Advancing Climate Literacy in Union Vocational Education and Training Programs in English Canada, Quebec, Europe and the US: Analysis, Findings and Lessons Learned

Appendix 4:
The Research Approach Adopted to Determine the Content of the Proposed Climate Literacy Curriculum:

Climate and Industry Research Team (CIRT)

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Using Padlet Software to Organize the Research for Identifying the Components of the Climate Literacy Curriculum

Access to Padlet can be obtained by emailing John Calvert at jrc@sfu.ca:

Introduction and Outline of the Research Challenge

One of the tasks of the Climate and Industry Research Team (CIRT) has been to consider what could be included about climate literacy in the training material provided to instructors, apprentices and working trades. We looked at examples from programs in Canada, the US and Europe as part of our research and found a great deal of material, some through our interviews and some through examining the written curriculum guides being used in various training facilities. Much of this information has been shared with Skillplan and SRDC to assist them in their work of developing appropriate curricula and determining how to measure its impact. However, a more specific challenge was to decide what elements of climate science relevant to the construction industry and its workforce could be included in the content of training modules for the industry. As members of the Advisory Committee may be interested in the process CIRT followed, we have put together this account of how we proceeded.

Initially, we felt that there were two components for the curriculum content we needed to develop. The first was to provide the training programs with a broad overview of what the science on climate change is telling us, an approach that would be applicable to all construction trades. This involves providing information on how global temperatures have been increasing and what effects the increase is having on our society. Climate change is profoundly affecting our economy, the construction industry, and its workforce. A clear understanding of what is happening to the climate is the foundation for what needs to be taught in the climate literacy component of the curriculum. But climate change is also affecting the building industry in numerous ways. Government policy is responding to it, resulting in more stringent building codes and public pressure for more energy efficient, lower carbon buildings. Policy is changing the nature of what the industry now delivers and how it does this. In response, the building industry has the opportunity to make a major contribution to achieving Canada's climate objectives, a fact that makes training on climate literacy particularly relevant to the construction workforce. Industry and its workers can – and should – be part of the solution, a perspective that, arguably, needs much greater public awareness as well as providing the workforce with a sense of the importance of its contribution to this process.

The second component of the curriculum content involves providing more specific information designed to reveal how each trade is being affected by climate change and, more importantly, how each trades workforce can make a positive contribution to meeting Canada's climate goals.

This component involves analyzing the work of each trade to identify the knowledge, skills and attitudes that are conducive to implementing green working practices. This is an exercise that requires working with trades' specialists in each individual trade, drawing upon their expertise and understanding of what their trade does on the job site and hence how it can contribute to a low carbon future.

Our focus has been on the first component, that is, developing the foundational information about climate change that could be taught to all trades. Drawing on our interviews and our literature review, our CIRT team decided that there were nine subject areas that the curriculum should cover. We called them chapters and gave each of these nine subject areas a working title. (They will be discussed in more detail later in this document.) The process involved considerable interaction on Zoom within CIRT over several months to arrive at the nine chapters and then decide what should be included in each. As our discussions evolved, we added, or modified, the content and issues covered in each chapter.

An important consideration was to ensure that the material we identified could be readily accessed by Skillplan in its task of building the actual curriculum modules. This meant including URL links that would provide curriculum developers with easy internet access for the various issues covered in each chapter. We did not want the chapters to be simply a listing of academic articles but rather an accessible collection of research material from a variety of credible sources that could be readily found simply by connecting with the URLs provided. We thought that this might also provide a resource for future work on climate literacy issues by others with access to our material.

As a team, we needed to have a process whereby we could work together and contribute to a document that would reflect our joint consensus on what to include on climate literacy in a trade's curriculum – a process which would allow each team member to add or comment on a shared working text based on their knowledge and experience in researching low carbon construction issues. The solution we found was to use a software package called Padlet. This package is designed to enable multiple contributors to edit a shared document. We then created a document in which we included the nine chapters, each focusing on a particular aspect of how climate change was impacting society, the construction industry, and its workforce. While all team members contributed to each chapter, individuals took responsibility for chapters where they had appropriate knowledge or expertise.

The content of this Padlet template was primarily concerned with knowledge about climate science and its impact on the construction industry. To be clear, it was not intended to focus, significantly, on the specific workplace know-how of individual trades. It was thus not directly concerned with technical or theoretical knowledge related to each individual trade's skill set (like knowledge of installing heat pumps or learning electrical theory). As noted, the latter would be

addressed in developing the individual trades' specific curriculum through detailed consultation with trades specialists in a subsequent process. Rather, our work focused on developing the foundational content required to create a broader awareness of climate change. Additionally, our aim was to present the material on climate science in such a way that subsequently it could be readily integrated into the know-how and skills elements of the curriculum for individual trades, such as found in the Red Seal Standards.

In addition to providing an overview of the science and its impacts, the climate foundation Padlet template covers issues such as: basic principles of low carbon construction; understanding the interrelatedness of all elements of a project; recognizing the value of teamwork and coordination with other occupations on building sites; the importance of meeting the exacting design standards required by low carbon construction; the role of public policy in reshaping the industry, how climate is impacting jobs and the labour market; the impact of climate change on vulnerable populations and so forth.

As noted, each chapter of the template highlights a particular theme. These themes can be regarded as the items of knowledge, understanding, competency and attitudes that are overall goals. They can be expressed as 'learning outcomes,' provided these are understood as related to the content of the curriculum that is constructed out of the template. Within each chapter there are a group of sub themes. Each of these is accompanied by specific learning objectives. For example, the first chapter has the following learning objectives which correspond to its sub themes: What is the evidence that climate change is happening? How does burning fossil fuels create greenhouse gas emissions that heat the planet? How did fossil fuels facilitate the industrial revolution? What are the broad impacts of climate change on our living and working arrangements? How is climate change affecting the work of construction workers? How does it affect indigenous and vulnerable people? Why is this impact disproportionate for vulnerable populations?

In creating the nine chapters, we were challenged by the reality that many of the issues are not easy to put in a single chapter because they are multidimensional and overlap with a number of different themes. Construction work is being affected by climate change both because governments have adopted new, more stringent building codes and also because adverse climate events are directly changing what happens on worksites in response to adverse weather events or the introduction of new technologies that are designed to reduce emissions. Inevitably, there is considerable overlap in the issues covered by different chapters and our categorization concerning what goes where is at the end of the day a judgement call.

The material to which the chapters provide URL links takes a variety of forms, ranging from academic articles, government documents, newspaper stories, power point presentations, union research papers and so forth. Some of these provide valuable background material for course

development while others may be used immediately as items included in the content of the curriculum shared with learners. The goal has been to give the curriculum developer links to a variety of material which can be used for development of learning plans and other instructional teaching aids.

As an example, Chapter 9 Workplace and Occupational Culture has as its overall aim creating awareness of the importance of workplace and occupational culture in making low carbon construction possible. The chapter has nine sub-headings, each of which denote key aspects of workplace and occupational culture that we wish to emphasize in the curriculum. Under each of these are links to presentations, articles and reports that fill in this content in various ways and which can be used in the manner described in the previous paragraph.

Thus, it covers the importance of worker agency, teamwork and collaboration. It highlights the key issue of inter-occupational awareness, including knowledge of what other trades do and how their work interacts with the work of other trades. This in turn implies an ability to communicate and co-ordinate effectively with others and thus the importance of promoting a climate literacy culture in the workplace that facilitates engagement by employers and workers as well as an understanding of how construction work and its outcomes affects building users and the broader community. Some of the challenges connected with employer engagement are discussed in the included materials. Finally, the chapter emphasizes the importance of developing appropriate attitudes, which themselves are necessary for effective collaborative working. The materials in the sub-headings are thus organized in a rough expository sequence although it is open to curriculum designers to make changes to this sequence as they see appropriate.

The following is a list of the chapter headings:

Chapter 1: Understanding Climate Change and Its Consequences
Chapter 2: The Construction Industry as a Contributor to - and Solution for - the Challenge of Climate Change
Chapter 3: Fundamentals of Sustainable Building Practice
Chapter 4: How Public Policy on Climate Change is Transforming the Building Industry
Chapter 5: Construction Industry Jobs and Labour
Chapter 6: Sustainable Materials and Circularity in Construction
Chapter 7: Broad Understanding of Current and Future energy
Chapter 8: **Climate and Health Impacts of Construction**
Chapter 9: Workplace and Occupational Culture

In the next section, we describe the content of each of the chapters we have developed using the Padlet template. See Appendix 1 for a visual example of how Padlet presents the Chapters.

Chapter 1: Understanding Climate Change and Its Consequences:

This chapter provides a basic introduction to the science of climate change, including its causes and its effects. It presents scientific evidence that human beings have triggered global warming. and underscores that this conclusion is accepted by the overwhelming majority of scientists both in Canada and internationally. Understanding the historical - and continuing - contribution of burning fossil fuels to greenhouse gas emissions is critical for recognizing the urgent need to reduce carbon emissions. The chapter documents numerous and significant global climate impacts, such as floods, wildfires, droughts, atmospheric rivers, increasing temperatures, rising sea levels and glacier melting. These pose a significant and growing threat both to Canadians and to people in fragile ecosystems across the planet.

The chapter also illustrates how climate change is now impacting the construction industry and its workers. High temperatures and extreme adverse weather events adversely affect construction workers in numerous ways. It documents the disproportionate climate impacts on all Canadians but particularly Indigenous people, migrants, and vulnerable communities. It undermines biodiversity and damages food production.

Understandably, the groups most impacted are raising alarms and demanding mitigation to reduce the volume of GHGs being released and adaptation to cushion and protect people from the adverse impacts of climate change. The URLs link curriculum developers to the work of international organizations like the World Meteorological Organization, the Intergovernmental Panel on Climate Change and the United Nations which document these impacts and have developed policies to combat climate change. The purpose of explaining the causes and consequences of climate change is to highlight the importance of efforts to find ways to change the climate trajectory.

Chapter Sub-Headings: What the Science Tells Us; What Causes Climate Change; Industrial Revolution Accelerates Burning Fossil Fuels; How Is Climate Change Affecting Our Lives; How Does Climate Change Affect You, Your Workplace and Your Community; Impacts on Indigenous People; Climate and Environmental Justice

Chapter 2: The Construction Industry as a Contributor to - and Solution for - the Challenge of Climate Change.

This chapter looks at the contribution of the construction process and its resulting buildings and infrastructure in producing GHG emissions and in using energy that contributes to climate change. Buildings account directly for 12% of Canada's emissions through heating, cooling, and use of electricity, while the construction process adds another 6% to this total. The latter is a result of the imbedded carbon in the materials used in the process, such as concrete, steel,

chemicals, paints, and numerous other inputs, as well as the transportation required to move these materials to and from building sites. The equipment operated on building sites also contributes to emissions.

However, the industry has the potential to decrease this impact dramatically by adopting low carbon or net zero building standards and working practices which can make buildings much more energy efficient. It can shift building practices to conserve resources and use lower carbon inputs such as structural wood, recyclable materials, and better waste management. Achieving this requires a cultural change in the industry in which addressing climate issues becomes a core objective of everyone involved.

Industry transformation provides the opportunity for construction workers to make a significant contribution to Canada's climate objectives by performing work that is environmentally beneficial and personally satisfying because it contributes to the well-being of communities. Addressing climate change also will produce large numbers of satisfying, well paid jobs if Canada's climate change targets are to be achieved. Because high performance construction requires much higher quality standards, this will push the industry towards demanding a more knowledgeable and highly trained construction workforce.

Success in lowering the carbon footprint is dependent on many factors, including employer decisions, but a well-trained, skilled and climate literate construction workforce is one of the most important. Industry transformation to meet the climate crisis can be a vehicle for promoting social justice by providing training and employment to women, indigenous people, youth, and others traditionally excluded from the construction workforce. Facilitating a more representative workforce is also important to ensuring community support for this transformation whose outputs can significantly benefit working class communities through safer, healthier and more energy efficient buildings and infrastructure.

Chapter Sub-Headings: Buildings and Infrastructure Are Major Contributors to Climate Change; Potential of Construction Industry to Reduce Emissions; Potential of Construction Workforce to Reduce Emissions; Opportunities for Employment, Personal Development, and Making a Difference, Climate & Environmental Justice, and an Inclusive Industry.

Chapter 3: Fundamentals of Sustainable Building Practice.

This chapter focuses on the principles of sustainable building. It aims to generate awareness of the need for an integrated, holistic approach to the construction process, involving professionals, tradespersons, building occupants, and the whole supply chain. It highlights the importance of the occupations needed to perform this work and the green building education required for them to acquire the needed competencies and skills. It explains and justifies the higher standards and building codes needed for successful green building and the need for them to be properly followed and audited. It discusses ways to achieve and measure energy efficiency to reduce

carbon emissions and embodied carbon. It recognizes the different types of buildings involved, from new-build to retrofit whose production increasingly requires a workforce with a deep understanding of the principles of building science. This knowledge facilitates adopting a flexible, problem-solving approach to work that is required for addressing the numerous on-site challenges associated with high performance building practice.

The chapter covers six main themes: 1). basics of energy efficiency in building in relation to the building envelope and renewables. 2). Buildings as integrated systems, as highlighted in the European Build-up Skills zero carbon building requirements for a holistic, interdisciplinary, and cross-trade approach overcoming occupational divisions. 3). Green occupations, skill needs and training, including bridging professional-trade divides and the need for green building literacy (LEED, GPRO). 4). The need for precision and the importance of building codes and standards. 5). Measuring key features of zero carbon construction, including airtightness and thermal bridges, reducing carbon emissions and embodied carbon, and the performance gap, as described by, for instance, Canada's Green Building Council. 6). Types of energy efficient building, from new build (e.g., Passive House) to retrofitting the existing stock. Laying out these fundamentals, and providing reports, guidelines, and articles to support them, reveals the wide scope and complexity of what is involved in sustainable building and the social and economic as well as the technical issues involved.

Chapter Sub-Headings: Basic Principles of Building Science – Building Envelope, Ventilation, Mechanical Systems and Installation of Renewables; Buildings as Integrated Systems (Whole Building Approach) Green Occupations, Skill Needs and Training; Understanding Why Low Carbon Construction Must Be Done Precisely to Exact Specifications; Knowing How to Measure Key Features of Zero Carbon Construction – Air Tightness, Thermal Bridging etc.; Types of Energy Efficient Buildings (e.g. Passive House, NZEB etc.)

Chapter 4. How Public Policy on Climate Change is Transforming the Building Industry.

The aim of this chapter is to provide learners with an understanding of how public policy is driving change and attempting to transform the culture and practice of the building industry to enable it to meet increasingly tough government GHG and energy mitigation targets. Policy is driving industry to mitigate GHG emissions and energy use while adapting the built environment to meet the anticipated adverse impacts of climate change. The chapter highlights Canada's climate change legislation, including its major international commitments over the past 3 decades. These include the 1997 Kyoto Protocol, the 2009 Copenhagen Accord, the 2015 Paris Agreement, and its COP-26 undertakings. The Canadian Government is committed to achieve a 40% - 45% overall GHG reduction by 2030 and net zero by 2050. Domestically, the 2016 Pan Canadian Framework on Climate Change commits federal and provincial governments to an ambitious package of climate policies. Municipal governments have also included ambitious climate targets and are using their building codes and zoning regulations to implement these.

Canada's mitigation commitments in construction include an ambitious package of policies designed to lower carbon emissions from building work and the resulting buildings and infrastructure, including moving towards a life cycle approach (circular economy) to measuring carbon impacts. Canada's adaptation policies are designed to make buildings more resilient to withstand adverse climate impacts and better protect their occupant's safety, health and security.

Policy is pushing the industry to shift from its current focus on low bid, low performance to an approach that values quality and high-performance outputs. Climate policies are increasingly reflected in continuous changes to building and energy codes whose content is focused on lowering energy use and GHG emissions from all phases of the building process. Codes are a key policy tool designed to require industry to meet climate targets. It is necessary to force the market to achieve environmental objectives by adopting net zero construction practices, something that would not happen without tougher code requirements. They encourage those commissioning buildings to demand tougher standards of energy performance, improved water management and healthier air circulation for building occupants from the builders they employ.

Codes are being supplemented by voluntary energy rating standards such as Energy Star, Passive House and LEED which also promote low carbon construction outcomes. These are promoted by progressive building firms such as those affiliated with the Canada Green Building Council. Understanding the purpose of policy informed codes and standards and being able to implement their more stringent requirements in day-to-day construction practice is now a key element of being a competent, adaptable, and employable member of the skilled trades. Finally, public policy is also attempting to facilitate a more diverse, inclusive, and equitable workforce which is more reflective of Canadian society through initiatives such as community benefits agreements, additional training opportunities for groups historically excluded from the industry and targeted employment programs.

Chapter Sub-Headings: Public Policies and Climate Targets; Canadian Legislation Targets Climate Change; How Climate Change Policy Shapes Building and Energy Code Regulations; Targets Push Industry to Adopt Energy Saving Working Practices, Equipment, Technologies and Outcomes; Impacts on Working Practices, Skills Development and Employment Opportunities Tougher Climate Policies Are Required to Regulate the Market; Project Commissioning is Driving the Shift to Low Carbon Building; Government Procurement is Raising Construction Standards

Chapter 5: Construction Industry Jobs and the Labour Market

This chapter seeks to explain how fragmentation, extensive sub-contracting, individualization, and casualization of the industry works against the integrated, collaborative, trans-occupational, equitable and just approach needed for green construction. The fragmentation of the construction industry, whether through bogus self-employment, undeclared work, labour-only subcontracting or endless subcontracting chains, presents significant challenges to the coordinated and strategic

approach needed to produce high performance buildings. This is made worse by a low bid culture which ignores the need for high quality construction to achieve climate objectives and encourages a race to the bottom in building standards.

There are various ways these challenges can be addressed, each of which is outlined in the different sections of this chapter with URL links to relevant source material. One is building stakeholder alliances between the trades and their unions with professionals, progressive green employers, municipalities, and communities. The links provide illustrations of these alliances such as the inspirational example of Glasgow City Building's social housing program or BC's Columbia Institute's promotion of 'Jobs for Tomorrow' in conjunction with CBTU and environmental and community stakeholders. A second is by enhancing the role and leadership of unions in promoting green construction practices and standards through establishing relationships with communities, as shown in the European BROAD project, which involved unions in various EU member countries. A third is advocating for decent, secure work, not the casual and precarious employment and working conditions found in the underground economy which exploits workers and often promotes environmental racism through its discriminatory practices.

The chapter provides examples of strategies to achieve more climate focused construction work and overcome labour market shortages such as those promoted by the Campaign against Climate Change in the UK. It illustrates different approaches to vocational education and training for low energy construction of apprentices and the existing workforce, whether in the classroom, well-equipped workshops or on site, including the knowledge, skills, and attitudes these encompass. It notes that diversity and inclusiveness are key to transforming construction into an inclusive eco-industry, that no longer excludes large sections of the population. The final theme outlines labour's call for a just transition, now advocated by global (e.g., the ILO), national (CLC) regional and local union organizations, and the rallying call of construction unions that the transition to a green built environment is integrally connected with providing decent work. The chapter is therefore intended to be inspirational and motivating, showing the way forward and providing examples of how this can be achieved.

Chapter Sub-headings: The Challenge of Addressing Industry Fragmentation, Home-Owners, Architects, Project Managers, Unions, Workers Can All Work Towards the Same Goal for Mitigating Climate Change; Unions' Role in the Green Economy; Casual and Undeclared Work; Climate Jobs and Skill Shortages; Education in the Classroom; Community and Equity Benefits; Just Transition.

Chapter 6: Sustainable materials and circularity in construction.

The chapter provides a description of several of the main building rating systems (LEED, Passive House. R-2000, BOMA-BEST, Living Best, etc.) that are being increasingly used to assess the

GHG impacts and energy efficiency of buildings. These systems provide one way to evaluate the extent to which buildings can be described as 'green.'

Another aim of this chapter is to raise knowledge and understanding of the importance of building materials, resource use and materials management for reducing carbon emissions and energy demand in construction. It also aims to raise awareness of alternative, low-carbon materials, while outlining strategies for managing resources more efficiently and reducing waste.

A key emerging issue in the goal of achieving net zero construction is how to reduce the embedded carbon used in the construction of buildings and infrastructure. The chapter provides links explaining the concept of embedded carbon. It explains how the production of building materials such as steel and cement are energy intensive and carbon emitting. Shifting away from carbon and energy intensive building materials is a major way to reduce or eliminate embedded carbon and is increasingly viewed as a key element of emerging low carbon construction practice.

Linked to this is the notion of circularity in which the full product cycle from the resources used to extract building materials, to the carbon involved in their manufacture, to the energy used to transport them, to the impact of the construction process and, finally, their ability to be reused and recycled are all considered in assessing climate impacts.

Building construction is known for the sheer volume of resources used and, too often, wasted. The chapter draws attention to the advantages of natural building materials such as timber that have low or zero carbon footprints. It also introduces the concept of circular economy and how it can be applied in the built environment to embed principles such as minimizing waste, promoting recycling and repurposing of buildings (as opposed to demolishing) through low carbon refurbishing thus avoiding the carbon generated by production of materials for new construction. Building materials also have a significant impact on indoor air quality and hence occupant health so use of materials that are non-toxic is environmentally desirable.

The chapter discusses the shift towards electrifying building machinery and heavy equipment to reduce fossil fuel consumption as well as limit air and water pollution and lessen noise impacts on communities affected by construction.

Chapter sub-headings: Major Green Building Rating Systems (LEED, Passive House, R-2000, BOMA Best); Environmental Impact Assessments; Building Materials and Embedded Carbon; Sustainable Building Materials; Circularity in Construction; Waste Management, Reuse and Recycling; Sustainable Equipment

Chapter 7: Broad Understanding of Current and Future Energy.

This chapter explains the impacts of different energy sources on GHG emissions and outlines the reasons for the policies promoting the current shift in the construction industry towards reducing

energy consumption and adopting more environmentally sustainable building practices. It discusses the adverse GHG impacts of using fossil fuels in buildings and notes how shifting to renewable energy sources provides a way to reduce these impacts. Adoption of green building conservation methods are essential for improving energy efficiency throughout the building envelope and in HVAC mechanical systems. It presents various ways this is now being accomplished with examples of new systems and innovative conservation tools and practices.

The chapter discusses the rise of renewable energy and looks at the different types of this energy (solar, hydro, wind, geothermal, nuclear). It discusses the future trajectory of these options as well as examining the controversial issue of carbon capture and storage to reduce the volume of carbon released by burning fossil fuels, especially in high use situations such as electricity power plants.

One of the most encouraging ways to save energy involves the rapid expansion of the use of electrically powered heat pumps which are very economical and facilitate the shift away from using oil and gas for heating and air conditioning. These and other innovations can dramatically reduce the energy consumption of buildings while normally improving occupant comfort and air quality.

Lastly, it encourages reflection on the economic and social impacts of different energy sources' production and use at local, regional, national and global levels.

Chapter Sub-Headings: Types of Energy and Their Climate Impacts; Renewable Energy; Energy Used in Buildings and Construction Process; Methods of Energy Conservation; The Shift to Electrification of buildings and Equipment; Retrofits in Existing Buildings; Electrification in New Buildings; Economic and Social Impact of Energy Use.

Chapter 8: **Climate Related Health Impacts of Construction on Workers, Building Occupants, and Affected Communities.**

The focus of this chapter is to show how climate change affects the health of construction workers and those living and working in the buildings they produce. It explains how rising temperatures, atmospheric storms, floods, forest fires, and vector borne diseases affect workers, building occupants and local communities. Many construction workers are facing new and more extreme health and safety risks produced by climate change. Electricians, heavy equipment operators, plumbers and other trades are increasingly being called in to deal with the growing number of climate triggered weather events.

Greater environmental awareness associated with low carbon or net zero construction practices can reduce worker exposure while sheltering building occupants and their communities from adverse climate impacts. Climate informed commissioning practices can significantly improve health through better air and water quality and improved regulation of temperature and humidity.

They can also minimize exposure to mold, toxic chemicals and other contaminants while making buildings more comfortable and their occupants more productive.

High performance buildings reduce energy use and associated cost, alleviating energy poverty among low income and vulnerable populations. Buildings and infrastructure designed to adapt to climate change are normally more resilient and durable, protecting occupants from adverse impacts while being better able to withstand extreme weather events. Overall, workers engaged in low carbon, net zero construction practices can have a significant, positive impact on occupant well-being and community health, making communities more climate resilient.

Chapter Sub-Headings: Health Impacts of Climate Change; Worker's Health and Safety; Health Impact of Construction on Communities; End User and Occupant Impacts; Impacts on Vulnerable Populations; Low Carbon Construction and Climate Resilience.

Chapter 9: Workplace and Occupational Culture (Also See above)

Successful low carbon construction and the application of climate literacy to low carbon construction requires changes to the way in which know-how is traditionally thought of in construction. The traditional skill model tends to foreground the skills practiced in each trade without sufficient consideration of the building project as a unified whole. This is left to the architects and site managers. But low carbon construction requires the trades to take a larger role in meeting climate objectives.

The traditional model tends to be single trade focused without adequate regard to occupational overlaps or the implications of one trade's work for another's. The difficulty with this siloed approach is that it does not allow tradespeople to give their best to the project because it restricts their ability to utilize their knowledge, skills, and expertise fully to narrowly defined tasks. Competent low carbon construction requires greater workplace autonomy for making decisions and solving problems on worksites. It requires enhanced teamwork and shared responsibility for outcomes which, in turn, necessitates all trades working productively together to ensure that design specifications are met.

The chapter emphasizes how meeting the much tougher standards of low carbon construction also requires the development of an attitudinal approach that ensures attention to detail, concern for the work of neighbouring trades and a commitment for the successful completion of the project as a whole. Such changes in work attitudes and practices will also enable the sector to broaden its recruitment profile, attracting individuals from a much broader range than hitherto to become active participants in construction. The shift to low carbon construction with its emphasis on teamwork and cooperation also provides opportunities to create a more supportive, welcoming and equitable workplace culture in which achievement of a high-performance building is something for which all workers on site can point to with pride.

Chapter Sub-Headings: Worker Agency and Respect, Providing Workers with a Voice in Work Organization and Meeting Climate Goals; Teamwork and Collaboration and a Positive Learning Environment; Knowledge of Other Trades and Relationship to Other Trades; Communication and Collaboration Competencies; Promoting Climate Awareness and Literacy on Building Sites; Ensuring that Everyone is Trained Properly by Integrating Knowledge, Skills, and Competencies. (Savoir-Faire, Savoir and Savoir-Etre)

Appendix 1: Copy of Padlet Index Page for CIRT Climate Literacy Initiative