Power Workers' Union Submission on Canada's Draft Sustainable Development Strategy
July 2022

The Power Workers' Union (PWU) is pleased to submit comments and make recommendations to Environment and Climate Change Canada (ECCC) regarding the Draft Federal Sustainable Development Strategy (FSDS).

The PWU is a strong advocate of emission reduction strategies that contribute to sustainable development and has engaged in several federal consultations, including the National Infrastructure Plan, Clean Fuel Standard (CFS), 2030 Emission Reduction Plan, and Clean Electricity Standard (CES), Carbon Capture Utilization and Sequestration (CCUS) tax credit, SMR Action Plan, and Hydrogen Strategy.

The FSDS sets out the Government of Canada's sustainable development goals and targets and outlines implementation strategies for achieving them. The ECCC is seeking comments on the draft FSDS from Canadians to: strengthen the strategy; help inform the Government of Canada's sustainable development priorities; help shape the final version of the strategy; and, ensure its targets, milestones and actions reflect the priorities of Canadians.

The government is seeking feedback on several questions, including the following:

1. *Given the climate crisis facing Canada and the world today, does the structure of the draft 2022 to 2026 strategy—highlighting the environmental aspects of the 17 SDGs, including its more social and economic goals—resonate with you? How would you change it?*
2. *Do the goals, targets and actions highlighted in the draft strategy cover the key sustainable development issues that the federal government should be focusing on?*
3. *Which sustainable development issue(s) do you think are missing or need more emphasis?*
4. *Sustainable development encompasses environmental, social, and economic issues. Are these linkages captured well (for example in the chapters on SDG 1, No Poverty, SDG 4, Quality Education, and SDG 10, Reduced Inequalities)?*
5. *What do you think is the Government of Canada's primary role in driving sustainable development forward?*
6. *Do we have the right targets and indicators to advance and measure performance?*

The PWU addresses Questions 1 and 2 to set the context for the following recommendations that respond specifically to Questions 3 to 6.

Primary role of government in driving sustainable development (Q5)

1) The federal government's primary FSDS goal should be to enable the development of the sustainable energy infrastructure Canada needs including the infrastructure required to make the energy transition.

Sustainable development issues missing from the Draft FSDS (Q3)

2) The FSDS should be clear about the definition of clean energy in order to provide a unifying context for the sustainable development strategies and initiatives that advance decarbonization of the economy.

3) The FSDS should include the activities that the federal government is engaged in regarding nuclear energy.

Socio economic considerations and the role of the FSDS in addressing them (Qs 4 and 6)

4) Targets and metrics should include growth objectives for competitiveness, jobs, GDP, trade balance, and energy security to gauge the success of Canada's sustainable development of infrastructure.

Context for PWU Recommendations

The PWU supports the reframing of the FSDS's objectives to align with the UN Framework of 17 SDGs, the proposed actions and timelines and the impacts on federal departments and the subsequent complementary plans each will develop.

The PWU's comments focus on the chapters noted below with an emphasis on advancing Canada's greenhouse gas emission reduction objectives:

- Chapter 7: Increase Canadians' Access to Clean Energy
- Chapter 8: Encourage Inclusive and Sustainable Economic Growth in Canada
- Chapter 9: Foster Innovation and Green Infrastructure in Canada
- Chapter 12: Reduce Waste and Transition to Zero-Emission Vehicles
- Chapter 13: Take Action on Climate Change and Its Impacts

The PWU supports the GHG reduction initiatives in Chapter 13, specifically in the context of the *Canadian Net-Zero Emissions Accountability Act* and the *2030 Emissions Reduction Plan*. The PWU supports the need for a *National Adaptation Strategy* and, as summarized in the submission to Canada's 2030 Emission Reduction Plan, recognizes the universal agreement that more low-carbon electricity is required - two to three times what Canada has today.[1]

In this context and in response to Q2, the PWU observed four evident policy challenges that have inadequate focus and, as a result, will impede the achievement of the FSDS' goals and potentially undermine them. These challenges include:

a) The broad push to drive down emissions, including the objectives of the clean electricity standard, are not aligned with the timely development of the requisite enabling clean energy infrastructure.
b) The lack of clarity around the definition of clean energy and technology undermines the FSDS's ability to focus the initiatives and achieve its environmental, economic, and societal goals.
c) The critical contribution of nuclear technology to Canada's clean energy future and the associated ongoing and active federal government efforts to advance it are missing from the FSDS narrative. This effectively undermines the timely development of the clean energy infrastructure that is required to achieve Canada's 2050 climate objectives.

[1] PWU submission on Canada's 2030 Emission Reduction Plan, January 2022.

d) The socio-economic factors of competitiveness, jobs, GDP, trade balance and energy security that are critical to the health and prosperity of Canada are not evident in the targets, indicators, and measures.

The importance of these foundational sustainable development issues cannot be overstated and underpins the PWU's recommendations.

Primary role of government in driving sustainable development (Q5)

Recommendation #1 - The federal government's primary FSDS goal should be to enable the development of the sustainable energy infrastructure Canada needs including the infrastructure required to make the energy transition.

The federal government's broad push to drive down emissions in Canada, including the objectives of the proposed clean electricity standard, are not aligned with policies for, or the timely development of, the enabling clean energy infrastructure.

Four factors support this observation:

- The nature of Canada's clean energy options;
- The importance of electrification and carbon capture;
- The complex nature of sustainable solutions and the time required to develop them; and,
- The challenge of coordinating sustainable policies across Canada's multi-provincial and territorial jurisdictions.

The nature of Canada's clean energy options

Chapter 7 of the FSDS addresses the goal of increasing Canada's access to clean and affordable energy, which is identified as essential for the achievement of net zero emissions. This chapter identifies three pathways to net zero: energy efficiency, electrification, and clean fuels. In previous submissions, the PWU has identified the available trifecta of low-carbon energy solutions-- clean electricity, decarbonized fossil applications (enabled by carbon capture and storage (CCUS) and biomass) and hydrogen.[2] Hydrogen is highlighted as a distinct energy option as it is produced by clean electricity and decarbonized fossil fuels. Analysis shows how the availability of cost-effective clean electricity or carbon capture options impacts on the regional production and economics of hydrogen across this country.[3] Furthermore, there are significant potential synergies between a clean electricity system and the production and use of electrolytic hydrogen where appropriate.[4]

The importance of electrification and carbon capture

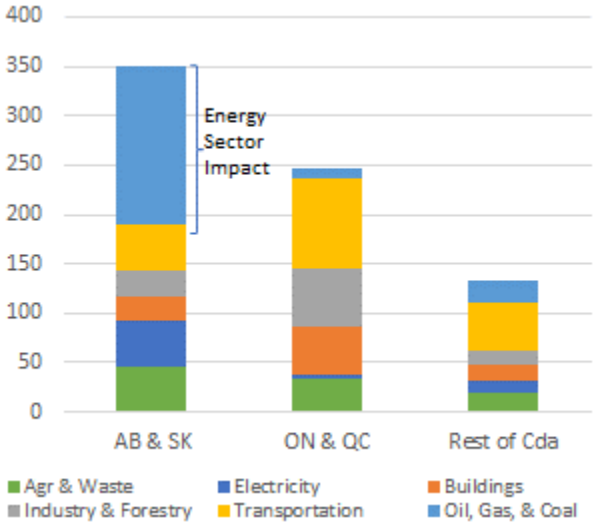
[2] PWU submission on Canada's 2030 Emission Reduction Plan, January 2022; PWU submission on the National Infrastructure Assessment consultation, regarding Government of Canada. "Building the Canada We Want in 2050." 2021.
[3] M. Brouillette, CCRE Commentary – Toward a National Energy Vision: Canada's Low-Carbon Energy Infrastructure Opportunity in a Global Net Zero Future, 2021.
[4] PWU submission on the National Infrastructure Assessment consultation, regarding Government of Canada. "Building the Canada We Want in 2050." 2021.

Chapter 7 of the FSDS recognizes that electrification provides a foundation for decarbonization strategies. In the development of Canada's 2030 Emissions Reduction Plan, the ECCC acknowledged the pressing need to develop significant amounts of new, low-carbon energy infrastructure that is required by 2050. The PWU shares this sense of urgency.[5]

Chapter 7 also notes that Canada's abundant fossil fuel resources can be converted to clean hydrogen when coupled with CCUS. Chapter 8 further emphasizes the importance of the development of CCUS technologies to remove or capture carbon dioxide from the air or industrial emissions (including electricity and oil and gas).

Canada's challenge is that the viability and importance of these two pathways differ across the country as a function of the emissions reduction challenge each region is facing [Figure 1].[6]

Figure 1: Total Emissions by Sector for Provincial Groups
(Mt CO_2e, 2019)

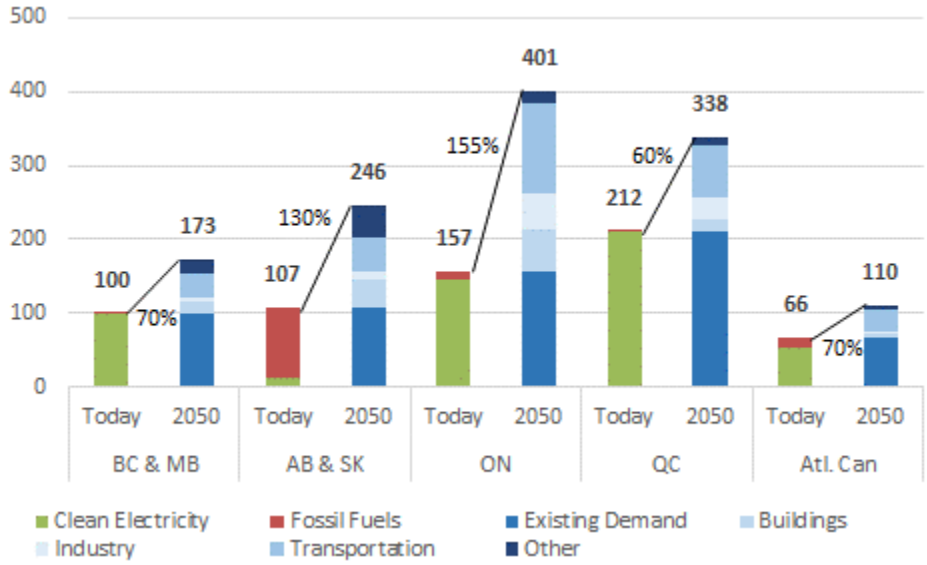


Source: Environment and Climate Change Canada, data on GHG emissions by province, 2021.

Alberta and Saskatchewan must address energy sector emissions and place significant importance on CCUS solutions. By contrast, low-carbon electricity resources will figure prominently in the clean-energy transition for Ontario and Quebec as the composition of their economies requires decarbonizing of transportation, industry, and buildings. In fact, the need to electrify in Ontario is over twice as great as for the other provinces [Figure 2].

[5] PWU submission to the 2030 emissions target consultation.
[6] CCRE Commentary, "Toward a National Energy Vision: Case Study - Electricity System Implications for Ontario and Quebec", 2022; M.Brouillette, presentation at CCRE Energy Leaders Roundtable, 'Case Study in Informing a National Energy Vision - Ontario decarbonization and implications for Quebec and Canada", June 2022.

Figure 2: Forecast Provincial Electricity Demand by Sector
(TWh)



Forecast energy demand based on economic sector-specific TWh/Mt forecasts. Excludes electrolytic hydrogen in BC, AB, SK and MB, assuming these provinces will rely on steam methane reforming from natural gas coupled with carbon capture. Assumes 75-percent reduction in AB/SK oil sector activity by 2050.

Source: Canada Energy Regulator, Canada's Renewable Power, 2021; Environment and Climate Change Canada Data, 2021; Strapolec Analysis.

Without clearly identified and commercially viable CO_2 storage options in Ontario and Quebec, the degree to which CCUS can help with their respective electrification remains to be validated.[7] This supports the importance that the Clean Electricity Standard (CES) discussion paper placed on accelerating the development of clean electricity system infrastructure.[8] However, it was noted in the PWU's CES submission that it is impossible to achieve net zero electricity emissions by 2035 given the already complex challenges of transitioning away from existing fossil-based supplies are further complicated by the anticipated growth in demand for low-carbon electricity resulting from electrification of the economy.[9] Electricity demands required to achieve Net Zero will substantially exceed not only the currently available supplies in all provinces but also the ability to develop new resources.[10]

Analyses indicate that meeting the Ontario's electrification demand under current polices will: increase electricity sector emissions thereby eradicating the reductions achieved by closing Ontario's coal stations over a decade ago; set back Canada's overall 2030 national emission targets; and, offset the

[7] The FSDS does identify an action to establish the potential for CCUS
[8] Proposed Federal Clean Electricity Standard, January 2022
[9] PWU submission on Submission on Canada's Clean Electricity Standard Discussion Paper, April 2022.
[10] PWU submission on the National Infrastructure Assessment consultation, regarding Government of Canada. "Building the Canada We Want in 2050." 2021.

achievable emission reductions from the electricity sector in all the provinces that are still burning coal.[11]

Large-scale low-emission electricity generation infrastructure takes more time to develop than natural gas generation, yet the FSDS does not indicate how federal leadership will ensure that the supply of clean energy is available to meet the demand that it is nurturing. Misalignment of these factors could be disastrous. For example, energy brownouts are a real possibility in Ontario in the next decade and may be forcing commitments to long-term, higher electricity system emissions infrastructure to avoid that consequence.[12]

The complex nature of sustainable solutions and the time to develop them

The options for developing sustainable clean electricity systems involve significant infrastructure trade-offs: local clean electricity and hydrogen production; new pipeline infrastructure for hydrogen, captured carbon for sequestration and new oil and gas distribution to manage the transition and provide energy security; and, interprovincial electricity transmission networks.

In previous submissions, the PWU has recommended that an infrastructure decision-making framework should reflect the balance and potential synergies between low-carbon electricity, decarbonized fossil fuels and hydrogen.[13] Each of these energy sources have unique infrastructure requirements and how the three are balanced will greatly influence the infrastructure planning pathway to decarbonize Canada's economy. Regional differences and infrastructure solutions will also require balancing given their impact on national scale delivery infrastructure investments.

The PWU has also submitted that regional interprovincial Tx Interconnections are dependent upon the regional choices regarding the type and location of new non-emitting supplies to be locally developed and the emission reduction role that new transmission may play in helping neighboring jurisdictions.[14,13] Investments in interprovincial interties come with very high costs and need to be justified.[15]

The challenge of coordinating sustainable policies across Canada's governing stakeholders

Advancing sustainable development is dependent on deciding what can be built where and when. The FSDS does not appear to present an integrated vision for accommodating the diversity of Canadian stakeholder interests and engaging them in the transition from today's energy infrastructure towards the future sustainable infrastructure Canada needs. This omission in the FSDS vision is its single most crucial gap. For example, the FSDS places significant emphasis on Canada's existing hydroelectric assets which analyses and recent experience suggest is questionable.[16]

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[11] Strategic Policy Economics, "Electrification Pathways for Ontario to Reduce Emissions", 2021; CCRE Commentary, "Toward a National Energy Vision: Case Study - Electricity System Implications for Ontario and Quebec", 2022;
[12] PWU submission on Submission on Canada's Clean Electricity Standard Discussion Paper, April 2022.
[13] PWU submission on the National Infrastructure Assessment consultation, regarding Government of Canada. "Building the Canada We Want in 2050." 2021.
[14] PWU submission on the National Infrastructure Assessment consultation, regarding Government of Canada. "Building the Canada We Want in 2050." 2021.
[15] PWU submission on Submission on Canada's Clean Electricity Standard Discussion Paper, April 2022.
[16] Strategic Policy Economics, "Towards a National Energy Vision - The Realm of the Possible for Canada: Hitting Above Its Weight to Reduce Global Emissions", 2021.

The PWU believes that Canada needs a national energy vision to achieve its 2050 climate objectives.[17] Canada's energy transition to NZ exemplifies its enduring policy dilemma – balancing the regional differences and disparities in resources and interests created by our vast geography to craft a principle-based National Energy Vision.[18,19] This vision must address: the emerging international concerns over energy security; Canada's ability to contribute to global emissions reductions; optimal regional energy solutions; choices that impact interprovincial energy exchange; and indigenous rights and partnerships that enable the requisite infrastructure development e.g., hydroelectric, oil and gas.

Sustainable development issues missing from the Draft FSDS (Q3)

Recommendation #2 - The FSDS should be clear about the definition of clean energy in order to provide a unifying context for the sustainable development strategies and initiatives that advance decarbonization of the economy.

Chapter 7 lays out Canada's view on clean energy and how access to affordable clean energy is essential to decarbonize the economy and achieve net zero greenhouse gas (GHG) emissions (p70). The Chapter notes that Canadians have access to some of the world's cleanest electricity with 82% of electricity generated coming from non-GHG-emitting sources, including 67% from renewables and 15% from nuclear (p70). In this context, the word "clean" appears to denote forms of energy that are non-GHG-emitting.

However, the remainder of the FSDS obscures this definition while appearing to "green-wash" the federal objectives with misleading rhetoric. Clearer federal guidance is required to underpin a strategy that seeks low-carbon, affordable energy to provide the maximum economic and social benefits on the nation's path to net zero.

This observation stems from three factors:

a) The use of the term "clean" as it applies to energy in the FSDS is used inconsistently;
b) The FSDS ambiguous use of "clean energy" implies a strategy focused on non-hydro renewables to solve Canada's future clean energy supply, an approach analyses show is not viable; and,
c) The ambiguous term "clean" permeates the FSDS thereby obfuscating the intent of many proposed initiatives.

a) The use of the term "clean" as it applies to energy in the FSDS is used inconsistently.

The FSDS includes statements that contradict the above definition of clean energy as "non-GHG-emitting", such as:

- "*GHG emissions come from activities such as non-renewable electricity production*" (p70), implying that clean electricity only comes from renewables.

[17] PWU submission on Canada's 2030 Emission Reduction Plan, January 2022;
[18] K. Taylor. CCRE Commentary. "A National Energy Vision for Canada: A Principled Approach." April 2021.
[19] M. Brouillette, CCRE Commentary – Toward a National Energy Vision: Canada's Low-Carbon Energy Infrastructure Opportunity in a Global Net Zero Future, 2021

- *"Clean fuels produce fewer GHG emissions than traditional fuels*" (p70), implying energy sources do not need to be non-emitting to be considered clean.
- *"Abundant fossil fuels can be converted to "clean" hydrogen when coupled with CCUS technologies"*, even though it is well accepted that the capture efficiency of CCUS is less than 90% and such hydrogen production methods are not considered non-emitting.[20,21]

This bias in language narrows the perspectives on possible solution sets for achieving a healthy net zero future for Canadians by framing Canada's energy future as reliant on only renewables, less emitting fossil fuels, and hydrogen made from natural gas. This myopic focus ignores other sustainable, possibly more effective, approaches. The FSDS should define what GHG emission performance constitutes clean energy and use the term consistently.

b) The FSDS ambiguous use of "clean energy" implies a strategy focused on non-hydro renewables to solve Canada's future clean energy supply, an approach analyses show is not viable.

Chapter 7 of the FSDS emphasizes the expectation that renewables will comprise a significant share of our future energy supply mix and does so through such statements as:

- The government plans to expand the supply of clean electricity through investments in renewable and next generation clean energy and technology and clean fuels production (p71);
- The government seeks to provide more transmission to connect regions with "clean" power and those that don't by the "integration of renewables and clean fuels" (p71); and,
- The implementation strategy (p74) focusses on supporting renewables by
    - Playing a leading role and working with partners on clean and renewable energy
    - Supporting renewable energy deployment to replace GHG emitting sources
    - Identifying short term milestones for offshore renewables energy regulation and smart renewable energy projects

Chapter 8 discusses "Climate tech" as a subset of "clean tech" that includes transitioning energy supply to "renewable sources" (p84).

Chapter 13 places further emphasis on the role of renewables, identifying:

- Urgent action to reduce GHGs to net zero and grow prosperity by realizing opportunities in emerging markets such as renewable energy (p126); and,
- Short-term milestone to use 100% clean electricity in federal real property including producing or purchasing renewable electricity (p136).

These examples suggest that clean energy is defined as renewables and clean fuels while other viable "next generation clean energy" options remain undefined.

[20] It is noted that the FSDS makes reference to technologies for direct air capture of CO_2 which could improve the non-emitting performance of clean fuels, but without consideration of their affordability and need for clean energy to operate them.

[21] Canada's Hydrogen strategy distinguishes between the emissions content of hydrogen produced from natural gas and that for hydrogen produced by non-emitting electricity.

The FSDS should comprehensively define what constitutes clean energy, i.e. non-GHG-emitting, and include a strategic approach for advancing each supported solution in recognition of the different technology, development and deployment challenges. This will set a transparent stage for the public to interpret the nature and intent of the FSDS initiatives.

The term "clean" should at least differentiate hydro from non-hydro renewables generation sources and properly contextualize their current contribution and the approach for advancing them in the future. The public may not be aware that the renewables statistics quoted in the FSDS are more reflective of hydroelectricity, while the proposed initiatives suggest wind and solar. The future development of hydroelectric generation is complicated by well-understood challenges and additional investment is not supported by any initiatives identified in the FSDS.

For fuller clarity and transparency, the FSDS should define the non-emitting electricity generation supply mix options, including nuclear energy's stated share and the use of biomass and carbon capture equipped natural gas-fired generation. A viable FSDS should include the regional implications of these choices and include an approach for reconciling them (see recommendation #1).

The FSDS is missing a critical strategic element for creating Canada's sustainable energy system in the next 10 years that is needed to support the decarbonization activities that the government is promoting today. The FSDS should explicitly consider the impacts of increasing electricity demand and how this may impact the viability of available supply options. The FSDS should clearly present the approach to reconciling how the magnitude of the forecasts of new electricity demand impact the available baseload supply options—hydroelectric, natural gas with carbon capture and nuclear. The FSDS should acknowledge that proper analysis of Canada's weather patterns shows that the cost of intermittent renewables is significantly elevated due to massive electricity storage and backup generation requirements and are cost effective contributors to electricity needs only where they are integrated with natural gas-fired generation. Without this element, the FSDS fails to reflect a fact-based foundation putting at risk Canada's net zero mission for affordable energy and economic and social well-being.

c) *The ambiguous term "clean" permeates the FSDS thereby obfuscating the intent of many proposed initiatives.*

The ambiguity associated with the use of the word "clean" in the FSDS is further magnified by the use of many other terms in Chapters 8 and 9 e.g., "green", "climate" and "sustainable". The use of these words appears to be at times synonymous and not at others.

Chapter 8 discusses the Clean Tech sector, however:

- Skill development initiatives focus on specific "clean jobs", "green jobs", battery industry, clean energy workforce for women; and,
- Commitments to sustainability are achieved "by shifting away from fossil fuels so benefits of clean economy can be enjoyed", implying the clean fuels narrative is not sustainable.

Chapter 9 introduces additional terms and ambiguity:

- Green infrastructure is stated as increasingly important to sustain economic, environmental and social well-being and is defined as low carbon transportation and clean energy (p88). However, initiatives are to grow electric vehicle, natural gas and hydrogen fueling stations. → *What is the sustainable role for natural gas fueling?*
- Green bonds (p90) for green infrastructure and clean tech → but eligibility for green bonds is not GHG emissions dependent?
- The Buy Clean Strategy to use made-in-Canada low-carbon products has no identified relationship to clean energy and or buying clean energy; and,
- Sustainable financing for climate and related practices to ensure a stable and predictable transition to a net zero economy (p91) does not appear to be related to "clean".

The FSDS should clearly define the term "clean" and develop an integrated, consistent lexicon to provide Canadians with a transparent, unifying understanding of what the government is trying to achieve. Canada needs a balanced transparent approach around all affordable clean energy solutions that will move Canada towards its net zero goals of affordable clean energy that maximize the economic and social well-being of the country. The support of Canadians deserves clearly communicated objectives.

Recommendation #3 - The FSDS should include the activities that the federal government is engaged in regarding nuclear energy.

The critical contribution of nuclear technology to Canada's clean energy future and the associated efforts of the federal government to advance it are missing from the FSDS narrative. This further undermines the development of needed clean energy infrastructure.

While Chapter 7 identifies nuclear as providing 15% of Canada's clean electricity and includes nuclear as contributor to the measurement of Canada's future non-emitting electricity generation, the term nuclear <u>does not appear anywhere else in the document</u>.

This omission is noteworthy for two substantive reasons:

a) The federal government is engaged in advancing nuclear as a solution
b) Nuclear is an essential element for Canada to achieve Net Zero.

Analyses clearly suggest that the proposed FSDS is unlikely to be successful without including nuclear. Forecasts of new demand further suggest that Canada has already run out of time to ensure that it has the low-carbon electricity needed to decarbonize the economy.

a) The federal government is engaged in advancing nuclear as a solution

The FSDS identifies many initiatives associated with the elimination of coal, investments in carbon capture, development of clean fuels and, yet, makes no mention of nuclear. Concurrently, the Government of Canada is engaged in several initiatives that include nuclear as an integral part of its strategy:

1) Hydrogen Strategy
    a. The FSDS discusses Canada's hydrogen strategy largely in the context of using fossil fuels and carbon capture to create hydrogen.

    b. There is, however, a nuclear working group within this initiative that is examining the role of nuclear energy and other non-emitting electricity generation in producing hydrogen.
2) Clean Energy Ministerial (CEM)
    a. The FSDS notes Canada's important international role as a member of the CEM.
    b. However, the FSDS does not mention that Canada, along with 3 other nations, co-leads the CEM program on Nuclear Innovation: Clean Energy Future (NICE) and advocated for the inclusion of nuclear within the CEM's definition of clean energy.[22]
3) Canada is actively engaged in many international cooperative initiatives with several countries (e.g. the U.K., U.S., Romania, etc.) regarding nuclear technology.[23]
4) Canada is supporting new nuclear technology development:
    a. The SMR action plan;[24]
    b. Several provinces have entered into memoranda of understanding on the development of new Small Modular Reactors (e.g. Ontario, Saskatchewan, New Brunswick, and Alberta);
    c. Government of Canada invests in small modular reactor technology to help transition Canada to net zero with cleaner sources of energy;[25]
    d. Government of Canada indicates clear support for the role of nuclear in Canada's clean energy transition in Federal Budget 2022.[26]

To provide a balanced, accurate, and transparent view of Canada's sustainable development strategy, the government should include nuclear as a key strategic element in the FSDS.

b) Nuclear is an essential element for Canada to achieve net zero.

The PWU has made many submissions articulating the essential and critical role of nuclear energy for achieving a Net Zero economy.[27] These submissions have been informed by many analyses that show:

1) The demand for new energy is significant as described under recommendation #1

[22] https://www.cleanenergyministerial.org/initiatives-campaigns/nuclear-innovation-clean-energy-future/
[23] NRCan Quarterly Nuclear Energy Session, NRCan Update, December 2020.
[24] https://smractionplan.ca/content/message-minister
[25] https://www.canada.ca/en/innovation-science-economic-development/news/2022/03/government-of-canada-invests-in-small-modular-reactor-technology-to-help-transition-canada-to-net-zero-with-cleaner-sources-of-energy.html
[26] https://cna.ca/2022/04/07/government-indicates-clear-support-for-the-role-of-nuclear-in-canadas-clean-energy-transition-in-federal-budget-2022/
[27] PWU submission on the National Infrastructure consultation, regarding Government of Canada, "Building the Canada We Want in 2050", 2021; PWU submission on Canada's 2030 Emission Reduction Plan, January 2022; PWU submission on Submission on Canada's Clean Electricity Standard Discussion Paper, April 2022; PWU submission on the Government of Canada's "Federal Carbon Capture Utilization and Storage Tax Credit Proposal." 2021.

2) Nuclear is the most cost-effective, locational flexible, low-carbon source of generation, particularly for meeting the substantial need for new 24x7 baseload power.[28] Nuclear is much less costly than renewables-based solutions in many areas of Canada.
3) Nuclear pairs cost-effectively with energy storage, the hydrogen economy and the integration of EVs with the electricity system.[29]
4) Other non-emitting options have significant challenges:
    a. Renewables cannot address the needs in jurisdictions such as Ontario, due to Canada's latitude and weather patterns that reduce solar energy in the winter and entail intermittent loss of wind output that could last several weeks.[30] Policies favoring renewables solutions in Canada are misinformed by poor energy system modelling.[31]
    b. Hydro may have limited economically feasible development options.
    c. CCUS may not be viable everywhere in Canada.[32]

In its submission on the 2030 Emission Reduction Plan, the PWU recommended that the federal government should provide balanced policy support and incentives for all non-emitting energy resource options—including a level-playing field for low-carbon conventional and advanced nuclear technologies, renewable biomass and hydrogen.[33] In addition, it recommended the federal government adopt a clear position in support of the role of low-carbon nuclear in meeting Canada's future energy needs. Nuclear generation is an essential element of Canada's response to the climate change challenge and for achieving NZ by 2050. Strong, sustained advocacy and policy incentives by the federal government are imperative to ensure long-term, low-carbon energy security for Canada and achieve its economic and environmental targets.

The FSDS should also acknowledge in Chapter 12 that the nuclear sector is the only sector that manages its full life-cycle waste in an engineered environmentally sustainable manner. In contrast, the issues regarding the toxic and otherwise environmentally hazardous waste from solar panels and the batteries that would back them up, for example, do not yet have a policy solution.

Socio economic considerations and the role of the FSDS in advancing them (Qs 4 and 6)

Recommendation #4 - Targets and metrics should include growth objectives for competitiveness, jobs, GDP, trade balance, and energy security to gauge the success of Canada's sustainable development of infrastructure.

The socio-economic factors of jobs, GDP, trade balance and energy security that are critical to the health and prosperity of Canada as a nation, underpinned by competitively lower carbon, affordable energy

[28] Strapolec, Advancing Ontario's Energy Transition Part 1: Electrification Pathways, 2021; M.Brouillette, presentation at CCRE Energy Leaders Roundtable, 'Case Study in Informing a National Energy Vision - Ontario decarbonization and implications for Quebec and Canada", June 2022.
[29] Strategic Policy Economics, "Electrification Pathways for Ontario to Reduce Emissions", 2021; PWU submission on Submission on Canada's Clean Electricity Standard Discussion Paper, April 2022.
[30] M. Brouillette. "Distributed Energy Resources in Ontario: A Series of Unfortunate Truths." CCRE Commentary. 2019; Strategic Policy Economics, "Renewables and Ontario/Quebec Transmission System Interties", 2016.
[31] PWU submission on Submission on Canada's Clean Electricity Standard Discussion Paper, April 2022.
[32] Strategic Policy Economics, "Towards a National Energy Vision", 2021.
[33] PWU submission on Canada's 2030 Emission Reduction Plan, January 2022;

and fundamental to a sustainable development future are not evident in the targets, indicators and measures of the FSDS.

The PWU believes that the global transition to a lower-carbon energy future presents both challenges and opportunities for Canada. Deploying the required low-carbon energy infrastructure as quickly as possible will be critical for sustaining Canada's role as a global energy provider and in turn, will attract billions of dollars of new investment. These strategic investments are critical to sustaining Canada's: economic competitiveness; growth of domestic technological and manufacturing capabilities; continued export of energy and technical expertise to other jurisdictions; energy security; and positive trade balance.[34]

As a result, the pathway choices that are made during this transition will impact the economic and social well-being of Canadians.[35] The PWU has submitted that meeting Canada's Net Zero goal will require the re-development of most of the country's existing energy infrastructure. Canada's constitution allocates accountability for energy to the provinces. Their decisions influence the distribution of jobs and economic benefits accruing from energy project investments. The federal government needs policies that maximize these benefits at the local and national level—and create a reliable, Net Zero electricity system.[36]

The FSDS does not treat the pathway to net zero as an integrated strategy for growing the economy and only selectively targets 8% growth in clean tech jobs. This target may or may not be aligned with the sustainable economic and social well-being of Canada's future decarbonized economy. The relevance of this target also depends on how "clean tech" is defined, as previously discussed under recommendation #2. It is also unclear as to whether such a clean tech job measure represents an appropriate indicator of success in the FSDS.

Given that the sustainable development of non-emitting energy infrastructure will be a primary driver of Canada's future economy, comprehensive employment metrics resulting from infrastructure development should be identified by the FSDS.

Significant factors influencing economic well-being include:

- Affordability on a $ per unit of energy basis;
    - Affordable energy is a critical competitiveness factor for Canada's export oriented industrial base. Affordability means competitively priced energy that gives Canadian businesses a competitive advantage so they can grow and create jobs.
- Jobs and GDP leverage on a $ per unit of energy basis;
    - This measure ensures a sustainable balance between achieving the lowest cost or most affordable energy and the jobs created
- Energy trade balance

[34] PWU submission on Canada's 2030 Emission Reduction Plan, January 2022; M. Brouillette, CCRE Commentary – Toward a National Energy Vision: Canada's Low-Carbon Energy Infrastructure Opportunity in a Global Net Zero Future, 2021.
[35] Strategic Policy Economics, "Electrification Pathways for Ontario to Reduce Emissions", 2021; Green Ribbon Panel, "Clean Air, Climate Change and Practical, Innovative Solutions", 2020 and 2022.
[36] PWU submission on the National Infrastructure Assessment consultation, regarding Government of Canada. "Building the Canada We Want in 2050", 2021.

    - Avoiding imports of energy and energy technologies to retain "within Canada" a greater share of energy expenditures, yielding higher job creation in the domestic economy.
- Energy security
    - Recent global events have put a spotlight on the importance of energy security and the value of being insulated from geo-political shocks. These globally driven increases in the cost of oil and gas are negatively impacting the wallets of Canadians which could be significantly reduced by better leveraging Canada's low-carbon and carbon-lowering energy resources and technologies.

Studies have repeatedly shown that energy pathway choices can materially impact the economic benefits of transitioning to net zero. Given the significant nuclear supply chain existent in Canada, the FSDS should address how new nuclear clearly stands out as an economy building option.[37]

To underpin the success of the FSDS, it should include broad indicators and targets for the integrated economic impacts of the energy transition. These could include measures that track:

1) Jobs per unit cost of energy in the country
2) GDP per unit cost of energy in the country
3) Competitiveness of energy cost with Canada's major trading partners (measuring the competitive advantages Canada may have or not have)
4) Productivity and GDP growth as compared to Canada's major trading partners
5) Percentage of energy supply that relies on imports

These additional metrics will provide a more robust decision framework when selecting the best, clean energy pathways for Canada.

Closing

The PWU believes these comments and recommendations are supportive of Canada's objectives for the sustainable development towards achieving net zero. We will continue to work with the ECCC and other stakeholders to help achieve Canada's climate goals. The PWU is committed to the following principles: create opportunities for sustainable, high-pay, high-skill jobs; ensure reliable, affordable, and environmentally responsible electricity; build economic growth for Canadian communities; and, promote intelligent reform of Canada's energy policy.

[37] M. Brouillette. "Distributed Energy Resources in Ontario: A Series of Unfortunate Truths." CCRE Commentary. 2019; Strategic Policy Economics, "Emissions and the LTEP - Part 2", 2015.