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Workshop Outcomes Paper

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Cleantech Data in Canada

The Canadian government has clearly recognized that growth in clean technology represents an important economic opportunity for Canada, and will simultaneously assist the country in its transition to a low carbon future. The Government's Clean Technology Data Strategy will, among other things, provide for the collection of data on the sector to inform the evidence base. To date this strategy has primarily focused on the macroeconomic data collected and disseminated by Statistics Canada (StatsCan); however, during consultations held by NRCan in Fall 2016, stakeholders pointed to data needs that were beyond what will be available through StatsCan's (and other) data collection initiatives.

One aspect of this data, which has been labelled 'industry data', will be key to understanding the dynamics of the private marketplace, enabling a deep understanding of what drives successful commercialization, and what is holding Canadian companies back. It will also feed into the design of policies and programs that build on strengths and address weaknesses.

Industry data refers to data, typically sourced from a range of private and not-for-profit market participants, which seeks to capture in detail the economic health of a specific market or sector but are not generally captured and/or are not reported in great detail in StatsCan's national data program.

A workshop aimed at identifying the opportunities for industry-level data to complement federal government data was convened on behalf of NRCan, ISED and StatsCan on April 6, 2017 at the MaRS Discovery District in Toronto. Forty five stakeholders from across the country discussed the scope and scale of data needed by different stakeholders, highlighted the need for alignment with various levels and sources of data, and developed a base structure for moving forward. The workshop informed the Government of Canada, the provinces and territories, and other key stakeholders in the cleantech space, and provided a forum to receive deep feedback on:

1. key needs and uses for industry-level data, and how well current sources meet those needs;

2. barriers to more consistent collection, aggregation and collective use of industry data by different market participants; and,

3. options or models that could improve the availability and use of data to create a positive impact on the growth and support of the sector.

Following is a summary of the workshop, with the key themes, outcomes and outputs of each of the breakout groups and sessions consolidated and summarized below.

Breakout Session #1 - Key needs and uses for industry-level data

In the first breakout session, each of the 6 tables had a robust discussion on:

- Who uses industry data, why and how?
- What data/indicators do we need in order to properly support the cleantech sector?
- What challenges exist in collecting cleantech data?

There was a clear recognition by those in the group that the current data being collected isn't yet meeting the needs and objectives of those in the sector. Success, and the factors contributing to it, need to be better measured and understood. Until this is done it will be extremely difficult, if not impossible, to effectively target programming and funding, and create the conditions for entrepreneurs and companies to thrive.

Who Uses Industry Data? Why?
The main users of industry-level cleantech data will be all levels of government, innovation and support networks, industry associations, academia, and to a much lesser extent, companies, investors, and cleantech customers. Each of these groups has, to one extent or another, a desire to understand the sector's growth and what is driving it, what is hindering it, and what can be done to remove any barriers.

For governments and innovation centres, the main goals are to understand the sector's economic impacts, and to have data that enables good decision making. By providing a consistent baseline set of indicators (*i.e.,* number of companies, the specific sectors in which they are working, jobs created, revenue generated, capital raised, intellectual property generated, export markets targeted, etc.), Canada's strengths and areas for improvement will be readily apparent. The data should also have the ability to help understand investment trends, sources of capital (grant, seed, series, debt, project), and where critical "valleys of death" exist that must be addressed to enable real success in the sector. It will also help to determine how Canadian companies are competing internationally.

Data would also help better understand the use and outcomes of available programs, particularly which areas are successful, and which ones might need to be tweaked, pivoted, or cancelled entirely. In addition to assessing programs within Canada, access to this data, if done correctly, can enable benchmarking against international peers (an example given was Norway's transportation policies, which have enabled the largest penetration of electric vehicles per capita in the world).   This would include federal programs and funding mechanisms such as SR&ED, IRAP, SDTC, as well as provincial and municipal initiatives.

A table with additional details on the outcome of this conversation can be found in Appendix A.

What data/indicators do we need in order to properly support the cleantech sector?
Following significant discussion, a non-exhaustive list of the types of industry data desired was put forward. The list can be found in Appendix B, with a short summary below.

The role of industry data in a pan-Canadian framework would be to more consistently address the need to track the progress of companies through the sector. The ability to do this over time, including feedback from key players and stakeholders, will help to determine what is working in developing the sector, what is not, and why. It will also help government and other actors to track results, tweak or revamp programs and opportunities to ensure funds deployed towards the sector are creating the largest possible impact.

The types of data desired are all intended to feed into the needs of the users, and the uses, previously identified. They include company level data, which will help key players understand the scope and scale of the industry, and its economic impact (revenue generated, capital raised, jobs created, etc). It will also identify availability of capital and the specific sources and types of capital being used (grant, government investment, friends and family, seed, debt, project, working capital, etc), and where companies are hitting the "valleys of death" that put them at risk of failing, or being acquired by international investors (in which case Canada loses the current and future economic value of these companies).

Data detailing the programs companies use and the opportunities they take advantage of is important, as is the information detailing the outcomes and success of these programs. This data will be important for the government and others offering programming to determine their relevance and success, and to modify them as needed to ensure successful outcomes.

Data should also be collected on things such as export markets, intellectual property development, team structure and diversity, market adoption both nationally and internationally, and the ability to access the talent necessary for rapid growth.

Challenges in Collecting and Using the Data
Many challenges with collecting the necessary industry data were identified. A summary follows, with a more fulsome list identified in Appendix C.

Collecting this data has a number of key challenges that must be addressed. One of the first issues to be addressed is the definition of clean technology that will be used specifically for industry data. This definition should build on the work already done by Statistics Canada and other government departments. It is expected that the industry-led data collection will focus on a narrower definition of cleantech (*e.g.*, technology companies that hold intellectual property). This is essentially a subset of the broader StatsCan definition. Finalizing the definition for industry data is absolutely essential as it will inform which companies will form part of this data initiative and which will not. Following this step, there will be a need to determine the taxonomy/hierarchy that will be used. The system must be flexible and nimble so that future iterations can be modified, since the sector is young and dynamic. What is considered cleantech today may not be tomorrow, and vice versa.

From a structural perspective, this means determining where this data will be housed, who will be responsible for its collection, how often it will be collected so that we can begin to see patterns and trends, and how it will align with the Government of Canada's current initiatives. Proper anonymization and data storage will be essential. It will also be necessary to determine who has access to the data and under what conditions.

Much data on the sector is already collected. As such, there is a need to identify what is already available and who holds the data, and determine how best to access and amalgamate it. The current data is not consistent among different sources so is not readily comparable. Survey fatigue is also an important consideration, so efficient data collection will help increase survey responses and avoid duplication, both being very important if we are to get a thorough dataset.

Quotes of Interest
"What is the role of government? The government shouldn't be picking winners, but rather backing winners and creating the conditions for the sector to grow."   "When a company is doing their first few projects, they are incredibly difficult to finance because of perceived risk by the market. If we don't fill that void our companies will flounder."   "Perhaps we already have this data somewhere, but it isn't readily accessible."

Breakout Session 2: Main Uses for Industry Data

In the second breakout session, participants were asked to build on the outcomes of the first breakout session, and delve deeper into the potential uses for industry data, what decisions it can enable, and what questions the data would need to answer. In addition, participants were asked to consider key success factors – the essential features of this data that will be required to ensure that it is deeply useful for stakeholders.

The main uses identified in this breakout session for the industry-level data are to:
- determine sector performance
- determine existing program effectiveness
- identify capital availability and gaps
- understand the effects and impacts of policy and regulatory decisions
- understand markets, adoption, key export opportunities
- assessment of the labour market, to provide input and feedback into the needs for job/skills training and post secondary education.

Other ideas for the data are to:
- use it to provide "matchmaking", essentially enabling the identification of potential investors, customers and partnerships
- help to quantify the emissions reduction and benefits to water and air quality, etc, enabled by Canadian cleantech firms

For each of the identified uses for industry data, a number of key success factors were identified. The ones most emphasized are:
- the consistency of the data, especially nationally (and internationally if possible, although this is considered unlikely)
- proper governance – data custodian, security and anonymity of sensitive data, and appropriate level of access
- ability to benchmark to understand the health of companies
- timing/frequency of data collection and analysis
- level of detail required
- ability to amalgamate and build on existing data sets

The litmus test for the success of the industry-level data will be whether it is used to make concrete and tangible decisions that benefit the sector.

Key considerations for the data are:
- Timing of collection (e.g., quarterly, annually, bi-annually)
- Level of consistency required
- Level of detail required
- Level of access for various stakeholders
- Ability to evolve along with the sector – perhaps tag companies under certain categories rather than creating a rigid taxonomy

Quotes of Interest
"Who will become the custodian?" "We cannot predict how the sector will evolve. There will need to be a method to tag companies under certain categories rather than creating a rigid taxonomy."

Breakout Session 3: Next steps

In advance of the workshop, participants were given a white paper that presented 5 different scenarios for the collection of data. The options varied from keeping data informal and uncoordinated ("business as usual") through to creating a coherent, cohesive strategy. Rather than dig into each of the options the group worked on determining next steps. The outcome

wasn't clear next steps, but rather a strong list of factors that need to be considered as the Clean Technology Data Strategy moves forward.

It was made very clear that leaving Canadian cleantech data in the current state is not an option. As already mentioned, the first step is to finalize a definition of "cleantech" that works for the industry, and as has already been mentioned, is likely a subset of the government's current, broad definition. In addition to the definition, it is necessary to determine the scope of cleantech for this particular purpose. Will the industry data collection apply only to "pure play" cleantech companies, or also include that part of large corporates that could be considered cleantech? Or is there perhaps a layered approach?

Data management will be very important, including determining who will be responsible for collecting and cleaning the data, and managing any structural changes over time. Additional factors to consider will be the frequency of data collection and governance of the data set, including privacy requirements, who is able to access the data, and on what terms.

Additional detail on the output of this session can be found in Appendix E.

Quotes of Interest
"The little guys are heads down trying to run a business. They look to the broader industry to make sure that there is value resulting from their efforts to submit this data. It must be heard and acted on."

Conclusion

The outcome of the day was broad consensus on the importance of industry-level data as Canada builds a world class cleantech sector. While there remains much to be determined, it is very clear that "business as usual" is not an option.

The role of industry data in a pan-Canadian framework would be to more consistently address the need to track the progress of companies through the sector. The ability to do this over time, including feedback from key players and stakeholders, will help to determine what is working in developing the sector, what is not, and why. It will also help government and other actors to track results, tweak or revamp programs and opportunities to ensure funds deployed towards the sector are creating the largest possible impact. To enable this, there is a clear desire to align the industry data with StatsCan's initiatives to ensure that both components complement work already underway with the Cleantech Data Strategy.

Appendix A
Additional Notes From Breakout Session #1 – Key Needs and Uses for Industry-Level Data

The following information summarizes the comments received from all the tables. It is amalgamated by key stakeholder group.

STAKEHOLDER GROUP	USE/PURPOSE
Government (Federal, Provincial, Territorial, Municipal)	• Providing a baseline – e.g., getting an accurate overview of the number and size of companies, and specific sectors where they are working (since "cleantech" is so broad), jobs created, revenue generated, capital raised, IP, etc. • Understanding investment trends, sources of capital (grant, seed, series, debt, project), and where critical "valleys of death" exist • Developing and assessing effectiveness of programs (e.g., SR&ED), granting/funding mechanisms (e.g., IRAP), and other interventions, and modifying as necessary • Determining success of programs compared to international peers (e.g., Norway's transportation policies) • Determining the sector's growth and understanding what is driving it, and what is hindering it (e.g., access to capital, talent, customers, etc) • Determining environmental outcomes from technologies • Determining how Canadian companies are competing internationally (multi-jurisdictional benchmarking) • Policy development, measurement and validation • Understanding the sector's economic impacts, including but not limited to jobs and revenues • Understanding technology adoption, both at home and abroad, including government procurement • Forecasting • Diversity • Can be a tool to bring government departments together around achieving outcomes
Innovation Support Networks/Industry Associations	• Same needs as the government
Academia	• Research opportunities for over-arching economic

	trends in the sector
Cleantech Companies, Investors, Buyers/Customers	• Is a difference between the data being used by the government to determine policy and that used to make business decisions • Need market information/market intelligence • Need to understand investment comparables, valuations, relevant investors for their type of company, potential customers, best export markets

Appendix B
Additional Notes From Breakout Session #1 - What Data/Indicators Do We Need in Order to Properly Support the Cleantech Sector?

This is an important but non-exhaustive list:

Industry Benchmarking	- Labour, economic metrics, etc. - Growth potential of various markets - Understanding the "Double Valley of Death" - High level aggregation of performance data
Cleantech Company Level Data	- How many cleantech companies do we have in Canada? Who are they and what stage are they at? - Which subsectors of cleantech are they working in? - Revenue - Jobs created - Capital raised - source of capital (grant, government investment, friends and family, seed, debt, project, working capital, etc.), including names of investors where possible - Round of financing - Exports – percentage of sales outside of Canada, countries selling to - Team diversity, especially senior team - Public-Private partnerships - R&D and IP
Government Return on Investment	Success metrics for government grants, investments and programs
Markets and Adoption	- What markets are adopting cleantech? - Tariff information on international markets - Are Canadians adopting their own technologies? Which ones?
Access to Talent	Where to access talent? What are the

	gaps in Canada? • Matchmaking data to connect companies with talent?
Program Support and Access	• Program availability and success • Data to enable modifications/pivots to ensure program effectiveness • Data to allow government to understand and report on outcomes from programs
Qualitative Data	• A question was raised: is there a need for qualitative data?

Appendix C
Additional Notes From Breakout Session #1 - Challenges With Collecting the Data

Timing	• Collecting data on a regular basis will be key to understanding trends
Consistency	• Need a clear definition of cleantech (as it relates to industry data specifically). It is necessary to ensure the industry is being properly accounted for • Alignment with government data initiatives and a connection between macro and micro • Taxonomy - should we be tagging the different classifications rather than creating a hierarchy?
System Flexibility	• The system supporting the data will need to be nimble so future iterations can be modified (what is considered cleantech today may not be in the future)
Consolidation and Accessibility	• Does the data exist? Need to determine what data already exists and use/re-use it • Must be consistent and comparable – not easy to amalgamate/compare existing data
Additional Notes and Needs	• Must manage survey fatigue – can prevent companies from responding (since collecting this data benefits the industry as a whole, but not the companies directly) • Must determine the correct indicators of success • Where are companies getting their capital • Where are the most relevant and largest export markets? • How do Canadian cleantech companies compare to their international peers • Anonymization of data, since sensitive company information is being shared • Impacts on the labour market, and needs for additional education/training, immigration, and other potential measures to fill the talent gap • How can data highlight relevant valleys of death, and feed government policy and programs to ensure continued sector growth? • Can we link emissions reductions to economic drivers like revenue and job growth? • Policy challenge: part of this government's mandate is ensuring emissions and environmental targets are achieved. GHG emissions, for example, are not geographically isolated. Global emissions resulting from deployment of Canadian

	technology should be given credit for the reductions (not just reductions physically located in Canada) • Need gender-based analysis (made clear that is wanted/needed in last budget)

Appendix D
Additional Notes From Breakout Session #2A – Main Uses for Industry Data

Existing Program Effectiveness	• Stop/start/maintain in terms of program deployment • Identification of gaps & unintended consequences of programs • Benchmarking against other countries • Identification of the structures that need to exist or be removed to permit the development and adoption of innovation in the sector • The current strategy right now is to spread wide and not to pick technologies but is that the best way?
Adoption, Existing Markets and New Opportunities	• What regions are seeing growth in cleantech adoption? • Who are the customers? • Are Canadian companies part of that growth? • What is fueling the traction? • Demand data would be useful to help companies orient themselves to where the opportunities for growth exist. • Import and export opportunities
Policy and Regulatory Development	• Effectiveness and enforcement of policy • What companies have survived the "double valley of death"? • What structures were there to support the ones that did? • Where did capital come from? • What challenges nearly caused them to fail? • What was lacking for those that did not survive? • How does support differ by jurisdiction? • Question: will this data be used to help measure the success of the infrastructure bank?
Financing	• Where are investments being made? How large are the rounds? Are they early or late stage investments? • Comparison to international trends on investment and competition • Can we find a way to collect valuation data? • How much capital runway do these companies need to break into the market? • What are the differences between the different categories of cleantech companies (e.g., water vs. energy vs. agtech)

Talent, Skills, and Education Data	• Where is accessible talent? How can it be connected with the right companies? • Information should be accessible on what schools and mentorship programs are available and whether those programs are preparing students to work for these companies • Understanding talent migration • What are universities with successful IP commercialization programs doing well/right? • Are regions seeing major changes in labour markets? Are the skills of these transitional workers compatible to the growing cleantech sector?
Matchmaking	• Are there opportunities to bring players together based on data – e.g., partnerships, investors, customers, etc • Should this be in scope?
Environmental Impact	• Emissions reductions, benefits to water and air quality, etc • International impacts of Canadian companies should be factored in • Should be a link between economic growth and environmental impact
Government Collaboration and Partnerships	• Envision a collaborative partnership between different agencies that allows for aggregated levels of analysis - any business with employees has an identifying number can use to link to data sources (enables anonymization, and collaboration between groups)

Appendix E
Additional Notes From Breakout Session #2B – Key Success Factors for the Data

Consistency	• National consistency critical, international would be ideal
Clarity/Alignment on definition of cleantech as it applies to industry data	• Need to finalize the definition of cleantech to be used for industry data. May be different than the government's current definition used to capture broad economic activity.
Timing	• Must collect data on consistent intervals (ideally annually) • Must be timely or will lose relevance • Is a dynamic sector, so need to report quickly and often or information will become obsolete
Tags Instead of Buckets?	• Sector will evolve. Will need to be a method to tag companies under certain categories. Perhaps better than a rigid taxonomy • Historical tags will need to be kept while room for new tags will be required
Regional Representation	• All regions must be represented
Governance and Maintenance	• Who will become the custodian? • Will there be sufficient meta-data to understand the core data? • Should a portal be created? Perhaps as part of the new cleantech hub? (Was disagreement on whether this is a viable option)
Decision Making	• Must be a concrete and tangible way to connect this dataset to decisions
Retention of Survey Participants	• Must have year-over-year data for the same companies. Will give a clear narrative about their growth, development, and usage of existing resources and programs
Level of Access	• Must determine who has access, and

	whether there is a cost for access
General Comments	• To get deep granularity on the data, consolidating and expanding existing data sets should be considered • It will important to have the municipal governments considered • Must consider what the cleantech satellite account is already providing • Best practice – companies must be able to partially complete the survey and then come back to it • Companies could be followed with anonymous company codes

Appendix F
Breakout Session #3 – Next Steps

- Understand what resources and programs this data set is designed to support
- Prioritize the key data points and questions to be added into this data set
  - Data sets should be rolled out as quickly possible
  - Need clarity on what is essential and what is "nice to have"
  - Some groups will continue to collect data out of their own self-interest, so opportunities to include these existing data sets should be incorporated
- Data needs to be comparable across jurisdictions
- Must align with the Pan-Canadian Framework
- Confidentiality is critical
- Decide on the frequency of reporting
  - Annual ideal
  - Higher frequency would be nice but likely to create survey fatigue
- Governance on the data set to manage and prioritize expectations and changes to the data set
- Who will be in charge of collecting the data?
  - Potentially an independent or StatCan, etc.
  - Must ensure that it aligns with the SEGS, etc
- Should the collection be centralized or decentralized? Option for provinces could align and feed data to the Federal Government
- Filtering: Who will get to decide which companies are cleantech and which ones are not?
- How and who should be able to access the data?
  - Potentially multiple levels of information where the public could see basic information and more sensitive information can be held for specific stakeholders
  - Who pays for this work?
    - The funding sources need to be regular and ongoing
  - Who will be in charge of merging the data and conducting due diligence for consistency?
    - What initial structures need to be created to give this data set the capacity to be updated and evolve?
- Governance may be conducted similarly to the Canadian Data Transportation Model (Virtual Centre)
  - Partnerships are among federal government, provincial government, and a table of private sector stakeholders.
  - They empower all the participants to have a stake in what's being done and why

Appendix G

A special thank you to all of our participants in this workshop

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Neil Huff	Foresight
Chris Johnstone	ISED
Jane Kearns	MaRS
Hemant Kumar	GNB - Jobs Board Secretariat
Karen Mallory	SDTC
Barb McMurray	MOECC
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Kevin Roberts	StatCan

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