Recommendations of the Czech Hydrogen Technology Platform on the Delegated Act specifying a methodology for assessing GHG emissions savings from low-carbon fuels and low-carbon hydrogen

HYTEP Position Paper

Updated version 1

May 2024

INTRODUCTION[1]

This paper provides HYTEP's recommendations on the Delegated Act specifying a methodology for assessing GHG emissions savings from low-carbon fuels and low-carbon hydrogen. The DA is prepared as a part of so-called Gas Package.[2] The Czech Republic, like other Member States, is gradually starting to meet the objectives of the Green Deal for Europe. This includes decarbonisation through the replacement of hydrogen with a carbon footprint by its emission-free variant and increased use of renewable fuels of non-biological origin (including renewable hydrogen) as an energy source and fuel. Establishing clear, simple, and consistent methodology for assessing GHG emissions savings from LCH can accelerate its expansion, foster the growth of a European hydrogen market, and streamline the integration of renewable hydrogen sources.

There is now a growing consensus that while renewable hydrogen is the goal and an important tool for decarbonisation, LCH should also be used, at least temporarily. The production of large quantities of LCH would reduce its production costs and trigger the development of hydrogen-based end-use technologies. The Czech Republic is counting on LCH. The updated Hydrogen Strategy of the Czech Republic of 2024 explicitly mentions that low-carbon hydrogen is important for the Czech Republic (p. 7). The strategy even identifies it as one of the pillars of the development of the hydrogen economy in the Czech Republic (p. 11) and foresees its use in both industry and transport. At least by 2030, according to the updated Hydrogen Strategy, the consumption of renewable hydrogen and LCH should be approximately the same, i.e. 20 thousand tons of renewable hydrogen and 20 thousand tons of LCH (Chapter 5).

As explained below, HYTEP believes that unless countries without access to abundant renewable energy or import of RES or renewable hydrogen such as the Czech Republic will be allowed to use LCH at least temporarily, they will not be able to meet the ambitious EU net-zero targets. Requirement to use LCH is not only a way to achieve decarbonisation and energy security but is also in line with maintaining the competitiveness of the Czech industry as well as with the basic principles of the EU energy policy and rights of each Member State.[3]

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[2] More to the Gas Package see Hydrogen and decarbonised gas market package (europa.eu)
[3] As written in article 194, point 2: "Measures shall not affect a Member State's right to determine the conditions for exploiting its energy resources, its choice between different energy sources and the general structure of its energy supply, without prejudice to Article 192(2)(c).", of The Treaty on the Function of the European Union (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:12012E/TXT).

Abbreviations

ATR	Autothermal Reforming
CBAM	Carbon Border Adjustment Mechanism
CCS	Carbon Capture System
DA	Delegated Act
EU ETS	EU Emission Trading System
FEUM	FuelEU Maritime
GHG	Greenhouse Gas Emissions
GP	Gas Package
LCH	Low-Carbon Hydrogen
PPA	Power Purchase Agreements
RCF	Recycled Carbon Fuels
RES	Renewable Energy Sources
RED 3	Revised Renewable Energy Directive 3
RFNBO	Renewable Fuels of Non-biological Origin
SAF	Sustainable Aviation Fuel
SMR	Steam Methan Reforming

1. The basics about low-carbon hydrogen

Low-carbon hydrogen is an essential piece of the emerging hydrogen economy that will play a significant role in the energy transition. Especially in the market ramp-up phase, it will play important role in decarbonization pathway, where renewable hydrogen is not yet available at sufficiently affordable price. We are of the opinion that **LCH will accelerate the hydrogen market´s build-up and therefore its production and use should be supported.**

We want to declare that upcoming DA specifying a methodology for assessing GHG emissions savings from low-carbon fuels including LCH **is crucial as it will enable a clear distinction between renewable and low-carbon hydrogen.**

1.1 What is low-carbon hydrogen?

The EU does not yet have a final methodology for production of LCH, but the proposal for a Directive on common rules for the internal markets in renewable and natural gases and in hydrogen put forward by the European Commission contains a framework within which a future methodology should fall. According to Article 2 (10) "*'low-carbon hydrogen' means hydrogen the energy content of which is derived from non-renewable sources, which meets a greenhouse gas emission reduction threshold of 70%*".[4] To explain the definition, the emissions of the production lifecycle must be lower than 3.38 kg CO_2 e/kg H_2, which is at least 70 % lower than the fossil fuel reference of 11.3 kg CO_2 e/kg H_2 (production from natural gas without CCUS).

Today, low carbon hydrogen is produced by employing a wide range of technological pathways such as the following, but not limited to:

- Electrolysis (low and high temperature);
- Reforming with carbon capture (SMR, ATR with CCS);
- By-product hydrogen;
- Methane splitting (pyrolysis of methane) with carbon black storage.

Currently, the most mature LCH production technology on industrial scale is water electrolysis powered by low carbon electricity. On global scale, LCH production comes mostly from fossil fuels with carbon capture. Of the LCH options, hydrogen produced by

[4] European Commission (eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021PC0803)

electrolysis of water using nuclear electricity can be considered the closest to renewable hydrogen (in terms of emissions).

1.2 Low-carbon hydrogen in EU legislation

As mentioned above, the DA should, among other things, set methodology for production of LCH. This methodology is required because the existing EU legislation is confusing with regard to LCH and its role in the decarbonization of Europe (see table 1 below). Today, legislation distinguishes between *renewable hydrogen* (defined as RFNBO in RED 3), *low carbon hydrogen* and other *hydrogen*. Renewable hydrogen as RFNBO is preferred and therefore supported. In the context of the preparation of the DA accompanying the Gas Package, there is a growing debate on the position of LCH in EU legislation and its role in achieving a net-zero future and EU energy security. Today, existing EU legislation takes different positions on LCH. It is appropriate to use the existing debate to push for a greater role for LCH in EU decarbonization. The inconsistency of the position of EU legislation on LCH should become the basis for an argument why the position of LCH needs to be adjusted, in particular to push for its increased use.

HYTEP believes that the European legislation should be more technology neutral, allowing both low-carbon and renewable hydrogen to be used to meet greenhouse gas reduction targets. **If the European Union's objective is to mainly support renewables, this can be done by introducing multipliers, such as those currently used in RED 3 for RFNBO use in the transport sector or the FuelEU Maritime scheme**.

Table 1: The LCH and RFNBO position in various EU norms: The comparison

<table>
<tr><th></th><th>Obligations and general targets</th><th>RFNBO/RCF as defined in and certified through RED</th><th>LCH as defined in and certified through GP</th></tr>
<tr><td>RED 3</td><td>• Industry: 42% RFNBOs sub-target by 2030
• Transport: At least 29 % share of renewable energy in final consumption of all energy used. Or a minimum of 14.5 % reduction in GHG compared to emissions that would have been created by fossil fuel use instead</td><td>• Certified RFNBO count towards target
• x2 multiplier for advanced biofuels and RFNBOs
• Additional multipliers in aviation and maritime transport: x1.2 for advanced biofuels and x1.5 for RFNBOs</td><td>• Certified GP LCH does not count towards target</td></tr>
<tr><td colspan="4">The RED 3 supports the use of RFNBO over LCH in the transport and industrial sectors, while allowing an exemption for the industrial target in article 22b.</td></tr>
<tr><td>Gas Package</td><td>• To publish DA on methodology for LCH production
• To regulate the internal markets for renewable and natural gases and integrate the renewable and LC gases into the existing gas network
• Blending with up to 5% hydrogen and access to LNG terminals and gas storage is ensured for LC and renewable gases</td><td>• RFNBO certification and RED irrelevant</td><td>• Defines basis for LCH certification, some tariff reductions possible for LCH
• Certification of LCH should be similar to that of RFNBO</td></tr>
<tr><td colspan="4">In May 2024 EP approved Gas Package. The package (made up of one directive and one regulation) will have to be formally adopted by energy ministers in the Council of the EU before the legislation can be signed into law.</td></tr>
<tr><td>FEU Marit.</td><td>• Gradual reduction of GHG emission intensity until 2050, starting in 2025 with 2 % reduction compared to 91,16 CO2/MJ fossil fuels comparator
• 2 % sub-target for RFNBO as of 2034</td><td>• Certified RFNBO count towards target
• Use of RFNBOs will be double counted towards the GHG reduction until 2033</td><td>• Certified low-carbon fuels, LCH and its derivates can be counted towards GHG emission reduction target</td></tr>
<tr><td colspan="4">Eligible fuels under the FuelEU Maritime include RFNBOs and e-fuels, recycled carbon fuels and biofuels as defined in the RED 3, as well as low-carbon fuels and other hydrogen-derived fuels as defined in the EU gas market directive (see above). RFNBO is incentivized over LCH by the possibility to use a multiplier until 2033.</td></tr>
<tr><td>ReFuelEU Aviation</td><td>• Average share of 1.2% synthetic fuels for the period 2030-2031 and average share of 2% for the period 2032-2034
• Until 2035, a SAF flexibility mechanism allows the blending obligation to be averaged across EU airports
• General target allows the use of Sustainable Aviation Fuels (SAF), appx. 2 % share is required from 2025</td><td>• Hydrogen for Aviation: Renewable or LCH made from non-fossil low carbon energy (nuclear electricity via electrolysis)
• Recycled Carbon Aviation Fuels: Kerosene produced from recycled carbon as defined in the RED, e.g., made from refinery or steel mill off-gas</td><td>• SAF: Kerosene produced with RFNBOs and LCH made from non-fossil LC energy. The GHG savings of SAF must be at least 70 % compared to a fossil comparator of 94 gCO_2eq/MJ</td></tr>
<tr><td colspan="4">Supports the production of e-fuels from renewable hydrogen and, in part, the use of LCH. LCH can only be counted as part of the SAF target if it is produced using nuclear power. LCH cannot be counted towards synthetic fuels sub-target.</td></tr>
</table>

ETS 2	• No RFNBO/LCH targets	• No special rules for RFNBOs but allow to reduce ETS cost through free allowances	• No special rules for LCH
Incentivizes the production of low-carbon and renewable hydrogen making the production eligible for free allowances based solely on emission intensity.			

2. Evidence-based arguments for importance of low-carbon hydrogen in Czechia

To date, most of Europe's efforts have focused on increasing the production of renewable hydrogen. More recently the REPowerEU plan has set an ultimate target of 10 Mt of renewable hydrogen production in 2030, with an additional 10 Mt to be imported from outside the EU aiming to accelerate the pace of decarbonization and limiting dependence on fossil fuels from Russia. However, **there are two limiting factors for renewable hydrogen produced within the EU: i) the availability of renewable electricity and ii) high CAPEX cost of electrolysers.** While the availability of a sufficient number of electrolysers at an affordable price is a problem faced by virtually all EU countries and can be overcome with sector scale-up, the availability of sufficient renewable energy is a problem faced by countries with worse climate conditions for wind and solar.

The support for LCH is particularly important for Member States like the Czech Republic, which due to geographical and climatic constraints don't have access to cheap renewable electricity and until the gas pipelines will not be repurposed and sea terminals for hydrogen and its derivatives constructed, they don't have the possibility to import (enough) renewable hydrogen at an affordable price to meet the requirements of European directives and regulations by 2030.

The Czech Republic is counting on LCH. The updated Hydrogen Strategy of the Czech Republic of 2024 explicitly mentions that low-carbon hydrogen is important for the Czech Republic and identifies it as one of the pillars of the development of the Czech hydrogen economy (p. 11) and foresees its use in both industry and transport. According to the updated Hydrogen Strategy, the consumption of renewable hydrogen and LCH should be approximately the same: 20 thousand tons of renewable hydrogen and 20 thousand tons of LCH (Chapter 5).

Domestic production of renewable hydrogen is economically not feasible yet compared to countries with higher shares of renewable energy sources and better climate conditions (more wind and sun; for wind and photovoltaic potential of the Czech territory see maps below). The result of this situation is the **high production price of renewable**

hydrogen; while in countries rich in sunshine and wind such in Spain, the production price of hydrogen is between 5-8 euro/kg, [5] in the Czech Republic it is up to 15 euro/kg. This fact is well illustrated by the outcome of the first hydrogen auction. Winning bidders came from four countries, with three projects in Spain, two in Portugal and one each in Finland and Norway.[6] The geographical spread also reflects access to cheap renewable power in the Iberian Peninsula and the Nordics.[7]

Apart from worse climate conditions leading to higher prices for RES in general, **the Czech Republic is lagging behind in the expansion of wind energy production** because most of the wind potential is located in areas protected by Natura 2000 (Map 1). This means that acceleration zones and accelerated management of the construction of new RES in accordance with the RED 3 will bring rather limited change. The lack of wind energy combined with strict RFNBO rules for temporal correlation and additionality create a condition where it is more difficult to produce RFNBO and thus meet the RED 3 targets, especially until 2030. This problem is even more pronounced when considering that **no hydrogen pipeline transport will be available until 2030**. Even after 2030, the lack of a plan for the distribution of renewable hydrogen to demand centers is evident, leading to projects that focus more on the consumption of hydrogen where it is produced locally.

According to the National Energy and Climate Plan (currently under review by the European Commission), more specifically in the WAM 3 scenario, which has been set as the default scenario for the Czech Republic's decarbonization approach[8], the Czech Republic aims to increase both renewable and nuclear power generations capacities by 2050. While the current boom in solar power generation could create hours on the market when electricity prices are pushed to new lows, especially in the summer, leading to a potential improvement in the RFNBO production price, the **low wind power generation capacity** won't be enough to create an abundance of low prices in the fall, winter and spring, leading to higher RFNBO prices over the year in the Czech Republic's bidding zone. This fact, combined with low-capacity factors for both technologies, leads

[5] Reuters, January 24 2023 (Imported hydrogen can beat EU production costs by 2030 - study | Reuters)

[6] European Commission (climate.ec.europa.eu/eu-action/eu-funding-climate-action/innovation-fund/competitive-bidding_en).

[7] The European Hydrogen Bank auction prices are well below other recent European support schemes. Recently concluded auction in the Netherlands offed an average of Eur2/kg, across a range of Eur1.28-3.50/kg. Danish auction results in 2023 were even lower, at 80 Euro cent-Eur1.33/kg. The UK, which has introduced a contracts-for-difference style subsidy, with natural gas setting a price floor, awarded GBP2 billion of funding across 11 projects totaling just 125 MW, under its first electrolytic hydrogen allocation round (Offshore Energy 2023).

[8] By 2030, the Czech Republic aims to build 10.1 GW of photovoltaic power plants (excluding home solar) and 1.5 GW of wind power capacity.

to higher prices for RFNBO production compared to more RES-rich Member States.[9] In addition to financial, climate and other constraints, PPAs are also required to produce RFNBO, but there is a lack of PPA market due to slower adoption of renewable energy compared to Western countries. In addition, additionality allows PPAs to be concluded only with RES that have not received investment or operational support, which further reduces the potential to find available RES on the Czech market.

For the reasons mentioned above, HYTEP recommends that the **Czech Republic shall support less stringent criteria for LCH production** and at the same time **shall call for easing the rules for RFNBO production to support the establishment of the nascent hydrogen market**. For the Czech Republic it is important that **the EU approach to the production of LCH will be technology neutral**, allowing for more options to decarbonise. The reason is that we expect that in the long-term nuclear power could potentially play a bigger role in efficient production of LCH in Czechia. This is again in line with the scenario proposed in the National Energy and Climate Plan, where the expansion of newly installed nuclear capacity to almost 8 GW of total nuclear capacity by 2050 would account for almost half of the Czech Republic's electricity production in 2050 (from 30 % today, while maintaining ambitious electrification targets).

3. Recommendations on creating a level playing field for low-carbon hydrogen and on Czech position on low-carbon hydrogen

With regard to future negotiations on LCH at EU level, HYTEP recommends that the Czech Republic take the following steps:

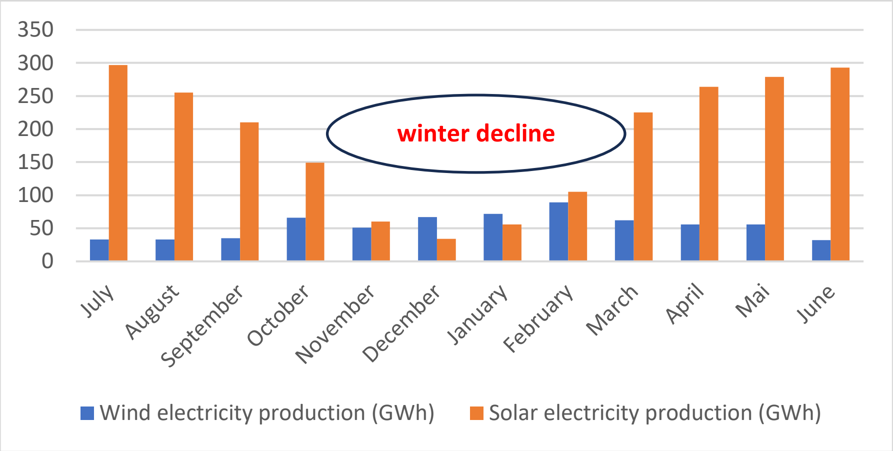
- **Push for a technology-neutral approach when setting various GHG reduction targets in the future** (provided that such technology is low-carbon). Such approach should be applied to all upcoming revision of relevant European directives and regulations, providing means to decarbonise without relying solely on renewables.
- **Support revision of RED 3, allowing LCH to count towards GHG reduction targets** in transport and industry.
- **Advocate for** the creation of a **robust methodology to support appropriate GHG accounting** for LCH production to address arguments against LCH production and use, including methane and hydrogen leakage.

[9] In 2022, the installed total solar capacity was 2,100.4 MW and produced about 2,298,347 MWh of electricity, resulting in a capacity factor of 10.9 % for 2022. In 2022, total installed wind capacity was 339.1 MW, producing about 641,330 MWh of electricity for a capacity factor of 18.9 %. For more see (https://eru.gov.cz/rocni-zprava-o-provozu-elektrizacni-soustavy-cr-pro-rok-2022).

- **Support allowing** Member States where low emission electricity is mainly produced by **nuclear power** to produce LCH instead of RFNBO. If nuclear electricity is used for electrolysis of water, similar to the current 90% threshold of RES in the bidding zone for the production of RFNBO, no temporal, geographical and additionality rules should be applied.
- **Push Commission to speedily adopt the rules for LCH methodology.** New rules should be simple and hence as easily applicable as possible to reduce red tape and administrative burden as well as accelerate the certification process of LCH.
- **Oppose the general application of the principle of additionality, temporal and geographical correlation**, especially if modeled on the RFNBO methodology (RFNBO DA). Such rules should be applied specifically for each technology. Although the Gas Package Directive mentions the requirement of consistency with the RFNBO and RCF methodology, stating that "*the methodology shall be consistent with the methodology for assessing greenhouse gas emission savings from RFNBO and from RCF*", there is no requirement to specifically include all rules from the RFNBO DA, unlike the Renewable Energy Directive 2018, which sets out the above rules in its preamble (paragraph 90).
- **Support** the application of **temporal correlation** rules for certain technology production pathways (e.g. electrolysis), but **on a monthly basis** even after 2030. Given the likelihood that hydrogen projects will face further delays, it is unwise to tighten the rules as originally envisaged in the RFNBO methodology already in 2030, as this would be even more detrimental to projects that are not developed. With such a proposal, the Czech Republic should argue not to tighten the rules of temporal correlation even for RFNBO production (especially in light of the Commission's revision of the delegated act in 2028).
- **Support the geographical correlation** rule in order to ensure consistency between the rules for electrolytic hydrogen production with **nuclear power plants**.
- **Promote the inclusion of direct PPAs** into the delegated act on LCH, via intermediaries and also with electricity aggregators (and consequently allow the same with RFNBO) for low carbon electricity.
- **Support** that based on the methodology of RFNBO production, all hydrogen produced by electrolysis that cannot be counted as RFNBO (not produced by fully renewable electricity) but meets the conditions of a GHG reduction factor of 70 % (compared to fossil fuel comparator of 94 g/MJ) during a one-month period, should have the possibility to be **certified as LCH.**
- For LCH production from natural gas and its upstream emissions, **advocate the use** of **project specific or default values of upstream emissions**, as this creates more flexibility in this highly regulated environment.

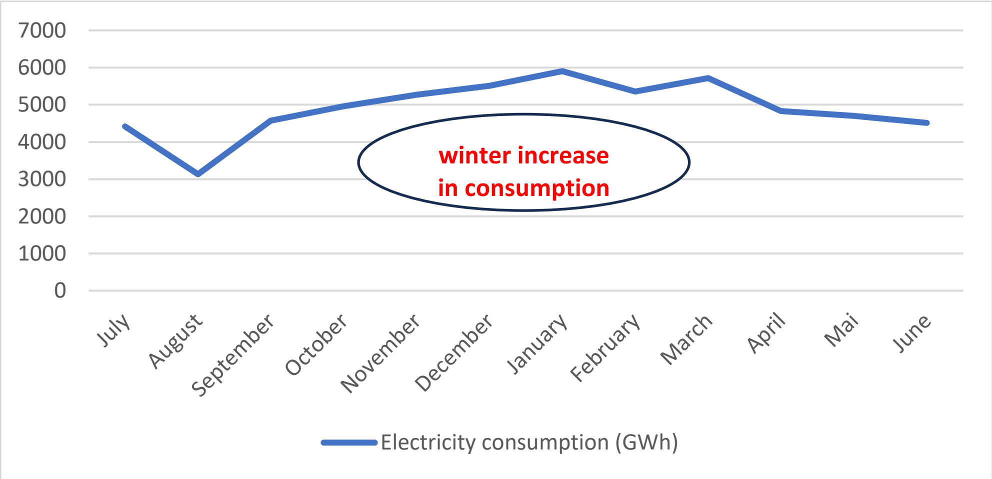
Appendix

Graph 1: Renewable electricity production, Czech Republic. An average between 2020-2022



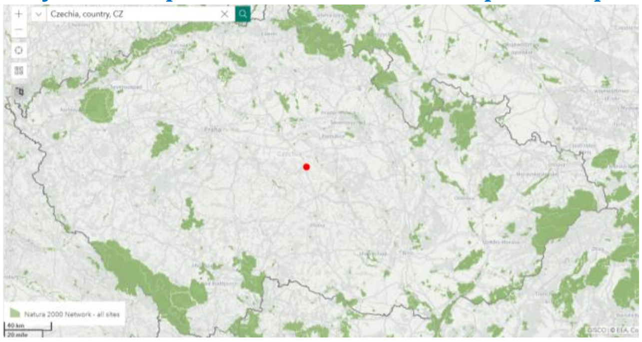
Resource: ERÚ, 2021, 2022, 2023

Graph 2: Electricity consumption (GWh), Czech Republic. An average between 2020-2022



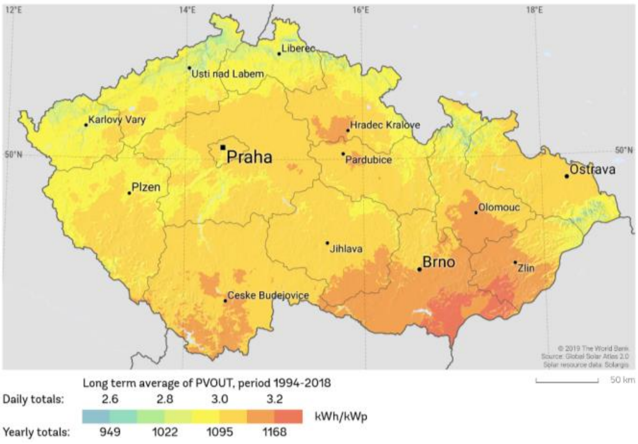
Resources: ERÚ, 2021, 2022, 2023

Map 1: NATURA 2000, System of protected areas of European importance



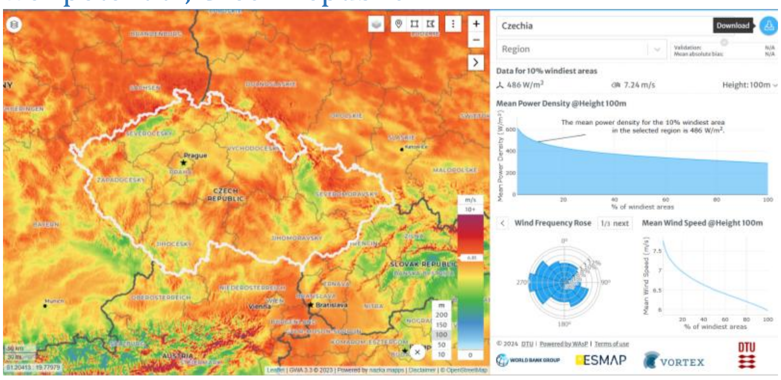
Resource: natura2000.eea.europa.eu

Map 2: Photovoltaic power potential, Czech Republic



Resource: globalsolaratlas.info/download/czech-republic

Map 3: Wind power potential, Czech Republic



Resource: globalwindatlas.info/en/area/Czechia

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References

ERÚ (Energetický regulační úřad) (2021): *Roční zpráva o provozu elektrizační soustavy za rok 2020*.
ERÚ (Energetický regulační úřad) (2022): *Roční zpráva o provozu elektrizační soustavy za rok 2021*.
ERÚ (Energetický regulační úřad) (2023): *Roční zpráva o provozu elektrizační soustavy za rok 2022*.
Offshore Energy (2023): *UK reveals winners of first hydrogen allocation round*. Available at: offshore-energy.biz/uk-reveals-winners-of-first-hydrogen-allocation-round/
Reuters (2023, January 24): *Imported hydrogen can beat EU production costs by 2030 – study.*
World Bank (n.d.): *Solar Atlas*.
World Bank (n.d.): *Wind Atlas*.