Potential for Hydrogen Export from Kazakhstan to the West

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The Role of Hydrogen As Key Part of European Green Deal

- Energy source to be used in fuel cells for hydrogen-powered transport or as a means to produce synthetic fuels.
- Energy storage medium that allows for renewable energy to be stored in a supply-based and flexible manner
- Sustainable base material for the industrial sector
- Key role for sector coupling
- Base substance for producing ammonia as raw material for the chemical industry and production of fertilizers
- Component to be combined with captured carbon emissions from the industrial sector
- Base material for a decarbonized heat sector
- **Kazakhstan plans H2 deployment in cement, steel, agriculture and transportation by 2030 (pilot) and by 2060 in full to reach the carbon neutrality**

Cooperation Options – European Union & Germany

Germany has already entered into International Hydrogen Partnerships

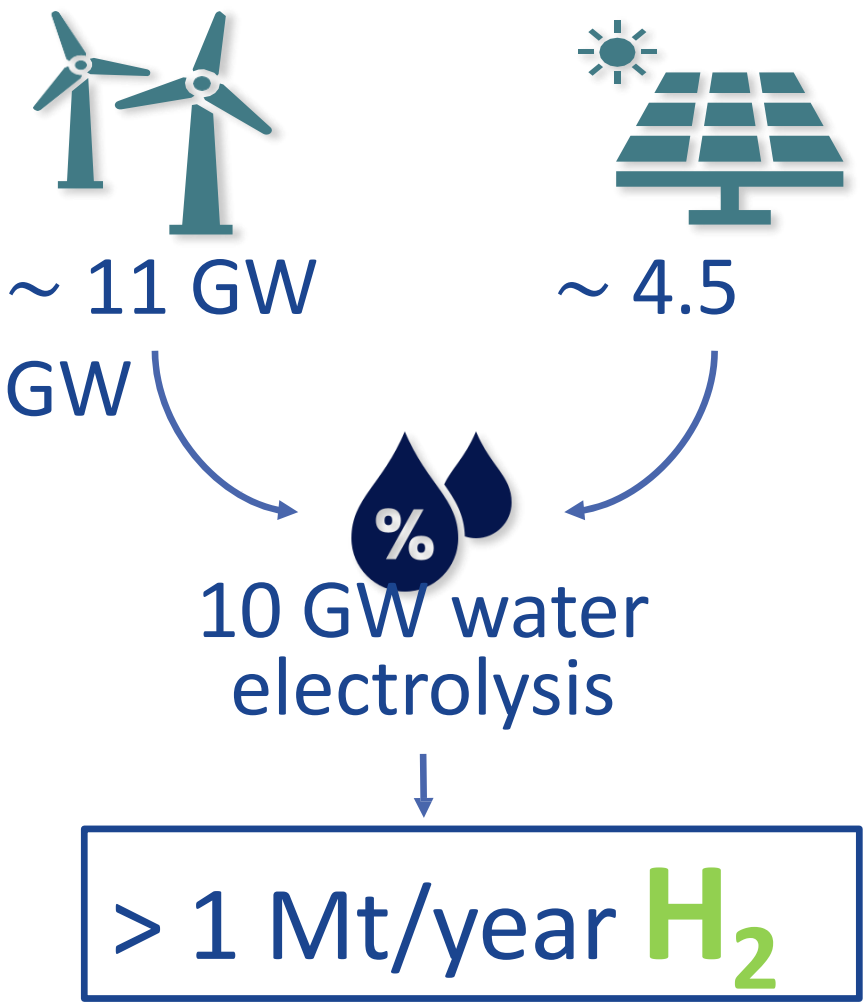
- **P**ackage of 2 billion € for international partnerships
- Agreement with Morocco on developing the industrial production of Green Hydrogen
- Cooperation of Porsche and Siemens with Chile on synthetic gasoline production based on Green hydrogen
- Pilot project for production of Green hydrogen in Egypt
- MoU on developing Green hydrogen with Saudi Arabia
- German Canadian hydrogen partnership
- Strategic Alliance with Russian on Green Hydrogen
- **Kazakhstan should follow soon, discussions are under way**

Hydrogen in Kazakhstan – Demand and Production Capacity

Водород

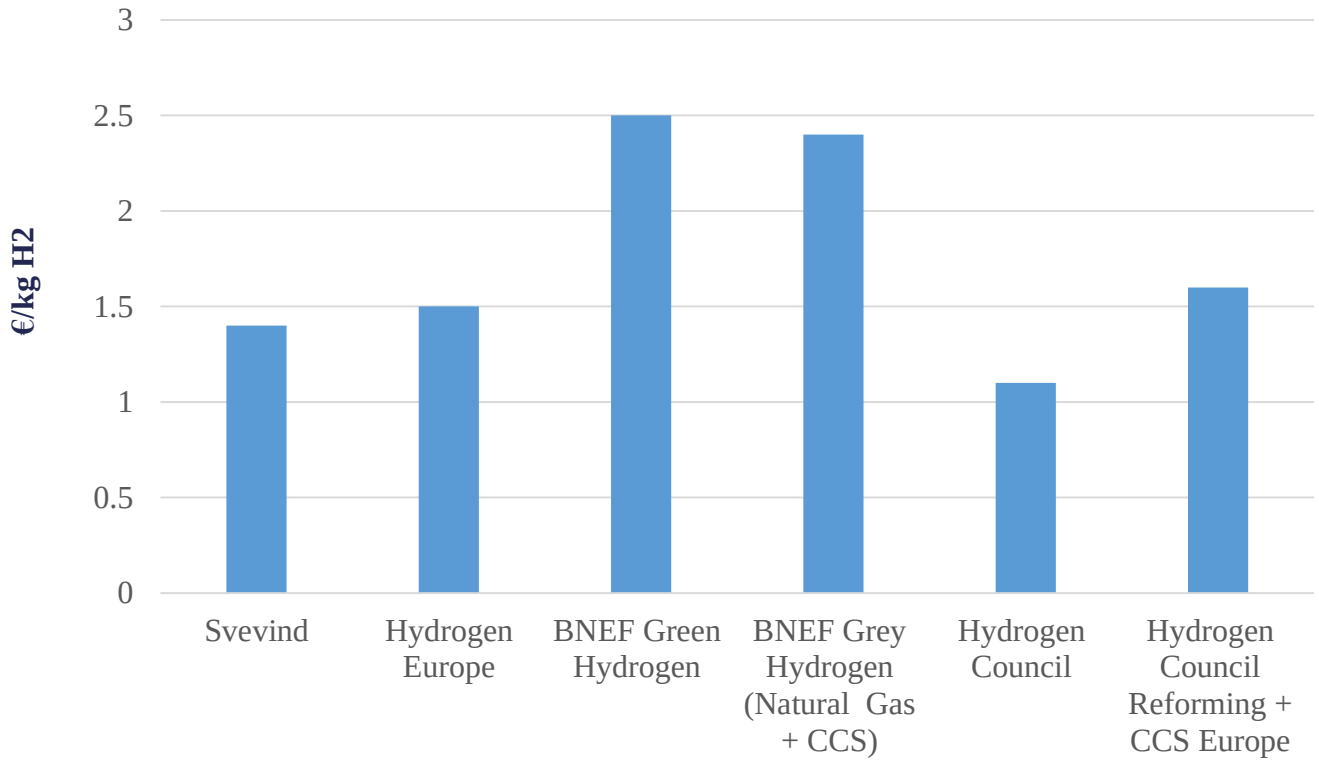
Сценарий углеродной нейтральности								
Потребление H2 (спрос на водородное топливо в следующих секторах), тыс. т н.э.								
	2025-2030	**2031-2035**	**2036-2040**	**2041-2045**	**2046-2050**	**2051-2055**	**2056-2060**	**2021-2060**
Производство электроэнергии	43,8	0,0	0,0	1534,9	3789,5	6936,6	10482,8	22787,6
Промышленность	399,5	856,2	3057,5	4169,3	4890,4	5748,9	5491,9	24613,6
Население	0,0	0,0	0,0	0,0	0,0	20,6	0,0	20,6
Коммерческий сектор	0,0	0,0	28,7	0,0	0,0	0,0	0,0	28,7
Транспорт	39,9	49,7	97,2	154,4	284,5	408,6	369,3	1403,6
Всего спрос	**443,4**	**856,2**	**3086,2**	**5704,2**	**8679,9**	**12706,1**	**15974,7**	**48854,2**
Производство H2 (возможность производства водорода из следующих видов ТЭР), тыс. т н.э.								
из угля	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
из биомассы	0,0	58,8	34,8	0,0	0,0	0,0	0,0	93,7
из ВИЭ	96,0	127,1	2428,7	5279,3	8964,4	13114,8	16344,0	46354,2
из природного газа	387,2	719,9	719,9	579,2	0,0	0,0	0,0	2406,3
Всего предложение	**483,2**	**905,8**	**3183,4**	**5858,6**	**8964,4**	**13114,8**	**16344,0**	**48854,2**
Дефицит (-)/ излишки(+)	**39,9**	**49,7**	**97,2**	**154,4**	**284,5**	**408,6**	**369,3**	**0,0**

Svevind Key Indicators of a Hydrogen Unit



Investment in a 10 GW green hydrogen project vs projected hydrogen production prices

€ 12-15 billion



Svevind Large RES Project

2

Pre-TEO completed for green hydrogen production in the Mangystau Oblast

A local subsidiary created

Meeting with RoK MoFA on May 18/19, 2021 in Nur-Sultan

On June 29 – July 03, 2021, the **management** and technical team visited the Mangystau

Selection of teams started to develop projects

Preliminary **design** started

A review of the desalination plant's technologies is underway

Kazakhstan

> 45,000 MW
(under development)

H_2 potential

> 3 Mt/year

Action plan

December 2021: Approval and signing of Framework Agreement on Basic Principles

End of 2024:
All required **permits** and licenses obtained

2026-2031: Construction

2021

JULY | AUG | SEP | OCT | NOV | DEC

2022 **2023** **2025** **2030**

Preliminary selection of **land plots** for power, desalination and electrolysis plants

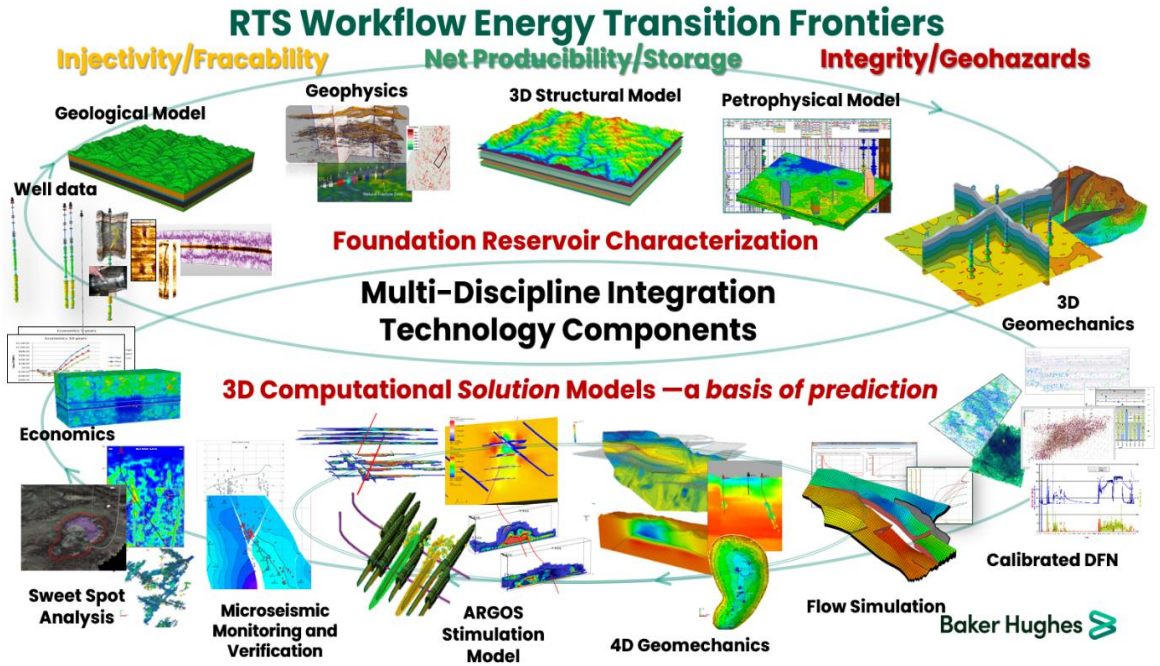
Formalization of land use agreements for all designed territories for 2 15GW wind and solar plants and 2 10GW electrolysis plants.

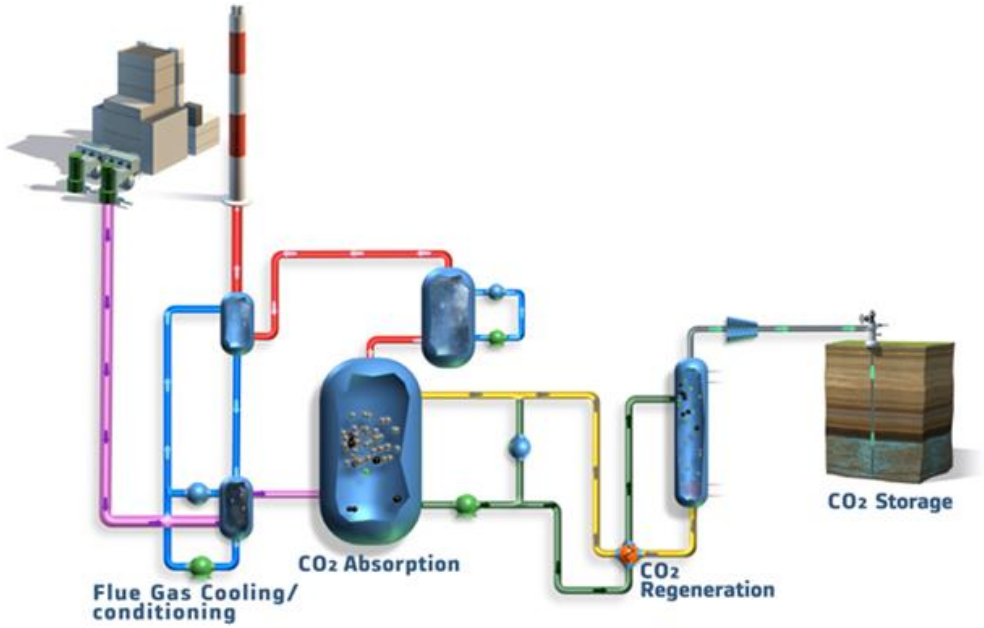
Project funding

Blue Hydrogen as Intermediate Solution before Green H2 is available

The first Pilot Project for Capturing and Permanent Storage of CO2 CCS in Kazakhstan

- Based on Cold Ammonia Process
- Deep Saline Aquifer as target storage formation
- Extensive Geo- and Dynamic Modelling starts in 2022





Soyuz Pipeline vs. Trans-Caspian Pipeline

1. The completion of the Southern Gas Corridor delivering deliver natural gas from Azerbaijan as far as Italy has led to renewed interest in a Trans-Caspian Pipeline (TCP).
2. This pipeline, designed to be hydrogen-ready, would contribute to satisfy the EU's energy requirements at low cost and in line with the principles of the European Green Deal.
3. As a key cross border infrastructure project TCP is already a Project of Common Interest and eligible for funding from the Connecting Europe Facility.

Legal Framework Required

So far there are no regulations in place for pipeline transportation of hydrogen in Kazakhstan

Working with the Ministry of Ecology, Geology and Natural Resources

- **The Environmental Code of the Republic of Kazakhstan defines the main provisions of state regulation in the field of emissions and removals of greenhouse gases, however, the Code does not define the principles for the regulation and licensing system in relation to projects to significantly reduce CO2 emissions into the atmosphere.**

Discussions with the Ministry regarding regulation:

- **Existing legislative standards for the pilot application of carbon dioxide capture and storage technology;**
- **Creation of legislative standards for hydrogen pipeline transportation**

Closing

Kazakhstan has great interest to become hydrogen exporter due to:

- **Superior Wind and Solar conditions**
- **Excess gas available for blue H2 generation**
- **Our objectives include EU ETS credits for blue and green hydrogen**

Thank you for your attention!