# Vandenilio technologijų pritaikymas transporte

2021 m. birželio 11 d.

Vilnius

*LPK Tomas Garuolis*

# Vandenilis geležinkelio transporte transporte

## Hydrogen fuel cell train to be developed with EU funding

4 November 2020

**EUROPE: The FCH2RAIL consortium's €14m project to design, develop and test a prototype hydrogen fuelled train has been awarded a €10m grant from the European Commission's Fuel Cells & Hydrogen Joint Undertaking as part of the Horizon 2020 Programme**


The European Commission's Fuel Cells and Hydrogen Joint Undertaking (FCH JU) has selected a CAF-led project for a €10m grant to support the development of a hydrogen-powered train prototype.
The €14m FCH2RAIL project seeks to design and develop a zero-emission vehicle with competitive operating performance compared with diesel engine-powered trains.
The European Union (EU) funding was awarded under the Horizon 2020 programme.
Besides CAF, the FCH2RAIL project involves DLR, Renfe, Toyota Motor Europe, Adif, IP, CNH2 and Faiveley Stemmann Technik.
The process to establish a contractual agreement is currently underway to allocate specific tasks to each consortium member.

The four-year project is set to launch next January.
The prototype will be developed by modifying the existing Renfe's three-car commuter unit belonging to Civia series.
The vehicle will be equipped with a new power generator system fitted with hydrogen fuel cell systems and LTO batteries. The step will enable the bi-mode train to run on electrified and non-electrified routes.

Šaltinis: https://www.railway-technology.com/news/eu-grant-caf-led-hydrogen-train-development-project/

# Žalieji uostai

## Portuguese green hydrogen for the Port of Rotterdam

The Portuguese and Dutch governments want to connect the hydrogen project of Sines to the Port of Rotterdam and to develop a strategic export-import value chain to ensure the production and transport of green hydrogen to the Netherlands and its hinterland.

**SEPTEMBER 24, 2020** EMILIANO BELLINI

26 Apr 2021 Email

**One Portuguese port aims to be the first European port to achieve zero emissions by 2035.**

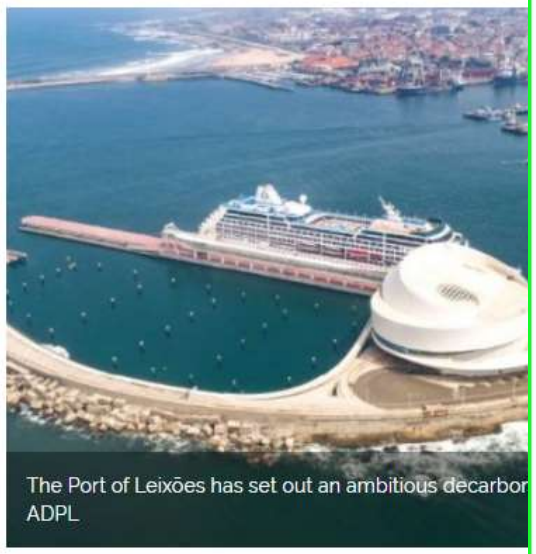
The Port of Leixões foresees its decarbonisation 15 years before the deadline set by the European Commission's European Green Deal. The port also aims to be self-sufficient in energy production, with the capacity to obtain all its energy from renewable sources.

"The goal is to become an international reference port in southern Europe in the transition to a new energy system based on the use of its own natural resources, with the ambition to be a self-sufficient port with zero emissions," said Nuno Araújo, president of the board of directors at the APDL port authority.

**Energy transition roadmap**

This year, APDL will present its energy transition roadmap to guide concrete actions aimed at making Leixões one of the first non-polluting ports and reinforcing its commitment to sustainable growth.

As well as phasing out fossil fuels, the decarbonisation plan focuses on



The Port of Leixões has set out an ambitious decarbon
ADPL

## Port of Antwerp heads international consortium aiming to make European ports greener

Thursday, 06 May 2021

By **Helen Lyons**


Photo from Port of Antwerp

**The Port of Antwerp will head a new international consortium with the goal of making Europe's ports greener.**

The consortium is called PIONEERS and involves 46 partners (including port companies, terminal operators, transporters and government agencies) working with a grant of €25 million from the European Horizon 2020 programme.

https://www.brusselstimes.com/news/belgium-all-news/168241/barcelona-constanta-venlo-jacques-vandermeiren-annick-de-ridder-european-horizon-pioneers-port-of-antwerp-heads-international-consortium-that-aims-to-make-european-ports-greener/

# Automobilių industrija ES

*Oct 7, 2020 - 04:56 pm*

## Hyundai hand over first of 1,600 H2 trucks in Switzerland

**The Korean company also announces plans to market the fuel cell trucks internationally.**

FCEV | FUEL CELL TRUCK | FUEL CELL TRUCKS | H2 | HHM | HYDROSPIDER | HYUNDAI | SWITZERLAND | XCIENT

Hyundai has handed over the first seven units of its fuel cell truck XCIENT to customers in Switzerland. Hyundai plans to deliver a total of 50 such trucks to the Alpine nation this year. By 2025 a total of 1,600 of the H2 trucks will be allocated to the Swiss market.

*+ + Kindly see our update below + +*

In July this year, Hyundai announced that it had shipped the first ten units from

## Hyzon Motors Announces Order for up to 70 Hydrogen Trucks for Austrian Supermarket Chain

- Hyzon Motors signs definitive agreement to supply up to 70 hydrogen fuel cell powered heavy trucks to a leading Austrian grocery store chain with ~300 locations

- Hyzon expects to begin delivering trucks in 2021, with all trucks expected to be delivered over the course of three years

- Hyzon and MPREIS have further partnered on a feasibility study for hydrogen fuel cell powered vehicles in alpine conditions

NEWS PROVIDED BY
HYZON Motors →
Jun 02, 2021, 07:31 ET

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## Solaris fuel cell bus: the Urbino 12 hydrogen takes the road

Solaris Urbino 12 hydrogen. The Polish producer has added in 2020 the fuel cell bus to its zero-emission bus portfolio. At the heart of the vehicle is the eighth generation of the fuel cell module by Ballard, launched at Busworld 2019. Solaris officially presented their hydrogen Urbino at the UITP summit in Stockholm in mid-2019. [...]

15 May 2021 by Editorial Staff

## Volvo and Daimler bet on hydrogen truck boom this decade

Swedish and German groups expect fuel to challenge diesel in long-distance freight

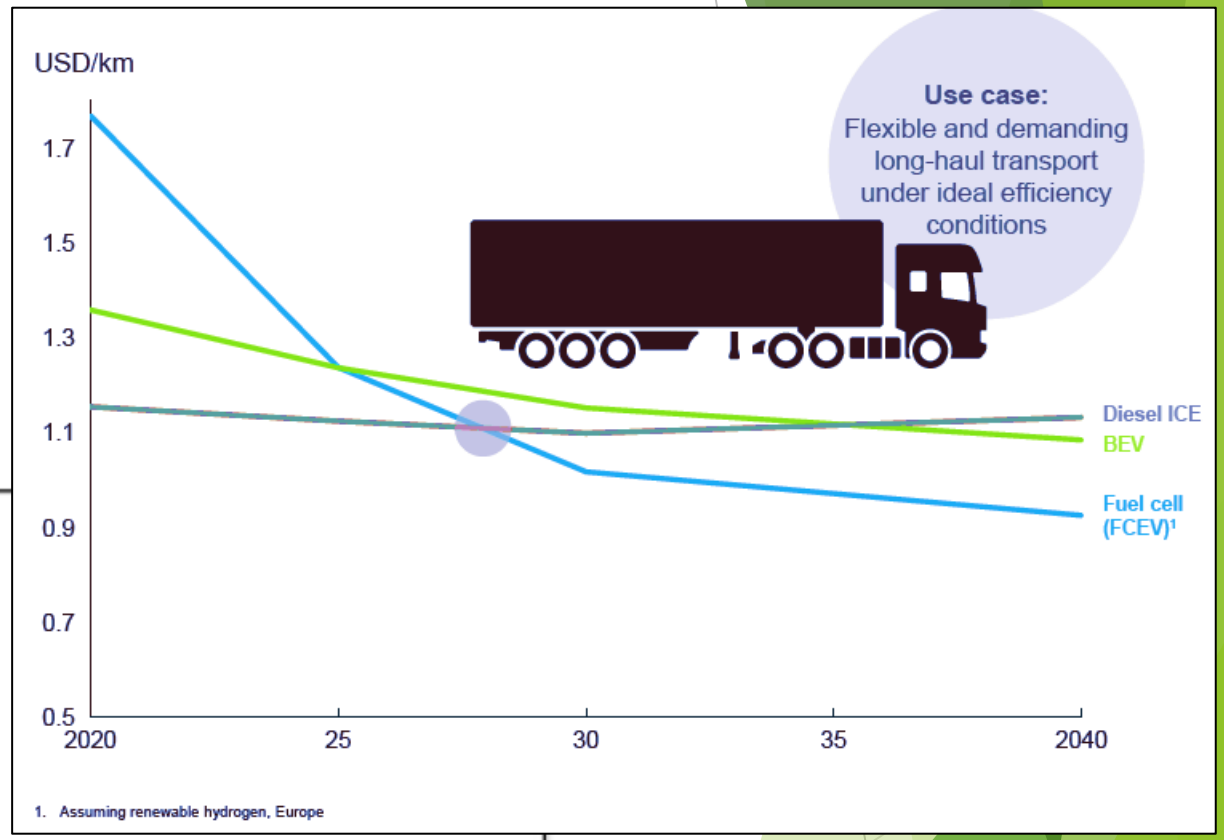
# Transporto energetika - technologiniai sprendiniai

| | Fossil powertrains | | Zero emission[1] | | |
|---|---|---|---|---|---|
| | **Diesel** | **LNG/CNG** | **e-fuels** | **Battery-electric** | **Fuel Cell-electric** |
| Description | Combustion engine powered by diesel | Combustion engine powered by LNG/CNG | Combustion engine powered by e-diesel | Electric motor powered by chemic. stored energy in a rechargeable battery | Electric motor powered by a fuel cell, combined with a battery |
| Strengths | > Established technology with widespread infrastructure<br>> Long daily driving ranges | > Fuel cost advantage compared to diesel<br>> Lower particulate emissions than diesel | > Use of existing infrastructure<br>> Use of existing HDT combustion engines | > Meet emission restrictions<br>> High powertrain efficiency | > Meet emission restrictions<br>> Possibility for long daily driving ranges<br>> Quick refuelling compared to BET |
| Potential constraints | > $CO_2$ and $NO_x$ emissions and related regulation | > Infrastructure availability<br>> Limited emission reduction potential<br>> Relatively low fuel efficiency (~25%) | > Production cost not on competitive level: ~3.5 x diesel price<br>> Remaining local emissions (e.g. $NO_x$)<br>> $CO_2$ sourcing | > Cost, size and weight of batteries<br>> Range limitations<br>> Recharging time and space required<br>> Vehicle cost | > Availability of infrastructure<br>> Production cost of $H_2$<br>> Vehicle cost |

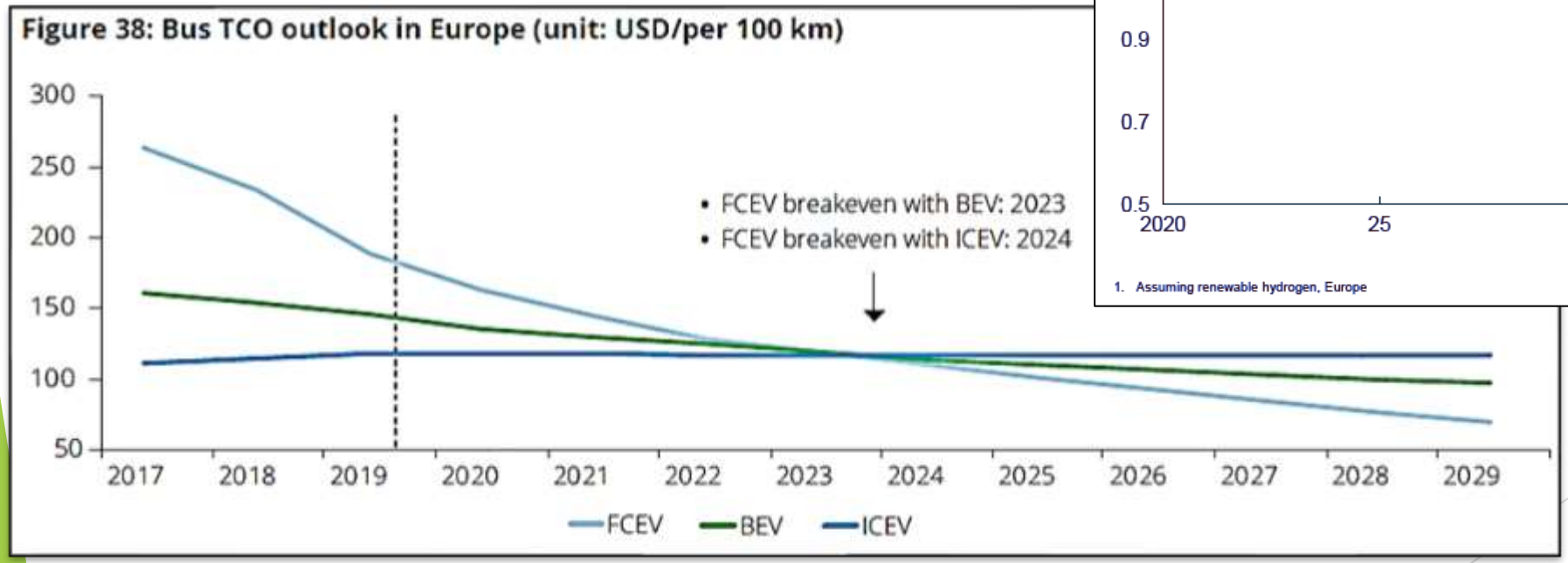
1) With primary energy derived from renewable sources  Remaining local emissions

Šaltinis: Desk research; Roland Berger; 2020

# Transporto technologijų ekonominis konkurencingumas

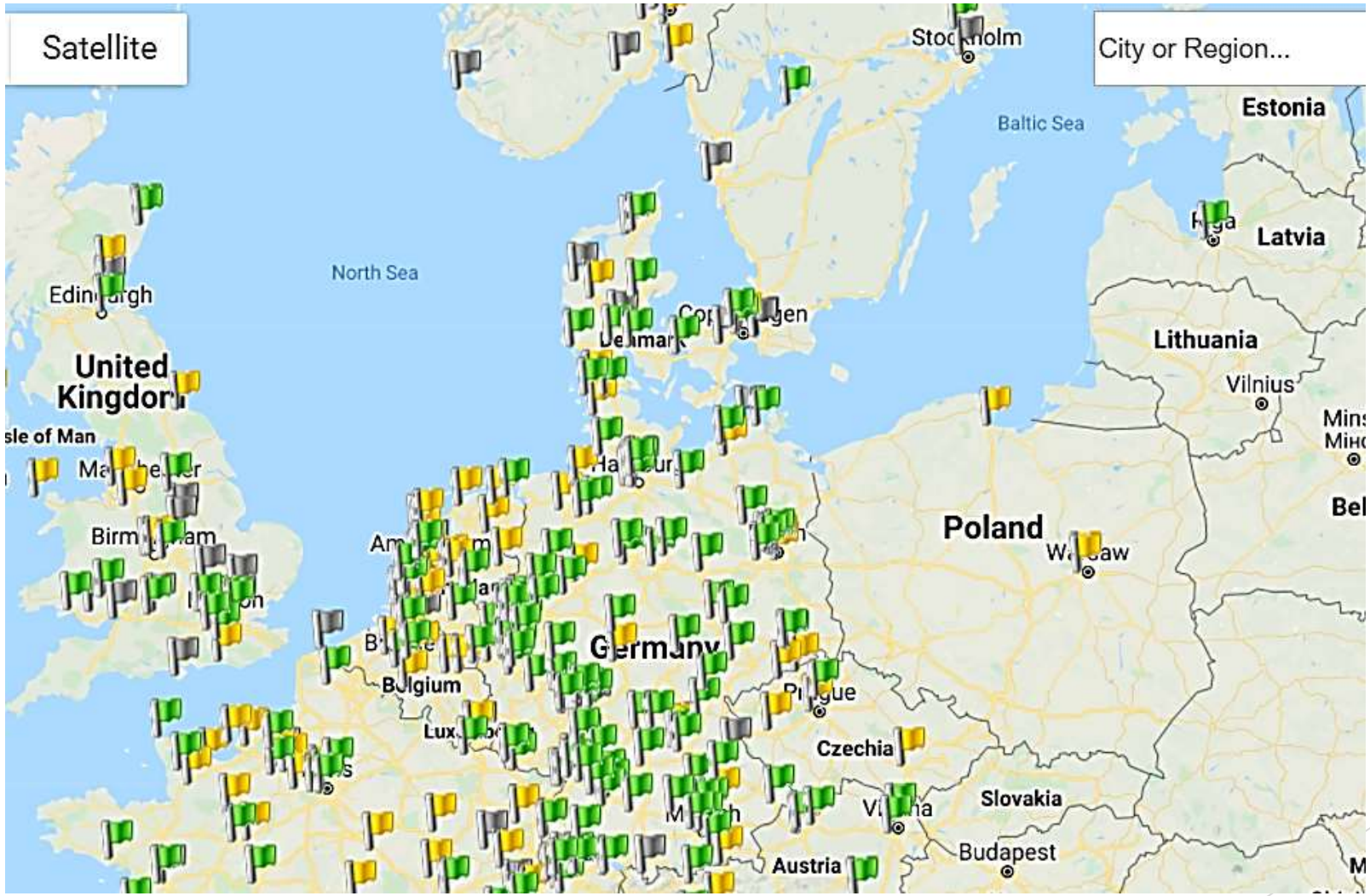



Šaltinis: Hydrogen Insights „A perspective on hydrogen investment, market development and cost competitiveness“ ; McKinsey & Company; 2021



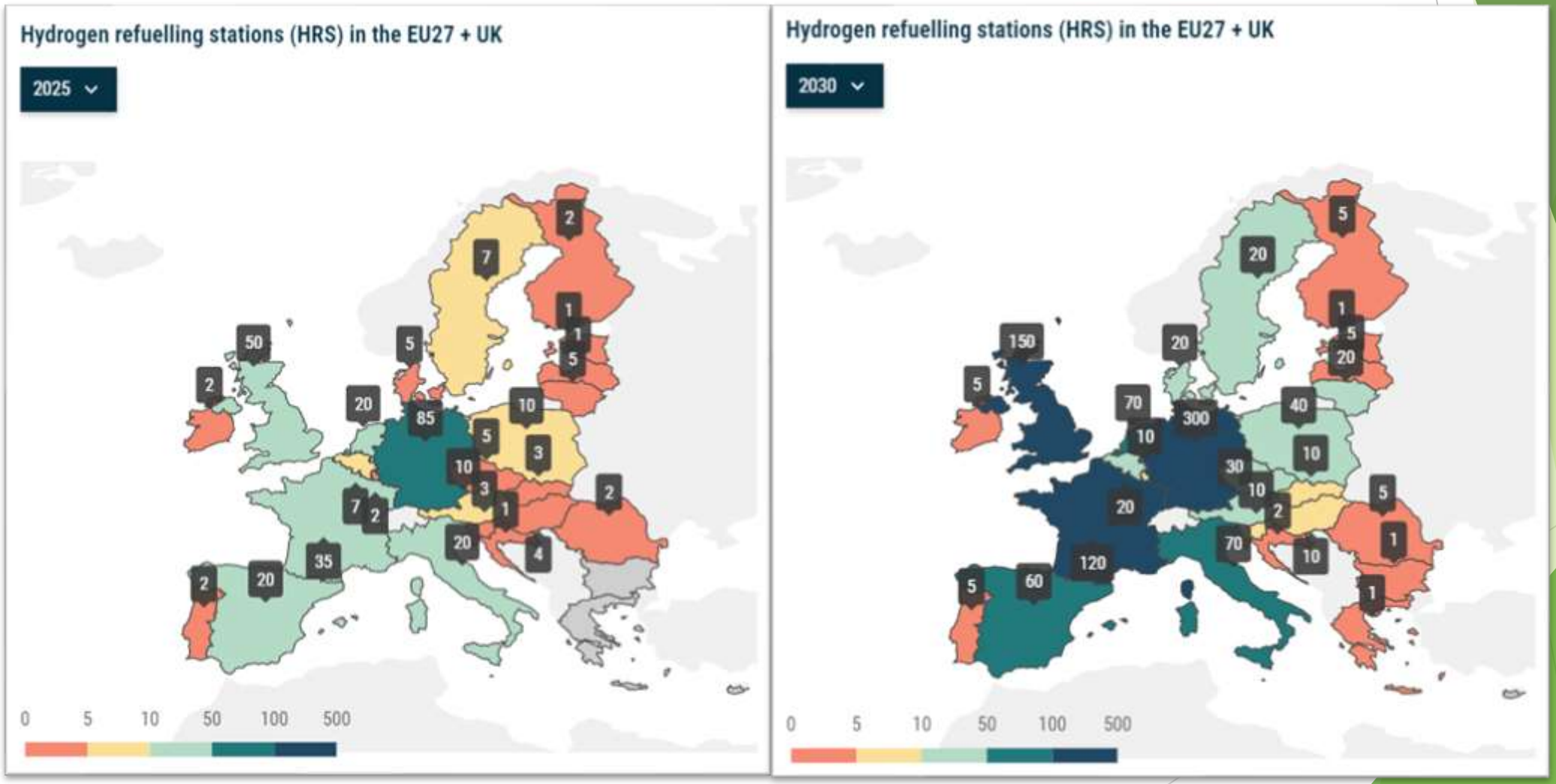

Šaltinis: Fueling the Future of Mobility; Deloitte; 2020

# Vandenilio infrastruktūra ES (transportas)




Šaltinis: https://www.h2stations.org/

# Infrastruktūros poreikis




Šaltinis: ACEA

# Regioniniai projektai (miesto transportas)


Šaltinis: https://www.h2nodes.eu/en/

# H2 kolonėlės

Biudžetas: 3,9 – 4,4 M€;
Pajėgumai:

- Įkrovimo laikas sunkiajam ir lengvajam transportui ≈ 15 min.
- Pagamintas vandenilio kiekis ≈ 200 kg/para (30 bar), užtenka ≈ 40 lengvųjų automobilių (500 km) ir 4-6 autobusai/sunkusis transportas.

Sąnaudos:
Elektra 10 800 kWh/para.
Vanduo 1800 ltr.

## Orlen Set To Build Its First Hydrogen Refuelling Stations

25 May 2021 08:00

**PKN Orlen has commenced the process of selecting a contractor for its hydrogen refuelling stations, with the first stations serving buses and passenger cars to be deployed in Poznań and Katowice.**


*Credits to PKN ORLEN*

Šaltinis: Lietuvos energetikos institutas, https://industryeurope.com/

# Gamyba Lietuvoje
## elektrinio automobilio konversija

- Prototipo konversijos kaina iš BEV į FCEV: 70 000 eur.
- Bendroji masė iki 7,2 t.
- Vandenilio kiekis kuro talpose 7-8 kg (18 val darbui. 500 km)
- Šiuo metu vyksta “field test” Vokietijoje.
- Projekto dalyvis: Elinta Motors

Šaltinis: Elinta Motors

# Galimybės v/s Rizikos

**Galimybės:**

- $CO_2$ emisijų mažinimas,
- atsinaujinančių energijos išteklių plėtra,
- naujų technologijų ir inovacijų kūrimas, diegimas,
- inovacijų konsultavimo paslaugų rinkai teikimas,
- logistikos plėtra,
- **automobilių pramonės plėtra.**

**Rizikos:**

- technologinė/infrastruktūrinė atskirtis,
- ūkio šakų ir rinkų praradimas,
- konkurencingumo praradimas.