



LANGUAGE LADDERS

A1. Scientific Principles

As part of the justification for your rating, please include a description of the major scientific issues involved in this pathway, and the state of knowledge on these at this time.

Please select which of the following statements best represents the Pathway.

- A. The scientific principles involved in the pathway are not yet fully understood.
- B. The scientific principles involved in the major steps in the pathway are well understood and all relevant information has been disseminated to the scientific community.
- C. The scientific principles involved in all steps in the pathway are well understood and have been validated by independent research teams...
- D. ...and no significant scientific questions remain to be answered in this pathway.

A2. Technology Validation

As part of the justification for your rating, please include an overview of each of the primary technologies involved in the pathway, the scale-up steps required and the degree of validation.

Please select which of the following statements best represents the Pathway.

- A. The technologies involved in this pathway have not been tested beyond the laboratory bench scale.
- B. The technologies involved in this pathway have been successfully tested at the first logical scale beyond the laboratory bench.
- C. The technologies involved in this pathway have been successfully tested on a demonstration scale under commercially relevant conditions...
- D. ...and external stakeholders have been involved in the demonstration and have accepted or validated the results.

A3. Commercial Readiness

"Integrated" in this Language Ladder means that all major technology components have been coupled together in a manner equivalent to that which would occur in a commercial operation.

Please select which of the following statements best represents the Pathway.

- A. The technologies involved in the pathway have not been tested as an integrated process.
- B. The major technologies involved in the pathway have been successfully tested as an integrated process but not yet under conditions relevant to a commercial operation.
- C. The major technologies involved in the pathway have been tested as a integrated process under conditions relevant to a commercial operation...
- D. ...and any remaining commercialization risks are expected to be acceptable to organizations operating in this sector.

A4. Societal Acceptability

Please select which of the following statements best represents the Pathway.

- A. Commercialization of this pathway would encounter significant societal resistance which will not be readily overcome.
- B. Commercialization of this pathway would encounter societal concerns and it will be a challenge to address these in a clear and convincing manner.
- C. Societal concerns arising from the commercialization of this pathway would be minimal and are expected to be relatively easy to address.
- D. Commercialization of this pathway would not encounter societal concerns.

A5. Fit to Canadian National Initiative

A Canadian National Initiative is one that has the potential to have an economic and/or social impact equivalent to past Canadian projects such as building the national railway. It may include a high level of participation in a major international project.

Please select which of the following statements best represents the Pathway.

- A. The pathway is not yet ready to be considered as a potential Canadian National Initiative.
- B. This pathway has high potential to be a Canadian National Initiative but there is minimum evidence of support by Canadian public and/or private stakeholders.
- C. This pathway is an important Canadian National Initiative which has been supported by Canadian public and/or private stakeholders.
- D. This pathway is a major Canadian National Initiative in which there is clearly demonstrated sustaining support by Canadian public and/or private stakeholders.

B1. Corporate Capacity

Please describe the corporate capacity required to fully commercialize this pathway in all its aspects. Provide names of companies where appropriate and indications of their experience and strengths relevant to the pathway.

Please select which of the following statements best represents the Pathway.

- A. There are no Canadian companies who have the capacity to be leaders in the development of this pathway within Canada.
- B. There are one or more capable Canadian companies who will be leaders in commercialization of this pathway within Canada but the supporting industrial infrastructure will require significant enhancement.
- C. There are many capable Canadian companies who will be leaders in the commercialization of this pathway. The supporting industrial infrastructure is more than adequate to achieve effective commercialization.

- D. This pathway is in an area of major Canadian industrial strength and the full commercialization of this pathway will ensure that many Canadian companies will be able to achieve and maintain a world leadership position.

B2. Canadian Competitive Advantage

Please provide a description of the specific competitive advantages (including examples) that commercialization of this pathway would provide for Canada, both in energy related markets and in the global economy as a whole.

Please select which of the following statements best represents the Pathway.

- A. Commercialization of this pathway would not contribute to any unique Canadian strength in international energy markets.
- B. Commercialization of this pathway would fit well with existing Canadian strengths in international energy markets.
- C. Commercialization of this pathway would add significantly to existing Canadian strengths in international energy markets...
- D. ...and would give Canada an important and sustainable competitive advantage in wider aspects of the global economy.

B3. Sustainability

Please describe how full commercial development of this pathway would extend the life of existing sources of energy and/or create new sources with the potential to substitute for non-renewable sources. Include specific examples and estimates of substitution potential where possible.

Please select which of the following statements best represents the Pathway.

- A. Development of this pathway would neither
 - i) extend the expected commercial life span of an existing energy source, nor
 - ii) introduce a new energy source with a life span over 30 years.
- B. Development of this pathway would measurably (by at least 30 years) extend the

expected commercial life span of an existing energy source, or would introduce a new energy source with an equivalent life span.

- C. Development of this pathway would extend the expected commercial life span of an existing energy source well beyond any current societal planning horizon (100 years plus), or would introduce a new source with the same long term potential.
- D. Development of this pathway would result in an essentially unlimited energy supply.

B4. Enabler for Another Pathway

As part of the justification for your rating, please describe the specific interactions and interdependencies of this pathway with other existing or potential energy pathways.

Please select which of the following statements best represents the Pathway.

- A. Commercialization of this pathway is dependent on the successful commercialization of another energy pathway but will not contribute in itself to the successful commercialization of that pathway.
- B. Commercialization of this pathway is not dependent on the successful commercialization of another pathway and will not contribute in a measurable way to the successful commercialization of another energy pathway.
- C. Commercialization of this pathway will contribute in a measurable way to the successful commercialization of another energy pathway.
- D. Commercialization of this pathway is essential to the effective commercialization of another energy pathway and will substantially enhance the effectiveness of both.

B5. Delivery/Infrastructure Issues

As part of the justification for your rating, please describe issues related to the delivery of the energy source in this pathway (such as, for instance, integration into an existing grid, storage, backup, etc.) and their means of resolution where appropriate.

Please select which of the following statements best represents the Pathway.

- A. Little or no infrastructure exists for delivery of this energy source and/or there are significant unresolved issues related to delivery which must be dealt with before commercial introduction.
- B. Some unresolved delivery/infrastructure issues exist but these can reasonably be expected to be dealt with before commercial introduction.
- C. This energy source is part of a commercial delivery system in at least one major market in Canada and the experience in that market is completely transferable across Canada.
- D. The delivery/infrastructure system for this energy source is well established in most regions across Canada.

C1. Economic Impact

Please select which of the following statements best represents the Pathway.

- A. Successful commercialization of this pathway would have a limited or short term economic impact on the Canadian economy.
- B. Successful commercialization of this pathway would contribute to the Canadian economy, and possibly would have major impact in a specific geographic region.
- C. Successful commercialization of this pathway would have a major positive and sustained impact across the Canadian economy ...
- D. ...and would be equivalent to other significant Canadian undertakings such as building the first gas pipeline across the country.

C2. Environmental (other than GHG emissions) Impact

Please identify the major environmental impacts (other than greenhouse gas emissions) affecting land, air and water that you have considered in arriving at your rating and provide explanatory comments.

Please select which of the following statements best represents the Pathway.

- A. Commercialization of this pathway would have significant negative overall environmental impacts that would be perceived as unacceptable by well-informed citizens.
- B. Commercialization of this pathway would have small negative overall impacts on the environment and well-informed citizens would seek evidence that those impacts would be acceptable.
- C. Commercialization of this pathway would have small positive overall environmental impacts in the view of well-informed citizens.
- D. Commercialization of this pathway would have significant positive overall environmental impacts in the view of well-informed citizens.

C3. Greenhouse Gas (GHG) Emissions Impact

Please select which of the following statements best represents the Pathway.

- A. Commercialization of this pathway would result in significant increases in Canada's total GHG emissions.
- B. Commercialization of this pathway would result in moderate increases in Canada's total GHG emissions.
- C. Commercialization of this pathway would result in moderate reductions in Canada's total GHG emissions.
- D. Commercialization of this pathway would result in significant reductions in Canada's total GHG emissions.

C4. Energy Efficiency Impact

Please select which of the following statements best represents the Pathway.

- A. Commercialization of this pathway would result in a reduction in the overall efficiency with which energy is produced/converted/delivered/used in Canada.

- B. Commercialization of this pathway would not have a material impact on the level of efficiency with which energy is produced/converted/delivered/used in Canada.
- C. Commercialization of this pathway would increase the overall efficiency with which energy is produced/converted/delivered/used in Canada.
- D. Successful commercialization of this pathway would result in major improvements in the efficiency with which energy is produced/converted/delivered/used in Canada.

C5. Value-Added Impact

Canada has expressed concern for many years about the low level of recovery and upgrading of our natural resources. This has led to a strong national goal of adding value to our raw resources, either by increasing yield/recovery or product value.

Please select which of the following statements best represents how the Pathway would increase the yield/recovery or value of the involved energy stream above that achieved by current commercial practice.

- A. Commercialization of this pathway would not increase the yield or value of products derived from this energy pathway, in comparison to current commercial practice.
- B. Commercialization of this pathway would moderately increase the yield or value of products derived from this energy pathway, in comparison to current commercial practice.
- C. Commercialization of this pathway would significantly increase the yield or value of products derived from this energy pathway, in comparison to current commercial practice.
- D. Commercialization of this pathway would result in a major transformation in how Canada's resources are recovered and upgraded within our borders.