

Overcoming Systemic Barriers to 'Greening' the Construction Industry: The Important Role of Building Workers in Implementing Climate Objectives at the Workplace

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ABSTRACT: There is a broad consensus among climate scientists and policy makers that reducing the GHG emissions and energy consumption of the built environment is critical to mitigating the impact of global warming. This means adopting policies that will dramatically accelerate the introduction of low carbon construction, both in new structures and in retrofitting the existing building stock. An important, but often overlooked, component of this process is how to ensure that climate objectives are properly implemented at the workplace by building trades workers. This paper argues that for this to happen, there must be major changes in how the industry is organized – changes that challenge the unregulated market with its pervasive reliance on labour sub-contracting and precarious employment and its negative impact on building standards. The industry must transform its inadequate training and apprenticeship system to give workers the additional skills needed for low carbon construction. It must reduce the loss of qualified workers and their skills, by providing greater job security and a long term career in the industry. And it must incorporate a greater role for the workforce – and the unions that represent it – in creating a 'green' construction culture at the workplace.

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INTRODUCTION: THE SIGNIFICANCE OF THE CONSTRUCTION INDUSTRY IN COMBATING GLOBAL WARMING

Year by year it becomes ever clearer that global warming presents the greatest challenge to the future of our species. The massive amount of scientific evidence is increasingly being reinforced by the growing number of disruptive climate events – unprecedented storms, disappearing arctic ice, receding Greenland glaciers, measurable increases in sea levels and numerous other worrisome indicators. The prospect of a four degree Celsius increase in global temperatures is no longer an extreme estimate – it is becoming increasingly probable by the end of the century (Hansen, 1988; McKibben, 1989; Intergovernmental Panel on Climate Change (IPCC), 2007; Stern, 2006; UNEP, 2009; World Bank, 2012; World Meteorological Association; 2013; IEA, 2013; IPCC, 2013).

In light of these developments, the need to curb - and then reduce – greenhouse gas (GHG) emissions and energy consumption is now imperative. While there are many areas of our economy that require urgent attention, the built environment is, arguably, at the top of the list. Buildings produce an estimated 30-35 percent of GHG emissions and account for almost 40 percent of energy use. In its 2007 examination of the building sector, the IPCC noted that: “Over the whole building stock the largest portion of carbon savings by 2030 is in retrofitting existing buildings and replacing energy – using equipment due to the slow turnover of the stock.” (IPCC, 2007, p. 389). A more recent study by the International Labour Organization (ILO, 2012, p.127) examined the potential for GHG and energy reductions in the world’s major economies and concluded that:

“Of all the elements that constitute society, buildings are the biggest consumers of energy and the largest emitters of greenhouse gases. Yet, the building sector also has the highest potential for improving energy efficiency and reducing emissions. Many investments in resource-efficient buildings are cost effective and the large stocks of older and inefficient buildings, notably in industrialized countries, mean that placing greater emphasis on renovation could yield substantial environmental benefits.”

Conserving energy in the built environment involves designing and introducing new energy conservation systems in buildings under construction and retrofitting the existing building stock. As new construction represents only about 1 ½ percent of the existing stock of buildings, retrofitting existing buildings is clearly critical to achieving effective

climate change mitigation, given the relatively small share of the total building stock that new construction will represent over the next several decades (UNEP 2009).

Progress in addressing climate change in the built environment requires the transformation of Canada’s building industry to give it and its workers the capacity to implement low carbon construction in all the areas in which it operates. This transformation must entail every step in the supply chain, from the decisions by those who commission and purchase construction services, through the work of architects, planners and engineers who design the buildings, to the general contractors and sub-contractors who oversee projects and, finally, to the trades and labourers who actually carry out the work on the building site.² At each stage of this process the industry needs to implement the most effective and technologically advanced low carbon construction innovations. And all those who work in the industry must be trained and committed to the same objective. In the words of the 2007 IPCC report noted above, it will require “...very significant efforts to enhance programs and policies... well beyond what is happening today...” (IPCC, 2007, p.390)

CHARACTERISTICS OF CANADA’S BUILDING INDUSTRY IMPEDING THE TRANSITION TO LOW CARBON CONSTRUCTION

Canada’s construction industry accounted for approximately 7.4 percent of the country’s workforce at the beginning of 2013 (CANSIM Table 282-0088). While its contribution to Canada’s GDP fluctuates significantly with the ups and downs of the business cycle, it has averaged about 6 percent in recent years (Canada Year Book, 2012). Construction is almost exclusively a private sector activity, in which the economic interests of the owners and developers who commission construction services and the contractors that deliver these services shape virtually all aspects of its operation. Market forces influence what gets built (or renovated), who builds it and the development priorities adopted by the industry. Even where government is the purchaser of construction services, private firms carry out the actual work.

Admittedly, there is extensive public regulation of many aspects of construction, such as building codes that address fire safety, electrical systems, plumbing, engineering standards, structural integrity and the use of specific construction materials. There is also public oversight of

2 The terminology for describing general contractors varies somewhat in the industry. Another term commonly used is prime contractor.

planning and development through provincial and municipal government regulations that influence – at least to some degree - what gets built and where it gets built. However, in practice, the industry exercises enormous influence over much of the public regulation that exists. Moreover, the economic and political influence of the industry ensures that most regulation is ‘industry friendly’ in that it accommodates the industry’s focus on maximizing profits and minimizing regulations that would challenge this basic objective.

Progress towards low carbon construction and renovation has been painfully slow in Canada to date. It is the contention of this paper that the explanation for this poor performance is to be found in the way the industry is currently organized. The industry’s predominantly market based approach – an approach which is strongly resistant to public planning and public regulation - impedes the adoption of effective climate change measures in the built environment.³

And the industry’s influence over much of the public policy debate - and related decision making - further compounds this problem. For it minimizes the scope of the challenge we now face and reinforces the view that we can address climate change without major changes to the way the industry currently functions. This is not to deny that certain parts of the industry are attempting to introduce innovative greener building practices or establish more climate friendly standards through the adoption of voluntary initiatives such as LEED, BOMA, Built Green, Green Globes, ISO-14001 and Passive House. But these initiatives are not mainstream and do not reflect the prevailing approach of the industry.

There is an enormous gap between what needs to be done to meet the challenge of climate change and what the construction industry, as currently organized, can deliver. The determining factor in what gets built and how it gets built, or renovated, is price. Climate considerations take second place. Competition, based almost exclusively on low bid, results in a race to the bottom as firms strive to obtain work through cutting corners on design, materials, technology and labour. Rather than upward pressure encouraging adoption of the highest environmental standards, unregulated price competition results in the opposite: pressure to adopt the minimum standards that will prove acceptable in the competitive market (Barrett, 1998; Bosch and Phillips, 2003; Prism Ana-

3 The focus of this article is on construction in English Canada. As will be noted in various parts of the text, the situation in Quebec differs quite substantially from the rest of Canada. Many of the problems identified in the paper are far less pronounced in that province due to its much more extensive public regulation of the industry. See Charest, 2003 for a good analysis of the Quebec industry.

lytics, 2010). While this focus may satisfy the economic interests of the industry as presently constituted, it does not provide the basis for low carbon construction.

This is compounded by the fact that most purchasers of construction services are not knowledgeable about the details of the work and are not in a position to evaluate matters such as quality of design, materials, installation methods or workmanship. Too often they are not aware of the options available to reduce the carbon footprint of their buildings or the potential long term financial benefits of reduced energy use. The classic principal – agent dilemma is characteristic of much of the industry's operation reinforced by asymmetry of information between purchaser and contractor (O'Grady, 2010; Hamilton-Smith, 2012; BCIT, 2012). Additionally, where landlords do not pay the cost of heat and electricity, they often see little benefit in paying for improved energy conservation in their buildings, while tenants have no reason – or capacity - to invest in improved insulation or other energy conservation initiatives in buildings they do not own and in which they may not rent long enough to reap the benefits (IPCC, 2007; UNEP, 2009).

These factors are further impacted by the conservative, highly risk averse attitude of many in the industry. While the industry is accustomed to ongoing change as new technologies and building methods are introduced, it sees change primarily in terms of lowering the costs of meeting prevailing building standards and norms, rather than a vehicle for a major 'green' transformation of the industry. Fundamentally new approaches, such as those entailed in much low carbon construction, can be more challenging to implement and hence raise the risk of lawsuits if purchasers are dissatisfied with the outcome (O'Grady, 2010; BC Construction Association, 2011). In contrast, standard construction methods minimize risk and ensure predictable, that is, profitable outcomes.

This conservative tendency is reinforced by a culture in English Canada that strongly resists attempts by governments to introduce more directive public regulation, whether in terms of planning, design requirements, engineering standards, tougher building codes, demolition protocols, new technologies or mandated workforce training and

skills qualifications.⁴ It is normally willing to accept such changes only where they do not impose major costs, can be introduced with minimal disruption to its activities and do not otherwise interfere with its profit maximizing objectives (Bosch and Phillips, 2003). Much of the industry views government efforts to impose new regulatory standards as an unwarranted interference in the market. While it is not averse to government support, such as tax concessions, training subsidies, or public funding of research and technological innovation, it sees such support in terms of the government assisting it with its commercial objectives. Government direction to change the way it currently operates is a different matter entirely.

The industry has many characteristics that present major challenges to resolving the widely recognized weakness in its labour regime. Fluctuations in the business cycle, as well as seasonal weather changes, result in a 'boom and bust' pattern of building activity. These changes are much more dramatic than in most other sectors of Canada's economy. The industry does not control – and often cannot easily predict – these larger economic factors that affect the level of building activity. But the construction industry is strongly affected by them. This makes much construction work risky. The way the industry deals with risk is largely through sub-contracting (Bosch and Phillips, 2003). This practice enables developers and prime contractors to reduce their exposure to cyclical fluctuations by being able to ramp their use of sub-contractors up and down as demand fluctuates. It also enables them to reduce the risk of major capital investment in equipment and facilities being idle. For sub-contracting enables them to shift responsibility for much of this investment to smaller operators. And, because they are not employers of the workers of the sub-contractors, developers and general contractors reduce their employment obligations, shifting the costs of downturns to sub-contractors and workers.⁵

4 One of the most egregious examples of this is in the demolition of existing buildings. Because it is normally far cheaper to bulldoze an old structure than to dismantle it so that its materials can be re-used, massive volumes of used materials end up in landfills. The industry prefers this option as it minimizes labour expenditures, which are the major cost in taking apart a building. Industry influence has largely undermined efforts by municipal governments to implement effective materials recycling as this would require extensive public regulation of demolition practices and the creation of new markets for used materials.

5 In recent years there has been a great deal of interest in how global supply chains now involve extensive sub-contracting of much of the world's manufacturing to developing countries with low wages, minimal taxes and little worker protection. But, in reality, this pattern has been part of the construction industry in Canada for generations. Sub-contracting is the norm with consequences that parallel what has been happening more recently in the extensive outsourcing by corporations in the developed world to sub-contractors in the developing world.

However, labour market 'flexibility' is achieved largely at the expense of the workers who face periodic unemployment, whether directly as employees, or indirectly as self-employed 'owner operators'. One of the consequences of this precarious employment system is that it prevents a long term attachment to the industry. Instead of a career, many workers abandon the industry during downturns to seek work in other sectors of the economy. High labour turnover means the industry loses valuable skills and squanders a significant part of its investments in training.

The extensive use of sub-contracting also results in a very fragmented industry structure. While there are a number of very large contractors, especially in the Industrial, Commercial and Institutional (ICI) sector, overwhelmingly the industry is composed of very small firms or individual owner operators. Fully 89 percent of employers have 20 or fewer workers and 61 percent have less than 5 workers (O'Grady, 2005; Hamilton-Smith, 2010). Extensive sub-contracting is the norm. Historically, contractors have also used sub-contracting to circumvent unionization and union collective agreement obligations.⁶

The fragmented industry structure makes it very difficult to provide an effective training system. Small contractors normally do not have the qualified journeypersons or other resources to support apprentices. As we shall discuss further in this paper, unions can address this problem through multi-employer agreements. But this is an option that most of the industry opposes. And governments have not been prepared to address this issue through establishing a much more directive approach that would require contractors to support training both financially and by accepting apprentices. Given this situation, it is perhaps not surprising that Canada's construction industry has not been very successful in developing a workforce capable of achieving the scope of the transition that is now required to cope with global warming.

THREE MAJOR BARRIERS TO INDUSTRY TRANSFORMATION

Identifying all the challenges to 'greening' the industry is clearly a task beyond the scope of a single article. As noted, the basic organization

6 The demarcation lines between various trades is, arguably, also a contributor to industry fragmentation, as it reinforces a proprietary approach to work in which control over skill sets (and the unions representing workers with these skill sets) results in occupational silos. This can impede broader worker solidarity, as well as more effective integration of all work on a building site, particularly as there are significant differences in wages among various trades. In countries such as Denmark, where the wage structure is very flat, unions have been able to overcome these divisions more effectively than in Canada as demarcation issues do not impact wages significantly.

of the industry, with its focus on price competition to the exclusion of other concerns – and its opposition to public regulation – lies at the root of the problem. A fundamental reorganization of the industry will be required to address these issues. Assuming such a re-organization were to be implemented, the bulk of the process will draw upon the expertise of planners, architects, engineers and other professionals. It is these professionals who will be in a position to re-design the industry’s approach to implementing low carbon construction.

The focus of this article is considerably narrower. It is to examine some of the key changes needed to facilitate the development of a construction labour force capable of implementing green construction at the building site. While transforming the industry will require far larger changes than those discussed in this article, a restructured industry will still require workers with the capacity and training to implement progressive climate objectives. Consequently, examining the barriers that are currently impeding this from happening and outlining some of the possibilities for overcoming these barriers constitutes one – admittedly modest – component of this larger climate change project.

It is possible to highlight three key barriers. The first is the impact of the underground economy in driving down standards and impeding introduction of more energy efficient building techniques. The industry’s extensive reliance on sub-contracting encourages underground activity by facilitating small-scale, ‘under the radar’ building work. Government reluctance to address its negative impacts compounds the problem. The second is the inadequacy of the current training and apprenticeship system, an issue that is widely acknowledged in the industry, but which it has failed to address effectively, in part due to its fragmented structure. And the third is the widespread neglect of the potential role that workers and the unions that represent them can – and should - play in the process of greening the built environment, a neglect based on a lack of interest in – or hostility to - the role of organized labour in the industry by many of those advocating the ‘greening’ of the industry.

THE NEGATIVE IMPACT OF UNDERGROUND CONSTRUCTION ACTIVITY

Canada’s underground construction economy consists of a variety of economic activities that its participants keep hidden from public view to avoid taxes, regulations and, in some cases, conceal illegal activities. Its characteristics have been extensively documented in a variety of studies in recent years by both academics and government agencies (Mirus,

1994; Gervais, 1994; Lippert and Walker, 1997; Barrett, 1998; Giles and Tedds, 2002; Armstrong and O'Grady, 2004; Gilbert, 2010; Hamilton-Smith, 2010; Ontario Construction Secretariat, 2010; Dean, 2010; Terefe et. al., 2011; Drummond, 2012; Statistics Canada, 2012). Statistics Canada estimated that in 2009, underground activity in the entire Canadian economy amounted to \$36 billion. The construction industry accounted for about 29 percent of this total.

There are a number of interrelated factors that facilitate the operation of underground construction activity. One is the extensively documented practice of tax avoidance (Auditor General of Canada, 1999; Pigeon, 2004; Prism Analytics, 2010a; Statistics Canada, 2011; 2012) Employers, small contractors and self-employed workers avoid taxes either by not divulging that they are receiving income from those purchasing construction services or by disclosing only part of it. By not charging customers HST (or GST in some provinces), they gain a major cost advantage over legitimate contractors. They also reduce costs by avoiding Canada Pension Plan (CPP) contributions, Employment Insurance (EI) payments, workers' compensation premiums and other employment related deductions (Armstrong and O'Grady, 2004). Additionally, they may not declare their work to the relevant municipal authorities, thus avoiding the costs of building permits (and the oversight of building inspectors). While workers may share in some of the immediate cost savings of underground activity because they avoid paying statutory contributions such as CPP and EI, they also lose the significant benefits that flow from these programs.

Because many of their customers – particularly in the residential construction and renovations sector – do not have the expertise to assess if work is being done properly, underground firms can also cut corners on materials and workmanship. Aside from the negative impact on building standards and on the employment conditions of workers in this sector (whether employed, or in some cases, described, misleadingly, as self-employed 'owner operators'), competition from underground suppliers pressures legitimate contractors to cut corners to remain competitive, including using less skilled or unskilled workers wherever feasible. It encourages deskilling rather than up skilling. These practices enable them to under-bid legitimate employers and contractors by a substantial margin – normally in the range of 20-30 percent, but in some cases as much as 50 percent (Armstrong and O'Grady, 2004; Hamilton-Smith, 2010). In an environment

where price is normally the dominant factor in determining who gets work, underground operators have an enormous advantage.

While the underground economy adversely affects much of the construction industry, from the perspective of this paper its impact in undermining 'green' construction is of particular importance. Ruthless cost cutting makes it difficult to implement new green technologies or use more environmentally responsible working practices because these tend to be more expensive – at least in the short run - than other options. Confusion over the right technology, or standards, in the context of conflicting claims by different contractors or manufacturers, makes this even more challenging for those who purchase construction services, a problem often exacerbated by the absence of clear guidelines from government. Even when low carbon innovations are commissioned by customers wishing to support good environmental practices, these may not be properly installed due to poor installer training and the absence of proper inspections (Gleeson, 2010).

The underground economy poses a major barrier to the development of the skills needed to implement green construction. Workers get little or no formal training and only rarely are able to obtain recognized qualifications such as a journeyperson's ticket (O'Grady, 2004; Hamilton-Smith, 2010). Underground employers do not want to support apprentices partly because the insecurity of their contracts, partly because of the costs, partly because of the need to permit release time for classroom study and partly because of the administration associated with participating in a formal training program. Many want to avoid publicly acknowledging that they even have employees, as this may raise the visibility of their construction activities not only to the apprenticeship authorities, but also to other government agencies and may expose them to unwanted inspections or tax audits.

Consequently, most workers in the underground sector have no pathway to formalized training, because they do not 'exist' from the perspective of the regulatory and training authorities. At the same time, workers are normally not in a position to invest in their own training, given their precarious job security and fluctuating incomes due to frequent lay-offs. The result is that this large segment of the industry fails to train its workforce. This failure most clearly impacts the conventional training and apprenticeship of construction workers. But it also means there is little opportunity for a large portion of construction workers to acquire the advanced skill sets that are so necessary for implementing low carbon construction.

The underground economy not only drives down standards by providing a cost advantage to contractors that work 'under the radar': it also pressures legitimate firms to cut corners on design, materials, equipment and staffing. It thus undermines the capacity of the industry to implement high quality construction. From the perspective of 'greening' the construction industry and reducing the carbon footprint of the built environment, failure to address the problems of the underground economy results in failure to implement many of the innovations necessary for the green transformation of the industry. This is particularly important because so much of the underground economy is involved in renovation, repairs and maintenance work where green retrofitting needs to be widely implemented.

While some of the remedies for addressing the underground economy are well known, and while governments have taken some limited steps to deal with issue like tax evasion, overall they have not moved aggressively to implement many of the obviously relevant regulatory changes (Drummond, 2012). Moreover, in some provinces, such as BC, governments have actually abandoned some of the policy tools formerly used to support training and apprenticeship programs for the construction workforce. This has been done to placate industry opposition to alleged government regulatory and spending excesses. In BC, for example, the provincial government terminated the Industry Training and Apprenticeship Authority (ITAC), replacing it with the more narrowly focused and employer dominated BC Industry Training Authority (ITA), a decision that effectively excluded labour participation in the province's training programs (BC Federation of Labour, 2012).

Aside from the impact of lobbying by affected developers and contractors, government reluctance to regulate the underground economy reflects a broader commitment to neoliberal principles. To a large degree, governments accept the view that the regulatory 'cure' – tough government measures – for the problems identified in the underground economy is worse than the 'disease' of unregulated market functioning. Despite the obvious problems, supporters of the status quo, such as the Independent Contractors and Business Association (ICBA) of BC, maintain that there is no pressing need to regulate it more extensively because government intervention inevitably leads to greater inefficiency and undermines economic progress.⁷

7 See, for example, the anti-government focus of the publications of the Independent Contractors and Business Association of BC for the most extreme version of this view.

ADDRESSING THE IMPACT OF THE UNDERGROUND ECONOMY ON CONSTRUCTION STANDARDS

While a fundamental restructuring of the construction industry involves much more than simply curbing the abuses of the underground economy, there is no question that this needs to be part of the process. Governments have a variety of policy options to address some of its worst excesses. The key point is to recognize the need for a comprehensive approach that utilizes a wide range of these tools simultaneously and in a coordinated manner. Within Canada, only Quebec, with its Commission de la construction du Québec (CCQ) has adopted this wide ranging approach (Charest, 2003).

Government options include rigorous enforcement of the existing tax laws through comprehensive auditing of contractors, including self-employed 'owner operators'. In addition to capturing unpaid income tax, auditors can ensure that CCP, EI and other statutory payments are also collected. Both federal and provincial governments need to cooperate in this endeavour. Provincial governments can provide additional resources to their workers' compensation boards to ensure that contractors register the workers they employ and pay their assessments. They can increase the frequency of workplace inspections to curb unsafe working practices. They can also enforce employment standards and human rights codes more vigorously (Prism Economics, 2010). And they can increase penalties for violators to a level that acts as a real deterrent, something which Quebec, uniquely, has been considerably more successful at doing. By providing significant funding to the CCQ, the province claims to have recovered \$1.9 billion in unpaid taxes and levies during the 1997 to 2008 period. The volume of 'declared' work has also increased much more rapidly than the growth of construction investment in the industry, indicating that more of the underground contractors and independent operators are now complying with the law (CCQ web site, Oct. 4, 2013). Quebec also requires all construction workers to be registered as a condition of working in the industry and to ensure that they are enrolled in the industry's pension and welfare plans.

Another approach is for governments to license all contractors working in the sector (Armstrong and O'Grady, 2004). Currently, anyone can set up shop and provide construction services. However, there is no quality control, no protection for purchasers and no guarantee that employers are following employment standards, health and safety legislation or meeting their statutory contributions to EI, CPP and

other programs. Licensing would force many underground operators to acknowledge that they are providing construction services and make tax and regulatory avoidance more difficult. It would establish a data base on which the performance of contractors could be monitored, both by public authorities (tax auditors, workers' compensation officials, etc.) and by customers of their services (Hamilton-Smith, 2012). Requiring employers to be members of employer associations, as in Quebec, would also facilitate greater co-ordination of the sector, particularly with respect to training (Charest, 2003). Government procurement contracts can also level the playing field by again including fair wage requirements.

Quebec is now requiring that all construction workers register and provide a current resume of their training and skill sets on a government managed web site. The intention is both to enable workers to advertise their availability and to make it more difficult for workers in the underground economy to continue to operate. Registration will also make it easier to address some of the other problems of the underground economy such as tax evasion as workers will have to identify themselves as working in the industry.

Provincial and municipal governments can also enforce building codes more rigorously – including hiring sufficient numbers of building inspectors - to guarantee that the work being performed meets existing standards. One reason underground contractors continue to function is that they avoid building inspections, particularly in the residential renovations sector where work is often easy to conceal. Their ability to do so is a consequence of the limited resources governments have been allocating to inspections.

Provinces such as BC could also expand the number of 'compulsory' trades and take measures to ensure that only those with the appropriate qualifications are able to perform key components of construction work (Armstrong, 2008). This approach to labour regulation is standard practice in a number of European countries such as Germany. More stringent licensing of the trades would also provide a major incentive for workers to take formal training or apprenticeships, given that, once completed, these qualifications would provide greater job opportunities.

To address the failure of underground contractors to support training, governments can require all firms operating in the industry to contribute to the cost of training through compulsory levies such as have been implemented in some states in Australia, California, numerous European countries and Quebec which has a compulsory 1.5 percent of payroll levy (Charest, 2003; Calvert, 2011; Hamilton-Smith, 2012).

Another major policy tool is labour legislation (which will be discussed more extensively later in this paper). Unionized sectors of the industry have been far more successful in achieving good training outcomes than the unorganized sectors. Minimally, as in Quebec, public policy should encourage, rather than limit the ability of workers to unionize. This would make a major difference in the construction industry in the rest of Canada and would also make it much easier to implement an effective training and apprenticeship regime.

THE INDUSTRY'S TRAINING CHALLENGES

A second key area where the construction industry fails to meet the challenge of climate change is in training its workers. Successful 'green' construction requires a highly trained workforce. Much of the work involves very tight tolerances and careful installation of components (Gleeson, 2010; Goodland 2012). It also involves introducing new technologies and new building methods. In the area of retrofitting, where the largest energy savings are possible, the skilled trades must be able to implement low carbon construction in a wide variety of different building types, erected at different times with different technologies and different materials. To do this work well, the construction trades must have a comprehensive knowledge of many different building methods so that they are able to apply the most effective approach to each specific project. Successful 'green' construction requires the development of higher skill levels and this requires a significant, ongoing, investment in workforce training.

As noted earlier, Canada's construction market is characterized by a 'boom and bust' pattern that exaggerates the ups and downs of the business cycle and the related property market. The wide variations in demand lead to periods of intense building activity followed by periods of unemployment (Bosch and Phillips, 2003). The cyclical and seasonal economic forces shaping the industry make it particularly difficult to develop and maintain a qualified workforce - arguably much more difficult than in most other areas of the Canadian economy where more stable employment provides a stronger base for both employers and workers to invest in training, because both sides of industry can reasonably expect to accrue the benefits of this investment.

The training and apprenticeship system involves a number of players. In addition to the trainees, it includes contractors who provide employment and on the job experience, training providers - predominantly public colleges and/or unions - to provide the classroom and the-

oretical components of the trade and governments to fund and regulate the training system, usually through arm's length agencies, although sometimes directly through ministries of education, post-secondary education or their equivalents.

Apprenticeship is the core approach to training construction workers. In most trades approximately eighty percent of the time is spent on the job and the remainder in formal classroom training. The periods of formal education are normally scheduled for part of each year to correspond to the increasing on-the-job experience of workers. Apprentices need employment to complete their training program and graduate as qualified journeypersons. However, as noted, the industry is characterized by wide swings in employment that reflect the business cycle, seasonal factors and the state of the local property market. In some provinces this is exacerbated by boom and bust employment patterns in major infrastructure or resource projects. When the economy is booming, construction contractors are desperate for workers. When it is in recession, workers are regularly laid off for months or even years at a time (Sharpe and Gibson, 2005; Hamilton-Smith, 2010; Coe, 2011). These factors lead to high labour turnover and the corresponding loss of the skills and experience that workers have acquired.

Rather than a national, comprehensive approach to training the construction workforce, Canada has a patchwork quilt of apprenticeship and trades training arrangements, reflecting the Constitutional jurisdiction of provinces/territories (Sharpe and Gibson, 2005; Morissette, 2008; Armstrong, 2008; Laporte and Muller, 2010). The federal government provides funding through a package of training agreements with the provinces. But outside Quebec, the training system is fragmented, inadequately funded and poorly regulated, shifting most of the costs and risks to workers. Instead of supporting training in low carbon construction, the current federal government's main interest in trades training is in response to demands from the oil, gas and mining sectors. This approach ignores both the need for training in green construction methods and the much larger potential gains achievable in the built environment where reductions in GHG emissions and energy can be most effectively implemented.⁸

8 While provinces have made significant efforts to establish national standards that are recognized across the country through the Red Seal program, there are still significant variations in provincial approaches. This is highlighted by the differences in the number of designated 'compulsory' trades in which practitioners must have a certificate of trades' qualification (TQ) as a legal condition of performing a particular type of construction work. While some provinces have several dozen such trades others have as few as three.

The volatile nature of construction means that workers take significant risks when they commit to the long term training associated with a full three to five year apprenticeship. Most have no guarantee that they will obtain steady employment – employment which they need to fulfil the on-the-job component of their apprenticeship program. Given that most are from working class backgrounds, they normally do not have significant financial resources to carry them over during prolonged periods of unemployment, an issue compounded by the fact that in the initial years, apprentices' wage rates start at half or less of that of a journey person. Absent adequate financial resources they can be – and often are – forced to abandon their training program to seek work in other parts of the economy. The drop-out rate in many trades is well over half of those who commence an apprenticeship (Laporte and Muller, 2010; Hamilton-Smith, 2010; Coe, 2011).

The paradox is that when there is ample work, apprentices may not wish to go back to school due to the loss of income, but also because they may fear not getting work when they are finished their classroom studies each year. This means losing their investment in acquiring building skills (Bosch and Phillips, 2003). At the same time, the industry loses the potential benefits of future skilled workers. These problems are inherent in how the largely unregulated construction labour market functions. They pose an ongoing challenge to establishing and maintaining a qualified workforce.

In practice, larger employers and/or unionized employers tend to be more supportive of the training system and their apprentices have a much higher than average completion rate. For some of these employers, the benefits of having a well trained workforce are so substantial, and the costs of poorly performed work so significant, that investment in workforce skills makes economic sense. In some sectors of the economy, such as oil, gas and other resources, profit margins are high and the pay offs from having a skilled workforce are substantial, so they support apprenticeships. In addition, where employers are party to a collective agreement, they are also likely to support training as a result of contract provisions stipulating the ratio of apprentices to journey persons and as a result of negotiated contributions to training funds – normally cents per hour – to supporting apprenticeship programs (O'Grady, 2005; Prism, 2010)

However, most construction employers are very small and do not conform to this pattern. Overall, the industry's training performance is very poor, with alarmingly high rates of non-completion. (Gunderson

2010) Efforts by the federal and some provincial governments to encourage more workers to take apprenticeships over the past fifteen years have largely failed (Hamilton-Smith, 2010).

According to Coe and Emery (2012, p.95):

“...(T)he large expansion in apprenticeship training registrations since 1991 has not produced a substantial increase in the number of persons completing apprenticeship programs in the building trades. In 2007, there were only 3900 completions of apprenticeship programs in the building trades, up only 300 from 3600 completed in 1991. Moreover the ratio of completed apprenticeships to the number of individuals registered in building trades apprenticeship programs fell from 7.7 percent in 1991 to 4.9 percent in 2007.”

Desjardans and Paquin of Statistics Canada carried out a detailed examination of the completion rates of the 1994 and 1995 cohorts of starting apprenticeships using Canada's Registered Apprentice Information System (RIAS) ten years later. They found that the completion rates for the construction trades were, on average, much lower than for non-construction trades. Some building trades did much better than others, with construction electricians (62 percent), plumbers (58 percent) and sheet metal workers (56 percent) doing relatively better. But others, such as steamfitter-pipefitter (38 percent) and carpenters (34 percent), did relatively poorly (Desjardans and Paquin, 2010).⁹ BC's Industry Training Authority (ITA) noted that the completion rate for apprenticeships after 6 years in its provincial program was only 40 percent in 2011 (ITA website).

BC's ITA does not provide a break-down between union and non-union apprentices. But there is evidence that the average completion rates it cites would be considerably lower if the relatively high success rates of apprenticeships with unionized employers were excluded. The BC and Yukon Territory Building and Construction Trades Council (BC BCTC) claims that the training programs run by its member unions have a success rate averaging about 90 percent over the past 5 years (BC BCTC web site). In his study of factors influencing apprenticeship completion rates, Coe (2011) noted that the rate was 10 percent higher for compulsory trades and concluded that a shift towards increasing the number of compulsory trades would likely increase this rate. Unions have been strong supporters of expanding the number of compulsory trades.

9 While Statistics Canada's data for 2011 indicate an increase in completions to 55,422, the number of apprentices registered in the system is also up to 426,283 (Cansim Table 4770054).

Small contractors and contractors working in residential and low rise apartment construction, as well as non-union employers, have a particularly poor track record in supporting apprenticeships, while those in the underground economy provide almost no formal apprenticeship training, despite the significant size of this part of the industry (O’Grady, 2010; Hamilton-Smith, 2012). Even among larger employers, unionization is a key factor in apprenticeship. A 2013 survey by Katherine Jacobs (2013) of the Ontario Construction Secretariat found that 83 percent of unionized contractors supported apprentices, compared with only 42 percent of their non-union counterparts.

These problems are exacerbated by free-ridership, where employers who do not train benefit from those who do by poaching the latter’s newly qualified journeypersons (Bosch and Phillips, 2003). It is also exacerbated by the absence of a system - with the notable exception of Quebec - that would require all construction employers and/or contractors to contribute to the costs of training the industry’s workforce. Such arrangements are common in much of Europe, California and parts of Australia, to cite examples where such cost sharing is in place. One of the advantages of an industry-wide levy on employers is that having paid into it, many employers then choose to take advantage of the funds it makes available by supporting trainees or apprentices. If you are paying for training, why not take advantage of it yourself by claiming some of the available training money?

GREENING THE BUILT ENVIRONMENT REQUIRES ENHANCED TRAINING AND SKILLS

While the construction industry might simply continue with its somewhat dysfunctional approach to training and apprenticeship, the problem now is that we need to ‘green’ the built environment and hence need a training system that prepares construction workers properly for this task.¹⁰ Numerous studies indicate that low carbon construction requires considerably higher levels of training and skills than currently possessed by Canada’s construction workforce (Leeson, 2010; Goodland, 2012; Aitkenhead, 2012). A recent ILO (2012, p.127) study concluded that:

“Experience in a growing number of countries, both industrialized and developing, demonstrates that the construction of energy- and

¹⁰ This is not to imply that the industry will automatically provide jobs to workers who have acquired green skills. The economics of the labour market will determine employment, absent much tougher government requirements forcing industry to adopt low carbon construction. However, if there are fundamental changes in the industry’s support for green building techniques, then a qualified workforce will be essential.

resource-efficient buildings requires competent enterprises and a skilled workforce. Poorly installed equipment and materials do not yield expected gains in efficiency and emissions reduction. Targeted investments in skills upgrading and certification of building firms, formalization – notably of small and medium-sized enterprises (SMEs) which dominate the sector – and improvements in working conditions to retain qualified workers are therefore essential components of a successful strategy.”

Indeed, much of the literature indicates that trades workers require significant additional training beyond what they have received in a conventional apprenticeship (Goodland, 2012). The building industry’s overall lack of support – both policy and financial - for a comprehensive, industry-wide training and apprenticeship system results in large segments of the workforce that lack both the basic skills and the enhanced ‘green’ skills needed to meet the challenges of implementing low carbon construction competently.

While the need for a high level of skills may seem apparent in new construction, as noted earlier the need for such skills is even greater in retrofitting. New construction only accounts for about 1 ½ percent of Canada’s total building stock. So the impact of low carbon construction in new building is relatively small and will take generations to have a significant impact. Retrofitting the existing built environment is thus critical to implementing an effective climate change program. The existing building stock is characterized by a wide diversity of building types, materials, technologies, dates of construction, and many other factors. The approach to construction at the turn of the nineteenth century, or in the 1920s or 1930s – and many of these buildings still exist – is significantly different from that of buildings constructed in the 1980s or 1990s. Each building has its own particular challenges with respect to retrofitting. There is no general ‘cookie cutter’ for much of what has to be done to reduce its carbon footprint.

Decisions about what needs to be done to ‘green’ the existing building stock require both an understanding of the particular attributes of individual buildings and a knowledge of the options now available to reduce energy consumption. These options must also be assessed in light of their cost effectiveness, installation complexity, skill requirements/skills availability and a variety of other factors. They require an understanding of the fundamentals of building construction and the possibilities arising from the new ‘green’ technologies, materials, and

systems now available. This requires knowledge, judgement and a clear understanding of the challenges that have to be overcome.¹¹

Construction workers are constantly involved in problem solving on the work site. They normally do this without close supervision. Often on smaller projects only one or two members of a trade are responsible for handling the work and they are expected to do it to on their own in a way that meets the professional standards mandated by the architects, engineers or prime contractors. While there are tasks on building sites that can be performed by workers with little or no training or skills, retrofitting does not readily fit in to this pattern. In reality every project is different and every project has its unique challenges, many of which are not predictable in advance. Consequently, the trades have to be able to analyze the characteristics of a wide variety of building projects and make judgements about how best to implement the objectives of these projects in a cost effective, safe and efficient way.

It is true that those further up the supply chain, and particularly architects and engineers, are positioned to make many of the 'big picture' decisions about the selection of appropriate technologies or changes to building design or building systems. But the practical challenges facing retrofitting are ones that must be addressed on the job site by those actually doing the work. It is they who, for the most part, are able to see the details of what is

11 The negative consequences of relying on a deregulated approach to implementing green retrofit programs were starkly illustrated in the experience of Australia with its Energy Efficiency Homes Package (EEHP) normally referred to as the Home Insulation Program (HIP). This was part of the federal government's response to the 2008 global economic meltdown. This program, announced at the beginning of 2009, was part of a larger \$42 billion *nation building jobs plan*. The insulation component was targeted to reduce energy consumption by as much as 40 percent in 2.7 million Australian homes, although the number actually ended up being only a small fraction of this target. While the overall GHG reduction approach of the Australian federal government to the fiscal meltdown was, arguably, far more thoughtful than what the Canadian government did in its comparable, but reluctantly implemented, infrastructure program, the actual implementation of the HIP was characterized by a number of major installation problems. Large numbers of unskilled workers with little understanding of the potential dangers associated with electrical fires resulting from careless installation of insulation in attics were commissioned to do the bulk of the work. However, their work quickly resulted in a numerous fires, and a small number of fatal electrical accidents among the poorly trained installers. This led to a major public reaction to the program, a number of high profile government investigations at both state and federal levels and a rapid shift to other less dangerous conservation options such as heat pumps. Alan Hawke noted that a subsequent audit performed in Queensland and cited in the Commonwealth Parliamentary debates revealed the following: "Over 14,600 roof inspections have been undertaken, and 1000 targeted audits of electrical safety issues in Queensland have also been carried out as at the end of the program. The results of roof inspections have shown significant levels of work that did not fully meet quality and safety standards (16 percent of inspections revealing quality issues and 7.6 percent of inspections revealing safety issues) (Hawke, 2010, p. 55).

currently in place and it is they who are often in the best position to assess the right choices for implementing low carbon construction. Introducing new materials, new technology, and new working practices is contingent on construction workers - and particularly the skilled trades - knowing how to install these innovations correctly. Thus while the role of labour is only one component of the broader package of changes needed to 'green' the construction industry, it is nevertheless a critical one. And the failure to address this area significantly limits the ability of the industry to implement many of the climate innovations that architects, engineers, project managers and policy makers wish to achieve.

Similarly, the establishment of more stringent energy conservation requirements in building codes is contingent not only on having an effective and adequately resourced enforcement system to ensure that builders comply with these requirements, but also in having a workforce that knows what the codes require and is capable of implementing them on the building site. Knowledge of building codes is a key part of building work. It requires extensive training.

All of this underlines the need to strive for much higher levels of training and skills within the industry. Yet, as noted, the economic characteristics of the industry make the achievement of this objective difficult. The extensive underground economy, the large number of very small employers and independent operators with no training capacity, the extensive reliance on sub-contracting which encourages use of the least qualified labour, the prioritization of low bid over quality, the difficulty in costing the long term benefits of lowering energy consumption, the split between owners and tenants which encourages the former to minimize spending on conservation and numerous other factors push the industry in the opposite direction. Rather than recognizing that effective climate change programs will require a major commitment to training and upgrading the skills of the workforce and major changes to the fundamentals of how the construction industry is organized, both government and industry participants remain wedded to an unregulated market model based on narrowly conceived price competitiveness and opposition to government regulation.

THE ROLE OF WORKERS AND THEIR UNIONS IN IMPLEMENTING GREEN CONSTRUCTION

A third barrier to the greening of the construction industry is the limited role that building trades' workers and their unions currently

play in this process.¹² Outside Quebec, less than a third of the industry is organized. Union representation is concentrated in the ICI sector and primarily with large contractors. It is also uneven, varying considerably among the trades and between the trades and semi-skilled or unskilled construction workers. Although average union density in construction has remained fairly constant at just under a third of the workforce during the past fifteen years in Canada, after falling significantly during the 1980s and early 1990s, this figure conceals major shifts in the pattern of unionization, with increases in Quebec offsetting declines in English Canada. (Charest 2003, Statistics Canada Labour Force Survey, Table 282-0078)

Construction Collective Agreement Coverage in Canada 1997 – 2012

(Percent of Workforce)

Province	1997	2000	2003	2006	2009	2012
Newfoundland & Labrador	25.71	27.27	20.78	27.10	26.62	31.95
Prince Edward Island	20.59	13.79	19.35	13.95	17.95	23.68
Nova Scotia	38.16	26.97	22.78	26.40	23.98	28.99
New Brunswick	27.78	29.41	20.00	21.74	29.72	25.13
Quebec	48.48	50.11	56.25	57.69	57.80	59.30
Ontario	32.62	32.42	32.99	29.52	30.51	31.51
Manitoba	22.56	21.47	17.34	27.83	22.48	22.22
Saskatchewan	22.86	24.66	23.31	22.01	17.67	21.60
Alberta	17.19	21.04	21.67	18.78	19.29	19.38
British Columbia	31.31	31.77	30.51	25.02	20.35	21.89
All Canada Union Coverage	32.39	32.53	34.19	31.67	31.23	32.76

Source: Statistics Canada Table 282-0078 Labour force survey estimates

12 This section should not be misinterpreted as saying that unions in all sectors of construction are in decline. For example, unions with specific skills in certain sectors, such as UA which represents pipeline workers, enrol virtually all workers involved in laying large diameter pipelines, an economic activity that is expanding. Individual unions in other sub-sectors of construction, such as the IBEW in certain provinces have also maintained or increased union density in areas such as hydroelectric utilities. However, the point is that when all sectors of the industry are examined, the overall influence of unions has been weakening, at least outside Quebec.

Overall, the influence of the building trades unions - like the larger Canadian labour movement - has been on the decline (Charest, 2003). Despite these setbacks, some unionized trades, such as the International Brotherhood of Electrical Workers (IBEW) continue to play a major role in establishing and enforcing the qualifications for their trade through its role in the National Electrical Trades Council (NETCO) (MacLeod, 2012). Construction unions in Ontario have persuaded the government to give them a role as board members overseeing the construction component of the newly established College of Trades. And building trade unions in certain regions, such as the greater Toronto area, continue to organize significant numbers of workers in major commercial and industrial projects (although the residential sector remains largely unorganized).

Nevertheless, some unions continue to play a significant role in training and apprenticeship. In Ontario, for example, they operate over 200 trades training facilities, normally in co-operation with unionized employers (O'Grady, 2005). The building trades unions have collective agreement provisions requiring their employers to contribute part of the wage package - normally about 1 percent of payroll (in the form of a specified number of cents per hour) - to Training Trust Funds (TTFs). TTFs are jointly managed by a union and a group of contributing employers with which the union has collective agreements. They provide part, or all, of the classroom training that apprentices require, in some cases supplemented by provincial government purchases of training 'seats'. They may also share some of the classroom training with publicly funded community colleges or purchase classroom capacity from them.

In an industry characterized by numerous small employers, where few have the capacity to guarantee apprenticeships, individually, or provide the classroom component of training, the TTFs fulfil an important industry need. Most apprentices work for a number of employers during their training and their union affiliation provides employment continuity during this period. Because they are based in multi-employer collective agreements, TTFs tend to have stable funding over time which facilitates long term planning of courses and programs. O'Grady estimates that in Ontario fully 25 percent of building union members receive some training each year from TTFs. They also have an excellent track record in terms of the percentage of apprentices who actually complete their apprenticeships - a rate that is far higher than in the non-union sector (O'Grady, 2005) This contrasts sharply with a number of federal and provincial government policy initiatives, such

as providing training tax credits to employers, which have simply failed to achieve better apprenticeship outcomes despite large outlays of public funds on these programs (Hamilton-Smith, 2012).

The major exception is Quebec where the building trades have significantly expanded their role in training and apprenticeship, a development that reflects the provincial government's very different approach to construction labour relations and its willingness to require employers to take more responsibility for training through its payroll levy system. The government's 1968 legislation - an Act Respecting Labour Relations, Vocational Training and Manpower Management in the Construction Industry (Bill R-20) - has encouraged collective bargaining in the construction sector and resulted in relatively high union density.¹³ Quebec unions have been able to establish a wide network of TTFs through negotiations with unionized employers and these continue to play a central role in trades training in the province (Charest, 2003; O'Grady, 2005). According to the Commission de la Construction du Quebec, its \$150 million training fund supports 20,000 trainees, annually, for apprenticeship and continuing trades training. Minimally, as in Quebec, public policy in English Canada should recognize and support a much greater role for unions in trades training.

Another way governments can work with unions in supporting training is through the use of project agreements such as BC's Vancouver Island Highway Project. This was the largest construction project in western Canada during the mid-1990s. The provincial government created a public corporation to act as the employer of all the construction labour on the project. It then negotiated a blanket agreement with the 13 highway construction unions which included commitments to local hire, local training and a major focus on training for members of BC's four equity groups. In an industry in which equity group participation was about 2 percent overall, the Vancouver Island Highway achieved equity participation of just over 20 percent of all hours worked during the 8 years of the project. Union training facilities played an important role in this process (Cohen and Braid, 2003; Calvert and Redlin, 2003).

13 In the fall of 2013, new Quebec legislation entitled an *Act to Eliminate Union Placement and Improve the Operation of the Construction Industry* established the Carnet Reference Construction, a body that registers all construction workers covered by the R-20 law and acts as a clearing house that employers must now use when they hire workers. Workers must post a resume outlining their skills and training on the Carnet's web site in order to be hired. There is considerable dissatisfaction among unions about the new limits it places on their earlier role in dispatching workers to employers. Approximately 85 percent of workers were already directly hired by employers before the new law was enacted, but those who were dispatched by the unions normally went to the larger work sites. Whether this new law will have a significant impact on union density is not yet clear. See: <http://carnet.ccg.org/en/>

SUPPORTING A GREATER ROLE FOR CONSTRUCTION UNIONS

Despite the evidence that unionized workplaces have a much higher success rate in apprenticeship completions and that unions have been consistent advocates of the maintenance of a high quality training system, most policy makers do not see them as major players in the green transformation of the industry. In much of the literature on greening the construction industry, unions simply do not exist. In fact, a number of provincial governments, such as BC's, have taken steps to exclude them from provincial training authorities while enacting changes to labour codes and procurement policies designed deliberately to weaken the role of organized labour in the industry and, not insignificantly, to deny construction workers a voice in this process.

Similarly, outside the specific organizations that unions and unionized employers have jointly created to promote training and workplace skills, such as the National Electrical Trade Council (NETCO), government policy makers and many advocates of 'greening' the built environment generally ignore the potential role of unions in this process. The assumption is that low carbon construction will be introduced successfully without the active involvement of workers – other than by doing what they are assigned to do.¹⁴

One reason why policy makers have not been more interested in viewing unions as major players in 'greening' the industry is that there has been a more general shift in Canada towards a neoliberal labour relations paradigm, in which the role of all unions is marginalized. The labour climate has become increasingly hostile to unions at both federal and provincial levels, as evidenced by regressive changes to labour leg-

14 The Federal Government's trades training initiatives have focused on providing skills for its favoured resource extraction industries where it needs the training expertise of a number of the construction unions. The goal is to get unions to address industry needs in the absence of other apprenticeship and training options the Federal Government might otherwise prefer. Arguably, it is courting some of the major building trades unions not because it supports unionization but because it – and resource industry employers – needs them, at least for the immediate future. However, its policies are designed to enable employers, not unions or workers, to have a greater say about where public money for training will be allocated. For example, its controversial Canada Jobs Grant program provides no new money. Rather it will shift \$300 million, annually, from existing Canada Labour Market Agreement training programs to its more employer-focused approach. The Federal Government will provide employers with up to \$5,000 per trainee to be matched by an equal contribution by provinces and, in theory, employers. However, these initiatives to meet the needs of employers have not been accompanied by any policies designed to expand union representation. Significantly, there is virtually no mention of unions in the Federal Government's outline of its various employment and training initiatives in its Canada Action Plan 2013 with the exception of its Helmets to Hardhats program for veterans (<http://actionplan.gc.ca/en/initiative/canada-job-grant>).

islation and the increasing tendency of governments to impose back to work legislation whenever unions take strike action. In the context of an overall anti-labour shift by the current federal and most provincial governments, arguments about the potential benefits of a greater union role in training, apprenticeship and climate change initiatives go against the tide. Yet the evidence is clear: a highly skilled construction workforce is now needed to implement climate objectives and unions have demonstrated that they can contribute to this process.

That there is significant potential for unions to play a greater role in climate initiatives as is evidenced by a number of promising initiatives in the built environment. One example is the work of the BC Insulators union which has developed a comprehensive package of new building code measures and government procurement requirements explicitly designed to significantly reduce GHG emissions and energy consumption (Lee Loftus, President, BC Insulators, interview June 7, 2012). It has made numerous presentations to BC municipalities and to the provincial government advocating implementation of these policy changes. It has also worked closely with the BC Institute of Technology (BCIT) in modifying the classroom training program for apprentices in the insulating trade to include new climate modules. And it has worked extensively with both the environment committee of the BC Federation of Labour and the BC Green Jobs Coalition to advocate tougher climate policies.

Similarly, at the national level, the IBEW has worked closely with industry through the NETCO to develop new standards and training modules for the installation of solar PV equipment and related renewable electric vehicle technology. Qualified electricians can now add a certification in these areas to their trades' qualifications (Carol MacLeod, NETCO interview Aug. 12, 2013; Andy Clevon, IBEW interview July 12, 2012; MacLeod, 2012).

The implementation of low carbon construction on the job site aligns well with the building trades unions' goal of maintaining high standards of skills and supporting the apprenticeship and training system (Lowe, 2009; Loftus *op. cit.*; Clevon, *op. cit.*). True, their goal of a high skill, high wage industry reflects their self-interest in maintaining, or improving, the wages of their members and reflects a desire to exercise control over the labour process. At the same time, most skilled trades take pride in the exercise of their skills and in their ability to adapt to a wide range of problem solving situations – a key feature of effective climate retrofitting.

The interests of building trades unions also correspond to the need to have a more stable and permanent workforce, with a long term attach-

ment to the industry. Their members want a career, not just a job. This too, is a precondition for expanding and maintaining the knowledge base essential to implementing low carbon construction. High turnover in the industry, especially among trainees who fail to complete their apprenticeships, is not conducive to effective climate programs.

But the final aspect of this is the role of unions in contributing to a change in the culture of the workplace – a culture that values work well done and takes pride in learning and exercising demanding skills (Sennett, 2009). The challenge of incorporating climate issues into a stable workplace culture that already supports these values is far less than one of attempting to do so in the context of a workforce that is poorly skilled, precarious, low paid and with little or no long term attachment to the industry.

CONCLUSION

This article has identified three major problems that are impeding the ability of the Canadian construction industry to meet the challenge of global warming: the extensive and largely unregulated underground economy, fundamental weaknesses in the training and apprenticeship system and the failure to include workers - and the unions that represent them - in the process of greening the built environment. It has not claimed that these are the only, or indeed the most important, impediments.¹⁵ But it does assert that addressing these three problems is an essential part of what needs to be done. And it also recognizes that there is no single (or simple) answer to resolving these problems. Rather, a combination of different policy changes is needed that, together, can fundamentally shift the focus of the industry in a more environmentally responsible direction.

Provincial and federal governments must take a co-ordinated approach to dealing with the underground economy. This means enforcing tax, WCB, EI, CCP and other statutory obligations. Provinces and municipalities can enforce building codes vigorously and ensure that contractors meet health and safety and employment standards regulations. A comprehensive contractor licensing system, coupled with registration of workers, can also facilitate more extensive oversight of the sector, making it easier to monitor tax evasion, protect worker interests and provide more effective consumer protection.

15 Thus, we have not discussed issues such as the major role that publicly funded trades training colleges can play, a greater emphasis on climate issues in the education of architects and engineers, the comprehensive 'greening' of municipal planning and building codes and direct government financial support for training and apprenticeships, to cite a few of the more obvious areas where major climate initiatives are also needed.

Governments need to require all employers, contractors and self-employed owner operators to contribute to workforce training by paying a compulsory training levy and hosting apprentices. This will address the ‘free rider’ problem and provide funds for employers and unions who support training, eliminating one of the major financial barriers to successful apprenticeships. Governments in some provinces can also expand the scope of compulsory trades to ensure that workers performing skilled jobs are actually qualified to do this work. More stringent licensing of the trades would also provide a major incentive for workers to take formal training or apprenticeships, given that, once completed, these qualifications would provide greater job opportunities (Armstrong, 2008). This should be accompanied by the introduction of major ‘green’ components to the curriculum of the trades training institutions. Governments can also condition their purchase of construction services by requiring contractors to employ apprentices on publicly funded projects. And they can restore, or expand, apprenticeship and training in their own operations.

Turning to unionization, changes to labour legislation can play a role in industry transformation by supporting, rather than undermining union representation. As the example of Quebec illustrates, supportive labour law and extensive industry regulation does make a difference (Charest, 2003). Governments can support union training centres through training seat purchases and through dedicating payroll training levies to them.

The work of some unions, such as BCs insulators and the IBEW in pushing for better climate policies was noted earlier. Unions outside the building trades, both nationally, and internationally, have developed policies that focus on what they describe as a just transition to a low carbon economy (SustainLabour, 2008; CEP, 2009; ITUC, 2013). Investing in major retrofitting of the existing built environment is an extremely effective way to create employment. There is an enormous potential to create new construction jobs in energy conservation and retrofitting, given the size of the existing stock of buildings and the urgency of reducing GHG emissions and energy use.¹⁶

As was indicated at the beginning of this paper, there are a variety of other measures needed to ‘green’ the built environment in addition

16 An example of this is found in the approach of the Danish construction unions to the economic crisis of 2008. Recognizing that a stimulus package was needed to address the crisis, they lobbied the government (successfully) to bring forward a number of major building retrofitting programs which they argued would both create jobs and reduce the country’s carbon footprint (Calvert, 2011).

to the three discussed above. Clearly, effective action requires a comprehensive approach that includes a wide range of initiatives affecting many different components of construction. Moreover, as noted, many of the major planning, technological and organizational changes are beyond the scope of the construction workforce itself. Innovations currently being promoted by progressive climate scientists, architects, planners, engineers and developers, as well as proponents of various regulatory and building code amendments are essential to reducing Canada's GHG emissions and energy use.

However, the present policy framework supports the status quo in English Canada and undermines efforts in a variety of areas to restructure the construction industry. The industry is failing, by a wide margin, to achieve sufficient progress on climate issues. Its commitment to free market policies effectively precludes the kinds of major policy measures now required. Hostility to public regulation, failure to tackle the abuses of the underground economy and industry's unwillingness to support fundamental changes to the current training and apprenticeship system – including a larger role for unions - are all major barriers to achieving a workforce capable of implementing low carbon construction successfully. Absent significant changes to the basic organization of the construction industry, it will not have the capacity to implement the kinds of climate measures that are now so urgently needed.¹⁷

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