CUTTING-EDGE HYDROGEN SOLUTIONS WITHIN THE FRAMEWORK OF PJSFC “SISTEMA

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D.Sc. (Chemistry), Professor at Bauman Moscow State Technical University; Head of the Department of Electrochemical Power Engineering, Platov South-Russian State Polytechnic University (NPI)

20 Candidate of Sciences dissertations defended under his supervision

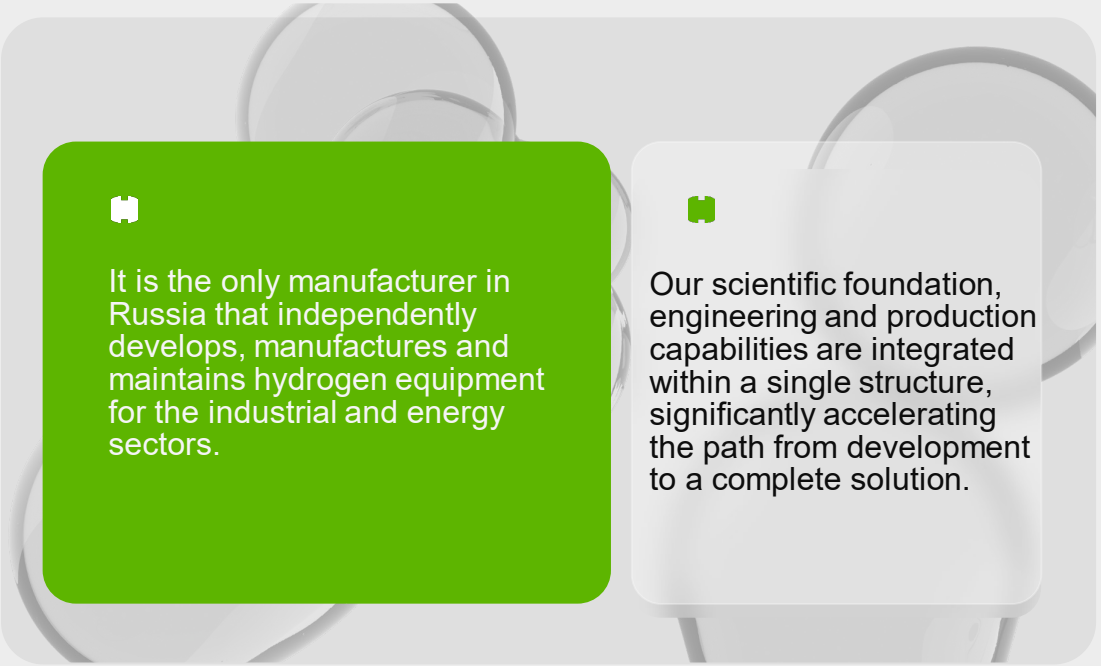
250+ scientific publications, monographs and textbooks

15+ patents

From 1985 to 2022, he conducted research at the Russian Academy of Sciences (RAS). Expert roles: Hydrogen Energy Expert Council of the Russian Ministry of Energy; Scientific and Technical Councils of Rosatom and AFK Sistema. Member of international electrochemical and solid-state ionics societies; editorial boards of Electrochemistry, Electrochemical Energy, and Alternative Energy and Ecology.

The «Hydrogen Technologies Center» and the «Hydrogen Energy Centre» are industrial developers and manufacturers of hydrogen equipment.

HTC is a company within the Sistema Corporation — one of Russia's largest investment holdings.



It is the only manufacturer in Russia that independently develops, manufactures and maintains hydrogen equipment for the industrial and energy sectors.

Our scientific foundation, engineering and production capabilities are integrated within a single structure, significantly accelerating the path from development to a complete solution.

2022

Company was founded with the support of Sistema Corporation

5 877 м²

Total production floor space

120

R&D specialists in the team

2025

Launch production of hydrogen equipment with the support of the Russian Ministry of Energy

24

Doctors of Science and PhDs in the team

Our team

Our scientific staff

9
Doctors of Science

17
Ph.D. holders

27
Masters and specialists

16
Master's students

19
Researchers

16
PhD student

21
Articles

>70
Patents

Scientific partnerships

>20
Universities and institutes of the Russian Academy of Science

Business partnerships*

>24

Leading fuel, energy and transport companies

Production and office facilities

5600м^2

* Excluding partnerships within Sistema Corporation

Our own production facility at the «Rudnevo» Industrial Park

«Rudnevo» Industrial Park is a part of the Technopolis Moscow

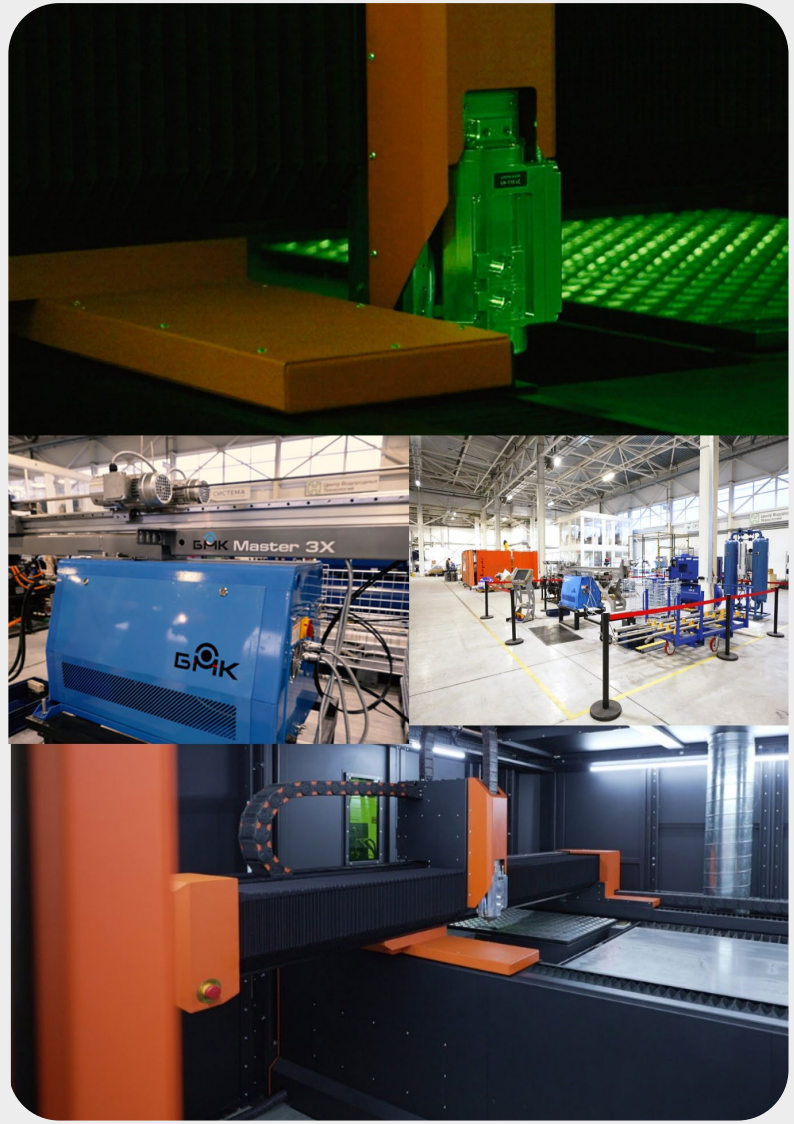
Grants tax benefits and reduces production costs.

Compliance with localization requirements

Manufacturing in Russia simplifies participation in tenders

Convenient Logistics & Equipment Acceptance

Customers can visit the facility, inspect the equipment and accept it prior to shipment.



5 877 M^2

total floor space

Enables the manufacturing of large-scale technological complexes.

Parameters of HTC Electrolyzer meet industrial operation requirements

Key technical specifications:

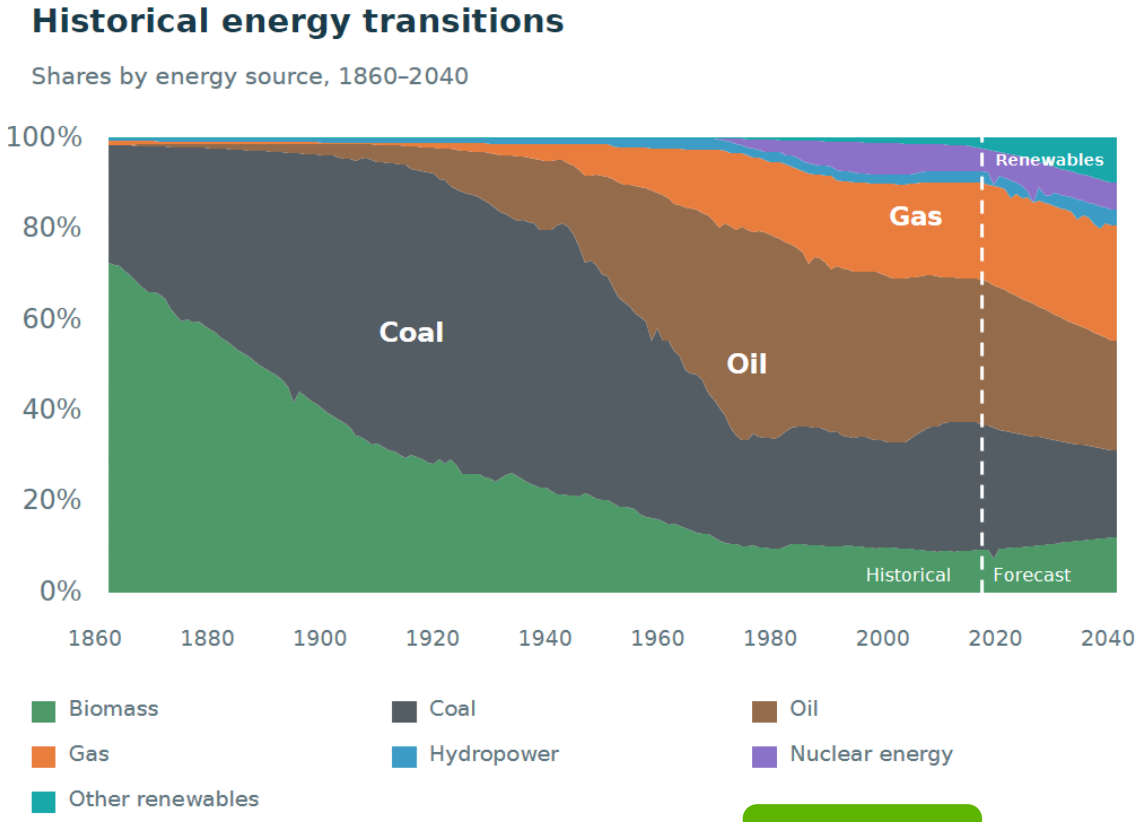
ALK
Alkaline membrane

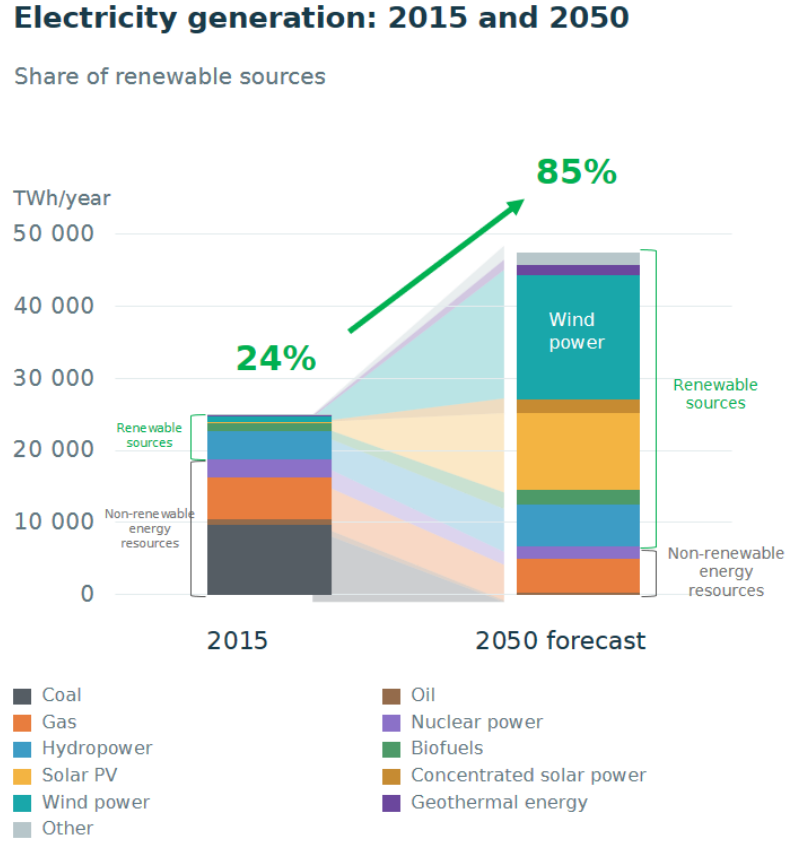
Output	from 4 Nm³/h
Hydrogen purity	up to 99,9999%
Working pressure	up to 1,6 MPa
Regulation range	from 30%
Configuration	containerized, skid-mounted, stationary



Energy transitions and electricity generation

Renewable energy sources (RES) are gradually replacing conventional fuels and are projected to dominate by 2050.





Drivers of the “New Energy” Transition

- Government policies: decarbonization, energy security and affordability
- Technological progress: digitalization and new technologies
- Market factors: deindustrialization and net-zero strategies

Challenge

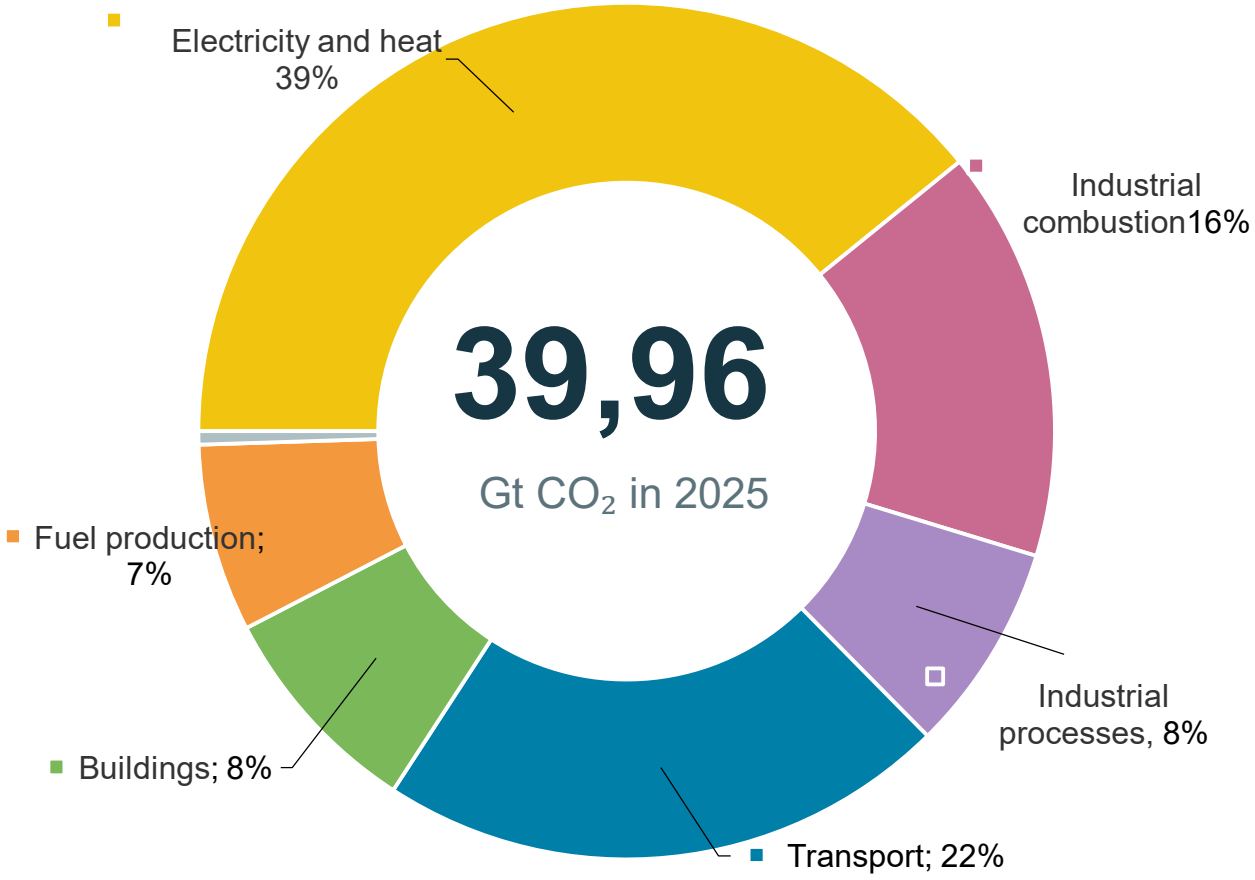
Variable (stochastic) renewable generation requires fundamentally new solutions for balancing power systems.

Solution

Variable (stochastic) renewable generation requires fundamentally new solutions for balancing power systems.

Global CO_2 Emissions by Sector

Updated for 2026. Latest annual estimates: 2025



Sector	Share	Gt CO_2
Electricity and heat	**39.2%**	15.65
Industrial combustion	**15.5%**	6.21
Industrial processes	**7.9%**	3.16
Transport	**21.6%**	8.62
Buildings	**8.2%**	3.28
Fuel production	**7.1%**	2.84
Other sources	**0.5%**	0.20

Global CO_2 emissions increased by approximately 10%: from 36.34 Gt in 2015 to 39.96 Gt in 2025.

Source: European Commission, JRC / IEA-EDGAR, EDGAR_2026_GHG.

How hydrogen is produced and its environmental footprint

WHITE	Natural hydrogen that accumulates underground. It only needs to be extracted.		H_2 natural hydrogen
GREEN	Produced by water electrolysis using solar, wind or hydropower. No carbon dioxide emissions.	$H_2O \rightarrow H_2$ water electrolysis using renewables	CO_2 no emissions
GREY	Produced from natural gas by steam reforming. Low cost, but the process emits large amounts of CO_2.	steam reforming of natural gas	CO_2 high emissions
BLUE	The same process as grey hydrogen, but CO_2 is captured and stored underground. Emissions are reduced by approximately half.	steam reforming with CO_2 capture	CO_2 ≈ 50% lower
TURQUOISE → CH_4	Produced by methane pyrolysis without air. The process forms hydrogen and solid carbon (soot), which does not enter the atmosphere.	methane pyrolysis	C carbon is used

YELLOW (ORANGE)	Water electrolysis using electricity from nuclear power plants. No CO_2, but radioactive waste remains.	water electrolysis using nuclear power	radioactive waste
BROWN (LIGNITE)	Produced from lignite by gasification at high temperature. Produces a lot of hydrogen and very large amounts of CO_2.	lignite gasification	CO_2 very high emissions

H_2 hydrogen | CO_2 carbon dioxide | production technology | energy source (feedstock) | features and consequences

HTC

Main Types of Electrolyzers

Type	Electrolyte / Charge Carrier	Temperature	Key Features
AEL Alkaline	KOH or NaOH solution OH^-	60–90 °C	Mature technology Liquid electrolyte
PEM Proton Exchange	Polymer membrane H^+	70–90 °C	Compact stacks Platinum-group metals
AEM Anion Exchange	Polymer membrane OH^-	50–80 °C	Emerging technology Membrane lifetime is critical
SOEC Solid Oxide	Ceramic electrolyte O^{2-}	650–850 °C	Uses steam and heat Requires thermal integration

Hydrogen Storage and Transportation Methods

Compressed Hydrogen

+ Mature technology
+ No energy required for gas discharge
− Low volumetric hydrogen density
− High-pressure storage
− Compression consumes up to 15% of energy



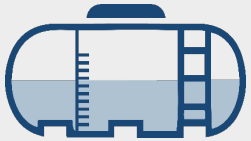


Liquefaction

+ High gravimetric hydrogen storage density
− Energy losses of up to 30–50%
− Low volumetric gas density
− Energy for ortho–para conversion
− Cryogenic temperatures (253 K)
− Boil-off losses
− Energy required for gas discharge

Liquid Organic Compounds

+ High volumetric hydrogen storage density
− Complex multistage carrier regeneration
− Potential toxicity of carriers



Hydrocarbons, ammonia

Absorption Methods (Metal Hydrides, IMCs)

+ High volumetric hydrogen density
+ High safety
− Low gravimetric hydrogen density



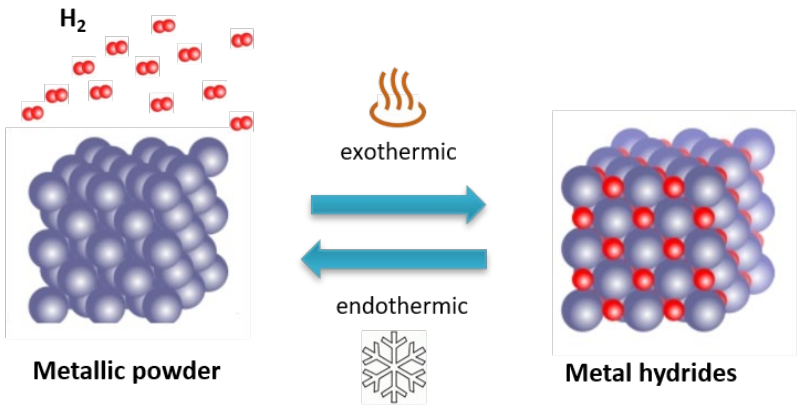


Cryogenic Tanker
(2,750 kg of hydrogen)



Cylinder Trailer
(700 kg of hydrogen)

Metal Hydride Storage



Structure of metal hydrides

Advantages of metal hydride storage systems based on $LaNi_5$ and TiFe:

- Easy activation
- Resistance to poisoning
- Single hydride phase
- Moderate operating temperatures (0–100 °C) and pressures (0.1–10 MPa)
- High hydrogen absorption/desorption rate
- Possibility of composition tuning using substituting additives

$LaNi_5$



TiFe



High-pressure thermosorption hydrogen storage systems

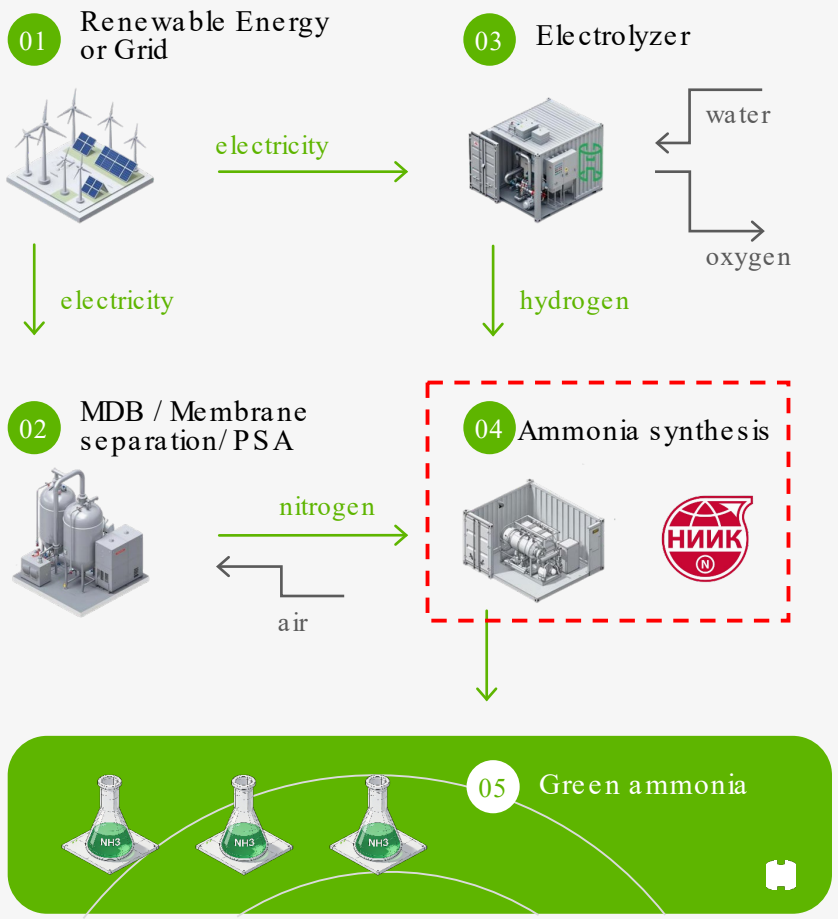




Low-pressure storage systems



Integrated technological plant chain



01 Power sources

The power source can include wind-solar power plants, hydroelectric power plants, and nuclear power plants for electrolyzers and auxiliary equipment.

02 Hydrogen production

Electrolysis units split water into hydrogen and oxygen under the action of an electric current. Hydrogen with a purity of 99.99% is immediately fed into the ammonia synthesis system without intermediate storage to minimize losses.

03 Nitrogen production

Separation of atmospheric air into components, with the release of pure nitrogen (99.999%).

04 Ammonia synthesis

In a high-pressure reactor at a temperature of 400-500°C, hydrogen and nitrogen combine under the action of a catalyst to form ammonia (NH_3) with a purity of up to 98%. Unreacted gases are returned to the cycle, which minimizes raw material losses.

05 Storage, dispatch and logistics

The finished product is stored in tanks and can be shipped by rail tanks for deliveries to the domestic market and by sea transport for export. Green ammonia can also be used to produce green urea.

04 Supply of «turnkey» technology

Scaling of «turnkey» technology in the BRICS and MENA countries, enabling the transition to a carbon-neutral ammonia production cycle.

Hydrogen Generation and Storage in Liquid Organic Hydrogen Carriers (LOHC)

Hydrogen Generation and Storage in Liquid Organic Hydrogen Carriers (LOHC)

Production site



source H_2
Organic carrier



OUR REACTOR
HYDROGENATION

Hydrogen addition tothe organic carrier

LOHC TRANSPORT





Can be integrated into existing logisticsfor transporting liquid hydrocarbons

Consumption site





OUR REACTOR
DEHYDROGENATION

Hydrogen release fromthe organic carrier

H_2

CONSUMER

Key Economic Advantages

DEPLOYMENT FLEXIBILITY
Enables deployment in remote locations

LOWER COSTS
By leveraging existing infrastructure and logistics

EFFICIENT LOGISTICS
Safe transportation without cylinders, high pressures, or cryogenic conditions

SCALABILITY
Easy adaptation to the needs of any market

Up to 40%
Lower energy costs forhydrogen storage

90 kg/day
Hydrogen productioncapacity

- 50oC
Operation in Arcticconditions

24/7
Autonomous hydrogengeneration

«Development of electrocatalysts for fuel cells and electrolyzers»



- Method of obtaining nano-structured platinum-carbon catalysts (Russian Federation invention patent No. 2660900, priority date 15.06.2017).
- Catalytic electrode and method of its manufacture (Know-how, Order 11pco dated 25.12.2020).

Project objectives

Development of efficient bimetallic catalysts for solid-polymer fuel cells.

Feasibility

Reduction of the cost of electrocatalysts by reducing the platinum content.

Expected results

- Catalytic electrode for alcohol fuel cells*) (Russian invention patent No. 2507640, priority date 02.07.2012).
- Method of manufacturing metal-oxide catalytic electrode for low-temperature fuel cells (Russian Federation Patent No. 2522979, priority date 14.11.2012).

Project status:

- PtCo/C catalysts for solid-polymer fuel cells were obtained.
- The obtained catalysts were 5-10% more efficient than standard Pt/C catalysts, but according to initial data they degrade much faster.
- The obtained catalysts were tested in a single fuel cell (‘Copter’) and showed an increase in specific currents (compared to standard ones) under optimal conditions.
- Work is underway to develop a pilot batch of new catalysts and manufacture stable dispersions of catalytic systems on their basis.
- 1 patent application, 1 article.

«Production and study of properties of proton exchange membranes for fuel cells and electrolyzers»

Project objectives:

Development of a new generation of proton exchange membranes to replace imported Nafion - like membranes:

A. New generation of Nafion - and Aquion-like membranes based on Russian materials from monomers to membranes.

B. Low-cost proton exchange membranes based on domestic raw materials.

C. Proton exchange membranes based on track membranes with in-situ grafting of active centers (JINR, INEOS RAS, FIC PCF and MH RAS) C. Proton exchange membranes based on track membranes with in-situ grafting of active.

D. Medium-temperature proton exchange membranes based on ‘polymer-salt’ components for operation in the temperature range 150-300 C and electrochemical devices based on them.

Developed:

- Technique of heavy ion irradiation of fluoropolymer films and conditions of their modification by graft polymerization of perfluoroalkanesulfonyl fluoride monomers.
- Proton exchange membranes based on per fluorinated compounds, polybenzimidazoles and sulfated polyarenes.

Project Status:

9 new organic precursors based on per fluorinated aliphatic and aromatic hydrocarbons have been synthesized. Their polymerization may yield novel patent-pure polymers of Nafion- and Aquion-like types. Preliminary experiments have confirmed the feasibility of obtaining such polymers. A patent application is being prepared based on these results.

Track membranes based on stable monomers (PVDF, LDPE, HDPE) with thickness of about 10 μm in a wide range of morphologies and track diameters (150-50 nm) were obtained.

The results are obtained by varying the mass, charge and energy of the bombarding ions.

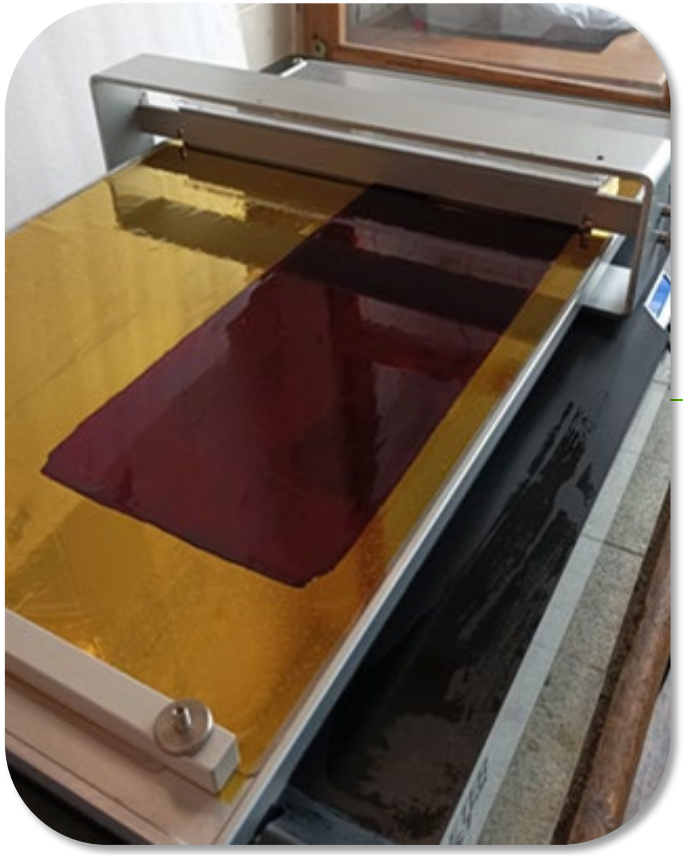
It was shown by EPR analysis that free radicals both obtained as a result of wall radiolysis and secondary peroxide radicals involving air are able to exist at temperatures of at least +60 °C with a very low recombination rate, which may lead to a new cheap way to produce Nafion-like membranes.

Work has begun on the preparation of new proton exchange membranes based on sulfated and phosphorylated polyarylenes. Several samples of membranes of this type with acceptable conductivity were obtained for the first time, but preliminary studies of their stability in Fenton's reagent predict a sharp reduction in the lifetime of such membranes compared to standard membranes.

Project «Membranes». New type of medium temperature proton exchange membranes

Project Prerequisites:

- Costliness of traditional backup power supply systems based on hydrogen fuel cells and electrolyzers;
- High requirements to the purity of fuel (hydrogen) for fuel cells;
- Request of the RES market for increasing the ‘greenness’ of applied technologies.

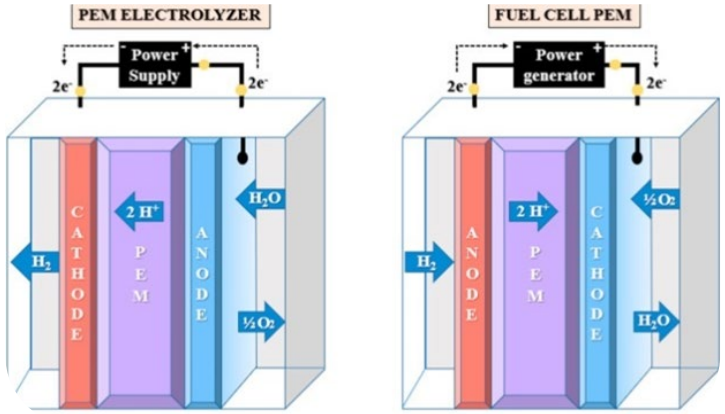


Problems encountered:

Lack of competences for the development of medium-temperature membranes in the Russian Federation;

There is no equipment on the market for testing the operating modes of medium-temperature proton exchange membranes.

R&D «Medium-temperature proton exchange membranes for electrolyzers and fuel cells»



For the first time in the world!

The implementation of this project will enable the mass production of reversible hydrogen sources and fuel cells for high-efficiency, compact energy storage systems that integrate the hydrogen fuel cycle in a single device. as well as power units for transport using cheaper unpurified hydrogen.

Project objectives

Development of medium-temperature proton conducting membranes for electrochemical devices based on CsH_2PO_4 solid electrolytes.

Site

Elektrozavod (Moscow), HEC Laboratory Complex (Chernogolovka), A.N. Nesmeyanov Institute of Organoelement Compounds of the Russian Academy of Sciences (Moscow), Institute of Solid State Chemistry and Mechanochemistry, Siberian Branch of the Russian Academy of Sciences (Novosibirsk)

Expected outcomes

- Membranes based on CsH_2PO_4 - polymer systems (150-300 °C)
- Reversible fuel cell / electrolyzer with increased efficiency
- Medium temperature electrolyzer for production of fuel and mixture of CO_2 and H_2O.

Project status:

Proton-exchange membranes have been successfully synthesized for the first time in systems based on poly[2,2']-m-(phenylene)-5,5'-bisbenzimidazole–pentahydromonocesium diphosphate and its analogs.

It has been demonstrated that compounds of this class efficiently operate within a temperature range of 20–240 °C, even in the absence of external humidification. Preliminary experiments have confirmed the feasibility of using such membranes in fuel cell assemblies.

A patent application has been prepared for the synthesis methodology of these membranes.

(HEC , Institute of Solid State Chemistry and Mechanochemistry SB of the Russian Academy of Sciences, A.N. Nesmeyanov Institute of Organoelement Compounds of the Russian Academy of Sciences).

«Development of protective coatings of bipolar plates with improved characteristics for fuel cells and electrolyzers»





Intellectual property used

Method for producing gas-tight thin coatings of functional materials from submicron and nanosized powders via aerosol deposition (Know-how, Order No. 21pco dated December 25, 2019).

Project objectives

Development of mechanically and corrosion-resistant carbon coatings for bipolar plates of electrolyzers and fuel cells, as well as equipment for its application

Feasibility

- High corrosion resistance and low contact resistance, significantly exceeding the best world benchmarks (2-10 times better)
- Cost reduction and proprietary technologies

Expected outcomes

Development of gas-tight, corrosion-resistant carbon coatings with high conductivity for bipolar plates of electrolyzers and fuel cells.

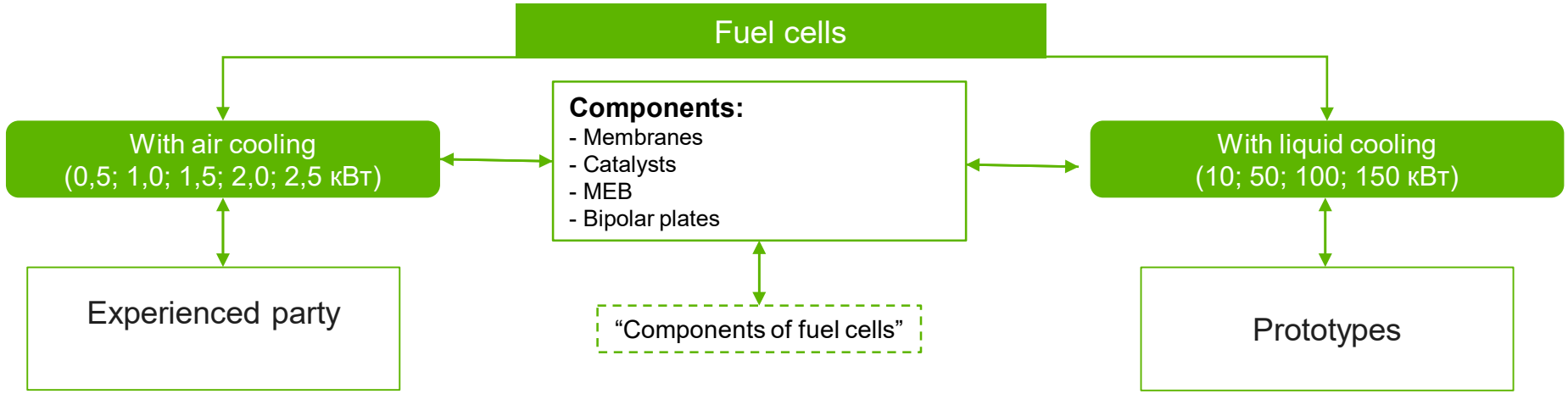
Project status

The influence of nitrogen additives in the fullerene-like soot jet on conductivity and mechanical strength (on steel and titanium substrates) was investigated. The corrosion resistance of such coatings was examined in both acidic and alkaline environments.

It was demonstrated that in the absence of nitrogen in the deposition atmosphere, the film predominantly contains sp^3-hybridized carbon, whereas with nitrogen introduction, a sufficient amount of sp^2-hybridized bonds forms, enhancing conductivity.

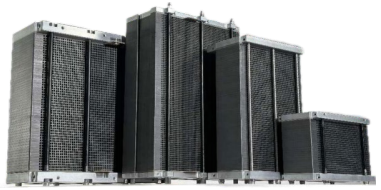
A plant for applying such coatings to steel and titanium plates has been designed and built.
1 paper has been published. 1 patent application and 2 articles are being prepared.

Fuel cells



Air-cooled fuel cells (open cathode)





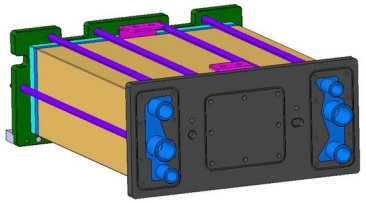
Ключевые преимущества:

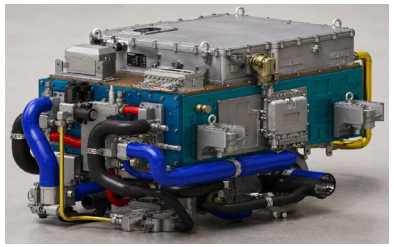
- Мощность до 5 кВт одним блоком;
- Не требуют сложной системы жизнеобеспечения;
- Срок службы >5000 часов;

Продукты:

- Продукт 1 – Энергоустановки для робототехники;
- Продукт 2 – БПЛА на ТЭ;
- Продукт 3 – БПЛА на ТЭ большой грузоподъемности;
- Продукт 4 – Автономное энергоснабжение;
- Продукт 5 – Мобильные зарядные станции.

Liquid-cooled fuel cells





Ключевые преимущества:

- Мощность до 170 кВт одним блоком;
- Срок службы >15 000 часов;
- Температурный диапазон -35 – 45 ºС;
- Использование водорода >98%

Продукты:

- Продукт 6 – Электрохимические генераторы;
- Продукт 7 – Стационарные водородные системы генерации;
- Продукт 8 – Мобильные системы генерации электроэнергии;
- Продукт 9 – Зарядные станции для электротранспорта;
- Продукт 5 – Автономное энергоснабжение (вариант исполнения).

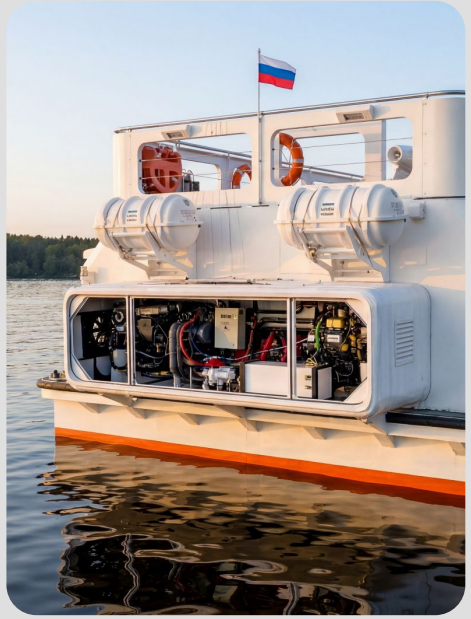
Application of “HTC” technologies in transport

- Zero emissions
- Low noise level
- Fast refueling



Hydrogen truck KAMAZ

- Load capacity over 20 tons
- Range up to 400 km
- Operational time of 20 hours without refueling
- Power unit output up to 120 KW
- Operation at temperatures from −30 up to +50 °C



Hydrogen-powered marine transport

- Passenger capacity from 40 up to 100 people
- Range up to 500 km
- Refueling time no more than 10 minutes
- Power unit output up to 100 KW
- Cruising speed up to до 13 km/h

Commercial products PTC “KAMAZ”

Fuel cell-powered automobile KAMAZ 53193 (Commercial truck)



Project characteristics:

Setting	Target characteristics
Wheel configuration	4x2
Gross weight, tonnes	20,5
Range, km	> 500 (1100)
Power of electric bridge, kW	2x80
Number of tanks, pcs	60-10
Hydrogen reserve, kg	Up to 54
Hydrogen pressure, bar	350
Capacity of fuel cell-based power plant, kW	120
Energy capacity of traction batteries, kWh	150-300

Fuel cell-powered automobile KAMAZ 54907 (Long-haul truck)



Project characteristics:

Параметр	Целевые хар-ки
Wheel configuration	6x4
Gross weight, tonnes	44
Range, km	> 800 (1100)
Power of electric bridge, kW	336
Number of tanks, pcs	11-16
Hydrogen reserve, kg	Up to 80
Hydrogen pressure, bar	700
Capacity of fuel cell-based power plant, kW	240
Energy capacity of traction batteries, kWh	140





CHT commercial products of marine transport





Hydrogen-powered catamaran (Stage 1 + Stage 2)

Setting	Stage-1	Stage-2
Status	Initial tests have been passed (09. 2023)	Finalisation of design documentation
Dimensions	length 22 м, width 8.2 м	
Water displacement	<42 tonnes	
Crew / passengers	2 / 100	2 / 70
Cruising speed	7 knots (13 km/h)	
Number of tanks	2 (60l+50l)	2(160+160l)
Hydrogen pressure, bar	350 bar	
Range	300 km	>300 km
Capacity of fuel cell-based power plant, kW	25 kW	60 kW
Filling time	<10 min	



Hydrogen-powered boat

Setting «MOJKA»	Target characteristics
Status	Finalisation of design documentation
Dimensions	Length 16,5 м, width 4 м
Water displacement	<35 tonnes
Crew / passengers	2 / 40
Cruising speed	7,3 knots (13,5 km/h)
Number of tanks	4 (180l)
Hydrogen pressure, bar	350 bar
Range	300 km
Capacity of fuel cell-based power plant, kW	>60 kW
Filling time	<10 min

Clean energy.
12 hours of autonomy.
Up to 147 passengers.

An environmentally friendly vessel powered by hydrogen fuel cells and solar panels.

Cruising speed
12 km/h

PIER 1
Departure
May 22, 09:00

→

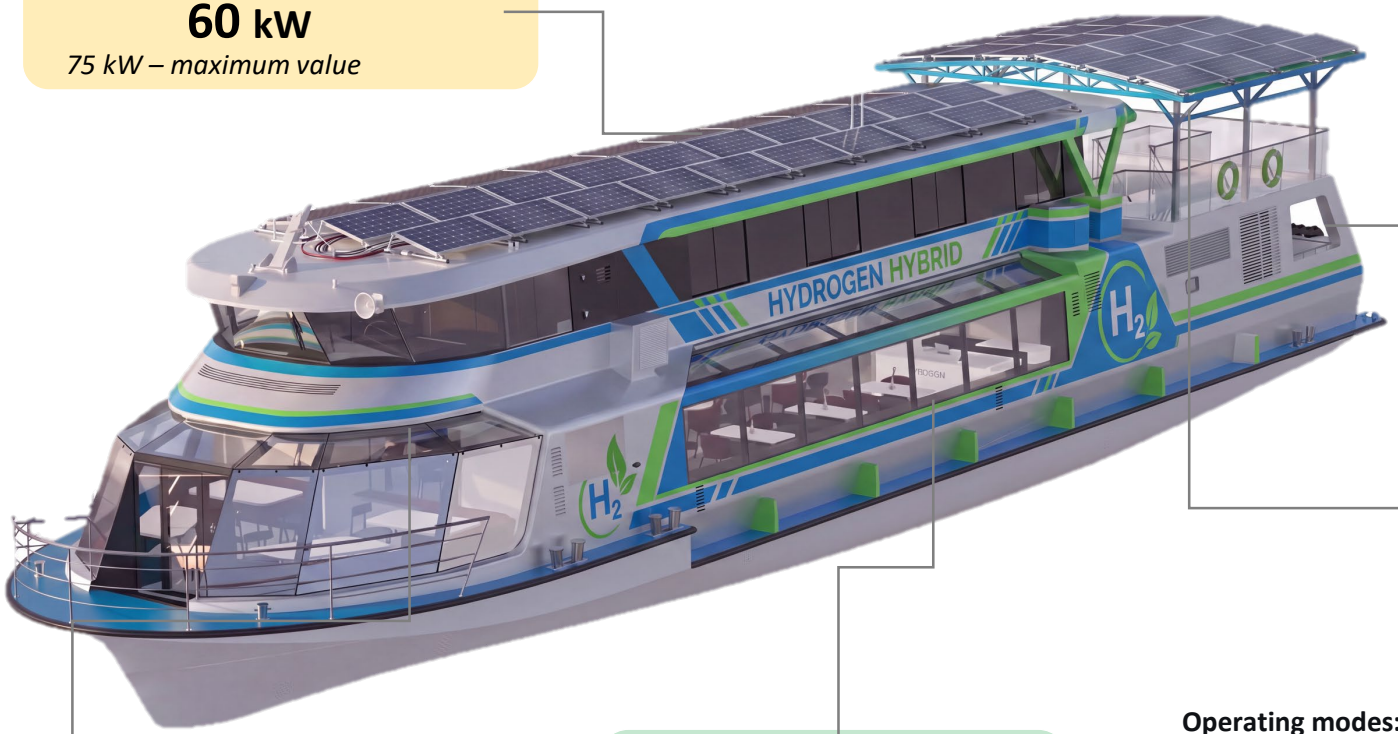
PIER 2
Arrival
May 22, 21:00

Total travel time: 12 hours



Power System Configuration and Key Specifications

Solar PV System
60 kW
75 kW – maximum value



Operating autonomy: **12 hours**
Total energy capacity: **1 200 kWh**
Cruising speed: **12 km/h**
Passenger capacity: **up to 147 people**

Main Propulsion Motors
2 · 200 kW

Hydrogen Storage System
2,4 M^3

Fuel Cell System
80 kW

Battery Energy Storage System
540 kWh

Operating modes:

1. Normal operation: The solar PV system (via the battery) and the fuel cell system jointly supply power to the propulsion motors.

2. Cloudy weather mode: The fuel cell system and battery supply power to the propulsion motors, while the solar PV system is inactive.

3. Peak load mode: The fuel cell system and battery jointly provide the maximum required power of up to 400 kW.

Hydrogen Refueling Infrastructure

Key innovation: enabling port decarbonization without the need for lengthy and costly modernization of shore-based infrastructure. The proposed platform can be deployed significantly faster and at a lower cost. Green hydrogen refueling time: 10 minutes

The key innovation of the project is the ability to decarbonize ports without costly modernization of shore-based infrastructure. We propose using floating hydrogen refueling platforms, which can be deployed significantly faster and at a lower cost than stationary refueling facilities.

The UK implementation demonstrates the feasibility of this approach. For Indonesia, with its thousands of islands, floating hydrogen refueling platforms represent an optimal solution, enabling vessels to be refueled throughout the archipelago without the need to build costly shore-based infrastructure.



Example of an autonomous hydrogen hub implemented in the United Kingdom for refueling hydrogen-powered vessels.

Fuel cells unmanned aerial vehicles (UAV’s) — for missions requiring long-term flight durations



Application areas

- Monitoring of extended infrastructure (pipelines, power lines)
- Logistics and cargo delivery
- Special missions that require extended flight duration

Advantages over battery-powered drones

- Flight time is up to 195 minutes (versus 30-40 minutes for battery solutions)
- Refueling time - 3 minutes
- Stable operation over a wide temperature range
- Low noise level

Technical specifications



up to **2,5** KW
fuel cell power

up to **120** km
flight time on a single fill

Integration into various UAV types (multirotor, airplane)

HTC

Energy storage systems — eco-friendly alternative to diesel generators and rechargeable batteries.

Are used at facilities with renewable energy sources, where it is necessary to:

- Store excessive electricity
- Provide autonomous and backup power supply
- Store energy for long periods of time

Technical specifications

Power
from 100 KW
up to 500 KW

Scalability
up to 10 MW

Operation at temperatures
from −40
up to +50

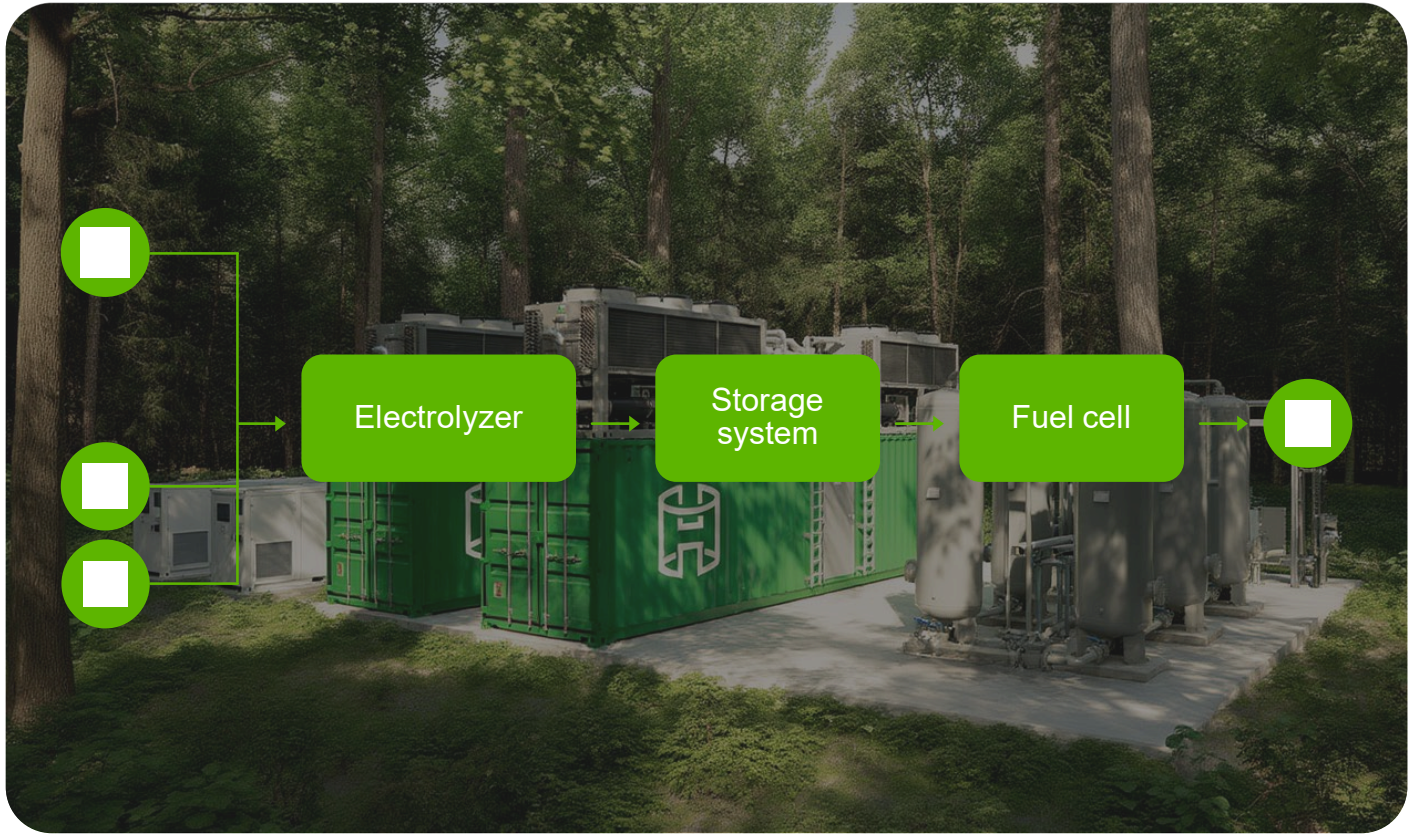
Advantages over traditional solutions



- Zero emissions during operation
- Storage without degradation
- High reliability regardless of climatic conditions
- Minimal operational costs
- Modular architecture for various tasks

HTC

Energy storage systems — closed hydrogen cycle



Hydrogen production

- Electricity from the grid or from renewable sources enters the electrolyzer
- Water is split into hydrogen and oxygen by an electric current

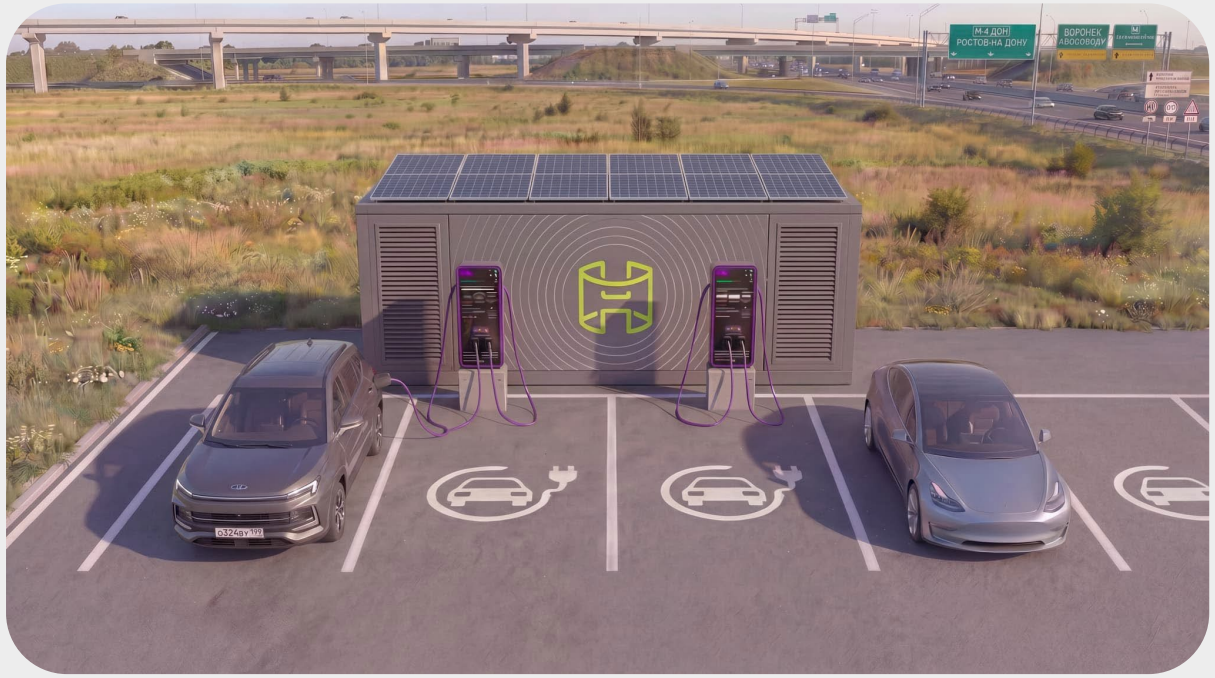
Hydrogen storage

- Hydrogen is pumped into metal hydride storage systems, receivers, or high-pressure cylinders

Electricity generation

- Hydrogen is supplied to the fuel cell
- A chemical reaction converts hydrogen into electricity
- By-product — drinking water

Autonomous Charging Stations for Electric Vehicles



Concept rendering of the station at a park-and-ride facility
(Design may be adapted to customer requirements)

An autonomous EV charging station that generates electricity from hydrogen directly at the parking site — without cables, substations or a grid connection.

Dimensions: 6 m × 2.4 m × 2.6 m
Factory-built, branded design, mobile configuration

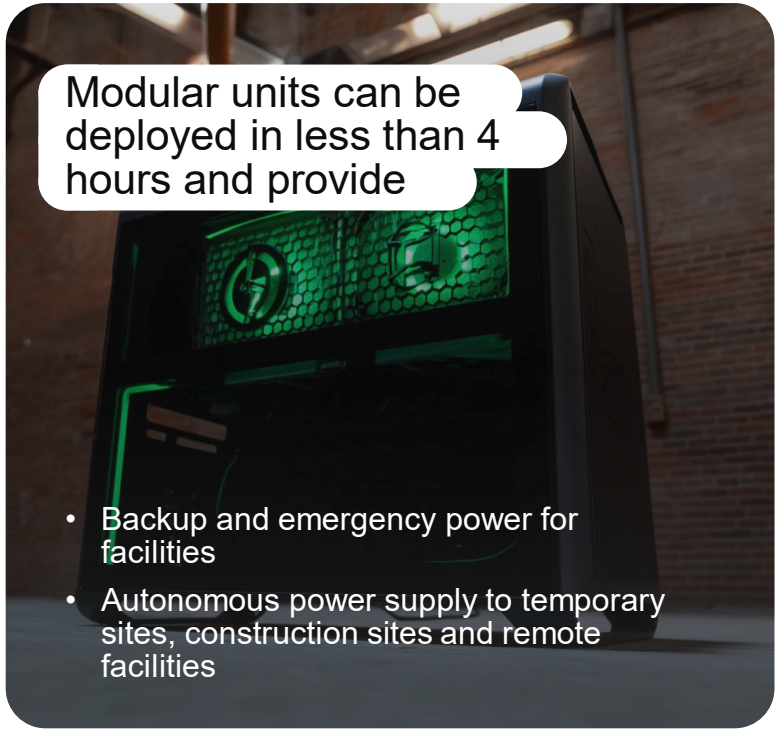
PEM Fuel Cells
Hydrogen → electricity; water vapor is the by-product

DC Charging Point
Direct-current charging for electric vehicles

Fully Autonomous
No connection to municipal power grids required

HTC

Mobile hydrogen power stations — a universal solution for organizing autonomous and backup power supply



Advantages over diesel generators

- Zero emissions under exploitation
- OPEX 33% lower, operational cost savings up to 64%
- Reduction of the service-team calls by 75%
- Possibility of autonomous operation when integrated with electrolyzer

Technical specifications

from 4 KW up to 100 KW
power

up to 99,6%
reliability

from −40 up to +50 °C
Operation at temperatures

modular architecture

НТС

Global Partner Network

Developing the hydrogen technology ecosystem

JOINT-STOCK FINANCIAL CORPORATION SISTEMA

MINISTRY OF ENERGY OF THE RUSSIAN FEDERATION

MINISTRY OF INDUSTRY AND TRADE OF RUSSIA

Scientific Partnership

MIPT

UNISA university of south africa

SOUTHERN FEDERAL UNIVERSITY SFedU ROSTOV-ON-DON · TAGANROG

UNIVERSITY OF MPUMALANGA

Lomonosov Moscow State University

National Research Mordovia State University

TOMSK POLYTECH

BAUMAN MOSCOW STATE TECHNICAL UNIVERSITY

Platov South-Russian State Polytechnic University

НТС

Evening school «Hydrogen energy» 2026

Bauman Moscow State Technical University

450
Participants

37
region of Russia

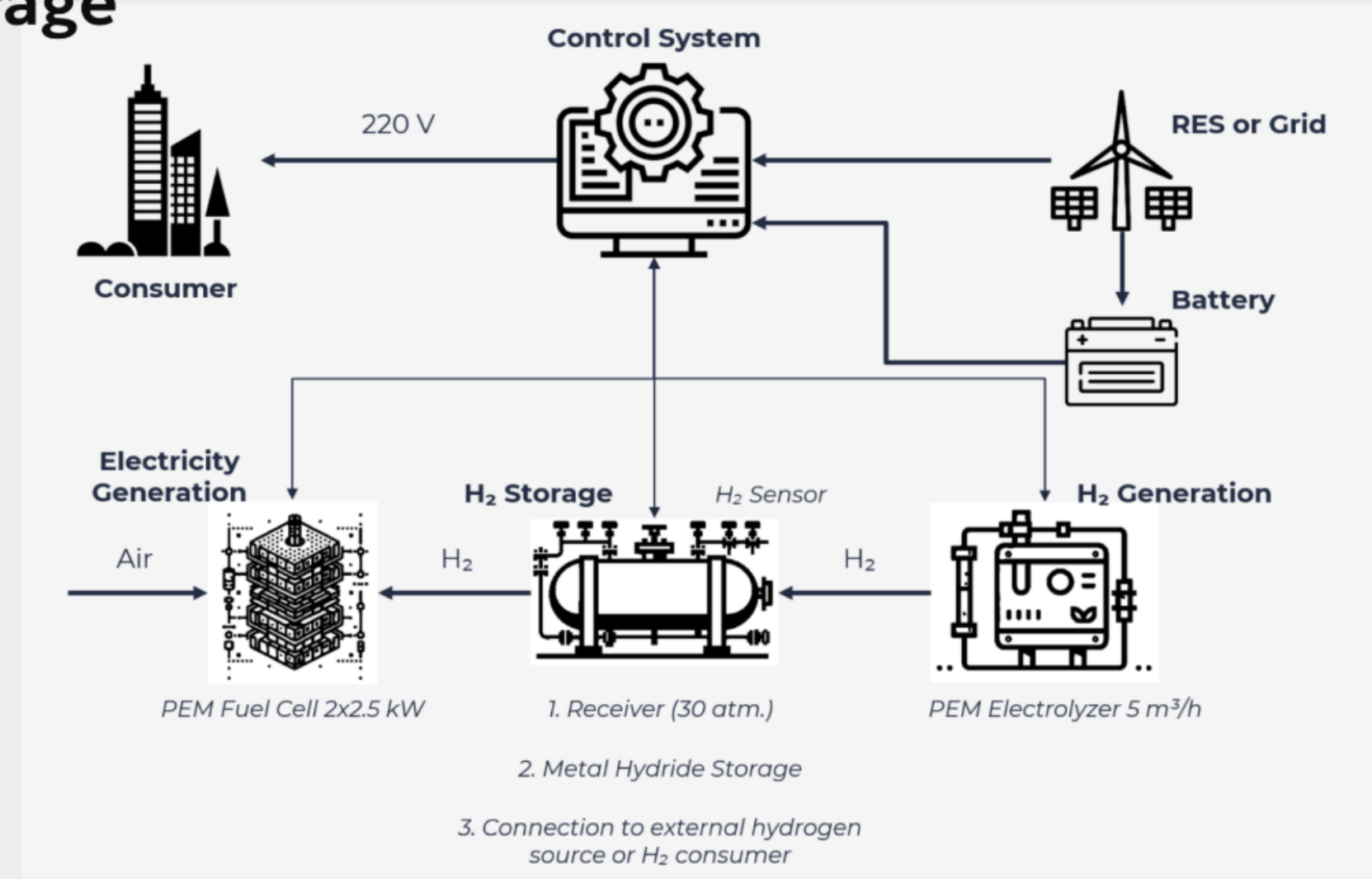
91
universities



Russia | Belarus | Kazakhstans | Tadjikistan | Uzbekistan | Tunisia | Vietnam | Colombia | India | China

14
participating countries

Functional Scheme of a Hydrogen Energy Installation with Energy Storage



University curriculum

Full Course of Specialized Subjects

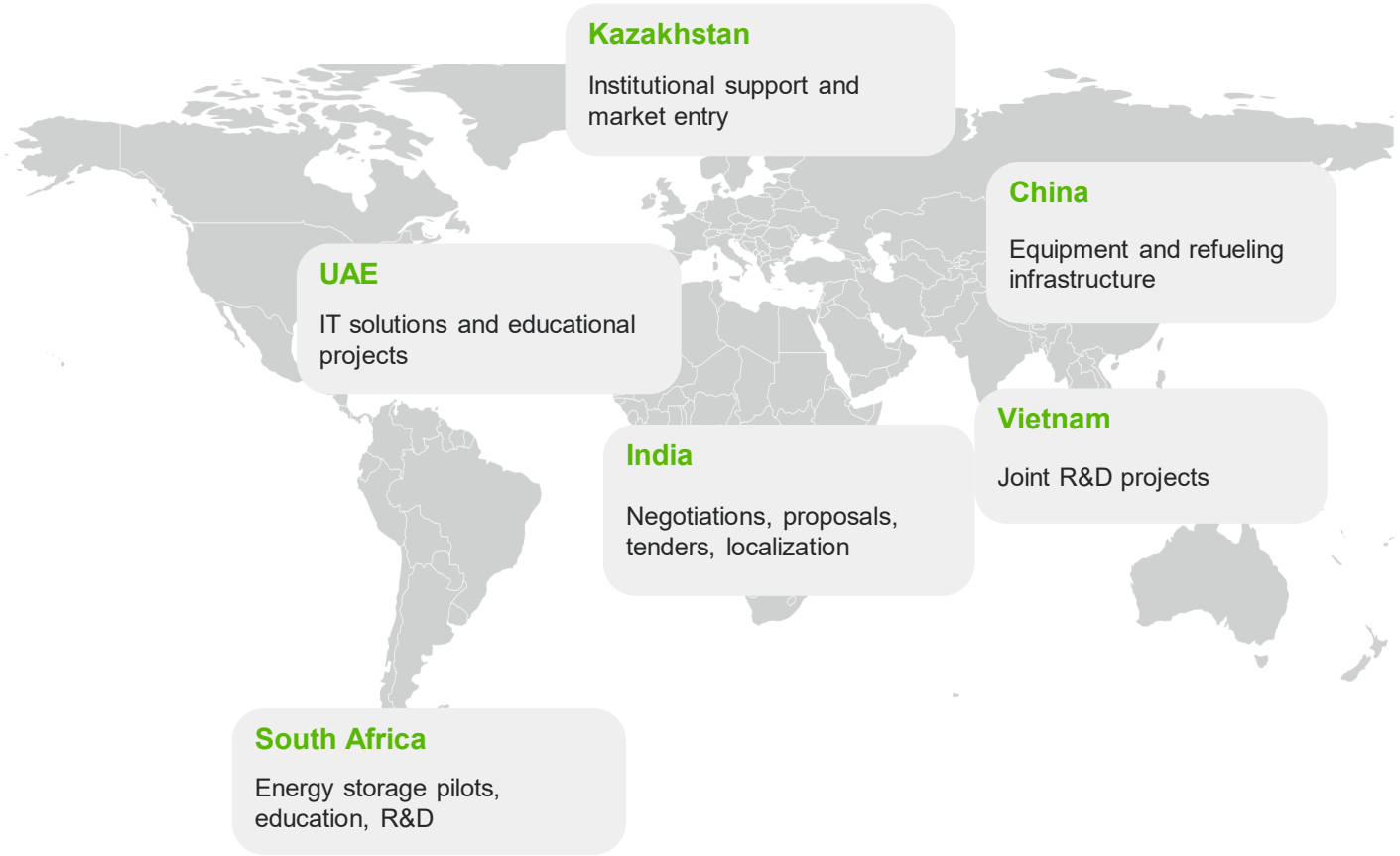
Specialty: Hydrogen Energy Engineering (2 years, 4 semesters)

1. Electrochemical Energy Sources
2. Fundamentals of Hydrogen Technologies (Introduction)
3. Hydrogen Transportation and Storage
4. Fuel Cells and Power Generators Based on Them
5. Organization of Scientific Research: Instruments and Experimental Techniques
6. Management of Electric Power Enterprises
7. Mathematical Problems in Electric Power Engineering
8. Information Technologies in Professional Activity
9. Design of Energy Systems
10. Hydrogen Cycle and Renewable Energy Sources
11. Fundamentals of Economic Analysis of Hydrogen Energy Systems
12. Electric Transport / E-mobility
13. Design of Electronic Devices and Systems
14. Practical Issues of Explosion Safety. Rules for the Design and Technical Operation of Power Installations

Research Projects (Scientific Research Work)

- ✓ **Research Project 1: Design of Electric Power Supply Systems** (solar, wind, grid integration)
- ✓ **Research Project 2: Hydrogen Delivery System to End Users** (gas buffers, compression)
- ✓ **Research Project 3: Metal Hydride Hydrogen Storage** (alloy composition selection, thermal management systems for heating and cooling)
- ✓ **Research Project 4: Development of Control Systems for Laboratory-Scale Liquid Hydrogen Storage**
- ✓ **Research Project 5: Advanced Hydrogen Storage Systems** (metal hydrides, Liquid Organic Hydrogen Carriers — LOHC)

Geography of HTC Partnerships



Kazakhstan

Institutional support and market entry

China

Equipment and refueling infrastructure

UAE

IT solutions and educational projects

Vietnam

Joint R&D projects

India

Negotiations, proposals, tenders, localization

South Africa

Energy storage pilots, education, R&D

Также в фокусе:

- Indonesia
- Oman
- Qatar
- Saudi Arabia
- Latin America