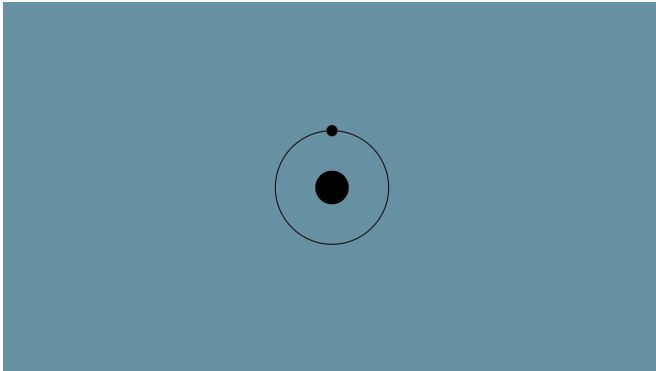


Scientists extract hydrogen gas from oil and bitumen, giving potential pollution-free energy

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Scientists have developed a large-scale economical method to extract hydrogen (H₂) from oil sands (natural bitumen) and oil fields. This can be used to power hydrogen-powered vehicles, which are already marketed in some countries, as well as to generate electricity; hydrogen is regarded as an efficient transport fuel, similar to petrol and diesel, but with no pollution problems. The process can extract hydrogen from existing oil sands reservoirs, with huge existing supplies found in Canada and Venezuela. Interestingly, this process can be applied to mainstream oil fields, causing them to produce hydrogen instead of oil.

Hydrogen powered vehicles, including cars, buses, and trains, have been in development for many years. These vehicles have been acknowledged to be efficient, but the high price of extracting the Hydrogen from oil reserves has meant that the technology has not been economically viable. Now a group of Canadian engineers have developed a cheap method of extracting H₂ from oil sands. They are presenting this work at the Goldschmidt Geochemistry Conference in Barcelona.

"There are vast oil sand reservoirs in several countries, with huge fields in Alberta in Canada, but also in Venezuela and other countries" said Dr. Ian Gates, of the Department of Chemical Engineering at the University of Calgary, and of Proton Technologies Inc.).

Oil fields, even abandoned [oil fields](#), still contain significant amounts of oil. The researchers have found that injecting oxygen into the fields raises the temperature and liberates H₂, which can then be separated from other gases via specialist filters. Hydrogen is not pre-existing in the reservoirs, but pumping oxygen means that the reaction to form [hydrogen](#) can take place.

Grant Strem, CEO of Proton Technologies which is commercializing the process says "This technique can draw up huge quantities of hydrogen while leaving the carbon in the ground. When working at production level, we anticipate we will be able to use the existing infrastructure and distribution chains to produce H₂ for between 10 and 50 cents per kilo. This means it potentially costs a fraction of gasoline for equivalent output". This compares with current H₂ production costs of around \$2/kilo. Around 5% of the H₂ produced then powers the oxygen production plant, so the system more than pays for itself.

The economics of the process is favorable according to Grant Strem "What comes out of the ground is hydrogen gas, so we don't have the huge above-ground purification costs associated with oil refining: we use the ground as our reaction vessel. Just taking Alberta as an example, we have the potential to supply Canada's entire electricity requirement for 330 years (Canada uses around 2.5% of the world's electricity—around the same amount as Germany, and more than France or the UK). Our initial aim is to scale up the production

from Canadian [oil sands](#), but in fact, we anticipate that most of the interest in this process will come from outside Canada, as the economics and the environmental implications make people look very hard at whether they want to continue conventional oil production. The only product of this process is hydrogen, meaning that it the technology is effectively pollution and emission free. All the other gases remain in the ground because they cannot go through the hydrogen filter and up to the surface".

The technology was developed by Ian Gates and Jacky Wang as the result of an agreement between the University of Calgary and Proton Technologies Inc., which now holds the patent.

Professor Brian Horsfield (GFZ German Research Centre for Geosciences, Potsdam) said: "The research is highly innovative and exciting. It's an adaptation of some 1970's fire-flood production concepts, but tuned to a modern day perspective. Declining oil field production infrastructures now stand to get a new lease of life. Extensive field testing will be crucial in assessing how the system works on industrial scales and over time"

More information: Clean Hydrogen Production (Only!)From Heavy Oil Reservoirs, goldschmidt.info/2019/

Pollution-free hydrogen: green energy breakthrough? techxplore.com/news/2019-08-pollution-free-hydrogen-breakthrough.html

Provided by Goldschmidt Conference

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