# **Session Notes for Discussion Session:** New Data Opportunities for Linked Environment-Economy-Innovation Research

## Context of Discussion

There were two main topics discussed in this session:

**1. New Data in Canada**

As part of the Horizontal Business Innovation and Clean Technology Review, Statistics Canada and the Treasury Board Secretariat created a new dataset on innovation and business performance in Canada. This dataset combines data on business performance, derived from tax records, with information on government innovation programs and grants accessed for all firms in Canada.

Here are some of the key details of the new dataset:

* 10-year panel of every firm in Canada, including clean technology firms.
* Tax records (shipments, employment, etc.).
* Information on interactions with the federal government, including service transactions and grants. This covers the universe of federal innovation programs.
* Ability to link to other Statistics Canada data through Business Number.
* An anonymized version will be publicly available.

There is also a potential opportunity for researchers to augment Statistics Canada data with information from outside sources. This is particularly valuable for research on innovation, as Statistics Canada has a great wealth of information on outcomes for firms, but there are many dimensions of firm operations that this data cannot capture. One option to address this is to merge web-scraped information with existing Statistics Canada data.

One of the speakers in this session has done just this to derive new insights on innovation and entrepreneurship. This speaker’s work attempts to use information companies disclose online to determine if they are doing innovative activities. By matching this information with Statistics Canada’s innovation data, researchers hope to be able to test how well this web-based data captures firm innovation. This work may also be able to shed light on dimensions of innovation not captured by traditional survey methods.

**2. Funding Clean Tech – New Data and New Insights**

There are some important challenges to addressing the innovation deficit required to meet climate goals. For one, start-up rates are down across the OECD. In addition, young firms tend to drive patenting activity, but most of these young firms do not survive. These challenges have the potential to limit the development and uptake of new ideas and products. To get a sense of what makes a green start-up successful, and how that might differ from other start-ups, one of the speakers in this session has constructed a new dataset on start-ups and their innovative activities. This data, which matched the Crunchbase Database with patenting data (PATSTAT), provides rich information on the characteristics of companies and their founders, their success at patenting new products and technologies, and their funding and acquisition histories.

This has produced some interesting findings. In terms of a green start-up’s ability to attract funding, the founder’s background may be more important than the company’s background. For example, diversity among a company’s founders (e.g. age and gender) contributes to funding success. Except for government funding, previous entrepreneurial experience among founders is important for the company’s ability to attract funds.

This work has also helped determined some factors that contribute to the success of green start-ups (IPO or acquisition). For example, those that receive private venture capital funding have a higher rate of successful exit. However, those that receive government funding have a lower success rate. In addition, companies founded by people with previous patent filings are more successful. Similarly, companies with young founders are more successful.

There are also differences between green start-ups and other start-ups. Green founders are more likely to be academics, hold PhDs, or be inventors. There are also fewer serial entrepreneurs founding green technology companies. Green start-ups are also more likely to attract venture capital funding, particularly from government sources. In addition, conditional on receiving funding, green start-ups also receive more.

## Research Questions Identified

The following specific research questions/ideas emerged from the discussion:

* **What framework should be used to study clean technology and innovation?** Can, and should, we study the clean-tech industry in isolation? Clean tech firms are very different from others. They face multiple market failures (innovation and externalities) and may require large infrastructure investments. However, that does not mean we can look at clean tech on its own. **What can we learn by comparing clean tech to other sectors?**
* **What are the most productive links for the new Canadian data?** This data can be used in isolation, but the goal is to leverage this new dataset by linking it with other data. Here are just a few potential links:
  + Survey of Innovation and Business Strategies or Survey of Advanced Technology.
  + Employment records/tax.
  + Pollution data.
  + Energy use.
  + Scientific Research and Experimental Development (SR&ED) forms.
  + Administrative data, such as crop-yield and solar panel installation counts derived from satellite data.
* **How can the new Canadian data best be leveraged?** Can researchers help promote or encourage links with this data? If so, how?
* **What are the opportunities for collaboration between researchers and government?** Can researchers bring in data to help address specific policy questions? Are there government programs underway that researchers could study to provide evidence on program effectiveness?
* **How large of an opportunity is innovation in addressing climate change?** How large of a reduction in emissions could the adoption of existing clean-tech deliver? Do we need new ideas/technologies, or is the adoption existing technologies sufficient? Are there potential negative consequences of innovation, in terms of increased emissions?
* **Is there a gender bias in clean-tech?** Johnstone’s work shows evidence that there might be a gender bias in capital funding for green tech. Companies founded by women are 30% less likely to be funded. In addition, conditional on being funded, these companies receive 17% less funding, but have the same success rate. The gender bias disappears if the funding group is managed by a woman. **Is this any different from other types of new technology? What is the right policy response to address this potential bias?**
* **Why do private vs. government funded green start-ups have different outcomes?** Johnstone identified some factors that contribute to the success of green start-ups, noting those that receive private funding have different success rates from those with government support. How could selection be driving these results? Does this imply government funding programs may need to be rethought?
* **What makes a company successful at receiving government support?**
* **What other web-scraped data might be useful for studying innovation?**
* **Are there opportunities for collaboration on data development across jurisdictions?** In Canada, can the new federal data be augmented with provincial data? Can links between Canadian and OECD data be made?