements as new systems become available.



Photo: Lithuania Inland Waterways

There are also constraints on energy supply within urban areas, e.g., at Marvelė, on-site renewable generation is restricted, so the port must rely on the national grid. Here, long-term planning and fixed-rate contracts with energy providers are critical to ensure a stable, cost-effective supply.

Battery logistics adds another layer of complexity. Each container weighs about 30t, which requires strong docks, special cranes, and improved storage areas to manage safe and efficient exchanges. A second charging point in the Port of Klaipėda is also being considered to meet growing demand, which involves talks with local operators and energy suppliers to get both power and space.

That said, to enhance operational flexibility even further, floating ‘battery barges’ are being considered as mobile power units to keep vessels running without interruption. Also, fixed-rate energy contracts will help control electricity costs, while close coordination between government, industry, and energy providers is helping develop the E41 into a scalable, zero-emission inland waterway system.

With infrastructure plans in place, the focus has shifted to vessel design. A blueprint for electric pushers has been completed, tailored to the Nemunas River and fit to work with high-capacity batteries. Trials with diesel-electric hybrids, methanol-electric systems, hydrogen fuel cells, and battery-electric vessels have already provided important data that shapes the final specifications.

The project is currently in the implementation stage, with standards of production, regulatory approvals, and procurement underway. A 2024 public tender invited international building companies and technology providers to deliver the pushboats to the needed performance and sustainability criteria. At the same time, the Kaunas Marvelė Port is expanding its capacity to 2.5MW, which will enable three battery containers to charge at 750kW each.

#### Charge up!

Clearly, the success of Lithuania’s inland waterway electrification depends on a robust charging network. With the dual-connection system, which delivers the necessary 750kW/ vessel, the network fits into the European

combined charging system standard but remains demand-scalable. Kaunas’s proximity to a high-capacity transformer reduces grid extension costs, while a public-private financing model ensures stable pricing. Yet, challenges remain – from the limited availability of ultra-high-power charging equipment to reliance on the national grid due to zoning restrictions, as well as the need for heavy-duty cranes and reinforced docks to handle 30t battery modules.

To overcome these obstacles, solutions such as battery barges and fixed-rate energy contracts have been under discussion. Meanwhile, improvements to the infrastructure at the Kaunas Marvelė Port and the public tender for e-pushboats highlight Lithuania’s capacity for extensive implementation. Thanks to robust collaboration among the government, the private sector, and the EU, the project is progressing despite market volatility and competition from road transport. The initiative’s benefits go beyond logistics, reinforcing environmental targets, supporting economic growth, and positioning Lithuania as a regional leader in sustainable (inland) shipping. ■