

Hydrogen Hub Alberta for Green Future

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Alberta is uniquely positioned to take a leadership role in the emerging clean hydrogen production value chain as we have both blue hydrogen production capabilities due to abundant natural gas reserves (more than half of all the natural gas in Canada) by ATR + CCS and a ready-made infrastructure of Alberta Carbon Trunk line for carbon disposal. Alberta leads in per capita energy consumption as well as it is highest GHG emitter in Canada. Hydrogen production by ATR + CCS in Alberta will bring carbon intensity well below threshold of 4.37 kg of CO₂ per kg of H₂.

Incentives like Clean Hydrogen Investment Tax Credit, Investment Tax Credits for Carbon Capture, Utilization and storage, Alberta Emission Performance Credits, Clean Fuel Standard and saving in carbon tax makes hydrogen production cost competitive (< 2\$ / kg) in Alberta.

Alberta hydrogen roadmap supports establishing new hydrogen demand outside of its traditional use as an industrial feedstock & supports emerging hydrogen market in transportation, utility heat market, storage, export, power generation etc.

The concept of Alberta hydrogen hub represents a visionary step towards integrating Hydrogen as an energy vector and decarbonizes Alberta's industrial heartland. It will have 3 phases of ATRs with supplier contract with ATR technology companies. Carbon will be disposed via Alberta Carbon Trunk line. Construction of H₂ pipeline network and distributed production will enable a pipeline hub through the heart of Alberta delivering hydrogen to industrial and municipal clients. Surplus hydrogen will be stored underground in potential salt caverns near Lotsberg, Alberta.

Other than supplying hydrogen to industry processes, hydrogen will be supplied to –

- 1) Municipalities for home heating – Hydrogen combi furnace by Gradient Thermal Inc.
- 2) Green winter tourism- H₂ fuel cell snowmobile and snow groomers
- 3) Hydrogen fuel cell forklifts for use in indoor warehouses.
- 4) Saskatchewan's motive agricultural transportation- H₂ fuel cell tractors, trucks, trailers, harvesters, H₂ power irrigation system etc.

Salt caverns provide the ability to use every KWH of energy and results in ~ 20 % increase in project economics. Alberta hydrogen hub will be exporting hydrogen to Saskatchewan where it will be stored underground in potential salt caverns near Lloydminster and Saskatoon.

Apart from having business and competitive clean hydrogen advantages, Alberta has some challenges like lack of hydrogen refueling stations and safety considerations in designing H₂ systems. Also, the barrier for H₂ hub proposition would be financial and policy mechanism.

More research would be required for in situ gasification of bitumen for hydrogen production with potential to sequester CO₂ directly in the reservoir to take advantage of Alberta's oil sand bitumen reserve.

