Natural Hydrogen Fuel

Prelims - *General Science | Physical, Social, Economic Geography of India and the World*

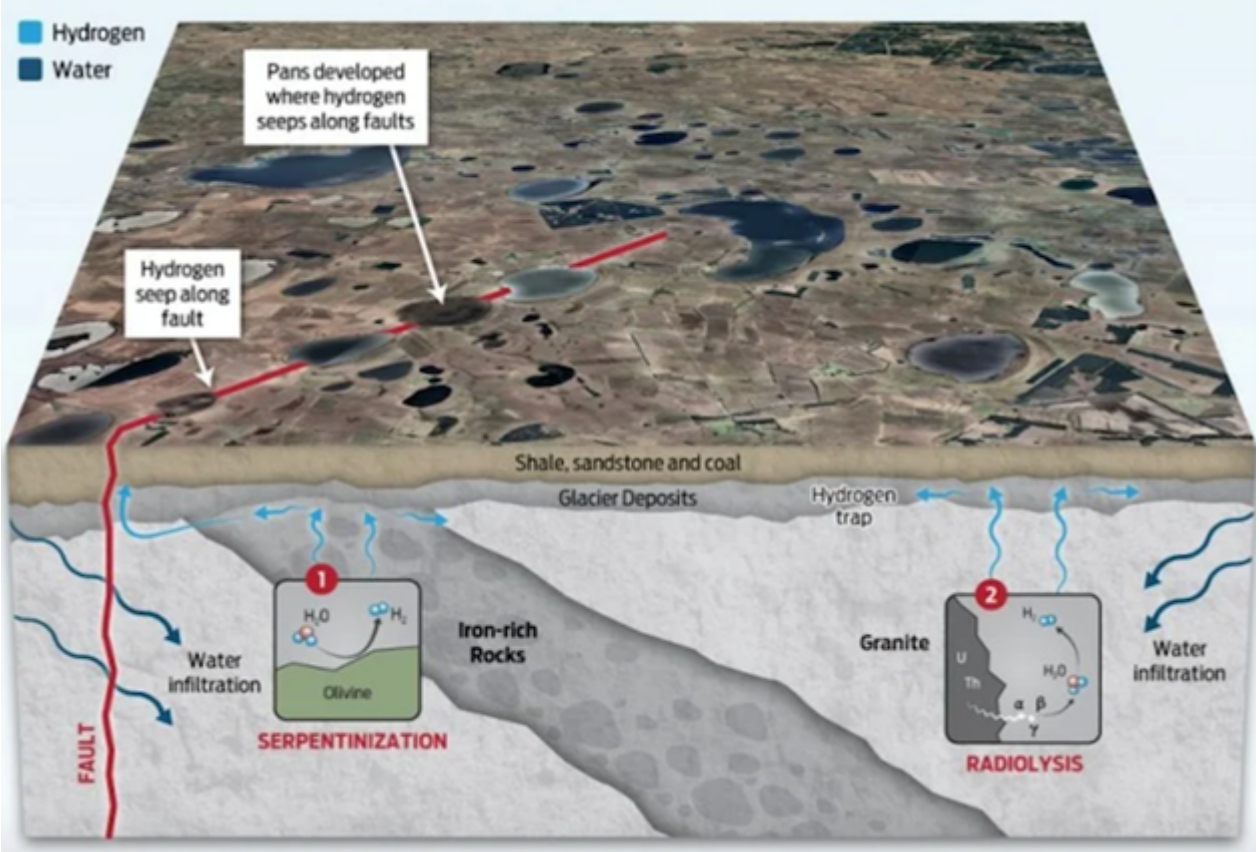
Why in News?

According to research firm Rystad Energy, by the end of 2023, 40 companies, including start-ups, were searching for deposits of natural hydrogen around the world, up from just 10 in 2020.

- **Hydrogen** – It is a *gas of diatomic molecules with the formula* H_2, officially called "dihydrogen", but also called molecular hydrogen.
- It is a colorless, odorless, flammable gas.
- **Natural Hydrogen** – It refers to hydrogen gas that is found in its natural form beneath Earth's surface.

  Natural Hydrogen is sometimes known as ***white Hydrogen or gold Hydrogen or geologic Hydrogen****.*

- **Generation** – It *occurs as a free gas* in geology, produced by
  - ***Serpentinisation***, the interaction of water and iron-containing rocks.
  - ***Radiolysis of water*** by radioactive rocks, and from organic matter at depth.
- Helium co-exists with hydrogen in a few reserves points that radiolysis plays a role in its generation.



- **Discovery** – It was *1st discovered by accident in Mali*, contains *no carbon and produces only water when burned*.
- **Areas for geological hydrogen generation** – Gas seeps, volcanic outgassing, mines and in also in active mountain ranges with tectonic activity
  - **Examples**: The Pyrenees, Alps, and Himalayas
- **Current reserves** – Hundreds of hydrogen seeps have been in various countries, including Spain, France, Albania, Colombia, South Korea, Canada and
  - Australia - Eyre Peninsula and Kangaroo Island
  - United States - Kansas, Nebraska

Favourable Geological Structures for Natural Hydrogen in India
• Hard rock formations of diverse ultramafic/mafic and basaltic assemblages • Andaman and Himalayan ophiolite complexes • Greenstone volcanic-sedimentary sequences in cratons (Dharwar, Singhbhum) • Sedimentary basis (for example, in Vindhyan, Cuddapah, Gondwana and Chhattisgarh) • Basement rocks with fractures • Areas where active hydrothermal systems as represented by hot springs exist

- **Current production** – It is *manufactured mostly from natural gas* through an energy-intensive and polluting process.

  *Production of **Green Hydrogen** involves a process that involves splitting water into hydrogen and oxygen using renewable electricity.*

- **Significance** – If harvested in a sustainable manner, it may provide a ***clean and potentially low-cost fuel***.

Quick Facts

- **Serpentinization** – It is a geological process where ultramafic rocks, rich in minerals like olivine and pyroxene, are altered by water and converted into serpentine minerals which *releases hydrogen gas* during the process.
- **Radiolysis –** It is the process in which subatomic particles naturally emitted by radioactive rocks such as granite cause certain molecules to break apart, *releasing hydrogen*.

Reference

The Hindu| Potential of Natural Hydrogen Fuel