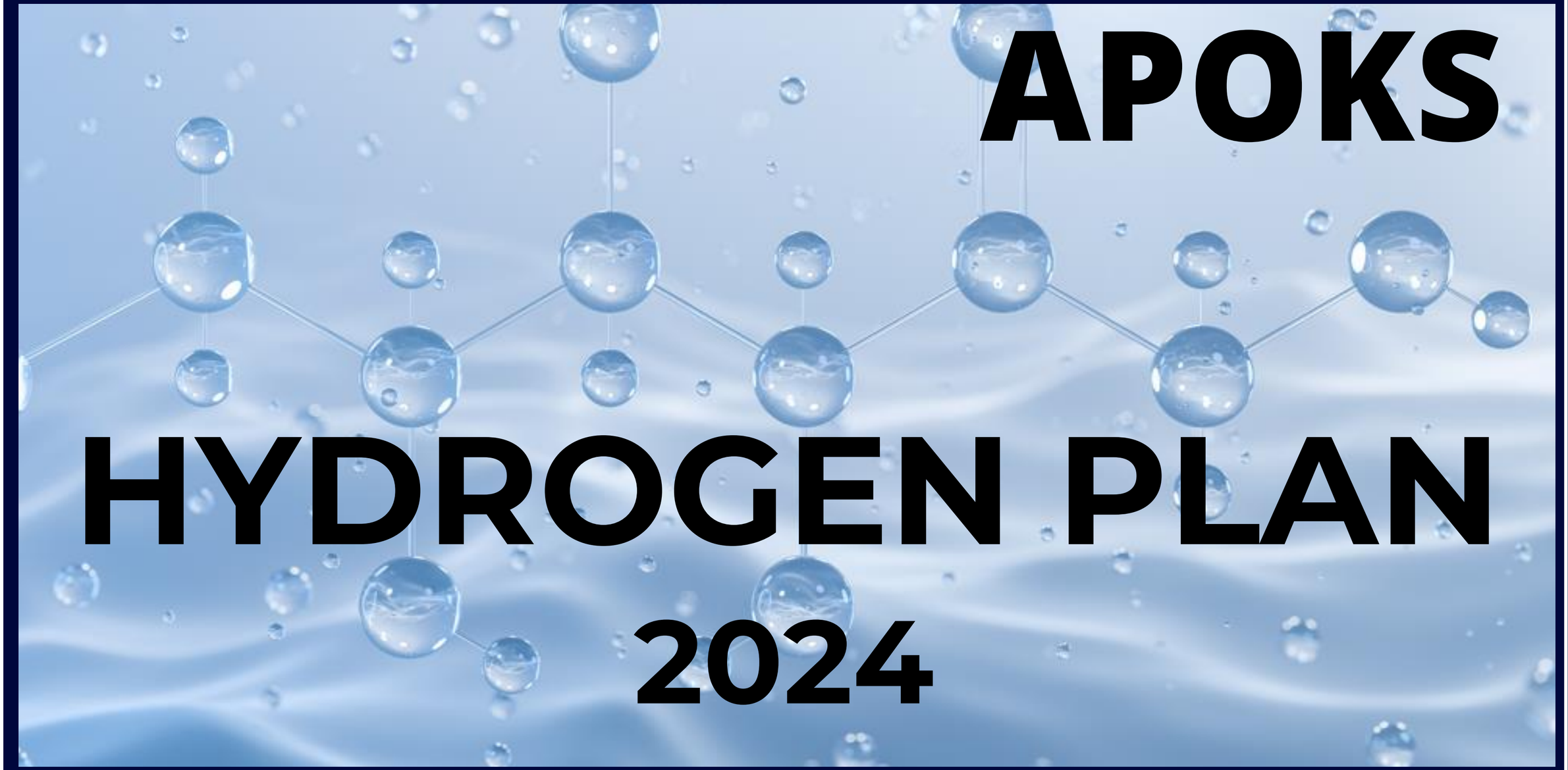

APOKS
HYDROGEN PLAN
2024

APOKS

APOKS, z.s. is an independent, non-profit organization, founded in 2017. Our main goal is to strive for solutions, education and information sharing in the field of optimization of energy and combustion processes, where, with the right design and implementation, negative effects on air quality and the environment can be significantly eliminated.

*In 2021, on the initiative of APOKS z.s. the informal platform **HYDROGEN group** was founded, which set itself the goal of creating know-how in the field of using hydrogen or, in general, fuels with admixture of hydrogen, primarily in the area of building heating.*

HYDROGEN GROUP

APOKS 2023

- hydrogen study for the Czech Gas Association
- conference H2 HEATING
- partner of fairs in Ostrava, Brno and Prague
- measuring the emissions of gas appliances with a H2 blend
- lectures at five other conferences
- seven professional articles
- four newspaper interviews
- three podcasts
- four foreign trips
- cooperation with the Ministry of Industry and Trade

APOKS MAIN EVENT OF 2024

01

H2 showroom

APOKS project
training center

02

Conference H2 HEATING

APOKS project
second grade

03

H2 blending

GASNET project
village connected to blend

04

H2 self-sufficient house

APOKS project
a house heated by hydrogen

01

H2 showroom

APOKS project
training cente

PROJECT DESCRIPTION

The goal is to create a compact space with installed functional combustion appliances, while a variable mixture of natural gas or pure hydrogen will be burned.

Standard appliances will be used, which are expected to be used in residential buildings, both for heating and for heating water and food.

FINAL SOLUTION

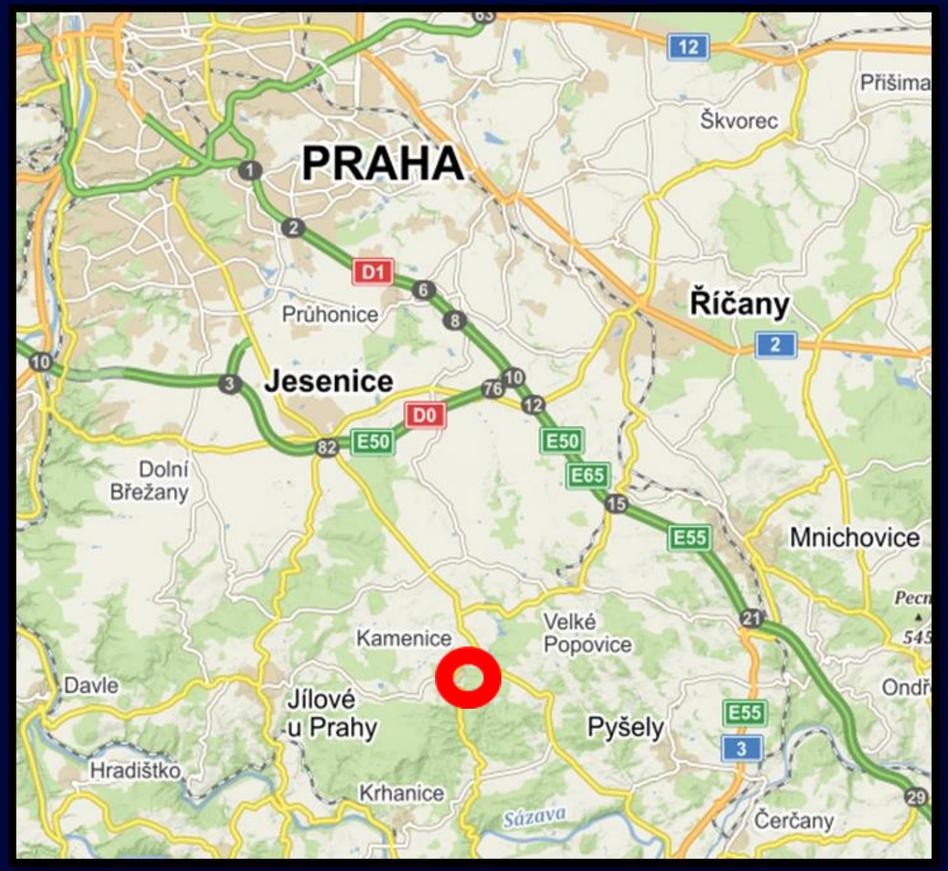
The office space will continue to be used daily as an office of the association APOKS z.s. and will therefore be generally accessible to the public.

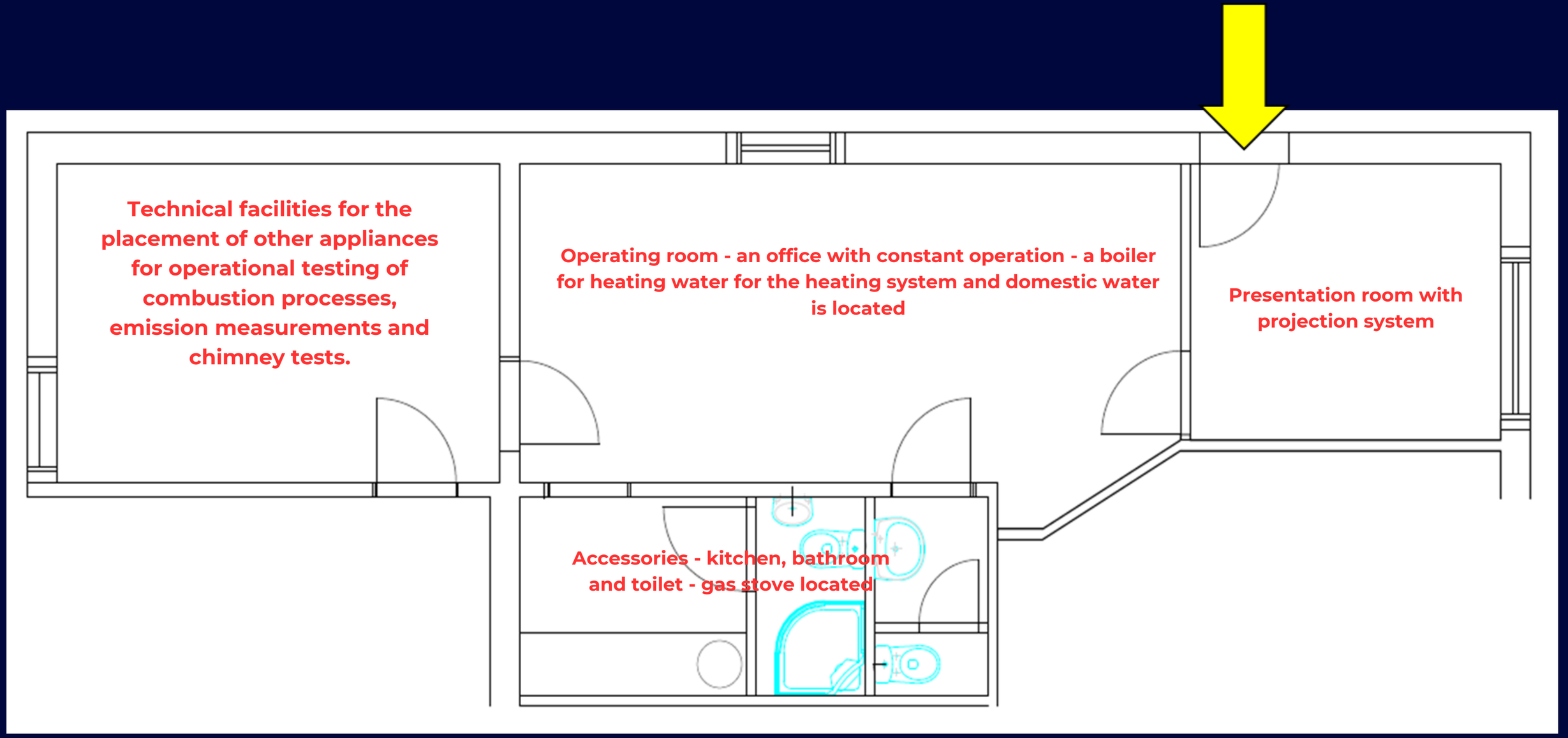
The space will also include a room for discussions and showing presentations and a room for further operational testing of blended or pure hydrogen appliances.

The operation of the office should give visitors an idea of the real impact of using hydrogen or a mixture of hydrogen and natural gas from the end user's perspective.

H2 SHOWROOM

the village of Kamenice - approx. 20 km south of Prague - the building at Olivová 1412 is located very close to road 603 Prague-Benešov and has its own parking lot




Technical facilities for the placement of other appliances for operational testing of combustion processes, emission measurements and chimney tests.
Operating room - an office with constant operation - a boiler for heating water for the heating system and domestic water is located
Presentation room with projection system
Accessories - kitchen, bathroom and toilet - gas stove located

TECHNICAL SOLUTION

The supply of hydrogen with a purity of 99.9% will be in pressure cylinders with a volume of 50 l under a pressure of 20-30 MPa (200-300 bar) located near the mixer in a secure cage outside the building.

A mixing system capable of creating a blend with hydrogen will be connected to the hydrogen and low-pressure distribution of natural gas, which will be adjustable in the range of 0-30% hydrogen in the mixture (by volume).

The following appliances will be connected to the blended mixture:
- boiler with hot water tank
- stove with oven

The output from the boiler will be hot water directed to:
- plate heaters
- hot water distribution in the kitchen, bathroom and toilet

Exhaust gas from the boiler and supply of combustion air will primarily be handled by stainless steel coaxial pipes, the alternative is the use of plastic.

The condensate will be collected in a collection container with a pH measurement, then diluted with water to a pH > 6 and discharged into the sewer.

CONSTRUCTION PERMIT

Part of the project is a system methodology for building permit conditions.

This methodology can be used by state institutions authorizing buildings with hydrogen.

SAFETY

Part of the project is a system methodology for hydrogen safety in terms of:
- production (electrolyzer)
- storage (pressure vessel)
- piping
- appliances

Both indoors and outdoors.
This methodology can be used by designers or builders.

Opportunities for cooperation

ERASMUS programme

the possibility of foreign cooperation to create a system of training Czech experts as part of educational programs

internship of APOKS teachers

STRATEGY MAP

FINANCIAL	**estimated costs approx. 40,000 euros (now invested 5,000 euros)**
PARTNERS	**LINDE, BOSCH, ČPS, KAMENICE, KP tech**
PROCESS	**start 10/2023** **in operation 8/2024** **end of 1st phase 5/2025**

02

Conference H2 HEATING

APOKS project

May 30, 2024 in Prague

Hydrogen as a solution for self-sufficiency and sustainability in the field of building energy

H2 HEATING

PROJECT DESCRIPTION

The goal of the conference is to present in detail the entire process of production, storage and consumption of hydrogen in order to achieve complete or partial self-sufficiency of both individual buildings (family and apartment buildings) and urban units (development projects, closed residential areas, municipalities, city districts, etc.).

FINAL SOLUTION

Presentation of possible solutions, both closed systems (including community ones) completely independent of central energy sources, and open systems where hydrogen can be used as an additional source, backup medium or mixed with natural gas. Especially for closed systems, emphasis will be placed on sustainability, i.e. the environmental friendliness of the entire production and consumption cycle.

H2 HEATING 2023

4 blocks
26 lecturers
130 listeners

www.H2HEATING.cz

30-th March 2024 - Prague - hotel STEP

gasnet

03

H2 blending

GasNet project
village connected to blend

Blend of 20% hydrogen in natural gas in the existing local natural gas network.

H2 BLENDING

gasnet

GasNet is the largest distributor of natural gas in the Czech Republic.

It provides supplies to more than 2.3 million customers.

PROJECT DESCRIPTION

Hranice has one of the youngest and the most modern gas distribution systems in the Czech Republic. In their construction, we used materials that already enable the distribution of new gases such as biomethane and hydrogen. In addition, for local distribution, hydrogen should be produced directly in the vicinity of the town of Hranice at the Trojmezí Farm, using electricity from renewable sources.

FINAL SOLUTION

The gradual use of hydrogen within the gas system is envisaged in proposals for European and national energy policy and legislation. As the largest Czech gas distributor, we are therefore preparing for its gradual development. Initially, hydrogen should be mixed with natural gas. We have the support of the Energy Regulatory Office and the Ministry of Industry and Trade.

APOKS INVOLVEMENT

Checking of the flue gas paths of all type B and C appliances (only with the exception of WAW window heaters up to 7 kW) and authorized measurement of flue gas in the standard range for:

- 209 domestic boilers
- 89 devices for small and large customers

APOKS is a project partner for:

- control of flue gas exhausting
- measurement of emissions
- making the methodology for exhausting flue gas and condensate
- risk assessment
- preparation of the final report in the mentioned areas

STRATEGY MAP

FINANCIAL	**estimated costs approx. 1,600,000 euros (now invested 50,000 euros)**
PARTNERS	**GasNet, Ministry of Industry and Trade, Energy Regulatory Office, APOKS**
PROCESS	**start 3/2023** **in operation 8/2024** **end of 1st phase 8/2025**

04

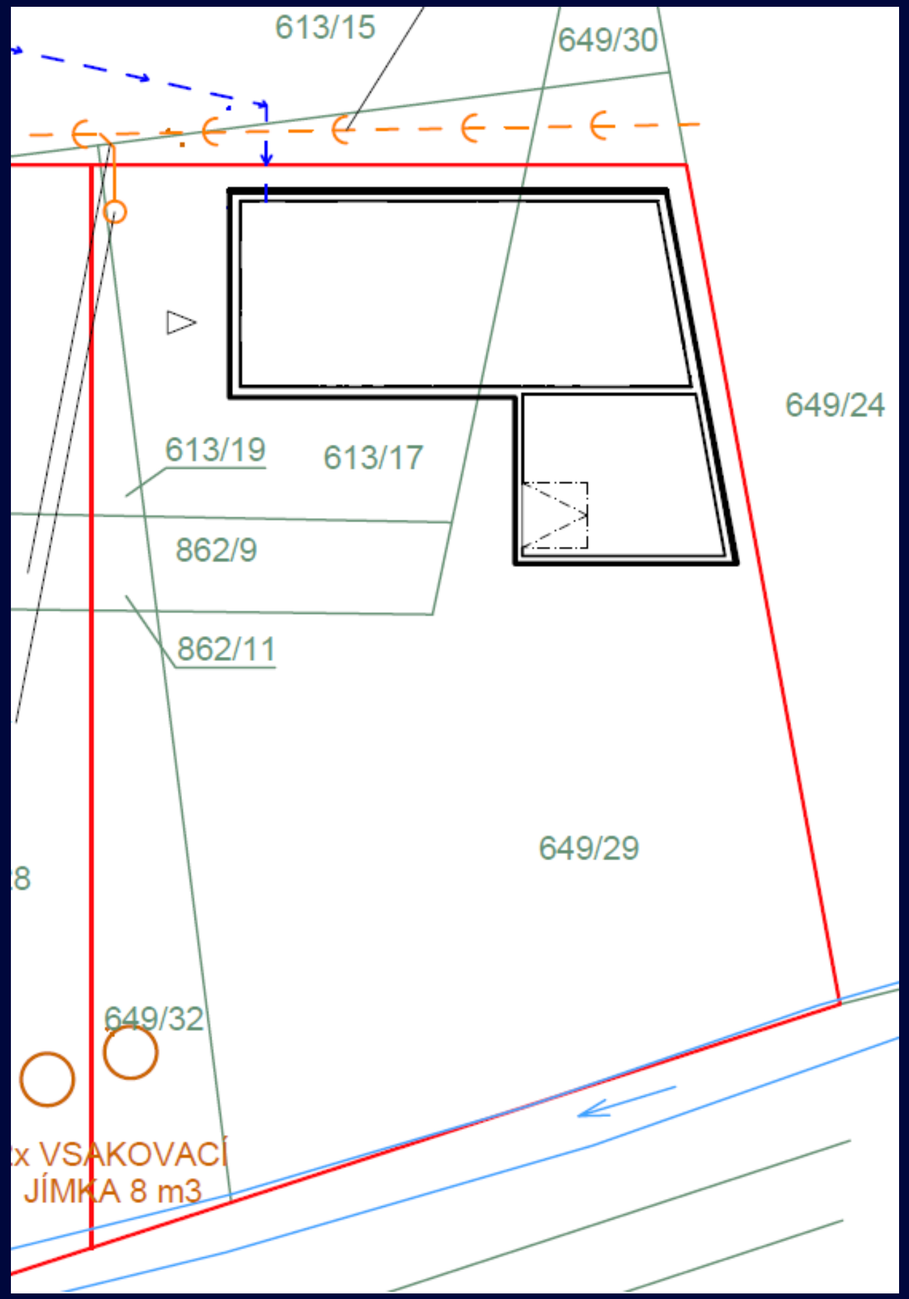
H2 self-sufficient house

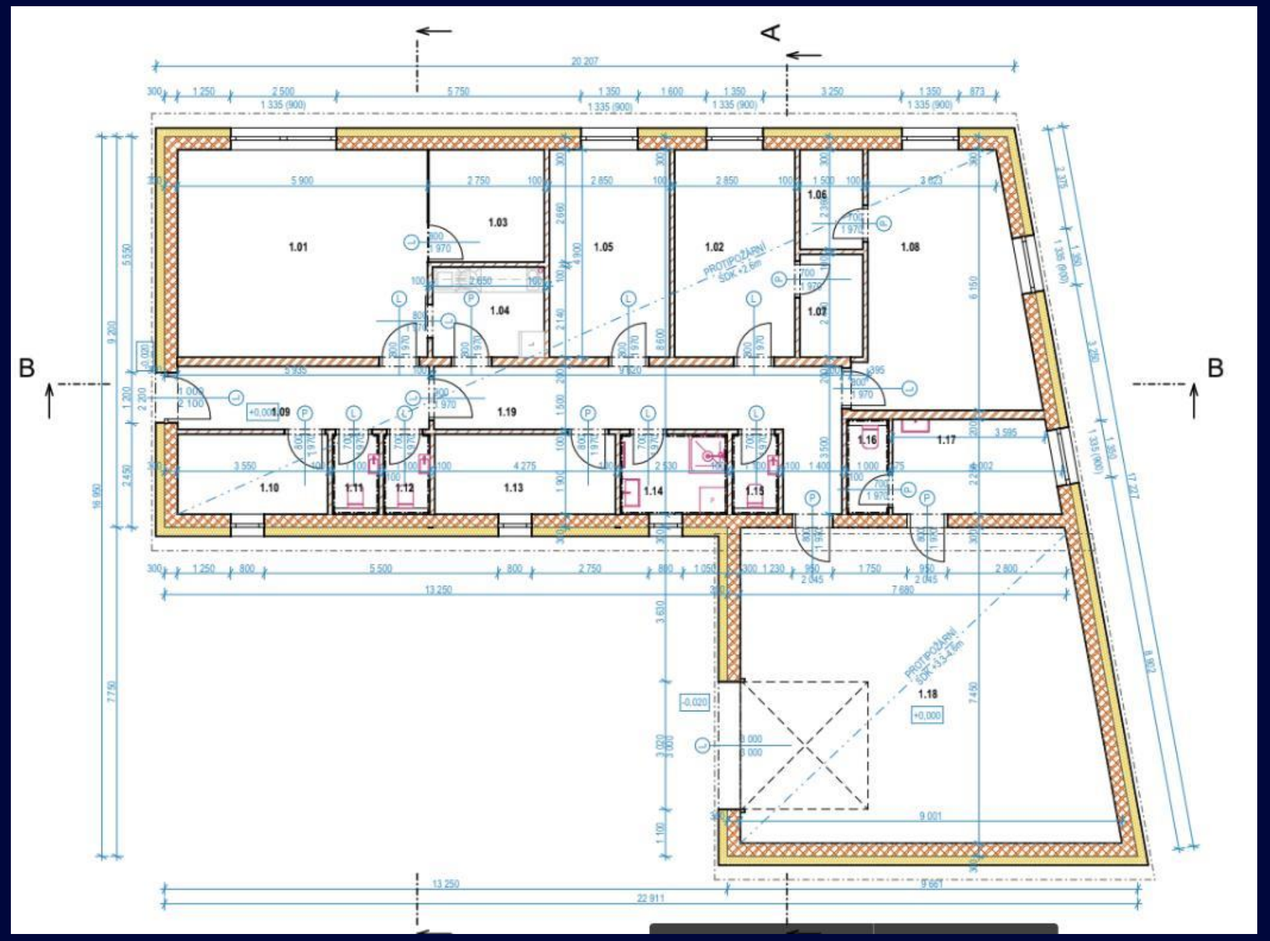
APOKS project
house heated by hydrogen

The functional house independent of external energy supplies.

H2 HOUSE

construction allowed on 25.november 2022





TECHNICAL SOLUTION

photovoltaic panel

electrolyzer

pressure tank

(fuel cell)

H2 gas boiler

CURRENT STATUS

STRATEGY MAP

FINANCIAL	**estimated costs approx. 400,000 euros (now invested 70,000 euros)**		
PARTNERS	**in negotiations**		
PROCESS	**start 10/2021**	**in operation 7/2025**	**end of 1st phase 5/2026**

“

It won't be easy, but it will be worth it !

”

APOKS

THANK YOU

Do you have any questions?

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