



# BUYING BETTER

LEVERAGING FEDERAL PROCUREMENT TO DRIVE  
DEMAND FOR CANADIAN CLEANTECH

JANUARY 2022



**Smart Prosperity  
Institute**

## About Smart Prosperity Institute

Smart Prosperity Institute is a national research network and policy think tank based at the University of Ottawa. We deliver world-class research and work with public and private partners – all to advance practical policies and market solutions for a stronger, cleaner economy.

[institute.smartprosperity.ca](https://institute.smartprosperity.ca)

## Acknowledgements

This report was written by Teslin Augustine and Harshini Ramesh. Editing and writing support was provided by John McNally. Research initiation and direction provided by Stewart Elgie. The authors would like to thank the Ivey Foundation for their generous support, and for providing valuable feedback on this report. The authors would also like to thank Sarah Petrean, and Liesbeth Casier, among others, for being external reviewers to this report and for providing their insights and feedback. The authors are grateful to the representatives, advocates, and leaders within Canada's cleantech and procurement sector who took the time to share their wisdom and insights on this challenge through interviews and discussions, and without whom this work would not be possible.

Responsibility for this final product is Smart Prosperity Institute's alone, and should not be assigned to any reviewers, interviewees, or any external party. Being interviewed or reviewing this report does not mean endorsement, and any errors remain the authors' responsibility.

With support from

I V E Y f o u n d a t i o n





# EXECUTIVE SUMMARY

Clean technologies will play a critical role in helping Canada meet its environmental and economic goals in the coming years. To support the growth of clean technologies ('cleantech'), and the companies that design or manufacture them, Canada must use every available tool in its toolbox, including leveraging the procurement capacity of the federal government. As the single largest buyer of goods and services in the country, the federal government is an important economic actor with the ability to send strong market signals. Federal cleantech procurement can help companies find their first customer, can help validate cleantech, ease their diffusion in the market, and can eventually lead to the growth of innovative cleantech.

With the objective of understanding ways in which federal procurement practices can be adapted to increase cleantech procurement, this report evaluates the rules and regulations, policy actors, and processes that define Canada's federal procurement ecosystem. This analysis reveals certain systems-level characteristics of the federal procurement system, and identifies specific practice-level, process-centric bottlenecks inhibiting federal cleantech procurement. Lastly, it offers recommendations to overcome the bottlenecks inhibiting federal cleantech procurement.

Owing to its process-centric approach, this report offers a unique perspective on reforming federal procurement. Procurement decisions are made by individual actors within the confines of the processes and structural factors surrounding procurement. Instead of analysing how to incent individual action, this report focuses on how the processes surrounding federal procurement can be optimized, and considers practical ways in which existing federal procurement systems and administrative capacities can be adapted to increase procurement of cleantech and environmentally preferable goods and services. Additionally, the policy solutions featured in this report are not aimed at achieving mass systems change or overhauling the entire procurement system. Instead, this report looks at what changes or policy tweaks can be implemented right away to overcome bottlenecks inhibiting change within federal cleantech procurement purchasing processes in time to support Canada's 2030 climate targets.

Evaluating the challenges inhibiting federal cleantech procurement is relevant not only for supporting greater uptake of cleantech, but also for drawing lessons that are relevant for procuring innovative, or environmentally preferable goods and services (e.g., low-carbon building materials), and procuring

from small and medium size enterprises (SMEs). This is because cleantech procurement marks the intersection of three distinct issues that the federal procurement system grapples with: it requires procurement to favour environmentally preferable goods and services and consider environmental performance that is not currently accounted for<sup>1</sup>; it requires higher participation of small to medium-sized enterprises in federal procurement, since cleantech companies in Canada are disproportionately SMEs<sup>2</sup>; and, it requires procurement be adept at buying novel innovative products, which has historically not been a strength of federal procurement.<sup>3</sup> The combination of these three factors makes this report's findings and recommendations relevant to the discussion on green and innovative procurement, as well as greater SME participation in federal procurement.

This report puts forward five policy recommendations, which – though they focus on cleantech – would also be useful in advancing procurement of environmentally preferable innovative products in general.

## Recommendation 1

**Extend current government pilot support programs to offer commercialization assistance to cleantech companies.** The federal government has some programs in place to help cleantech companies prototype and test their innovations. Innovative Solutions Canada (ISC), for example, currently buys pre-commercial goods and services and tests them in a real-world setting. However, even when a pilot has successfully been executed and the need is established, there is no direct or standard pathway to commercial contracting for these companies. ISC was explicitly meant to be modelled after the United States' Small Business Innovation Research (SBIR) program. By incorporating commercialization support as standard practice and setting aside resources to the same, ISC will be better placed to replicate SBIR's success.

## Recommendation 2

**Create a buyers group open to adopting cleantech post pilot testing.** A buyers group, akin to the Coordinated Access National (CAN) Health Network, can bridge the gap between piloting and commercialization that cleantech companies face. The buyers group should be composed of federal departments and agencies wanting to solve a problem with a cleantech solution, but also interested in testing the technology before committing to a commercial contract. This would create an integrated market of buyers who have the budget and the intention to procure innovative technologies, would allow individual departments share the risk of innovative procurement, and would expedite the procurement process. A potential starting point for the buyers group to identify problems that could be remedied with cleantech solutions would be the 23 line items Public Services and Procurement Canada (PSPC) has identified as accounting for close to 58% of its total carbon footprint.

## Recommendation 3

**Timely revision of bid language through feedback channels between federal departments that run cleantech piloting programs and procuring departments.** A dedicated team which would act as the innovation knowledge center could assist in the timely revision of bid language. The innovation knowledge center would collaborate with ISC, Natural Resources Canada (NRCan), Sustainable Development Technology Canada (SDTC), and other federal actors to learn about cleantech that are available, with an emphasis on technologies with clear use cases that have already had a successful pilot phase with the government (this mandate could later be expanded). It would then translate these learnings into readily usable bid terms and technical specifications to attract innovative cleantech products. Such a circular feedback process will help de-risk innovative procurement by setting up a system whereby procurement officers have the support they need and have access to technical specifications and bid terms to procure clean technologies that have already been successfully piloted in a federal body. It balances the need to be careful with how taxpayer dollars are spent, and the imperative to use procurement as a strategic tool for advancing clean innovation and economic growth.

## Recommendation 4

**Help cleantech SMEs build capacity to participate in federal procurement.** A range of supports including guidance materials, helpdesks, training, bootcamps, and facilitating participation in fairs and events will help provide practical and actionable information on procurement to cleantech companies. These could be delivered through different mediums including through mobile applications, videos, and could be modular, so that cleantech SMEs can pick and choose programs based on what is most relevant to them. Some of these services are currently being provided by Procurement Assistance Canada (PAC), which offers seminars to help SMEs find government procurement opportunities. However, it is worth thinking through how PAC's support services can be modernized. PAC's mandate could also be expanded to offer specialized services for innovative SMEs. Companies who specialize in innovation, such as those that develop cleantech, have distinct needs. Cleantech companies' product offerings often consist of products that do not yet fit in established product categories. Given the economic and strategic relevance of cleantech for Canada, specialized and customized training and advisory services, possibly delivered as concierge services, is justified.

## Recommendation 5

**Increase industry-focused educational efforts to help cleantech companies better understand government's procurement needs and processes.** There is a lack of training opportunities focused on understanding the complexities of federal procurement, especially for cleantech companies. Organizing formal or informal educational forums such as webinars, workshops, seminars, and cohort/contact/mentor-based learning will help cleantech companies understand the federal government as a customer. Industry organizations, start-up accelerators and incubators, who perceive government as an important buyer for their members, are well placed to help cleantech companies understand their buyer – i.e., the federal government – and think through how their technology and value proposition fits with the buyer's needs. Additionally, industry organizations can work with PAC, which regularly hosts educational webinars and workshops to help SMEs access public procurement opportunities, to either market these resources to their members or organize PAC sessions specifically aimed at cleantech companies.

# TABLE OF CONTENTS

<b>LIST OF ABBREVIATIONS</b> .....	<b>VI</b>
<b>INTRODUCTION</b> .....	<b>1</b>
<b>OVERVIEW OF REPORT</b> .....	<b>3</b>
<b>THE CASE FOR SUPPORTING CLEANTECH</b> .....	<b>4</b>
<b>FEDERAL PROCUREMENT: A TOOL FOR SUPPORTING CLEANTECH</b> .....	<b>6</b>
<b>PROCUREMENT ECOSYSTEM</b> .....	<b>8</b>
What Governs Procurement Decisions?.....	8
Who Influences or Impacts Procurement Decisions?.....	10
How are Procurement Decisions Implemented? .....	13
<b>CHARACTERISTICS &amp; BOTTLENECKS</b> .....	<b>16</b>
Characteristics of the Federal Procurement System .....	18
Bottlenecks Inhibiting Cleantech Procurement .....	19
<b>POLICY RECOMMENDATIONS</b> .....	<b>22</b>
<b>HOW TO INTERPRET REPORT FINDINGS &amp; RECOMMENDATIONS</b> .....	<b>32</b>
<b>FUTURE AREAS OF RESEARCH</b> .....	<b>33</b>
<b>CONCLUSION</b> .....	<b>35</b>
<b>LIST OF REFERENCES</b> .....	<b>37</b>

# LIST OF ABBREVIATIONS

AB	Acquisitions Branch	PSPC	Public Services and Procurement Canada
CAN	Coordinated Access Network	R&D	Research and development
CAP	Commercialization Assistance Program	RFP	Request for proposal
CGG	Centre for Greening Government	SBA	Small Business Administration
DoE	(US) Department of Energy	SBIR	Small Business Innovation Research
ECCC	Environment and Climate Change Canada	SDTC	Sustainable Development Technology Canada
EIC	European Innovation Council	SME	Small and Medium Size Enterprise
EISMEA	European Innovation Council and SME Executive Agency	SOSA	Standing Offers and Supply Arrangements
GDP	Gross Domestic Product	SRI	Supplier Registration Information
GGS	Greening Government Strategy	TBS	Treasury Board Secretariat
GHG	Greenhouse Gas	WTO-GPA	World Trade Organization Agreement on Government Procurement
IP	Intellectual Property		
ISC	Innovative Solutions Canada		
ISED	Innovation, Science and Economic Development		
IT	Information Technology		
NRCan	Natural Resources Canada		
PAC	Procurement Assistance Canada		





# INTRODUCTION

Cleantech (or clean technologies) are set to play a critical role in driving Canada's national economic growth and enabling Canada's transition to net-zero emissions in the coming decades. The global market for low-carbon goods and services is currently valued at over \$5.8 trillion and is projected to grow by 3% each year,<sup>4</sup> making Canada's domestic cleantech industry a future source of export revenues, high-quality jobs, and economic growth.<sup>5,6</sup> Cleantech will also be foundational for any pathway Canada takes to meet its 2030 and 2050 greenhouse gas (GHG) emissions reduction targets. Innovative cleantech will support increased energy efficiency and reduced energy consumption; a shift to non-emitting electricity; and will assist in reimagining the way Canadians travel, produce and consume goods, and build and live in their communities.<sup>7</sup>

For clean technologies to fulfill their role in shaping Canada's clean growth future, it is vital that Canada uses every available tool in its toolbox to create an ecosystem that stimulates clean innovation and builds on existing cleantech capacity. One such important, but underused, tool for growing the clean economy is federal procurement. The Canadian federal government is one of the largest buyers of goods and services in the country<sup>8</sup> with total annual spending valued at about \$23 billion (2016 figures)<sup>9</sup>

***For clean technologies to fulfill their role in shaping Canada's clean growth future, it is vital that Canada uses every available tool in its toolbox to create an ecosystem that stimulates clean innovation and builds on existing cleantech capacity.***

or about 13% of GDP.<sup>10</sup> It is, therefore, an important economic actor with the ability to send strong market signals that can spur innovation to drive policy goals, including Canada's GHG emissions reduction targets.

Public procurement's promise and potential to support local innovation, including clean innovation, is substantive and often cited.<sup>11</sup> However, there are a range of challenges Canada faces in using this policy lever for fuelling the purchase of cleantech. Cleantech procurement involves the intersection of three distinct issues that the federal procurement system has historically grappled with. One, it requires federal procurement to favour

environmentally preferable goods and services.<sup>12</sup> Two, it requires increased participation of small to medium-sized companies (SMEs) in federal procurement. It is estimated that SMEs make up over 70% of cleantech employers in Canada.<sup>13</sup> Three, it requires that procurement offices be adept at purchasing innovative technologies.<sup>14</sup> Keeping these factors in mind, this report aims to answer two research questions:

1. What are the specific barriers inhibiting greater adoption of cleantech by the federal government?
2. What policy solutions can help drive increased cleantech procurement by the federal government?

## Box 1

### What is Cleantech?

This report uses Statistics Canada's definition of "cleantech" or clean technology, whereby cleantech is any good or service whose primary objective is to reduce environmental damage. Alternately, cleantech is any good or service that is more resource efficient or causes lesser pollution than market-available comparable products.<sup>15</sup> Cleantech companies' product offerings, therefore, often consists of products that do not yet fit in established product categories. Additionally, it is important to understand that cleantech is not a sector by itself, but rather a set of goods and services that are used throughout different sectors of the economy, including energy production, water use and management, and transportation, among others.<sup>16</sup> This report's discussion on federal procurement is related to cleantech that has at minimum reached the early market adoption phase or is considered mature technology.<sup>17</sup> In other words, this report's discussion is not applicable to goods or services that are in the prototype or pre-commercial stage.

There is some overlap between goods and services that are considered to be cleantech, and those that are considered to be *green* goods and services. The key distinction between the two, however, is that green goods and services are those that have a lower GHG emissions profile than comparable alternatives. A cleantech good or service also helps reduce environmental damage but may or may not have a comparable alternative. Thus, for example, low-carbon cement, would be considered both green and cleantech, whereas an air quality monitoring device would be considered cleantech, but not a green good or service, since it does not improve the emissions profile of an existing process relative to available substitutes.

An in-depth examination of the bottlenecks inhibiting federal purchasing of cleantech is useful for two reasons. First, purchasing more cleantech is imperative to driving economic growth and meeting environmental objectives. Second, and perhaps more interestingly, challenges and barriers to procuring cleantech are, to a large extent, also applicable to purchasing innovative green goods or services in general, especially vis-à-vis SMEs. This includes low-carbon building materials, clean economy services, or product offerings from SMEs which support environmental or social objectives. An in-depth examination of the barriers to federal cleantech purchasing can, therefore, offer transferable lessons in other areas by breaking down the barriers to change and innovation within federal procurement. This work is therefore useful for advocating for changes within the federal procurement system, for any product or service that shares one or more of the features outlined above.

Procurement decisions are made by individual actors within the confines of the structural factors and the process design surrounding procurement. Accordingly, this report features a novel and in-depth analysis of the processes, actors and policies shaping Canada's federal procurement system. This analysis brings to light certain fundamental characteristics of the federal procurement system with respect to the way the system is designed, the cultural attributes that underpin federal procurement, and the process-related patterns of the procurement system. This systems-level understanding is then used to identify specific practice-level process-centric bottlenecks which hinder federal cleantech procurement. The bottlenecks, though presented in the cleantech context, are to a large extent also applicable to other innovative goods and services especially vis-à-vis SMEs. The report then offers five policy solutions which aim to optimize procurement processes to improve cleantech procurement. Rather than creating new program lines and setting up new institutional and administrative infrastructure, these policy solutions look at ways in which existing government supports or programs, and existing industry coalitions and bodies, can be leveraged to increase cleantech procurement by the federal government. This report does not claim to have "solved" procurement challenges, but rather contributes to the ongoing discussion by directly tackling challenges faced by procurement officers in purchasing cleantech.





# OVERVIEW OF REPORT

This report begins by making the economic and environmental case for supporting and enabling cleantech. Thereafter, it talks about why leveraging the federal government's procurement capacity is an important tool for supporting cleantech. In addition to ensuring that Canada has the tools it needs to reach its net-zero by 2050 target, supporting cleantech through procurement helps clean technologies overcome a crucial market failure they often grapple with: market prices not fully reflecting the cost of pollution, thereby leading to distorted valuations.

Subsequently, this report deep dives into the federal procurement ecosystem. It analyses the various rules and regulations governing federal procurement in Canada, the various policy actors involved, and lays out the processes through which procurement typically occurs at the federal level. The insights gained from the assessment of the policies, actors, and processes involved in federal procurement, supplemented with discussions with key stakeholders, bring to light certain characteristics and bottlenecks of the federal procurement system. Accordingly, the following section of the report discusses six key characteristics of Canada's federal procurement system as well as four bottlenecks inhibiting greater federal cleantech procurement.

Finally, this report concludes with five policy recommendations specifically aimed at addressing the identified bottlenecks. If implemented, these recommendations could have an inordinately positive impact on cleantech procurement specifically and innovation-friendly procurement generally, and in turn contribute to Canada's economic growth and climate targets. The policy solutions featured in this report are not aimed at achieving mass systems change or an overhaul of the entire procurement process. Instead, they are tweaks and changes that can be implemented right away, in time to meet Canada's 2030 climate targets, and are aligned with the administrative structure and incentives the federal procurement system currently operates under.

This report's findings and policy recommendations are based on primary and secondary research. The authors' literature review and desktop research were supplemented with interviews with 17 stakeholders. Of the stakeholders interviewed, seven were from the private sector representing cleantech sector views, six were from the public sector (i.e., federal officials and other public procurement practitioners), and the remaining four were from the third sector (i.e., academia and other subject-matter experts). These interviews were given anonymously, and discussants' views are not attributed to any one individual in this report.



# THE CASE FOR SUPPORTING CLEANTECH

Canada has both economic and environmental reasons for supporting cleantech. The country is a global cleantech leader and in 2017 was ranked 4<sup>th</sup> globally in terms of countries where cleantech companies are most likely to emerge (Global Cleantech Index), ahead of the United States.<sup>18,19</sup> Cleantech is an area where Canada has several competitive advantages including a sizeable research ecosystem, a skilled workforce<sup>20</sup> and a national net zero target for 2050.<sup>21</sup> Consequently, cleantech has enormous potential to boost Canada’s economic growth and export income. In 2019, cleantech goods and services accounted for about \$32.6 billion or 1.39% of Canada’s GDP.<sup>22</sup> Between 2014 and 2019, Canada’s cleantech exports grew at an annual pace of 9.7% – three times faster than all other product categories.<sup>23</sup> This is particularly encouraging since oil and natural gas products currently account for about 13% of Canada’s total merchandise exports.<sup>24</sup> In a net-zero future, where fossil fuel reliance is expected to be lessened,<sup>25</sup> there will be a need to make up for the expected loss in economic activity and growing cleantech exports is one way of doing that.

***The full social cost of waste and pollution are yet to be fully represented in market prices which results in systemic market distortions or externalities.***

Despite Canada’s cleantech exports growing year-on-year at an impressive pace, it ranks only 16<sup>th</sup> globally in terms of cleantech exports<sup>26</sup> pointing towards significant untapped opportunity to grow and expand into new markets. For cleantech companies in Canada, however, continuing to grow the size of their operations to tap into new markets means overcoming two key challenges: First, market failure owing to externalities; and second, attracting the necessary financing to support scaling their operations. Procurement practices that support innovative cleantech can help bridge this gap and overcome these two challenges.

The full social cost of waste and pollution are yet to be fully represented in market prices<sup>27</sup> which results in systemic market distortions or externalities.<sup>28</sup> In the absence of proper market signalling, firms may experience under-investment in clean innovations<sup>29</sup> because early stage cleantech may be perceived as riskier compared to dirtier technologies.<sup>30</sup> This can discourage traditional investors, which is particularly disadvantageous for cleantech companies, since they are typically capital-intensive or require a longer investment period.<sup>31</sup> Somewhat related to this first challenge is the second one cleantech companies face: difficulty attracting capital to scale operations. Despite overall venture capital supply increasing in Canada over the past few years, available funding in the innovative economy is still inadequate.<sup>32</sup> On a per capita basis, Canadian cleantech venture capital investments represent half of what is seen in the United States.<sup>33</sup> Companies tend to see a funding gap between the initial capital investment and eventual revenue generation from product sales (i.e., commercialization). In fact, this phenomenon is so commonplace that it is termed the “valley of death”<sup>34</sup> in literature. While there has been some progress on scaling for Canadian cleantech companies in recent years, it remains a challenge for the sector.<sup>35</sup>

Domestic job creation is another major benefit to building up the cleantech industry. In 2019, Canada’s environmental and cleantech sector provided 341,000 well-paid jobs,<sup>36</sup> representing an annual growth rate of 3.03% between 2009 and 2019.<sup>37</sup> Cleantech jobs are typically high quality with average annual compensation (with benefits) of around \$84,700.<sup>38</sup>

Finally, a major acceleration in clean innovation and cleantech deployment is also necessary to provide Canada the goods and services required for emissions reductions to meet 2030 and 2050 emissions reduction targets.<sup>39</sup> Delivering on these targets requires continuous innovation towards reducing Canadians’ carbon footprint.





# FEDERAL PROCUREMENT: A TOOL FOR SUPPORTING CLEANTECH

Federal procurement is an important policy tool for accelerating clean innovation and cleantech deployment in Canada, which in turn hold economic and environmental relevance for Canada. Public procurement can reduce investment risks for clean innovations that might bring about significant national-level benefits in the future but face difficulty finding their first customer. When government acts as a first buyer, it validates the product both within and outside of the domestic market, eases the diffusion of cleantech in the market, and eventually leads to the growth of innovative cleantech and cleantech companies.<sup>40</sup> Over time, investment in cleaner goods, services or works is incentivized, which drives innovation, encourages long-term investment, scales up demand,<sup>41</sup> and helps drive down costs.

If Canada realizes its full procurement potential to drive these outcomes, it would not be the first country to successfully use the power of procurement to bolster domestic cleantech and innovation. Increasingly, public procurement is becoming widely acknowledged as a means of supporting cleantech adoption. The European Union’s Europe 2020 strategy, for example, lists public procurement as a key market-based instrument to “shift towards a resource efficient and low-carbon economy.”<sup>42</sup> Historically, as well, public procurement has been seen to result in the uptake of innovative technologies. For example, American defence-related procurement led to the widespread use of steam engines, electric motors, and semiconductors not just in the US, but worldwide.<sup>43</sup>



## ***Increasingly, public procurement is becoming widely acknowledged as a means of supporting cleantech adoption.***

While public procurement includes procurement by municipal, regional, provincial, and federal governments, and public institutions (hospitals and universities), this report focuses solely on federal procurement. There are a few reasons for this. First, the Government of Canada is the single largest buyer of goods and services in the country.<sup>44</sup> While total annual government expenditure, which includes procurement spending not only by the federal government, but also the provincial governments, municipalities, public academic institutions, and hospitals totals about \$200 billion or about 13% of Canada's GDP,<sup>45</sup> annual total federal procurement spending is about \$23 billion (2016 figures).<sup>46,47</sup> This makes the federal government the largest public buyer and a very important economic actor with the ability to send strong market signals that can spur innovation in new technologies and services to drive policy goals,

including Canada's climate goals. Given the impact the federal government could have on markets, identifying challenges and ideating policy solutions that encourage federal cleantech procurement is justified. Second, the rules and processes that define procurement at the federal level are different from those at the provincial or regional level, and those that apply to public bodies such as hospital and school boards, among others.<sup>48</sup> This variation necessitated choosing a specific level of government or public body for deeper analysis. Accordingly, federal procurement was picked as the main subject of study given its comparatively larger buying power. Finally, the primary objective of this report is to develop actionable and practical policy solutions that would increase the uptake of cleantech procurement and would potentially also be relevant for the procurement of other low-carbon or technological solutions. This would not have been possible without narrowing its focus. A narrow focus enabled a detailed assessment of federal procurement practices including the actors, processes and policies impacting procurement and thereby assisted the identification of specific bottlenecks in the system for cleantech purchasing whose implications can be built upon in future work.

### Box 2

#### **State of Federal Cleantech Procurement**

---

In 2016, federal spending on cleantech procurement was about 3.74% of total government spending.<sup>49</sup> This was deemed insufficient by Canada's Economic Strategy Tables, which was announced as part of Budget 2017's Innovation and Skills Plan to support economic growth.<sup>50</sup> The Economic Strategy Tables identified cleantech as a high promise sector for the Canadian economy and recommended that cleantech procurement by the federal government be increased from 3.74% to 5% of total government spending by 2025.<sup>51</sup> This is comparable to the target set by Finland, which in 2015 decided to deploy 5% of total public expenditure towards innovative procurement.<sup>52</sup>

The target set by the Economic Strategy Tables is reflective of on-the-ground reality. Based on a survey of 259 high-growth cleantech start-ups in Canada, a 2020 report found that cleantech procurement by federal government accounts for only about 3.6% of companies' annual revenues.<sup>53</sup> This is indicative of the fact that government sales are not providing cleantech companies the boost they need and that there is a need to reform federal procurement to make it more amenable to innovative cleantech procurement.

The federal government, however, has made some strides towards embracing and promoting cleantech. The 2017 Greening Government Strategy (GGS) lists a set of voluntary commitments that the government has made towards reducing emissions from government operations to net-zero by 2050.<sup>54</sup> The key pillars of GGS are reducing emissions from buildings, fleet electrification, and procuring 100% clean electricity by 2022. One of the tools GGS identifies is procuring environmentally preferred goods and services and it specifically mentions supporting departments undertake cleantech demonstration projects and increase the adoption of cleantech to reduce the carbon footprint of government operations.<sup>55</sup> Additionally, the government is also in the process of identifying goods and services with high environmental impact such as cement, steel, IT, etc., and is greening existing standing offers and supply arrangements (explained in later sections) to include robust environmental criteria.<sup>56</sup> While all these initiatives will further environmental goals, they may or may not result in the increased uptake of cleantech by the federal government. This is owing to the distinction (explained in Box 1) between green goods and services and cleantech. Therefore, while a good start, current federal government initiatives do not fully leverage and capture the potential of public procurement to support cleantech.



# PROCUREMENT ECOSYSTEM

An in-depth look into the federal procurement ecosystem is a necessary first step towards developing a nuanced understanding of the bottlenecks inhibiting greater federal cleantech procurement and creating policy solutions targeted at those bottlenecks. This section provides an overview of the federal procurement system and is structured around the following three questions.

1. **What governs procurement decisions?** Overviews key policies and legislations that are pertinent to the cleantech procurement process.
2. **Who influences or impacts procurement decisions?** Looks at the policy actors that influence or impact cleantech procurement.
3. **How are Procurement Decisions Implemented?** Describes, step-by-step, procurement processes as they relate to cleantech procurement.

Answering these questions will give an overall sense of the federal purchasing process, and the regulatory constraints or pillars that guide procurement decisions (i.e., who makes, implements, and influences these decisions), and the process through which these decisions are implemented.

## What Governs Procurement Decisions?

A web of interconnected laws, policies and guidelines govern the federal government's considerable spending capacity of over \$20 billion annually. These can be broadly classified into the three categories – those Governing General Procurement (laws, policies, and regulations that affect all procurement), Governing Cleantech Procurement, and Governing Procurement Processes.<sup>57</sup>

**Table 1: Federal procurement – Overview of laws, policies, and guidelines**

Category	Description
Governing General Procurement <sup>58</sup>	Regulates expenditure of public funds and establishes the Treasury Board. Lays down fairness, openness, and transparency while ensuring best value for the Canadian people as the basic principles of procurement.
Governing Cleantech Procurement <sup>59</sup>	Requires that federal departments incorporate environmental performance through the lifecycle of acquired assets and services as a factor in procurement decisions but does not set any specific green procurement targets.
Governing Procurement Processes <sup>60</sup>	Outlines and enables the application of specific considerations, such as green procurement requirements, Indigenous business support, risk assessment, etc., in federal procurement.

It is important to note that the laws, policies, and guidelines mentioned in this report are not representative of the entire universe of procurement rules and regulations applicable to federal procurement. They do, however, provide an understanding of the core principles underpinning federal contracting and give some insight into the various, sometimes competing, considerations procurement officers must manage during the procurement process.

Four general procurement regulations – the *Financial Administration Act 1985*, the *Government Contracts Regulation 1987*, the *Treasury Board Contracting Policy*, and the *Directive on the Management of Procurement* – provide the legal basis for federal government procurement and define the principles of government contracting. While no one regulation specifically discusses cleantech procurement, the *Policy on Green Procurement 2006* for the first time explicitly introduced environmental and sustainability considerations<sup>61</sup> into procurement spending, making it relevant for the purchase of goods and services whose environmental performance is an attractive attribute. The 2017 *Greening Government Strategy (GGS)* also lists a set of voluntary commitments that the government has made towards reducing emissions from government operations to net-zero by 2050.<sup>62</sup>

Besides environmental considerations, there are a plethora of other aspects that procurement officers need to keep in mind or consult on before entering contracts. This last category of regulations consists primarily of manuals, guidelines, and other policies such as the Procurement Strategy for Aboriginal Business, Public Services and Procurement Canada’s (PSPC) Supply Manual (obligatory only for PSPC), or the Project Complexity and Risk Assessment Manual.

A review of the regulatory environment surrounding federal procurement offers two interesting insights. First, promoting innovation in general or cleantech innovation in particular is not one of the goals or defining principles of federal procurement. Instead, procurement is meant to obtain the best value for Canadians. Second, the federal procurement system is quite prescriptive and procurement officers must balance several

**Promoting innovation in general or cleantech innovation in particular is not one of the goals or defining principles of federal procurement. Instead, procurement is meant to obtain the best value for Canadians.**

responsibilities and considerations – ranging from environmental considerations to land claim agreements – before entering new contracts. This arguably places significant administrative burden on officers who might routinely be overseeing several procurement activities at the same time, which, in turn, has serious implications for whether a particular solution, such as cleantech, can be pursued over other considerations.

## International Trade Agreements and the Federal Government

Canada is party to several trade agreements including the World Trade Organization Agreement on Government Procurement (WTO-GPA) and 14 free trade agreements with over 51 countries around the world.<sup>63</sup> The fundamental objective of these trade agreements is to remove barriers to international trade and ensure a fair system that does not discriminate between locally produced and foreign produced goods and services.<sup>64</sup>

Trade agreements influence how Canada can conduct public procurement.<sup>65</sup> They, however, become applicable only when procurement crosses a pre-determined monetary threshold. Monetary thresholds vary depending on the agreement and whether the product procured is a good, service, or construction-related.<sup>66</sup> The Canada-Korea free trade agreement currently has the lowest threshold for goods and services at CA\$100,000

(2021 figures).<sup>67</sup> Under the WTO-GPA the threshold for goods and services procurement by individual government departments or agencies is CA\$238,000 and for government-wide procurement or for crown corporations the threshold is CA\$650,000 (2021 figures).<sup>68</sup> Procurement below these thresholds is not subject to international trade regulations.

Additionally, trade agreements are only relevant for certain goods and services. Most trade agreements do not cover goods procured for the Department of National Defence, the Royal Canadian Mounted Police, and the Canadian Coast Guard.<sup>69</sup> This is due to the national security exception that is built into them. This is significant since these departments are among the top procurers with the highest spending in the federal government. Coverage of services varies among trade agreements.

The WTO-GPA, for example, only applies to services expressly listed.<sup>70</sup>

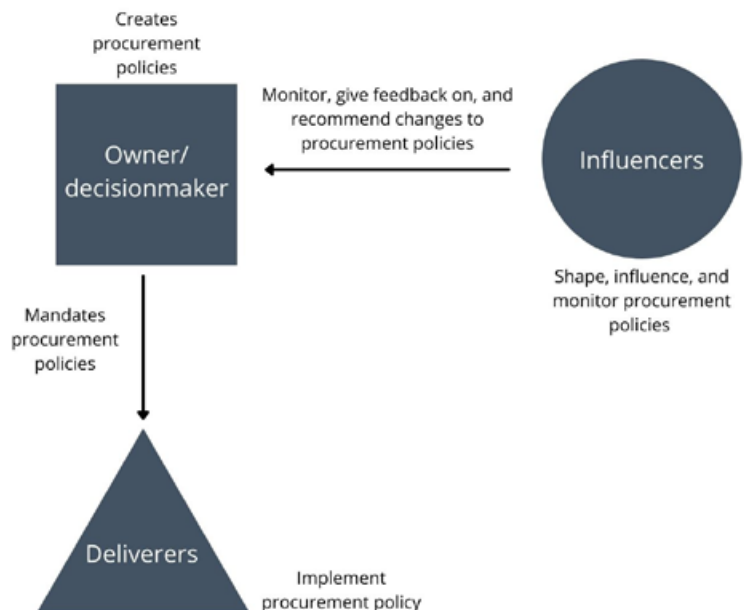
Depending on the agreement, there are other exemptions as well. The WTO-GPA, for example, does not cover procurement in respect to shipbuilding, urban transportation, certain communication equipment, and certain agricultural goods.<sup>71</sup> The Comprehensive Economic and Trade Agreement between Canada and the EU exempts procurement in respect to shipbuilding and repair, and certain agricultural goods, among other things.<sup>72</sup> Importantly, Canada's trade agreements do not prevent the government from giving priority to minority-owned businesses, and Indigenous Peoples or businesses in procurement.<sup>73</sup>

Box 6 discusses whether Canada's trade agreements inhibit the federal government from buying cleantech.

## Who Influences or Impacts Procurement Decisions?

Several policy actors influence federal cleantech procurement either by shaping bid specifications or through more concrete policy-making roles. They can broadly be classified into three categories: Owner/Decision Maker, Influencer, and Deliverer. This categorization has been derived from Bainbridge et al.'s (2011) Rapid Policy Network Mapping framework.<sup>74</sup> The authors' definitions for these categories, which have been modified to fit the context of this report, are as follows.

Figure 1: Policy actors and their interactions





**Owner/Decision Maker:** An organization, entity, or individual that has the ultimate authority to decide policy outcomes whether it concerns practical aspects or more intellectual and norm-setting aspects of federal procurement. Owners, often, have legislative or rule-making powers.

**Influencer:** An organization, entity or individual that is required or invited to be involved in the formal policy development process. This does not include organisations voluntarily participating in a public stakeholder consultation process (e.g., lobby groups, civil society) unless they are invited to or required by law to do so. Decisions made by owners usually follow consultation with the influencers. This report focuses only on domestic influencers. International organizations working on green or sustainable procurement are not considered in this report.

**Deliverer:** An organization, entity or individual that is responsible for delivering or supporting the delivery of actions outlined in procurement policies. Deliverers can influence the outcome of a policy process based on how they implement the policy requirements and affect how the policy is experienced by those it is meant to regulate or service. Thus, for example, a public buyer would fall under this category.

Figure 1 illustrates how the three categories of policy actors relate with each other. Table 2 identifies key policy actors, separated into three categories – owners/decision-makers, influencers, and deliverers – and briefly describes their primary responsibilities and how it impacts cleantech procurement. The list of policy actors or the description of their responsibilities is by no means exhaustive and is a simplified version created to get an overall sense of the multiplicity of policy actors involved and their potential engagement with cleantech procurement policy making and processes.

**Table 2:** Key policy actors and their impact on cleantech procurement

Policy Actor	Responsibilities	How they impact cleantech procurement
<b>Owner/Decision-maker</b>		
<b>Treasury Board</b>	Cabinet committee of the Privy Council of Canada which establishes government-wide procurement policies including those related to cleantech procurement. <sup>75</sup>	<ul style="list-style-type: none"> <li>• Can create new policies to advance cleantech procurement.</li> </ul>
<b>Influencers</b>		
<b>Treasury Board Secretariat (TBS)</b>	Administrative arm of the Treasury Board and supports Treasury Board in fulfilling its responsibilities including overseeing the government's financial management and ensuring value-for-money for Canadians. <sup>76</sup>	<ul style="list-style-type: none"> <li>• Monitors government-wide procurement activities and makes recommendations to the Treasury Board on potential procurement-related policy changes, which can be used to suggest cleantech-friendly changes.</li> <li>• Mandated to review procurement strategies that require Cabinet or Treasury Board approval for consistency with Treasury Board's policy requirements,<sup>77</sup> and can therefore review, update, or add cleantech considerations.</li> </ul>
<b>Centre for Greening Government (CGG)</b>	Provides advice and technical support to other federal government departments to reduce emissions from operations. <sup>78</sup>	<ul style="list-style-type: none"> <li>• Develops plans for helping government reduce its GHG emissions and recommends cleantech adoption such as the use low-carbon vehicles.</li> <li>• Tracks, monitors, and reports governmental environmental performance including through its procurement activities and thereby keeps federal departments accountable.</li> <li>• Can influence the policy owner by appraising them of the status of policy implementation and, by extension, the need for regulatory reforms or better implementation, which is critical for increasing cleantech procurement.</li> </ul>
<b>Commissioner of the Environment and Sustainable Development</b>	Appointed by the Auditor General of Canada and is responsible for auditing the performance of the sustainable development strategies of various federal departments.	<ul style="list-style-type: none"> <li>• Provides Parliament with analyses and recommendations on ways the federal government can protect the environment and promote sustainable development.<sup>79</sup> The 2006 Policy on Green Procurement was a direct result of a 2005 report by the Commissioner's Office, who criticized the government for not doing enough to advance green procurement in the federal government.<sup>80</sup> The office can be a key player in recommending cleantech integration in sustainable development.</li> </ul>

## Deliverers

<b>Public Services and Procurement Canada (PSPC)</b>	80% <sup>81</sup> of federal government procurement is managed by PSPC, <sup>82</sup> which acts as the common buyer for federal departments and agencies.	<ul style="list-style-type: none"> <li>• Subject to the regulatory boundaries established by the general procurement regulations, described above, PSPC can develop manuals, guidelines, and other tools to support procurement practices. It could put in place strategies for the development of bids that can attract cleantech.</li> </ul>
<b>Acquisitions Branch (PSPC)</b>	Develops consolidated procurement instruments which include, among other things, environmental considerations. <sup>83</sup> <i>Green Procurement Team</i> (within AB) coordinates and supports the implementation of the Policy on Green Procurement. <sup>84</sup>	<ul style="list-style-type: none"> <li>• Leads procurement services within PSPC. Can influence standing offers and supply arrangements (see section below for details) to incorporate cleantech criteria.</li> </ul>
<b>Shared Services Canada</b>	Provides common procurement services to all federal departments for products and services related to the delivery of email, data centre, network and workplace technology devices. <sup>85</sup>	<ul style="list-style-type: none"> <li>• Like PSPC, can influence bids to advance cleantech procurement.</li> </ul>
<b>Departmental procurement teams outside PSPC</b>	Administers and manages the procurement needs of the various departments and agencies on a daily basis. <sup>86</sup>	<ul style="list-style-type: none"> <li>• Defines procurement needs based on which PSPC officers develops bids; alternately when procurement is carried out in-house, departmental procurement teams develop procurement bids. In either case, they can determine whether a cleantech-friendly bid is developed or not.</li> </ul>
<b>Expert Departments</b>	Lends PSPC or other procuring federal agencies expert support vis-à-vis understanding technical requirements / specifications. From a cleantech perspective two departments are particularly relevant: Environment and Climate Change Canada (ECCC) and Natural Resources Canada (NRCan).	<ul style="list-style-type: none"> <li>• Provides technical recommendations which may be included in procurement bids. This influences where and how cleantech considerations are integrated into the procurement process.</li> </ul>

## Box 4

### Industry Enablers – Supporting Cleantech Companies Access Procurement Opportunities

There is another category of policy actors, termed ‘industry enablers’ in this report, who are specifically mandated to support cleantech businesses access public procurement opportunities. Industry enablers have neither policy-defining roles, nor influence over cleantech procurement as policy influencers or deliverers yet are important to be aware of since they interact closely with the cleantech companies and help them participate in federal procurement.

Prominent cleantech-specific industry enablers include Procurement Assistance Canada and Innovation Solutions Canada. Procurement Assistance Canada (PAC) (formerly known as the Office of Small and

Medium Enterprises) is tasked with helping small businesses bid on federal contracts. It advises small businesses on how to register as a supplier for the federal government and hosts seminars and webinars on doing business with the government of Canada, among other things.<sup>87</sup> Innovative Solutions Canada (ISC) periodically issues challenges and competitions that help small businesses compete for funding for a pilot project.<sup>88</sup> It helps companies apply to be on a pre-qualified list for federal departments to test or buy pre-commercial products. In some cases, this extends to commercialization support, whereby cleantech companies that meet certain criteria are afforded preferential access

to federal bids (explained in further detail in the Policy Recommendations section). While other industry enablers exist, these are arguably the two actors whose responsibilities align most closely with greater cleantech procurement.

It is also important to briefly mention the Clean Growth Hub (managed jointly by NRCan and ISED<sup>89</sup>). The Clean Growth Hub helps cleantech companies find and access government funding opportunities. However, it doesn’t play a prominent role in directly supporting procurement access for cleantech companies.

## How are Procurement Decisions Implemented?

In reflection of federal procurement’s regulatory complexity, there are several steps or decision-making points that federal procurement officers typically need to go through before soliciting bids from potential suppliers. This report breaks down federal procurement, up to the stage of bid solicitation, into three main stages. The process outlined is a simplified version of reality yet is representative of the complexity of federal procurement. Additionally, it bears mentioning that the process outlined below is not exclusive to cleantech but is simply presented from a cleantech perspective.

### Stage 1: Identifying the Buyer

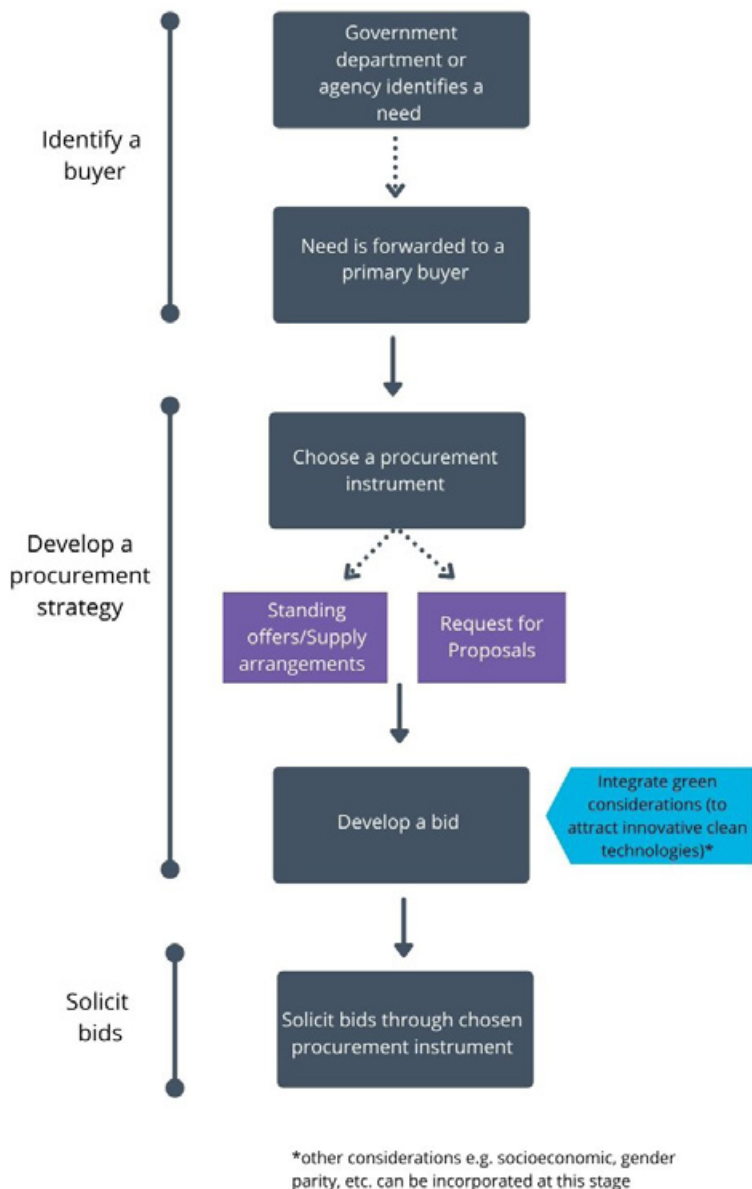
The procurement process begins with a federal department or agency identifying the need for a good or service, which is then forwarded to Public Services and Procurement Canada (PSPC), Shared Services Canada, or handled in-house. Different stipulations dictate who the primary buyer would be.

**PSPC:** PSPC handles most federal procurement and is therefore the main federal government ‘buyer’ acting on behalf of the ‘client’ department where the procurement need originated. The *Department of Public Works and Government Services Act* gives the Minister of Public Services and Procurement “the exclusive responsibility for the procurement of goods”<sup>90</sup> for contracts valued up to \$75 million,<sup>91</sup> over which approval of the Treasury Board needs to be sought.<sup>92,93</sup> PSPC also procures services (including construction) on behalf of most federal government departments and agencies. There are many exceptions to PSPC’s role as the common buyer. For example, defence-related procurement is mostly carried out by the Department of National Defence (pursuant to the *Defence Production Act 1950*).<sup>94</sup>

**Shared Services Canada:** Shared Services Canada provides common procurement services to all federal departments for IT-related products and services (pursuant to the *Shared Services Canada Act 2012*).<sup>95</sup>

**In-house:** Individual federal departments and agencies occasionally carry out procurement activities in-house. For example, procurement is done in-house either when the department’s own legislation permits it or when the Minister of PSPC has delegated procuring power to the departments.<sup>96</sup>

Figure 2: Mapping the federal procurement process



Given that most procurement is handled by PSPC at the federal level, moving forward, PSPC-specific requirements and criteria will be described to illustrate the complex nature of procurement in general, which has implications for cleantech procurement as well.

### Stage 2: Developing a Procurement Strategy

Once a buyer has been identified, a procurement strategy must be created.<sup>97</sup> A procurement strategy outlines “how a good, service, or construction will be procured.”<sup>98</sup> It defines whether a process will be competitive or non-competitive and how industrial or regional benefits, or other national objectives are applicable.<sup>99</sup> Cleantech can be incorporated into the

strategy as a focal point for procurement. For example, in 2019, the Government of Canada committed to using 100% clean electricity to power federal buildings in all jurisdictions. In response to this national objective, it issued four requests for proposals (RFP) as a part of its procurement strategy.<sup>100</sup>

Described below are some important aspects that need to be considered while developing a procurement strategy.

### **Choosing a procurement instrument**

There are two principal methods through which a procurement strategy can be actioned. The first is through Standing Offers and Supply Arrangements (SOSA), which are procurement instruments meant to help reduce the cost of procuring common, government-wide goods and services by lowering administrative costs. A standing offer (SO) is a continuous offer from a supplier to provide a good or a service at a pre-arranged price under pre-defined terms and conditions if or when required by the government.<sup>101</sup> Some products and services commonly purchased through SOs are food, fuel, pharmaceuticals, stationery, office equipment, and repair and overhaul.<sup>102</sup> SOs are used for goods and services that are known and defined<sup>103</sup> and provide little leeway to procurement officers for setting the product/service requirement.

A supply arrangement (SA), on the other hand, defines a set of conditions that will apply to a pool of pre-qualified suppliers for bid solicitations as well as the resulting contracts.<sup>104</sup> SAs are used for goods and services that departments need on a regular basis but cannot be fully defined in advance.<sup>105</sup> Compared to SOs, SAs allow procurement officers more leeway in terms of setting the product/service requirement. However, unless existing SOs already specify a cleantech good or service, or, in the case of SAs, contain terms that would favour a cleantech alternative, it is not likely that cleantech will be featured in procurement instruments at this stage. For example, for certain goods and services PSPC is mandated to use SOSAs.<sup>106,107</sup> Therefore, procurement officers must first figure out if a SOSA already exists or is mandated for the good or service, they are seeking to buy.<sup>108</sup> Mandatory SOSAs exist for products like ground effect vehicles, motor vehicles, trailers, and cycles, which may have innovative cleantech alternatives. However, PSPC requires its officers to place the pre-defined offer<sup>109</sup> discouraging updates to the existing criteria, which might make it more cleantech friendly.

The second procurement method is an RFP.<sup>110</sup> For goods and services for which SOSAs are not applicable, procurement officers are responsible for issuing an RFP and holding an open competition by inviting prospective suppliers to submit their applications. An RFP is designed to procure the “most cost-effective solution based upon established evaluation criteria.”<sup>111</sup> An example of a cleantech purchasing call from PSPC includes the 2019 RFP to purchase electricity and associated Renewable Energy Certificates.<sup>112</sup>

### **Developing a bid**

For goods and services that are not covered by SOSAs, procurement officers must develop an RFP or a bid. Procurement officers have access to previously issued bids and can borrow language from older RFPs. Alternately, they may create a new bid solicitation document or update an existing one.

Developing an RFP is a multi-faceted process. Green procurement is one of the many factors that procurement officers must account for. As described before, though promoting innovation in general or cleantech in particular is not a requirement under any of the regulations governing federal procurement, integrating green considerations is. Green requirements in a bid are pertinent to cleantech as it could indirectly promote cleantech procurement. To support the procurement of environmentally sustainable goods and services, which could include cleantech, procurement officers might consult the following:

- The green language repertoire which documents the green requirements previously used in older bid solicitations for different goods and services.<sup>113</sup>
- The green goods and services scorecard which provides product-by-product environmental criteria that bids should take into account.<sup>114</sup>
- Environmental factors and evaluation indicators that are generally applicable and listed in the Annex of Chapter 2 of the PSPC Supply Manual.<sup>115</sup>

Additionally, for certain commodities,<sup>116</sup> procurement officers are required to develop a green procurement plan.<sup>117</sup> The plan is a questionnaire designed to solicit information about the key environmental impacts of a good or service and how these can be mitigated.

Other than green considerations, procurement officers must consider a range of issues such as risk factors, accessibility requirements, and national objectives, among others.<sup>118</sup> To advance socioeconomic goals, procurement officers must consider the Procurement Strategy for Aboriginal Businesses<sup>119</sup> and other relevant policies. They must also ensure compliance with trade agreements, and land claim contracting obligations, among other considerations.

It is important to note that the buyer (usually PSPC) and the client typically collaborate while developing an RFP.<sup>120</sup> While the buyer develops the RFPs, it is based on procurement needs that are defined by the client department. Therefore, if the client department wants to purchase a good that has known cleantech alternatives, the buyer may suggest the same, but the final decision lies with the client. There can also be situations when neither the client nor the buyer has the expertise to define the



product requirements to be included in the RFP. In this case, an expert department such as NRCan or ECCC (who have expertise from a cleantech perspective) may be consulted. For example, in a situation where a client department owns buildings and needs to procure dishwashers to be installed in its buildings, it may consult NRCan to learn more about which energy efficiency ratings or labeling requirements should be specified in the RFP.

## Box 5

### Who are Procurement Officers?

---

Procurement officers, numbering in the tens of thousands, are not a monolith and procurement teams are often composed of different levels of government officials. According to a 2005 report by the Officer of the Auditor General of Canada there are three main categories of procurement officers. First are the program managers, who identify procurement needs and ensure that the cost of purchasing goods and services can be covered within their departmental budgets; second, the acquisition card holders who are responsible for minor purchasing required for day-to-day departmental operations budgets; and lastly the procurement or contracting officers, including those performing managerial functions.<sup>121</sup> This last group handles procurement processes such as soliciting and appraising bids and negotiating and overseeing contracts.

### Stage 3: Soliciting Bids

Bid solicitation implements a procurement strategy through the chosen procurement instrument (SOSA, RFP). Federal bids are typically published on the Government of Canada's official procurement website (<https://buyandsell.gc.ca/>).<sup>122</sup> Before participating in a federal bid, cleantech companies are required to register their interest in selling to the government in the Supplier Registration Information system (SRI).<sup>123</sup> This step provides companies with a Procurement Business Number, a core requirement to conducting business with the government.<sup>124</sup> The SRI also enables companies to register in three PSPC registration databases<sup>125</sup> for further business.<sup>126</sup> Different purchasing organizations (federal departments and agencies) may require companies to register other information.<sup>127</sup>

***If the client department wants to purchase a good that has known cleantech alternatives, the buyer may suggest the same, but the final decision lies with the client.***

Suppliers are invited to submit a bid on Buyandsell.gc.ca or directly via email, depending on the client's selection methodology.<sup>128</sup> The onus, however, rests on the companies to discover and participate in federal bids. A supplier is expected to understand how to sell to the government, what the procurement process looks like, what supports are available, and how to prepare bids.<sup>129</sup>



# CHARACTERISTICS & BOTTLENECKS

From the assessment of the policies, actors, and processes involved in federal procurement (presented above), as well as the authors' discussions with key stakeholders, certain characteristics of the federal procurement system emerge. These systems-level characteristics of federal procurement which impede cleantech procurement help identify specific bottlenecks in the procurement system.

The 'iceberg model' for systems thinking has been adapted in this report to describe the characteristics of the federal procurement system and resulting bottlenecks. In general, the model is intended to demonstrate how consequences arise in a system.<sup>130</sup> At the tip of the iceberg, are certain negative events.<sup>131</sup> The portion of the iceberg beneath the water pertains to the root causes of these events.<sup>132</sup> The deeper the layer, the more fundamental and intrinsic it is to the federal procurement system, and therefore the harder to reform in the short-term. In this report's iteration, the tip encompasses crucial practice-level pain points, which are referred to as 'bottlenecks,' that could

potentially be targeted when thinking through ways to increase federal cleantech procurement. Beneath the surface are three layers – process patterns, cultural attributes, and system design – which are the characteristics of the federal procurement system that help to create these bottlenecks.

This report focusses on the tip of the iceberg – that is, practice-level bottlenecks, rather than the underlying systems-level characteristics. Addressing the base of the iceberg by overhauling an entire procurement system and designing it to be more innovation friendly is an exciting idea and one that will potentially also bring about a large and sustained increase in cleantech procurement. That said, a systems-level change takes time, requires enormous political will, requires managing and negotiating between competing interests and power centers, and could also mean revamping administrative capacities of implementing bodies. Even assuming a systems-level change takes place in the manner advocates call for, its impact is uncertain and would not occur for some time, thereby standing

in the face of meeting climate targets set for the next ten years. Therefore, in the interest of expediency and simplicity, this report acknowledges the key systems-level characteristics of the procurement system and uses that to narrow down on four bottlenecks or areas of intervention. Removing these bottlenecks, through practical solutions, could have an inordinately positive impact on cleantech procurement specifically, innovation-friendly green procurement generally and could play a key role in contributing to Canada’s economic and climate targets.

The next section of this report discusses the underlying systems-level characteristics (base of the iceberg). Despite not being the focus of this report, it is important to talk about these since they shed light on the bottlenecks and help understand how and why these bottlenecks exist in the first place.

**Figure 3:** Characteristics and bottlenecks – Federal procurement

Figure 3a: Iceberg model: Federal procurement

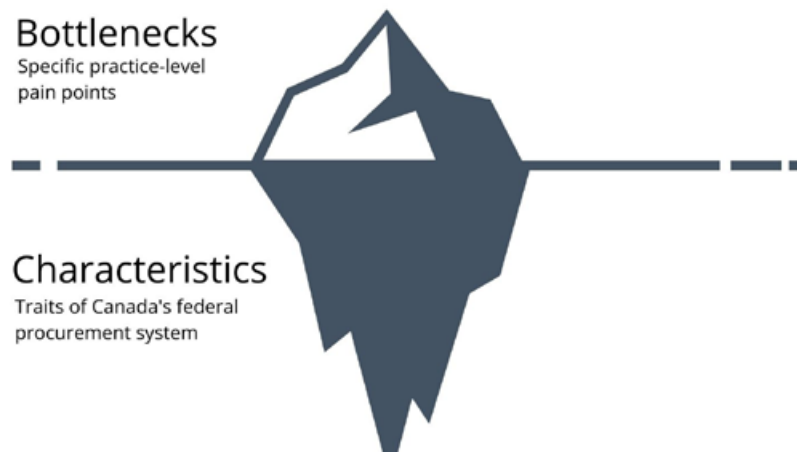
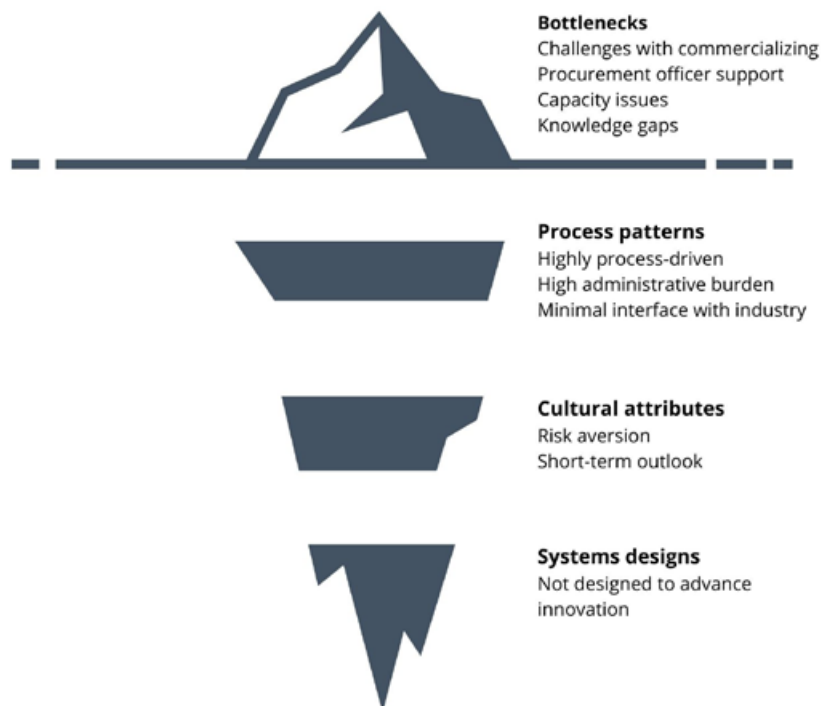


Figure 3b: Deconstructed iceberg model: Federal procurement



# Characteristics of the Federal Procurement System

This section details important characteristics of the federal procurement system for understanding bottlenecks in cleantech procurement. These lie beneath the surface of the water and help explain the bottlenecks, which lie above the surface.

The six key characteristics of the federal procurement system can be classified into three categories – systems design, cultural attributes, and process patterns. Systems design refers to systemic or foundational characteristics which affect the goal of federal procurement. These are discussed first, as they have implications for other layers. Cultural attributes are the shared beliefs, traits or philosophies that underpin federal procurement. These stem from the way the procurement system is designed. Last, process patterns are the manifestation of the systems design and the cultural attributes of federal procurement. These are characteristics that stand out on an everyday practical level, and they are hence discussed after systems design and cultural attributes have been identified.

## Systems Design

### 1. Not designed to advance innovation

Canada's public procurement system was not designed to encourage innovation or procure innovative technologies geared towards supporting a strategic goal such as reducing carbon emissions or reaching net-zero emissions. In the early- to mid-1900s, public procurement in Canada was meant to be an instrument of distribution where money and resources were allocated to certain areas or industries for a specific purpose.<sup>133</sup> By the 1970s-80s, the nature of government spending transformed to strike a balance between economic efficiency and market competition.<sup>134</sup> This shift shaped and limited procurement to acquiring goods and services that achieve "best value for the least money" in pursuit of wider policy objectives.<sup>135</sup>

Federal procurement today continues to be governed by legislations and policies created in this era and in the 1990s in response to various trade agreements.<sup>136</sup> While discussions on public procurement in the last decade have called for leveraging the government's buying power to unlock innovation,<sup>137</sup> no explicit action has been taken to update existing policies or create new policies to use procurement to support the uptake of strategically important innovative technologies.

## Cultural Attributes

### 2. Risk aversion

The federal procurement system, which has been designed to achieve best value for Canadians, has created a risk-averse culture. This can be a significant obstacle to the procurement of innovative cleantech.<sup>138</sup> The way the system is designed incentivizes safe bets which are typically off-the-shelf products and solutions that have been widely seen to work well and where economies of scale are achievable.<sup>139</sup> There is a reluctance to purchase new technologies or novel solutions, which are perceived as being riskier due to the fear of being accused of spending carelessly.<sup>140</sup> The risk perception associated with cleantech can be related to both the technological risk (i.e., risk of potential technology failure) and financial risk (i.e., risk of wasted financial resources).

Research has shown that risk aversion or even the perception of risk associated with new solutions can lead public servants to adopt processes that are more stringent than existing internal regulations.<sup>141</sup> This is particularly true for clean technologies that are not widely understood and not developed by well-known players in the market. The challenge of risk-aversion is compounded by the fact that poor project decisions or unsuccessful projects often attract media scrutiny which further encourages the risk-aversion of public servants.<sup>142</sup> A case in point is when the purchase of a new helicopter fleet for the Canadian Air Force in 2012 came under scrutiny due to delays in the arrival of this fleet.<sup>143</sup> The costly delays, amounting to lost dollars and issues with national security, garnered attention as the "worst procurement [deal] in Canadian history," attracting much criticism of the defence procurement system.<sup>144</sup> Public pressure discourages experimentation by the government,<sup>145</sup> leading to more conservative procurement.<sup>146</sup>

### 3. Short-term outlook

A procurement system that does not support innovation arguably begets a short-term outlook. A good or service that might be cheap in the short run and offer best value for Canadians, may eventually result in high costs being incurred by taxpayers if there is cost associated with disposal, or a need to repair or replace the good or service in the future.<sup>147</sup> Arguably, this is symptomatic of election cycles and short-term budgetary planning (i.e., a systems-level feature of Canada's political institutions). The focus on value for money may prompt procurement officers to ignore procurement of more transformative solutions which have the potential to influence future markets. In medical technology or infrastructure sectors, for example, the quality of goods or services are key for successful procurement<sup>148</sup> and the cheapest option may not offer the long-term quality required.



## Process Patterns

### 4. Highly process-driven

Federal procurement is meant to advance fairness, openness, and transparency, while obtaining best value for Canadians. To achieve this goal, procurement follows a series of prescriptive, well-defined, and somewhat complicated processes. Accordingly, procurement officers are required to ensure compliance with many regulations and meet all procedural requirements. Procurement officers are not typically required to create bids from scratch, but instead can simply rely on SOSAs for procuring more routine goods and services or use tools like the green language repertoire which is a compilation of the exact language used in previous procurement bids or and services to help develop their bids. As a result, often the same bid specifications get repeated year after year.<sup>149</sup>

***Process patterns are the manifestation of the systems design and the cultural attributes of federal procurement. These are characteristics that stand out on an everyday practical level.***

### 5. High administrative burden

There is a multiplicity of regulatory requirements that procurement officers must meet while preparing bids. In a highly process-driven procurement system, procurement officers must balance several responsibilities and considerations ranging from environmental considerations to land claim agreements before entering new contracts. This arguably places significant administrative burden on officers. This is compounded by the fact that procurement officers might also routinely be overseeing several procurement orders at the same time.

Such a system is not amenable to providing procurement officers the time or resources they need to devise a procurement bid for innovative goods and services. It also doesn't empower procurement officers to assess and reward bids to innovative cleantech. Assessing innovative cleantech poses a challenge to procurement officials since that would require evaluating their environmental, economic, and other benefits that enable these technologies to compete against larger scale incumbents.<sup>150</sup> The result is that many bids end up being assessed by lowest cost of purchase, without considering lifetime maintenance costs or alignment with economic, environmental, and social goals.<sup>151</sup>

### 6. Minimal interface with industry

Among the three categories of policy actors mapped earlier (i.e., owners, deliverers, and influencers) one actor notably missing was industry. While industry is given the opportunity to voice concerns and have its say in Standing Committee processes and procedures (e.g., The Standing Committee on Government Operations and Estimates), or it might be consulted before the finalization of a green procurement plan, there is no formal or concrete channel<sup>152</sup> through which industry can participate and inform the actions of the owner or the deliverers. This disconnect between industry and procurement bodies is created intentionally to avoid any appearance of bias or corruption in decision-making and in the interest of fairness and transparency. However, this well-intentioned separation often results in procurement officers not being up to date on new and innovative products or solutions available in the market.

Early interaction enables suppliers to access industry knowledge and better align tender specifications with available products or services.<sup>153</sup> The absence of early interaction, which can build trust and reduce the need for expensive monitoring and other transaction costs associated with information exchange in situations where there is information asymmetry, is a key barrier to procuring innovative cleantech.<sup>154</sup> Successful cases of cleantech procurement feature procurers who have insights and realistic expectations of a department's needs, the procurement process, and the potential solutions.<sup>155</sup>

## Bottlenecks Inhibiting Cleantech Procurement

In the context of the systems-level characteristics described above, this report identifies four specific bottlenecks which should be targeted to increase federal adoption of cleantech.

### **Bottleneck 1: Cleantech companies struggle to transition from pilot stage to commercial operations**

Government programs stop short of helping cleantech companies transition from the pilot stage to commercial operations. The federal procurement system, as it stands, is not designed to support innovation, and was never intended to act as a policy tool for aiding Canadian innovation. The suite of policy tools that Canada has historically relied on for supporting innovation have been heavily focused on supply-side or "push" policies, such as policies to promote research and development<sup>156</sup> or support product piloting, while paying lesser attention to demand-side or "pull" policy levers such as public procurement,<sup>157</sup> which would help companies pass the pilot stage and enter full commercial operations.

Canadian institutions excel at churning out original research, and Canada is among the top spenders on research and development among the Group of 20 countries.<sup>158</sup> Research success, however, has not translated into commercial products for companies.<sup>159</sup> There are also some pilot demonstration programs that cleantech companies can access or compete for that fit under the category of government funding, rather than procurement. For example, Innovative Solutions Canada (ISC) periodically issues challenges/competitions that help small businesses compete for funding for a pilot project. Another example is Innovation, Science and Economic Development Canada's (ISED) Sustainable Development Technology Fund, which supports demonstration of technologies.<sup>160</sup>

While such support is critical for developing Canada's cleantech ecosystem, the link connecting cleantech companies who have successfully passed the R&D and the pilot stage with actual public procurement opportunities is missing. Cleantech companies who, after investing time and money, compete and win competitions to earn the chance to pilot their products, do not typically see these pilot projects getting translated into commercial contracts. Conversations with industry stakeholders revealed that cleantech companies sometimes tend to get stuck in a cycle of piloting and are unable to ascend to commercial adoption, which in turn impacts their ability to attract venture capital funding and subsequently scale up their operations. Overall, while the government offers many supports in the pre-commercial phase, this support is lacking at the commercialization stage.<sup>161,162</sup>

### **Bottleneck 2: Lack of incentives or support to procurement officers for innovative procurement**

Canada's prescriptive procurement system provides little incentive to procure cleantech products since innovative procurement was never intended to be an outcome, and green procurement policy goals are not a priority.<sup>163</sup> Contracts awarded do not have any indicator attached to them to signal green or innovative procurement.<sup>164</sup> These considerations are "not reflected in the objectives, performance evaluation metrics, systems of reward, and ongoing management metrics of the procurement function."<sup>165</sup>

Civil servants, including both procurement officers from the buyer department (when applicable), and those the buyer is coordinating with from the client department, rely on and build bids from previous bids. This effectively excludes innovation and environmental and social considerations from the RFPs being developed. Prescriptive specifications, drafted at various points of time, create challenges for cleantech products since they might not reflect today's context.<sup>166</sup>

In the absence of proper incentives or the time, training, or resources to gain technical knowledge, it is unreasonable to expect that procurement officers (from both the client and the buyer side) will design or write a bid that would allow openness or flexibility to procure alternative cleantech solutions. It may be perceived that procuring clean technologies carries financial and technological risk, will increase costs, or cause unnecessary complications,<sup>167</sup> which could lead to fewer procurement opportunities to purchase cleantech.

***Cleantech companies sometimes tend to get stuck in a cycle of piloting and are unable to ascend to commercial adoption, which in turn impacts their ability to attract venture capital funding and subsequently scale up their operations.***

### **Bottleneck 3: Cleantech companies do not always know of or understand government procurement processes and needs**

Cleantech companies sometimes lack an understanding of the federal government's procurement needs, government tendering processes and a sense of how procurement decisions are made. Specifically, there are two key aspects that cleantech companies often lack an understanding of. First, that government markets have specific characteristics – including "a specific procurement process; strict contract monitoring; preferences for certain sellers; [and a] minor role of marketing"<sup>168</sup> – which requires specialized knowledge and skillsets to navigate. Discussions with stakeholders suggest that cleantech companies lack a nuanced understanding of the government tendering process and how procurement decisions are made. For example, contracts valued over \$25,000 generally go through a pre-defined competitive process, albeit subject to exceptions, and procurement decisions can only be made based on the outcome of that process.<sup>169</sup> Therefore, if industry wants to better engage with the federal government as a prospective client, it is important that they understand the various steps involved in federal procurement, the actors involved, as well as potential opportunities of collaboration and consultation through which procurement bids can be affected.

Second, cleantech companies sometimes lack an understanding that the federal government is not one single entity. Different departments and agencies are responsible for procuring different goods or services which are dictated by their mandate, as well as procurement rules.<sup>170</sup> For example, three federal organizations – namely National Defence, PSPC and Canada Post – manage the most building floor area within the federal government.<sup>171</sup> Since greening buildings is one of the commitments made under the GGS, cleantech companies offering goods or services aimed at decarbonizing buildings might be best served working with these federal government departments for procurement opportunities. Similarly, the Canadian Nuclear Safety Commission has a departmental green procurement target to maintain 30% of their fleet vehicles to include hybrid vehicles.<sup>172</sup> An automation supplier equipped with this knowledge could target this particular government body.

#### **Bottleneck 4: Procurement practices can discourage small and medium sized cleantech companies**

Many cleantech companies are also SMEs. It is estimated that SMEs make up over 70% of cleantech employers in Canada.<sup>173</sup> A 2017 Statistics Canada survey found that a majority (over 80%) of Canadian cleantech SMEs are small businesses employing between 5 and 99 people.<sup>174</sup> Smaller cleantech start-ups or SMEs experience unique challenges, often shared with SMEs from other sectors, in selling to the government. First, cleantech SMEs are often unaware of contracting opportunities.<sup>175</sup> Bid solicitations are hosted on the Government of Canada’s official procurement website (<https://buyandsell.gc.ca/>) and small cleantech companies with limited personnel might not be able to keep track of the hundreds of bid solicitations that are posted on the platform weekly. A 2014 study found that approximately 26% of all SMEs reported difficulties with finding contracting opportunities.<sup>176</sup> Despite organizations in place, such as Procurement Assistance Canada that works with cleantech SMEs to help them find and access procurement opportunities, this continues to be a problem. Smaller companies expect to be found in marketplaces (e.g., digital platforms like mobile phone application stores), rather than reaching out via an RFP, as the former is more cost-effective.<sup>177</sup>

Moreover, prospective suppliers need to participate in a complex and resource-heavy bidding process. This usually excludes smaller firms who do not have the resources or time to navigate an administratively heavy RFP.<sup>178,179</sup> For instance, if sustainability assessments are required by an RFP, then SMEs might not have the resources necessary to undertake that assessment. 43% of SMEs report that the complexity of contracting is a primary barrier to participating in federal procurement.<sup>180</sup> In addition, larger firms are often more able to satisfy criteria requiring a certain capacity to implement a contract, giving them another advantage against SMEs.<sup>181</sup>

## Box 6

### **Do International Trade Agreements Limit the Federal Government’s Ability to Buy Cleantech?**

Experts believe that Canada’s international trade commitments are not an impediment to the federal procurement of cleantech.<sup>182</sup> Canada’s trade agreements provide sufficient leeway for government procurement to favour products and services which protect and preserve the environment or offer greater environmental benefits.<sup>183</sup> This is true for both Canada’s free trade agreements and its multilateral trade obligations, specifically under the WTO-GPA.

Trade agreements do, however, prevent the federal government from prioritizing Canadian cleantech. They place limitations on promoting Canadian industries and limit integration of domestic content requirements in public procurement.<sup>184</sup> Barriers to procuring domestic cleantech can be somewhat overcome in view of the monetary thresholds outlined in trade agreements (refer to Box 3). Additionally, exemptions built into trade agreements such as those for health and public services, shipbuilding and culture, and national security can also be taken advantage of for domestic cleantech procurement in these sectors (refer to Box 3).





# POLICY RECOMMENDATIONS

This section of the report makes five policy recommendations aimed at addressing the bottlenecks identified above. These recommendations consider ways to support commercialization of cleantech and to address capacity and knowledge issues that both government and industry face. While these recommendations narrowly address cleantech, they would also advance procurement of innovative products and green goods and services in general.

The policy recommendations aim to increase federal cleantech procurement through changes that are realizable within the current system (detailed above). Rather than focusing on creating new program lines and setting up new institutional and administrative infrastructure, they look at ways in which existing government supports or programs, and existing industry coalitions and bodies can be leveraged and adapted to address bottlenecks inhibiting higher cleantech uptake by the federal government.

Recommendations are accompanied by an example that illustrates what implementation has looked like in practice in other countries or contexts. Transferable learnings from each example are also highlighted to illustrate how lessons or models from other countries or jurisdictions should inform the design of Canadian programs or processes aimed at achieving the same objectives.

## **Recommendation 1: Extend current government pilot support programs to offer commercialization assistance to companies**

Federal departments frequently issue challenges or competitions targeted at identifying and supporting innovative technologies including cleantech. Participating companies, however, often find it difficult to translate their pilot success into commercial contracts (Bottleneck No.1).



***A pathway to commercialization... could either look like an automatic transition to a government contract after a successful pilot, or even supports to access private contracts.***

ISC, for example, currently buys pre-commercial goods and services and tests them in a real-world setting, under its testing stream.<sup>185,186</sup> ISC puts out about 2-4 calls for proposals per year for testing innovative goods and services.<sup>187</sup> These proposals are then evaluated by ISC in conjunction with PSPC and the National Research Council and innovations that pass the evaluation make it into a pool of qualified innovations.<sup>188</sup> The actual pilot testing and accompanying funding depends on being able to match a particular innovation with a federal organization's needs and interests. As such, not all program applicants are able to subsequently pilot technologies if there isn't an established need. However, even when a pilot has successfully been executed and the need is established, there is no pathway to commercialization for companies under ISC's testing stream. A pathway to commercialization, in this case, could either look like an automatic transition to a government contract after a successful pilot, or even supports to access private contracts. This poses a barrier to deployment that prevents companies that offer products that match the needs of federal departments from subsequently landing contracts. This is a case where both supply and demand exist, but there is no formal process through which the buyers and sellers can engage in a transaction.

There have been recent steps taken to resolve this gap. In January 2021, ISC started piloting a pathway to commercialization for Canadian SMEs which would enable the Government of Canada to buy tested prototypes from companies that have successfully completed a pilot (and passed an assessment criteria) for three years, without requiring these companies to participate in additional competitions.<sup>189</sup> While the findings of ISC's pilot are not yet known, this is a step in the right direction. A similar program also exists under ISC's challenge stream, which is targeted towards early-stage technologies. Cleantech companies that qualify for this stream could receive funding for R&D, support with prototype development, and a commercialization pathway like the one being piloted under the testing stream.<sup>190</sup> It is, however, unclear how many of the companies that receive early R&D funding go all the way to commercialization, making the prospective impacts of this stream unclear as well.

The need for a roadmap to commercialization is not isolated to ISC's testing stream. Other federal departments such as NRCan frequently issue challenges to support innovative technologies including cleantech.<sup>191</sup> NRCan's 2018 Impact Canada Initiative, for example, is set to deploy \$75 million over four years, partly to support innovations that are ready for commercialization (streams A and B of the initiative).<sup>192</sup> While winners of the challenge received monetary rewards and potentially got the opportunity to raise their profile and thereby attract investment, commercialization was not built into the challenge.

In short, some federal programs are in place to help cleantech companies prototype and test their innovations. There is, however, a need to extend such programs and integrate, as standard practice, a pathway to commercialization for companies that have crossed the threshold and proven the use case and applicability of their technologies. Providing commercialization support and a clear process through which companies who successfully pilot solutions can sell to departments with an established need, will incentivize more and more companies to participate in such challenges, and will further cleantech innovation and economic growth.

## How the US's Small Business Innovation Research (SBIR) program supports commercialization

The SBIR program was launched in 1982 in the US, with the purpose of encouraging innovative domestic small businesses through federal funding.<sup>193</sup> It is targeted at early-stage technologies and supports businesses from the R&D phase through commercialization. The program is jointly administered by 11 participating US federal agencies. Each participating agency identifies R&D topics or challenges that could be solved through innovative technologies, evaluates proposals from small businesses on potential solutions to these challenges and allocates awards from its budget to winning companies. This ensures buy-in from participating federal departments who choose program participants and see these companies move from early R&D stages to prototyping and commercial application. The US Small Business Administration (SBA) plays a coordinating role and updates Congress on program implementation.<sup>194</sup>

Of importance is the final phase (Phase III) of the SBIR program, which is explicitly built into SBIR's programming and designed to help small businesses pursue commercialization opportunities, albeit not limited to federal procurement. Commercialization support occurs through a Commercialization Assistance Program (CAP), which is, yet again, carried out by the participating agencies. The agencies have a budget of approximately US\$10,000 (2014 figures) per company to provide commercialization support. Some participating agencies like the National Institutes of Health assign this funding to a third-party vendor, which supports the commercialization needs of qualifying companies. Support is customized based on whether it is an emerging company or a company with some commercialization experience, or a seasoned company that needs regulatory or reimbursement training.<sup>195</sup> The US Department of Energy (DoE), which is another participating agency, administers CAP somewhat differently. Companies can either choose to participate in the Department's CAP program, which is administered by another third-party vendor or can apply for a lump sum amount of US \$5,000 (2016 figures) to spend on its own commercialization efforts.<sup>196</sup> The DoE uses a pay-for-service model, whereby the third-party vendor is remunerated against the list of services chosen by the company. This acts as incentive for the vendor to market its services to SBIR companies and ensure their relevance by customizing them to the needs of the companies.<sup>197</sup>

A key strength of the SBIR program is the support that participating federal departments provide to innovative companies from R&D all the way to commercialization. Another is the well-defined commercialization support that SBIR has in place. Companies receive specialized support for writing and participating in public and private bids and entering new markets.

### Transferable Learnings

When it was set up in 2017, ISC was explicitly meant to be modelled after the SBIR program.<sup>198</sup> However, there are a few ways in which ISC could more closely align with the SBIR model to replicate SBIR's success.

- **Decentralizing the challenge and award process:** Cleantech companies applying to the ISC streams are evaluated by ISC in conjunction with PSPC and the National Research Council. Consequently, the ISC program is implemented in a top-down manner and federal departments, who might have issues they are seeking to address through innovative solutions, only have a limited say and are less invested in the companies whose work they are funding. This is in contrast to the SBIR program, wherein SBA only performs a coordinating role. Granting power to individual departments will encourage buy-in for procuring innovation.
- **Allowing individual departments to design their own commercialization programs:** Federal departments working closely with cleantech companies during the pilot stage should be allowed to design their own commercialization supports. This would complement existing centralized programs which allow such companies a favourable position vis-à-vis government bids for a period of 3 years.
- **Setting aside resources for commercialization support:** Like SBIR's CAP, Canada can set aside resources to provide support for qualifying cleantech companies to participate in commercialization opportunities. Including commercialization support as standard program function would ensure that participating companies are aware of the potential that a successful pilot could land them a commercial contract and would incentivize greater supplier participation. Commercialization support could be in the form of mentorship, training, and advisory services for companies to find public or private sector buyers and could be administered in partnership with industry groups such as industry associations, accelerators, and incubators. Alternately, financial support in lieu of such services is also an option worth considering.

## **Recommendation 2: Create a buyers group open to adopting cleantech post pilot testing**

A buyers group composed of federal departments and agencies is another tactic that can be used to bridge the gap between piloting and commercialization that many cleantech companies face (i.e., Bottleneck No.1). Buyers group members would be those wanting to solve a particular problem with a cleantech solution, but also interested in testing the technology before committing to a commercial contract. Such a group would enable experimentation and allow interested federal bodies to test-drive cleantech, thereby mitigating or even eliminating technological and financial risks associated with cleantech adoption by the federal government (i.e., Bottleneck No.2). It would also act as a touchpoint between industry and government to collaborate and exchange information (mitigating Bottleneck No.3). This is yet another way for existing supply of Canadian cleantech to connect with existing demand for cleantech goods and services in the federal government.

Over the past few years, PSPC has been collecting data on the carbon footprint of its procurement activities.<sup>199</sup> It has identified 23 line items which account for close to 58% of the total carbon footprint<sup>200</sup> of PSPC's procurement activities.<sup>201</sup> This can be a starting point for the buyers group to identify challenges that could be remedied with cleantech solutions. The buyers group would act as a marketplace for innovative cleantech companies wherein companies would be paired with participating departments and be provided pre-procurement support to promote refinement of their technology and increase ease of adoption for both the seller and the buyer. Canada's Coordinated Access National (CAN) Health Network follows a similar model and offers important lessons that can be applied in the cleantech context.

# How the Coordinated Access National (CAN) Health Network model encourages experimentation and de-risks innovative procurement

The CAN Health network (also referred to as “the Network”) is comprised of Canadian health organizations and companies (also known as Edges) which include hospitals, private clinics, home care organizations, and health authorities.<sup>202,203</sup> These organizations form a network that allows for the collaboration, adoption, and procurement of innovative healthcare technologies.<sup>204,205</sup>

The procurement process begins with the identification of a healthcare challenge by an Edge that can be addressed with an innovation.<sup>206,207</sup> CAN Health ensures that the Edge, which identifies the challenge, has the budget to solve it through the procurement of an innovative solution. The Network then publishes this challenge.<sup>208</sup> Companies with a product or solution that matches the challenge apply to have their innovations considered.<sup>209</sup> The Network evaluates submissions using a pre-determined set of criteria and invites the most promising contenders to present their solution to the Edge which identified the challenge.<sup>210</sup> The Edge, paired with a team of experts including the Network, select a promising company and places them onsite to prove the value of their product.<sup>211</sup> The chosen company works with the Edge on a commercialization project, akin to a trial phase, spanning 3-9 months. During this time, while the company can access Edge staff, clinicians, data and other business intelligence or development resources, the Edge gets a chance to test out the innovative product or service being offered by the company.

Edges are given scores based on their participation in the Network and their engagement with the selected companies. This not only drives internal competition but also acts as an evaluation metric to assess the Network’s success. Assistance is provided to the Edge by the Network to remove any financial barriers that may inhibit the Edge’s participation in the commercialization project. Additionally, the Network offers other pre-procurement supports to the company including market/competitor analysis, etc., to enable it to be in the best possible position to win future commercial contracts. This stage helps companies commercialize and scale.<sup>212</sup> Once proven successful, the product becomes available to the Edge and the whole Network to purchase through a streamlined procurement process.<sup>213</sup> This expedites procurement within the whole Network without needing to repeat the whole process.<sup>214</sup>

To date, eight out of ten projects have resulted in sales, with some companies making multiple sales and one company even achieving significant export sales.<sup>215</sup> This model is beneficial to companies and buyers because it highlights which technologies are attached to which problems, removing uncertainties about what to buy.<sup>216</sup>

## Transferable Learnings

The CAN Health model has been cited by private and public sector actors<sup>217</sup> as an interesting one to replicate in procurement processes beyond health technology. A similar model aimed at supporting cleantech could replicate the following program design elements:

- **Creation of an integrated market:** The CAN Health Network creates a repository of potential buyers with an openness to testing and buying innovative technologies. The identification of buyers who have the budget and the intention to procure innovative technologies leads to the creation of an integrated market. This is advantageous to companies who may not otherwise know of potential customers or have the capacity to seek out government buyers. A similar integrated market for cleantech companies, composed of a curated network of buyers could facilitate greater engagement between cleantech companies and their buyers and increase cleantech’s market penetration.
- **De-risking adoption of innovative technologies:** Through its Edges, CAN Health provides a testbed for innovative technologies, enabling companies to iterate their products or services according to customer needs. In addition to refining the technology for mass deployment, this process de-risks procuring innovative technologies for the buyer. Additionally, the financial risk of testing is mitigated from the financial support CAN Health provides to its Edges. Cleantech companies can benefit from a similarly designed testbed, where they can access insights from users and prove the viability of their product for a contained amount of time to see if it is successful in a real-life setting.
- **Expedited procurement processes:** The Network’s expedited procurement model facilitates the uptake of technologies in areas with identified needs, meaning companies do not need to seek individual buyers. This can be carried over for cleantech procurement to ensure that an available roster of buyers can quickly procure proven technologies and that bids are appropriately constructed to incorporate cleantech considerations.



### **Recommendation 3: Timely revision of bid language through feedback channels between federal departments that run cleantech piloting programs and procuring departments**

Procurement officers, in both the client and buyer departments, often lack the training and the time to develop bids that could attract innovative cleantech products (Bottleneck No.2). This often results in old language or text from previous rounds of RFPs being re-used when SOSAs are not applicable. Borrowing bid language from previous bids leaves little scope for procuring cleantech that might not have existed when the initial text was developed. In this context, it is critical to consider ways to help procurement officers develop bid language and create RFPs that are reflective of newly available technologies and put in place a mechanism for updating SOSAs which are in tune with changing market realities.

This could be achieved by setting up a dedicated team which will act as the innovation knowledge center. This team could be housed within a central governing body such as the TBS (or, more specifically, CGG) who are key policy influencers and have government-wide mandates. It could collaborate with ISC, NRCan, SDTC and other federal actors to learn about cleantech innovations that are available, with an emphasis on technologies with clear use cases that have already had a successful pilot phase with the government. The innovation knowledge team would then be responsible for sharing these learnings with procuring federal government agencies and departments. It would also help translate these learnings into readily usable RFP/SOSA terms and technical specifications to attract innovative cleantech products. At a later stage, the role of the innovation knowledge center could be expanded, in such a way that it acts as the innovation procurement knowledge hub – supporting procurement officers understand what cleantech solutions to procure and how.

Establishing a circular feedback process, or knowledge-sharing process, whereby learnings and findings from pilot programs can be used to modernize RFP/SOSA templates and terms, will enable greater cleantech procurement by ensuring bids reflect current market realities. This is unlikely to result in the government procurement of breakthrough new clean technologies or perhaps even the best the market has to offer. It will, however, go a long way in de-risking innovative procurement by setting up a system whereby procurement officers have the support they need and have access to technical specifications and RFP/SOSA terms to procure clean technologies that have already been successfully piloted in a federal body. It balances the need to be careful with how taxpayer dollars are spent, and the imperative to use procurement as a strategic tool for advancing clean innovation and economic growth.

Currently, within PSPC, the Acquisitions Branch (AB) develops consolidated procurement instruments. Of particular interest to cleantech is that AB is mandated to coordinate and support the implementation of the Policy on Green Procurement.<sup>218</sup> It develops standard clauses and conditions related to green procurement that could be incorporated into PSPC's SACC manual and the green language repertoire. Collaborating with the innovation knowledge team will help AB bridge the gap between public procurement and Canada's thriving innovation ecosystem by ensuring that bid language is periodically updated so that the federal government procures innovative products.

## How the New York State Energy Research and Development Authority (NYSERDA) helps de-risk innovative procurement

NYSERDA is a public corporation that provides information and analysis, offers innovative programs, and technical expertise to help New York reduce its reliance on fossil fuels while increasing energy efficiency.<sup>219</sup> Among its many services, and reflecting priorities outlined in its multi-year strategic program plan, NYSEDA also procures clean energy solutions for New Yorkers.<sup>220</sup>

With respect to clean energy, NYSEDA serves the function of a central qualifying body, which has the mandate and the technical expertise to not just identify which clean energy solutions to procure, but also how to design standards and RFP terms to ensure that taxpayer interests are protected. A feature of their procurement calls is their consideration of unsolicited proposals.<sup>221</sup> These proposals call NYSEDA's attention to technology solutions that should be considered and at times, are turned into a competitive solicitation,<sup>222</sup> thereby drawing attention to new energy or technological options. NYSEDA has a Technology and Business Innovation Group which supports procurement staff in better understanding the technical features of market innovations. This group is made up of technical reviewers and advisors who are enlisted to evaluate a "proposal's technical merit and commercial viability" during the competitive process.<sup>223</sup> NYSEDA also has the authority to set standards for clean energy procurement. For example, to participate in Renewable Energy Standard procurements, prospective facilities must receive a NYSEDA certificate<sup>224</sup> and are required to match standards for eligibility, which are updated frequently.<sup>225</sup>

### Transferable Learnings

NYSERDA not only has the mandate, the expertise, and the capacity to push forward clean energy, it also has the power to set clean energy standards in New York. Though the innovation knowledge centre, proposed above, will have a different mandate than NYSEDA, there are lessons to be learned, especially in terms of the role NYSEDA plays as the body that decides what new clean energy solutions can be procured and how, that are applicable in the Canadian context.

- **Central knowledge translation body:** NYSEDA's key role is in translating knowledge about clean energy technologies into actionable procurement projects. A similar role played by an innovation knowledge centre in the Canadian context will lessen the burden on procurement officers to understand and check technological viability, and thereby help de-risk innovative procurement.
- **Technical expertise as core to the procurement process:** NYSEDA is staffed with technical experts, who can navigate, understand, and translate technology design into technical specifications. This is necessary to sustain a procurement process looking to procure innovations. Similarly, the innovation knowledge centre may be staffed with technical experts including engineers who can translate pilot learnings into technical specifications that procurement officers can readily use.

### Recommendation 4: Help cleantech SMEs build capacity to participate in federal procurement

As mentioned earlier, a significant percentage of cleantech companies in Canada are also SMEs, which makes it even more challenging for cleantech companies to navigate an already complex and expensive public procurement process (Bottleneck Nos. 3 and 4). A recent study found that the complexity of the contracting process and the high cost of contracting are two challenges Canadian SMEs frequently cite vis-à-vis federal procurement.<sup>226</sup> The question then becomes what policy levers

can potentially be used to help ease the administrative and financial burden on cleantech SMEs and facilitate their increased participation in federal procurement.

A range of supports including guidance materials, helpdesks, training, bootcamps, and facilitating participation in fairs and events will help provide practical and actionable information on procurement to cleantech companies. These could be delivered through different mediums including through mobile applications, videos, and could be modular, so that cleantech SMEs can pick and choose programs based on what is most

relevant to them. Some of these services are currently being provided by Procurement Assistance Canada (PAC). PAC offers seminars to help SMEs find government procurement opportunities. However, it is worth thinking through how PAC's support services can be modernized.

PAC's mandate could also be expanded and strengthened to offer specialized services for innovative SMEs. Companies who specialize in innovation, such as those that develop cleantech, have distinct needs. Cleantech companies' product offerings often consist of products that do not yet fit in established product categories. Given the economic and strategic relevance of

cleantech for Canada, specialized and customized training and advisory services, possibly delivered as concierge services, is justified. Training subjects covered could include procurement processes, webinars on applicable regulations and legislations, training on how to go about developing a proposal in response to a bid,<sup>227</sup> how to calculate total cost of ownership (which includes life-cycle cost assessment, ongoing operating costs, and end-of-life management<sup>228</sup>), and other cleantech-specific issues. Additionally, PAC could set up legal and financial advisory services aimed specifically at cleantech SMEs to support their participation in public procurement.

## How the European Innovation Council and SME Executive Agency (EISMEA) helps innovative SMEs

EISMEA (called the Executive Agency for Small and Medium-sized Enterprises until April 2021<sup>229</sup>) is an EU agency tasked with supporting European innovators and opening opportunities for SMEs. While EISMEA has multiple program lines, of particular interest are its activities under the European Innovation Council (EIC).<sup>230</sup> EIC is EISMEA's flagship innovation programme established to support breakthrough technologies from early-stage R&D through helping innovative SMEs scale and access financing. EIC aims to bring together stakeholders from across Europe's innovation ecosystem to facilitate "cross-fertilisation" of ideas to further innovation and creativity.<sup>231</sup> Interestingly, EIC is headed by an independent board composed of members from outside the public sector. EIC's board is made up of entrepreneurs, researchers, investors, corporates, and other relevant stakeholders from the innovation ecosystem.<sup>232</sup>

One key service EIC offers innovative start-ups is "business acceleration."<sup>233</sup> This includes coaching, mentorship, and training support; and access to advisory services, global partners (including investors and procurers), and peers.<sup>234</sup> Through EISMEA's EIC program, innovative SMEs gain access to legal and financial advisory services including on issues related to IP protection, certification, and standardisation, among others. They also gain access to summer schools and boot camps on business plan development, innovation strategy development, and business trade fairs to help innovative SMEs find and explore new markets.<sup>235</sup> These services are delivered online as well as through EIC partner organizations.

### Transferable Learnings

There are important differences between the mandate and set-up of the European Innovation Council and Procurement Assistance Canada. Unlike PAC, EIC's business acceleration services are only offered to select projects and companies that are either funded by EIC or have been selected by the EIC based on an application for a particular service or event. Yet, there are some learnings from EIC that are relevant in the Canadian cleantech context.

- **Recognition that SMEs specializing in innovation have unique needs:** Both EISMEA and EIC have emerged out of the fundamental understanding that innovative SMEs' needs are different from other companies. Consequently, different supports need to be designed to help such companies grow and find their market. EIC helps innovative SMEs navigate the financial, legal, and administrative complexity of their businesses through customized training and mentoring. In the Canadian context, PAC services could be expanded to include these as well.
- **Support services delivered through various mediums and formats:** EIC services are delivered through what could be considered passive learning mediums, such as webinars and workshops, as well as through more engagement-centric mediums such as bootcamps, summer schools, and networking events. This lets companies choose the medium of training or knowledge gathering that is most beneficial for them. The use of various modes of education can be espoused by PAC as well and can also be done in collaboration with existing industry partners such as industry associations, accelerators, and incubators.

**Recommendation 5: Increase industry-focused educational efforts to help cleantech companies better understand government's procurement needs and processes**

Cleantech companies need to understand their buyer (i.e., the federal government) and how their technology and value proposition aligns with the buyer's needs<sup>236</sup> (Bottleneck No.3). Companies can do this by engaging in educational efforts to understand how and where to find public procurement opportunities, which departments have made commitments to reduce GHG emissions, and how much money has been allocated for this purpose by which departments, among other similar concerns. This will help companies identify a prospective client and think about how their products can help individual federal departments reduce emissions.

Industry organizations, start-up accelerators, and incubators who perceive government as an important buyer for their members are possibly best placed to help cleantech companies fill this knowledge gap. As it stands, there is a lack of training opportunities focused on understanding the complexities of federal procurement, especially for cleantech companies. Organizing formal or informal educational forums such as webinars, workshops, seminars, and cohort/contact/mentor-

based learning will help cleantech companies understand the federal government as a customer.<sup>237</sup> Industry organizations with existing programs and initiatives to support companies' marketing efforts, etc., can expand their education supports to address knowledge gaps specific to cleantech and federal procurement. MaRS Cleantech, for example, is an accelerator and incubator that provides advice and connectivity to help start-ups and other organizations scale up.<sup>238</sup> Foresight Canada, another accelerator, hosts workshops to build skills that make companies ready to play in the current business climate.<sup>239</sup> These can be built upon to address the knowledge gaps specific to federal procurement. Additionally, industry organizations can work with PAC, which regularly hosts educational webinars and workshops to help SMEs access public procurement opportunities, to either market these resources to their members or organize PAC sessions specifically aimed at cleantech companies.

'Meet the Buyer' events can also help increase awareness of different public procurement opportunities and operations.<sup>240</sup> Such events act as touch points between industry and the public procurers and enable knowledge exchange between these stakeholders: government learns more about the new technologies that are available, and industry gets a chance to better understand public procurement processes and opportunities.



## How the Los Angeles Cleantech Incubator (LACI) helps companies understand their customer

---

LACI is a private non-profit organization helping cleantech start-ups commercialize, create partnerships, and provide workforce development support.<sup>241</sup> To date, LACI has helped companies raise \$184 million in funding, generate \$220 million in revenue, create 1,700 jobs, and create over \$379 million in long-term economic value.<sup>242</sup>

Key resources provided by LACI include its education and training programs, featuring a range of seminars or workshops that provide training to cleantech companies on topics like government procurement, which are freely available for portfolio companies.<sup>243</sup> In addition to these education supports, the incubator also offers targeted market education support, through their Market Access Program. The program aims to help start-ups scale through “transformative energy, transportation and circular economy pilots and supportive services.”<sup>244</sup> It targets cleantech companies looking to commercialize, prove technology viability and de-risk their product offering through community pilot.<sup>245</sup> Start-ups receive grant funding; advice for project scoping, implementation, and management; a chance to showcase results on a multi-stakeholder platform; and access to Pilot Partners.<sup>246</sup> Additional benefits include the educational supports that share best practices for pilot execution.<sup>247</sup> A key benefit to the program is the market access and visibility that cleantech companies achieve. Specifically, cleantech start-ups are able to access and engage with their potential customers, including local and state public agencies, through meetings, networking events or roundtable events.<sup>248</sup> This includes quarterly roundtable meetings with elected city, state, and federal officials.<sup>249</sup>

### Transferable Learnings

There are learnings from LACI’s model that could be adopted to better support the Canadian cleantech ecosystem.

- **Training focussed on government procurement:** LACI understands that the government is an important buyer for its membership and provides training, education, networking opportunities and assistance to the cleantech companies it works with in this aspect as well. There are important differences between public- and private-sector buyers,<sup>250</sup> and arming cleantech companies with the specific tools needed to sell to the government is critical.
- **Creating forums for networking and information-exchange:** Another important role LACI plays is in putting together platforms, events, and other convening points at which cleantech companies are able to engage with their potential buyers, including government buyers. This connectivity is key in the Canadian context, since it will increase the interface between the government and industry, helping cleantech companies cater their innovations to the government’s needs.



# HOW TO INTERPRET REPORT FINDINGS & RECOMMENDATIONS

The findings and recommendations made in this report have relevance outside of cleantech as well. As indicated earlier, challenges for federal cleantech procurement are also often applicable to procuring innovative technologies in general, procuring from SMEs, and procuring environmentally preferable goods and services. Studying cleantech procurement, therefore, offers many lessons that are relevant for innovative or environmentally preferable goods and services, especially those sold by SMEs.

This report is meant as an addition to the ongoing national conversation on green procurement,<sup>251</sup> which has drawn attention to the power of procurement and argued for improved tracking of embodied carbon data to support better procurement decisions,

and the procurement of low-carbon goods and services.<sup>252</sup> By analysing procurement processes and practice-level bottlenecks, this report produces findings and recommendations that offer avenues to improved green procurement. It builds on existing research base by complementing the discussion on why and how to incorporate factors such as embodied carbon emissions, life-cycle cost assessments including end-of-life disposal,<sup>253</sup> with insights on practical ways to operationalize these recommendations. It adds to the discourse by considering practical ways in which existing federal procurement systems and administrative capacities can be adapted to increase procurement of cleantech and environmentally preferable goods and services.





# FUTURE AREAS OF RESEARCH

Federal procurement decisions are made by individual actors within the confines of the structural factors and the process design surrounding procurement. This report breaks down how federal procurement processes can be optimized to improve cleantech procurement and makes policy recommendations that will advance changes in this context. The solutions advocated do not rely on individual actions but try and put in place processes to update bids to support cleantech procurement, mitigate risks associated with innovative procurement, or information and capacity gaps that inhibit cleantech SME participation in federal procurement. This perspective, however, does not prohibit the possibility that incentivizing individual actors within the procurement system might also encourage change. Future areas of research could examine how combinations of the process changes outlined in this report interact with approaches that incentivize individual action (of procurement officers), to better understand whether optimal policy bundles to drive action exist.

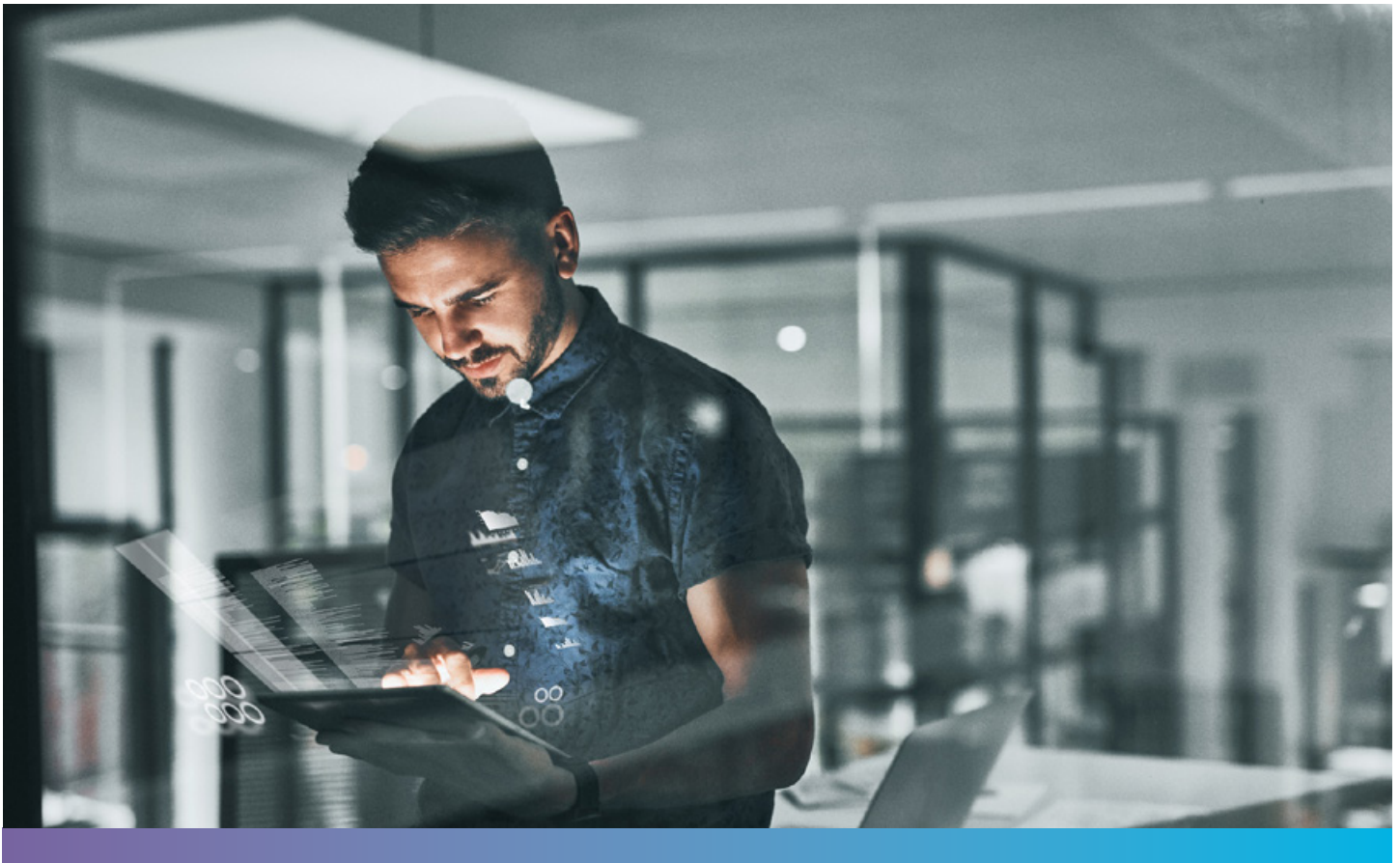
***The solutions advocated do not rely on individual actions but try and put in place processes to update bids to support cleantech procurement, mitigate risks associated with innovative procurement, or information and capacity gaps that inhibit cleantech SME participation in federal procurement.***

Another area future research could focus on is looking at how Canada could operationalize outcome-based procurement at the federal level. Outcome-based procurement enjoys widespread support among green and innovative procurement experts and is regarded as a best practice for furthering innovation through

public procurement.<sup>254</sup> An outcome-based procurement model focuses on defining the outcome (in terms of qualities, effects, functionalities, etc.) that is sought through procurement rather than prescribing how the desired outcome should be achieved.<sup>255</sup> It is potentially a viable policy solution for Canada to support innovative cleantech procurement in the long-term. Putting in place an outcome-based procurement system in Canada, however, will mean redesigning and retooling the current model of federal procurement, which is input-based (i.e., the exact goods or services needed are outlined in RFPs in a prescriptive fashion). Therefore, research and thinking around how Canada could practically transition to an outcome-based model is needed.

Finally, this report does not examine the cost implications of implementing the recommendations it has advocated for. Any policy option that can be deployed – be it implementing process design changes, or putting in place tools to incent individual action, or bringing about long-term systems level changes such as implementing an outcome-based model – to use federal procurement as a strategic tool to advance Canada’s environmental and economic agenda will be associated with varied level of costs, benefits, and implementation timelines. Future research could focus on assessing this aspect.





# CONCLUSION

Cleantech are expected to play a critical role in helping Canada maintain its economic prosperity and growth in the future. They are also key to Canada being able to meet its 2030 and 2050 emission reduction targets. Given the strategic relevance of cleantech for the country's economic and environmental goals, it is important to deploy all potential instruments for the growth of cleantech in Canada.

Federal procurement is a crucial, but underused, means of supporting cleantech. As the single largest buyer of goods and services in the country, the federal government is uniquely placed to shape the market for cleantech. By procuring cleantech, the federal government can generate demand for environmentally preferable goods and services, influence industry's response to environmental standards in global markets, and adapt Canadian assets to be resilient to climate change,<sup>256</sup> while at the same time boosting Canada's position as a global cleantech leader.

With the intention of understanding ways in which federal government procurement practices can be adapted to increase cleantech procurement, this report evaluated the rules and regulations, policy actors, and processes that define Canada's

***Instead of overhauling an entire system, this report asks: how can we build on existing administrative and regulatory capacities to make federal procurement more cleantech-friendly? What changes or tweaks can be implemented right away, which can overcome bottlenecks inhibiting federal cleantech procurement?***

federal procurement ecosystem. This analysis brought to light aspects of the federal procurement system's design, culture, and processes that impede cleantech procurement. Observing these systems-level problems led to the identification of four practice-level bottlenecks which, if addressed, could have an inordinately positive impact on cleantech procurement. Lastly, this report offered five policy recommendations targeted at addressing the bottlenecks identified. The findings and recommendations of this

report, though specific to cleantech, are largely also applicable to innovative technologies, green procurement, and procuring from SMEs in general.

Due to its focus on practice-level process-centric bottlenecks rather than the underlying systems-level issues, this report presents a unique perspective on procurement. Canada's federal procurement system is incredibly complex and there are a variety of reasons why it is not well suited at procuring innovative cleantech, not the least being that procurement was never designed to support innovative

technologies. Instead of overhauling an entire system, this report asks: how can we build on existing administrative and regulatory capacities to make federal procurement more cleantech-friendly? What changes or tweaks can be implemented right away, which can overcome bottlenecks inhibiting federal cleantech procurement? Such a perspective allows this report to add to the discussion on federal public procurement in Canada by identifying feasible policy recommendations that can improve federal procurement's ability to leverage innovative low-carbon technologies to advance Canada's economic and environmental goals.

# LIST OF REFERENCES

- Alhola, K. (2014). *Promoting Cleantech in Public Procurement and Investments in Finland* (p. 13). Finnish Environment Institute.
- Alhola, K., & Nissinen, A. (2018). Integrating cleantech into innovative public procurement process – evidence and success factors. *Journal of Public Procurement*, 18(4), 336–354. <https://doi.org/10.1108/JOPP-11-2018-020>
- Allen, B. A. (2006). *Procurement policy in Canada: Evolution and impacts: domestic policy, trade, and information technology* [Thesis, Library and Archives Canada = Bibliothèque et Archives Canada]. <https://curve.carleton.ca/system/files/etd/c49bbe21-2bfa-4238-a456-7b992e893d36/etd.pdf/bab7bfc2b256b40a4176f4ca264255a9/allen-procurementpolicyincanadaevolutionandimpacts.pdf>
- Atamis. (2020, November 10). *The Differences Between Public and Private Sector Procurement*. Atamis Ltd. [http://www.atamis.co.uk/blog/Differences\\_in\\_public\\_private\\_sector\\_procurement](http://www.atamis.co.uk/blog/Differences_in_public_private_sector_procurement)
- Bergmann, T., & Utikal, H. (2021). How to Support Start-Ups in Developing a Sustainable Business Model: The Case of an European Social Impact Accelerator. *Sustainability*, 13(6), 3337. <https://doi.org/10.3390/su13063337>
- Bleasby, J. (2021, April 1). Inside Innovation: Prescriptive procurement stalls Canada’s adoption of carbon-reduced concrete - constructconnect.com. *Daily Commercial News*. <https://canada.constructconnect.com/dcn/news/technology/2021/04/inside-innovation-prescriptive-procurement-stalls-canadas-adoption-of-carbon-reduced-concrete>
- Blokland, P., & Reniers, G. (2020). Safety science, a systems thinking perspective: From events to mental models and sustainable safety. *Sustainability*, 12(12). <https://doi.org/10.3390/su12125164>
- Blue Green Canada. (2021). BUY CLEAN: How Public Construction Dollars Can Create Jobs and Cut Pollution (p. 30). Blue Green Canada. <http://www.bluegreencanada.ca/sites/default/files/Buy%20Clean%20How%20Public%20Construction%20Dollars%20Can%20Create%20Jobs%20and%20Cut%20Pollution%20%28Eng%29%20%282%29.pdf>
- Borish, M. (2020). *Canada’s Cleantech Future Looks Bright* (p. 19). Export Development Canada. [https://octia.ca/wp-content/uploads/2021/03/EDC\\_canada-cleantech-future.pdf](https://octia.ca/wp-content/uploads/2021/03/EDC_canada-cleantech-future.pdf)
- Bouckaert, S., Fernandez Pales, A., McGlade, C., Remme, U., & Wanner, B. (2021). *Net Zero by 2050—A Roadmap for the Global Energy Sector* (p. 224). International Energy Agency. [https://iea.blob.core.windows.net/assets/20959e2e-7ab8-4f2a-b1c6-4e63387f03a1/NetZeroBy2050-ARoadmapfortheGlobalEnergySector\\_CORR.pdf](https://iea.blob.core.windows.net/assets/20959e2e-7ab8-4f2a-b1c6-4e63387f03a1/NetZeroBy2050-ARoadmapfortheGlobalEnergySector_CORR.pdf)
- Byers, M., & Webb, S. (2013). “The Worst Procurement in the History of Canada”—Solving the Maritime Helicopter Crisis (p. 36). Canadian Centre for Policy Alternatives. [https://www.policyalternatives.ca/sites/default/files/uploads/publications/National%20Office/2013/02/Worst%20Procurement%20in%20History\\_0.pdf](https://www.policyalternatives.ca/sites/default/files/uploads/publications/National%20Office/2013/02/Worst%20Procurement%20in%20History_0.pdf)
- CAN Health Network. (2020). *ABOUT US*. CAN Health Network. <https://canhealthnetwork.ca/about-us/>
- CAN Health Network. (2020b). *EDGEs*. CAN Health Network. <https://canhealthnetwork.ca/edges/>
- CAN Health Network. (2020c). *Call for Innovation*. CAN Health Network. <https://canhealthnetwork.ca/call-for-innovation/>
- Canada Action. (2020, December 12). Canada Ranks 2nd on the 2021 Global Cleantech Innovation Index. Canada Action. <https://www.canadaaction.ca/cleantech-innovation-index-ranking>
- Canada, House of Commons, Standing Committee on International Trade, *Minutes of Proceedings*, 43<sup>rd</sup> Parliament, 2<sup>nd</sup> Sess, No 21 (14 May 2021)
- Canadian Nuclear Safety Commission. (2014, February 3). *Supplementary Information Tables for Report on Plans and Priorities 2016–17: Departmental Sustainable Development Strategy – Green Procurement*. Canadian Nuclear Safety Commission. <https://nuclearsafety.gc.ca/eng/resources/publications/reports/rpp/rpp-2016-2017/supplementary-information-tables/greening-government-operations.cfm>
- Casier, L. (2019). Canada’s International Trade Obligations: Barrier or Opportunity for sustainable public procurement? Unlocking Canada’s WTO GPA and CETA commitments in relation to sustainable procurement (p. 44). International Institute for Sustainable Development. <https://www.iisd.org/system/files/publications/canada-international-trade-spp.pdf>
- Clean Energy Canada. (2017). *The Power of Procurement: Cutting the federal government’s carbon emissions* (p. 14). Clean Energy Canada. <https://cleanenergycanada.org/wp-content/uploads/2018/01/RoundTable-Report-FINAL-2.pdf>
- Clean Energy Canada. (2021a). *A Buy Clean Roadmap for Canada* (p. 22). Clean Energy Canada. [https://cleanenergycanada.org/wp-content/uploads/2021/07/CEC-Buy-Clean-Roadmap\\_FINAL.pdf](https://cleanenergycanada.org/wp-content/uploads/2021/07/CEC-Buy-Clean-Roadmap_FINAL.pdf)
- Clean Energy Canada. (2021b). *The Next Frontier* (p. 16). Clean Energy Canada. [https://cleanenergycanada.org/wp-content/uploads/2021/03/Report\\_CleanEnergyCanada\\_CleanIndustry2021.pdf](https://cleanenergycanada.org/wp-content/uploads/2021/03/Report_CleanEnergyCanada_CleanIndustry2021.pdf)
- Connell, C. (2019). *Canada’s Role as a Cleantech Innovator: A Governmental Proposal* [Major Research Paper, University of Windsor]. <https://scholar.uwindsor.ca/cgi/viewcontent.cgi?article=1123&context=major-papers>
- Crisan, D. (2020). *BUYING WITH INTENT: PUBLIC PROCUREMENT FOR INNOVATION BY PROVINCIAL AND MUNICIPAL GOVERNMENTS* (p. 47) [SPP Briefing Paper]. University of Calgary. <https://www.policyschool.ca/wp-content/uploads/2020/07/Public-Procurement-Crisan.pdf>

- Da Ponte, M., Foley, M., & Cho, C. H. (2020). Assessing the Degree of Sustainability Integration in Canadian Public Sector Procurement. *Sustainability*, 12(14), 5550. <https://doi.org/10.3390/su12145550>
- de Bas, P., Hausemar, P., Kruger, T., Rabuel, L., de Vet, J. M., & Vincze, M. (2019). *Analysis of the SMEs' participation in public procurement and the measures to support it* (p. 212). European Commission.
- Defence Production Act*, RSC 1985 c D-1. Retrieved from <https://laws-lois.justice.gc.ca/eng/acts/d-1/page-1.html#docCont>
- Denton. (2021, January 26). Federal government procurement of solar electricity in Alberta. *Dentons*. <https://www.dentons.com/en/insights/articles/2021/january/26/federal-government-procurement-of-solar-electricity-in-alberta>
- Deyanska, A., Hjartarson, J., & Holmes, A. (2014). *Spend Smarter, Not More: Leveraging the Power of Public Procurement* (p. 21). Ontario Chamber of Commerce. [https://occ.ca/wp-content/uploads/SpendSmartNotMore\\_online-1.pdf](https://occ.ca/wp-content/uploads/SpendSmartNotMore_online-1.pdf)
- Dion, J., Kanduth, A., Moorhouse, J., & Beugin, D. (2021). *Canada's Net Zero Future: Finding Our Way in the Global Transition* (p. 132). Canadian Institute for Climate Choices. [https://climatechoices.ca/wp-content/uploads/2021/02/Canadas-Net-Zero-Future\\_FINAL-1.pdf](https://climatechoices.ca/wp-content/uploads/2021/02/Canadas-Net-Zero-Future_FINAL-1.pdf)
- Economic and Workforce Development Department. (2016). *Contract Summary Sheet*. The Office of The City Clerk. [https://clkrep.lacity.org/onlinecontracts/2016/C-122178\\_C-AM-7-21-16.pdf](https://clkrep.lacity.org/onlinecontracts/2016/C-122178_C-AM-7-21-16.pdf)
- European Commission. (n.d.). *About EISMEA*. European Innovation Council and SMEs Executive Agency (EISMEA). Retrieved October 25, 2021, from [https://eisma.ec.europa.eu/about-eisma\\_en](https://eisma.ec.europa.eu/about-eisma_en)
- European Innovation Council. (n.d.a). *About the European Innovation Council*. European Innovation Council. Retrieved October 25, 2021, from [https://eic.ec.europa.eu/about-european-innovation-council\\_en](https://eic.ec.europa.eu/about-european-innovation-council_en)
- European Innovation Council. (n.d.b). *Business Acceleration Services*. European Innovation Council. Retrieved October 25, 2021, from [https://eic.ec.europa.eu/eic-funding-opportunities/business-acceleration-services\\_en](https://eic.ec.europa.eu/eic-funding-opportunities/business-acceleration-services_en)
- Federal Economic Development Agency for Southern Ontario. (2020, February 5). *Breaking through barriers to scale Canadian companies*. Government of Canada; Innovation, Science and Economic Development Canada. <https://www.feddevontario.gc.ca/eic/site/723.nsf/eng/02541.html?OpenDocument>
- Foresight Canada. (n.d.). *Explore Our Workshops*. Foresight CAC. Retrieved October 25, 2021, from <https://foresightcac.com/our-programs/workshops/>
- Ghisetti, C. (2017). Demand-pull and environmental innovations: Estimating the effects of innovative public procurement. *Technological Forecasting and Social Change*, 125, 178–187. <https://doi.org/10.1016/j.techfore.2017.07.020>
- Global Affairs Canada. (2012, May 29). *International Trade Agreements and Local Government: A Guide for Canadian Municipalities*. Government of Canada. <https://www.international.gc.ca/trade-agreements-accords-commerciaux/ressources/fcm/complete-guide-complet.aspx?lang=eng>
- Global Affairs Canada. (2013, May 16). *Government Procurement*. GAC. <https://www.international.gc.ca/trade-agreements-accords-commerciaux/topics-domaines/gp-mp/index.aspx?lang=eng>
- Global Affairs Canada. (2016, October 30). *Text of the Comprehensive Economic and Trade Agreement – Annex 19*. Government of Canada. <https://www.international.gc.ca/trade-commerce/trade-agreements-accords-commerciaux/agr-acc/ceta-aecg/text-texte/19-A.aspx?lang=eng#a7>
- Globe Advance 2020. (2021). *SCALING IN CANADA CLEANTECH: What's Next for Canada Summary Report* (GLOBE Advance, p. 40). Emissions Reduction Alberta, Delphi Group, Globe Series. <https://foresightcac.com/wp-content/uploads/2021/04/Scaling-Cleantech-Advance-Report-2020-Fv.pdf>
- Globe Capital 2019, & Delphi Group. (2019). *Flowing Investment to Scale Cleantech* (p. 21) [THE SCALING CLEANTECH WORKSHOP AT GLOBE CAPITAL 2019]. Globe Capital 2019. <https://www.globeseries.com/wp-content/uploads/2019/05/flowing-investment-to-scale-cleantech.pdf>
- Globe Capital 2021. (2021). *GLOBE Advance 2021: Scaling Cleantech in Canada* (Scaling Cleantech in Canada, p. 22) [Summary Report]. <https://foresightcac.com/wp-content/uploads/2021/07/Scaling-Cleantech-in-Canada.pdf>
- Government Contracts Regulations, SOR/87-402 (2019)
- Greenwood, J., & Qaiser, F. (2017). *Innovation in Cleantech: How Canada can become a global leader* (p. 25). MaRS Discovery District. <https://www.marsdd.com/wp-content/uploads/2017/03/Innovation-in-Cleantech-MaRS-Report-2017-1.pdf>
- Gualandris, J., Edmonds, F., & Da Ponte, M. (2019, October 22). *How Sustainable and Circular Procurement Can Take Off*. Network for Business Sustainability. <https://www.nbs.net/articles/how-sustainable-and-circular-procurement-can-take-off>
- Hoekman, B., & Taş, B. K. O. (2020). Procurement policy and SME participation in public purchasing. *Small Business Economics*. <https://doi.org/10.1007/s11187-020-00414-z>
- Huang, L., Canada, & Innovation, S. and E. D. C. (2020). *SME profile: Cleantech in Canada*. Innovation, Science and Economic Development Canada. [https://epe.lac-bac.gc.ca/100/201/301/weekly\\_acquisitions\\_list-ef/2020/20-23/publications.gc.ca/collections/collection\\_2020/isde-ised/lu188-113-8-2020-eng.pdf](https://epe.lac-bac.gc.ca/100/201/301/weekly_acquisitions_list-ef/2020/20-23/publications.gc.ca/collections/collection_2020/isde-ised/lu188-113-8-2020-eng.pdf)
- Impact Canada. (2021). *Food Waste Reduction Challenge: Business Models*. Government of Canada. <https://impact.canada.ca/en/challenges/food-waste-reduction-challenge/challenge>
- Innovation Canada. (2018, January 23). *Technology readiness levels*. Government of Canada. <https://www.ic.gc.ca/eic/site/080.nsf/eng/00002.html>
- Innovation Canada. (2019, December 19). *Economic Strategy Tables—Home*. Government of Canada. <https://www.ic.gc.ca/eic/site/098.nsf/eng/home>



- Innovation Science and Economic Development Canada. (2018b, March). *Summary of the Evaluation of the Sustainable Development Technology Fund* [Index Pages]. Government of Canada; Innovation, Science and Economic Development Canada. <https://www.ic.gc.ca/eic/site/ae-ve.nsf/eng/03872.html>
- Innovation Solutions Canada. (n.d.). *Innovation Solutions Canada Annual Report 2018-2019* (Annual Report, p. 22). Innovation, Science and Economic Development Canada. Retrieved October 25, 2021, from [https://www.ic.gc.ca/eic/site/101.nsf/vwapj/00130\\_en.pdf/\\$file/00130\\_en.pdf](https://www.ic.gc.ca/eic/site/101.nsf/vwapj/00130_en.pdf/$file/00130_en.pdf)
- Innovation, Science and Economic Development Canada. (2018a). *The Innovation and Competitiveness Imperative: Seizing Opportunities for Growth* (Canada's Economic Strategy Tables: Cleantech, p. 23). Government of Canada. [https://www.ic.gc.ca/eic/site/098.nsf/vwapj/ISED\\_CleanTechnologies.pdf/\\$file/ISED\\_CleanTechnologies.pdf](https://www.ic.gc.ca/eic/site/098.nsf/vwapj/ISED_CleanTechnologies.pdf/$file/ISED_CleanTechnologies.pdf)
- Innovation, Science and Economic Development Canada. (2021, October 25). Innovative Solutions Canada—Home [Home page]. Government of Canada. <https://www.ic.gc.ca/eic/site/101.nsf/eng/home>
- Innovation, Science and Economic Development Canada. (2021a, February 5). *Testing Stream*. Government of Canada. <https://www.ic.gc.ca/eic/site/101.nsf/eng/00064.html>
- Innovation, Science and Economic Development Canada. (2021b, February 5). *Testing Stream—Open calls for innovative prototypes*. Government of Canada; Innovation, Science and Economic Development Canada. <https://www.ic.gc.ca/eic/site/101.nsf/eng/00124.html#eligibility>
- Innovation, Science and Economic Development Canada. (2021c, July 9). *Challenge Stream for government*. Government of Canada; Innovation, Science and Economic Development Canada. <https://www.ic.gc.ca/eic/site/101.nsf/eng/00142.html>
- International Energy Agency. (2021). Net Zero by 2050—A Roadmap for the Global Energy Sector (p. 224) [Flagship Report]. International Energy Agency. <https://www.iea.org/reports/net-zero-by-2050>
- International Institute for Sustainable Development. (2012). *Procurement, innovation and green growth: The story continues ...* International Institute for Sustainable Development. <https://www.deslibris.ca/ID/234900>
- Invest in Canada. (2021). Canada's Free Trade Agreements. Invest in Canada. <https://www.investcanada.ca/programs-incentives/canadas-free-trade-agreements>
- Janus, S. S. (2016). *Becoming a Knowledge-Sharing Organization: A Handbook for Scaling Up Solutions through Knowledge Capturing and Sharing*. World Bank. <https://openknowledge.worldbank.org/bitstream/handle/10986/25320/9781464809439.pdf>
- Jenkins, T., Canada, & Public Works and Government Services Canada. (2013). *Canada first - leveraging defence procurement through key industrial capabilities: Report of the special adviser to the minister of Public Works and Government Services*. Public Works and Government Services Canada. [http://epe.lac-bac.gc.ca/100/201/301/weekly\\_checklist/2013/internet/w13-08-U-E.html/collections/collection\\_2013/tpsgc-pwgs/P4-52-2013-eng.pdf](http://epe.lac-bac.gc.ca/100/201/301/weekly_checklist/2013/internet/w13-08-U-E.html/collections/collection_2013/tpsgc-pwgs/P4-52-2013-eng.pdf)
- Kaplan, L., & Milke, M. (2021, January 12). Over \$1.9 trillion: The value of Canada's oil and gas exports, 1988 to 2019. *Canadian Energy Centre*. <https://www.canadianenergycentre.ca/over-1-9-trillion-the-value-of-canadas-oil-and-gas-exports-1988-to-2019/>
- Koivisto, J. (2018). Co-designing an outcome-based public procurement: Early involvements, participations and orderings. *Journal of Public Procurement*, 18(4), 323–335. <https://doi.org/10.1108/JOPP-11-2018-019>
- Liao, D., Orser, B., & Riding, A. (2017). *Canadian Federal Procurement as a Policy Lever to Support* (p. 49). Telfer School of Management. [https://telfer.uottawa.ca/assets/documents/2017/Federal-Procurement-and-SMEs-report-Telfer\\_web.pdf](https://telfer.uottawa.ca/assets/documents/2017/Federal-Procurement-and-SMEs-report-Telfer_web.pdf)
- Ling, T. C., Kudina, K., & Rauf, N. (2021, May 27). *The Law Reviews—The Government Procurement Review*. The Law Reviews. <https://thelawreviews.co.uk/title/the-government-procurement-review/canada>
- Los Angeles Cleantech Incubator. (n.d.a). *LACI Market Access Program*. Retrieved October 25, 2021, from <https://lincubator.org/wp-content/uploads/Market-Access-Program-Info-Deck-1.pdf>
- Los Angeles Cleantech Incubator. (n.d.b). *Market Access Program—Los Angeles Cleantech Incubator*. Retrieved October 25, 2021, from [https://laci.smapply.org/prog/market\\_access\\_program/](https://laci.smapply.org/prog/market_access_program/)
- Lukiwski, T. (2018). *Modernizing Federal Procurement for Small and Medium Enterprises, Women-Owned and Indigenous Businesses* (No. 15; p. 168). House of Commons, Canada. <https://www.ourcommons.ca/Content/Committee/421/OGGO/Reports/RP9996115/oggorp15/oggorp15-e.pdf>
- Maclean's. (2012, July 11). Peter MacKay calls Cyclone helicopter deal “worst procurement in Canadian history”. *Macleans.ca*. <https://www.macleans.ca/general/peter-mackay-calls-cyclone-helicopter-deal-worst-procurement-in-canadian-history/>
- MaRS Discovery District. (n.d.). *MaRS Cleantech*. MaRS Discovery District. Retrieved October 25, 2021, from <https://www.marsdd.com/our-sectors/cleantech/>
- Maxime, D., & Lesage, P. (2020). *Carbon Footprint of Procurements by Public Services and Procurements Canada (Québec Excluded)* (p. 121). International Reference Centre for the Life Cycle of Products, Processes and Services. <https://ciraig.org/wp-content/uploads/PSPC-SPAC-EN.pdf>
- McCarthy, S. (2020). *Clean Slate: How Canada Can Spur Growth by Procuring from Its Own Cleantech Startups* (p. 25). Innovation Economy Council. <https://innovationeconomyCouncil.com/wp-content/uploads/IEC-Report-Clean-Slate-Oct-2020-1.pdf>
- Meadowcroft, J. and contributors. 2021. *Pathways to net zero: A decision support tool*. (Transition Accelerator Reports, 3(1) p 1-108). <https://transitionaccelerator.ca/wp-content/uploads/2021/01/2021-01-24-Pathways-to-Net-Zero-v9-4.pdf>
- National Academies of Sciences, Engineering, and Medicine. (2016). *SBIR/STTR at the Department of Energy*. The National Academies Press. <https://doi.org/10.17226/23406>

National Cancer Institute. (2019, June 5). *CAP Program* | NCI: SBIR & STTR. National Cancer Institute. <https://sbir.cancer.gov/programseducation/caprogram>

Natural Resources Canada. (2018, December 14). *Making an Impact in Cleantech*. Government of Canada; Natural Resources Canada. <https://www.nrcan.gc.ca/transparency/reporting-and-accountability/plans-and-performance-reports/departmental-plan-formerly-reports-on-plans-and-priorities/2019-20-departmental-plan-making-impact-cleantech/21645>

Natural Resources Canada. (2021). *Evaluation of the Clean Growth Hub Program* [Evaluation Report]. Natural Resources Canada. <https://www.nrcan.gc.ca/transparency/reporting-and-accountability/plans-and-performance-reports/strategic-evaluation-division/reports-and-plans-year/evaluation-the-clean-growth-hub-program/evaluation-the-clean-growth-hub>

OECD. (2014). *Going green: Best practices for green procurement—Canada* (p. 6). Organization for Economic Co-operation and Development. <https://www.oecd.org/governance/procurement/toolbox/search/gpp-procurement-Canada.pdf>

Office of the Auditor General of Canada. (2005). *Report of the Commissioner of the Environment and Sustainable Development to the House of Commons, 2005*. (p. 44). Office of the Auditor General of Canada. <https://www.oag-bvg.gc.ca/internet/docs/c20050900ce.pdf>

Office of the Auditor General of Canada. (2007, November 15). *Who We Are*. Office of the Auditor General of Canada. [https://www.oag-bvg.gc.ca/internet/english/au\\_fs\\_e\\_370.html#Commissioner](https://www.oag-bvg.gc.ca/internet/english/au_fs_e_370.html#Commissioner)

Office of The Chief Advisor - Procurement. (2019). *Using an outcome-based procurement approach* (p. 10). Queensland Government. [https://www.hpw.qld.gov.au/\\_\\_data/assets/pdf\\_file/0018/3456/usingoutcomebasedprocurementapproach.pdf](https://www.hpw.qld.gov.au/__data/assets/pdf_file/0018/3456/usingoutcomebasedprocurementapproach.pdf)

Office of the Procurement Ombudsman. (2013, March 12). *Procurement Practices Review 2009-2010 - Chapter 5: Methods of Supply Standing Offers and Supply Arrangements*. Office of the Procurement Ombudsman. <https://opo-boa.gc.ca/paapp-prorev/2009-2010/chptr-5-eng.html?pedisable=true>

Office of the Procurement Ombudsman. (n.d.). *2018-2023 Procurement Practice Review Plan* (p. 25). Government of Canada. <https://opo-boa.gc.ca/documents/pepa-prp-2018-2023-eng.pdf>

Perry, C. (2021). *Supporting SME access to public procurement opportunities* (p. 21) [Research Paper]. Northern Ireland Assembly. <http://www.niassembly.gov.uk/globalassets/Documents/RaISe/Publications/2012/education/1212.pdf>

Public Services and Procurement Canada. (2009a, December 18). *Plan the Procurement Strategy*. Buyandsell.Gc.Ca. <https://buyandsell.gc.ca/for-government/buying-for-the-government-of-canada/plan-the-procurement-strategy>

Public Services and Procurement Canada. (2009b, December 18). *Standing Offers*. Buyandsell.Gc.Ca. <https://buyandsell.gc.ca/for-businesses/selling-to-the-government-of-canada/the-procurement-process/standing-offers#20>

Public Services and Procurement Canada. (2009c, December 18). *Supply Arrangements*. Buyandsell.Gc.Ca. <https://buyandsell.gc.ca/for-businesses/selling-to-the-government-of-canada/the-procurement-process/supply-arrangements#20>

Public Services and Procurement Canada. (2009d, November 10). *Bid on Opportunities*. Buyandsell.Gc.Ca. <https://buyandsell.gc.ca/for-businesses/selling-to-the-government-of-canada/bid-on-opportunities>

Public Services and Procurement Canada. (2009e, November 10). *Register as a Supplier*. Buyandsell.Gc.Ca. <https://buyandsell.gc.ca/for-businesses/selling-to-the-government-of-canada/register-as-a-supplier>

Public Services and Procurement Canada. (2011, October 7). *Part B: Bid solicitation - Task and Solutions Professional Services - Professional Services - Buying and Selling - PSPC Services*. Public Services and Procurement Canada. <https://www.tpsgc-pwgsc.gc.ca/app-acq/spc-cps/aactb-tbpsb-eng.html>

Public Services and Procurement Canada. (2012, January 18). *1. Chapter 1—Public Procurement*. Buyandsell.Gc.Ca. <https://buyandsell.gc.ca/policy-and-guidelines/supply-manual/section/1#section-1.30.1>

Public Services and Procurement Canada. (2012b, January 18). *3. Chapter 3—Procurement Strategy*. Buyandsell.Gc.Ca. <https://buyandsell.gc.ca/policy-and-guidelines/supply-manual/section/3#section-3.5>

Public Services and Procurement Canada. (2012c, January 18). *2. Chapter 2—Defining the Requirement and Requisition Receipt*. Buyandsell.Gc.Ca. <https://buyandsell.gc.ca/policy-and-guidelines/supply-manual/section/2>

Public Services and Procurement Canada. (2012c, January 18). *2.2. Annex: Green Procurement: Environmental Factors and Evaluation Indicators*. Buyandsell.Gc.Ca. <https://buyandsell.gc.ca/policy-and-guidelines/supply-manual/annex/2/2>

Public Services and Procurement Canada. (2018, February 20). *Core responsibility 1: Purchase of goods and services - PSPC*. Public Services and Procurement Canada. <https://www.tpsgc-pwgsc.gc.ca/trans/cahiersinformatre-ministertmaterial/livre2-book2/p1-eng.html>

Public Services and Procurement Canada. (2020, November 2). *Seminar Notes: Mythbusting Government Procurement*. Buyandsell.Gc.Ca. <https://buyandsell.gc.ca/for-businesses/resources-for-businesses/reference-sheets-for-suppliers/mythbusting-government-procurement>

Public Services and Procurement Canada. (2021, August 6). *Procurement Support for Businesses*. Government of Canada. <https://buyandsell.gc.ca/procurement-support-for-businesses>

Public Works and Government Services Canada. (2011, October 7). *Green Procurement—Buying and Selling—PWGSC*. Public Services and Procurement Canada; Government of Canada, Public Works and Government Services Canada. <https://www.tpsgc-pwgsc.gc.ca/app-acq/ae-gp/index-eng.html>

Public Works and Government Services Canada. (2011a, October 7). *Green Language Repertoire—Green Procurement—Buying and Selling—PWGSC*. Public Services and Procurement Canada; Government of Canada, Public Works and Government Services Canada. <https://www.tpsgc-pwgsc.gc.ca/app-acq/ae-gp/rle-glr-eng.html>

- Public Works and Government Services Canada. (2011b, October 7). Green Goods and Services—Green Procurement—Buying and Selling—PWGSC. Buyandsell. Gc.Ca; Government of Canada, Public Works and Government Services Canada. <https://www.tpsgc-pwgsc.gc.ca/app-acq/ae-gp/paer-cgpp-eng.html#a2>
- Public Works and Government Services Canada. (2016, November 30). *The basics of selling to the Government of Canada—Canada.ca*. Government of Canada. <https://www.tpsgc-pwgsc.gc.ca/app-acq/vendre-sell-eng.html>
- Radwanski, A. (2020, July 19). Will Ottawa use its purchasing power to boost Canadian clean-tech firms? *The Globe and Mail*. <https://www.theglobeandmail.com/business/article-will-ottawa-use-its-purchasing-power-to-boost-canadian-clean-tech/>
- Sawyer, D. (2020, November 17). Canada's clean-energy gazelles are outperforming fossil fuels. *Policy Options*. <https://policyoptions.irpp.org/magazines/november-2020/canadas-clean-energy-gazelles-are-outperforming-fossil-fuels/>
- SendPulse. (2021, September 2). *What is Government Market: Characteristics, Example - Definition*. SendPulse. <https://sendpulse.com/support/glossary/government-market>
- Shared Services Act, SC 2012, c 19. Retrieved from <https://laws-lois.justice.gc.ca/eng/acts/s-8.9/page-1.html#h-446389>
- Simpson, M. (2020, July 27). Minister Ng open to expanding CAN Health procurement project model to other sectors. *Betakit*. <https://betakit.com/minister-ng-open-to-expanding-can-health-procurement-project-model-to-other-sectors/>
- Smart Prosperity Institute. (2018). *Clean Innovation: Why it Matters & How to Accelerate it Across the Canadian Economy* (Smart Prosperity Leaders' Initiative, p. 36). Smart Prosperity Institute. [https://www.smartprosperity.ca/sites/default/files/clean\\_innovation\\_report.pdf](https://www.smartprosperity.ca/sites/default/files/clean_innovation_report.pdf)
- Smith, R. (2017, June 20). *Innovative Solutions Canada*. <https://casi.ca/resources/Documents/AERO/2019/Abstracts%20Submitted/Space%20deck-%20June%2017th%20Montreal%20Deck.pdf>
- Statistics Canada. (2019). Cleantech and the Survey of Environmental Goods and Services: A technical reference guide. Statistics Canada. <https://www150.statcan.gc.ca/n1/en/pub/16-511-x/16-511-x2019001-eng.pdf?st=tYtCWcj>
- Statistics Canada. (2020, December 18). *The Daily—Environmental and cleantech products sector grew at twice the pace as the total economy in 2019*. <https://www150.statcan.gc.ca/n1/daily-quotidien/201218/dq201218d-eng.htm>
- Statistics Canada. (2021a, May 5). The Daily—Annual Survey of Environmental Goods and Services, 2019. Statistics Canada. <https://www150.statcan.gc.ca/n1/daily-quotidien/210505/dq210505b-eng.htm>
- Statistics Canada. (2021b, October 18). Cleantech and the Survey of Environmental Goods and Services: A technical reference guide. Statistics Canada. <https://www150.statcan.gc.ca/n1/en/catalogue/16-511-X>
- Strategic Programme of Prime Minister Juha Sipilä's Government. (2015). Finland, a land of solutions (p. 80) [Government Publication]. Prime Minister's Office, Finland. [https://valtioneuvosto.fi/documents/10184/1427398/Ratkaisujen+Suomi\\_EN\\_YHDISTETTY\\_netti.pdf/8d2e1a66-e24a-4073-8303-ee3127bfcac](https://valtioneuvosto.fi/documents/10184/1427398/Ratkaisujen+Suomi_EN_YHDISTETTY_netti.pdf/8d2e1a66-e24a-4073-8303-ee3127bfcac)
- Sustainability Advantage. (2019, November 17). *Sustainable Procurement*. Sustainability Advantage. <https://sustainabilityadvantage.com/businesscases/sustainable-procurement/>
- Sustainable Development Technology Canada. (2021, March 22). To Build Global Cleantech Champions Requires a Deliberate Effort to Strengthen Canada's Domestic Market. Sustainable Development Technology Canada. <https://www.sdtc.ca/en/to-build-global-cleantech-champions-requires-a-deliberate-effort-to-strengthen-canadas-domestic-market/>
- Sworder, C., Salge, L., & Van Soest, H. (2017). *The Global Cleantech Innovation Index 2017—Global Cleantech Innovation Programme (GCIP) Country Innovation Profiles* (The Global Cleantech Innovation Index 2017, p. 75). Cleantech Group and World Wildlife Fund. [https://www.unido.org/sites/default/files/files/2017-11/GCII\\_GCIP\\_report\\_2017.pdf](https://www.unido.org/sites/default/files/files/2017-11/GCII_GCIP_report_2017.pdf)
- Sworder, C., Salge, L., & Van Soest, H. (2017). *The Global Cleantech Innovation Index 2017: WHICH COUNTRIES LOOK SET TO PRODUCE THE NEXT GENERATION OF START-UPS?* (The Global Cleantech Innovation Index 2017, p. 52). Cleantech Group and World Wildlife Fund. [http://info.cleantech.com/rs/151-JSY-946/images/Global\\_Cleantech\\_Innovation\\_Index\\_2017\\_FINAL.pdf](http://info.cleantech.com/rs/151-JSY-946/images/Global_Cleantech_Innovation_Index_2017_FINAL.pdf)
- Tollinsky, N. (2021, April 30). CAN Health Network and MEDTEQ aim to drive healthcare innovation. *Canadian Healthcare Technology*. <https://www.canhealth.com/2021/04/30/can-health-network-and-medteq-aim-to-drive-healthcare-innovation/>
- Toronto Region Board of. (2021, July 14). *RAP Webcast Series: De-Risking the Technology Procurement Process* [Webinar]. Toronto Region Board of Trade. <https://vimeo.com/575020885>
- Treasury Board of Canada Secretariat. (1994, January 1). *Directory of Federal Real Property*. Canada. <https://www.tbs-sct.gc.ca/dfrp-rbif/home-accueil-eng.aspx>
- Treasury Board of Canada Secretariat. (2015, January 30). *Government of Canada Spend Data by Department—Open Government Portal*. Open Government. <https://open.canada.ca/data/en/dataset/c37d7510-c54c-4652-8e6f-79023e44be62>
- Treasury Board of Canada Secretariat. (2016, September 26). *Standing Offers and Supply Arrangements—Open Government Portal*. Government of Canada. <https://open.canada.ca/data/en/dataset/f5c8a5a0-354d-455a-99ab-8276aa38032e>
- Treasury Board of Canada Secretariat. (2017, December 19). *Greening Government Strategy: A Government of Canada Directive*. Government of Canada. <https://www.canada.ca/en/treasury-board-secretariat/services/innovation/greening-government/strategy.html>
- Treasury Board of Canada Secretariat. (2017, December 19). *Greening Government Strategy: A Government of Canada Directive*. <https://www.canada.ca/en/treasury-board-secretariat/services/innovation/greening-government/strategy.html>

- Treasury Board of Canada Secretariat. (2018, July 5). *Policy on Green Procurement*. Government of Canada. <https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=32573>
- Treasury Board of Canada Secretariat. (2021, April 1a). *Contracting Policy Notice 2021-1: Entry into force of the Canada-United Kingdom Trade Continuity Agreement*. Government of Canada. <https://www.canada.ca/en/treasury-board-secretariat/services/policy-notice/contracting-policy-notice-2021-1-canada-uk-trade.html>
- Treasury Board of Canada Secretariat. (2021, June 11b). *Contracting Policy Notice 2021-2: Continued Response to COVID-19 Limited Extension of Temporary Amendments to Contracting Limits*. <https://www.canada.ca/en/treasury-board-secretariat/services/policy-notice/contracting-policy-notice-2021-2-response-covid-19-limited-extension-temporary-amendments.html>
- U.S. Small Business Administration. (n.d.). *The SBIR and STTR Programs*. SBIR-STTR. Retrieved October 25, 2021, from <https://www.sbir.gov/about>
- Uyarra, E., Edler, J., Garcia-Estevéz, J., Georghiou, L., & Yeow, J. (2014). Barriers to innovation through public procurement: A supplier perspective. *Technovation*, 34(10), 631–645. <https://doi.org/10.1016/j.technovation.2014.04.003>
- Vera-Perez, I. (2021, February 1). *Cleantech's audacious global goals* [Text]. Mitacs. <https://www.mitacs.ca/en/industry/technology/cleantech/cleantechs-audacious-global-goals>
- Vinet, J., & Godard, M. (2019, December 5). PSPC Agile Procurement. Agile and Innovative Procurement Symposium. [https://cipmm-icagm.ca/wp-content/uploads/Presentation\\_PDF/2019\\_Agile\\_Symposium/Public%20Sector%20Innovation%20-%20Public%20Services%20and%20Procurement%20Canada%20EN.pdf](https://cipmm-icagm.ca/wp-content/uploads/Presentation_PDF/2019_Agile_Symposium/Public%20Sector%20Innovation%20-%20Public%20Services%20and%20Procurement%20Canada%20EN.pdf)
- Weiss, J., & Hamilton, S. (2021, October 18). International Trade Agreements – Friends or Foe of Circular Procurement [Conference Webinar]. <https://circularprocurement.ca/summit21/>
- World Trade Organization. (2012). Canada—General Notes—Annex 7. Integrated Government Procurement Market Access Information (e-GPA) Portal. <https://e-gpa.wto.org/en/Annex/Details?Agreement=GPA113&Party=Canada&AnnexNo=7&ContentCulture=en>
- Xenos, N. (2021, September 15). Power of Public Procurement: Government-Buying Co-operation to Accelerate the Circular Economy. World Circular Economy Forum. <https://www.wcef2021.com/session/power-of-public-procurement-a-new-age-of-government-buying-co-operation-to-accelerate-the-circular-economy/>



# REFERENCES

- 1 Blue Green Canada 2021.
- 2 Alhola & Nissinen 2018; Ghisetti 2017.
- 3 Crisan 2020.
- 4 Treasury Board of Canada Secretariat 2017.
- 5 House of Commons 2021.
- 6 Innovation, Science and Economic Development Canada 2018a.
- 7 Dion et al. 2021; Meadowcroft, J. and contributors 2021.
- 8 Liao et al. 2017.
- 9 Office of the Procurement Ombudsman n.d.
- 10 Clean Energy Canada 2017.
- 11 Alhola & Nissinen 2018; Connell 2019; International Institute for Sustainable Development 2012; Smart Prosperity Institute 2018.
- 12 Blue Green Canada 2021; Clean Energy Canada 2017.
- 13 Vera-Perez 2021.
- 14 Alhola & Nissinen 2018.
- 15 Statistics Canada 2021a.
- 16 Statistics Canada, 2019.
- 17 Innovation Canada 2018.
- 18 This was an improvement over Canada's 2014 rank where it placed 7<sup>th</sup> globally. The 2017 ranking places Canada behind Finland, Denmark, and Sweden.
- 19 Sworder et al. 2017.
- 20 Innovation, Science and Economic Development Canada 2018a.
- 21 Canada Action 2020.
- 22 Statistics Canada 2020.
- 23 Sawyer 2020.
- 24 Kaplan & Milke 2021.
- 25 International Energy Agency 2021.
- 26 McCarthy 2020.
- 27 Ghisetti 2017.
- 28 Smart Prosperity Institute 2018.
- 29 Ghisetti 2017.
- 30 Ghisetti 2017.
- 31 Globe Capital 2019 & Delphi Group 2019.
- 32 Globe Capital 2019 & Delphi Group 2019.
- 33 Globe Capital 2019 & Delphi Group 2019.
- 34 Globe Advance 2020 2021.
- 35 Greenwood & Qaiser 2017.
- 36 House of Commons 2021.
- 37 Authors' calculation with data from: <https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=3610063201>
- 38 Borish 2020.
- 39 Bouckaert et al. 2021.
- 40 Jenkins et al. 2013.
- 41 International Institute for Sustainable Development 2012.
- 42 Alhola 2014.
- 43 Ghisetti 2017.
- 44 Office of the Procurement Ombudsman n.d.
- 45 Clean Energy Canada 2018.
- 46 2016 is the latest year for which federal government spending data (across all departments and agencies) is available.
- 47 Office of the Procurement Ombudsman n.d.
- 48 Ling et al. 2021.
- 49 ISED 2018.
- 50 Innovation Canada, 2019
- 51 ISED 2018
- 52 Finland, a Land of Solutions: Strategic Programme of Prime Minister Juha Sipilä's Government 2015.
- 53 McCarthy 2020.
- 54 Treasury Board of Canada Secretariat 2017.
- 55 Treasury Board of Canada Secretariat 2017.
- 56 Xenos 2021.
- 57 Only policies applicable till the point of contract awarding are described in this section. Policies such as the Vendor Performance Management Policy become applicable once the contract has been awarded.
- 58 This includes the Financial Administration Act 1985, the Government Contracts Regulation 1987, the Treasury Board Contracting Policy, and the Directive on the Management of Procurement
- 59 This includes the Policy on Green Procurement.
- 60 This includes the Project Complexity and Risk Assessment Manual, PSPC Supply Manual, PSPC Code of Conduct for Procurement, Standard Acquisition Clauses and Conditions Manual, Procurement Strategy for Aboriginal Business, the various Land Claim Agreements, Canadian Content Policy, and Common Services Policy.
- 61 Takes into account both the environmental performance and the costs throughout the life cycle of assets and acquired services, including planning, acquisition, use and disposal. This includes operation costs, administrative costs, cost of disposal, and indirect costs (e.g., less energy efficient equipment may produce more heat causing building's air conditioning system to work harder and increase electricity costs).
- 62 Treasury Board of Canada Secretariat 2017.
- 63 (Invest in Canada, 2021)
- 64 Global Affairs Canada, 2012
- 65 Casier, 2019

66 Global Affairs Canada 2013.  
67 Treasury Board of Canada Secretariat, 2021a  
68 Treasury Board of Canada Secretariat, 2021a  
69 Public Services and Procurement Canada, 2021  
70 Public Services and Procurement Canada, 2021  
71 World Trade Organization, 2012  
72 Global Affairs Canada, 2016  
73 Public Services and Procurement Canada, 2021  
74 Bainbridge et al. 2011.  
75 Lukiwski 2018.  
76 Public Services and Procurement Canada 2012.  
77 Lukiwski 2018.  
78 Treasury Board of Canada Secretariat 2017.  
79 Office of the Auditor General of Canada 2007.  
80 OECD 2014.  
81 This is based on 2015 data, which is the last year for which data is available.  
82 Office of the Procurement Ombudsman, n.d.; Treasury Board of Canada Secretariat 2015.  
83 Public Works and Government Services Canada 2011.  
84 Public Services and Procurement Canada 2012.  
85 Shared Services Canada Act 2012.  
86 Office of the Auditor General of Canada 2005.  
87 Public Services and Procurement Canada, 2021b  
88 Innovation, Science and Economic Development Canada 2021.  
89 Natural Resources Canada 2021.  
90 <https://www.tpsgc-pwgsc.gc.ca/trans/cahiersinfoministre-ministertransmaterial/livre2-book2/p1-eng.html>  
91 Public Services and Procurement Canada 2018.  
92 Exceptions can be made to this general rule as was done for COVID-19 related procurement when PSPC's contracting limit was increased to \$500M  
93 Treasury Board of Canada Secretariat 2021b  
94 Defence Production Act 1985.  
95 Shared Services Act 2012.  
96 Public Services and Procurement Canada 2018.  
97 Lukiwski 2018.  
98 <https://buyandsell.gc.ca/for-government/buying-for-the-government-of-canada/plan-the-procurement-strategy#what>  
99 Public Services and Procurement Canada 2009a.  
100 Denton 2021.  
101 Public Services and Procurement Canada 2009b.  
102 Public Services and Procurement Canada 2009b.  
103 Office of the Procurement Ombudsman 2013.  
104 Public Services and Procurement Canada 2009c.  
105 Office of the Procurement Ombudsman 2013.  
106 Office of the Procurement Ombudsman 2013.  
107 While not always mandated, all government departments are encouraged to use existing SOSAs.  
108 Public Services and Procurement Canada 2012b.  
109 Public Services and Procurement Canada 2012b.  
110 Depending on client needs the buyer could also issue an invitation to tender, a letter of interest/request for information, or request for quotation. For further reading, please visit [here](#).  
111 Public Services and Procurement Canada 2009d.  
112 Denton 2021.  
113 Public Works and Government Services Canada, 2011a.  
114 Public Works and Government Services Canada, 2011b.  
115 Public Services and Procurement Canada 2012c.  
116 Those listed under the Commodity Management Policy.  
117 Public Services and Procurement Canada, 2012c.  
118 Public Services and Procurement Canada 2012b.  
119 Lukiwski 2018.  
120 Lukiwski 2018.  
121 Officer of the Auditor General of Canada, 2005  
122 The Government of Canada has launched a new website called [CanadaBuys.com](https://CanadaBuys.com). Procurement is currently being migrated to this new site.  
123 Public Services and Procurement Canada 2009e.  
124 Public Services and Procurement Canada 2009e.  
125 1. SELECT: A database for suppliers who provide Construction, Architectural, Maintenance, and Engineering (Consulting) services; it enables PSPC to invite firms to bid; 2. ProServices: A mandatory method of providing "professional services that are valued below the Canada Korea Free Trade Agreement"; 3. Translation Bureau: A service that invites self-employed individuals, firms, or freelancers to provide translation services.  
126 Public Services and Procurement Canada 2009e.  
127 Public Services and Procurement Canada 2009e.  
128 Public Services and Procurement Canada 2011.  
129 Public Works and Government Services Canada 2016.  
130 Blokland & Reniers 2020.  
131 Blokland & Reniers 2020.  
132 Blokland & Reniers 2020.  
133 Allen 2006.  
134 Allen 2006.

135 Allen 2006.  
136 The EU's realist power: public procurement and CETA negotiations with Canada  
137 This argument was also furthered by a 2017 report of the government of Canada's Advisory Council on Economic Growth and by the 2011 Jenkins expert panel report. In 2019, then Minister of Public Services and Procurement Mandate Letter called for the modernization of procurement practices that can support innovation and green procurement, yet reforms have not taken place.  
138 Crisan 2020.  
139 Crisan 2020.  
140 Crisan 2020.  
141 Crisan 2020.  
142 Allen 2006.  
143 Byers & Webb 2013; Maclean's, 2012.  
144 Byers & Webb 2013; Maclean's, 2012.  
145 Deyanska et al. 2014.  
146 Deyanska et al. 2014.  
147 Deyanska et al. 2014.  
148 Deyanska et al. 2014.  
149 Innovation, Science and Economic Development Canada 2018a.  
150 Innovation, Science and Economic Development Canada 2018a.  
151 Innovation, Science and Economic Development Canada 2018a.  
152 Industry/seller feedback maybe sought through a separate "Request for Information" (RFI). Procurers issue RFIs outlining a potential requirement and requesting sellers' response detailing their ability to satisfy or "provide ideas and suggestions on how the eventual solicitation might be structured". RFIs, however, exist separately from RFPs, and are sometimes issued prior to large value RFPs. <https://buyandsell.gc.ca/policy-and-guidelines/supply-manual/section/4/5/5>  
153 Uyarra et al. 2014.  
154 Uyarra et al. 2014.  
155 Alhola & Nissinen 2018.  
156 Smart Prosperity Institute 2018.  
157 Smart Prosperity Institute 2018.  
158 Sworder et al. 2017  
159 McCarthy 2020.  
160 Innovation Science and Economic Development Canada 2018b.  
161 Crisan 2020.  
162 Innovation, Science and Economic Development Canada 2018.  
163 Gualandris et al., 2019.  
164 Treasury Board of Canada Secretariat 2016.  
165 Da Ponte et al., 2020.  
166 Bleasby, 2021.  
167 Radwanski 2020.  
168 SendPulse 2021.  
169 Government Contracts Regulations 2019.  
170 Public Services and Procurement Canada 2020.  
171 Treasury Board of Canada Secretariat 1994.  
172 Canadian Nuclear Safety Commission 2014.  
173 Vera-Perez 2021.  
174 Huang et al. 2020.  
175 Liao et al., 2017.  
176 House of Commons 2021.  
177 Toronto Region Board of 2021.  
178 Lukiwski 2018.  
179 Lukiwski 2018.  
180 House of Commons 2021.  
181 Hoekman & Taş 2020.  
182 Weiss & Hamilton, 2021; Casier 2019  
183 Weiss & Hamilton, 2021  
184 Lukiwski, 2018  
185 ISC operates through two program lines: testing stream, challenge stream. The testing stream involves buying pre-commercial products/services, testing them in a real-life setting and providing feedback. The challenge stream is a competitive R&D program stream. aimed at early-stage technologies. Selected companies selected are supported through 3 phases: proof of feasibility, prototype development, and pathway to commercialization.  
186 Innovation, Science and Economic Development Canada 2021a.  
187 Smith 2017.  
188 Innovation, Science and Economic Development Canada 2021a.  
189 Innovation, Science and Economic Development Canada 2021b.  
190 Innovation, Science and Economic Development Canada 2021c.  
191 Natural Resources Canada 2018.  
192 Impact Canada 2021.  
193 U.S. Small Business Administration, n.d.  
194 U.S. Small Business Administration, n.d.  
195 National Cancer Institute 2019.  
196 National Academies of Sciences, Engineering, and Medicine 2016.  
197 National Academies of Sciences, Engineering, and Medicine 2016.  
198 Innovation Solutions Canada n.d.  
199 Maxime & Lesage 2020.

- 200 These figures represent only the partial life cycle emissions from goods i.e., resources used and manufacturing. It doesn't account for emissions from distribution, use and end of life disposal.
- 201 This number includes procurement for all regions except Quebec.
- 202 CAN Health Network 2020a.
- 203 CAN Health Network 2020b.
- 204 CAN Health Network 2020a.
- 205 CAN Health Network 2020b.
- 206 Federal Economic Development Agency for Southern Ontario 2020.
- 207 CAN Health Network 2020a.
- 208 CAN Health Network 2020b.
- 209 CAN Health Network 2020b.
- 210 CAN Health Network 2020c.
- 211 CAN Health Network 2020c; CAN Health Network 2020a; Federal Economic Development Agency for Southern Ontario 2020.
- 212 CAN Health Network 2020c.
- 213 Federal Economic Development Agency for Southern Ontario 2020.
- 214 CAN Health Network 2020a.
- 215 Tollinsky 2021.
- 216 Tollinsky 2021.
- 217 Globe Capital 2021 2021; Simpson 2020; Sustainable Development Technology Canada 2021.
- 218 Public Services and Procurement Canada 2012a.
- 219 <https://www.ase.org/profile/new-york-state-energy-research-and-development-authority-nyserda#:~:text=NYSERDA%2C%20a%20public%20benefit%20corporation,reduce%20reliance%20on%20fossil%20fuels>.
- 220 <https://www.nyserda.ny.gov/About/Publications/Program-Planning-Status-and-Evaluation-Reports/Strategic-Outlook>
- 221 A Guide to Doing Business with the New York State Energy Research and Development Authority
- 222 A Guide to Doing Business with the New York State Energy Research and Development Authority
- 223 <https://portal.nyserda.ny.gov/servlet/servlet.FileDownload?file=00Pt0000004FqpBEAS>
- 224 <https://www.nyserda.ny.gov/All-Programs/Clean-Energy-Standard/Renewable-Generators-and-Developers/RES-Tier-One-Eligibility/Certification>
- 225 New York State Clean Energy Standard RES Tier 1 Certification – Submission Instructions and Eligibility Guidelines
- 226 Liao et al. 2017.
- 227 de Bas et al. 2019.
- 228 Sustainability Advantage 2019.
- 229 European Commission n.d.
- 230 European Commission n.d.
- 231 European Commission n.d.
- 232 European Innovation Council n.d.a.
- 233 European Innovation Council n.d.b.
- 234 European Innovation Council n.d.b.
- 235 European Innovation Council n.d.b.
- 236 Globe Capital 2021 2021.
- 237 Bergmann & Utikal 2021.
- 238 MaRS Discovery District n.d.
- 239 Foresight Canada n.d.
- 240 Perry 2021.
- 241 C40 Cities n.d.
- 242 C40 Cities n.d.
- 243 Economic and Workforce Development Department 2016.
- 244 Los Angeles Cleantech Incubator, n.d.a.
- 245 Los Angeles Cleantech Incubator, n.d.b.
- 246 Los Angeles Cleantech Incubator, n.d.a.
- 247 Los Angeles Cleantech Incubator, n.d.a.
- 248 Los Angeles Cleantech Incubator, n.d.a.
- 249 Los Angeles Cleantech Incubator, n.d.a.
- 250 Atamis 2020.
- 251 Clean Energy Canada 2018; Clean Energy Canada 2021a; Clean Energy Canada 2021b.
- 252 Clean Energy Canada 2021a.
- 253 Clean Energy Canada 2021a.
- 254 Koivisto, 2018
- 255 Office of The Chief Advisor – Procurement, 2019
- 256 Treasury Board of Canada Secretariat 2018.





**Smart Prosperity  
Institute**

[institute.smartprosperity.ca](http://institute.smartprosperity.ca)

## ACKNOWLEDGEMENTS

This report was written by Teslin Augustine and Harshini Ramesh. Editing and writing support was provided by John McNally. The authors would like to thank the Ivey Foundation for their generous support, and for providing valuable feedback on this report. The authors would also like to thank Sarah Petrean, and Liesbeth Casier, among others, for being external reviewers to this report and for providing their insights and feedback. The authors are grateful to the representatives, advocates, and leaders within Canada's cleantech and procurement sector who took the time to share their wisdom and insights on this challenge through interviews and discussions, and without whom this work would not be possible.

Responsibility for this final product is Smart Prosperity Institute's alone, and should not be assigned to any reviewers, interviewees, or any external party. Being interviewed or reviewing this report does not mean endorsement, and any errors remain the authors' responsibility.