



Committee Report

To: Warden Janice Jackson
Members of the Planning and Development Committee

From: Mark Paoli
Director, Planning and Economic Development

Date: April 15, 2021

Re: Bruce Innovates Foundational Hydrogen Infrastructure Feasibility Report

Staff Recommendation:

That the Bruce Innovates Foundational Hydrogen Infrastructure Feasibility Report be received; and,

That staff be directed to share the Bruce Innovates Foundational Hydrogen Infrastructure Feasibility Report broadly with the energy sector and other interested stakeholders; and,

That staff be directed to promote Bruce County as a unique region with the economic profile, location, resources, readiness to build, and partners required to become a leader in clean hydrogen technology, research and innovation; and,

That staff, in consideration of the Memorandum of Understanding with Saugeen First Nation that ended on December 31, 2020, be directed to advance conversations with the Nuclear Innovation Institute's Centre for Next Generation Technologies to align efforts on the advancement of hydrogen in Bruce County.

Background:

In December of 2020, Hatch presented an update on their progress in advancing the Bruce Innovates Foundational Work - feasibility study and market assessment. The feasibility study was sought to assess the project's plans to advance foundational hydrogen infrastructure answering the question "will it work" and a business plan (formed from the knowledge gained from the feasibility study and market assessment) to form the framework to build the industry, answering the question "how will it work".

The Bruce Innovates Foundational Hydrogen Infrastructure Feasibility Report, which includes a market assessment, is attached. An Executive Summary is also attached. For reference, Hatch approached this work by considering the technical, financial and market analysis to articulate a professional expert opinion of the project and for consideration of next steps. Appendix "A" - Path to Bruce Innovates provides a chronological recap of how the initiative has evolved to where it is today.

Feasibility Study and Market Assessment Key Take-Aways:

For clarity, the following terms are used as described below in this report:

Bruce Region means the geographic area that includes Bruce, Grey and Huron Counties

Bruce County means the Corporation of the County of Bruce
County - means the geographic area of Bruce.

In the report, Hatch has shared a supportive and realistic overview of the growth in the hydrogen sector, its role in contributing to Provincial, National, and worldwide climate reduction targets and the potential for development of a production and storage hub in the Bruce region. There are several key take-aways from both the feasibility analysis and from the market assessment. The list below represents a few of the main points and although it is not an exhaustive list.

1. The demand for hydrogen in Ontario can be expected to grow significantly in the next thirty years to meet Ontario and Canada's climate goals. Several hundreds of megawatt capacity of electrolysis is anticipated to match the forecasted demand.
2. The market assessment highlighted that there is very little demand for hydrogen at this time locally in the county.
3. Sectors identified as possible export opportunities for green hydrogen consumption primarily outside of the Bruce Region include:
 - a. Industry & Ammonia Production
 - b. Transportation
 - c. Power-to-Gas
4. A 5MW demonstration plant, as considered in this study, has been deemed to be technically feasible. However, it is not financially viable today with the current grid electricity pricing in Ontario and market prices of grey and blue hydrogen. At present there are no incentives for consumers to purchase green hydrogen at a premium in Canada.
5. **Environmental Impact:** A hydrogen generation plant will not cause any negative environmental impacts. The use of hydrogen to decarbonize various sectors will lead to positive environmental impact by displacing fossil fuels.
 - a. The greatest environmental benefits are realized by displacing gasoline and diesel in the transportation sector, with the potential to reduce emissions by 89% and 85% respectively for every Liter of fuel displaced.
6. **Economic Impact:** A hydrogen facility in the county will provide economic benefits for the county both during construction and operations. The growth of hydrogen production beyond a 5MW plant in the sector will enhance the existing job mix in the county to close the gap between those in the sales/service sector and utilities.

7. **Social Impact:** A hydrogen plant has the potential to advance investment in training and education facilities in the county, retain and attract professional talent and position the county as a vital player in Ontario's green hydrogen industry if successfully executed.
8. **Underground Storage:** Underground formations within the county were identified to hold potential for gas storage but these opportunities would need to be further studied and tested for suitability with Hydrogen.
9. **Site Selection:** Several potential sites within the Bruce region were identified for the demonstration facility that meet the selection criteria such as land, access to utilities and the potential for expansion to support a growing production hub.
10. **Key Recommendations:**
 - a. Consider a larger (20 MW or greater) starting facility size with vehicle refueling and a contracted off-taker/sponsor for improved financial, economic, environmental, and social impacts.
 - b. Negotiate lower fixed electricity price with the IESO and ensure high plant utilization to minimize LCOH.
 - c. Seek out sources of funding and determine requirements for applications.
 - d. Establish MOUs and LOIs with interested parties to quantify demand, the frequency, cost and mode of supply.

From the analysis provided by Hatch, it is evident that hydrogen can be considered an emerging market in Canada and that the Bruce Region is a prime location to initiate and take advantage of 'first on the market' positioning. Doing so would grow the existing energy sector in the county, stimulate innovation and initiate an opportunity to capitalize on spin offs, next generation job creation and training. As represented in the Bruce Innovates Foundational Hydrogen Infrastructure Overview, a production hub and storage site could act as a catalyst to further sector expansion.

The 5 MW demonstration facility, the focal point of the Hatch report, is identified as an initial step to realizing a hydrogen economy in the county. From the analysis, this facility has the potential to create approximately 15-21 direct and indirect full-time employment opportunities over the two-year construction period and a Gross Value Add (GVA) of between 3.1 M - 4.3 M. Building a larger 20 MW facility would increase both the GVA and the full-time job creation by upwards of 2 times. A 100 MW facility would see that increase further to 5 times.

The operation variance of these facilities would see these same impacts range from starting with the 5 MW at \$.4 - \$.6 M and 2 FTE job creation annually. The 20 MW would see these numbers multiple by 4 and the 100 MW facility by 11. The job creation potential is a catalyst to evolving training, retaining and attracting skilled workers, entrepreneurial activity and securing the high paying jobs forecasted in NRCAN's federal Hydrogen strategy.

Key markets for the distribution of county produced Hydrogen include transportation, buildings (first by blending with Natural Gas) and industry (ammonia and urea). These markets serve as a near-term opportunity that can also accommodate a facility scale-up in the mid to long-term. It is noted that the two main cases for Hydrogen in an industrial context are in refining and chemical production. A focus on chemical industrial off-takers in Southwestern Ontario, namely the ammonia and urea industries and by extension fertilizer production. This market serves and will continue to serve the county's strong Agriculture sector. This poses an opportunity to leverage this connection and attract investment in green ammonia. In doing so, relationships to widen and the potential for additional off takers is realized. As demand increases, the potential to export to Sarnia, GTA and the tri-city areas, all within a 3-hour transport radius, represents a growth position.

Hatch identified the production facility as having the potential to be a hydrogen industry catalyst. As a "first on the scene" exporter, this would position the county to encourage industry growth and supply a range of markets with a low-carbon hydrogen option to meet their needs and reduce their environmental impacts. Doing so would enable the county to evolve into a major player within the hydrogen space and stands to gain longer-term economic and social benefits, encouraging investment and growth of the energy sector while leveraging its existing nuclear presence and facilitating the energy industry's further shift to decarbonization.

Conclusion: Establishing a Long-Term Production Hub:

Establishing a large-scale hydrogen production hub is considered by Hatch to be a parallel and independent task from the initial demonstration facility. High hydrogen demand is forecasted in Ontario (that could be supplied by multiple production hubs) and although no key technical barriers were identified to prevent the county from contributing to or even catalyzing this hydrogen market growth, a substantial amount of work must still be done in order to realize this goal and to de-risk pursuing a large-scale production hub. Hatch has identified two key areas that pose the highest risk to this vision and recommends the following actions to allow for a more informed decision on the program:

1. Socialize with critical program stakeholders

- Promote and bring to the forefront of public and industry stakeholders (IESO, government, vendors and sponsors) awareness and inform companies that they should act and plan for their hydrogen adoption or carbon reduction strategy.
- Understand if there is interest and to what level.

2. Gauge specific hydrogen demand interest

- The low-carbon gaseous hydrogen market still needs to be established or incentivized to make this venture viable. Limited and inadequate hydrogen demand exists in the county today and new demand opportunities would need to be coordinated locally (e.g., an ammonia plant) or exported to other demand centers to support a production hub. Identifying specific hydrogen off-takers will

provide insight into the deployment roadmap and de-risk the endeavor for more informed decision making.

Points for Consideration in Determining Next Steps:

Hatch has presented a professional overview of the Bruce Innovates concept with recommendations and considerations in moving the initiative forward. With the completion on this work, staff are seeking Council's direction on next steps with the following considerations:

- Share the completed feasibility study with potential commercial developers to advance the potential production hub and storage capability.
- Continue to entertain supports for firms in the hydrogen space aside from involvement in the Bruce Innovates initiative as key economic drivers in filling the energy diversification gap and current labour gaps.
- Begin discussions with the NII and the Centre for Next Generation Nuclear Technology to work together and align efforts avoiding duplication in advancing the hydrogen sector in the county.
- Facilitate and support Private Sector Partnerships with the Bruce County Federation of Agriculture as an important future industry growth initiative.
- While the Memorandum of Understanding with the Saugeen First Nation has expired, formal dissolution of the partnership should be discussed, and a plan forward should be developed - especially next steps with some respect to the first nation's objectives in forming the partnership. A delegation from County staff and Hatch was planned for the Saugeen Band Council as well to recap the work to date and presenting the findings from the feasibility study / market assessment may be a good way to finish off the work undertaken by the partnership. This is still in progress and will proceed allowing for Covid restrictions.
- A formal communication to the Bruce Innovates steering committee should be sent if the group is disbanded.

Financial/Staffing/Legal/IT Considerations:

Originally, this work included leveraging \$125,000 needed to apply to FCM's Green Municipal Fund, a program specifically for feasibility studies. From industry advice, it was understood that this work would cost approximately \$250,000 - \$350,000. The final proposed budget submitted to FCM was \$297,500. The County was approved for \$148,500 based on a cash contribution of \$124,750 and an in kind (staff) of \$24,000. The grant provides 50% funding towards expenses. The development of the feasibility study and market assessment came in under the anticipated spend. The total cost of this work was \$140,500. \$70,250 of the cost is covered through the successful grant application to FCM's Green Municipal Fund leveraged with \$70,250 from the bridge reserve as approved in the March 2020 Corporate Services Committee meeting.

The costs associated with the Recommendations would be in line with the scope of the existing Planning and Development Department operating budget.

Interdepartmental Consultation:

Corporate Services in conjunction with financial detail. Office of the CAO in relation to report development and recommendations for consideration.

Link to Strategic Goals and Elements:

- Goal #6 Explore alternate options to improve efficiency, service:
 - C. Look for economy of scale or shared services among our departments and our communities
- Goal #7 Stimulate and reward innovation and economic development

Report Author:

Jill Roote
Manager, Economic Development, Planning and Development

Departmental Approval:

Mark Paoli
Director, Planning and Development

Approved for Submission:

Sandra Datars Bere
Chief Administrative Officer

APPENDIX 'A'

Path to Bruce Innovates:

The following represents the chronological history behind the Bruce Innovates file for reference, and as further background to its connection to the overall objectives within Bruce County's Economic Development function and its alignment to the ["Find Yourself in Bruce" Economic Development Strategic Plan](#).

1. July 12, 2018 Planning and Development Committee

Deloitte presented Project Innovate - Driving Innovation in Bruce County. The report highlighted the county's labour challenges and the need to spur an innovative entrepreneurial landscape, in conjunction with establishing a collaborative environment between industry and academia, to support and grow a diversified economic base building on the strengths from being home to the largest nuclear generating station - Bruce Power - and advance an energy supercluster. Among other benefits, doing so would help to fill the gap in the disparity in career opportunities across the region. Council endorsed the action plan.

[JULY 12 2018 PROJECT INNOVATE PRESENTATION AT PDC](#)

2. October 18, 2018 Planning and Development Committee

Delegation presented "Energy Innovation in Bruce County", illustrating how the county is uniquely positioned to become the "Hydrogen Capital of Canada". Matthew Fairlie, with the Hydrogen Business Council (HBC), Sam Suppiah, with the Canadian Nuclear Laboratories (CNL) and Ron Oberth, with the Organization of Canadian Nuclear Industries (OCNI). This delegation noted two competitive strengths for the county in growing the hydrogen sector - production based on the proximity to nuclear and wind electricity and the vast geologic formations that support storage capabilities. Production plus storage and important aspects to consider with respect to future energy developments. Council supported the concept.

[OCTOBER 18 2018 PLANNING AND DEVELOPMENT COMMITTEE](#)

3. November 18, 2018 Planning and Development Committee

Deloitte presented the business plan for the Bruce Centre of Excellence, which illustrated the framework for integration of a Skilled Workforce Secretariat and Energy Business Incubator into the Ontario Nuclear Innovation Institute (originally coined as the Bruce Centre of Excellence). Council endorsed the plan.

[PDC NOVEMBER 18 2018 BRUCE CENTRE OF EXCELLENCE](#)

4. May 2019 Memorandum of Understanding with Saugeen First Nations

Bruce County signed a Memorandum of Understanding (MOU) with Saugeen First Nation, 7GFuels, to partner and to facilitate the programs evolution and both organizations contributed seed money to support the advancement of the program. The highlights of this work were communicated to Council via regular information / action reports to the Planning and Development Committee and a monthly update as an attachment to the Communications in The Field report.

5. Highlights of the Initial work beginning in Q3 of 2019 and continuing through 2020 by the Saugeen First Nation / Bruce County Partnership Steering Committee included:

- Areas of focus for Committee Work included: Government Relations, Economic and Market Development, Red Tape and Business Burden Reduction and Research, Development and Training.
- The project steering committee acknowledged that there are several interested parties in both the private and public sector that want to support the hydrogen agenda. Various partnerships and committee connections ensued as a result.
- Committee input as a response to the Provincial consultation of electricity pricing and programs was submitted in May 2019. A second submission pertaining specifically to this project and surplus pricing was also submitted via the project steering committee representatives.
- The initial focus of the committee was on the large-scale deployment starting with the demonstration but noted that mini pilot projects would happen simultaneously. (Page 18 in the Bruce Innovates - Project Overview document details the action plan for the entire process towards hydrogen advancement in the county starting with the pre-pilot phase - feasibility / business case - and then follows the 3 phase process).

6. Highlights of Federal Grant Applications (all unsuccessful) submitted in 2019 to Support this Large-Scale Deployment effort. These were done by County staff.

- Saugeen Sustainability Energy Centre - submissions made to the Low Carbon Economy Challenge Fund (LCEF) Underground Storage / Dynamic Electrolyzer - submission made to the Strategic Innovation Fund (SIF)
- An application to NRCan's NICE program submitted for both the SSEC and Storage / Electrolyser initiatives.
- Following the Steering Committee's approval, a letter was sent to the Prime Minister Justin Trudeau with copies to the Ministers of the Environment and Climate Change, Natural Resources, Crown - Indigenous Relations and Innovation, Science and Economic Development to communicate the lengthy process in accessing funding streams and requirements.

Note- the unsuccessful applications led to the realization of that proof in concept was needed and further acknowledged the importance of the feasibility study.

7. July 11, 2019 Planning and Development Committee

This was a pivotal moment in that it was acknowledged through the Bruce Innovates update information report -- that there was a need to undertake the development of what was thought to be the foundational work necessary to access the required funds that would advance the project objectives. To date, all funding avenues had been declined. The reason was that there was a need for the supporting work to make applications for various programs more impactful.

NOTE: In 2019, the Corporate Services Committee endorsed \$125,000 toward this project from the Federal Gas Tax top-up. In March of 2020, a report to the Corporate Services Committee noted that AMO deemed this project (along with 3 others) ineligible for the gas tax top up funding allocation. Therefore, a recommendation was

made and endorsed that these projects would be supported instead through the 2019 McCurdy Bridge project and as such, that these projects (totaling \$249,000 including Speed/Traffic Measurement Camera Device, Speed Warning Signs, Cultural Action Plan & Archaeology Master Plan and the Hydrogen Project Feasibility Study and Business Case - Bruce Innovates), have their 2019 budget and funding reallocated from the Bridge Reserve.

[MARCH 2020 CORPORATE SERVICES COMMITTEE GAS TAX REALLOCATION](#)

NOTE: Through various meetings during the initial development of the initiative, with Ministry staff at both the Federal and Provincial levels, it became apparent that there was a need for additional documentation that clearly outlines why hydrogen, why Bruce County, the potential commercial interest and the impact on the local economy. This led to the development presented by Hatch and includes the realistic benefits to the region now and into the future with respect to social, environmental and economic gains.

8. 2020- This work continues to gain traction

The initiative had advanced to the point where corporate partners are joining Bruce County and Saugeen First Nation to realize the hydrogen potential of the region and its economic, social and environmental benefits. There are a number of Non-Disclosure Agreements (NDAs) with commercial entities that were interested in the pilot with Private Sector Partner. Those advances have ceased. However, other commercial entities reached out about advancing various hydrogen focused companies.