RESEARCH NOTE / NOTE DE RECHERCHE

Why the Construction Trades Have a Valuable Role in Meeting the Climate Challenge

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Abstract: The construction industry accounts for 18 per cent of Canada's greenhouse gas emissions. There is extensive evidence that this can be reduced significantly by implementing aggressive net zero building practices. However, the way the industry is organized impedes this achievement because it fails to promote the development of a broadly based, highly qualified, climate-literate workforce. Successful low carbon construction requires enhancement of workers' knowledge, skills, and competencies because it requires much higher energy performance standards than traditional construction practice. Yet the industry remains wedded to the current system of low-bid, low-quality construction to cut costs. The organization of much construction work reflects a Taylorist approach, with extensive piecework and subcontracting that relies heavily on precarious, unskilled, and semi-skilled workers. Most employers avoid investing in trades training, leaving it to governments, unions, and individual workers to fund workforce development. Committed to a deregulated market with minimal government interference in their profit-making activities, many contractors oppose tougher building and energy regulations while lobbying against higher labour standards, occupational certification requirements, and union organizing. To meet their net zero targets, governments must recognize that market forces are inadequate to create the well-trained, highly skilled workforce needed. Major policy interventions are required to force industry to make the necessary changes in vocational education and training (VET) and employment practices – changes designed to upskill the construction workforce and give workers and unions a greater voice in shaping climate-informed building practice.

Key Words: climate literacy; net zero; apprenticeship; building emissions; construction labour; vocational education and training (VET)

Résumé : L'industrie de la construction est responsable de 18 pour cent des émissions de gaz à effet de serre du Canada. Il existe de nombreuses preuves démontrant que ce phénomène peut être considérablement réduit en mettant en œuvre des pratiques agressives de construction à émissions nettes nulles. Cependant, la manière dont l'industrie est organisée entrave cette réalisation car elle ne parvient pas à promouvoir le développement d'une main-d'œuvre diversifiée, hautement qualifiée et sensibilisée au climat. Une construction à faibles émissions de carbone réussie nécessite l'amélioration des connaissances, des aptitudes et

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des compétences des travailleurs, car elle nécessite des normes de performance énergétique beaucoup plus élevées que les pratiques de construction traditionnelles. Pourtant, l'industrie reste attachée au système actuel de construction à bas prix et de mauvaise qualité pour réduire les coûts. L'organisation d'une grande partie des travaux de construction reflète une approche taylorienne, avec travail à la pièce et sous-traitance extensifs qui s'appuient largement sur des travailleurs précaires, non qualifiés et semi-qualifiés. La plupart des employeurs évitent d'investir dans la formation aux métiers, laissant aux gouvernements, aux syndicats et aux travailleurs individuels le soin de financer le développement de la main-d'œuvre. Engagés en faveur d'un marché déréglementé avec une interférence minimale du gouvernement dans leurs activités lucratives, de nombreux entrepreneurs s'opposent à des réglementations plus strictes en matière de construction et d'énergie tout en faisant pression contre des normes de travail plus élevées, des exigences en matière de certification professionnelle et la syndicalisation. Pour atteindre leurs objectifs de zéro émission nette, les gouvernements doivent reconnaître que les forces du marché ne suffisent pas à créer la main-d'œuvre bien formée et hautement qualifiée dont ils ont besoin. Des interventions politiques majeures sont nécessaires pour forcer l'industrie à apporter les changements nécessaires dans l'enseignement et la formation professionnels et dans les pratiques d'emploi – des changements destinés à améliorer les compétences de la main-d'œuvre de la construction et à donner aux travailleurs et aux syndicats une plus grande voix dans l'élaboration de pratiques de construction tenant compte du climat.

Mots Clefs: littératie climatique; bilan neutre; apprentissage; émissions de gaz à effet de serre par les bâtiments; construction; formation et enseignement professionnels

Climate change is the most important issue facing Canada and the world today. The latest scientific assessments by the Intergovernmental Panel on Climate Change (IPCC) paint a depressing picture of the extent of the challenge, reinforcing the need for a much more concerted effort to implement climate mitigation while adopting measures to adapt to the increasingly damaging impacts of global warming.[1] While the Paris Agreement commits governments to try to keep the increase in global temperatures below 2 degrees Celsius – ideally, below 1.5 – the prospects of achieving this objective appear increasingly slim.[2]

Canada is already experiencing the adverse impact of global warming, as evidenced by the alarming increase in wildfires, atmospheric rivers, heat domes, extreme temperatures, droughts, floods, and melting permafrost.[3]

1. Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2022: Mitigation of Climate Change; Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (IPCC, 2022), https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_FullReport.pdf.

2. United Nations Framework Convention on Climate Change (UNFCCC), *Paris Agreement* (Geneva, 2015), https://unfccc.int/sites/default/files/english_paris_agreement.pdf; James Hansen, Makiko Sato, Leon Simons, Larissa S. Nazarenko, Isabelle Sangha, Karina von Schuckmann, Norman G. Loeb, et al., "Global Warming in the Pipeline," *Oxford Open Climate Change* 3, 1 (2022), https://arxiv.org/ftp/arxiv/papers/2212/2212.04474.pdf.

3. Dave Sawyer, Ryan Ness, Dylan Clark, and Dale Beugin, *Tip of the Iceberg: Navigating the Known and Unknown Costs of Climate Change for Canada* (Ottawa: Canadian Institute for Climate Choices, 2020), https://climatechoices.ca/wp-content/uploads/2020/12/Tip-of-

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The year 2023 was the hottest on record by a wide margin. Climate scientists are predicting that these events will get much worse in the coming years as further increments of carbon are released into the Earth's atmosphere. In response both to climate science and to the growing adverse climate impacts, the federal government has established ambitious mitigation targets to cut Canada's overall emissions by at least 40 per cent to 45 per cent by 2030 and 100 per cent by 2050. The construction industry plays an essential role in helping to meet these objectives. The set target for construction is 37 per cent reduction in carbon emissions by 2030.[4] Most, but not all, provincial, territorial, and municipal governments have established comparable objectives. The need for these targets and their accompanying public policies indicates that the construction industry, on its own, has not been able to deliver the extent and quality of construction outputs required to address Canada's climate challenge.

Establishing targets is important. But the real question is how different sectors achieve them. This paper is designed to provide a broad overview of the scope of the challenge that Canada faces in implementing its climate objectives in the construction industry with a particular focus on workforce training. Several questions on the linkage between worker training and climate action are important here. First, what are the major changes in construction practices and workforce training needed to meet Canada's climate goals and to create a climate-literate construction workforce committed to delivering them? What are the barriers? What measures are needed to overcome these barriers? The paper brings together material from various sources, including climate science, building science, vocational education and training (VET) studies, labour relations, and public policy.

In answering these questions, the paper makes several arguments. First, the industry's ideological commitment to a minimally regulated free market in construction denies the seriousness of the climate crisis. Second, a low-bid tendering system in the sector drives down quality and ignores the much higher standards that net zero construction demands. Third, the continuing failure of employers to support VET ends up marginalizing unions and the positive role these organizations can play in addressing the climate crisis.

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the-Iceberg-_-CoCC_-Institute_-Full.pdf; Canada, Commissioner of the Environment and Sustainable Development, *Report 5: Lessons Learned from Canada's Record on Climate Change* (Ottawa: Auditor General of Canada, 2019), https://www.oag-bvg.gc.ca/internet/docs/parl_cesd_202111_05_e.pdf.

4. Justin Trudeau to Steven Guilbeault, "Minister of Environment and Climate Change Mandate Letter," 16 December 2021, https://www.pm.gc.ca/en/mandate-letters/2021/12/16/minister-environment-and-climate-change-mandate-letter; Environment and Climate Change Canada, "Government of Canada Confirms Ambitious New Greenhouse Gas Emissions Reduction Target," news release, 21 July 2021, https://www.canada.ca/en/environment-climate-change/news/2021/07/government-of-canada-confirms-ambitious-new-greenhouse-gas-emissions-reduction-target.html.

Finally, the existence of a large, unregulated, and exploitative underground economy in the sector has never been adequately addressed by governments and restricts proactive climate policies. The paper proposes solutions that emphasize the potential of the construction workforce to address the climate crisis through enhanced worker agency, a greater role for unions, new climate literacy training, and a package of public policy measures designed to promote industry transformation, including a more diverse, welcoming, and climate-aware workplace culture.

The article is structured as follows. It begins by situating the construction industry as part of Canada's liberal market economy (LME) in which employment and workforce development are shaped by the profit-seeking activities of private corporations. It defines climate literacy and discusses what it means to be a climate-literate construction worker. It then assesses the capacity of Canada's construction industry to meet climate targets, examining a range of factors that affect the development of a more climate-informed workforce. This involves explaining why low carbon or net zero construction is different from conventional construction practices and describes what this means for building standards and its implications for the knowledge, skills, and competencies of construction workers. It contrasts Canada with the tougher regulatory approach of the European Union. It also assesses how subcontracting, self-employment, and the underground economy result in workforce precarity, undermining efforts to fulfill the training and employment needs of construction workers and marginalizing the role of unions. It examines the positive role of unions in supporting VET and concludes by noting examples of policies and best practices that can significantly strengthen the industry's capacity to develop a climate-literate workforce while also providing more secure and satisfying careers for construction workers.

This article draws on academic research for Canada's Building Trades Unions' (CBTU) "Building It Green" project funded by the federal government's Union Training and Innovation Program (UTIP). It is also based on a literature review of academic sources using Simon Fraser University Library's academic search engine, Scopus, Google Scholar, and an extensive search of the documents produced by unions, industry, international and national environmental NGOs, think tanks, and federal, provincial, and municipal governments. The analysis of the literature is supplemented by interviews with trainers from fourteen different affiliates of the CBTU, various training school directors in English Canada, and individuals from unions, contractors, governments, and environmental organizations.[5]

5. Linda Clarke, Melahat Sahin-Dikmen, Christopher Winch, Vivian Price, John Calvert, Pier-Luc Bilodeau, and Evelyn Dionne, "Differing Approaches to Embedding Low Energy Construction and Climate Literacy into Vocational Education and Training," in Edmundo Werna and George Ofori, eds., *Routledge Handbook on Labour in Construction and Human Settlements* (London: Routledge, 2024), chap. 5. The authors identified in this footnote are part of the "Building It Green" academic advisory group for the climate literacy initiative of the

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Locating Canada's Approach to the Construction Sector

Canada can be classified as an LME in which the role of the state (outside Québec) is limited and the VET system is built around meeting employer priorities. As Gerhard Bosch and Peter Philips argue in their international comparison of construction systems, Canada follows a "low road" approach, characterized by a poorly regulated construction market in which unions represent a minority of the workforce. While governments provide considerable financial support to training institutions, decisions about participation in VET are largely left to individual workers, who bear most of the risks and costs.[6]

This approach has resulted in a small but well-trained construction trades workforce employed primarily on major industrial, commercial, and institutional (ICI) projects serving the needs of major employers who require a high level of skill and expertise. But it coexists with a much larger unorganized workforce, many of whom work in the underground economy. These workers have limited access to VET because they are constrained by employment precarity, financial barriers, and employer reluctance to support workforce training. Underground workers face a poorly regulated, highly competitive labour market that precludes them from having the fair – and secure – employment conditions necessary for developing the knowledge, skills, and competencies needed for a stable career in construction.

To use the theoretical framework of Peter Hall and David Soskice, LMEs differ from coordinated market economies (CMEs), such as in northern Europe, in the extent to which they privilege competitive markets over other societal interests, including the interests of workers in having better labour conditions and a greater voice, or agency, in shaping decisions at the workplace. The state's role in an LME is to provide the policy and legal framework for profitable investment and to limit the demands of labour for a larger share of national income. Although markets function in both systems, governments in LMEs give corporations more control of economic decisions, including how the labour market functions and the objectives of workforce VET. Although the state is far from absent in LMEs, it regulates business less, but labour much more through restrictions on the right to strike, limits on secondary picketing, and an approach to union certification that does not acknowledge the challenges created by the inherently temporary, project-based nature of construction work.[7]

CBTU.

6. Gerhard Bosch and Peter Philips, eds., *Building Chaos: An International Comparison of Deregulation in the Construction Industry* (London: Taylor and Francis, 2003).

7. Peter Hall and David Soskice, "An Introduction to Varieties of Capitalism," in Hall and Soskice, eds., *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage* (Oxford: Oxford University Press 2001), 1–71, doi:10.1093/0199247757.003.0001; Gregory Matte, "A Critical Analysis of Apprenticeship Programs in British Columbia," PhD thesis, Carleton University, 2020.

Canada's construction VET system performs a variety of functions, but its primary goal is to deliver whatever skills employers require when they need them. Workers' interests in developing their human capacity through work that facilitates personal growth, job satisfaction, and pride in performing jobs well are secondary considerations. Promoting greater worker agency on job sites is not a core objective of the system. Formal apprenticeships are limited to a relatively small cohort of workers, employed in major ICI projects. The majority of workers are employed in precarious jobs, working as self-employed, independent operators or in the underground economy with little access to formal VET.

Although the system focuses on meeting employer needs, employer support for VET is restricted to a relatively small number of larger companies for whom a highly skilled workforce is essential. Most small and medium employers provide little support for the formal training system. Instead, the industry shifts this responsibility to provincial/territorial governments, union training facilities, and workers themselves. Except for Québec, which has a payroll levy, governments have chosen to provide tax incentives or subsidies to employers rather than requiring them to contribute to industry-wide training funds – or to pay more taxes – which would make all employers share the costs of VET. The way construction work is organized in Canada, and how VET is funded and delivered, impedes the system's ability to implement net zero construction.

Assessed from a climate lens, Canada's performance, including that of its construction industry, has been quite disappointing. While there is a debate about how to evaluate progress, both government assessments and studies by well-respected climate organizations rate Canada poorly in terms of the effectiveness of its policies. In their 2023 report to Parliament, Canada's Commissioner of the Environment noted the large gap between the federal government's climate targets and its relatively limited accomplishments. The international Climate Action Tracker organization gives Canada's efforts a "highly insufficient" grade.[8] A report from the Canadian Climate Institute reached similar conclusions.[9] In its annual report card on provincial/territorial progress, Efficiency Canada documents the slow rate of progress.[10] These

8. Canada, Commissioner of the Environment and Sustainable Development, *Report 6: Canadian Net-Zero Emissions Accountability Act – 2030 Emissions Reduction Plan* (Ottawa: Auditor General of Canada, 2023), https://www.oag-bvg.gc.ca/internet/docs/parl_cesd_202311_06_e.pdf; "Canada," Climate Action Tracker website, accessed 27 March 2024, https://climateactiontracker.org/countries/canada/.

9. Seton Stiebert and Dave Sawyer. "Emissions from Oil and Gas, Buildings Undercut Canada's Climate Progress," *440 Megatonnes*, Canadian Climate Institute, 28 September 2023. https://440megatonnes.ca/insight/emissions-oil-and-gas-buildings-undercut-canadas-climate-progress/.

10. James Gaede, Alyssa Nippard, Brendan Haley, and Annabelle Linders, *The 2022 Canadian Energy Efficiency Scorecard: Provinces and Territories* (Ottawa: Efficiency Canada, 2022), https://www.scorecard.efficiencycanada.org/wp-content/uploads/2022/11/2022-Canadian-

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and other assessments confirm that the current approach is unlikely to meet Canada's climate goals.

Examining Climate Literacy

A LOGICAL STARTING POINT in examining climate literacy in construction is to clarify the term. According to the US Global Change Research Program, climate literacy "is an understanding of your influence on climate and climate's influence on you and society. A climate-literate person: understands the essential principles of Earth's climate system, knows how to assess scientifically credible information about climate, communicates about climate and climate change in a meaningful way, and is able to make informed and responsible decisions with regard to actions that may affect climate."[11]

Indigenous scholars have added to this definition by emphasizing that the insights and understanding of Aboriginal communities need to be incorporated into our conception of climate literacy – an issue of particular importance for construction, given its major impact on the environment. This means acknowledging the multiple ways we are connected to the natural world and recognizing our responsibility, as stewards of the land, air, and water, to ensure that our decisions today preserve this inheritance for future generations. The Indigenous perspective entails a wholistic, ecologically informed approach to our relationship with nature, based on protecting biodiversity and sustaining a healthy environment in which all peoples can flourish. The importance of including Indigenous understandings has been acknowledged by the 1987 Brundtland Report, the 1992 United Nations (UN) Convention of Biological Diversity and Environment, the IPCC, and Climate Change Canada's *Climate Science 2050*.[12] Numerous Indigenous scholars in Canada have underscored

Energy-Efficiency-Scorecard-English.pdf.

11. US Global Change Research Program, *Climate Literacy: The Essential Principles of Climate Science* (Washington, DC, March 2009), https://www.globalchange.gov/reports/climate-literacy-essential-principles-climate-science. For a recent, comprehensive review of 740 articles discussing climate literacy, see Najibah Suhaimi and Siti Nur Diyana Mahmud, "A Bibliometric Analysis of Climate Change Literacy between 2001 and 2021," *Sustainability* 14, 19 (September 2022): Article 11940, doi:10.3390/su141911940. The author is indebted to Professor Vivian Price for her insights on this issue.

12. R. K. Pachauri and L. A. Meyer, eds., *Climate Change 2014: Synthesis Report; Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Geneva: IPCC, 2014), https://www.ipcc.ch/report/ar5/syr/; World Commission on Environment and Development, *Our Common Future* [The Brundtland Report] (Oslo, 1987), https://www.are.admin.ch/are/en/home/media/publications/sustainable-development/brundtland-report.html; UN, "Convention on Biological Diversity," Secretariat for the Convention on Biological Diversity, Montréal, May 1992), https://www.cbd.int/doc/legal/cbd-en.pdf; Environment and Climate Change Canada, *Climate Science 2050: Advancing Science and Knowledge on Climate Change* (Ottawa, 2021), https://publications.gc.ca/collections/collection_2020/eccc/En4-414-2020-eng.pdf; see also Leela Viswanathan, "Climate

the value of this contribution.[13] Adding an Indigenous perspective fills a gap in the Global Science Research Program's definition; together, they make a more robust and nuanced approach to defining climate literacy.

In addition to having a broad awareness of how climate change is affecting society, a climate-literate construction worker is one who is aware of how climate change is affecting the building industry and, in turn, how the industry is impacting climate change. This includes knowledge about the sources of energy used in the construction process and in the resulting buildings, the carbon content of construction materials, and how different building methods impact the overall climate footprint of buildings and infrastructure. It also includes an understanding of how building design and working practices affect energy use and greenhouse gas (GHG) emissions. And it entails recognizing the wider environmental, ecological, health, and social impacts of the industry associated with the physical location of construction projects, adjacent areas, and communities affected by them. This also includes the contribution that building workers can make to creating more healthy, sustainable, equitable, and socially just communities by ensuring that the quality of their work contributes to achieving these goals. Having a strong background in climate literacy facilitates connecting the dots – that is, making the link between what gets done on job sites and its broader climate, environmental, health, and community impacts.[14]

While apprenticeship programs are the primary target for introducing climate literacy content into Canada's VET programs, both pre-apprenticeship programs and upgrade training for journeyworkers need to be included. Climate information can be presented at two levels. The first is to promote a general overview about how climate change is affecting society, the industry, and its workers – in other words, providing an understanding of the basics of climate literacy. The second is to address how climate change affects the work of individual trades and what they can do on the job to address it. Specific, trade-oriented information is therefore needed in each occupational category to be relevant for the different kinds of work each trade performs. Both of these

Science 2050: Mobilizing Indigenous-Led Research and Knowledge on Climate Change," Indigenous Climate Hub blog, 1 February 2021, https://indigenousclimatehub.ca/2021/02/climate-science-2050-mobilizing-indigenous-led-research-and-knowledge-on-climate-change/.

13. Angele Alook, Ian Hussey, and Nicole Hill, "Indigenous Gendered Experiences of Work in an Oil-Dependent, Rural Alberta Community," in William K. Carroll, ed., *Regime of Destruction: How Corporate Power Blocks Energy Democracy* (Edmonton: Athabasca University Press, 2021); Angele Alook, Emily Eaton, David Gray-Donald, Joël Laforest, Crystal Lameman, and Bronwen Tucker, *The End of This World: Climate Justice in So-Called Canada* (Toronto: Between the Lines, 2023); Suzanne Mills, "Fractures and Alliances: Labour Relations and Worker Experiences in Construction," *Labour/Le Travail*, no. 80 (Fall 2017): 13–26.

14. John Calvert, "Labour and Climate Change," in John Peters and Don Wells, eds., *Canadian Labour Policy and Politics* (Vancouver: UBC Press, 2022), 274–288.

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factors need to be incorporated into the development of climate-informed curriculum.

Various terms are commonly used to describe the ways that buildings and infrastructure are being upgraded to meet climate objectives; these include "low carbon," "low energy," "zero carbon," "nearly zero," "net zero," "net zero ready," "high performance," "green," "sustainable," and several others. There is no widely accepted single term that encapsulates how buildings meet climate change objectives. There are differences in the meanings of commonly used terms, such as between "low energy" and "low carbon," the former focusing on actual energy consumed and the latter on carbon or GHG emissions. There are also differences in the approaches taken to lower emissions or energy use. In practice, different studies and reports adopt one or another of these terms, resulting in a somewhat messy proliferation of different descriptors for related, but distinct, phenomena. As the term "net zero" is now widely used in government policy documents and by Canada's construction industry, this article uses it as a generic term to describe the core elements of a low carbon/low energy approach, recognizing that in some contexts, such as citing documents, other descriptors may be more precise or appropriate.[15]

Canada's Construction Industry and Climate Change

According to Statistics Canada, construction employs about 1.6 million workers and contributes about 7 per cent to Canada's gross domestic product (GDP).[16] The industry is divided into major sectors, including industrial, commercial, institutional, and residential. Each of these has various subsectors, such as highway construction or pipelines, depending on the type of construction work involved. Construction activity – and employment – is highly sensitive to fluctuations in the business cycle, as well as seasonal downturns, resulting in significant job precarity for many workers. Because work is project based, it is inherently temporary, and workers often change employers as they move from project to project.

Canada's construction union density was 31.6 per cent in 2022 and has been relatively stable for several decades. However, this average conceals wide variations among construction trades, industry sectors, regions, and provinces.[17] The highest unionization rates are found in large ICI projects and in major

15. For a good discussion of the many terms currently in use, see Diana Ürge-Vorsatz, Radhika Khosla, Rob Bernhardt, Yi Chieh Chan, David Vérez, Shan Hu, and Luisa F. Cabeza, "Advances toward a Net-Zero Global Building Sector," *Annual Review of Environment and Resources* 45 (September 2020): 227–269.

16. Statistics Canada, "Labour Force Characteristics by Industry," table 14-10-0022-01, doi:10.25318/1410002201-eng.

17. Statistics Canada, "Union Status by Industry," table 14-10-0132-01, doi:10.25318/1410013201-eng.

urban clusters, such as the Greater Toronto Area. Unions are not well represented in small commercial projects, low-rise apartments, and particularly, residential construction. Union density also varies quite significantly among provinces. The exception is Québec, with its unique labour relations system that requires almost all construction workers to be members of a union.

The construction process and the wide range of buildings and infrastructure it produces account for approximately 18 per cent of Canada's GHG emissions, underscoring the importance of lowering the carbon and energy footprint of this sector.[18] The IPCC believes that major gains in building efficiency are feasible with existing technologies and at costs that are reasonably affordable, a finding echoed by the Senate of Canada's report on emissions in the built environment.[19] Other studies, by Passive House Canada, the Pembina Institute, the Canada Green Building Council (CAGBC), and the US Academy of Science, support this view.[20] Virtually all levels of government in Canada have established policies to move us toward net zero by mid-century. They use various policy tools to make the construction industry lower its climate footprint, including research funding, tougher building regulations, subsidies, tax breaks, educational programs, and procurement policies.[21] Some provinces and territories have enacted more aggressive building code regulations,

18. Natural Resources Canada (NRC), "The Canada Green Buildings Strategy," discussion paper, Ottawa, July 2022, https://natural-resources.canada.ca/sites/nrcan/files/engagements/green-building-strategy/CGBS%20Discussion%20Paper%20-%20EN.pdf.

19. Pachauri and Meyer, eds., *Climate Change 2014*; Senate of Canada, Standing Senate Committee on Energy, the Environment and Natural Resources, *Reducing Greenhouse Gas Emissions from Canada's Built Environment* (Ottawa, November 2018), https://sencanada.ca/content/sen/committee/421/ENEV/reports/ENEV_Buildings_FINAL_e.pdf.

20. Jared Langevin, Aven Satre-Meloy, Andrew J. Satchwell, Ryan Hledik, Julia Olszewski, Kate Peters, and Handi Chandra-Putra, "Demand-Side Solutions in the US Building Sector Could Achieve Deep Emissions Reductions and Avoid Over $100 Billion in Power Sector Costs," *One Earth* 6, 8 (18 August 2023): 1005–1031, https://doi.org/10.1016/j.oneear.2023.07.008; Canada Green Building Council (CAGBC), *Decarbonizing Canada's Large Buildings: Summary Report* (Ottawa: CAGBC, 2021), https://portal.cagbc.org/cagbcdocs/advocacy/2021_CaGBC_Decarbonization-Retrofit-Costing-Study_2DEC21_EN.pdf; Madi Kennedy and Tom-Pierre Frappé-Sénéclauze, *Canada's Renovation Wave: A Plan for Jobs and Climate* (Calgary: Pembina Institute, 2021), https://www.pembina.org/reports/canadas-renovation-wave.pdf; Synergy Sustainability Institute, "The Business Case for Passive House," Victoria, 27 May 2015, https://www.passivehousecanada.com/downloads/Business_Case_for_Passive_House.pdf.

21. Environment and Climate Change Canada, *Pan-Canadian Framework on Clean Growth and Climate Change: Canada's Plan to Address Climate Change and Grow the Economy* (Gatineau, 2016), https://publications.gc.ca/collections/collection_2017/eccc/En4-294-2016-eng.pdf; Natural Resources Canada, "Advancing Energy Efficiency in the Built Environment: Progress Report 2019," Ottawa, 2019, https://publications.gc.ca/collections/collection_2021/rncan-nrcan/M144-297-2019-eng.pdf; Canadian Net-Zero Emissions Accountability Act, SC 2021, c 22, https://laws-lois.justice.gc.ca/eng/acts/c-19.3/; NRC, "Canada Green Buildings Strategy."

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such as British Columbia's ambitious Energy Step Code.[22] This is a regulatory approach that establishes energy and GHG targets that are more stringent than existing building codes. It indicates the future code changes that governments plan to implement, with the purpose of encouraging industry to prepare for them. Developers who build to the higher standards can receive concessions on other components of their projects, for example, relaxing density or height restrictions. Municipalities including Toronto and Vancouver are using their zoning and building approval powers to require higher standards of energy conservation, including offering rebates on development charges to builders who meet their energy performance and GHG emission targets. Several Canadian cities have signalled that they plan eventually to ban the use of fossil fuels in new buildings. Most have passed bylaws requiring buildings to meet zero-GHG emissions targets by specific dates in the future.[23] However, the results still do not meet the timelines that environmental advocates believe is possible. Opposition from developers and contractors in the industry has also impeded progress.[24]

Over the past three decades, the focus of environment and climate policy has moved from the initial – and somewhat narrow – emphasis on mitigating GHG emissions and reducing energy use to include adaptation and resilience measures to deal with increasingly extreme weather and other climate-induced impacts. Governments have also broadened their approach to include the concept of a "circular economy" that considers the embedded carbon and energy used throughout the life cycle of buildings and emphasizes reuse,

22. James Glave and Robyn Wark, *Lessons from the BC Energy Step Code* (Victoria, 2019), https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/construction-industry/building-codes-and-standards/reports/bcenergystepcode_lessons_learned_final.pdf.

23. General Manager of Planning, Urban Design, and Sustainability and General Manager of Engineering Services, "Climate Emergency Action Plan," report to the City of Vancouver, 3 November 2020, https://council.vancouver.ca/20201103/documents/p1.pdf; Toronto, *Zero Emissions Building Framework* (Toronto, March 2017), https://www.toronto.ca/wp-content/uploads/2017/11/9875-Zero-Emissions-Buildings-Framework-Report.pdf; Toronto, "TransformTO Net Zero Strategy: A Climate Action Pathway to 2030 and Beyond," Toronto, November 2021, https://www.toronto.ca/legdocs/mmis/2021/ie/bgrd/backgroundfile-173758.pdf; City of Vancouver, By-Law No. 13472, Annual Greenhouse Gas and Energy Limits By-Law, 20 July 2022, https://bylaws.vancouver.ca/consolidated/13472.PDF.

24. Brendan Haley and Kevin Lockhart, *Strengthening Canada's Building Code Process to Achieve Net-Zero Emissions* (Ottawa: Efficiency Canada, 2020), https://efficiencycanada.org/wp-content/uploads/2020/10/Strengthening-Canadas-Building-Code-Process-to-Achieve-Net-Zero-Emissions.pdf; Fiona J. Warren and Nicole Lulham, eds., *Canada in a Changing Climate: National Issues Report* (Ottawa: Natural Resources Canada, 2021), https://changingclimate.ca/site/assets/uploads/sites/3/2021/05/National-Issues-Report_Final_EN.pdf. In the November 2023 issue of its newsletter, the Independent Contractors and Businesses Association (ICBA) claims that the BC government's climate policies are destroying the province's economy and should be reversed; see ICBA, *The Construction Monitor*, November 2023, https://www.icbaindependent.ca/wp-content/uploads/2023/11/ICBA-Winter-2023-BC.pdf.

recycling, and conservation.[25] Most recently, they have added broader environmental, ecological, social, and equity considerations.

Governments assume that the industry, as currently organized, has the capacity to deliver their climate objectives. However, their policies are based on several optimistic assumptions. One is that the conventional, LME market-based approach to organizing the construction industry can achieve net zero outcomes without significant new public policy interventions, including changes to the way the industry itself is organized. A second is that the current VET system can equip the industry's future workforce with the knowledge, skills, and competencies needed for net zero construction. Both of these assumptions have significant problems.

Low Carbon or Net Zero Construction Practice Is Different

TO UNDERSTAND WHY INDUSTRY practices have to change, it is helpful to recognize the fundamental differences between conventional construction, as practised before climate change became a significant concern, and the new requirements of net zero construction. The latter is designed to achieve measurable reductions in energy use, GHG emissions, and other adverse environmental and ecological impacts. To achieve this, all aspects of construction must meet stringent design and commissioning specifications, from initial planning through to eventual decommissioning. Work must be carried out precisely to meet net zero specifications. The building project must be treated as an integrated unit, not as a collection of siloed contracts. The building envelope must be properly insulated and sealed, and thermal bridges eliminated. Interior building services like heating, ventilation, and air conditioning (HVAC) systems must be properly sized and calibrated to minimize energy use. What energy is used should come from renewable sources, generated onsite where feasible. The carbon content of building inputs must be minimized, and materials reused when buildings are decommissioned where feasible. Recycling and waste management must be handled properly. The entire construction process must be organized from beginning to end to achieve these climate objectives. The principles of high-performance, low carbon construction have been widely discussed in the industry for many years. Perhaps the leading global advocate of this approach is the Passive House Institute. Its research arm provides extensive technical advice to the construction industry, both in Canada and internationally, and has created a comprehensive set of criteria for determining the performance requirements of low carbon/low or zero energy buildings.[26]

25. Gabriel Luiz Fritz Benachio, Maria do Carmo Duarte Freitas, and Sergio Fernando Tavares, "Circular Economy in the Construction Industry: A Systematic Literature Review," *Journal of Cleaner Production* 260 (2020): Article 121046.

26. See International Passive House Association, "Passive House Certification Criteria,"

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However, the connection between achieving net zero standards and the corresponding competencies the workforce needs to deliver them is often overlooked. Government policy to lower the climate impact of buildings assumes that the way the industry currently organizes work and trains and employs the construction workforce can meet climate goals if appropriate targets are established and if employers commit to achieving the targets. This ignores fundamental differences between the precise requirements of net zero construction and prevailing practices in much of the industry. The significantly higher performance standards of net zero construction have important implications for the required knowledge, skills, and competencies of the construction workforce and attitudes toward performing high-quality work. As a recent research paper by ECO Canada notes, "Canada's building sector workforce does not have the widespread experience or skills required to perform their roles in a manner that achieves energy efficiency goals. Until the essential occupations and skills become widespread, this workforce will not be fully prepared to support the development of energy efficient buildings."[27]

The key attributes of a climate-literate construction workforce have been extensively researched internationally.[28] There is ample evidence that it is extremely difficult to implement net zero construction effectively without a knowledgeable, skilled, and motivated workforce to meet its much more precise and demanding standards. It requires a trades workforce that understands the climate and environmental objectives and is committed to achieving them.[29]

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n.d., accessed 28 June 2024, https://www.passivehouse-international.org/index.php?page_id=150&level1_id=78. The CAGBC is the largest domestic organization promoting low carbon construction practice. It manages the LEED energy rating system and has over 1,100 affiliates representing all sectors of the building industry. The CAGBC produces extensive research on a wide range of "green" building issues, which it incorporates into its extensive list of publications, including several with a focus on training and apprenticeship. See, for example, CAGBC, *Trading Up: Equipping Ontario Trades with the Skills of the Future* (Ottawa: CAGBC, 2019), https://portal.cagbc.org/cagbcdocs/advocacy/CaGBC_Trading_Up_Skills_Analysis_Report_2019.pdf; Linda Clarke, Colin Gleeson, Melahat Sahin-Dikmen, Christopher Winch, and Fernando Duran-Palma, *Inclusive Vocational Education and Training for Low Energy Construction: Final Report* (European Construction Industry Federation AISBL and European Federation of Building and Woodworkers, 2019), https://www.fiec.eu/application/files/8715/7839/3089/VET4LEC___Report___lowres___EN.pdf.

27. ECO Canada, *Assessment of Occupational and Skills Needs and Gaps for the Energy Efficient Buildings Workforce* (Calgary: ECO Canada, February 2021), https://www.ashb.com/wp-content/uploads/2021/10/IS-2021-205.pdf.

28. International Labour Office (ILO), Skills and Employability Department, *Skills and Occupational Needs in Green Building* (Geneva: ILO, 2011), https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_166822.pdf; Linda Clarke, Colin Gleeson, and Christopher Winch, "What Kind of Expertise Is Needed for Low Energy Construction?," *Construction Management and Economics* 35, 3 (2017): 78–89; CAGBC, *Trading Up*.

29. Christopher Winch, "Education and Broad Concepts of Agency," *Educational Philosophy and Theory* 46, 6 (2013).

While learning technical skills is important, training must go beyond learning individual tasks or acquiring specific technical skills. Workers need basic knowledge of building science, the building process, and their role within it. This means understanding buildings as integrated units, systems thinking, teamwork, communication competencies, capacity for on-site problem solving, and an understanding of the contribution of each occupation in achieving climate objectives. A climate-literate workforce also requires a commitment to high-quality work, responsibility for outcomes, and significant worker agency.[30]

Summarizing several decades of European construction experience, Linda Clarke and Christopher Winch note that

> successful Nearly Zero Energy Building (NZEB) depends on coordination and overall project awareness, teamwork and the application of theoretical knowledge to particular circumstances.... Our research has shown how comprehensive Vocational Education and Training (VET) systems (including based on apprenticeship) and broad occupational profiles covering a range of activities, constructed and maintained through consultation and coordination with social partners and based on imparting relevant knowledge, represent the "high road" to energy efficiency in buildings; these are best placed to respond to the challenges of climate change.[31]

Based on their extensive research on European construction, Clarke and Winch argue that public policy should encourage this "high road" approach to VET because of the evidence that it is the most effective way to deliver net zero construction. They distinguish between "training," which they see as learning the skills required to perform narrowly defined tasks, and a broader educational approach that seeks to instill an understanding of the principles underlying the building process and the theoretical basis of the work of a trade. Climate literacy is much more than acquiring new technical skills. It involves acquiring the capacity to solve new problems based on applying a solid knowledge of building science. VET programs should promote worker agency, intellectual development, and personal responsibility for building outcomes. Workers must be active participants who understand why they are implementing low carbon construction and believe in the value of what they are doing. Thus, Clarke and Winch reject a narrow focus designed simply to

30. Marcello Antonucci, Susanne Geissler, Marianna Papaglastra, and Peter Wouters, *Towards Improved Quality in Energy Efficient Buildings through Better Workers' Skills and Effective Enforcement: A View of the Concerted Action EPBD on Challenges and Opportunities, summary report*, Concerted Action Task Force on the Interaction with Build-Up Skills (2014), https://build-up.ec.europa.eu/sites/default/files/content/CA_EPBD_BUS_interaction_report.pdfrke et al., *Inclusive Vocational Education and Training*; CAGBC, *Trading Up*.

31. Linda Clarke and Christopher Winch, "VET for a Greener Construction Sector: Low Road or High Road Approaches to Apprenticeship," in Stelina Chatzichristou, Vlasis Korovilos, Lisa Rustico, and Marieke Vandeweyer, eds., *Apprenticeships for Greener Economies and Societies*, Cedefop reference series no. 122 (Luxembourg: Publications Office of the European Union, 2022), 87, doi:10.2801/628930.

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add "green" technical skills, in favour of a broader focus that sees workers as active agents of change.

They also emphasize the important role that organized labour can play in ensuring that government VET policy and industry practice reflect the training and occupational interests of workers, as occurs in many northern European countries that follow a social partnership model.[32] However, as Andrew Sharp and James Gibson note in relation to Canada's experience, "There is a broad consensus that the weak tradition of social partnership or corporatism is a major impediment to institutional solutions to training issues."[33]

Learning from the European Union's Experience

CANADA'S EFFORT TO PROMOTE a more climate-literate workforce can learn much from the European VET experience. To ensure that its workforce was equipped to implement its ambitious GHG and energy targets, the European Union (EU) established a major research program in 2011 called Build Up Skills (BUS). The program recognized that major changes in member countries' VET systems would be needed to meet its Energy Performance of Buildings and Energy Efficiency Directives. It asked each country to evaluate the existing capacity of its workforce to deliver low carbon construction, identify the future skills required, and estimate the number of workers in each skill category needed to meet its climate targets.[34] BUS recognized the link between the additional construction work necessary to implement climate targets and the corresponding need to increase investment in workforce VET. The establishment of the energy and GHG targets created the rationale for expanding training programs. BUS then asked each country to create a "national roadmap" for developing VET programs and make investments to achieve the desired outcomes.[35] Key BUS findings were that the future climate workforce would require higher qualification standards, greater energy literacy, and a deeper understanding of the principles of building science. In its 2018 evaluation of the impact of the initiative, BUS concluded the following: "The results show that BUILD UP Skills projects boosted education and training of craftsmen

32. Clarke and Winch, "VET for a Greener Construction Sector."

33. Andrew Sharp and James Gibson, "The Apprenticeship System in Canada: Trends and Issues," CSLS Research Report 2005-04, Centre for the Study of Living Standards, Ottawa, September 2005, 69, http://www.csls.ca/reports/csls2005-04.PDF.

34. ILO, Skills and Employability Department, *Skills and Occupational Needs*; Marcello Antinucci et al., Towards *Improved Quality in Energy Efficient Building through Better Workers' Skills and Effective Enforcement,* European Union and Build Up Skills (March 2014) https://www.epbd-ca.eu/outcomes/arc/medias/pdf/CA_EPBD_BUS_interaction_report_summary.pdf.

35. European Commission, Executive Agency for Small and Medium-sized Enterprises, *Evaluation of the BUILD UP Skills Initiative under the Intelligent Energy Europe Programme 2011–2015: Final Report* (Luxembourg: Publications Office of the European Union, 2018).

and other on-site construction workers and system installers in the building sector and increased the number of qualified workers across Europe. All projects developed and piloted new qualifications and training schemes and/or upgraded existing ones."[36]

One of the outcomes of the BUS initiative was the development of detailed curriculum modules for the VET programs of EU member countries. These include knowledge of the basic findings of climate science, the impact of construction on climate change, and ways the industry can mitigate and adapt to it. Their VET programs have incorporated this material. An example is the five very detailed training modules now being used in Ireland. Informing the workforce of its role in achieving EU climate targets has been a significant part of curriculum reform, as has been the climate rational for the regulations now in place. The Irish VET modules also translate general climate literacy information to relate it specifically to the work of its individual construction trades.[37]

The EU has continued its efforts to develop an energy- and climate-literate workforce with subsequent initiatives, including its Horizon 2020 and LIFE Clean Energy Transition programs.[38] The EU's progress has been the result of tough legislation requiring its member countries to achieve measurable targets within specific time frames. Government policies and legislation have been largely responsible for the progress it has made.

Canada's Approach: Failing to Address Systemic Barriers to a Climate-Literate Workforce

CANADA'S APPROACH TO CONSTRUCTION training has been somewhat different. As noted, Canada is an LME in which markets have priority, the role of the state (outside Québec) is quite limited, and the VET system is built around meeting employer requirements. In recent years, the federal, provincial and territorial governments have poured a great deal of money into construction

36. Koen Rademaekers, Rob Williams, Katarina Svatikova, Irati Artola, Simonas Gausas, and Jonas Antanavicius, *Final Report on the Assessment of the BUILD UP Skills Pillar II* (Luxembourg: Publications Office of the European Union, 2018), 4, https://build-up.ec.europa.eu/sites/default/files/content/bus-d4.4finareport_on_assessment_april_2018_0.pdf.

37. See, as one example of the five modules, QualiBuild Ireland, *Introduction to Low Energy Building Construction: Learners' Handbook*, Build Up Skills Ireland, 14 July 2016, https://www.igbc.ie/wp-content/uploads/2016/09/D2.3-QualiBuild-FES-Learners-Handbook-Final_PU.pdf. What is remarkable about the Irish curriculum modules is their extensive discussion of climate science and the high level of knowledge they assume building workers need to acquire.

38. European Commission, Proposal for a Directive of the European Parliament and of the Council on Energy Efficiency, Brussels, 14 July 2021, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0558; European Commission, "'Fit for 55': Delivering the EU's 2030 Climate Target on the Way to Climate Neutrality," Brussels, 14 July 2021, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0550.

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training. However, much of the focus has been on providing the skilled workforce needed for resource and fossil fuel projects and major ICI developments.[39] Governments have largely ignored the training needs of the large numbers of workers employed in smaller commercial and residential construction projects and those engaged in building renovations, many of whom are "self-employed" or populate the large underground economy.

The federal government's approach is summarized in its recent Sustainable Jobs Plan and subsequent Bill C-50, the *Sustainable Jobs Act*.[40] The plan outlines the $84 billion the government is spending on various economic development commitments, which includes funding for its climate agenda. It allocates approximately $1.6 billion for various labour adjustment and training programs.[41] But these expenditures are for the entire economy, not just construction, and the funding is spread over multiple years. In response to union demands, the government also set up a Sustainable Jobs Secretariat to coordinate the various government programs involving climate-related training and employment. In addition, it established the Sustainable Jobs Partnership Council to work with various stakeholders in promoting employment initiatives. Its membership includes employers, unions, First Nations, civil society, and others that it feels it needs to consult on an ongoing basis.[42] These initiatives have been consolidated into Bill C-50, the *Sustainable Jobs Act*.[43] The secretariat and partnership council initiatives are positive developments, but a key question is whether the federal government will support them adequately and allow them to press for real change in the industry.

With respect to promoting apprenticeship, the federal government currently offers employers up to $10,000 for hiring a first-year apprentice in one of 39 Red Seal trades.[44] Some provinces top this up. Ottawa allocates $50

39. See, for instance, the description of Canada's programs for apprenticeship support on the Employment and Social Development Canada website, https://www.canada.ca/en/services/jobs/training/support-skilled-trades-apprentices.html.

40. Natural Resources Canada, *Sustainable Jobs Plan* (Ottawa, 2023), last modified 3 October 2023, https://natural-resources.canada.ca/transparency/reporting-and-accountability/plans-and-performance-reports/sustainable-jobs-plan/25381.

41. This does not include the approximately $2 billion in federal transfers under the Labour Market Development Agreements Program. Not all of this is for construction. Employment and Social Development Canada, "About the Labour Market Development Agreements Program," last modified 8 May 2024, https://www.canada.ca/en/employment-social-development/programs/training-agreements/lmda.html.

42. Natural Resources Canada, *Sustainable Jobs Plan*.

43. Natural Resources Canada, "Government of Canada Tables the Canadian Sustainable Jobs Act to Enable the Creation of Good, Middle-Class Jobs across Canada," news release, 15 June 2023, https://www.canada.ca/en/natural-resources-canada/news/2023/06/government-of-canada-tables-the-canadian-sustainable-jobs-act-to-enable-the-creation-of-good-middle-class-jobs-across-canada.html.

44. The Red Seal program establishes the skills and knowledge (i.e. standards) that apprentices

million annually to its Union Training and Innovation Program in support of research projects that will improve the apprenticeship system, such as the CBTU's Building It Green project.[45] It also continues to fund a package of other programs for women, Indigenous workers, and people with disabilities.

While valuable, these programs need to be put into perspective. They are extremely modest considering the recruitment and training challenge the industry faces to meet the government's ambitious emission reduction targets. Estimates of the number of new housing units Canada will need in the coming years vary, depending on assumptions about population growth and economic activity. But they indicate that there will have to be an enormous increase in the rate of construction. According to the Canada Mortgage and Housing Corporation (CMHC), Canada's current housing stock is 16.5 million units. It estimates Canada will need 5.8 million more housing units by 2030 to address current shortages and projected population growth. This will require an increase of 3.5 million units above current production rates, or considerably more than double what is now being built.[46] Using slightly different assumptions, the Office of the Federal Housing Advocate has an even larger estimate of 9.6 million new units being required by 2031.[47] Canada will also have to build more infrastructure to service these homes. And the rate of ICI construction will have to increase in parallel, to provide offices, schools, hospitals, and the many other buildings needed to accommodate this growth.

Turning to net zero upgrades, Efficiency Canada argues that Canada will have to retrofit over nine million existing residential buildings and half a million ICI structures by 2050.[48] Natural Resources Canada estimates that

must learn to be certified to practise a trade. The standards for each trade are developed by the provincial directors of apprenticeship in collaboration with the federal government, industry, unions, colleges, and other stakeholders. At the end of their apprenticeship, trainees must pass the Red Seal exam to obtain their certificate of qualification. The Red Seal standards provide the template for the curriculum that provinces and territories use in their apprenticeship programs. Experienced tradesworkers can also obtain a Red Seal ticket by documenting their time in the industry and "challenging" the Red Seal exam for their trade. In 2022, approximately 15 per cent of new Red Seal certifications were of workers who had challenged the exam.

45. Details of this initiative can be found on the CBTU website, https://buildingtrades.ca/workforce-dev/building-it-green/.

46. Canada Mortgage and Housing Corporation (CMHC), *Housing Shortages in Canada: Updating How Much Housing We Need by 2030* (Ottawa: CMHC, 2023), https://assets.cmhc-schl.gc.ca/sites/cmhc/professional/housing-markets-data-and-research/housing-research/research-reports/2023/housing-shortages-canada-updating-how-much-we-need-by-2030-en.pdf.

47. Carolyn Whitzman, *A Human Rights-Based Calculation of Canada's Housing Supply Shortages*, Office of the Federal Housing Advocate (Ottawa: Canadian Human Rights Commission, 2023), https://www.homelesshub.ca/resource/human-rights-based-calculation-canada%E2%80%99s-housing-shortages.

48. Brendan Haley and Ralph Torrie, *Canada's Climate Retrofit Mission: Why the Climate*

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"Canada would need 142 years to retrofit all homes and 71 years to retrofit all commercial and public buildings" at the current refurbishment rates.[49] In a recent study of the retrofit performance of major industrial countries, Canada ranked near the bottom. On a scale of one to five points, with one being the lowest, the country rated one point on building energy efficiency, one point on emission reduction progress, and one and a half points on climate policies. The report noted the very high energy and GHG intensity of Canada's current building stock and concluded that "the country has made little progress in improving building energy performance. Emissions from fuel combustion have actually been rising."[50]

The amounts spent on new workforce training pale in relation to the massive increase in VET investment required to meet these needs. They are also but a fraction of the tens of billions being provided in other parts of the federal government's economic and climate programs, such as tax credits for carbon capture or hydrogen production; major energy infrastructure projects, such as the $35 billion (and growing) Trans Mountain Pipeline; tax credits for fracking and liquefied natural gas expansion; and the tens of billions of dollars of subsidies for new electric car battery plants.[51] More importantly, the amounts spent on new workforce training are not designed to promote industry transformation. Instead of working with provinces and territories to develop a comprehensive plan for significantly expanding investment in VET programs to meet anticipated workforce needs, as the EU did, the federal government has been tinkering at the edges of the system, reluctant to implement the financial and regulatory measures required.

The Challenge of Bringing Employers to the Table

THE SUPPORT OF EMPLOYERS is essential to advancing climate literacy in Canada's construction industry. Yet international studies consistently show that Canada's employers are laggards. Compared with Scandinavia, Germany, Belgium, and other European countries, Canadian employers provide far less support for apprenticeships. The reason this is a major problem is that on-site

Emergency Demands an Innovation Oriented Policy for Building Retrofits (Ottawa: Efficiency Canada, June 2021), 38, https://www.efficiencycanada.org/wp-content/uploads/2021/06/Retrofit-Mission-FINAL-2021-06-16.pdf.

49. NRC, "Canada Green Buildings Strategy," 5.

50. Robert Kilgour, Joshua Deru, Laura Watson, and Michael Lord, *Global Retrofit Index: An Assessment of the Performance of G20 Countries to Reduce Emissions from Buildings* (Oxford, UK: 3Keel LLP, October 2022), 29, https://www.3keel.com/wp-content/uploads/2022/10/Global_Retrofix_Index.pdf.

51. For a brief summary of key programs, see Employment and Social Development Canada, " Grants and Funding for Skilled Trades and Apprenticeship," last modified 21 June 2024, https://www.canada.ca/en/services/jobs/training/support-skilled-trades-apprentices/funding-opportunities.html.

learning is the dominant component of Canada's VET system. Approximately 80 per cent of apprentices' time is spent working on construction sites; only 20 per cent is in the classroom.[52] This is considerably less than in many northern European countries whose apprenticeship systems are widely admired and where employers contribute far more to support apprenticeships.[53] The extent and quality of the worksite training that Canadian employers provide are critical to the development of qualified journeyworkers. This training can either reinforce or undermine what apprentices learn in the classroom, including on climate change. Yet employer VET practices on most Canadian construction sites are often poorly organized and badly regulated. There are wide variations in the quality of training that apprentices receive, and for many, the experience is disappointing.[54]

Construction employers are well organized in Canada, particularly with respect to lobbying governments for tax credits, subsidies, and other financial supports. But while their trade organizations are good at representing their economic and political interests, most employer organizations in English Canada have little, or no, capacity to make binding commitments on behalf of their members to support VET programs. This contrasts with the successful experiences in Scandinavia, Germany, and Belgium – to cite relevant examples – where employers, collectively, support VET extensively. The ability of European employer federations to enlist the co-operation of their member employers enables them to support industry-wide apprenticeship programs. As employers, they recognize that they have a collective interest in an effective training system – one whose success requires employers to do their part.[55]

To be fair, many Canadian employers provide a positive learning environment for their workers on job sites. They mentor apprentices and offer journeyworkers opportunities to upgrade their qualifications to keep up with industry developments. This is particularly true where they need to deliver high-quality construction outputs and cannot accept inferior work because

52. The classroom and on-the-job hours required to complete an apprenticeship for each trade are listed in the Ellis Chart, Red Seal website, last modified, 2 February 2023, https://www.red-seal.ca/eng/resources/.2ll.3s.shtml.

53. Bonnie Watt-Malcolm and Antje Barabasch, "Tensions in the Canadian Apprenticeship Sector: Rethinking Bourdieu's Analysis of Habitus, Field and Capital," *Research in Comparative and International Education* 5, 3 (2010): 289–301; Paul Cappon, *Think Nationally, Act Locally: A Pan-Canadian Strategy for Education and Training* (Ottawa: Canadian Council of Chief Executives, July 2014), https://thebusinesscouncil.ca/report/think-nationally-act-locally-a-pan-canadian-strategy-for-education-and-training/; Nicholas Dion, "Apprenticeship in International Perspective: Points of Contrast with Ontario," @ Issue Paper No. 21, Higher Education Quality Council of Ontario, Toronto, 20 January 2015, https://heqco.ca/wp-content/uploads/2020/03/Intl_Apprenticeship_ENG.pdf.

54. John Meredith, "Apprenticeship in Canada: Where Is the Crisis?," *Journal of Vocational Education and Training* 63, 3 (2011): 323–344.

55. Hall and Soskice, "Introduction to Varieties of Capitalism."

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it undermines their reputations and their ability to obtain future contracts. Contractors working on major ICI projects, including Class A commercial buildings, require a well-trained workforce to deliver the standard of construction required by those commissioning this work.[56] They often have long-term employees, so it is in their interests to invest in apprentices who will remain with them once they obtain their provincial trades qualification (TQ) or national Red Seal endorsement. The ICI sector of construction is also the most extensively unionized. Its contractors recognize that union members are highly productive as a result of their training and experience and, consequently, capable of delivering the quality of work their customers expect. Many of these contractors are also participants in the Canadian Apprenticeship Forum, which is a strong supporter of improving apprenticeship programs and the source of much of Canada's research on the issue.[57]

At the same time, the majority of contractors who build small commercial buildings, low-rise apartments, and most of the residential sector provide little support for apprenticeships and other forms of training. These sectors have a high proportion of very small employers, most of whom do not have the capacity, resources, or interest in supporting workforce VET. They operate in a construction market where price competition is fierce, labour costs are critical, and obtaining contracts a constant challenge. Without guarantees of future contracts, they cannot provide the employment security required to support apprentices. As workers move from project to project and contractor to contractor, the return on training investment for small employers is problematic, as many fear their apprentices may be "poached" by other employers once they become qualified journeyworkers. Because the standards of construction performance in this sector are often poorly monitored, many contractors find they can function without a well-trained workforce. Building purchasers are frequently not aware of the standards that should be met or do not see the long-term value in quality construction. Substandard work is overlooked, and price, too often based on minimum labour costs, becomes the determining factor in winning bids. These are not problems of individual "bad" employers; they are systemic. They are a result of the failure of governments to regulate the construction market for building quality and to protect worker rights to decent, stable, and reasonably well-paid work.

While these employers would not conceptualize their approach as Taylorist, the system operates according to many of his "scientific management" principles. Much of the work is organized to minimize the need for workers with formal qualifications. Subcontracting facilitates a breakdown of work into

56. Class A buildings are normally large commercial, office, and high-rise residential projects built to meet the requirements of owners with high-paying tenants who expect quality amenities and high standards of fit and finish.

57. The CAF website (https://caf-fca.org/) has an extensive library of research papers on various aspects of pre-apprenticeship, apprenticeship, and journeyworker training.

narrow, simpler tasks to maximize the use of unskilled and semi-skilled workers. Piecework incentive systems pressure workers to maximize output in the shortest time frame, encouraging practices that skimp on quality. These arrangements also increase employer control over the work process, minimize worker agency, and facilitate downward pressure on wages and working conditions.[58] Whether decent or predatory in their labour practices, contractors operate within a larger system based on low-bid tendering, weak regulations, and limited enforcement of both building codes and labour standards. Significantly, from the perspective of this article, it is also a system that results in major barriers to implementing climate-focused VET.

Instead of placing more responsibility on employers, collectively, to train the workforce – a huge weakness of our system – governments have sought to fill skill gaps by other methods, such as providing employers with generous subsidies and tax breaks to hire apprentices; breaking apart trades into components that require less training (deskilling), reducing the formal trades qualifications required to perform certain jobs; eliminating compulsory trades; recruiting skilled workers from abroad; increasing temporary foreign worker permits for less skilled work; and promoting microcredentials that provide narrow, task-specific, non-transferable skills to fill short-term labour requirements.[59]

Giving employers $10,000 – or $20,000 for some targeted groups – to hire a first-year apprentice may seem like a viable way to encourage them to support apprenticeships by covering some of the costs they may incur. However, it assumes that employers' costs are the major barrier to hiring apprentices. While popular with employers, such subsidies offer windfall gains to those who would hire apprentices anyway and provide a perverse incentive to others to treat it as a wage subsidy for a revolving door of first-year apprentices who can be exploited as cheap labour given their low starting wages. Ironically, the subsidy may lead in many cases to outcomes that are the opposite of what governments say they intend. Without a proper assessment of employers' capacity for, and commitment to, providing appropriate mentorship, such subsidies are unlikely to achieve the desired outcomes, especially if assessments of training quality are weak and funds are not conditioned on meeting measurable learning targets. Commenting on the need to evaluate the quality of employer support for training, and based on an extensive series of interviews with employers in Vancouver, John Meredith concluded that "Canadian policy has failed to establish the sorts of collective protections that have been central to

58. Harry Braverman, *Labor and Monopoly Capital* (New York: Monthly Review Press, 1974); Herman Rosenfeld, "Lean Production Is Not a Solution," *Catalyst* 6, 1 (2022), https://catalyst-journal.com/2022/06/lean-production-is-not-a-solution; Matt Vidal, "The Politics of Lean Production," *Catalyst* 5, 4 (2022), https://catalyst-journal.com/2022/03/the-politics-of-lean-production.

59. Bob Barnetson and Jason Foster, "Who's on Secondary? The Impact of Temporary Foreign Workers on Alberta Construction Employment Patterns," *Labour/Le Travail*, no. 80 (Fall 2017): 27–52.

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effective apprenticeship systems elsewhere, and instead has built a structure of indiscriminate public subsidies that may actually be suppressing private training investment. It [his research] concludes that the true measure of any crisis in Canadian apprenticeship policy is not the sheer volume of registrations, but rather the amount and the quality of skill formation that occurs in Canadian workplaces."[60]

The lack of employer support for VET undermines Canada's ability to provide the number of qualified workers now needed for net zero construction. Cash incentives and "light touch" regulation have not worked well, as evidenced by the ongoing shortage of qualified tradesworkers, about which employers continually complain. To oversee on-the-job support for apprentices, governments must be willing to regulate employer workplace practices much more extensively and invest considerably more in systems and staff to support apprentices on job sites.[61]

Shifting the Costs of Training to Workers

As Bosch and Philips note, a key characteristic of construction is that the financial burdens of seasonal and cyclical fluctuations in the market are carried, disproportionately, by the workforce.[62] Employment precarity is a common experience. Workers face unemployment during downturns in the business cycle and often during winter months, when it is more expensive to build projects. Precarity also means the benefits that workers in other industries customarily receive – such as pensions, extended health care, sick leave, and long-term disability – are absent, with the notable exception of the unionized sector and a few large unorganized contractors. The ability of unions to protect their members is also affected by cyclical and seasonal unemployment patterns. Compounding this is that Canada's employment insurance (EI) system does not adequately compensate qualifying workers for lost wages. Many do not qualify in any case.

Most construction workers do not work on major ICI projects and are not employed by unionized contractors. Workers on residential and small commercial construction projects receive little, or no, formal training. Workforce precarity undermines the ability of workers to participate in VET. Instead, they are left to learn on their own through finding a job in the industry, normally starting as helpers or labourers. The absence of adequate formal training

60. Meredith, "Apprenticeship in Canada," 324.

61. Ontario does have legislation that, in theory, gives it the ability to monitor the quality of employer support for apprenticeships. However, its effectiveness is critically dependent on the resources and political support provided to its inspectors. Modernizing the Skilled Trades and Apprenticeship Act, 2019, SO 2019, c 7, Sch 40.

62. Gerhard Bosch and Peter Philips, introduction to Bosch and Philips, eds., *Building Chaos*, 17–39.

programs presents a major challenge for governments that assume the industry will be capable of delivering the high-performance outcomes needed for effective net zero construction. Aside from its adverse impact on workers' lives – which governments should recognize as a priority for action in any case – precarity is a major barrier, limiting opportunities for workers to acquire the knowledge, skills, and competencies needed for net zero construction and resulting in many workers leaving the construction industry entirely.

The system has another problem: contractors failing to provide apprentices with opportunities to learn the full scope of a trade. The contracts that employers win often involve narrowly focused, highly specialized tasks requiring limited skill sets. Apprentices assigned to these tasks have little opportunity to acquire the core knowledge, skills, and competencies of a well-rounded journeyworker. Some apprentices also find that their journeyworker mentors do not have the time, or are not encouraged by their employers, to provide the needed coaching.[63] Some contractors exploit apprentices as cheap labour, benefitting from the fact that the pay in the first or second year is considerably less than that of a qualified journeyworker.

Within the formal apprenticeship system there is an alarming non-completion rate.[64] While completions vary significantly by trade, over half of apprentices never finish. Data on the number of completions underscores the scope of the problem. According to Statistics Canada's Registered Apprentice Information System database, only 35,658 Red Seal apprentices were certified in 2022, a number that includes Red Seal graduates in trades outside construction.[65] Of those who finish, many take six or more years to complete a four-year apprenticeship.

There are various reasons for this, some understandable, some not. Some apprentices find they simply do not like construction work. Some do not wish to lose income by returning to the classroom in the second, third, or fourth year of their program, especially if they have no guarantee of a job to which they can return. Some employers offer apprentices jobs at the journeyperson pay rate before they finish to dissuade them from returning to the classroom, so that they can continue working. Other workers leave because of poor employer support or a toxic work environment – problems of particular concern to women, Indigenous workers, and racialized minorities. Some apprentices never return to the classroom because they see no financial

63. Meredith, "Apprenticeship in Canada."

64. Statistics Canada, "Pathways Indicators for Registered Apprentices in Canada, 2019," *The Daily*, 21 June 2021, https://www150.statcan.gc.ca/n1/daily-quotidien/210624/dq210624b-eng.htm; Canadian Apprenticeship Forum (CAF), *National Registration and Completion Trends in Red Seal Trades 2023* (Ottawa: CAF, 2023).

65. Statistics Canada, Registered Apprenticeship Information System (RAIS), last modified 4 December 2023, https://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=3154; Statistics Canada, Canadian Apprenticeship Registrations and Certifications, last modified 5 December 2023, https://www150.statcan.gc.ca/n1/pub/71-607-x/71-607-x2020016-eng.htm.

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benefit in getting their ticket.[66] But a significant number drop out because they cannot get enough work to complete their program. The high non-completion rate contrasts sharply with other public educational programs, where a dropout rate of 50 per cent or more would be seen as alarming, not least for the workers involved. Union membership clearly improves completion rates. A recent Statistics Canada report noted that membership was "associated with better outcomes for apprentices"; specifically, union apprentices "were less likely to leave their program than those who were not union members."[67] While this information should encourage provinces and territories to amend their labour legislation to facilitate union growth, it appears to have had little effect on their labour policies.

The Adverse Impact of Extensive Subcontracting and Self-Employment

A major reason Canada faces significant challenges in implementing net zero is its weakly regulated free-market economic model. This encourages competitive tendering in which contracts are awarded to the lowest bidder. Subcontracting and self-employment encourage low-bid competition. Even some of the largest employers engage extensively in subcontracting by parcelling out work to smaller contractors or self-employed individuals. Because so much construction work is labour intensive, low wages are often key to winning bids.

Employers use various strategies to keep labour costs down. A major one involves fictitious "self-employment" by individual workers who are categorized as "independent operators." In 2018, according to Statistics Canada, 27 per cent of the construction workforce was self-employed.[68] Contractors avoid hiring workers as employees to circumvent the legal employment obligations. While, technically, self-employed workers may not be employees, in practice the work they do is often the same. This system enables developers and general contractors to minimize long-term employment commitments and avoid

66. Meredith, "Apprenticeship in Canada"; Deanna Rexe, "The Trades Education Pipeline in Canada: A Critical Review of the Retention and Completion Literature on Apprenticeship," paper presented at the annual conference of the Canadian Society for the Study of Higher Education, Waterloo, Ontario, 28–30 May 2012; Patrick Coe, "Apprenticeship Program Requirements and Apprenticeship Completion Rates in Canada," *Journal of Vocational Education and Training* 65, 4 (2013): 575–605; Hyeongsuk Jin, Manon Langevin, André Lebel, and Michael Haan, "Factors Associated with the Completion of Apprenticeship Training in Canada," *Insights on Canadian Society*, Statistics Canada, 9 December 2020, https://www150.statcan.gc.ca/n1/pub/75-006-x/2020001/article/00008-eng.htm.

67. Jin et al., "Factors Associated with the Completion," 7.

68. Laura Yssaad and Vincent Ferrao, "Self-Employed Canadians: Who and Why," *Labour Statistics at a Glance*, Statistics Canada, released 28 May 2019, https://www150.statcan.gc.ca/n1/pub/71-222-x/71-222-x2019002-eng.htm.

paying their share of statutory benefits (EI, CPP, WCB, etc.), evade minimum labour standards, and shift responsibility for health and safety to workers. But these cost savings come at the expense of workers.

Where such practices are weakly regulated, general contractors who parcel out work to subcontractors or self-employed workers have a major competitive advantage over those that directly employ workers. This pressures firms that do employ workers to minimize labour costs to remain competitive. The system also promotes workforce precarity by relieving companies of any obligation to cushion unemployment resulting from seasonal fluctuations and long-term swings in the business cycle, shifting the risks and costs to workers. As they have no employees, companies also avoid responsibility for supporting workforce VET.[69]

Widespread subcontracting and self-employment fragments what should be an integrated work process and weakens communication, collaboration, and teamwork among workers, key attributes of successful net zero construction practice. It also impedes adoption of a "whole building" approach that takes account of all the contributing factors associated with successful net zero building practice. Subcontractors or self-employed workers are not responsible for the overall outcome of projects, only their component. These practices drive down the very quality standards that are now so necessary to implement net zero construction successfully. They also contrast sharply with successful net zero practice, such as that followed by Passive House, which deliberately encourages building integrated teams on work sites.[70]

Price competition in the absence of clearly established and enforced energy standards and worker qualification requirements privileges contractors who focus on the cheapest way to build. Too often this means that the performance of building projects is far below achievable GHG and energy standards. Except for large ICI purchasers for whom operational costs and building quality are major considerations, most of those who buy buildings are still influenced primarily by the upfront price, rather than long-term energy costs, about which they normally have inadequate information – a problem exacerbated by the absence of building energy audits. Investors who plan to sell, lease, or rent their buildings also have little incentive to focus on operational energy costs, as future owners or tenants will be paying the bills.[71]

69. Bosch and Philips, eds., *Building Chaos*.

70. ECO Canada, *Assessment of Occupational and Skills Needs and Gaps*.

71. John Calvert, "Overcoming Systemic Barriers to 'Greening' the Construction Industry: The Important Role of Building Workers in Implementing Climate Objectives at the Workplace," *Alternative Routes* 25 (2014): 81–116.

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Industry Greenwashing

The growing scientific evidence about the impact of climate change – and corresponding public awareness of it – has led to a major increase in the mainstream industry's efforts to label itself as a climate champion. Terms such as "sustainable," "net zero," "low carbon," and numerous other synonyms populate the advertising targeted at building purchasers and the general public. Trade shows and industry journals are now full of advertising material on the latest net zero technical innovations, promoting the view that industry is leading the charge for sustainable construction. At one level, this is positive, because the industry acknowledges that climate change is now an important factor in shaping its priorities. And the industry is making significant advances in technology, building information modelling systems (BIMs), materials, designs, and engineering protocols. These innovations are making it possible to deliver significant improvements in energy use and GHG emissions.

However, much of the credit for these positive changes is the result of good public policy. It is government regulations, like tougher building and energy codes, that have forced industry to adopt higher building performance standards and to search for ways to reduce energy use and lower GHG emissions. The need for public regulation is also the reason why governments continue to strengthen the codes, incrementally. They realize that the unregulated market will not deliver the extent of change that is needed.

Despite claiming that it now supports net zero, a significant part of the building industry remains strongly resistant to more extensive regulation, as this conflicts with its free-market belief system that governments should minimize regulatory intrusions into how it does business. Tougher building and energy regulations require firms to change, threatening to push up short-term costs and rendering obsolete some customary building practices. There are constant complaints about "red tape." During recent consultations on revising Canada's national building and energy codes, industry representatives raised objections about the additional cost, administrative requirements, and training burden that more stringent codes would impose on their operations.[72]

72. Haley and Lockhart, *Strengthening Canada's Building Code Process*; Kevin Lockhart and Sharane Simon, *Building for Tomorrow: Making Canada's New Housing Supply High Performance and Climate Ready* (Ottawa: Efficiency Canada, 2023), https://www.efficiencycanada.org/wp-content/uploads/2023/11/Housing-and-Climate-Report-%E2%80%94-Building-for-Tomorrow-%E2%80%94-Final.pdf. Concerned about the industry's indifference toward the impact of climate change and the lack of progress in changing industry practices, the BC Insulators Union has conducted a ten-year campaign to educate the industry about what it should be doing on this issue. According to its former president Lee Loftus, the 550-member union has spent over $1 million of its members' money on this effort. Loftus, interview by the author, 12 November 2020. For a detailed account of the BC Insulators campaign, see John Calvert and Corinne Tallon, "The Union as Climate Change Advocate: The BC Insulators' Campaign to 'Green' the Culture of the Building Industry in British Columbia," working paper no. ACW-08, Adapting Canadian Work and Workplaces to Respond to Climate Change, April 2016, https://ys.library.yorku.ca/items/36161531-ccda-4cab-a972-5d1b78e4a64d.

Corporate resistance to climate change policies has another dimension, one promoted by companies outside construction that currently provide considerable work for Canada's major building contractors and their workers. Aware of the way the public's understanding of climate change has shifted in recent years, with more people demanding government action, the major fossil fuel companies have modified their approach from one of contesting the science to one of arguing that their projects are becoming much "greener." They assert that they are now committed to dramatically reducing the carbon footprint of their extraction, processing, and transportation activities. They are replacing climate denial with climate promotion – at least in their public statements – and reframing their demands for government financial support as ways to hasten the decarbonization of their operations.

Pathways Alliance, which represents the major oil and gas companies operating in Canada, promotes itself now as a champion of net zero, albeit gradually and with a lengthy time frame. Its members present new technologies – such as carbon capture, "green" hydrogen, and systems that reduce the energy intensity of their operations – as solutions that will enable them to continue their extractive activities with minimal adverse climate impacts. They use theoretical estimates of the benefits of their approach as evidence that they are now on side with Canada's environmental goals. By saying that they are now publicly committed to reducing fossil fuel production over time, they can argue that there is little need for governments to impose stringent regulatory targets because the industry will manage this transition on its own. The president of Pathways Alliance, Kendall Dilling, made this point in a quotation that was prominently displayed on its website: "Climate change is a critical challenge, and the oil sands industry has an essential role to play in reducing emissions. Our path to net-zero emissions from operations will help our country achieve a sustainable future."[73]

Numerous critics at both national and international levels have challenged the problematic basis for these claims.[74] Nationally, the SSHRC-funded Corporate Mapping Project has critiqued these narratives, arguing that they are intended to obscure the industry's interest in continuing its profitable

73. In June 2024, Pathways removed this quotation and other content from its website, replacing it with a three-paragraph statement saying that recent changes to Bill C-59, *Canada's Competition Act*, had raised uncertainty about how it should communicate its views with the public. At the same time, it stated that this change is "not related to our belief in the truth and accuracy of our environmental communications." By the end of July, links to previously posted material on the Pathways net zero initiative led only to "Page not found" error messages. This material, however, is available on the internet by using the Wayback Machine; see https://web.archive.org/web/20240303121459/https://pathwaysalliance.ca/net-zero-initiative/.

74. William K. Carroll, Nicolas Graham, Michael Lang, Kevin McCartney, and Zoë Yunker, "Fossil Capital's Reach into Civil Society: The Architecture of Climate Change Denialism," in Carroll, ed., *Regime of Destruction*, 171–196; Shannon Daub, Gwendolyn Blue, Lise Rajewicz, and Zoë Yunker, "Episodes in the New Climate Denialism," in Carroll, ed., *Regime of Destruction*, 225–247.

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extraction operations.[75] Internationally, the investigative non-governmental organization (NGO) InfluenceMap has also questioned the industry's misleading claims: "InfluenceMap's analysis shows that despite the Canadian oil and gas sector's widespread use of net zero commitments and narratives, the industry remains strategically opposed to science-based policy to deliver net zero targets in line with limiting warming to 1.5C."[76]

The industry's approach neglects the evidence that reducing overall energy demand is a far more effective way to address global warming. The most successful net zero measure is the energy you don't use. According to a recent US study, demand-side energy reductions could save the United States $100 billion in energy infrastructure investment by 2050 and lower building energy use by 91 per cent.[77] Of relevance to the issue of climate literacy in construction is that the fossil fuel industry is promoting its "business as usual" approach to Canadian construction companies and their unions. This is part of its efforts to obtain their support for subsidies and tax concessions for carbon capture, green hydrogen, and new pipeline projects, as well as delays to government measures designed to reduce fossil fuel production.

Fossil fuel companies maintain that their investments will be a major source of contracts for the building industry and high-paying jobs for construction workers. They tell workers that their projects will be part of the transition toward a greener economy, to allay concerns that some workers have about the environmental impact of working on the projects. However, these projects generate few jobs for the large investments involved, producing a fraction of what comparable funds deliver in other options such as building retrofits, district heating, domestic heat pumps, public transit, and renewable energy projects.

Understandably, construction workers will go where there are jobs. They are not responsible for the economic choices governments make in response to industry lobbying. Nor are they responsible for the misleading climate claims of the fossil fuel corporations. But the industry's deliberate misrepresentation of the impact of these projects generates confusion, implying that they can be reconciled with achieving Canada's climate objectives. The underlying message is that nothing much needs to change and the industry can manage what needs to be done. The industry's messaging also represents a potential barrier to providing science-based information on climate change in VET programs because it creates pressure to tone down evidence critical of fossil fuel production.

75. See the Corporate Mapping Project website, https://www.corporatemapping.ca/.

76. InfluenceMap, "Canadian Oil and Gas Industry and Climate Policy: A Report on Climate and Energy Policy Advocacy by the Canadian Oil and Gas Sector," London, February 2023, 2, https://influencemap.org/site/data/000/021/Canada_Report_-_Main_Briefing_Feb21st_2022.pdf.

77. Langevin et al., "Demand-Side Solutions."

The Role of Voluntary Building Standards in Promoting Green Construction

While major parts of the industry question the need for much more stringent government regulation, there are also vocal proponents of "green" construction who take a different view. Members of the CAGBC and Passive House Canada, as well many progressive contractors, architectural firms, engineering companies, and some developers, do support stronger building and energy codes. They realize that these standards level the playing field by reducing the cost advantage of contractors whose projects fail to meet climate objectives or who get away with poorer-quality work. They advocate net zero best practices and have made major contributions to raising awareness of the role that the construction industry should be playing in meeting Canada's climate targets. A significant number of unionized contractors in the ICI sector also support strengthening the industry's role in addressing climate change to varying degrees. They emphasize building quality rather than simply low bid, an important prerequisite for net zero construction.

Incrementally, there has also been increasing industry acceptance of the climate benefits of voluntary green building standards, even if these are not widely, or fully, implemented. The term "net zero" has become part of the vocabulary of developers and contractors, even though for some it is primarily a marketing tool. More firms are promoting their buildings as "green" and asserting that they are meeting LEED, BREEAM, ASHRAE, Passive House, and other building standards.[78] But these are still not typical of much of the industry, which remains committed to existing practices and will only change when building and energy codes require it. Good building standards, like LEED, remain on the margins of the mainstream industry. LEED buildings still constitute a small component of new construction and have been criticized for failing to deliver the energy performance that owners expect.[79] Only 248

78. See, for instance, the fall 2022 issue of BuildForce Canada's magazine for examples of industry's positioning on climate change in its numerous advertisements. The fact that this entire issue was devoted to climate change, for the first time in the journal's history, is positive as it signifies a shift in the narrative of the organization: climate change has now entered its lexicon in a significant way.

In the building industry, the acronyms noted above are widely used; however, to clarify what they mean to other readers, the definitions are as follows: LEED stands for Leadership in Energy and Environmental Design, a building standard established by the US Green Building Council and used widely in Canada. BREEAM stands for Building Research Establishment Environmental Assessment Methodology. It was originally established in the UK but is now an international standard. ASHRAE stands for the American Society of Heating Refrigerating and Air-Conditioning Engineers. It publishes a variety of different building standards. Passive House is the name for an internationally recognized building system originating in Germany, considered to be a gold standard in minimizing the carbon footprint and energy use of buildings.

79. Ali Amiri, Juudit Ottelin, and Jaana Sorvari, "Are LEED-Certified Buildings Energy Efficient

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commercial LEED projects were certified in Canada in 2022, a small fraction of the total constructed that year. While gradual increases in the number and square footage of projects point toward wider adoption of this and other voluntary standards, they still represent a small part of total construction volume. To give some context, there were over 480,000 commercial and institutional buildings in place in 2021, according to Environment and Climate Change Canada.[80] Currently, only a small fraction of new buildings meet the ministry's nearly zero energy standard.[81] There are also significant criticisms about how some companies are gaming the system by manipulating standards, such as LEED, to maximize their point ratings by getting credits for features unrelated to reducing energy consumption or GHG emissions.[82]

The Organization of Construction Work and Unionization

MUCH OF THE INDUSTRY'S inability to meet energy and GHG targets is found in its approach to labour. As earlier noted, just under a third of the Canadian construction workforce was unionized in 2022. However, this national average includes Québec, with its much higher union density. In the rest of Canada, approximately 25 per cent of construction workers were union members.[83] There are significant variations in union density among trades, industry sectors, regions, and provinces. While major employers building ICI and large commercial projects are relatively well organized, unions have little presence in much of the industry, and particularly the residential sector, with a few

in Practice?," *Sustainability* 11, 6 (2019): Article 1672, doi:10.3390/su11061672. LEED's building rating system is managed in Canada by the CAGBC. It allocates points for various design elements, including climate change impacts, water use, health promotion, biodiversity, and other environmental amenities like bicycle racks. It categorizes buildings as silver, gold, or platinum, depending on the total points they receive on its rating system. The latest version is LEED v5 (https://www.usgbc.org/leed/v5).

80. CAGBC, "Canada Ranks 3rd in the World for LEED Certified Buildings in 2022," news release, 7 February 2023, https://www.cagbc.org/news-resources/cagbc-news/canada-ranks-3rd-in-the-world-for-leed-certified-buildings-in-2022/; Environment and Climate Change Canada, *A Healthy Environment and a Healthy Economy: Canada's Strengthened Climate Plan to Create Jobs and Support People, Communities and the Planet* (Ottawa, 2020), https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/healthy-environment-healthy-economy.html.

81. Haley and Lockhart, *Strengthening Canada's Building Code Process*, 12.

82. Robert Orr, "The Problems with LEED," draft paper, Project for Lean Urbanism, Centre for Applied Transect Studies, 2014, https://leanurbanism.org/wp-content/uploads/2014/06/Orr-LEED.pdf; Rochelle Ade and Michael Rehm, "The Unwritten History of Green Building Rating Tools: A Personal View from Some of the 'Founding Fathers,'" *Building Research and Information* 48, 1 (2020), doi:10.1080/09613218.2019.1627179; Danielle De Castro and Amy Kim, "Adaptive or Absent: A Critical Review of Building System Resilience in the LEED Rating System," *Sustainability* 13, 12 (2021): Article 6697, doi:10.3390/su13126697.

83. Statistics Canada, "Union Status by Industry."

exceptions such as the Greater Toronto Area. While there are various reasons for this, opposition by many small and medium employers is a major factor. The industry's low unionization rate is a significant indicator of employer effectiveness in marginalizing unions.

Extensive subcontracting and self-employment are barriers to union organizing. They fragment the work process.[84] Smaller employers are difficult to organize, while the "true employer" of questionable "independent operators" is often difficult to prove in labour relations board hearings.[85] Moreover, the employer culture – and ideology – in large parts of the industry is deeply hostile to unionization. Many unorganized employers fear unionization because they assume that unions will interfere with their "right to manage," push up wages, reduce profits, or possibly even put them out of business, given that wages are normally such a large component of costs. Their own economic insecurity is a factor in their anti-union stance.

Another major barrier to unionization is the large underground economy. It involves developers and contractors choosing to pay workers in cash, thus avoiding statutory employment obligations, including EI, WCB, and CPP. This practice also enables them to evade employment standards' regulations and health and safety legislation. Precisely because it is "underground," the size of this component of the industry is challenging to measure. A 2022 BC study estimated that it represented 19.5 per cent of that province's construction workforce.[86] A 2018 Ontario Construction Secretariat (OCS) study found that it "resulted in revenue losses to governments and government agencies of $1.8–$3.1 billion annually during the 2013–2017 period. This was an increase of approximately 30% over the estimated revenue losses for the 2007–2009 period."[87] A 2022 Canada Revenue Agency report estimated that the total

84. Judy Fudge, "Fragmenting Work and Fragmenting Organizations: The Contract of Employment and the Scope of Labour Regulation," *Osgood Hall Law Journal* 44, 4 (2006): 609–648.

85. The question of who is the "true employer" is highly contentious in labour law and the subject of numerous labour board hearings. Unions argue that self-employment is normally a way to conceal the actual employment relationship, enabling employers to avoid their statutory responsibilities. For an interesting discussion of the complexities of this issue, see Brian A. Langille and Ben Mayer-Goodman, "Hunting for Employees, Employers, Independent Contractors, Dependent Contractors and Other Figments of the Legal Imagination," *Dalhousie Law Journal* (forthcoming), doi:10.2139/ssrn.4587945.

86. BC Building Trades, *The Underground Economy in British Columbia's Construction Industry: Assessing the Impact*, 2022 Report on the Underground Economy (New Westminster: BC Building Trades, 2022), https://bcbuildingtrades.org/wp-content/uploads/2022/04/2022-Underground-Economy-Report.pdf.

87. Ontario Construction Secretariat (OCS), *The Underground Economy in Ontario's Construction Industry: Estimates of the Revenue Losses to Governments*, (Toronto: OCS, March 2019), 4, https://iciconstruction.com/2019/04/17/underground-economy-in-construction-it-costs-us-all-march-2019-2/.

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economic activity of the underground economy was $68.5 billion, of which 35 per cent was found in the residential construction market alone.[88]

The underground economy privileges developers and contractors who hide their construction activities, including evading sales tax and failing to disclose taxable profits. Often their work is not inspected because it flies "below the radar," resulting in poorly built projects that do not meet building code requirements and can be hazardous for occupants. These and other questionable, or illegal, practices substantially reduce what they charge for their work and drive down standards across the industry. Workers tolerate the precarious working conditions because they have little choice if they need jobs. To the extent that there is any financial incentive for workers to accept these conditions, it is by avoiding income tax and statutory benefits contributions. But workers are major victims, as they lose these entitlements. Not being covered by WCB means they can neither claim benefits if injured nor access rehabilitation. Avoiding EI contributions means no coverage when unemployed. And not contributing to CPP means no pension. Underground workers also are vulnerable to a range of common scams for which they have no redress, such as nonpayment for work, because they do not have an employment relationship on which to base any claim. The exploitation of temporary foreign workers, immigrants, and racialized workers is widespread. Both self-employment – which, as noted, accounts for 29 per cent of the workforce – and the large underground economy create major practical barriers to union organizing.

Another barrier to unionization is the anti-union attitude of many employers. This is reflected in resisting organizing drives – often through illegal means – and persistently opposing changes in labour legislation that would facilitate union organizing.[89] Employer associations, such as the Independent Contractors and Businesses Association (ICBA) of BC and Alberta, campaign energetically against union organizing at the workplace and lobby government extensively for weaker labour codes, lower employment standards, an end to fair wage policies, and less stringent WCB regulations.[90] ICBA's counterparts in other provinces also promote "merit shops" and strongly oppose government expenditures on enforcement of workers' rights, claiming they increase "red tape," undermine efficiency, and raise costs for building purchasers. Their

88. Canada Revenue Agency, *2022+ Underground Economy Strategy* (Ottawa, 2022), https://www.canada.ca/en/revenue-agency/programs/about-canada-revenue-agency-cra/corporate-reports-information/underground-economy-strategy-2022.html.

89. Sara Slinn, "Protected Concerted Activity and Non-Unionized Employee Strikes: Worker Rights in Canada in the Time of COVID-19," *Osgoode Hall Law Journal* 57, 3 (2021): 605–635, doi:10.60082/2817-5069.3601; Sara Slinn, "Broader-Based and Sectoral Bargaining in Collective-Bargaining Law Reform: A Historical Review," *Labour/Le Travail*, no. 85 (Spring 2020): 13–52.

90. See, for example, the ICBA's promotion of open-shop policies on its website. ICBA, "Grow Your Business," n.d., accessed 27 March 2024, https://icba.ca/grow-your-business/.https://icba.ca/grow-your-business/.

goal is a weakly regulated labour market, a view consistent with their opposition to government regulation of the industry in other areas, including climate change policies. They have succeeded in keeping large areas of construction "union free." This has been assisted by the employer-friendly Christian Labour Association of Canada (CLAC), which competes with legitimate unions and promotes itself as strike-free.[91] But, as noted later in this article, one consequence of marginalizing unions is to limit a major source of trades training and potential opportunities for enhancing climate literacy.

Addressing the Training Challenge

The question of who will be responsible for ensuring that Canada's construction workforce can learn the knowledge, skills, and competencies required to implement net zero construction is an increasingly important one, given the higher performance requirements. As noted, a major barrier is that most construction workers, particularly in the residential and small-scale commercial sectors, receive little or no formal training, and most employers do not contribute to workforce skills development.

Union training centres are one important way these barriers are being overcome. Through collective bargaining, unions have established numerous Joint Apprenticeship Training Committee (JATC) agreements with employers.[92] The agreements require that employers make payroll deductions to fund training facilities and programs, normally based on cents per hour worked by union members. This gives unions a major stake in VET. The collective agreements normally require that employers hire a certain ratio of apprentices to journeyworkers, providing the hours of employment that apprentices need to complete their programs. Participating employers benefit from access to the well-trained workers who graduate.

JATC agreements normally involve many employers and a single union. Consequently, labour has a strong influence on the governance and management of their training facilities. In addition, some unions operate their own facilities supported by negotiated contributions from employers. The main function of these training schools is to provide the classroom component of formal apprenticeship programs. However, many offer additional courses on occupational health and safety, orientation to construction work, workers' compensation, pre-apprenticeship, financial competency, mentorship, essential skills, respectful workplaces, and technical upgrades for journeyworkers.

91. Steven Tufts and Mark Thomas, "The Christian Labour Association of Canada (CLAC): Between Company and Populist Unionism," *Labour/Le Travail*, no. 80 (Fall 2017): 55–80.

92. John O'Grady, "Training Trust Funds: A Review of Their History, Legal Foundations, and Implications for Trade Union Training Strategy," Prism Economics and Analyses, Toronto, 2005. On its website (https://constructiontradeshub.com/), the CBTU notes that there are 195 union training centres in Canada. The OCS says there are over 100 in Ontario. Most are JATC governed, but some are owned entirely by union locals.

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Unions take responsibility for their indentured apprentices, encouraging them to fulfill the required classroom component of their apprenticeships and obtain their journeyworker qualification. When an apprentice is laid off by one employer, the union normally tries to find them work with another signatory to the collective agreement. Consequently, the success rate of JATC training facilities is higher than that of other training organizations.[93] Their impact is reflected in the fact that in Ontario, union facilities train one-third of all construction apprentices and have expanded significantly in recent years.[94]

The fact that apprentices are union members covered by collective agreements enables unions to advocate for them on job sites. Unions can monitor the quality of training apprentices receive, including whether they have opportunities to learn the full scope of their trades. Where provinces provide funding for apprenticeship courses, they customarily ask JATCs to enrol workers who are not union members, expanding the number of apprentices they train.

A good example of a JATC is BC's SkillPlan. Established in 1991 and overseen by a joint board, it provides a package of training programs for the fourteen affiliates of the CBTU and their unionized contractors across Canada and in major parts of the US. Its programs support 1,500 new apprentices every year. But its reach is much wider. It provides online and in-person training for trades instructors and working journeypersons. It offers a suite of courses to facilitate Indigenous workers entering the construction workforce, which it delivers in co-operation with various First Nations. Its mentorship program assists unions and employers in linking new apprentices with experienced journeyworkers to ensure they get adequate learning support on job sites. It offers a variety of pre-apprenticeship courses designed to give prospective apprentices the coaching they need to apply successfully to an apprenticeship. Its staff also specializes in custom course and curriculum development for specific trades.[95]

Unions also support VET though their participation in organizations like the Ontario Construction Secretariat. The OCS was set up through legislation. The province forced unions and employers in the ICI sector to implement central table bargaining in 1993. While the government's rationale for this policy was to limit disputes and respond to employer pressure to reduce the number of strikes, ICI employers have to engage in sectoral bargaining with unions and implement the resulting agreements. Although established for labour negotiations, the OCS now supports apprenticeships extensively. In a 2022 report, the OCS noted, "The unionized construction sector's annual contribution to

93. Jin et al., "Factors Associated with the Completion."

94. Ontario Construction Secretariat (OCS), *Training Investment in Ontario's Construction Industry* (Toronto: OCS, February 2022), https://iciconstruction.com/2022/02/03/training_investment_rpt2022/.

95. Details of its programs can be found on the website: "A Sample of Our Projects," SkillPlan website, n.d., accessed 28 June 2024, https://skillplan.ca/projects/.

training is estimated to be just over $146.4 million in 2019. This is an increase of 261% from the annual contribution estimated by the OCS in 2011 and a 300% increase from 2006."[96]

However, the OCS-legislated bargaining system covers only one sector of Ontario's construction industry, leaving employers in the others exempt from obligations to contribute to VET. In other provinces, unions and unionized employers have developed voluntary, broader-based bargaining councils, often linked to project agreements. Their scope is limited to the organized sectors, and consequently, they do not have anything like the capacity required to promote the extent of training the industry needs. Except for apprenticeship and in-house training programs by the largest companies for their core workers, the bulk of the industry relies on the public college system – and poaching graduates from union training programs – for its skilled workforce. This approach is quite inadequate and is responsible for the ongoing shortages of skilled workers.

Although unions have been relatively successful in promoting apprenticeships and other elements of workforce training where they have succeeded in organizing employers, current labour legislation in English Canada – still largely based on the 1935 US Wagner model – impedes union expansion, leaving the most vulnerable workers without representation. Aside from denying unorganized workers a voice in shaping the terms and conditions of their employment, it also means that unions are not able to play a larger role in providing VET to them. Unions have campaigned extensively over the years for more favourable legislation. But governments have not been willing to pass laws that would facilitate organizing, with the result that union density in construction has not increased in recent decades.

As Sara Slinn notes, broader-based, or sectoral, bargaining enhances the ability of unions to negotiate better collective agreements and to cover workers currently excluded under existing labour laws.[97] Legislation requiring all employers in major sectors of the industry to co-operate with the corresponding unions in negotiating collective agreements is needed to redress the balance between employers and workers and, in the process, to get employers to support apprenticeships. The criticism that this involves excessive state regulation misses the mark. The state is already deeply involved in regulating labour relations – it is just that its involvement favours one side. The assumption that every worker has the right, in a democratic society, to have their interests represented at the workplace is challenging only if we assume that the norm is no representation unless the employer can be forced to concede it. This effectively precludes the most vulnerable workers with the weakest bargaining position from obtaining union rights. Changes in labour law that would significantly expand unionization would also expand the scope of

96. OCS, *Training Investment*, 15.

97. Slinn, "Broader-Based and Sectoral Bargaining."

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union training programs and contribute significantly in addressing the need to address climate literacy in the workforce.

The Red Seal System: From Barrier to Enabler

Historically, an unintended barrier to implementing climate literacy in construction has been the VET curriculum. Canada's approach to apprenticeship has evolved in response to industry demands for a workforce that can deliver the construction projects that contractors built during a period when climate change, energy conservation, and environmental stewardship were not priorities. The principal goal was to meet the industry's labour-market requirements. This is not to deny that workers themselves had an interest in accessing apprenticeship and having their skills formally certified by the state. However, addressing climate change in the curriculum was not a priority – and not even on the radar screen – until recently.

The curriculum that training facilities across Canada use is largely based on the Red Seal standards for each trade. It is the result of negotiations among provinces and territories, represented by their directors of apprenticeship, construction employers, unions, colleges, and training instructors, facilitated by the federal government. Subcommittees decide what to update in curriculum revisions for each trade every four or five years. The very detailed guidelines in the standards – some over 200 pages long – identify the classroom curriculum that apprentices need to know to pass their national exam.[98] The standards provide the template for what provinces include in their apprenticeship guidelines and thus largely determine the content taught in public colleges and union training centres. The strength of the Red Seal system is that it provides apprentices with a standardized national curriculum built on the knowledge and experience of trades instructors and industry stakeholders from across the country.

However, it also has problems. Trades instructors complain that classroom time in the typical four-year program is insufficient to fully cover the curriculum they believe apprentices should learn. The appropriate balance between classroom study and on-the-job experience has been debated for many years. Unions normally want more in-class time and employers less. The standards are criticized for not being updated frequently enough to address new technology, working practices, and other industry developments. Updates for each trade often take four or five years – more for some – leaving gaps in the curriculum. There are also concerns about whether the Red Seal's multiple-choice exams, which apprentices must pass to gain their ticket, adequately assess an apprentice's performance on the job.

98. The detailed Red Seal standards for each trade are posted on the organization's website (https://www.red-seal.ca/about/pr.4gr.1m-eng.html).

A concern relevant to climate literacy is that the curriculum focuses too narrowly on technical skills and does not adequately cover building science or provide apprentices with an understanding of the relationship among the various elements of a construction project, as discussed earlier in this article. The fact that the classroom component of an apprenticeship is often taught separately for each trade reinforces trade silos because apprentices may only get to work with other trades when they are on job sites – and even then, trades may not interact with one another due to the way work is scheduled. A further problem is that subcontracting often involves trades-specific work, reducing opportunities for interactions on building sites.

The lack of focus on developing a climate-literate workforce is illustrated by the fact that until quite recently, Canada's Red Seal standards said almost nothing about climate change. The standards for each trade, which are available in PDF form on the Red Seal website, average between 100 and 200 densely packed pages, outlining the numerous skills each apprentice must master to pass the final exam. In 2019, the author examined the standards for 32 construction trades to see how often they mentioned fourteen climate-related terms. The cumulative total of references for each term in the entire group was as follows: "climate change" (0), "global warming" (0), "greenhouse gas"/"GHG" (0), "low carbon" (1), "low emission" (2), "green energy" (2), "Energy Star" (3), "energy conservation" (8), "ASHRAE" (41), "energy efficiency" (47), "LEED" (48), "renewable energy" (185), "environmental protection/sustainability" (386), and "environment" (848).

The absence of references to climate change, global warming, or GHG emissions in any of the 32 standards examined was striking. Of course, ignoring climate terms does not mean that apprentices are not learning the knowledge, skills, and competencies required to deliver successful net zero construction. Instead, it indicates that the standards curriculum is not adequately explaining the relationship between applying these skills and achieving climate objectives. Many trades instructors in public colleges and union training facilities have been covering climate change in the classroom. Some unions, such as the BC Insulators, have developed their own climate literacy training modules, which they have been able to deliver because their instructors decided to add this information to the standard classroom curriculum.[99] But the Red Seal curriculum was not assisting them. The issue for most apprentices, anxious to get their Red Seal endorsement, has been whether the exam would include climate change. Without the issue being in the curriculum, instructors had no reason to teach it or apprentices to learn about it.

99. John Calvert and Corinne Tallon, "Promoting Climate Literacy in British Columbia's Apprenticeship System: Evaluating One Union's Efforts to Overcome Attitudinal Barriers to Low Carbon Construction," working paper no. 201, Adapting Canadian Work and Workplaces to Respond to Climate Change, 2017, https://yorkspace.library.yorku.ca/server/api/core/bitstreams/644231cc-da8d-41d4-8c35-ac066ad4cfd2/content.

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In July 2023, the Red Seal Secretariat finally added a major statement on climate change – "Roles and Opportunities for Skilled Trades in a Sustainable Future"[100] – and indicated that this statement will now be added to all the standards. This represents a major step forward for climate literacy in Canada's VET system. The statement recognizes that climate change is now impacting the construction industry significantly and provides examples. It specifically recommends that workers become more climate literate. However, there is still much work to be done to incorporate this perspective into the standards for each trade and, in turn, to update what instructors teach in the classroom. While presumably an oversight, the online summary of the five-year Red Seal strategic plan (2022–2027), by the Canadian Council of Directors of Apprenticeship, has not been modified to reflect its policy change on climate change.[101]

Adding climate change content to the current Red Seal standards faces another challenge: the limited classroom time in apprenticeship programs, as indicated in the Ellis Chart. It is considerably less than in Germany, Belgium, Sweden, or Denmark.[102] Many instructors currently believe they need much more time to cover the full spectrum of what apprentices should learn and wonder how climate literacy can be added to the curriculum. Also, in recent years, new material has been added on occupational health and safety, workplace harassment, equity and diversity, and promoting a healthier and more welcoming workplace. Given the importance of raising climate awareness, the additional technical demands of net zero construction and the need to integrate new climate-relevant material into the curriculum, there is a strong argument for more classroom study. Unions support this, but employers have generally opposed a longer in-class period as disruptive to their labour requirements. The short-term interests of employers conflict with the need for a better-trained, more climate-literate workforce.

Addressing the Performance Gap

THE CURRENT SYSTEM'S FOCUS on employer priorities might not matter if it were delivering environmentally sound construction practices. However, only a very small proportion of Canada's building stock comes close to meeting net zero building standards – a fact that underscores how much work still needs to be done.[103] But the issue is not only that Canada is not building, or renovating, enough buildings to net zero standards. It is also that many buildings

100. Red Seal Secretariat, "Roles and Opportunities for Skilled Trades in a Sustainable Future," 25 July 2023, https://www.red-seal.ca/eng/resources/roles.shtml.

101. Canadian Council of Directors of Apprenticeship, "Strategic Plan 2022–2027," 25 April 2022, https://www.red-seal.ca/eng/about/str.1t.2g.3c.shtml.

102. Clarke et al., *Inclusive Vocational Education and Training.*

103. Haley and Lockhart, *Strengthening Canada's Building Code Process.*

designed to meet low carbon standards fail to achieve their promise. There is extensive research that documents a substantial "performance gap" in net zero construction. This is the gap between the specifications of sustainable buildings, or retrofits, and the energy performance of these buildings once completed. As Diana Ürge-Vorsatz and colleagues noted in their international literature review of pathways to green buildings, "Unfortunately, modelling protocols can result in what is commonly referred to as the performance gap, that is, the difference between modelled building energy performance and actual performance. The performance gap is both substantial and endemic in the design and construction sector, with large datasets showing gaps of 10–30%. Smaller-scale studies have shown performance gaps of 50–250%, and even up to 500%."[104]

Some post-construction assessments have found that new "energy efficient" or LEED-rated buildings perform no better – and sometimes worse – than conventional structures.[105] Various factors contribute to the performance gap, including design assumptions not reflecting on-site conditions, substitution of inferior materials, inappropriate modifications to specifications, and failure to account for key building-occupant behavioural factors that subsequently influence energy use.[106] However, another factor is that construction projects are simply not properly built. This is often due to the standard of workforce training.[107]

In their comprehensive study for the UK government of the performance of similar heat pumps installed in the UK and Germany, Colin Patrick Gleeson and Robert Lowe found that the quality of training was responsible for extremely large performance differences between successful German and

104. Ürge-Vorsatz et al., "Net-Zero Global Building Sector," 233–234.

105. Zero Carbon Hub, *Closing the Gap between Design and As-Built Performance: Evidence Review Report* (London, March 2014), https://www.thefis.org/?td_restrict_media_path_by_role=/wp-content/uploads/2019/03/Closing-the-Gap-Between-Design-and-As-Built-Performance-Evidence-Review-Report.pdf; International Partnerships for Energy Efficient Cooperation (IPEEC), *Building Energy Performance Gap Issues: An International Review* (Paris: OECD/IPEEC, November 2019), https://www.energy.gov.au/sites/default/files/the_building_energy_performance_gap-an_international_review-december_2019.pdf; Pieter J. De Wilde, "Building Performance Gaps: A Commentary," *Academia Letters* (March 2021), doi:10.20935/AL815.

106. Chris van Dronkelaar, Mark Dowson, E. Burman, Catalina Spataru, and Dejan Mumovic, "A Review of the Energy Performance Gap and Its Underlying Causes in Non-Domestic Buildings," *Frontiers in Mechanical Engineering* 1 (2020), doi:10.3389/fmech.2015.00017.

107. Micah Lang, Bud Fraser, Brendan McEwen, and Sean Tynan, "Pipes Need Jackets Too: Improving Performance of BC Buildings through Mechanical Insulation Practice and Standards; A White Paper," Vancouver: International Association of Heat and Frost Insulators and Allied Workers (IAHFIAW) – Local 118, December 2010, https://www.energyconservationspecialists.org/wp-content/uploads/2019/07/White-Paper_Pipes-need-jackets-too.pdf; Colin Patrick Gleeson, "Residential Heat Pump Installations: The Role of Vocational Education and Training," *Building Research and Information* 44, 4 (2016): 394–406, doi:10.1080/09613218.2015.1082701.

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poorly performing UK installations.[108] Worker competency was an important factor in explaining the gap.[109] Efficiency Canada argues that the current workforce "is not adequately equipped to deliver the scale and scope of green building construction and retrofitting that is required to meet Canada's greenhouse gas reduction targets."[110] Similarly, CAGBC maintains that Canada needs to increase "green literacy, or said another way, the ability to understand the broad implications of key building activities on the environment." It goes on to note, "The threshold for mistakes in high-performing buildings is slim and demands a higher level of sophistication and precision for the entire project team."[111]

Improving workforce competencies will not eliminate the performance gap entirely. But on many projects, the quality of on-site work can make a major difference if workers are aware of how construction quality can improve climate performance and are motivated to achieve this on the job.

Policies to Promote the Shift to Net Zero in the Industry

THE LINK BETWEEN RAISING building performance standards and developing a more climate-literate workforce is clear. Higher standards force contractors to improve the quality of their projects. This requires them to employ a workforce capable of implementing the standards. But these workers need to be trained, so the VET system must provide that training. If governments fail to raise – and enforce – higher standards, there will be no call for corresponding changes in workforce competencies and no demand for more workers graduating from VET programs that teach the relevant climate knowledge, skills, and competencies. Governments need to recognize the relationship between standards, workforce competencies, and VET.

In a federal state with powers divided among various levels of government, no single public policy can fully address the challenges of promoting a climate-literate workforce. However, federal, provincial and territorial, and municipal governments have numerous policy tools available to them. Some involve regulatory changes such as more stringent building and energy codes. Some use public procurement. Some use subsidies and targeted public funding. Some involve changing the content of the Red Seal curriculum. And some deal with the labour relations system within which workers, contractors, and unions

108. Colin Patrick Gleeson and Robert Lowe, "Meta-Analysis of European Heat Pump Field Trial Efficiencies," *Energy and Buildings* 66 (November 2013): 637–647.

109. Clarke, Gleeson, and Winch, "What Kind of Expertise."

110. Efficiency Canada and CAGBC, "Workforce Requirements for Low-Carbon Buildings," infographic, n.d., 1, accessed 28 June 2024, https://www.efficiencycanada.org/wp-content/uploads/2021/11/Workforce-Development-Placemat-Final.pdf.

111. CAGBC, *Trading Up*, 6.

operate. The following discussion examines options that can lay the groundwork for improving workforce climate literacy.

Stronger building and energy codes are essential to improving the industry's climate performance and to creating the demand for higher competency standards and workforce training requirements. There has been some progress. The federal government has been working with provincial/territorial governments, unions, employers, and other industry stakeholders to update the national building and energy codes. However, the 2020 codes are only now being introduced by provinces, a pace of change that does not reflect the urgency of the climate crisis.[112] BC provides a positive example of how to accelerate this process. The province has adopted the BC Energy Step Code, which gives credits for implementing standards above current building code requirements, to provide an incentive to meet these higher standards.[113] The purpose is to demonstrate the feasibility of these standards and to prepare industry for future code changes. The city of Vancouver has a schedule and timelines for higher building performance standards. Recognizing that additional training will be required for workers to implement the higher standards, the city has partnered with the British Columbia Institute of Technology (BCIT) to provide trades upgrade training. Toronto has been following a similar pathway. These examples illustrate how government policies can stimulate changes to industry practice, including linking higher standards with additional workforce training.

Mandatory building energy performance standards for new and existing buildings are another regulatory tool, and something that Efficiency Canada and other organizations have long been advocating.[114] These require the introduction of comprehensive energy audits that indicate energy sources and consumption, GHG emissions, and comparisons with industry benchmarks. Posting audit results prominently on buildings can provide building owners, purchasers, and renters with essential information on building performance. Audits also have public educational value. The EU has required performance standards coupled with audits and energy performance certificates for over

112. Haley and Lockhart, *Strengthening Canada's Building Code Process*; Canadian Environmental Law Association (CELA), *Recommendations for Municipalities: Mandatory Building Performance Standards* (Toronto: The Atmospheric Fund, October 2023), https://taf.ca/publications/mandatory-building-performance-standards/.

113. Evoke Sustainable Building Solutions, "BC Energy Step Code Metrics Report Update," submitted to Building Safety and Standards Branch, Ministry of Attorney General and Minister Responsible for Housing, BC, 29 September 2022, https://energystepcode.ca/app/uploads/sites/257/2022/10/BC-Energy-Step-Code_Metrics-Report_2022-09-29-R1-Compressed.pdf.

114. Andrew Pride, *Tiered Energy Codes: Best Practices for Code Compliance* (Ottawa: Efficiency Canada, September 2020), https://www.efficiencycanada.org/report-tiered-energy-codes-best-practices-for-code-compliance/; Gaede et al., *2022 Canadian Energy Efficiency Scorecard*.

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a decade.[115] The city of Vancouver provides an encouraging example of this approach in Canada. Starting in 2024, it requires large commercial owners to audit their buildings and implement retrofits to meet targets.[116]

Tougher regulations and building codes need rigorous enforcement. But enforcement costs money.[117] It also requires more well-trained building inspectors conducting more inspections. Influenced by neoliberal low tax policies, provinces and municipalities spend too little to enforce existing codes, a practice that suits many contractors who prefer minimal government oversight of their projects. Provinces, territories, and municipalities also need to budget for the future costs of regulating the much more stringent standards that net zero requires. Strict code enforcement ensures a level playing field, reducing the competitive advantages gained by contractors who cut corners. Higher standards, properly enforced, will also push up the quality of construction work.[118]

Another policy tool is public procurement. US President Biden's *Inflation Reduction Act* (IRA) provides one example. It uses federal construction purchasing and tax incentives to promote progressive environmental, labour, and community benefits. The IRA's goal is to "create good-paying union jobs that will help reduce emissions across every sector of our economy."[119] Canadian governments can raise building performance by specifying higher climate standards in contract tenders. They can link these to workforce development by requiring bidders to employ qualified Red Seal workers, include apprenticeship ratios, meet prevailing wage rates, and employ a more diverse workforce.

The federal government took a small step in this direction in its spring 2023 budget by offering employment tax credits to companies that offer 10 per cent of the resulting jobs to apprentices.[120] In principle, this is a positive step. But tax credits are a very blunt policy implement and can encourage free riders.

115. Sheikh Zuhaib, Senta Schmatzberger, Jonathan Volt, Zsolt Toth, Lukas Kranzl, Iná Eugenio Noronha Maia, Jan Verheyen, et al., "Next-Generation Energy Performance Certificates: End-User Needs and Expectations," *Energy Policy* 161 (February 2022): Article 112723, doi:10.1016/j.enpol.2021.112723.

116. City of Vancouver, By-Law No. 13472.

117. Edward Vine, Alison Williams, and Sarah Price, "The Cost of Enforcing Energy Codes: An Examination of Traditional and Alternative Enforcement Processes," *Energy Efficiency* 10 (2017): 717–718.

118. Toronto Auditor General, "Toronto Building – Improving the Quality of Building Inspections," Auditor General's Report, Toronto, 2 December 2013, https://www.toronto.ca/legdocs/mmis/2014/au/bgrd/backgroundfile-67006.pdf.

119. United States, The White House, "Fact Sheet: The Inflation Reduction Act Supports Workers and Families," Washington, DC, 19 August 2022, https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/19/fact-sheet-the-inflation-reduction-act-supports-workers-and-families/.

120. Canada, *Budget 2023: A Made-in-Canada Plan* (Ottawa, 2023), https://budget.canada.ca/2023/pdf/budget-2023-en.pdf.

Without high apprenticeship standards, the benefits may be marginal, particularly if the program relies on self-reporting by corporations instead of tough public auditing requirements. Another procurement policy, pre-approved supplier lists, can also raise standards by requiring companies bidding on public construction to provide evidence of their ability to meet climate and workforce training objectives as a condition of submitting bids.

Community Benefits Agreements

Community benefits agreements (CBAs), as the name implies, are a vehicle for delivering local jobs, training, equity employment, union wages, community amenities, and support for locally owned businesses. Some CBAs have also attempted to include climate and environmental components. CBAs normally involve community coalitions – often with labour's support – who pressure project developers to include some, or all, of the preceding benefits in their construction contracts. Their leverage on private developers comes from influencing public officials to impose conditions on project approvals. Their leverage on public projects comes through campaigning to persuade governments to include benefits in the procurement contracts awarded to construction firms.[121]

A key objective of CBAs has been to promote local employment, workforce training, and apprenticeships. Their success in achieving this goal depends on numerous factors, including the nature of the project, the power of community coalitions, union support, and the willingness of project proponents and governments to include employment equity, training, and local jobs for members of historically disadvantaged groups in construction projects. Some have also attempted to include climate and environmental considerations. An extensive literature examines the large variety of different CBAs that have been adopted across the US and Canada in recent years. Some appear to have

121. Dina Graser, *Community Benefits in Practice and in Policy: Lessons from the United States and the United Kingdom* (Toronto: Atkinson Foundation, September 2016), https://ccednet-rcdec.ca/resource/community-benefits-in-practice-and-in-policy-lessons-from-the-united-states-and-the-united-kingdom/; Armine Yalnizyan, *Community Benefits Agreements: Empowering Communities to Maximize Returns on Public Infrastructure Investments* (Ottawa: Institute of Fiscal Studies and Democracy, Summer 2017), http://www.ifsd.ca/web/default/files/Presentations/Reports/17011%20-%20Community%20Benefits%20Agreements%20-%2017%20July%202017.pdf; Amy Krings and Hillary Thomas, "Integrating Green Social Work and the US Environmental Justice Movement: An Introduction to Community Benefits Agreements," in Lena Dominelli, ed., *The Routledge Handbook of Green Social Work* (New York: Routledge, 2018), chap. 32; Blueprint Analytics, Design, Evaluation, "Community Benefits as a Strategy for Economic Inclusion in Ontario: The Eglinton Crosstown LRT Story (So Far)," slide presentation, Atkinson Foundation, Toronto, April 2018, https://atkinsonfoundation.ca/wp-content/uploads/2018/02/Eglinton-Crosstown-Story-so-far_April-2018.pdf; Albert Flootman, "A Framework for Implementing Community Benefits Agreements," (Hamilton, Ontario: Cardus Research, 2022), https://www.cardus.ca/research/work-economics/reports/a-framework-for-implementing-community-benefits-agreements/.

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made progress in achieving the goals noted above, although the significance of these achievements remains a matter of controversy.[122] In his review of the effectiveness of CBAs, James Nugent concludes that these agreements "risk producing a negotiated form of neoliberalism and gentrification that trades off gains for some marginalized groups only at the expense of others."[123] It is not the purpose of this article to provide an assessment of the successes and limitations of conventional CBAs, as this ground has been well trodden by other researchers, including in this publication.

However, there is a particular CBA model that does merit attention, both because it is unique and because it provides a concrete example of how governments can address many of the training and employment issues the industry currently faces. Of relevance to the theme of this article, the model is now being used to introduce climate literacy modules into the workplace orientation program for construction workers on public construction projects valued at over $500 million in BC. These include major bridges, twinning of the Trans-Canada Highway, the Vancouver Skytrain extension, several new hospitals, and the expansions of BCIT and Vancouver Community College.[124] The government's goal is to extend this to future capital projects as they are approved. What distinguishes this model is that it makes the government, through a recently established Crown corporation, BC Infrastructure Benefits (BCIB), the employer of all the construction trades workers on these building sites. This has been done through procurement contracts that require private contractors to purchase their labour from BCIB. Contractors still supervise the workers on their sites. They have the right to ask BCIB to hire some of the core employees they normally use on other projects. But they are no longer the employer of these, or other, workers they supervise.

The origins of this approach go back to the Vancouver Island Highway project the NDP government implemented during the 1990s. It successfully integrated local hire, training, and employment equity on a $1.3 billion capital

122. Nicholas Marantz, "What Do Community Benefits Agreements Deliver? Evidence from Los Angeles," *Journal of the American Planning Association* 81, 4 (2015): 251–267, doi:10.1080/01944363.2015.1092093; Yalnizyan, *Community Benefits Agreements*; Madeline Streiff Buitgelaar, "Cui Bono? Assessing Community Engagement in San Francisco Community Benefits Agreements," *Societies* 9, 1 (2019): Article 25, doi:10.3390/soc9010025; Anastasia Abrazhevich, "Community Benefit Agreements: A Framework for Participation in Toronto's Future Development," MA thesis, York University, 2020, https://yorkspace.library.yorku.ca/items/27c0cd04-2c98-451b-a804-2d24ecb75fc0; Bill Farley, "Disrupting the Knowledge and Power Imbalance in Community Benefits Agreement Negotiations: Lessons from the Aggie Square Development in Sacramento, California," *Journal of Urban Affairs* (advance online publication 30 January 2023), doi:10.1080/07352166.2022.2155527.

123. James Nugent, "The Right to Build the City: Can Community Benefits Agreements Bring Employment Equity to the Construction Sector?," *Labour/Le Travail*, no. 80 (Fall 2017): 84.

124. Community Savings Credit Union (CSCU), *Building a Better BC: Social and Economic Impact of the Community Benefits Agreement* (Surrey, BC: CSCU, 2021), https://www.buildingabetterbc.ca/.

project that was completed on time and on budget.[125] The approach was dismantled after the BC Liberal government was elected in 2001 because it had resulted in the unionization of the entire construction trades workforce on the project, a development that Liberal Premier Gordon Campbell strongly opposed. However, it was relaunched by the NDP government of Premier John Horgan in 2018.

BCIB is now the second-largest employer of workers on ICI projects in the province. As the employer, it is mandated to implement the government's ambitious apprenticeship, training, and employment targets for Indigenous workers, women, racialized minorities, and people with disabilities.[126] BCIB has negotiated a blanket collective agreement with the Allied Infrastructure and Related Construction Council representing nineteen building trades unions.[127] It requires new employees to join the appropriate union within 30 days of starting work. This ensures that all workers on its sites receive the same wages and benefits for their classification, guaranteeing pay equity. Article 9 of the agreement gives BCIB the ability to hire and dispatch workers to its various building sites according to a detailed priority hiring formula. Significantly, it prioritizes employing qualified members of equity groups and local residents. As the employer, BCIB also has responsibility for supervising apprenticeships on its building sites, which it does in co-operation with the unions. This enables it to link the on-the-job experience of apprentices with what they are learning in the classroom in their programs. Because success in promoting apprenticeships is one of its performance metrics, BCIB encourages apprentices to return to the classroom each year to fulfill this component of their training.

Central to BCIB's approach is its extensive employee data system. Prospective and current employees self-identify if they are members of an equity group. Once on BCIB's payroll, they can be tracked according to various criteria, including classification, equity status, contractors to whom they have been assigned, local residency, earnings, and hours worked. The hours worked are

125. Marjorie Griffin Cohen and Kate Braid, "Training and Equity Initiatives on the British Columbia Vancouver Island Highway Project: A Model for Large-Scale Construction Projects," *Labour Studies Journal* 25, 3 (Fall 2000): 70–103; John Calvert and Blair Redlin, "Advancing Public Policy Objectives through Collective Agreements: The Project Agreement Model for Public Construction in British Columbia's Transportation Sector," *Just Labour* 2 (Spring 2003), doi:10.25071/1705-1436.171; John Calvert, "Women's Employment on the Vancouver Island Highway Project," *Construction Labour Research News,* European Institute for Construction Labour Research 3, Brussels: 2015, http://www.clr-news.org/.

126. Selina Robinson (BC Minister of Finance) to David Miller (chair of BCIB), mandate letter, 19 May 2021, https://www2.gov.bc.ca/assets/gov/british-columbians-our-governments/organizational-structure/crown-corporations/mandate-letters/bc_infrastructure_benefits.pdf.

127. Allied Infrastructure and Related Construction Council of British Columbia (AIRCC) and BC Infrastructure Benefits Inc. (BCIB), *Community Benefits Agreement*, 17 July 2018, revised 1 March 2022, https://www.bcib.ca/wp-content/uploads/2023/05/Amended-and-Restated-Community-Benefits-Agreement-March-1-2022-Fully-Executed.pdf.

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particularly important in measuring employment equity progress in construction. Being assigned to job sites may not accurately measure the amount of work – and income – workers receive. BCIB tracks all of this. The extent and quality of the equity data it collects is far greater than anything else in construction in Canada.

Since its establishment in 2018, BCIB has made considerable progress. Indigenous employment in the provincial construction industry averages 6.2 per cent, according to Statistics Canada's 2021 construction employment survey.[128] On BCIB sites, 15 per cent of workers are Indigenous, and they have received 14 per cent of all paid hours. While women comprise 4.1 per cent of on-site construction workers in British Columbia, BCIB projects are employing over 9 per cent, and women have worked 10 per cent of total paid hours. Apprentices now account for 13 per cent of journeyworker hours, and BCIB's goal is 25 per cent.[129] The collective agreement enables BCIB to continue to give hiring priority to equity group members, including transferring them to its other work sites as jobs become available, preventing the "last hired, first fired" experience that many equity workers experience on other projects. This provides continuity of employment, laying the foundation for a career in the industry while ensuring that apprentices obtain the working hours needed to progress through their programs.

BCIB recognizes that many worksites are toxic, which is why so many members of underrepresented groups do not stay in the industry. Consequently, it has developed programs to improve the workplace culture to make it more welcoming for all workers. Under its Respectful Onsite Initiative (ROI) suite of courses, every new worker on BCIB projects must take Indigenous cultural competency training. This is designed to promote inclusive, respectful, and diverse workplaces. Its "History Matters" course covers the long period of discrimination and racism against Indigenous people in BC and outlines the need for reconciliation. Another course, "Justice, Equity, Diversity and Inclusion" (JEDI), is designed to signal that workplaces must be welcoming to all workers that BCIB dispatches and that there is no place for sexism and racism on its building sites. The two-day ROI program is delivered to small groups of workers as they join BCIB projects and is presented by experienced trainers, including Indigenous Elders. Using modules developed as part of the CBTU's Building It Green initiative, BCIB has recently added climate literacy modules into its

128. As cited in BuildForce Canada, "Construction and Maintenance Industry, British Columbia Highlights," Ottawa, March 2024, p. 32, https://www.buildforce.ca/en/lmi/forecast-summary-reports.

129. BCIB, "2023/24–2025/26 Service Plan," Vancouver, February 2023, https://bcib.ca/wp-content/uploads/2023/05/BCIB-Service-Plan-2023-26-FINAL.pdf. Some data has been updated through BCIB's response to the author's requests, 20 February 2024.

ROI orientation program – an addition that reflects the province's directive to support its climate change policies.

Initially, many contractors questioned the idea of the government becoming the employer and choosing workers to send to their work sites, although there was a precedent on the Vancouver Island Highway project. BCIB has taken steps to ensure that the workers it dispatches are fully qualified. It is aware that if they are not, the credibility of the initiative will be undermined, and co-operative relations with its contractors will not be possible. Thus far, its track record with contractors on the projects it has completed has been positive. Another issue was that unorganized contractors mistakenly thought they would be forced to unionize. But they are not the employers, so it is not an issue. Contractors were also hesitant about allocating time to the two-day ROI program. However, since its establishment, many have seen an improvement in the worksite culture on their sites.[130] According to BCIB, "After our first infrastructure project wrapped, the contractor approached BCIB asking whether they could offer ROI to their workers on non-BCIB projects. Since then, we have delivered the Respectful Onsite Initiative training to municipal departments, Crown corporations, private businesses and others because this training makes a difference."[131]

While the construction unions have supported the province's decision to establish BCIB, the initiative has been primarily a result of government policy.[132] The government wanted to use public construction procurement to implement its local employment, training, equity, and economic development priorities. Former Premier Horgan also had a personal commitment to the approach, seeing it as part of what he wanted to achieve in government. BCIB's establishment was not without controversy. Its continued functioning has required the government to resist substantial pressure from a hostile media, non-union contractors, BC's business community, and the main opposition political party.[133] Its future will likely depend on whether the current

130. For details of the ROI initiative, see "Respectful Onsite Initiative," BCIB website, n.d., accessed 27 March 2024, https://bcib.ca/respectful-onsite-initiative/.

131. "Bring ROI Training to Your Organization," BCIB website, n.d., accessed 27 March 2024, https://bcib.ca/respectful-onsite-initiative/get-roi/.

132. Gerhard Bosch and Claudia Weinkopf, "Reducing Wage Inequality: The Role of the State in Improving Job Quality," *Work and Occupations* 44, 1 (2017): 68–88.

133. Charlie Smith, "Constitutional Challenge Launched against NDP Government for Reserving Public Construction for Building Trades Unions," *Georgia Straight*, 27 August 2018, https://www.straight.com/news/1122061/constitutional-challenge-launched-against-ndp-government-reserving-public-construction; Jim Oostenbrink, "Sick of the ICBC? Ever Heard of the New BCIB?," Christian Labour Association of Canada blog, 6 January 2020, https://www.clac.ca/Your-voice/sick-of-the-icbc-ever-heard-of-the-new-bcib; BC Chamber of Commerce, "Maximizing Taxpayer Dollars on Public Infrastructure Projects and Defending the Rights of BC Companies and Workers," Vancouver, 2002, https://bcchamber.org/policy-search/maximizing-taxpayer-dollars-public-infrastructure-projects-and-defending-rights-bc.

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government is re-elected in 2024 and whether it remains committed to the model. If BCIB survives, it may provide a model that other provincial governments across the country could adopt.

Other Regulatory Policy Tools

Registration of all construction contractors and workers is another policy tool to facilitate a more climate-literate workforce. If you do not know who is working in the industry, how do you provide training? Outside Québec, anyone – contractor or self-employed – can take a job on many construction sites, regardless of whether they have had any training or are aware of the health, safety, and environmental impacts of construction work, except if there is a legal requirement for a compulsory trade or a requirement to have gas or electrical qualification.[134] Provincial governments do not have a comprehensive system for identifying and tracking construction workers. Data on contractors and workers is located in many different federal and provincial databases, including those tracking income tax, GST/PST, EI, CPP, WCB, provincial health registries, apprenticeship and journeyworker certifications, and business registration files. These databases are not linked. Registration is a requirement in most of Europe and Québec. Contractor and worker registration has been a valuable tool for Québec in workforce planning and in reducing the extent of the underground economy, while ensuring that workers are paid according to the relevant sectoral collective agreement.

Another regulatory tool that provincial governments can use to raise industry training standards is expanding the number of compulsory trades. By designating a trade as "compulsory," provinces indicate that only those with the appropriate training can perform the work. This is a way to ensure that it will be done properly, for reasons of public safety and consumer protection. Compulsory trades have a higher apprentice completion rate than voluntary trades because they more clearly link qualifications to expanded employment opportunities.[135] This strengthens the incentive for workers to take formal training. It is notable that among its recommendations on ways to raise construction quality in Ontario, the CAGBC recommended that the government should "consider increasing the number of compulsory construction apprenticeships."[136]

Making trades compulsory also facilitates unionization. Union density is higher in compulsory trades, and prospective apprentices know that they are

134. Provincial workers' compensation boards do have a significant amount of information submitted by employers about employees for whom they are contributing, but many in the underground economy evade registration. Regardless, the data is not linked to a wider system to track the training and equity status of all construction workers.

135. OCS, *Training Investment*; Jin et al., "Factors Associated with the Completion."

136. CAGBC, *Trading Up*, 41.

more likely to have steady work if they opt for a compulsory trade. Unions are significant providers of the classroom component of apprenticeship and attract workers wanting to learn a trade linked to future employment. When awarding public funding for training, provinces normally require union-managed facilities to accept a quota of apprentices who are not union members. The experience of studying in union training centres encourages these apprentices to join a union. Additionally, unions are strong advocates of the occupational identity and pride that is part and parcel of being a qualified journeyworker.

As earlier noted, in Canada's LME approach to construction, employer priorities play the dominant role in shaping the apprenticeship and training system. The current rationale for providing VET programs is largely instrumental: meeting employers' labour requirements. The industry's impact on workers is a secondary consideration, as is the interests of workers themselves. The primary purpose of VET is making workers employable so that they can fill whatever jobs the industry makes available. While it is obviously important to have a job instead of being unemployed, this narrative ignores the quality of jobs and the interests of workers in having jobs that provide opportunities for growth, exercise of agency, and a sense of accomplishment from implementing skills, solving workplace problems, or constructing something that is perceived to be of value. While not every job can provide these attributes in full, most can be improved. Creating decent jobs and reducing workforce precarity for the construction workforce, including independent operators and workers in the underground economy, are legitimate public policy objectives. Construction workers are entitled to employment security and pathways to long-term, stable careers in construction.[137]

This means designing the VET curriculum to expand workers' knowledge of the construction process and their role within it. It means including problem solving, teamwork, collaboration, and an understanding of the principles of building science and their application to net zero construction practice.[138] It means promoting workers' occupational identity and the expectation that they will have a lifelong career in the construction industry, not just a series of precarious jobs based on a narrow range of skills that limit employment options.[139] The notion of improving "job quality" needs to be an integral part of the way construction work is organized. It is also a way to encourage workers to join, and stay in, the industry.[140] This is the opposite of the simple,

137. Bosch and Weinkopf, "Reducing Wage Inequality."

138. Shane MacInnes and M-C MacPhee, *Workforce 2030: Rapid Upskilling for Green Building: LEC Tradelinx Curriculum Audit* (Endeavour Centre, June 2021).

139. Bonnie Watt-Malcolm and Antje Barabasch, "Tensions in the Canadian Apprenticeship Sector: Rethinking Bourdieu's Analysis of Habitus, Field and Capital," *Research in Comparative and International Education* 5, 3 (2010): 289–301, doi:10.2304/rcie.2010.5.3.289.

140. Patricia Findlay, Chris Warhurst, Ewart Keep, and Caroline Lloyd, "Opportunity Knocks? The Possibilities and Levers for Improving Job Quality," *Work and Occupations* 44, 1 (2017):

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task-specific approach characteristic of Taylorist methods of training and work organization, which ignores its impact on workers and focuses instead on how the VET system can meet industry demands for low-cost labour while minimizing employers' training obligations.

An example of Taylorist reorganization of work is illustrated in the way in which industry and governments are promoting microcredentials as a key solution to labour shortages. When detached from a broader focus on providing workers with a career in the industry – not just a narrow, short-term job – microcredentials can be a vehicle for deskilling the workforce.[141] Microcredentials are attractive to employers and governments. They offer a "quick fix" for immediate workforce shortages and require far less investment in VET. They are also appealing to colleges and other training institutions because they bring in public and student revenue, based on enrolment, course duration, and type of training involved. A major problem with microcredentials is that they are largely unregulated, and there has been a confusing proliferation of different credentials based on varying levels of training duration and quality, offered by a mix of public, private, and non-profit organizations, making it very difficult for many workers to know how to assess their value. This uncertainty reflects a huge gap in the construction regulatory system.

Clearly, some types of microcredentials have a place in the overall VET system and can provide opportunities for learning some of the skills needed in construction, particularly when they are conceptualized as a ladder eventually leading to a trades qualification. They are also valuable for journeyworkers who want to upgrade their skills or learn new technologies being introduced to their trade. But microcredentials are not the solution to addressing construction labour shortages. When detached from providing workers with a career in the industry, they can mislead them about the value of the certificates for future employability. Instead of short-term fixes, government policy should focus on providing pathways to long-term employment based on a well-rounded apprenticeship program.

Lessons from Québec

THE CURRENT LABOUR RELATIONS system in English Canada makes it quite difficult for most construction workers to unionize. As noted, only a quarter of the workforce belongs to unions. Barriers to organizing are well documented in the industrial relations literature, as well as in the extensive submissions by unions to labour relations boards and provincial governments, when the latter request their views on labour law reform.[142] These barriers include employer

3–22.

141. Braverman, *Labor and Monopoly Capital*.

142. See, for example, the campaigns by the Independent Contractors and Business Associations in BC (https://icba.ca/about/) and Alberta (https://icbaalberta.ca/) and similar

challenges to certification, difficulty in getting a first agreement, challenges in organizing very small employers, the prevalence of subcontracting and bogus self-employment, the large underground economy, the precarious employment patterns associated with project-based jobs, the limited number of compulsory trades, and the hostility of many employers who actively oppose union organizing campaigns and often victimize union organizers.

In contrast, Québec's workforce is highly unionized, as a result of the province's very different – and extensively regulated – labour relations system, based on Act R-20, overseen by the Commission de la construction du Québec (CCQ) and financed by a payroll tax on employers.[143] The foundation of the system lay in the 1930s *Act Respecting Collective Agreement Degrees* based on employment practices imported from Europe.[144] Construction was intensively regulated under this earlier system, and today's approach built on this precedent. VET is delivered in Québec's public education system and managed by the CCQ in consultation with employers and unions. In contrast to the rest of Canada, union or joint employer-union training facilities play little role, being mostly limited to upgrading activities.

Québec construction is not modelled on the US Wagner Act, in which unions are certified through a process of demonstrating majority support in individual workplaces or sectors. Rather, the system makes it mandatory for every worker to join a union. The key issue is which union they will join. On registration, workers indicate their union preference. Every four years, the CCQ oversees a vote in the different construction sectors to determine which of the five major union centrals will lead negotiations with employers. Workers can switch unions at this time. Québec also regulates the sectors in which workers are employed and imposes some geographic restrictions on where workers can seek employment.

Québec requires that construction workers registering with the CCQ obtain an occupational competency certificate as a condition of working in the industry. In addition, workers must complete a 30-hour course on health and safety. The CCQ collects extensive information on the kinds of construction work that contractors perform as well as the size of their workforces, the location of their projects, and details on the workers they employ, including occupation and union membership, hours, and payroll data. Employers must file monthly reports providing this information. Provincial inspectors are empowered to

open-shop organizations in other provinces; Tufts and Thomas, "Christian Labour Association of Canada"; Charles Smith and Andrew Stevens, "The Architecture of Modern Anti-unionism in Canada: Class Struggle and the Erosion of Worker's Collective Freedom," *Capital and Class* 43, 3 (2018): 459–481.

143. A description (in French) of the CCQ's history, legislative authority, and functions can be found on its website, https://www.ccq.org/fr-CA/En-tete/qui-sommes-nous.

144. Jean Charest, "Labour Market Regulation and Labour Relations in the Construction Industry: The Special Case of Quebec within the Canadian Context," in Bosch and Philips, eds., *Building Chaos*, chap. 5.

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visit work sites to check that contractors and workers are properly registered. They also have the right to open an employer's books to confirm that the statutory requirements and the collectively bargained terms of employment are being met.[145]

There are gaps in the system. It excludes construction by public bodies, including Québec Hydro, for example, but this is covered by other regulations. Some contractors, or individual workers, engaged in small-scale residential renovations (e.g. replacing roofs, painting homes, renovating kitchens) are excluded from the regulations. However, this work is not a major part of the industry, and most residential workers are covered when working on new construction. As a result, Québec has a smaller "underground" economy, comparatively, and is relatively more successful in addressing tax evasion. The CCQ and the unions can track most of those working in construction, ensuring that collective agreements are honoured.

Because it has detailed information about the workforce and oversees the province's apprenticeship programs, Québec has considerably better regulatory capacity than other provinces to deliver net zero construction training for the entire workforce. Québec illustrates that public policy, as reflected in labour law, matters when it comes to unionization. The legislated framework also provides a VET system capable of delivering information on climate change. However, Québec is similar to other provinces in one respect: research carried out as part of the CBTU's Building It Green program indicates that, to date, the CCQ has not included significant climate change content in its curriculum. It has the tools, but it is not yet using them.[146]

The Importance of a Well-Qualified, Climate-Literate Workforce

THE VOLUME OF NEW WORK required to meet climate targets, the higher competency standards for net zero construction, and the corresponding need to train more workers all underscore why governments must invest much more in VET. It is the trades workforce that performs much of the work on construction sites. The knowledge, skills, and competencies of electricians, plumbers, operating engineers, carpenters, ironworkers, finishing trades, construction labourers, and others are essential for successful low carbon construction.

To these essential technical skills must be added the commitment of construction workers to achieving climate objectives. Most construction workers take pride in doing a job well. Providing them with the knowledge of how their

145. Pier-Luc Bilodeau, professor of Industrial Relations, Laval University, personal email communication, 16 January 2024.

146. Pier-Luc Bilodeau and Evelyn Dionne, "Advancing Climate Literacy in Union Vocational Education and Training Programs in in Quebec: Analysis, Findings and Lessons Learned," Climate and Industry Research Team (CIRT) report, December 2023, https://buildingtrades.ca/wp-content/uploads/2022/04/CIRT-Quebec-Report.pdf.

work addresses climate change and improves the environment can significantly motivate workers to do the work properly and be a source of accomplishment and personal satisfaction. Understanding that high-performance construction results in buildings and infrastructure that is safer, healthier, more affordable to maintain, and more comfortable for occupants reinforces the importance of doing it right. Knowing that well-constructed buildings lower energy poverty and reduce the adverse health impacts of poorly built housing makes the work worthwhile. A commitment to following best practices can also motivate workers to demand that the projects on which they work are built properly and follow the building and energy codes fully when they are aware of the reasons for the standards.

At almost every stage of the construction process there are choices that impact whether a project fulfills its climate objectives. Workplace culture is an important factor in achieving climate goals. While tradesworkers must follow the specifications of the projects they work on, comply with building contracts, and follow the direction of their immediate supervisors, they still exercise discretion – sometimes quite significant discretion – in how they carry out their jobs. On many work sites, their qualifications enable them to work with little or no supervision. How well they handle the choices they have agency to implement depends on their attitudes, values, and motivations. Where trades understand and support the climate objectives of a project, they are far more likely to make good climate choices. The trades also play a major role in ensuring that projects meet building, energy, fire, and other construction codes. Being part of a team committed to lowering the carbon footprint of building projects and doing work properly can make it easier for everyone to follow best practices.

A good example of what a union can do is the campaign of the New Brunswick Insulators to persuade the province's public schools to carry out energy audits of their HVAC systems. The union realized that the existing buildings were wasting significant amounts of energy as a result of inadequate mechanical insulation of their furnaces, pipes, and ductwork. The contractors employing union members were only interested in work in traditional heavy industry, such as pulp mills and shipyards. They had no interest in refurbishing the insulation in public facilities such as schools. So the Insulators union learned how to do energy audits and offered these free of charge to school districts to demonstrate the potential energy and GHG savings from upgrading their insulation.[147]

The union's calculations of the estimated energy and GHG savings and return on investment – normally less than two years – persuaded school administrators in five of seven New Brunswick school districts and Mount Allison

147. John Calvert, "Just Transition in the Construction Industry: A Union's Campaign to Create Jobs by Promoting Climate Change Upgrades in Buildings," *Alternative Routes: A Journal of Critical Social Research* 33, 1 (2023), https://alternateroutes.ca/index.php/ar/article/view/22548.

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University to do dozens of upgrades, enabling them to cut their energy bills significantly while meeting provincial climate change targets. The new work has also doubled the union's membership and tripled the intake of apprentices. It has also facilitated a just transition from New Brunswick's declining heavy industries into jobs improving public-sector energy efficiency. This initiative illustrates how worker and union awareness of the climate benefits of construction work can advance net zero objectives.[148]

Conclusion

The preceding discussion outlines why Canada's construction industry faces major challenges in delivering climate objectives. To enlist the full capacity of the construction workforce, governments must address its underlying structural problems. Reliance on employer priorities and a free-market approach that eschews regulations and prioritizes low bid over quality is not working. The industry needs a major regulatory overhaul. Tougher building and energy codes, aggressive building energy standards, labelling requirements, comprehensive worker certification, and labour legislation to implement broader-based and sectoral bargaining are measures that can improve the industry's capacity to deliver good climate outcomes. However, enhancing the role of organized labour and, particularly, its ability to deliver VET informed by climate science must also be part of the agenda. Reducing workforce precarity, creating proper jobs for underground workers, and expanding the membership and role of unions are legitimate public policy objectives, as are measures to provide greater employment security and pathways to long-term, stable careers in construction.[149]

As noted, the conventional rationale for VET programs is largely instrumental: meeting the labour requirements of employers. To the extent that governments consider the industry's impact on workers, this is restricted to providing jobs. The impact of work on the lives of apprentices, journeyworkers, and other construction workers should have a central place in shaping the future of the industry. Young people are generally aware of the climate crisis. Explaining the role that construction workers can play in addressing the climate crisis can encourage those looking for work that aligns with their values to consider a career in construction and, in the process, address the pressing shortage of qualified construction workers.[150]

148. Another good example linked to climate literacy is found in the campaign of the BC Insulators Union to alert the industry to its potential role in addressing the climate crisis. John Calvert, "Construction and Climate Change: Overcoming Roadblocks to Achieving 'Green' Workforce Competencies," in Carla Lipsig-Mumm and Stephen McBride, eds., *Work in a Warming World* (Montréal: McGill-Queen's University Press, 2015), chap. 7.

149. Bosch and Weinkopf, "Reducing Wage Inequality."

150. Findlay et al., "Opportunity Knocks?"

Greater climate awareness also raises fundamental issues about the purpose of work and the potential of the industry and its workforce to build a society that incorporates environmental, ecological, social, and equity values. Everyone is affected by climate change, and everyone can benefit from construction measures that mitigate and adapt to its impact. Adding climate literacy components to the trades curriculum provides an opportunity to include Indigenous insights about our relationship to nature and our responsibility to future generations who will be affected by the industry's outputs. It opens the door to incorporating different perspectives on the nature of construction work and the role of building workers in contributing to a more inclusive and just society. It can also facilitate discussions about how the industry can be more representative of Canada's diverse population, in part by addressing discrimination against women, Indigenous people, and racial minorities at the workplace and as people living and working in the buildings and infrastructure the industry constructs. Introducing climate literacy into the trades curriculum will not fundamentally change the industry. But it can contribute to advancing an agenda that promotes the needed transformation.

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