HOW TO FIND NATURAL HYDROGEN IN POLAND?

Krystian WÓJCIK

NATURAL HYDROGEN:
an alternative route of renewable hydrogen production
in European Union?

Polish Geological Institute
National Research Institute
Polish Geological Survey

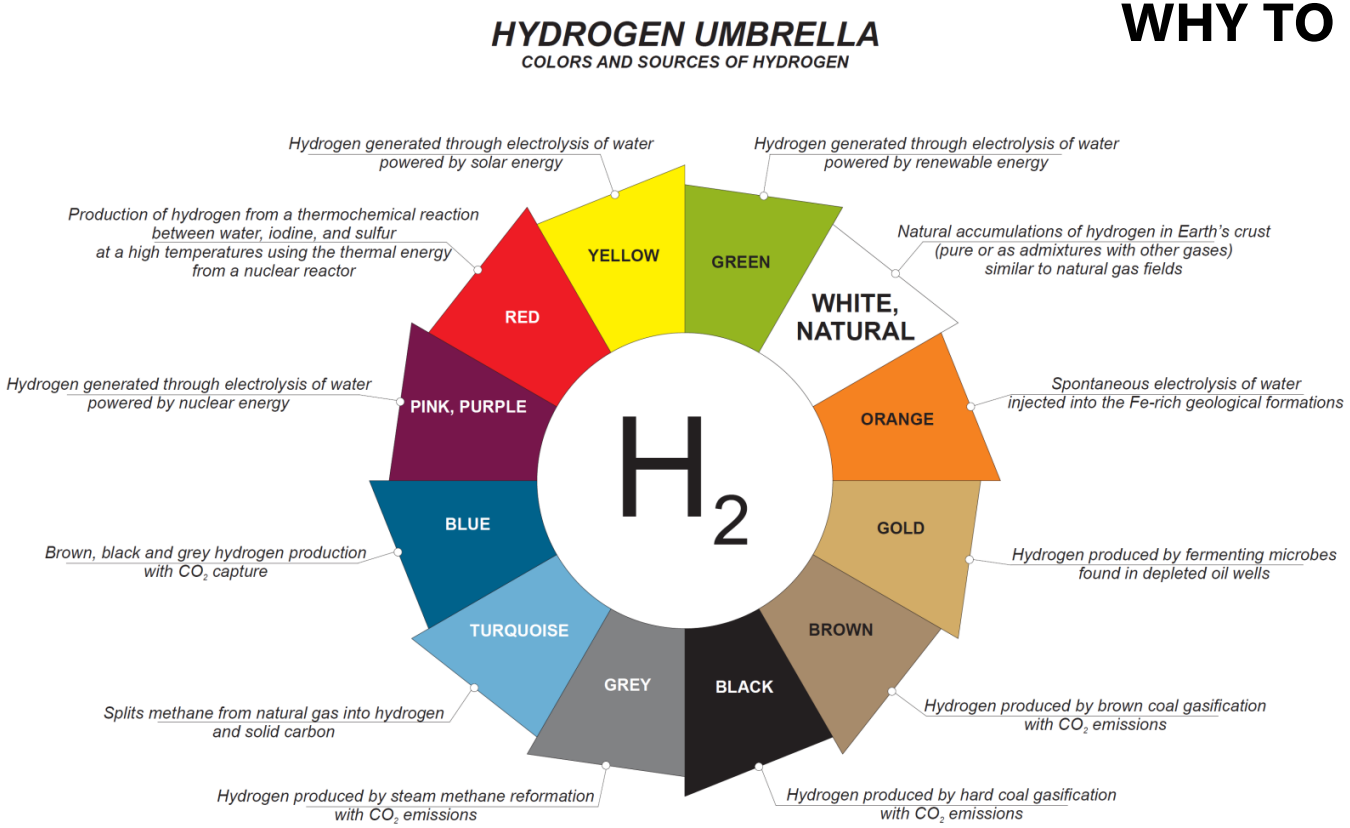
pgi.gov.pl

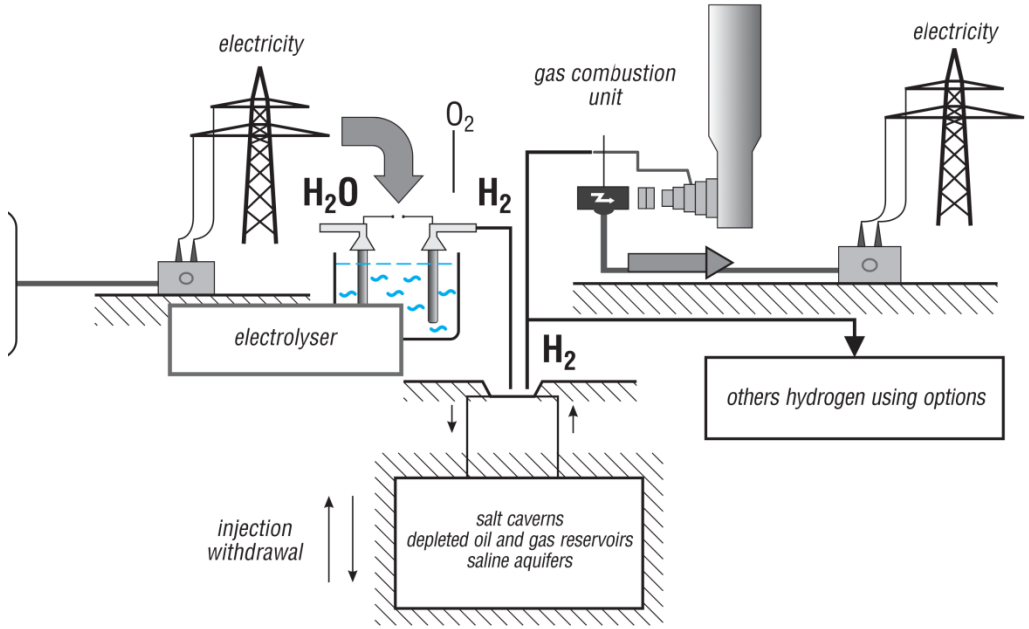
Greenet

European Hydrogen Week

Clean Hydrogen Partnership

WHY TO SEARCH NATURAL HYDROGEN IN POLAND?





HYDROGEN MARKET IN POLAND

Production of **GREEN HYDROGEN** (2030) = 0.2 Mt
BLACK/**GREY HYDROGEN** (2030) = 1.5 Mt

HYDROGEN → ELECTRICITY (2040) = 2.5-4.3 Mt (30-52 BCM)
HYDROGEN → NATURAL GAS (2040) = 5.2 Mt (62 BCM)

NATURAL HYDROGEN POSSIBLE EXPLOITATION (2024)
0.0007 Mt (8 MCM)

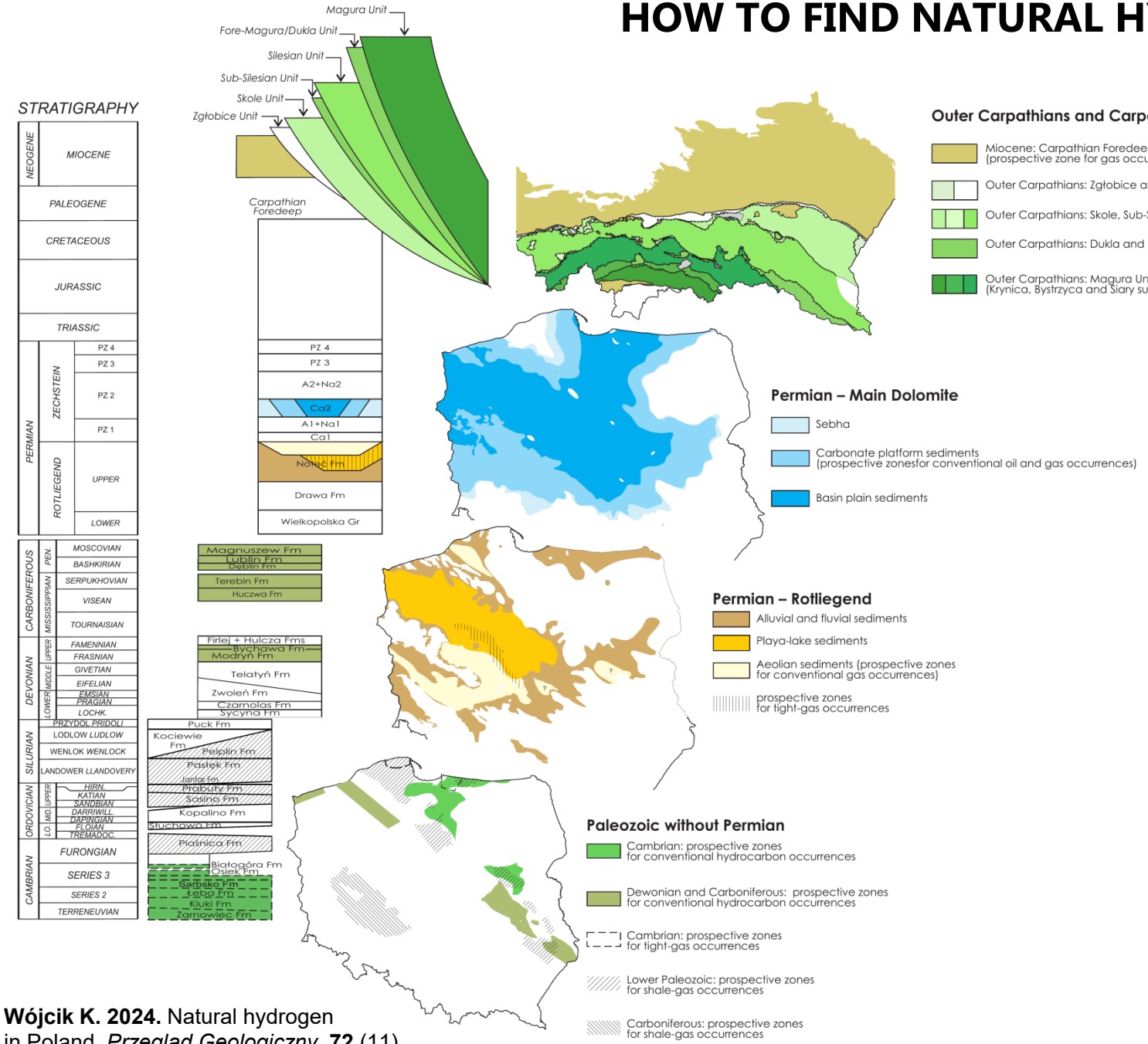
Wójcik K. 2024. Natural hydrogen in Poland. *Przegląd Geologiczny*, **72** (11).

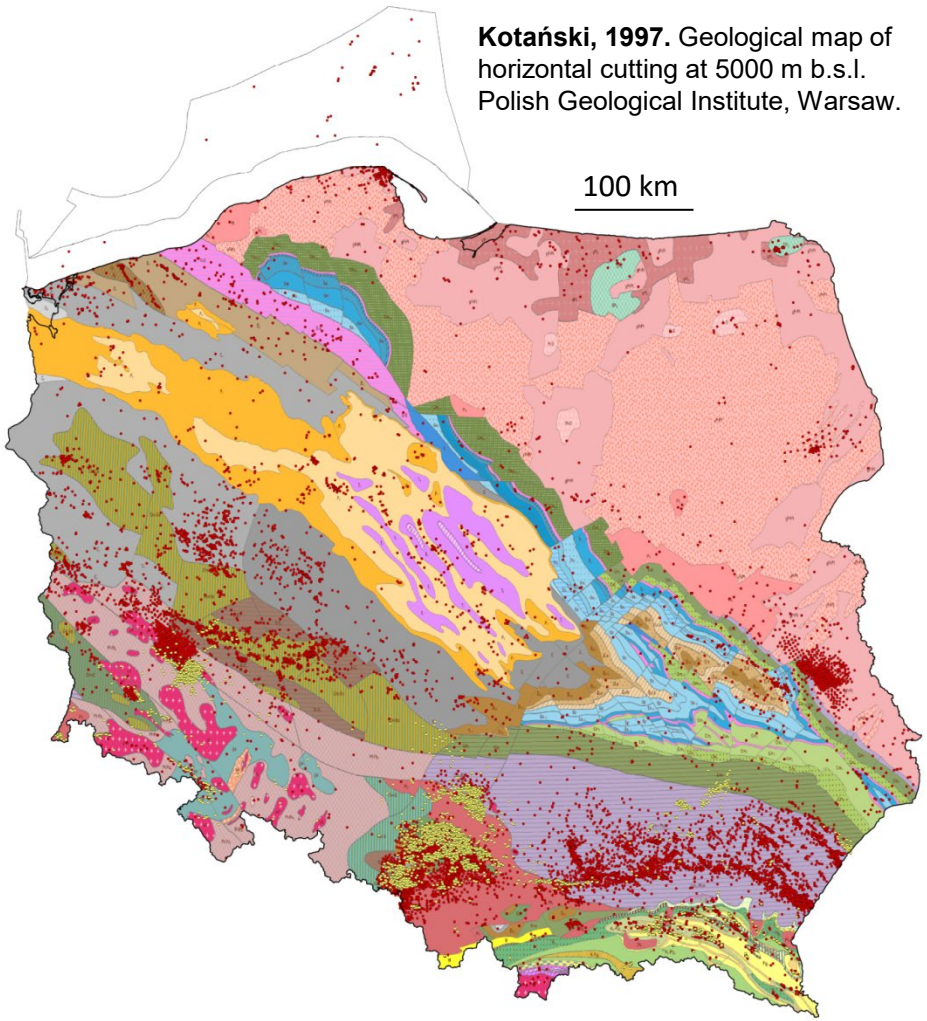
SPECTRA 2024. The hydrogen color wheel is expanding. Mitsubishi Heavy Industries Group.

Tarkowski R. 2017. Some aspects of underground hydrogen storage. *Przegląd Geologiczny*, **65**, 282-291.

PSW 2021. Polish Hydrogen Strategy until 2030 with an outlook until 2040. Ministry of Climate and Environment.

HOW TO FIND NATURAL HYDROGEN IN POLAND? DEEP WELLS!





Kotański, 1997. Geological map of horizontal cutting at 5000 m b.s.l. Polish Geological Institute, Warsaw.

Wójcik K. 2024. Natural hydrogen in Poland. *Przegląd Geologiczny*, **72** (11).

HOW TO FIND NATURAL HYDROGEN IN POLAND? GAS FIELDS!

Jeniniec oil field

Acreage: 142.12 ha
Reservoir thickness: 16.5 m
$P_{start}/P_{current}$: 55.01 Mpa / 23.28 MPa
Vabs: 43.2 t/d

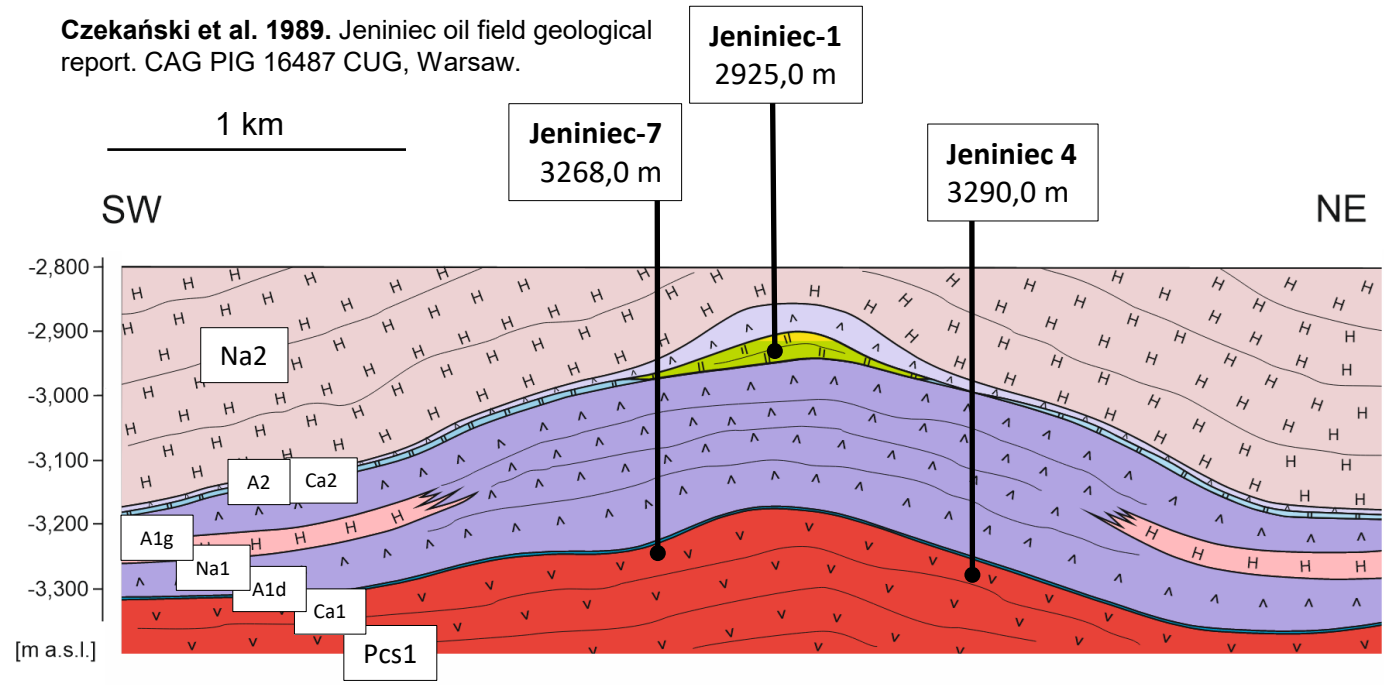
Original oilgeological resources : 282.0 kt
Current oil geological resources : 222.3 kt
Production 2023: 3.67 kt

Original gas geological resources: 20 MCM
Current gas geological resources: 26 MCM
Production 2023: 0.29 MCM

CH_4 = 52.73%; N_2 = 34.89%; He = 0.049%; H_2 = 10.358%

← **MIDAS 2024.** System of management and protection of mineral resources in Poland. PGI-NRI, Warsaw.

Czekański et al. 1989. Jeniniec oil field geological report. CAG PIG 16487 CUG, Warsaw.



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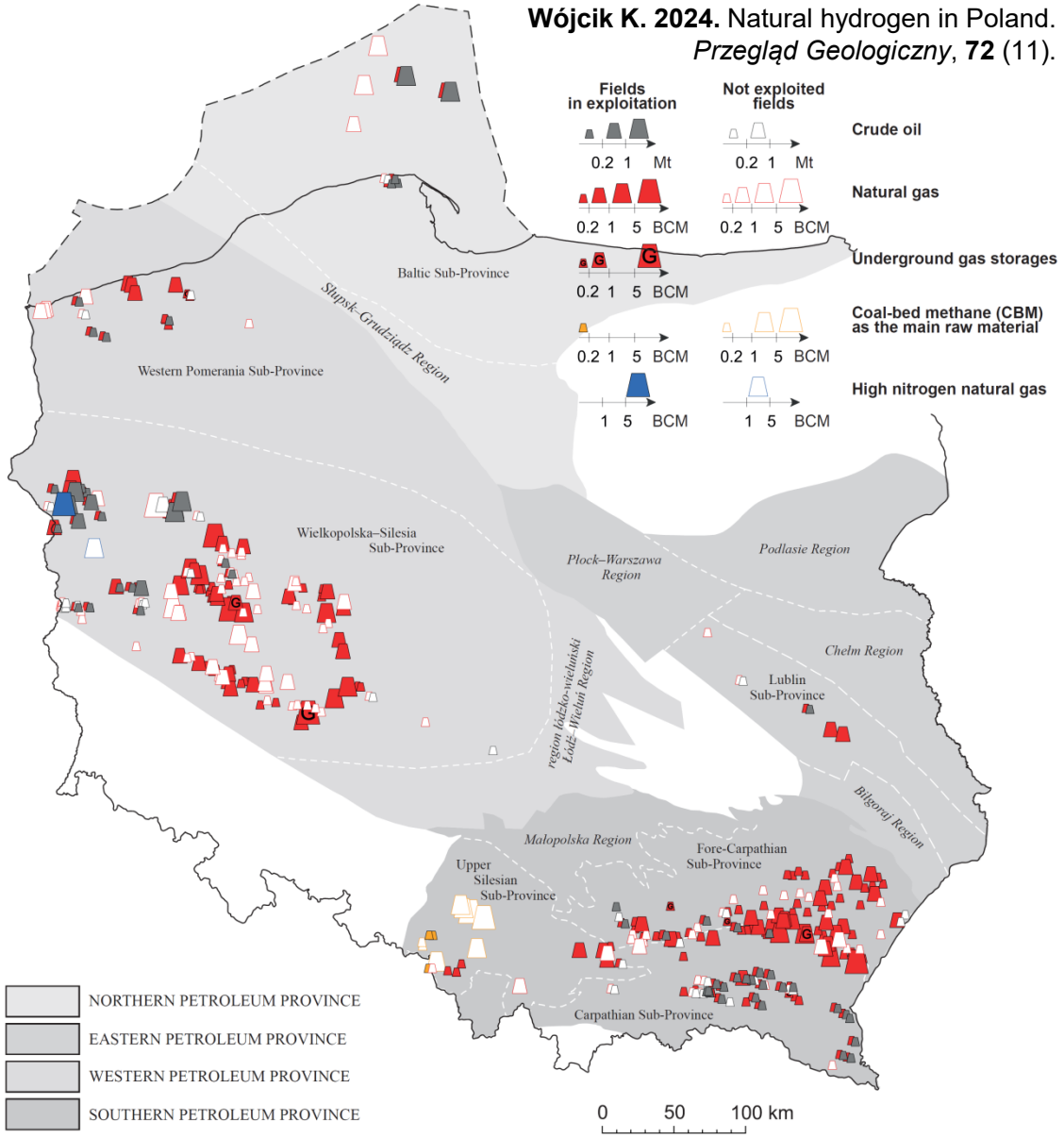
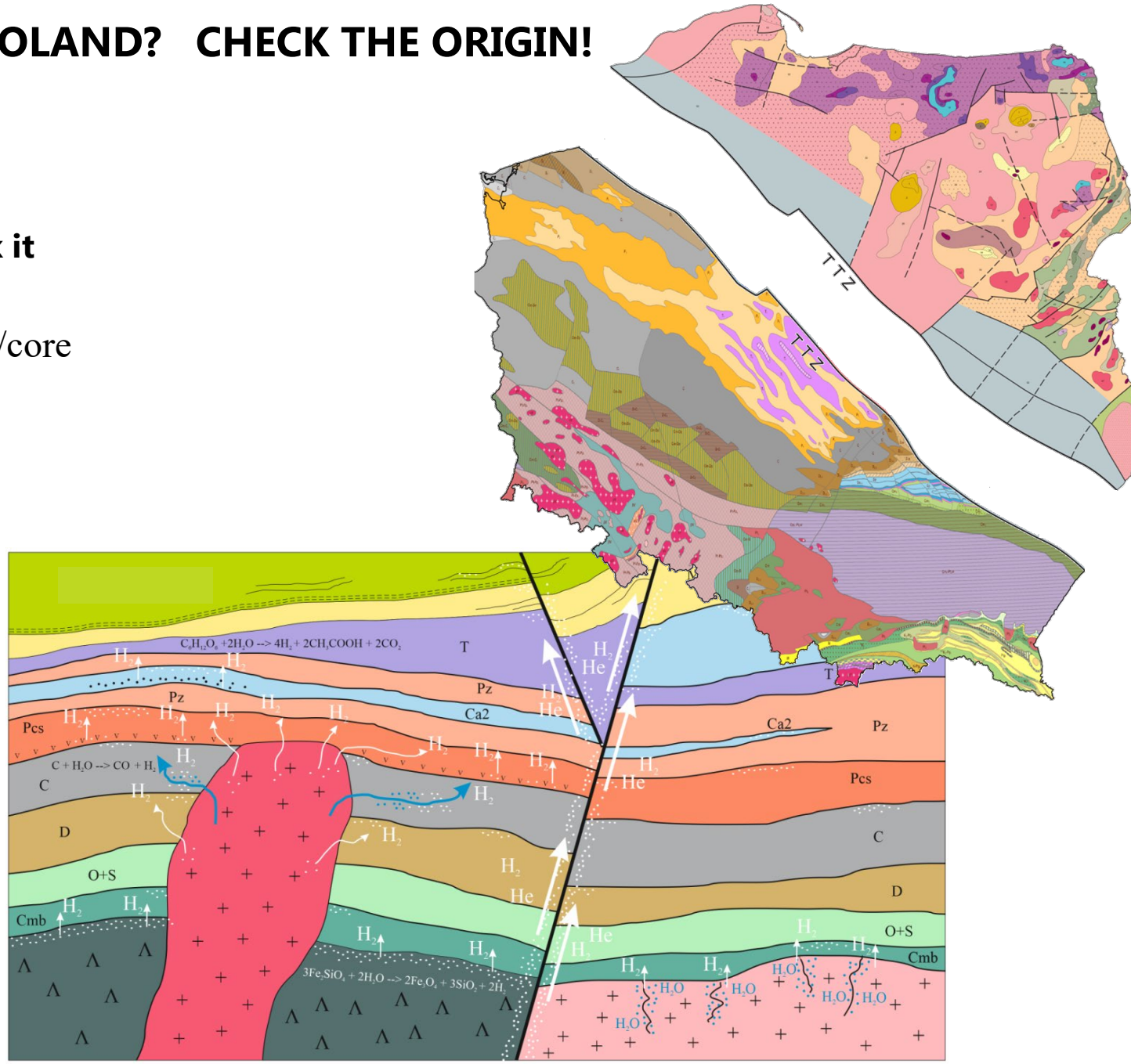


HOW TO FIND NATURAL HYDROGEN IN POLAND? CHECK THE ORIGIN!

Considered H_2 origin in Poland and how to check it

- migration from deeper parts of the Earth's mantle/core along deep faults
  (correlation of H_2 and He content in individual stratigraphic horizons)
  where: all geological horizons
- serpentinization of mafic/ultramafic rocks
  (correlation of elevated H_2 content with ultramafic rocks occurrences in the basement; source rock geochemistry)
  where: Sudetes and Fore-Sudetic Monocline
- hydrolysis in iron-rich formations
  (correlation of elevated H_2 content with Banded Iron Formations occurrences)
  where: East European Platform
- Variscan magmatism and volcanism
  (correlation of hydrogen isotopes between H_2, methane and volcanic gases)
  where: Permian – Rotliegend
- metamorphism of coal beds
  (correlation of hydrogen isotopes between H_2, methane and volcanic gases)
  where: Permian – Rotliegend,
  Carboniferous of the Fore-Sudetic Monocline, Intra-Sudetic Depression
- biogenic decomposition of organic matter
  (correlation of hydrogen isotopic composition between H_2 and source rocks for hydrocarbons)
  where: Permian – Main Dolomite, Caropathians



Wójcik K. 2024. Natural hydrogen in Poland. *Przegląd Geologiczny*, **72** (11).

HOW TO FIND NATURAL HYDROGEN IN POLAND/EUROPE/WORLD? DO IT WITH US!

NATIONAL FUND FOR ENVIRONMENTAL PROTECTION AND WATER MANAGEMENT

Ministry of Climate and Environment
Republic of Poland

POLISH GEOLOGICAL INSTITUTE – NATIONAL RESEARCH INSTITUTE

Prospection, exploration and exploitation of natural hydrogen fields in Poland – STAGE I (PGS)

STAGE I – H_2 occurrences and content in Poland

- **A.** H_2 in oil and gas fields
- **B.** H_2 in deep wells
- **C.** H_2 in cooper/salt/coal mines
- **D.** Data validation
- **E.** Content of H_2 in different geological horizons
- **F.** Prospective areas for H_2 occurrences

ORLEN

Mineral and Energy Economy Research Institute
Polish Academy of Sciences

AGH

POLISH GEOLOGICAL INSTITUTE – NATIONAL RESEARCH INSTITUTE

Polish Natural Hydrogen Initiative

STAGE II – origin of H_2 in Poland

- **A.** Possible origin of H_2 and how to check it
- **B.** Natural gas fields sampling
- **C.** Molecular and isotope investigations of natural gas samples
- **D.** Chemical monitoring of gas fields and model of H_2 accumulation
- **E.** Analysis of H_2 source rocks
- **F.** Origin of selected H_2 accumulations
- **G.** Well geophysics

Clean Hydrogen Partnership

POLISH GEOLOGICAL INSTITUTE – NATIONAL RESEARCH INSTITUTE

(SRIA 2021-2027)

Alternative route of renewable hydrogen production

STAGE III – exploration of H_2 in EU

- **A.** Comparison of possible hydrogen systems in Europe
- **B.** International/European prospection and exploration strategies
- **C.** Discover and production from the first natural hydrogen field in Europe
- **D.** Transformation of oil and gas sector in Europe

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