Utilizing green hydrogen in high heat industrial processes is a path to decarbonization

Net Zero Atlantic contracted Wood. to explore green hydrogen's potential for industrial heating in Nova Scotia

1. Nova Scotia's industrial sector today

- Heavy industry and manufacturing are hard to abate
- 600,000 tCO_2 eq emitted from heavy industry & light manufacturing in NS in 2022*
- 25% of global energy demand from industrial heating

*source: https://publications.gc.ca/collections/collection_2024/eccc/En81-4-2022-3-eng.pdf

2. Fossil fuels vs. green hydrogen emissions

$CH_4 + 2O_2 \rightarrow 2H_2O + CO_2$ + heat

Burning fossil fuels (e.g. Methane/CH_4) and oxygen/O_2 emits water/H_2O, carbon dioxide/CO_2, and heat.

$H_2 + O_2 \rightarrow 2H_2O$ + heat

Burning green hydrogen and oxygen emits water and heat.

20% H_2 blends possible in most process equipment

3. Operational considerations when firing green H_2

FLAME

~7× faster flame speed H_2 vs. natural gas

100% H_2 flame is invisible

4% –75% is the flammable range of hydrogen in air by volume.

EQUIPMENT

H_2's low density = larger piping and storage requirements

H_2 can cause embrittlement in high strength steels

H_2O dense stack plume

HEAT

Increase in % H_2 = Decrease in Flue Gas Flow

~1.2× hotter flame temp. H_2 vs. natural gas

COST

by 2030 — 50% decrease in H_2 production cost

by 2050 — 40% additional decrease in H_2 production cost

4. Net zero report insights

Provincial and Federal governments are supportive of green H_2 development.

Green H_2 is a confirmed pathway to reduce emissions from industrial process heating.

H_2 costs are expected to decrease over time.

Nova Scotia's renewable resources strategically position it to lead green H_2 development.

H_2-ready equipment is available today.

Mitigations are available for operational considerations when firing H_2.

Goal: Net zero by 2050

net-zero atlantic

wood.

Download the reports from the Decarbonizing Nova Scotia's Industrial Sector with Green Hydrogen project at **netzeroatlantic.ca/research-portal**