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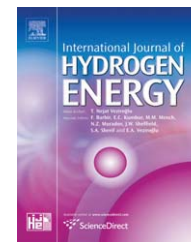


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## Challenges for renewable hydrogen production from biomass

David B. Levin<sup>a,b,\*</sup>, Richard Chahine<sup>c,b</sup>

<sup>a</sup>Department of Biosystems Engineering, University of Manitoba, Winnipeg, Manitoba, Canada R3T 5V6

<sup>b</sup>NSERC Hydrogen Canada (H2CAN) Strategic Research Network, Canada

<sup>c</sup>Hydrogen Research Institute, Université du Québec à Trois-Rivières, 3351 Boul. Des Forges (P.O. Box 500), Trois-Rivières, Québec G9A 5H7, Canada

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### ABSTRACT

The increasing demand for H<sub>2</sub> for heavy oil upgrading, desulfurization and upgrading of conventional petroleum, and for production of ammonium, in addition to the projected demand for H<sub>2</sub> as a transportation fuel and portable power, will require H<sub>2</sub> production on a massive scale. Increased production of H<sub>2</sub> by current technologies will consume greater amounts of conventional hydrocarbons (primarily natural gas), which in turn will generate greater greenhouse gas emissions. Production of H<sub>2</sub> from renewable sources derived from agricultural or other waste streams offers the possibility to contribute to the production capacity with lower or no net greenhouse gas emissions (without carbon sequestration technologies), increasing the flexibility and improving the economics of distributed and semi-centralized reforming. Electrolysis, thermocatalytic, and biological production can be easily adapted to on-site decentralized production of H<sub>2</sub>, circumventing the need to establish a large and costly distribution infrastructure. Each of these H<sub>2</sub> production technologies, however, faces technical challenges, including conversion efficiencies, feedstock type, and the need to safely integrate H<sub>2</sub> production systems with H<sub>2</sub> purification and storage technologies.

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