The Union as Climate Change Advocate:

the BC Insulator's Campaign to "Green" the Culture of the Building Industry in British Columbia

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By John Calvert and Corinne Tallon

Simon Fraser University, Burnaby, BC Canada

Abstract

This paper examines the efforts of one Canadian building trades' union, the BC Insulators, to influence the culture and climate change policies of the construction industry in British Columbia. The union's members install and inspect mechanical insulation (MI) on heating, ventilation and air conditioning (HVAC) systems in commercial and industrial buildings. Its climate advocacy was prompted by the failure of the province's construction industry to implement appropriate quality standards due to its culture of low bid construction practices and its unwillingness to train and employ qualified insulation workers. This failure was compounded by the reluctance of government to impose and enforce stringent building codes to reduce the carbon footprint of buildings. Recognizing the significant contribution that MI can make to reducing energy use and GHG emissions, the union embarked on a major campaign to promote the climate benefits of MI. It funded independent, technical research papers, commissioned best practice manuals with detailed guidelines on installing MI and initiated an extensive and carefully organized public education campaign to pressure industry and government to raise standards. It approached municipalities, building contractors, government officials, property developers, industry professionals and trade organizations to alert them to the importance of reducing the energy footprint of buildings. It pressured governments to raise MI standards in procurement of new and refurbished buildings and implement tougher requirements in their building codes. And it introduced climate change literacy into the curriculum of the apprenticeship system it oversees. This paper documents the union's comprehensive campaign as an illustration of the contribution labour can make to addressing the critical challenge of global warming

i) Executive Summary

The scientific community has made a profound contribution to our understanding of the threat of global warming and the urgent need to take effective mitigation measures to prevent a potentially cataclysmic increase in temperature by the end of the century. However, most discussions of climate change tend to overlook the role that labour can play, both in mitigating and adapting to global warming. Labour's voice is largely absent – or ignored – in the way climate issues are discussed in much of the academic literature and in the media. There are good examples of unions that have been working energetically to implement significant mitigation measures. This paper presents a detailed analysis of the efforts of one building trades' union, the British Columbia Insulators (BC Insulators), to contribute to this effort.

Buildings account for approximately 35% - 40% of energy use and are a major source of greenhouse gas (GHG) emissions in developed countries, primarily from burning natural gas, oil and other fossil fuels (IPCC 2014). Reducing emissions from this sector is a critical objective if we are to avoid a 4-degree Celsius increase in temperatures by the end of this century. This means dramatically reducing the energy consumption of the many types of buildings in which we live and work. Improving the energy efficiency of buildings can significantly reduce fossil fuel requirements and, correspondingly, reduce the need for additional investments in renewable energy to bridge the energy supply gap.

The Heat, Frost and Asbestos Workers' Union, Local 118 (BC Insulators) is a small Canadian trade union located in the western province of British Columbia. The union represents about 450 journeypersons and apprentices who install and maintain mechanical insulation (MI) in heating, ventilation and air conditioning systems (HVAC). Furnaces, boilers and air conditioning systems are responsible for as much as half of the energy consumption of commercial and industrial buildings. Consequently, improving their efficiency through insulating them properly is key to reducing GHG emissions and energy use in HVAC systems. The members of the BC Insulators' union are highly trained with a Trades Qualification (TQ) based on completion of a 4-year apprenticeship in HVAC systems and related building insulation methods which requires a total of 6,000 hours to complete. This is a nationally recognized standard for excellence under Canada's Red Seal certification system. Consequently, journeyperson MI's are fully capable of installing the latest energy saving systems and technologies in virtually every type of building, including the most sophisticated installations currently being introduced into the building industry.

Partly because of the nature of the building work its members perform which is intimately associated with improving energy efficiency, partly due to its frustration at the industry's failure to raise installation standards and partly due to the union's gradual recognition of the positive role its members could play in mitigating climate change, the BC Insulators has embarked on a remarkable campaign to encourage BC municipalities, the Provincial Government and the broader construction industry in the province to raise standards of MI to reduce GHG emissions

and energy consumption. This campaign supports the ambitious climate goals established by the BC Provincial Government and the Climate Charter ratified by almost all of BC's municipalities. However, from the union's perspective, these goals can only be achieved by implementing fundamental changes to the organization of the province's building industry – an industry characterized by a competitive, low bid culture that has failed to implement well-established, low carbon construction methods.

It is true that a small segment of the BC industry has attempted to incorporate climate change objectives into its projects, including standards such as Leadership in Energy and Environmental Design (LEED). But the mainstream industry remains committed to conventional building approaches in which quality is sacrificed to minimizing labour and material costs. To the extent that the industry has addressed climate issues, its activities have largely focused on building new, boutique projects for particular market niches involving purchasers wanting to demonstrate their climate commitment. But even these projects are subject to the same financial pressures regarding cost-cutting and project timelines, with evidence of significant shortcomings in the implementation of energy conservation systems and inadequate, or wholly absent, measures for assessing life cycle energy efficiency.

To address the absence of government and industry leadership in raising standards for MI, the union commissioned a major independently-researched technical study on the economic and climate change benefits of state-of-the-art insulation on HVAC systems by the engineering consultants HB Lanarc (Lanarc). The study "Pipes Need Jackets, Too" documented the significant contribution improved MI could make to meeting the province's ambitious climate change objectives while achieving long term energy savings for building owners. It provided the study to the Provincial Government, local municipalities and the BC construction industry as part of its campaign to improve construction practices in the province. It also lobbied governments to raise standards in municipal and provincial building codes and implement more rigorous inspections of HVAC installations.

To address the lack of clarity and absence of consensus within the industry about the technical requirements of state-of-the-art MI, the union then funded the development of a more detailed manual on best practices. The purpose was to provide contractors with clear instructions on how to install MI properly. With the help of associates at Lanarc, who had assisted in the "Pipes Need Jackets, Too" study, the union developed an extensive list of specific recommendations on raising the out-dated and inadequate standards of provincial and municipal building codes to align them with industry best practices. To address the need to provide workers with a more comprehensive understanding of climate issues, it developed a new "Green Awareness" course for the provincial apprenticeship program that adds climate literacy to the curriculum. This is now incorporated as a required foundational course for all first year insulation apprentices studying in BC's public trades' colleges.

To deal with the absence of qualified inspectors, the union initiated an MI inspector training program for the industry. The services of certified graduates from this program are now being offered to both government and the private sector to evaluate the quality of installations in commercial and industrial buildings. It has expanded its climate campaign through numerous presentations at trade shows, conferences and government and industry forums both in Canada and the US. And, it has consciously built collaborative relationships with a number of BC's major environmental NGOs who it sees as key allies in its campaign to 'green' the province's building industry. Over a six-year period, this small union of only 450 journeypersons and apprentices has spent just under one million dollars in support of its campaign.

The purpose of this paper is to document the evolution of the union's climate activism, from its initial efforts to raise industry standards through its gradual recognition of the contribution MI could play in mitigating climate change to its current role as a vocal advocate encouraging the building industry to adopt low carbon construction practices. The paper extensively documents the union's efforts, as well as identifying lessons that the broader labour movement might learn from this campaign.[1]

The union's goals have been ambitious. It has sought to change the culture of the construction industry in BC by shifting its focus from a narrow, short term, lowest-cost approach to one which recognizes the importance of reducing energy use over the life cycle of new and refurbished buildings. Its approach explicitly links its' members' work with the achievement of key climate change objectives. In the process the BC Insulators provides an example of how one small union, with the support of its members, has attempted to 'green' the culture of the industry in which it operates.

ii) Outline of the Paper

This paper is organized as follows. The first section reviews the current academic literature on the contribution of heating, ventilation and air conditioning to both the energy consumption and GHG impacts of the building sector. It documents the size of this contribution and hence its

[1] In carrying out this research, the BC Insulators provided the authors of this paper with unrestricted access to the union's files on its campaign to raise mechanical insulation standards in the industry. (A listing of key internal union documents is included as a bibliographic appendix to this paper). The authors also carried out extensive interviews with Lyndon Johnson, Executive Board Member and Trustee; Lee Loftus, Business Agent; and Ken Jakobsson, course instructor for the apprentice program in which they provided a detailed account of the various activities of the union's campaign to raise MI standards in BC. The authors would like to thank Ms. Danni Craig who assisted with the development of the paper's review of the role and potential of buildings to mitigate climate change. Subsequent research will evaluate the union's efforts to influence the policies and regulations of the provincial and municipal governments, promote its climate initiatives with developers, contractors and other industry professionals and introduce climate literacy into the apprenticeship curriculum. The authors would also like to thank the Canadian Social Science and Humanities Research Council for its support for this paper through funding the "Adapting Canadian Work and Workplaces to Respond to Climate Change" research project.

potential significance in mitigating climate change if low carbon, or zero carbon, construction practices are fully implemented. The second section discusses the contribution that mechanical insulation (MI) can make to lowering the carbon footprint of buildings. The third notes the critical importance of proper installation of MI and the corresponding requirement for a well trained, highly skilled workforce. The fourth section provides an historical account of a series of crises in the province's building industry, including the leaky condo debacle of the 1990s and the controversy over weak and poorly enforced fire-stopping regulations. A decade later, evidence of sub-standard construction practices again emerged with the Olympic Village scandal which is dealt with in the fifth section of the paper. These crises underscored problems of shoddy workmanship, inadequate building regulations and widespread complacency about the need to promote high quality construction practices. In the sixth section, the paper examines how growing public awareness of the impact of climate change influenced the union's own understanding of the issue and led it to conclude that it could play a significant role by explaining how much energy could be saved by raising MI standards. But its frustration at persuading both government and industry of the need for major change led it to recognize that it faced a credibility challenge, as many industry participants discounted anything proposed by a trade union. The seventh section documents the union's decision to commission a well respected engineering study firm, HB Lanarc (Lanarc) to provide credible, independent documentation of MI's benefits. It also provides a detailed analysis of study's findings and its recommendations.

Section eight of the paper documents the union's efforts to use the findings of the Lanarc study to embark on an advocacy campaign that included educational material, meetings with municipal governments and the Provincial Government, promotion of higher MI standards to the building industry and the use of the media to highlight its proposals for building code changes. In developing the campaign, the BC Insulators consciously linked the insulation requirements of modern HVAC systems to the achievement of progressive climate objectives. The ninth section discusses the union's decision to focus its energies on changing the policies and practices of local governments where it felt it could get the most sympathetic hearing. It describes the union's efforts to persuade local governments to include higher standards of insulation in their own contracts for the construction, or refurbishment, of public buildings, as well as the regulations they established for the broader building industry within their jurisdictions.

The tenth section analyzes the decision of the union to carry out a comprehensive review of the strengths and weaknesses of its campaign with the intention of refocusing its efforts in areas where it felt it could make the most progress. One of these is described in the next section in which the union decided to fill a major industry gap in the technical area by commissioning a detailed manual outlining the best practices of MI and making it available to industry stakeholders at no charge. The penultimate section of the paper examines the union's efforts to implement changes in other areas of the industry, including promoting MI at a number of major building industry conferences, supporting 'green' building industry organizations and establishing working relationships with a number of provincial environmental organizations. The

final section looks at the union's decision to introduce a climate literacy module into the curriculum of the apprenticeship system so that insulation workers would understand the role their trade can play in mitigating climate change.

1. The Role of Buildings in Mitigating Climate Change

The most recent IPCC report estimates that without significant mitigation, global mean temperatures will increase from 3.7°C to 4.8°C by 2100, compared to pre-industrial levels (IPCC 5th Assessment Report for Policy Makers, 2014, p.8) Globally, the building sector accounted for 32% of final energy use (8.8 Gt C02 emissions) in 2010 and 19% of GHG emissions (Ibid. p. 22). Buildings of all types - residential, commercial and industrial - consume about 31% of energy used in Canada, 41% in the US, 40% in the EU. (NRC 2012, IEA 2014; IPCC 2014, Eurostat 2015).[2]Absent fundamental policy changes, energy demand is projected to increase by between 50% and 150% of pre-industrial levels in the coming decades.

Heating, cooling and air conditioning systems (HVAC) are the principal consumers of energy in buildings. US data indicates that these systems account for 50% of total building energy use while the European share is 40% (Vakiloroaya et. al. 2014). Reflecting its colder climate, HVAC accounts for 61% of building energy use in Canada. (NRC 2005). Consequently. buildings represent an enormous potential for reducing the climate footprint, both in Canada and globally if low carbon approaches to new construction and renovations are widely adopted.

There is a broad scientific consensus that full implementation of current technologies, coupled with determined efforts to overcome well-known barriers to the achievement of sustainable building practices can dramatically reduce the carbon footprint of this sector. Energy savings of between 50% and 90% are currently possible in new buildings and 50% to 70% in refurbished buildings using deep retrofit techniques. (IPPC 5th Assessment Report 2014 - Buildings, p. 675). Due to their longevity, the carbon footprint of buildings constructed today will continue to affect global warming for generations into the future, underscoring the urgent need to adopt aggressive low carbon practices as quickly as possible. (IPPC 5th Assessment Report 2014 -Buildings, p. 686).

However, there are many barriers to successfully implementing low carbon HVAC systems in new and retrofitted buildings. These include, but are not limited to: split incentives between owner and tenant, inadequate up-front finance, costing approaches that ignore life cycle impacts, lack of technical knowledge, weak building codes, poorly trained installers, inadequate inspection systems, underground or black market installation practices and a general unawareness of the significance of this component of construction in determining energy use over the life cycle of buildings.

[2] The principal reason Canada's percent is significantly lower than the US or EU is due to the larger component of fossil fuel production in Canada's economy. Oil and gas projects, in particular, consume large volumes of energy.

Construction is a highly competitive industry in which builders rely heavily on low bid contracts to attract business. This means they are under pressure to minimize costs by installing the cheapest systems permitted by current building codes, while cutting corners on labour costs by employing unskilled or semi-skilled workers. However, implementation of effective MI is significantly dependent on the skills and knowledge of building workers on the construction site. Reliance on low bid contracting discourages employment of qualified workers and frequently results in HVAC systems failing to achieve their design objectives, a problem exacerbated by the difficulties in measuring the effectiveness of these systems.

2. What is Mechanical Insulation (MI) and Why is it Important for Mitigating Climate Change?

Mechanical Insulation (MI) is the term used to describe the process of insulating pipes, ducts and other components of HVAC systems (National Insulation Association 2009). HVAC systems use energy to control the temperature and ventilation of buildings and service a wide range of equipment within buildings. They work by circulating temperature-controlled air, water, or other fluids to maintain designated internal temperatures, or to carry out specific functions such as steam sterilization in hospitals (Paoli 2011). They normally have a heat source such as a furnace or boiler. Or, in the case of air conditioning, they have a heat exchanger or some combination of furnace and air conditioner.

HVAC systems are composed of interrelated ducts or pipes. Ducts are normally constructed using sheet metal but other materials may also be used, including fiberglass or plastic. Pipes may be of various metals, fibreglass, or different types of plastic. HVAC systems normally have a variety of other components, such as fans or pumps to manage fluid flows, control temperature and adjust for humidity. (Aydin and Ozerdem, 2006; ASHRAE 2014). While HVAC systems normally utilize electricity, both for heat and to power their functions, in most systems natural gas or oil – fossil fuels – are the dominant source of energy and hence the principal target of energy savings.

The purpose of MI is to limit the escape of heat (or cold) from pipes and ducts and other components of the HVAC system. It also minimizes drafts from ducts, and condensation from pipes and related equipment. There are a number of different types of insulating materials and the selection of a particular type depends on whether it is being used on duct work or piping. It is also dependent on the extent of insulation needed, building design, exposure to the elements, cost of installation, location and various other factors (Lanarc 2010; Lanarc, 2012; Lang et al., 2012; BPIE 2015).

MI installations are important contributors to the energy and thermal performance of HVAC systems in buildings, and thus play an important role in energy efficiency and its role in mitigating climate change. (Lanarc 2010; Lang et al., 2012) Proper application of MI is important to maximize its effectiveness and to maintain its longevity as exposure to moisture or rapid temperature changes can be damaging to poorly installed insulation, resulting in excessive energy loss. Condensation can undermine insulating capacity and contribute to corrosion or damage to HVAC equipment and

other components of buildings. (Carrie et al., 2008) Missing, damaged or improperly installed MI can significantly reduce heating and cooling system efficiencies. According to the IEA, energy loss can be up to 20% of total building energy consumption. (IEA 2013)

Faulty installation of MI can also have significant adverse effects on the health of building occupants (WHO 2015). There is an extensive literature on the negative health impacts of poorly installed insulation. (ASHRAE 2009; Davies, M. and T. Oreszczynb 2012; Reijula et. al. 2013). Air-borne organic, or chemical, contaminants can circulate through ducts causing numerous health problems, including asthma, allergies and other illnesses, often summarized under the rubric 'sick building syndrome.' (Niemela et. al. 2006). Dampness from pipes can also result in the build-up of moisture on interconnected walls, ceilings and floors, exposing occupants to dampness-related illnesses. Various forms of mould are themselves a significant health hazard. (WHO 2009; Altamirano-Medina et. al. 2009, Spengler et. al. 2011). Uninsulated pipes or ducts can be a fire hazard for entire buildings, while exposed pipes and ducts can cause burns to building occupants touching them.

MI is also important in ensuring that HVAC systems are able to control building temperatures effectively, including keeping temperatures even, minimizing drafts, suppressing noise and, in a variety of other ways, contributing to the comfort of those who work or live in buildings. Effective climate control within buildings may also contribute to improved productivity and heightened job satisfaction (Seppanen 2006). While the overall consumption of energy in buildings is critical in assessing the climate impact, effective temperature control also makes a significant contribution to the well being of those who work, or live, in buildings.

In recent decades there have been major strides in improving HVAC technologies and the various components and insulating materials used in MI installations. Further incremental progress is anticipated in the coming years. However, while considerable attention is focussed on the newest, most sophisticated building technologies, as noted, major gains in energy efficiency are already feasible - and highly cost effective - by using currently available HVAC systems if they are installed properly and insulated thoroughly. (IPCC 2014; Duda 2015). There is a broad consensus now that we do not have to wait for new technological developments to make significant improvements in the energy efficiency of heating and air conditioning systems. The main problem facing the building industry is not the lack of suitable technology. Rather, it is that the industry is not taking advantage of what is currently available. (Harvey 2013; IPPC 2014)

According to the IPCC "…In existing buildings 50 – 90 % energy savings have been achieved throughout the world through deep retrofits." (IPCC 2014, p. 675). Improved MI can make a major contribution to these energy savings. Perhaps more significantly, the pay-back time on such investments is often very short, sometimes within a year or two and, for deep retrofits, normally well within the life expectancy of the building. The main barriers to improved MI are not normally cost-related. Rather they reflect knowledge gaps, reluctance to abandon past practices, failure to calculate the rate of return on insulation investments, inadequate installer

training and a general reluctance of the industry to move away from short term, low bid tendering practices which ignore potential life-cycle energy saving from strategic insulation investments. (IPCC 2014)

There is considerable evidence to support this conclusion. Kneifel reviewed energy efficiency possibilities in a selected number of commercial buildings, using a representative sample of major building types in regions across the US. He found that effective implementation of existing energy saving technologies, including HVAC systems, could "…decrease energy use in new commercial buildings by 20–30% on average and up to over 40% for some building types and locations." (Kneifel, 2009). Due to their higher efficiency, smaller, less costly advanced HVAC systems could be substituted for larger ones, reducing the initial capital costs of their installation often to the point that such installations were no more expensive than existing alternatives. Brown and Southworth found that between 30% and 40% of energy could be saved by taking full advantage of existing technologies, including MI (Brown et. al. 2006.)

In a review of three major studies assessing the energy performance of recently built UK 'low energy' schools, Dasgupta and colleagues highlighted the problem of poor insulation practices, noting that the schools were "…failing to meet even basic criteria related to both energy consumption (Pegg et al. 2007; CarbonBuzz 2010) and provision of indoor environmental quality (Mumovic et. al. 2009a)". (Dasgupta et. al., 2013). In a review of another study that looked at 113 schools, Dasgupta found that "energy use in a newly built school is approximately 2.4 times higher than the designated value..." (Dasgupta et. al., 2013)

In its series of publications on energy saving in commercial and public buildings, ASHRAE notes that overall energy savings of current best practice low carbon construction methods can be as high as 50% in large commercial buildings compared with conventional methods of construction, a significant portion of which is the result of proper installation (and insulation) of HVAC systems (ASHRAE 2014).[3] Advanced systems with low temperature differentials, such as new heat recovery systems or radiant heating or cooling systems, are extremely sensitive to heat transfer. Excessive heat transfer significantly influences HVAC system performance. It noted that improper insulation practices may also result in a requirement for larger than necessary systems to compensate for the extra heat losses, raising HVAC capital costs.

One barrier to implementing higher standards of building energy efficiency, including better insulation of HVAC systems is the widespread perception that low carbon construction methods will add significantly to overall building or renovation costs. Numerous studies have questioned this view. In many cases the additional costs are marginal and quickly repaid by the resulting

[3] ASHRAE has produced 12 comprehensive Advanced Energy Design Guides for different categories of commercial and public buildings, including: schools, hospitals, retail stores, small and medium office buildings and big box stores with varying levels of energy saving from between 30% and 50% using current technologies. http://aedg.ashrae.org/

lower energy bill (Kneifel 2010). The 5th IPCC report reviewed a large number of studies on this question and found that small additional incremental investments normally resulted in economically viable energy savings in retrofitting both residential and commercial buildings. Citing studies by Harvey (2013), Mills (2011), Polly et al (2010), Rodsjo et. al. (2010), Korytarova and Urge-Vorsatz (2012), Mata (2010), Lewis (2004) and others, the IPCC found that the payback time for most retrofits was sufficiently short that they made economic sense without even taking into account climate change benefits. (IPCC p. 690)

In response to the US Federal Government's 2009 stimulus package, the State of Montana initiated a pilot program to "…determine the energy, cost and emission reduction opportunities available via the repair, replacement and/or maintenance of mechanical insulation systems in Montana's State facilities" (Moore and Crow 2009, p. 5) The study examined 25 facilities with a total of 1.3 million sq. ft. of floor space. The study's authors found that modest investments in MI totalling only $231,000 could reduce natural gas consumption by 8%. The rate of return on the investments varied among buildings from 7% to 54% with 82% of the total savings being recouped within 5 years. (Moore and Crow 2009)

According to a 2015 study by the Buildings Performance Institute Europe, major retrofitting of Germany's current building stock is very cost effective under most policy options, particularly when an economic benefit is attributed to the increased comfort of building occupants. The study looked at the question from the perspective of investors and analyzed 16 major categories of buildings, including residential, commercial, office and institutional. In the words of the study:

"The results show that comprehensive building renovation, comprising the building envelope and heating systems, is cost effective under today's economic conditions (defined in the Business-As-Usual scenario) in eight out of the 16 building categories, generating energy savings of 60 TWh/year. Savings could, however, be increased three-fold to 180 TWh/year (16% of current energy use in the building stock) by 2030 under the most favourable scenario assumptions and by including the value of increased comfort in the economic appraisal. (Building Performance Institute (EU) 2015 p. 10.)[4]

Ma and colleagues carried out an extensive literature review of studies documenting energy savings from building retrofits. Consistent with the findings of other studies, they concluded that "…energy and environmental performance of existing buildings can be improved significantly through appropriate retrofits" (Ma et. al. p. 900) Despite the fact that many of the retrofits actually resulted in net savings to building owners, they also found that the rate of low carbon retrofitting was very low. Building owners had no idea of the potential savings and were simply

[4] The main exceptions to cost effective renovations were single family and multiple family buildings constructed since 1995, due to the much more stringent energy efficiency requirements followed in recent years.

not doing it. Consequently, energy savings from retrofits were far below what could be achieved with existing knowledge and technology. (Ma et. al. Table 1)

In justifying the new California energy efficiency requirements of its 2016 building code, which requires tougher standards for HVAC systems as well as other improvements, the State Energy Resources Conservation and Development Commission argued that the code would have no significant impact on the costs to business and would only increase the initial construction costs of residential housing by a maximum of 2% which would be recouped quickly by future energy savings (California 2015). Another California study for Pacific Gas and Electric concluded that the new code would have no effect on new housing prices (Yu and Nickelburg 2015). Harvey's review of best practices in sustainable buildings found that the additional cost of new commercial buildings with energy saving factors of between 2 to 4 – which represent very significant reductions in energy use – cost, at most, only 5% more than conventionally built ones. And many new buildings were no more expensive, or even cheaper to build, than conventional structures. While not all of these energy savings are the result of better HVAC insulation, it is an important component of the overall package of energy savings (Harvey 2013)[5].

These and many other studies underscore the point that it is not the potential extra costs or the absence of suitable energy saving technology that prevents the building industry from achieving major gains in energy efficiency. Rather, it is the industry's reluctance to make full use of existing technology. The evidence also underscores the fact that there is no need to wait for new technologies to implement very substantial reductions in the energy consumption and GHG emissions of buildings. But to achieve these gains, the culture and practice of the industry must change.

3. The Importance of Competent Installation of MI in HVAC Systems

Improving the energy efficiency of HVAC systems involves a wide range of changes, including higher energy efficiency standards, better technology, tougher building codes, improvements in building design and construction, more conservation-oriented user practices and proper installation and maintenance of the equipment itself (IPCC 2014). Achievement of the potential of HVAC systems is not only contingent on selecting the most appropriate technology, but also by ensuring that the technology is installed correctly (Lillie 2012). Failure to install and maintain HVAC systems properly can undermine much of the potential energy saving as well as reducing the impact of other elements of low carbon construction, such as improved insulation of the building envelope.

However, a factor that is often not given adequate attention in the literature about the potential of reducing the energy footprint of buildings is that successful installation of HVAC systems,

[5] Harvey provides detailed cost estimates for a wide range of commercial buildings in the supplement to his article which includes an extensive set of tables on energy consumption and costs in a wide range of European and North American cities.

including insulating them properly, requires skilled workers who are knowledgeable about the requirements of good installation practice and who are able to exercise their skills effectively on the building sites where they work (Lang et. al. 2012; Zero Carbon Hub 2014). HVAC systems are increasingly sophisticated, requiring a deep understanding of the insulation requirements for each component as well as the specific characteristics of the large – and growing – number of dedicated insulating materials needed to protect HVAC systems effectively. Advances in technology place increasing demands on architects, engineers and system designers. But they also pose significant learning challenges for the skilled workers who are responsible for installing and maintaining MI on building sites. (Zero Carbon Hub, 2014)

While building engineers normally provide the specifications for HVAC systems, the contractors and skilled trades engaged in installing the systems also exercise considerable discretion over the selection of parts and components to meet the engineering design. This is particularly true in small scale installations where many of the decisions are left to the skilled trades.

HVAC systems incorporate a wide range of technologies. Components are produced by different manufacturers and use different materials. There is no simple 'cookie cutter' approach which fits all building types. Rather each system must be tailored to the specific characteristics of the building, a reflection of the fact that building types vary enormously depending on their function, size, location, age and numerous other factors. Consequently, the workers who install the systems must have a broad knowledge and well-rounded skills to make the most energy efficient choices in light of whatever cost and other constraints they face on building sites. (Build-Up Skills 2015)

Faulty installation by poorly trained workers, coupled with the absence of rigorous inspection and testing of the final system can result in HVAC installations failing to perform at their predicted capacity. (Hunt et. al. 2010; Domanski, Henderson et. al. 2014). That competent installation is a significant issue is underscored by evidence that even many LEED buildings do not meet their design specifications. Kneifel cites studies that indicate that between 28% and 35% of US LEED certified buildings actually use more energy than their conventional non-LEED counterparts. (Kneifel 2012, p. 334.) As noted earlier, the performance of many new UK schools that were designed to meet low carbon objectives has been far below what was anticipated (Dasgrupta et. al, 2012).

Addressing the problem of shoddy or incompetent installation must be a key component of energy conservation programs because there is so much evidence that a large proportion of systems simply are not performing anywhere near their design specifications. (Carrie et. al. 2000; Gleeson 2015)[6] (As we shall discuss later in this paper a union audit of mechanical insulation at

[6] One of the recent initiatives of the European Union has been to fund a major project that examines the capacity of the workforce in its member countries to implement low carbon construction. The Build-Up Skills program requires each country to carry out an inventory of the skill sets and training arrangements and to identify gaps that need to be filled to enable it to meet the EU's climate objectives. These reports are quite comprehensive and underscore the

a state of the art sustainable university building was found to have major sources of energy losses due to faulty installation practices.)

While having the appropriate skill set is important in new construction it is arguably even more essential when existing buildings are retrofitted. The construction of new buildings and replacement of existing ones represents a tiny fraction of the total building stock. While the pattern varies among countries, new construction normally amounts to about 1% to 1.5% of the existing building stock, often less in many countries. But climate change is happening far too quickly to wait for new buildings to become the majority of the building stock. Refurbishment is essential to meet climate goals. It also offers the most significant opportunities for reducing the overall carbon footprint of the built environment over the next few decades.

The numerous challenges faced in refurbishing buildings have been extensively addressed by engineers and climate scientists and there is now an enormous literature on this issue, much of it summarized by the comprehensive IPCC 2014 report on buildings. It recognizes that there is a wide variation in the existing building stock, reflecting factors such as age, existing installed technology and systems, building size, location, material composition, orientation, building functions and use and interaction with the surrounding environment. This means that approaches that are adopted for one building may not be suitable for another. Each building has unique characteristics which renovators need to consider in determining how best to proceed.

Within each building there are interactions among the various components that contribute to its energy use. To achieve the full benefits of improvements in one area often requires modifications or upgrades to other building components. Upgrading HVAC systems in older buildings requires detailed knowledge of the type of building, its age, the construction materials used, the existing installed systems and a variety of other concerns that determine the selection of the most appropriate materials and components, as well as how best to insulate them. (Ma 2012 p. 890). A package of retrofit measures which are integrated and mutually reinforcing is normally required to achieve the anticipated energy improvements. Conversely, upgrades that do not consider the relationships among the various systems and characteristics of a building may not achieve the anticipated contribution to energy savings.

Successful HVAC implementation for both new and refurbished buildings thus requires an apprenticeship and training system which provides building workers with the opportunity to acquire the needed technical skills. The training system should provide workers with a broad knowledge of building systems and construction methods. In addition, it should give them the

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importance of training and skills development in achieving energy efficiency targets in the building sector. They reflect the view that workforce climate literacy is an essential component of the future development of the industry. One of the key areas that countries have identified as needing additional training is in the installation of HVAC systems.

specific skills needed to enable them to make effective decisions on how best to implement complex HVAC systems in the context of the specific buildings they work on. Ideally, it should also give workers a broader understanding of the way in which their work contributes to achieving the overall climate objectives of low carbon construction. Effective training systems must also enable trades' workers to upgrade their skills on an ongoing basis to respond to the introduction of new technologies and systems. (Clarke, 2006; Clarke et. al. 2012; Gleeson 2015)

The preceding discussion has examined the role that MI can – and should - play as part of a broader effort to mitigate climate change by making buildings more energy efficient. It has highlighted the extent of the gains to be made, while noting that the industry, as currently organized, is still not achieving those gains. Implementation of successful low carbon construction remains a major challenge. The discussion has also underscored the need to have a highly skilled workforce, capable of adapting its skills to a wide variety of different building challenges.

It is within this context that the rest of this paper will document the efforts of one union to re-shape the culture of a reluctant building industry to incorporate climate change goals. It has done so by raising the public profile of MI, funding technical studies demonstrating how to implement higher MI standards, campaigning for tougher building codes, demanding comprehensive inspection and verification systems and including climate change training in the apprenticeship programs which it oversees. It has undertaken these activities because neither the industry within which it functions nor the government responsible for implementing climate policies has been willing to take the kinds of measures so urgently needed to implement successful climate policies in the building sector.

4. The Union's First Steps Towards Climate Advocacy: The 'Leaky Condo' Crisis

The BC Insulator's pathway to becoming a climate change advocate in the building industry was not obvious at the beginning. It was the result of a combination of factors, which, over time, facilitated the union's shift to becoming a strong and vocal supporter of low carbon, climate friendly construction. These factors included the nature of the work its members perform, the need to address the poor quality of much of the construction industry's output in the province, and the attacks on the unionized building industry by the government and non-union contractors which threatened members' employment and the union's survival. But a critical factor was also the union's recognition of the growing threat of global warming and the corresponding, unique, potential of the BC Insulators to play a leadership role in transforming the culture of the industry by encouraging it to play a major part in climate mitigation efforts. It was also influenced by the growing body of scientific evidence on climate change, both nationally and internationally, after the Kyoto accord was ratified – evidence which was reflected in the wide ranging climate change legislation enacted by many governments, including the BC Provincial Government, during the first decade of the 21st century.

Starting in the mid-1980s, BC experienced a construction boom. Over the following decade, large numbers of multi-unit residential condominiums were constructed to meet the housing needs of BC's rapidly growing population (Kayll, n.d.). Developers and building contractors rushed to take advantage of this business opportunity. This frenzy and resulting growth in competition within the industry generated significant pressures for developers to reduce both project costs and timelines. The subsequent negative outcomes included skimping on materials, such as exterior wall cladding, cutting corners on the insulation of pipes and ducts, and substituting non-union, unskilled workers wherever possible to cut costs. At this time, building codes regulating MI were weak and poorly enforced in many municipalities, so poor design, sub-standard equipment and faulty workmanship were often overlooked.

During this period there was a concerted attack on the construction trades' unions by non-union contractors, which also found support from government. The goal of the influential Independent Contractors and Business Association (ICBA) of BC was to drive the unions out of the province's building industry. This movement was accompanied by efforts to deskill many of the traditional building trades so that employers could more easily substitute cheaper, less qualified labour, a practice which had negative repercussions for the quality of MI being installed in buildings.

The weakening of training requirements and skills standards was a major factor in BC's 'leaky condo crisis' which emerged during the 1990s. Poor quality building work led to major problems with newly completed multi-unit residential buildings, including water leaks, extensive mould in interior walls, rotting wood and a host of other defects. The health of large numbers of occupants was adversely affected by airborne contaminants, release of chemicals from decaying materials, dampness, drafts and rampant mould on floors and walls. Numerous buildings had to undergo major, costly repairs during which many were uninhabitable for lengthy periods of time.

The total bill for this housing disaster remains in dispute given the difficulty of assessing the cost of the damage to such a large and varied number of units and given the fact that it often takes a number of years for the extent of damage to be revealed. A 2007 report to the BC Government's Homeowner Protection Office, by McClanaghan and Copas, estimated that between 48,260 and 58,000 units would need repairs by 2012 (Penner 2014). Other estimates indicated that 600 public schools and 300 commercial buildings were affected at a cost to owners of up to $4 billion in repairs. It was the biggest housing scandal in Canada's history and problems continue to emerge in buildings even today. (Kayll, n.d.)

To investigate the causes of the leaky condo crisis, the Provincial Government took the unprecedented step of establishing a public enquiry, chaired by a former Premier of BC, Mr. Dave Barrett, on April 17, 1998. After its first report was completed such was the ongoing controversy that the Government appointed Barratt again to oversee a second report, released in 2000, in which it asked him to make further recommendations. The second Barrett Commission held 53 hearings and received 340 submissions between September 13, 1999 and February 21,

2000. It heard a catalogue of complaints from disgruntled owners about shoddy workmanship, poor quality materials and a general absence of professional building standards. (Barrett Commission II – 2000; Kayll n.d.).

While MI was not the only cause of the extensive damage, it was a significant contributing factor in many cases. The BC Insulators' union, along with a number of other building trades' unions, made presentations to the Commission documenting a host of construction problems and outlining policy changes they believed the government should implement to raise building standards, improve training and deal with the culture of 'low bid' which, in their view, was at the root of the quality crisis.

In both reports, the Barrett Commission highlighted basic problems with the quality of the industry's work, underscoring the need for tougher building codes, better inspection, additional workforce training and a shift towards high quality rather than cheap, low bid construction. The Commission's main findings constituted a devastating critique of the province's building industry.[7] The findings illustrated the ongoing problems with an industry mentality characterized by a culture of opposition to government regulation, or other restrictions on the ability of contractors to minimize labour and other construction costs and maximize profits in a highly competitive and largely unregulated environment.

The leaky condo crisis was not the only problem facing the BC construction industry. Evidence of unnecessary fires due to faulty, or inadequate, insulation of HVAC systems emerged as early as the late 1980s. The BC Insulators' brought forward evidence on the seriousness of this hazard

[7] "The Commission was presented with case after case of ineffective regulation regarding responsibility and accountability at each stage of the construction process. These included:

(i) an inability on the part of municipalities to effectively monitor building quality; to ensure inspectors play a meaningful role in maintaining building standards and in enforcing building codes;

(ii) a lack of provincial monitoring to ensure accurate interpretation of the building code, as well as its performance requirements;

(iii) a lack of developer, builder, and general contractor responsibility -- often facilitated through protective corporate structures;

(iv) architects who have been unable to maintain professional responsibility in translating designs into quality physical structures;

(v) engineers who have been unable to ensure their involvement in the process will lead to quality construction of the building envelope;

(vi) a lack of training, skills, and qualifications that have led to a deterioration in the quality of worker performance;

(vii) an inadequate home warranty program which, in the majority of cases, is faced with a conflict of interest between its service to the homeowner and its obligation to the developer;

(viii) a mortgage guarantee system which tends to serve the interests of the residential construction industry and financial institutions, without due regard to the consumer, who buys its services;

(ix) a lack of information from the builder to the strata council to facilitate its responsibilities; and

(x) a lack of understanding as to the roles and responsibilities of strata councils and management companies, which has often left the homeowner confused and alone." (Barrattt Commission, 1998, Executive Summary)

and outlined recommendations that it felt should be implemented to address the problem. In response, the Provincial Government amended the building code in 1989 to introduce fire-stopping regulations. The updated code required fire resistant insulation to be installed in gaps in ducts and piping which otherwise would allow fires to spread within buildings. Despite the introduction of tougher regulations, implementation and enforcement of the regulations was often inadequate This was in part due to systems being installed by unskilled, untrained building workers. Additionally, staffing constraints meant that municipal governments were not carrying out full inspections on many projects, limiting any efforts to enforce the new codes.

The BC Insulators union saw that it could – and should – play a role as an advocate of fire safety. It contacted fire chiefs, city inspectors and municipal officials indicating that tougher regulations and effective enforcement were needed to maintain public safety. It also identified a number of specific projects built in the late 1990s where standards had not been met. It sent letters containing evidence of the problems to elected officials in a number of BC municipalities. While the focus on fire safety was not directly connected to climate change, the union's advocacy provided important contacts and increased its understanding of how to be a more effective proponent of stronger building codes and tougher enforcement policies. It also expanded the union's capacity to engage in the public policy process, establishing a role for itself as a 'player' in discussions about building standards. And it facilitated 'policy learning' about how to work with local communities and municipal governments.

5. The Olympic Village Development: Questionable Building Practices Continue in BC's Construction Industry

In 2003, the International Olympic Committee announced that BC had successfully bid on the 2010 Winter Olympics, to be held from February 12th to 28th. This resulted in a frenetic period of construction in the run-up to the event. The province had to accommodate the athletes as well as an anticipated flood of tourists. In 2006, the Vancouver Organizing Committee for the 2010 Olympic and Paralympics commissioned the Millennium Development Group (MDG) to build a new Olympic Village to house the athletes and others involved in the event. It was also intended to showcase BC's leadership in environmentally sustainable building construction and was to be North America's first LEED Platinum model community housing development.

During the construction, the BC Insulators became aware of major problems with the way some of the contractors were installing MI. The union carried out its own investigation, documenting problems and taking extensive photos of installations that failed to meet even the most basic standards. Poor quality MI practices were part of a larger set of issues in which numerous construction faults in other components of the buildings were becoming evident long before the project was completed. During construction, the union approached both the developer and the City to alert them to the potential problems that would result from poorly installed MI and asked them to take measures to address the problem. Unfortunately, the union's concerns were largely ignored at the time.

At the end of the Olympics, the City of Vancouver had to take over the facility due to the financial difficulties of MDG. To provide the funding needed to salvage the project, it asked the Provincial Government to pass a special piece of legislation to amend the Vancouver charter so that it could obtain $500 million in funding for the project. On January 17, 2009, the government passed the bill. The City did so with the intention of marketing its condominiums to interested purchasers in the municipality. However, despite its very high construction cost, the Village proved to be rife with construction defects. A total of 60 purchasers filed a class action lawsuit demanding a refund for the apartments they had bought.

Gary Mason of the *Globe and Mail* newspaper noted that "…(D)isgruntled homeowners have gone public with a disturbing video documenting a litany of problems, including water pouring out of light fixtures, heat not working, cracks in ceilings, hardwood floors that are bubbling because of moisture…" (Mason, 2011). The poor construction standards also resulted in the City of Vancouver marketing the condominiums at prices far below what it had earlier anticipated. While final losses to the city are still disputed, the number of at least $100 million is widely accepted. (Mason, 2014). One of the central ironies of this project was that it had been advertised as an example of quality 'green' construction when, in fact, the substandard workmanship ensured that the 'green' objectives could not be achieved. (McCarthy, 2012)

The union had made a major effort to warn the developer and the city about the poor quality of the construction while it was being built, by sharing photographic evidence with key managers, including the general manager of the construction project. This would have provided both the city of Vancouver and the project developer ample opportunity to make corrections during the development process, while avoiding any potential negative press that would have damaged the project's 'green' reputation.

But having failed in this effort, the union changed its approach. It decided to appeal to the broader public, by providing the *Vancouver Province* newspaper with its photos and other information documenting the numerous examples of faulty construction practices on the project (McLelland 2009). It followed this up with interviews with other media to publicize its concerns. It also developed a 6-point campaign to inform citizens about the high costs of failing to enforce proper building standards. This effort created a major public controversy over the construction standards of the development.

This was also a major learning experience for the union. It realized that a valuable way to raise awareness of the importance of MI was to appeal to the public directly through providing its evidence to the media. It came to recognize the role public knowledge and awareness - and public opinion - can play in influencing pressure for policy and practice changes. The union's inability to effectively influence the developer to alter poor construction practices during the development process, coupled with the high degree of public response and outrage once these practices were revealed, demonstrated the key role public awareness and engagement can play in

generating pressure for change. It was a lesson that was critical to its approach to developing future campaigns.

The union also became aware, during this process, that to be more effective in influencing public opinion, it needed to develop more sophisticated communication skills so that it could effectively manage public campaigns. Another important lesson was how its early identification of the construction problems and its efforts to alert the public to the potential construction problems subsequently gave the union more credibility once the scope – and cost – of the faulty building standards became apparent.

6. Growing Awareness of the Impact of Climate Change and the Role the Union Could Play as a Climate Advocate

As in many other parts of the world, the challenge of global warming was becoming better understood in both Canada and BC after the negotiation of the Kyoto Protocol in 1992 and the Federal Government's decision to ratify it in 1997. Like other governments, during the following decade, the BC Government passed a number of pieces of legislation designed to mitigate climate change. Several of its new policies focused on improving energy efficiency in buildings. (Frappé-Sénéclauze et. al. 2015a; 2015c) At the same time, there was a growing interest in some parts of the Canadian building industry to adopt climate friendly building standards, such as Leadership in Energy and Environmental Design (LEED), Building Research Establishment's Environmental Assessment Method (BREEAM) and Building Owner's and Manager's Association (BOMA) standards, partly to demonstrate their commitment to confronting global warming and partly to attract environmentally conscious developers and building purchasers.

The establishment of the US-based ASHRAE 90.1 standard in 1989 and its subsequent revisions were gradually reflected in changes made to the BC provincial building code, signalling to the construction industry that the Provincial Government expected it to improve energy efficiency in the buildings it constructed (Berkhout, 2015). This was paralleled to some degree within the industry by the adoption of LEED and other voluntary building standards, which were increasingly used as marketing tools to attract environmentally conscious buyers, including businesses that could advertise that they had commissioned climate friendly buildings. While positive, these developments involved only a minority of developers and contractors. The mainstream industry still operated under the assumption that there was no need for major changes to existing industry practices to accommodate the province's higher climate standards.

Another factor that influenced the development of the union's approach was the legislation the Provincial Government had passed to encourage municipalities and other government agencies to reduce their GHG emissions. The 2008 Local Government (Green Communities) Statutes Amendment (Bill 27) established new climate reporting requirements for municipalities as well as increasingly stringent GHG reduction targets of 6% by 2012 and 33% in 2020 below 2007 levels. The Provincial Government also required municipalities to include such targets and other

climate change commitments in their official development plans. And it asked them to sign a "Climate Action Charter" that committed them to a package of additional climate measures. Almost all of BC's municipal governments signed.

However, in the union's view, existing construction industry practices made it very unlikely that municipalities could achieve the Provincial Government's climate change objectives in the building sector. The prevailing low-bid approach largely precluded implementation of best practices in MI by encouraging contractors to win contracts purely on minimizing labour and material costs. While some contractors were beginning to claim that they were implementing low carbon construction methods in their bids, often there was no way of ensuring that this was, in fact, the case. In the union's experience, most contractors were still leaving MI work to labourers, uncertified plumbers and new apprentices who were not aware of the various requirements of proper installation. A more recent analysis of the Provincial Government's approach to reducing the energy consumption of buildings by Burkout supports the union's view of the weaknesses of the Government's approach.

"This review suggests that the province is failing to provide the monitoring, oversight and accountability needed if the building-sector market transformation strategy of 2008 is to succeed. While some initial building efficiency standards have been introduced, and a number of regulatory changes have been made that give utilities increased justification to pursue ambitious energy savings, far more action is needed before potential energy savings and GHG reductions can be fully realized within the building sector in British Columbia." (Burkhout 2015, p.9)

The union adapted the approach it had taken regarding the Olympic Village development in an attempt to collect further evidence of poor MI practices a pervasive development problem, even in environmentally accredited development projects. The University of British Columbia was in the process of completing construction on its Centre for Interactive Research on Sustainability (CIRS) building. This building, conceived a decade prior as the ultimate showcase for sustainability in the province, offered a significant opportunity to determine whether developers were delivering on their sustainability promises by providing the best possible standards on insulation. The union was able to coordinate a tour of the facility with the permission of UBC representatives and with representation from an Engineering Firm (Besant Associates Engineers) to corroborate findings. The tour ultimately identified a number of problems with MI work performed on the mechanical systems, including problems of missing fire-stopping, inadequate insulation thicknesses, improperly installed weather proofing, and use of 'Red List' materials not approved as part of the Living Building Challenges.

This investigation offered another example that even some of the most highly praised LEED construction projects were failing fully to meet their developers' low energy design objectives due to improper MI practices. The intention behind these projects was to exceed existing industry standards. But the union had found evidence that 'green' projects could be victim to some of the same sub-standard MI practices plaguing the rest of the industry. Moreover, it raised

concerns regarding the success of future sustainability initiatives planned by the University, including their flagship Residential Environmental Assessment Program (REAP) meant to encourage green construction approaches to family housing developments on UBC campuses. This investigation would open the door for further collaborations with UBC during the campaign, offering another opportunity to raise awareness about the environmental benefits of MI to an invested audience.

The union believed that the industry's lack of clear quality standards was a key contributor to the problem of poor installation practices and was something that it could specifically address. Some of the contractors with whom it had collective agreements concluded that purchasers might be more inclined to use their services if they provided a Quality Assurance Certificate Program. The BC Insulation Contractors Association (BCICA) proceeded to set up this certificate program which gave customers a one year guarantee that the building work they purchased from these contractors included properly installed MI.

The Certificate Program specified that contractors would only use components that met with ASTM or CAN/ULC standards, that the MI would be installed only by qualified insulation trades' workers and that it would be inspected by independent third party evaluators to confirm the standards had been met. While the union was in support of such a guarantee, it suggested that the guarantee be for 20 or 30 years, rather than one year, because properly installed insulation would normally not need to be replaced during much of the life of a building. The union also suggested that customers would be more likely to choose BCICA contractors if they could also implement an inspection program, which the union was prepared to – and subsequently did - establish.

While the Certificate Program did benefit some contractors, this initiative still faced major hurdles because most contractors - and particularly those that were unorganized or who operated in the underground economy - were not interested in providing such a guarantee. It also proved difficult to reach the purchasers of buildings to inform them of the potential benefits of the program.

One of the union's other issues in dealing with the contractors employing its members was how to persuade them of the significance of climate change and the importance of MI in mitigating it. Operating within a highly competitive, low bid culture, unionized MI contractors were forced to focus on minimizing costs wherever they could in order to bid successfully on contracts with their non-union competitors. Survival was the immediate priority, while climate change was a long-term issue that did not seem to be immediately relevant to the bottom line.

For many contractors it was also not clear that it was in their economic interests to focus more attention on quality improvements associated with low carbon construction as spending money on such improvements might result in their competitors under-bidding them and, ultimately, a loss of business. But the union felt that the higher standards of workmanship unionized

employers could provide would give them a clear advantage if the climate change benefits of MI were better understood and if the union were successful in pressing for improved building code standards which would require the work of skilled tradespersons.

Equally important for the union was the benefit of having contractors join them in their efforts to persuade governments – and the wider public - to raise MI standards. Presentations involving their employers tended to have more credibility because there was little, if any, animus towards employers, whereas many of those who the union sought to persuade were sceptical of anything proposed by a union. Some of the municipal councils in more conservative areas of the province were simply not receptive to hearing proposals from unions. The support of the employers also reinforced the impact of their technical recommendations, as the employers were normally seen as having expertise in this area as well.

In the period after the Olympic Village controversy, the union's leadership became increasingly committed to establishing a role as a climate champion in the industry. The fact that the nature of its members' work aligned with climate objectives made this approach a natural fit for the union. But the decision to pursue this approach was also a reflection of the union's growing commitment to climate mitigation efforts. It could have continued to pursue a more traditional approach through the collective bargaining process, through conventional organizing tactics and through focussing narrowly on the financial benefits of improved MI, independently of any link with climate change. Instead it chose to emphasize the climate change benefits of MI.

Part of the change needed was also internal. The leadership had to convince the 350 members of the local of the value in becoming an advocate on climate issues and the significance of the opportunity to play this role within the industry. This meant persuading them that spending substantial amounts of their limited union dues on a comprehensive climate campaign made sense. The approach was brought up regularly at membership meetings and in worksite discussions in which the leadership asked for approval to spend the amounts needed for the campaign. According to the union's leadership, in the period from 2010 to 2015, its members approved spending just under one million dollars. And the members continued to re-elect the leadership that asked for this funding.

One other factor that influenced members' commitment to the climate focused campaign was the difficulty many of their employers had in obtaining work. In the absence of adequate standards and in the context of a highly competitive industry where, as earlier noted, low bid was often the key factor in determining who won contracts, the members' employers were encountering major difficulties in getting contracts. The members knew that something major needed to be done to revitalize the unionized part of the MI industry. In this context, focusing on the climate change benefits of MI as a way to promote the kind of high quality workmanship they were capable of performing made considerable sense.

7. The HB Lanarc Study: "Pipes Need Jackets Too – A White Paper"

The union's experience with the Olympic Village scandal reinforced its conclusion that it was essential to provide government and the wider construction industry with clear evidence of the negative impacts of current poor construction practices and the corresponding benefits of proper MI installation, not only in terms of energy (and money) saved, but also because of its contribution to climate mitigation. In other words, the union needed to persuade the construction industry that it had a responsibility to support efforts to curb global warming and that this meant making changes to how it operated. It needed a cultural shift, one that involved growing climate literacy throughout the industry.

The problem it faced in changing the culture of the industry was that unorganized contractors represented a large component of the industry. They were highly suspicious of any recommendations made by a trade union. They assumed that its objectives were essentially self-interested, namely, recruiting more members, expanding employment in the trade and increasing wages and benefits. They were not receptive to proposals for change, especially from a union.

Its earlier efforts at alerting the city of Vancouver and the developer of the Olympic Village underscored the limitations of focusing only on the developers and contractors directly involved with building projects. Scepticism of the union's claims were shared by many in government and other parts of the industry, including developers, architects, engineers and members of the public. The union recognized that it had credibility problem.

Consequently, it needed objective, credible research to support its claims – research that could best be provided by a well respected, credible, independent firm of building consultants or engineers. This research could provide the evidence needed to convince governments to raise building code standards and allocate more resources to inspecting MI contractors. Its findings could form the basis of a major educational campaign. And it would give the union more credibility in its interactions with architects, engineers and developers because it would have solid evidence to show that higher MI standards would achieve energy savings and support climate objectives. Such a study could also provide the industry with technical details on how to use the most up-to-date technologies and best installation practices.

In May 2010, the union commissioned a major study from HB Lanarc Consultants Ltd. When the union approached Lanarc, the firm was sceptical that it would find the evidence that the union claimed existed. Despite its extensive experience in the construction industry, the firm had not carried out a detailed analysis of the potential energy-saving benefits of MI and was not inclined to do a study whose conclusion was already assumed. To address this problem, the union made a commitment to Lanarc that the firm would have a free hand to carry out the study without any limitations on the release of its findings, regardless of whether they supported the union's views on the benefits of MI, or not. It was a risk, but one the union felt comfortable taking on because of its experience in the industry.

Lanarc's study was thorough and professionally done with a literature review of academic journal articles on MI, an analysis of the province's climate legislation as it applied to the building sector, an extensive set of interviews with engineers and contractors who were representative of the various sections of the province's building community and a careful examination of the MI in a number of completed buildings in BC. Lanarc also examined the MI regulations in other jurisdictions, including the US and European Union (EU). The researchers consulted with the Thermal Insulation Association of Canada (TIAC) and other industry organizations in the US to map the various stages and actors associated with designing, implementing and evaluating the MI process to determine the various points in the production chain where things could go wrong. (Ibid., p. 8) The study also noted that in addition to its adverse effect on energy use and GHG emissions, poorly installed MI was responsible for serious adverse health impacts, including 'sick building syndrome.'

The paper incorporated an analysis of the various building standards and regulations that guided MI practices in BC, including the National Building Code of Canada, the BC Provincial Building Code, the City of Vancouver Building Bylaw, the Model National Energy Code for Buildings, voluntary guidelines, such as ASHRAE 90.1 (also referenced in the codes), and a variety of other industry guidelines from the Canadian Standards Association, the National Fire Protection Association and LEED protocols for new construction,. This analysis revealed numerous inconsistencies. Moreover, it found these inconsistencies to contribute significantly to the confusion about the precise standards that should be followed (Ibid., Table 2, pp. 11, 12). Of particular concern was the finding that "…the current edition of the BC Building Code does not include specific recommendations for the installation of insulation on pipes, ducts or equipment." (Ibid., p. 18)

Their survey of MI installations in a selection of BC buildings also found major deficiencies. Some had no insulation whatsoever. Others used the wrong type of insulation or failed to cover pipes and ducts properly or with the right thickness of insulation. They found pipe or duct insulation exposed to weather or damage from wildlife. Uncovered pipes and ducts were a burn hazard to occupants in some buildings. A surprising number of pipes were corroded as a result of condensation, reducing efficiency and shortening their service life. Poorly installed MI and the resulting condensation often damaged interior walls or other building components.

The study also focused on problems with regulatory compliance in the BC industry. It found that municipal governments were ill-equipped to enforce all areas of existing building code requirements due to a combination of lack of attention on MI, lack of resources and lack of expertise. This meant that poorly installed HVAC systems – systems that failed to achieve their potential – were routinely being approved by building inspectors. The consultants cited contractors who cut corners by installing equipment and systems that they knew would not likely meet optimal design specifications and once installed would be hidden behind finished walls or other building components. Clients would normally be unaware of the reasons why their buildings were using more energy than planned. (Ibid., p. viii).

One important component of the study involved a modelling exercise. Lanarc profiled three case-study examples representing common residential and retail building typologies in BC to calculate the potential GHG and energy savings of installing proper MI. Annual energy savings varied from a low of 1.4% in a large retail store to 8.4% in a 4 storey wood frame apartment to 14.2% in a 25 storey high rise condominium. Savings were dependent on system size, length of piping and duct work, and operating temperature. (Ibid., p.34) The authors also estimated that the investment payback time for retrofitting or installing higher standards of MI was normally only "several years" for most buildings in the province. In their words:

Based on our simple economic analysis that looks at installed costs, maintenance and energy saved, as well as other studies, the costs of providing MI to water pipes, in appropriate contexts, will be recovered quickly: generally within several years, in some cases less and in some cases more – but typically meeting developer criteria for payback. (Ibid., p. 36)

The consultants identified eight specific reasons why MI was not being installed properly. These included: outdated engineering specifications; untrained, unqualified installers; low bid contract tendering; widespread industry perceptions that MI was not important; use of substandard materials; inadequate review and inspection of projects; lack of communication between engineers and installers; and project timelines that precluded proper testing and inspection of the completed work. (Ibid., p vii)

The study found that the extent of energy loss – and corresponding increase in GHG emissions – from poorly installed MI was considerably greater than widely recognized in the industry. Its findings confirmed the potential long-term financial savings from proper installation of MI, as well as the significant climate change mitigation benefits.

In commissioning the study, the union wanted to ensure that it would be relevant for all the major actors involved in BC's construction industry, not just its own employers or a limited set of industry insiders. Consequently, the union gave Lanarc the scope to develop specific proposals for improving energy efficiency if the study indicated they were needed. Accordingly, Lanarc put forward a package of reform measures for provincial and municipal governments, as well as developers, architects, engineers, contractors, installers and training institutions.[8]

[8] Its report explicitly identified the following six potential target audiences:

1. *"Provincial and federal building code authorities.*
2. *Utility companies*
3. *Local government elected officials and staff, including:*
    a. *Building officials,*
    b. *Engineers,*
    c. *Planners,*
    d. *Sustainability personnel.*
4. *Trade associations and professionals with an interest in improving the quality of construction in British Columbia.*
5. *Land and building developers.*
6. *Large commercial building owners and managers." (Lanarc p. 1.)*

These included upgrading the BC Building Code (and its municipal counterparts) to incorporate the most recent ASHRE 90.1 standards for MI and a commitment to updating the Code quickly whenever ASHRE released new standards. It urged the BC government to "…include a clear, mandatory requirement for MI …by referencing minimum insulation requirements' tables as per the appropriate version of ASHRAE 90.1." (Ibid., p. ix) Other recommendations included better enforcement of building codes, new training programs for inspectors, public education on the benefits of MI and establishment of qualification requirements for installation contractors and installers. And they recommended mandatory inspections of MI by public inspectors or independent contract inspectors (Ibid., p. ix)

For local governments, it contained more detailed suggestions, including that municipalities require MI be included in development permit checklists as part of the building approval process. With respect to the buildings that local governments themselves commissioned (or retrofitted), it recommended that they require contractors to "…ensure that MI contractors are qualified under a recognized MI certification program" (p. x). Lanarc also proposed that municipal governments upgrade the training and qualifications of their building department planners, engineers and inspection staff.

Because part of the Provincial Government' climate action agenda was being delivered through gas and electric utility retrofit subsidies, the report recommended that these utilities explicitly include MI upgrades in their energy efficiency rebate programs. And for the broader building industry in BC, Lanarc recommended new education and training programs for engineers and other building professionals, inspectors and installers. This would be supplemented by the preparation of detailed technical manuals on the practical issues of implementing the most recent version of ASHRE 90.1 to assist the industry in adopting best energy conservation practices.

The report contained some recommendations for Canada's National Building Code which is the template on which individual provinces base their own codes. And it recommended amending Canada's Model National Energy Code, which also applies to buildings, to include stronger MI requirements.

Larnark noted that at the time its report was commissioned, the Provincial Government had already put in place a package of legislated changes, including the BC Energy Plan (2007), the Greenhouse Gas Reduction Targets Act (2007), the Clean Energy Act (2010), the Clean Energy Plan and the BC Climate Action Plan, all of which were intended to push the province towards reducing its GHG emissions and energy use. The authors argued that their recommendations on MI would contribute significantly to the achievement of these objectives.

In sum, the Lanarc study provided the union with valuable, independently-verified evidence concerning the potential climate and economic benefits of better MI. Lanarc's confirmation of

the potential energy saving and other benefits, coupled with the very modest additional investments required to install state-of-the art insulation gave the union credible arguments to take to government and industry. It also provided the union with a firm basis for embarking on a major campaign to change the industry's approach.

8. Developing a Comprehensive Campaign Linking MI to Climate Change Mitigation

Aware of its limitations in conducting major campaigns, the union enlisted the advice of communications experts Kris Klassen of Working Designs and Bill Tieleman of West Star Communications to develop a comprehensive strategy for disseminating its evidence on MI. This strategy emerged from extensive discussions with its own members and with various industry professionals with whom it had a good working relationship. The campaign identified specific individuals and organizations to contact, the information to present to them and the anticipated outcomes the union hoped to achieve. A different approach was adopted for municipal governments, utility companies, unionized employers, professionals within the industry (engineers, architects, developers) and for members of the general public. And, as noted earlier, the union felt that the campaign would benefit from the added credibility of making presentations jointly with employers with whom it had collective agreements.

The messaging of the campaign was framed to emphasize that poor MI practices were not simply a problem with a few rogue contractors, but rather an industry-wide problem. Consequently, solutions should involve industry-wide interests, including developers, construction professionals and contractors, regardless of union or non-union status. However, the union's involvement in the Olympic Village project had made it clear that the union versus non-union debate could easily overshadow the larger issue of how to address current industry MI practices. The fact that the union was raising the issues significantly coloured the tone of the conversations and reduced its ability to promote satisfactory outcomes.

To circumvent this problem, and to allow the messaging of the campaign to address the policy issues without having constantly to overcome the animus towards organized labour that was widespread in the industry, the union decided to rebrand itself. Its new image was also designed to better reflect the new approach of the union with its emphasis on environmental responsibility and its understanding of the importance for all parts of the industry of adopting MI best practices as part of a larger effort to reduce the climate footprint of the building sector. The new logo, a salamander circling the globe, along with a new name, the BC Insulator's, was an important piece of a comprehensive campaign and ensured the union's image was reflective of the campaign's intention and ultimate mission.

In 2010, using evidence from the Lanarc study, the union developed a communications package that included slide shows, videos, leaflets, press releases, letters and newspaper op, eds. It set up a new web site – the Energy Conservation Specialists (http://www.energyconservationspecialists.org/) and populated it with studies and technical material to which it could direct those who wanted more information about MI. The campaign

was divided into critical phases, starting with developing a set of cohesive and clear key messages, followed by establishing a priority list of organizations and individuals to contact as potential partners, and then expanding this to a broader range of people in government and industry.

One of the most persuasive arguments in favour of improving MI is that it is almost always economically viable as an investment, given the long-term benefits. As noted, Lanarc found that the payback time of most investments was relatively short. A key fact is that the cost of installing state of the art insulation is only a tiny fraction of the overall capital expenditure on a new building and a very modest component of the cost of a major retrofit. Based on this knowledge, the union initiated a campaign entitled "The Magic of MI – the 1% Solution." The purpose was to underscore the very low additional costs of state of the art MI (1% of total construction capital costs) while highlighting the very significant energy consumption and climate change benefits (up to 18% of building operating costs according to Lanarc). This 'framing' of the issue was also designed to allay fears that the union's proposals would entail major capital investments that would make projects with state-of-the-art MI unaffordable.

The Union decided to take the newly crafted campaign message on the road, as part of the campaign communications strategy. The purpose was to help assess MI awareness and interest within government and industry. In February, 2011 union representatives attended the National Federation of Canadian Municipalities (FCM) Sustainability Conference in Victoria, BC, setting up a major trade show booth to speak to the mayors and council members in attendance from all across Canada, as well as their planners, engineers and development officers. Its focus was on promoting energy audits, retrofit benefits and the link between climate change and MI. It has followed this up at FCM conferences every year since.
http://www.fcm.ca/home/searchresults.htm?q=BC+Insulators).

It also set up a booth for the first time at the BuildEx conference in Vancouver that same year to communicate the campaign message to members of BC's building industry and to establish relationships with suppliers, developers and building professionals in the province.
(http://buildexvancouver.com/)

9. Changing Local Government Policies and Practices

Despite their public commitments to climate change, the union felt that both the Provincial Government and local governments were failing to require industry best practice insulation standards in their contracts for new buildings, or in renovations to existing facilities. Municipal governments often were not aware of the latest developments in HVAC systems and, as a consequence, were not including appropriate requirements in their tender documents, a practice which placed unionized contractors, with their well-qualified workers at a significant disadvantage when bidding on contracts. Low standards, coupled with inferior workmanship by poorly trained installers meant that public buildings were not achieving the energy savings that were perfectly feasible - and highly desirable from a climate change perspective. Consequently,

the public was wasting energy and spending far too much money during the lifetime of these buildings.

As Lanarc had noted, this problem was compounded by the fact that the requirements of the BC provincial building code – which was the minimum all municipal governments were mandated to follow – did not include clear specifications for MI. In part, this was connected to a larger issue arising from industry pressure on government to keep building costs down by not imposing more stringent building and inspection standards, a problem compounded by the industry's hostility to being closely regulated.

The union felt that governments had an obligation to provide leadership on climate issues and that they should therefore be leading proponents of state-of-the-art HVAC systems. The union felt that the best way to actively engage governments in this issue would be by demonstrating how public buildings could become much more energy efficient by choosing the right systems and ensuring they were installed properly. In doing so, they could then encourage the private sector to follow suit (a view that parallels the stages the EU has adopted in its climate agenda). This meant adopting procurement standards above the minimal requirements of current provincial and municipal building codes – requirements that included much more stringent energy conservation standards in the tender documents that they used when asking building contractors to bid on public construction projects.

Getting local governments to support its policy recommendations thus became a key goal for the union. [9] It decided it could achieve this by making presentations to municipalities in BC, starting with those it believed would be receptive to its proposals because they were already publically committed to progressive climate action policies. Aside from the opportunity to publicize the importance of MI, presentations to municipal councils would normally result in councils directing their planning departments to review the union's material and report back with their assessment of the union's evidence and recommendations. Such reports could form the basis of subsequent council resolutions as well as expanding the research being carried out on MI. If

[9] However, it was further exacerbated by the fact that the National Building Code and, therefore, its provincial counterparts, did not contain adequate MI standards, nor did it reflect industry best practices. The process by which proposed changes to the National Building Code are submitted, reviewed, and finalized normally takes many years. It also involves significant compromises due to its requirement for consensus among all provincial and territorial governments. The resulting code requirements often reflect pressure to adopt the "lowest common denominator" acceptable to all involved parties. Even after a revised National Code is released, which happens once every 5 years, provinces still have to review it and decide what elements of it to include in their codes. This results in further delays in an industry where technology is changing rapidly. While the BC Insulators could have focused part of their campaign at the national level, the union realized that a campaign that targeted change at the Federal level would have been difficult to carry out, an assessment that also reflected the political reality that the Harper Conservative government was unlikely to be receptive to union pressure on climate issues, given its dismissal of the importance of climate change.

useful, they could then be shared with councils to which the union made presentations in the future.

The union's presentations to municipal governments had a number of specific objectives. One was to strengthen the MI requirements in municipal contracts for new and retrofitted buildings. A second was to ask for more rigorous inspection of buildings, including inspection of MI. Following Lanarc's recommendations, a third was to encourage municipal governments to pressure developers and contractors to include higher standards as a condition of their development permits and project approvals. And a final objective was to gain support for a resolution that the union wanted passed at the annual conference of the Union of BC Municipalities (UBCM) an organization that represented all 162 local governments in the province.

Sensing that the City of Burnaby would be sympathetic to its approach, the union made its first presentation to its Council on May 30th 2011. This presentation was received positively, and the Union followed it up with a second presentation on June 20th at which the Council supported a resolution brought forward by the Burnaby Director of Planning and Building entitled "Importance of MI – Resolution". The union had also asked the Council to endorse the recommendations put forward in the resolution on changes to the MI portions of the BC Building Code, and to submit it to the Union of BC Municipalities (UBCM). Burnaby Council voted in favour of the union's proposal. The Council also directed its building department to do a review of the union's recommendations. This was largely favourable and provided the union with additional evidence to share with other municipalities in the next phases of its campaign.

The BC Insulators proceeded to made presentations to a number of other municipal councils including the Cities of Victoria, Langley, Abbotsford, Kelowna, Prince George and North Vancouver, in the following year. While the reception of the Union's message varied - Surrey and Abbotsford were sceptical of the union's motives - others were supportive and the series of presentations succeeded in placing the issue on the political agenda of local governments in the province. To maximize the impact of its municipal campaign, he union sent letters to all 162 municipalities with a package of information and an offer to follow up with further material and possibly an appearance before their council.

At the same time, the union decided to begin lobbying the Provincial Government directly to get it to consider including stronger MI standards in the next revision of the provincial building code. On August 10, 2011 the union met with Christine A. Webb, Senior Policy Advisor, Building and Safety Standards Branch of the Provincial Government both to outline its recommendations and to establish a relationship with policy makers in government. In the following years it continued to lobby the province for the changes it wanted.

10. Developing Plans for the Next Stages of the Campaign: Focusing on Improving Communications and Clarifying Its Message

As the campaign progressed, the union felt it needed to assess its effectiveness and map out the next steps. It held a half day workshop in the spring of 2011 for this purpose. Based on these discussions it commissioned Lanarc to develop a new report outlining the future communications strategy for the campaign (Lanarc 2011, p. 5). The goal was to "bundle recent communications work…into an organized and strategic framework that will guide efforts going forward." (Ibid., p. 5.) Echoing the earlier technical paper by the same consulting firm, this strategy document identified five key audiences for the next stages of the campaign: the Provincial Government, the City of Vancouver, utility companies in BC, local governments and select professionals in the industry. It also underscored the need to develop "champions" with high credibility who could advocate for the union's cause.

The 26-page planning document was extremely detailed, profiling the various target audiences and indicating the key messages that the union should present to each. It provided summaries of the evidence to support the union's key claims. It also emphasized the need to frame the union's arguments in terms of climate change objectives rather than only promoting the economic benefits of better MI. It suggested that the overall energy savings and GHG reductions for the province should be a central component of the union's advocacy efforts. (Ibid., p. 5.) The document also underscored the need for a systematic, well-organized and carefully planned approach. This involved defining the scope of the union's efforts to change industry practices by identifying and targeting every major industry and government actor.

The document set out the next phases of the campaign, starting first with refining the union's message and producing a package of information materials targeted at specific audiences. The second phase involved developing an outreach program to identify and recruit "champions" who could work with the union to draft editorials, write letters and produce other supportive communications materials. It also recommended initiating meetings with key groups in government and industry in a planned and systematic way. The third stage outlined the actual "roll-out" of the campaign.

The September 2011 UBCM conference provided a major opportunity for the union to reach a much broader audience. In preparation, the union organized a number of key validators for its conference booth and its presentations, including Lanarc's staff and the members of the BC Insulation Contractors Association (BCICA). It also hosted an information session that attracted representatives from various components of the Provincial Government, including its building and safety standards branch, intergovernmental relations and planning division, stewardship and technical value branch, climate policy branch and energy efficiency branch as well as numerous mayors and council members. The UBCM passed the resolution on MI that had been put forward by the Municipality of Burnaby, demonstrating united support for recommendations to improve MI standards within the provincial Building code. The union was able to present this document

at subsequent meetings with individual municipalities, adding additional weight to their campaign message. [10]

This success has led the Union to become a regular presence at the annual UBCM conference. But its campaign presence has not been limited to just the provincial arena. It has continued to attend the FCM annual conference to meet with mayors and council members from across the country and encourage them to think about the benefits of higher MI standards. It has also paid for booths at a number of other industry, environmental and public policy conferences, both in Canada and in the US, as a way of promoting the view that MI is a necessary component of industry climate change initiatives.

As part of its efforts to promote the campaign at a national level, the union has encouraged union locals representing insulation workers in other provinces to follow its lead. For example, it has shared its promotional materials with Insulator's Local 95 in Ontario and assisted it with its presentations at the February, 2013 Federation of Canadian Municipalities (FCM) Conference in Windsor, Ontario (http://insulators118.org/2013-sustainable-communities-conference-and-trade-show/).

In October 2014, it participated in the Toronto GreenBuild conference. In November, that same year, Lee Loftus, the union's business agent made a presentation at the Thermal Insulation Association (TIA) of Canada's annual conference. Since then, the union has continued to promote its views at numerous industry, government and environment conferences, both in BC and nationally, regularly attending subsequent annual events of the organizations noted above. The union has also presented its climate agenda to US audiences at the GreenBuild Conference

[10] These changes would also require addressing another problem: concurrent authorities. The building industry in BC was concerned about variations in standards building codes among municipalities because it created confusion about what they were expected to do. As many companies operate in numerous municipalities, they have a strong interest in having consistent building code standards. The problem is that there are significant differences among municipalities both in the nature of the buildings they oversee and in their capacity to regulate the industry within their jurisdictions. While pressure on the Provincial Government to harmonize standards can have the effect of raising them for the least advanced municipalities, it can also result in downward pressure to adopt the lowest standard that all municipalities can enforce. Regulatory standardization can become a barrier to innovation and to the implementation of best practices as contractors can argue that they should not be required by governments to implement requirements beyond the minimum in the building code. If not properly framed, building codes can become a 'ceiling', limiting innovation and adoption of new best practices. In the most recent amendments to the BC Building Code, passed in the summer of 2015, the Provincial Government removed much of the discretion that municipalities had under the previous Code. The new Code overrides all existing municipal building codes and appears to make it illegal for local governments to require standards different from those in the provincial code. Although there are provisions for municipalities to appeal to the Provincial Government for variances, it is not clear whether this will be a common practice, particularly if contractors oppose efforts of municipalities to require standards higher than the minimum in the Provincial Code. The new legislation only comes fully into force in 2017 and it remains to be seen how it will impact municipal efforts to improve MI standards.

in San Francisco in 2012 and at the National Insulation Association Conference in Florida in April 2013. (A more detailed list of these activities is included as an appendix to this paper.)

Most recently, the union had a booth at the Vancouver SustainaBuild Conference on June 27, 2014 as well as making a presentation on deep energy retrofitting at one of the conference's workshops targeting industry and government building professionals. (http://www.energyconservationspecialists.org/751/). On July 10, 2014 it made a presentation at the Green Chamber of Commerce BC event, again showcasing 'green' insulation technologies. On December 1st to 3rd 2015, it participated in the Quality Urban Energy of Tomorrow (QUEST) conference in Vancouver. (http://insulators118.org/bc-insulators-green-team-connects-at-quest-conference/)

In 2015 it arranged to have a booth at the BUILDEX Canada Conference, which is the largest trade show for the construction industry in Western Canada. The conference hosts over 600 exhibits from all sectors of the industry. On February 25th and 26th 2016, the union again staffed a booth at the Vancouver Buildex Conference which is the largest construction trade show in Western Canada. (http://www.energyconservationspecialists.org/bc-insulators-at-buildex-vancouver-2016-to-talk-energy-conservation/)

As part its campaign, the union also focussed on building relationships with a number of industry organizations that are supportive of low carbon construction. One of these is the Canadian Green Building Council, an association that includes contractors, planners, architects and others interested in climate innovations. At the latest conference of the Council in Vancouver in 2015, the BC Insulators hosted an information booth staffed by its elected officials to promote the latest developments in MI to engineers, consultants and contractors. It has followed up these contacts with further meetings with a number of key engineering firms in the province.

The Insulators Union also contributes to the work of the Canadian Standards Association, a body that establishes guidelines for a wide range of industrial and consumer products, including building materials and HVAC systems. And it has pursued discussions with a number of the leading edge producers of the various components that are now included in MI systems to keep on top of recent developments and to build links between unionized contractors and equipment suppliers.

Property managers oversee the operation of many buildings in BC and therefore have an interest in how much energy their buildings are using. The union has reached out to firms such as Brookfield Global Integrated Solutions which oversees over 100 million square feet of property, globally, and whose properties consume very large volumes of energy that could benefit from improved insulation systems. Its message has been that retrofitting MI on many of their HVAC systems would be a prudent investment.

11. Addressing the Confusion in MI Standards by Developing a Detailed Technical Manual to Guide Industry Practice

One of the findings of the 2010 Lanarc report was that there was considerable confusion in the industry concerning standards and best practices. There was a major information gap which neither government nor the industry had filled. To address this problem, in 2012, the union commissioned another paper to provide the BC industry with technical guidelines. Entitled "MI Guide and Specifications for British Columbia," it was jointly produced by the firms HB Lanark and Besant and Associates, Engineers. The authors had the paper reviewed by six industry professionals to ensure it captured the best practices of the industry. The paper's purpose was outlined as follows:

The overall objective of this guide is to support the implementation of MI best practices on heating and cooling systems in BC, by providing a resource to a wide range of stakeholders from building and facility owners to MI installers – helping to work towards an ultimate goal of having every section of pipe and duct in the Province of BC insulated correctly. (HB Lanarc and Besant, 2012, p. 1)

The 86 page technical guide, which the union has posted at no charge on its website, outlines the various legal regulations governing the installation of MI in BC and summarizes key guidelines from a number of other sources, including the American Society of Heating, Refrigeration and Air-Conditioning Engineers Standards, the Thermal Insulation Association of Canada (TIAC), the North American Insulation Manufacturer's Association (NAIMA) and the Sheet Metal and Air Conditioning Contractors' National Association. It provides technical advice for building developers, mechanical engineers, general mechanical contractors, tradespersons, 3rd party inspectors and municipal building inspectors. The manual reviews the strengths and weaknesses of different project management tools such as MasterFormat and Uniformat as well as discussing software options for Building Information Modelling (BIM) and for planning and sourcing HVAC components. It also evaluates different materials commonly used and provides recommendations concerning where and when to use them.

It is somewhat unusual for a union to be developing - and funding - the technical guidelines for building systems such as HVAC installations. However, given the lack of clarity in BC's construction industry over standards and the failure of other organizations to develop installation manuals, the union felt that this gap had to be filled and that it was in a position to do so by commissioning appropriate professional and technical advice.

To further promote standards of MI and its connection to energy savings and environmental impact, the union established a new website separate from its regular union site that offers advice and technical support for developers, engineers, building owners and the general public. The "Energy Conservation Specialists" website (http://www.energyconservationspecialists.org/) describes the contribution good insulation can make in reducing the province's GHG emissions as well as saving energy for building owners and tenants. It includes various papers on insulation

best practices as well as descriptions of a number of case studies describing the energy savings that good MI can achieve.

The website also includes 'how to' videos on best installation practices which the BC Insulators produced as part of their effort to provide relevant instructions to all MI installers in the BC construction industry, regardless of union affiliation. http://mispec.org/

12. Introducing Climate Change into the Apprenticeship Curriculum

In both Canada and the US, many building trades' unions oversee the training of apprentices, including the standards and qualifications they have to meet to become journeypersons. This function dates back well over a century and is based on traditional craft worker control over the trade. In various Canadian provinces, unions continue to operate training facilities to provide their apprentices with the classroom component of their training programs. In some cases, these programs are entirely managed by unions, while in others they may be jointly managed with employers. And in some cases responsibility for various components of training may be shared with public and private colleges of further education.

Although most construction unions in BC are involved in apprenticeship training, the normal practice is for the classroom component to be delivered in the province's public community colleges. While unions may play a role in curriculum development, the government, through BC's Industry Training Authority establishes the standards for each trade in co-operation with employers and unions. [11]

The BC Insulators occupy a somewhat unique position in the training system in BC, however. They own the curriculum that is used in the classroom component of insulator's apprenticeship training in the province and have a copyright on the course content. The classroom components of the union's curriculum are taught by its own instructors, but delivered through BC's public college system through a contractual relationship. The main public trades training institution is the BC Institute of Technology (BCIT) which provides the facilities for the apprentice trainees. Because the training is offered in a public institution, the union's program is available to all who wish to become certified insulators, regardless of union membership. For apprentices who work for contractors with whom it has collective agreements, the union also assists them with finding ongoing employment to ensure they obtain the hours of on-the-job experience to move, successfully, through each year of their apprenticeship.

Because it provides the curriculum for all insulating apprentices in the province, the union has been able to incorporate climate change into the training it provides. The decision to amend the curriculum was not driven by outside pressure from government or employers. Rather it has been

[11] Over the past 15 years, the Provincial Government has largely excluded the building trades' unions from the role they formerly played in co-managing the apprenticeship system, in response to a concerted campaign by non-union contractors to eliminate the role of unions in the province's construction industry, including their role in apprenticeship. However the BC Insulators have retained control over the curriculum of MI apprenticeship.

a reflection of the union's commitment to the message at the core of their campaign regarding the significant role MI can play in green construction through long-term energy savings and reductions in GHG emissions.

The curriculum coordinator and head instructor for the MI apprenticeship program at BCIT, was drawn into discussions around the campaign immediately following the release of the Lanarc 2010 study. His early involvement speaks to the comprehensive approach adopted by the union from the outset of the campaign. The apprenticeship program offered a critical opportunity to reach future journeyperson MIs early in their careers and, in their training, to immerse them in the culture of green construction through mandatory and streamlined in-class instruction. As future members, the union viewed their participation in - and understanding of - the campaign and the evidence surrounding MI as a green industry as essential to generating the shift in industry culture necessary for the long-term success of the campaign, and the union.

The new core curriculum is composed of two separate courses, a standard LEED 101 course and a Green Awareness Training program tailored specifically towards the role of MI in improving energy efficiency. The LEED 101 course is an introductory course based on the US Green Building Council (GBC) green building principles and the fundamentals of the LEED Rating System. The course explores general topics around climate change and the impacts of building development as well as motivators for green building.

The course on Green Awareness emphasizes the specific role of MI in green building development. It introduces the concept of MI as a green job and exposes students to the issues and evidence brought to light through the HB Lanarc White Paper. It includes education on new green MI products, as well as training in new green MI tools, such as the 3E-PLUS program. 3E-PLUS is a computer program, offered through the US National Insulator's Association, that allows installers to easily calculate heat loss and determine surface temperatures on components of mechanical systems to determine the most appropriate insulation thickness required for optimal performance and efficiency.

These two core courses, each taught as one-day, 8-hour sessions, are now mandatory components of apprenticeship training. The LEED 101 course is taught during the first year of in-class training. The Green Awareness course is then taught as part of the second year's in-class training program. While these core courses represent the most significant changes to the curriculum as a result of the campaign, informal messaging now reaches students through a variety of other avenues. Conversations around the energy-saving and cost-saving benefits of MI spring up on the shop floor, information about the environmental benefits of MI show up on posters in the

classroom, and resources are now available online for apprentices through the various websites run by the union, all of which promote the energy conservation benefits of MI.[12] [13]

Interestingly, drawing from its training expertise in BC, the union also developed a training module for the US AFL-CIO's National Labour College, the only accredited US institution of higher education that was managed by the labour movement. (The course was first taught to its first year class in 2011, but unfortunately the College closed in 2014.).

13. Building Bridges with BC's Environmental Movement

In light of the union's climate change advocacy, it has viewed partnering with the environmental movement as a logical extension of its public policy campaigns. The work of its members coincides with the goals of many of these NGOs who are intent on reducing Canada's carbon footprint but not knowledgeable about the technical side of the building industry. The union is a founding member and strong supporter of the Green Jobs BC coalition. (http://www.greenjobsbc.org/who_we_are), an organization that includes the major trade unions in the province and leading provincial environmental groups, including the David Suzuki Foundation, the Columbia Institute, the Sierra Club and the Pembina Institute. Its mandate is to promote a sustainable economy which is socially just, environmentally progressive and committed to providing community sustaining jobs. Its key policy priorities are expanding public transit, promoting building energy efficiency and supporting the development of renewable energy.

In the building sector, Green Jobs BC recommends that the Provincial Government commit to net-zero energy use for new buildings by 2027 as well as financing a major retrofit program for existing structures. It also recommends "stretching" the current building code to allow municipal governments the flexibility to implement standards that are above those set out in the new 2015 code. The purpose is to prevent the code from acting as a 'ceiling' on innovative climate change building practices. Green Jobs BC has advanced its policy agenda by organizing a series of provincial and regional conferences and workshops promoting climate change activism as well as developing educational material and a website containing additional technical resources.

The BC Insulators works with another environmentally focused organization, the Canada Green Building Council. http://www.energyconservationspecialists.org/about-us/. And it has been a supporter of Blue-Green Canada, a coalition that brings together national environmental and

[12] A full description of the components of the Insulator's apprenticeship program can be found at: http://www.bcit.ca/study/programs/3800appr#courses

[13] Interestingly, drawing from its training expertise in BC, the union also developed a training module for the US AFL-CIO's National Labour College, the only accredited US institution of higher education that was managed by the labour movement. (The course was first taught to its first year class in 2011, but unfortunately the College closed in 2014.).

labour organizations to develop common policies for addressing climate issues. (http://bluegreencanada.ca/about). The goal of Blue-Green Canada is to facilitate a dialog between unions and environmental organizations that will facilitate linking progressive climate policies with support for a sustainable economy based on providing good jobs.

One of the most recent climate initiatives of the union has been to support expanding the public transit system in the Vancouver area. In the spring of 2015, the Provincial Government announced that it would hold a referendum on whether to approve the capital expenditure plans of Translink, the regional transit operator for BC's lower mainland. The decision to hold a referendum was controversial, as spending on many other infrastructure projects such as new bridges and roads was not something the electorate normally voted on. The union viewed the expansion of public transit as an important environmental policy issue. It posted information about the climate change benefits of this investment on its web site under the slogan "Transit Puts People First," aligning itself with many of Vancouver's environmental organizations. And it recommended to its members that they vote in favour of the funding proposal in the ballot, that took place on May 29th, 2015.

14. Conclusion: Establishing a Stronger Voice for Labour in Climate Change Mitigation Efforts

This article has examined the efforts of one building trades' union, the BC Insulators, to influence the climate policies of the construction industry in British Columbia. The union's members install and inspect mechanical insulation on HVAC systems, primarily in commercial and industrial buildings but also some multi-unit residential complexes. According to the IPCC and numerous other scientific bodies, the building sector has the potential to make a major contribution to reducing energy use and GHG emissions if low carbon construction techniques are widely implemented in both new and refurbished buildings.

The union became a climate change advocate gradually due to its concerns about maintaining and improving construction standards and its recognition of the role that properly installed mechanical insulation can play as part of the wider objective of 'greening' the building sector. Its advocacy was prompted by the failure of the province's construction industry to implement appropriate quality standards due to its commitment to low bid construction practices and its unwillingness to support the training and skills development of the construction workforce. This was compounded by the reluctance of governments at the municipal and provincial level to adopt and enforce the more stringent building code requirements needed to reduce the carbon footprint of buildings, a deficiency exacerbated by their failure to inspect building work adequately.

The BC Insulators decided to address these barriers by funding independent, technical research demonstrating the energy and climate change benefits of higher standards of MI. It supplemented this by commissioning a comprehensive technical manual that provides detailed, practical guidelines to both industry and government on HVAC insulation best practices. To promote change in the industry, it mounted an extensive, multi-year campaign promoting higher MI

standards to governments, industry and the wider public. This has included numerous presentations to municipalities across the province, meetings with Provincial Government officials, and appearances at industry trade shows. It has pressured governments to take a leadership role by requiring higher MI standards in their procurement of new and refurbished buildings and to use their regulatory powers to strengthen building codes and impose more stringent conditions on development permits.

Recognizing the difficulties of appealing only to a building establishment committed to the status quo, the union learned how to utilize the media to influence public opinion. By exposing the adverse consequences of improperly installed insulation, which included substantial energy losses, negative health effects for building occupants and premature deterioration of HVAC equipment and building components, the union enlisted the support of those purchasing buildings, as well as the wider public, for its campaign to raise standards. It framed its arguments not only in terms of the financial benefits of better MI, but also in terms of the contribution it can make to mitigating global warming. To expand the reach of its campaign, it has also built bridges with the major environmental organizations in BC who it views as important allies in its advocacy efforts.

What is perhaps most striking about the efforts of this union is that its 450 members have supported its campaign by investing almost a million dollars of their dues money over the past six years. In doing so, the members have created a significant profile for the BC Insulators as climate advocates within the province of BC, as well as nationally, through the union's efforts to demonstrate the climate change benefits of higher MI standards and its commitment to 'greening' the culture of the building industry.

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Appendix A

Interview Questions for Staff and Officials of BC Insulators

Name of interviewee _____
Position at BC Insulators _____
Date of interview _____
Location of interview _____

I want to thank you so much for taking the time to meet with me and for agreeing to participate in the interview. The information you provide will be very helpful in furthering our research project. Your green campaign offers a unique and interesting example of a climate initiative within a labour organization setting and, particularly, within the construction industry.

The interview is divided into several sections. I will start by asking you a few descriptive questions regarding your position within the BC Insulator's Organization and your involvement in the campaign. There will then be a series of questions about how the BC Insulators became involved in campaigning to highlight the role of mechanical insulation in saving energy and mitigating climate change, including how the BC Insulators' activism got started, its progression, and some of the outcomes from the campaign, and finally looking at lessons learned and possible next steps regarding the future of the campaign.

As mentioned during the consent process, this interview will be recorded for the purposes of the study. However, you are welcome to terminate the interview at any point throughout the process and you are free to retract any statements you make regarding any of the questions.

Section 1: Your Role with the Insulators and Your Campaign Involvement

1. To start, could you tell me how long have you been with the BC Insulators, and what is your current position within the organization?
2. Can you describe how and when you became involved in the BC Insulators' campaign to change industry practices and culture around the role of mechanical insulation, particularly in relation to its energy saving capacity?
3. How would you describe the position you filled within this campaign, and what were your responsibilities?

Section 2: Campaign Initiation & Progress (This section is about the BC Insulators' decision to initiate a campaign and to commission HP Lanarc to do a major study)

The decision to commission an independent study from Lanarc (entitled "Pipes Need Jackets, Too") appears to have been an important point in the BC Insulator's approach to promoting higher standards of mechanical insulation.

4. What key events had occurred - or were occurring - (in the industry, province, or within the union) in the period leading up to the HB Lanarc study that helped inform the approach that the BC Insulators adopted for the campaign?
5. Can you elaborate on why the decision was made to commission an independent study by HB Lanarc?
6. Can you describe how the working relationship with HB Lanarc evolved throughout the process?

After the publication of the "Pipes Need Jackets Too" study, the campaign involved approaching different governments and members of industry to encourage them to speak about the importance of mechanical insulation standards.

7. Were you involved in any of these meetings or presentations? - If yes, can you describe your role in these meetings?
8. Can you explain why the BC Insulators decided to target changes in mechanical insulation standards at the municipal level, rather than the provincial or federal level?
9. Can you identify any key meetings with municipal governments that you felt were particularly important to the campaign, and describe why they were important?
10. The BC Insulators decided to reach out to professionals such as engineers, architects, university academics and developers as part of its campaign. Can you describe its initiatives in this area and assess how they contributed to the campaign?
11. The BC Insulators' campaign has used the media to expose the poor quality of mechanical insulation on many projects to the public. Can you describe why the BC Insulators decided to 'go public' and what your experience has been in raising these issues in the media?
12. During the campaign, the International Association of Heat, Frost and Asbestos Workers, Local 118 to the BC Insulators changed its name to the BC Insulators. Why did this change occur and what effect did it have on the campaign?

Section 3: Membership Involvement and Support (This section focuses on the role of members in the campaign)

The BC Insulators' campaign has involved significant financial investment on activities that are typically outside the normal collective bargaining role of unions.

13. How did members initially respond to the campaign plans and approach?
    a. Was there significant pushback from membership about the need for the campaign, the focus of the campaign or the financing of the campaign and, if so, what was the substance of the pushback?
14. Have members played any particular roles in developing and supporting the campaign?
15. In your opinion, has the campaign changed how members view climate change issues within the industry context – or do they see the campaign primarily in terms of its potential to maintain employment?

Section 5: Environmental Dimensions of the Campaign (This section is intended to find out about the environmental and climate change dimensions of the campaign including the BC Insulators' relationship with key environmental organizations)

The connection between mechanical insulation and reducing GHG emissions appears to have been a gradual development in the BC Insulators' 'framing' of the campaign and the role of mechanical insulation in addressing global warming.

16. At what point in the campaign process did environmental concerns emerge as the key focus for the BC Insulators?
17. To what extent did government climate policies and legislation influence the approach taken by the BC Insulators in its campaign?
18. Can you describe how the BC Insulators became involved with environmental organizations in BC and comment on the current relationship of the BC Insulators with the larger environmental movement?

Section 6: Campaign Outcomes (This section is to obtain your views on the effectiveness of the campaign, including its strengths and weaknesses)

19. In your opinion, did the presentations you made to municipal governments result in them examining the feasibility of including higher standards of mechanical insulation in their contract tenders for new buildings or renovations to existing buildings? Did it change their policies regarding development permit approvals or other requirements for the broader building industry within their jurisdictions? If so, which municipalities?
20. Why was the decision made to put forward a resolution on MI at the UBCM convention in 2011, who was involved in putting it forward, and what impact has it had?
21. The province has adopted a new 2015 Building Code. Do you believe the BC Insulators has had any impact on the provisions of the code dealing with mechanical insulation? Why or why not?
22. Does the new building code have a positive or negative impact on mechanical insulation requirements within the industry and why?

Section 7: Lessons Learned & Next Steps (This section is intended to highlight any lessons learned from the campaign, anything you might change about the campaign process in retrospect, as well as important next steps regarding the future of the campaign and the role of MI within the industry)

23. Has the campaign changed the approach of the employers with whom you have collective agreements with respect to the role of mechanical insulation in addressing climate change? If so can you give any examples of such changes?
24. Are there any provisions in your collective agreements that reference climate change?
25. Do you think the campaign has made any significant difference in the broader construction industry's culture around mechanical insulation and its impact in mitigating climate change?
26. Looking back, was there anything you think could have been done differently, anything you would change about the campaign approach?
27. Going forward, what do you see as being important next steps to further the campaign?

Were there any other key events or components of the campaign that have not been mentioned that you think should be discussed