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Nisichawayasihk

A Future Net-zero
First Nation?

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Introduction

Nisichawayasihk Cree Nation (NCN) (Nelson House, MB), has embarked on a comprehensive program of economic development that addresses employment, training, healing from trauma, infrastructure development, and energy self-reliance. The First Nation is vitally concerned with nurturing young people, and is now interested in sharing its learning with other First Nations communities. NCN's development initiative is reflective of a convergence, or self-reliance approach to community economic development (ie. converging local production with meeting local basic needs) (Loxley, 2010). The program also reflects the quadruple bottom line of social enterprise (employment creation, environmental protection, social development, and income generation) (Berkes and Ross, 2013). NCN's training

program goes beyond simply imparting employment skills to young participants who must then find their way in uncertain labour markets. The program functions as a labour market intermediary connecting NCN trainees and residents to employment opportunities and employers, and supporting them after the hiring phase in adapting to possible employment challenges (Bernas and McKinnon, 2015).

This research surveys some of the scope and implications of this initiative. It discusses some of the significance of participation in training for NCN young people, the effects of finding employment, and the wider impact that employment development is having on the community. Finally, this report outlines the initiative's vision for next steps.

Beginnings

The origins of NCN's training go back to the signing of the Wuskwatim Project Development Agreement in 2006 (Wuskwatim Project History, 2019). This was the first agreement in Canada in which a First Nation entered into an equity ownership position in the development and operation of a hydroelectric project (Wuskwatim Project History, 2019). The partnership gave Nisichawayasihk a 33 percent share in the revenues from power generation at Taskinigahp Falls on the Burntwood River. It also gave the community a say in the development of the project and an on-going role in monitoring its impacts.

A key concern for the community in signing the Wuskwatim partnership was to provide employment and training for NCN citizens. Approximately 300 NCN residents found work in the development phase of the project. Currently, however, far fewer jobs are available. Only three people from NCN continue to work at Wuskwatim, and the program trust fund allocates only \$26,000 per year for summer employment. This outcome is generally consistent with analysis of export development approaches to community economic development (Loxley, 2010). Jobs for local community members tend to be low-skilled, and created in the development phases

of projects. In the operational phase, without an intentional localization strategy for employment, there tend to be fewer jobs for local residents, and most highly skilled roles are held by outsiders.

In 2012, when the generating station was brought on-line, Hydro ended its commitment to training at NCN. This left the community with a 27,000 square foot training facility, but no resources to run a program. Some in the community advocated converting the facility to housing or a hotel. Others, including a former chief, and the community's economic development officer, wanted to continue the role of training residents for employment. These community members persuaded the First Nation to provide a small grant, and the Atoskiwin Training and Employment Centre (ATEC) began its new training phase.

Training Leads to Development

Initially, ATEC aimed at providing high school completion programs (Mature Student Diploma). The program ran strictly on grants, and students paid no tuition fees. In fact the students were paid a small incentive of \$10 per day to encourage attendance. The program tried to offer pro-

programming that responded to the assessed, and the expressed, needs and interests of students.

In 2017, NCN assessed 545 residents between the ages of 18–35 who were on social assistance in the community. Of these, 170 expressed interest in learning trades (Pewapun, 2019b). That year ATEC began its Construction Trades Apprenticeship Program, accredited by the Manitoba Government. That same year, the First Nation issued a tender for construction of two new houses on the reserve. Typically, these tenders are fulfilled by ready-to-move (RTM) housing shipped from southern Manitoba, or they are won by outside contractors who fly into the community, complete the construction, and leave, taking their earnings with them. Very few of the resources expended on housing circulate within the community.

As a class exercise, ATEC's first-year apprentices, along with their instructors, developed a bid for construction of the two houses. The objective was to teach basic cost estimation. However, to add realism to their project, the class submitted their quotation. Somewhat to their surprise, the students won the contract. That summer, under supervision from red seal carpenters (those qualified to train apprentices), the trainees built their first two houses. Before that, the average time to build houses in the community was eight months. The ATEC students completed their two units in 84 working days. An inspector from Winnipeg was hired and certified the quality of their work as "meeting or exceeding work in urban centres" (Pewapun Manager, 2019).

The economic effects of this contract completion were significant. The trainees' incomes rose from \$311 per month in social assistance payments they were receiving as students, to \$3,338 per month (\$19.26 per hour) as first-year apprentices. The students were also able to put in their required hours of on-the-job training as apprentices. As residents of the community, the students could be expected to spend significant amounts of their earnings at the local store, at the

gas station, in payments to their housing providers, and to childcare providers. This would create a multiplier effect as these earnings were in turn spent by the local businesses and their employees. As much as possible, building material for the houses was purchased from Meetah Building Supplies, a company based at NCN that serves several communities in the North. Employees in this company again re-spent some of their earnings locally. Not only were wages retained and circulated within the community, but social assistance resources at NCN were saved and reallocated to other community needs. This reflects principles in convergence economic development referred to as import substitution (substituting locally-built housing for imported homes), and closing leakages of income from the local economy (Loxley, 2010)

Pewapun Construction

Most would regard winning and fulfilling a professional contract as a significant achievement for a training program. However, some potential contractors objected that ATEC, as a training program, had unfair advantages in the bidding process. There was also concern within ATEC that if trainees were injured on a contractual job the program's insurance may not cover the injuries. This led to the creation of a for-profit construction company, Pewapun (A New Day) Construction Ltd that could hire ATEC apprentices and bid on construction opportunities. Pewapun and ATEC have overlapping membership on their Boards of Directors (Pewapun Manager, 2019).

Beginning in 2017, Pewapun constructed another six individual houses, a four-plex facility to house NCN seniors, and an extension to the ATEC training centre. The most recent project is an energy-efficient eight-apartment complex for staff of the community's Medicine Lodge treatment centre (Pewapun, 2019a).

By 2018, Pewapun had logged 67,200 person hours of employment for 35 NCN citizens. At

apprenticeship wages this was a total of \$1.29 million in earnings retained and recirculated in the community. As of 2019, the company had 55 apprentices in its workforce (Pewapun, 2019a).

Heat and Energy Efficiency

In planning these projects, the students and their trainers began to take into account a statement in the NCN Strategic Plan that the community would “Consider alternative energy-based development such as solar, wind power, geothermal, (and) hydrogen power projects (Nisichawayasihk, 2019, p. 50). The four-plex living facility was the first building constructed with a view to energy and heat efficiency. The roof of the building was lined with twenty-five 325-watt solar panels delivering 8,000 watts of power. This solar energy was used not only for lighting and appliances, but also to power electric baseboard heating. The building envelope was constructed with Insulated Composite Envelope (ICE) panels. These are highly compressed sheets of Styrofoam insulation held in place by galvanized steel ribs. They are similar to the more widely used structural insulated panels (SIP’s) which use oriented strand board instead of steel ribs. The panels fit together to create prefabricated walls, floors, and rooves for houses (CMHC 2017; Enersmart, 2019). ICE and SIP panels are manufactured to precision standards to seal much more tightly than regular frame construction walls. This greatly reduces “thermal bridges” (loss of energy at studs and areas where walls join or the house structure meets the foundation) (CMHC, 2016; Natural Resources Canada, 2019).

The highly compressed Styrofoam creates high insulation values (R-36 to R-42) at reasonable wall thicknesses. The airtightness of these materials has been shown to greatly reduce the risk of mould which is an endemic problem in housing in the north (CMHC, 2017; Opis, Shaw, Stephenson, and Wild, 2012). The floor and lower edges of the rooms (up four inches from the floor) were

coated and sealed with Scorpion lining, a polyurethane product that moisture proofs the building and prevents mould growth (Scorpion Protective Coatings, 2019). After one year of operation the building was able to supply all its lighting, appliance, and heating needs from its solar array. The apartments drew no energy from the grid (Pewapun Manager, 2019). (Currently, technical issues relating to the interface with the Manitoba Hydro grid have meant the solar panels have had to be temporarily disconnected. These are expected to be resolved in the near future).

Pewapun has built an extension to the ATEC training building to create a manufacturing facility for SIP panels and for ready-to-move (RTM) housing. Pewapun plans to purchase manufacturing equipment that will replicate the Enersmart factory in Cochrane, Alberta, currently a leading producer of SIP panels (Enersmart, 2019). Five of Pewapun’s apprentices spent a week in training at the Enersmart factory where the trainees manufactured all SIP panels for Pewapun’s latest housing project. This reflects a convergence development principle of building backward linkages from production (Loxley, 2010). Development begins with a production initiative that meets basic community needs (in this case housing). It then considers opportunities to provide some of the inputs of this production (SIP panels). Backward linkages create further opportunities for employment or retention of income.

In the convergence approach, the surpluses of local production can be used for export. The ATEC facility will have the capacity to manufacture 100 houses per year. These can be shipped by rail, and then by barge on rivers, or by truck on winter roads, to communities that currently purchase them from southern non-Indigenous suppliers. This would allow Pewapun apprentices to manufacture housing, year-round in a controlled environment. This ATEC factory facility will have roof mounts for 30 solar panels and ground mounts for another 153. These photovoltaic arrays will power all the radiant floor

heat for the 14,000 square foot facility, and will supply all the power for the machinery and power tools used in the manufacturing.

Pewapun has now received a grant to convert a further five buildings in the community to solar power. This will require 120 340-watt panels. It has been calculated that meeting the entire power needs of the community would require 39,000 panels, or 16 million watts of power (Pewapun, 2019b).

Such a program is not unrealistic. In 2015, the Rainy River First Nation, near Fort Frances Ontario, commissioned a solar farm consisting of 130,000 solar panels that produce 25 million watts of power (Johnston, 2015). The First Nation sells the resource into the Ontario power grid. The solar farm takes in revenues of \$16 million

per year and earns \$1.6 million in profits. Fisher River First Nation, near NCN, has created a solar farm consisting of 3,000 panels that can generate one million watts of power (APTN News, 2018; MacIntosh, 2019). The First Nation is currently finalising technical details for supplying this energy to 350 houses in the community.

Currently, Nisichawayasihk pays \$1 million per year for hydro power for community-owned businesses, community service facilities (such as the senior's residence), and for families on social assistance. Reductions in these hydro bills through reliance on solar energy will mean significant savings to the First Nation. This is another instance of import substitution. Local production of solar power substitutes for imported hydro power and saves on hydro costs.

Net-Zero Buildings

A net-zero energy building is defined as one that produces as much energy as it consumes (CMHC, 2015; Minea, Chen, & Athienitis, 2017). Net-zero building construction has a long history in Canada (Panagiotidou and Fuller, 2013). In 1977, a home was built in Saskatchewan that was so air-tight and well-insulated it could be kept warm through a Saskatchewan winter with a hairdryer (Charron, 2017; CMHC, 2018; Paulsen, 2012). Net zero technology was further refined and elaborated by the Passive House Institute in Darmstadt, Germany (CMHC, 2018). This group of researchers built their first prototype in 1990. It was “Europe’s first inhabited multi-family house to document heating energy consumption below 10 kWh/m²a” (Passive House Institute, 2019). 10 kWh/m²a is a standardized, and highly stringent measure of energy use. Since then the Passive House Institute has provided technical assistance and certification worldwide for over 13,000 passive buildings that derive most of their heat energy from passive solar radiation (Passive House Institute, 2019; Panagiotidou and Fuller, 2013).

In 2017, in Agassiz, British Columbia, the Yale First Nation built a two-storey six-plex using Passive House principles. Canada Mortgage

and Housing Corporation (CMHC, 2018) reports the building is

80 percent more energy-efficient and emit(s) 80 percent less greenhouse gas than a similar building constructed without Passive House features. On even the coldest nights each house can be heated using the same amount of energy as just six 100-watt light bulbs (p. 3).

In 2006, CMHC launched its Net-zero Healthy Housing Demonstration Project (later renamed Equilibrium) (CMHC, 2008; CMHC, 2015). Builders in every region of the country were encouraged to apply for subsidies of up to \$100,000 to demonstrate the feasibility of net-zero energy home construction. Eleven homes in total were built. All achieved net-zero, or near net-zero, energy consumption (Panagiotidou and Fuller, 2013). In 2013, Natural Resources Canada’s Office of Energy Efficiency (OEE) launched the R-2000 Net-zero Energy Pilot. The objective of this program was to build net zero subdivisions. By 2016 the project had created 21 net-zero houses in four subdivisions and five net-zero-ready houses (only requiring the additional power sources) in another subdivision (Natural Resources Canada, 2019). The R-2000 project specified that to

qualify, housing must use off-the-shelf technology and could not custom-design any equipment. In the EQUilibrium program the buildings were carefully monitored, while owner occupied, for a full year after construction to verify the levels of energy consumed (CMHC, 2015b). One house had 182 sensors to monitor temperatures, energy consumption, solar radiation, and electrical flowrates (Minea, et al., 2017, p. 665). These demonstrated clearly the net zero energy standard.

Net-zero begins with creating a highly insulated and well-sealed building envelope, and ensuring that appliances, and space and water heating equipment, are highly efficient. Paulsen (2012) points out that if all the leakage areas of a conventional home were added together it would equate to having a 1.2 square foot hole in the wall of the building. Once energy leakage and consumption are reduced to very low levels, and all equipment and lighting is energy-efficient, the power needs of the building can be met from renewable sources (photovoltaic panels, geothermal pumps, or wind turbines). Some net zero homes are off-grid and rely on battery storage at times of low energy production. Others draw from the grid during periods of low production (e.g. cloudy days) and feed back to the grid in periods of high production. In either case, the result is net zero.

Most measures of net-zero refer to energy consumption when the building is in operation. Some argue that this is misleading because net-zero buildings often use more energy-intensive components in their construction (such as solar panels or specialized insulation), and so may not save energy overall (CMHC, 2015; Kneifel, O'Rear, Webb, O'Fallon, 2018). CMHC set out to measure this "embodied energy" in six of the eleven EQUilibrium demonstration projects (CMHC, 2015). The Corporation used an environmental impact tool developed for the Environmental Protection Agency in the US. They measured energy consumed, and carbon emitted, over the entire 20-year life-cycle of six EQUilibrium buildings.

This included energy used in raw material extraction, component manufacture, transportation to site, construction, operation, and maintenance of the buildings (CMHC, 2015; Kneifel, et al. 2018). Five of the projects were new-builds and one was a retrofit.

The study assessed: non-renewable energy consumed; greenhouse gases emitted; acidification of water and soil; particulate matter emitted (dust, soot, smoke); ozone depleted; solid waste created (in construction); smog emitted; water used (in the production of materials), and nutrients added to waters where previously they were scarce (eutrophication). The net-zero buildings were compared with those that met the minimum Ontario Building Code for the year of construction (2006), and buildings that achieved higher efficiencies based on Natural Resources Canada's R-2000 standard. While the EQUilibrium buildings were net-zero in operation, when the embodied energy was taken into account they still achieved reductions in:

- primary energy consumption;
- global warming;
- acidification of water and soil;
- emissions of dust, soot, and smoke;

Three of the buildings achieved a reduction in solid waste. All buildings had about the same performance for eutrophication (adding nutrients to waters). All except one building, however, had an increase in ozone depletion, water use during construction, and smog.

Net zero performance standards have improved greatly since 2006. Very significant progress has been made in the reduction of embodied energy. In 2018, a number of prototypes demonstrated that by utilising biomass as insulation material, buildings can actually withdraw carbon from the atmosphere (Magwood, 2019; Magwood and Burke, 2017). Plant matter, such as the internal portion of the stem of the hemp plant, can be mixed with lime. If the plants are widely grown, and the method is widely adopt-

ed, the construction sector could withdraw significant amounts of CO₂ from the atmosphere (Magwood, 2019; Hawken, 2017).

There is a critical need for the kind of expertise that Pewapun is developing among its young people at Nisichawayasihk. The training of young people in construction and management, the knowledge of net zero construction, and expertise in renewable energy technolo-

gies, all constitute highly important capabilities in Northern and First Nations communities. Both Indigenous Services Canada and the Assembly of First Nations identify development of capacity in Indigenous communities to construct, manage, and maintain housing, as key components in meeting housing needs in First Nations and in transitioning to sustainable energy and emissions.

Indigenous Housing on Reserve

As of the 2016 census, 31,595 Indigenous households, or one third of all Indigenous reserve houses, were deemed to be in “adequacy and suitability-based (ASB) housing need” (CMHC, 2019). While this means 33 percent of reserve families across Canada are in damaged or overcrowded housing, the figure is 50 and 51 percent for Saskatchewan and Manitoba reserves respectively (CMHC, 2019). These prairie provinces have the third and fourth largest reserve populations in Canada (only slightly less populous than BC and Ontario which have the largest). Of those households in need, 80 percent of houses are in need of major repair (the adequacy standard), and 33 percent are overcrowded (the suitability standard). Thirteen percent overlap with both kinds of problems.

CMHC reports that the Government of Canada spends \$319 million per year to support housing needs of First Nations on reserve (CMHC, 2019). This was divided between Indigenous Services Canada which spends \$143 million (ISC, 2019) and CMHC that spends \$176 million (CMHC, 2019). These figures are not significantly different from the spending of the previous Conservative government. In 2013, the figures were \$146 million through AANDC and \$157 million through CMHC for a total of \$303 million (Canada, 2015, p. 8)

In 2016, Indigenous Services Canada announced an additional \$554.3 million to be provided over two years for urgent housing needs on reserve (ISC, 2019). This is similar to the \$400 million spent by the Harper government for similar purposes a decade earlier from 2009–2011 (Canada, 2015 b). Once inflation and population growth are taken into account, the Trudeau government has not significantly increased funding for First Nations housing on reserve. The Canadian Centre for Policy Alternatives’ *Alternative Federal Budget* has consistently called for an expenditure of \$800 million to \$1 billion per year to address Indigenous housing needs (CCPA, 2016; 2017; 2018).

The top-up funding for urgent housing needs on reserve is certainly important. However, it will do little to reduce the backlog of needed housing. ISC (2018) acknowledges that the infrastructure deficit on reserve has now reached \$30 billion. The Department estimates the backlog of needed housing to be 35–40,000 units (Canada, 2015a; IDSC, 2018). The Assembly of First Nations estimates it at 85,000, and anticipates that it will grow to 130,000 by 2031 (Canada, 2015a).

This prompted Harold Calla, Executive Chair, First Nations Financial Management Board, to

comment to the Standing Senate Committee on Aboriginal Peoples

At this rate it will take 23 years to address the AANDC estimate of the current housing shortage and 49 years to address the AFN's estimate. In addition, it would take 25 years to renovate the units that currently need repair (Canada, 2015b, p. 29).

Regardless of the inadequacy of federal funding to build and renovate housing in Indigenous communities, significant housing work will occur on reserve. The government of Canada will construct an average of 1,750 new residential units per year and renovate 3,100 existing homes (Canada, 2015, p. 8).

One of the key factors identified by both the Assembly of First Nations and Indigenous Services Canada as critical to meeting housing need on reserve is for First Nations to acquire the capacity to construct, maintain, and manage their housing stock.

The Department of Indian and Northern Affairs (INAC, 2017) (now Indigenous Services Canada) in an evaluation of their on-reserve housing program found that

For communities with strong housing stock, the capacity to operate housing regimes and political strength on the part of band councils were cited by First Nation housing and band managers as critical to their success. Tied to this capacity was

the ability to acquire proper certified labourers and experts (INAC, 2017, p. 23)

The Assembly of First Nations (AFN, 2018) has stated

The legacy of colonization has removed the opportunity for First Nations to meet their housing needs and has prevented them from accessing necessary financial instruments, developing capacity, and establishing appropriate housing governance systems, which has left them almost solely dependent on government programs. (p. 3) ...

Action: Provide more access to relevant training and professional certification for housing and related infrastructure professionals (pp. 7–8)

ATEC and Pewapun are aiming to develop a network of training centres among First Nations communities that will provide qualifications not only in housing construction, but also in business management and leadership. ATEC/Pewapun's experience in training young people in both construction and alternative energy technologies will be highly important in the next decade. An entity has been created called Indigenous YouthBuild Canada (IYBC) that will develop a network of training sites similar to ATEC and Pewapun. IYBC will begin operations in four indigenous communities in 2020 (YouthBuild Canada, 2020).

Alternative Energy in Remote Communities

Not only will housing capacity be needed in Indigenous communities, but there will also be a need for expertise in alternative energy. There are 292 communities across rural and Northern Canada designated by the federal government as “remote.” In energy terms, this means that these communities have no access to the North American electrical grid (Canada, 2011; Heerema and Lovekin, 2019). While some have access to small localised hydroelectric grids, 251 remote communities generate electricity primarily by burning diesel oil (Heerema and Lovekin, 2019). Of these, 170 communities are Indigenous. These diesel generators are large enough to supply entire communities with power. Iqaluit for example, has a population of 7,542. It meets all of its electrical needs with 4 diesel generators that produce 15.1 million watts of power (Karanasios and Parker, 2016a; Qulliq Energy Corp., 2018). Across all these communities, diesel generators consume 215 million liters of diesel fuel annually and emit 600,000 tonnes of CO₂ to the atmosphere (Karimi and Kezerani, 2017).

Fuel for these generators is usually trucked into the communities over winter roads. In some cases, it is brought in by air (Heerema and Lovekin, 2019). When this transportation element is add-

ed to the equation, the carbon footprint of this sector becomes even more significant. Because transportation is often unreliable, communities keep large supplies of diesel fuel on-site (often one year’s supply). With ageing storage tanks, there are added risks of fuel spills and leakage (Karanasios and Parker, 2016a; Knowles, 2016). The Pan Canadian Framework on Clean Growth and Climate Change (Canada, 2016, p. 41) has identified reduction of reliance on diesel in Canada’s remote communities as a key objective in the country’s transition to net zero carbon.

Many remote communities are outgrowing their capacity for diesel generation. It is common to have load restrictions (LR) because of limited supply. This means that the number of new houses or buildings that can be added in these communities is limited. This in turn contributes to overcrowding and hinders economic development. In 2015, a Senate committee said the northern electricity systems are “aging, underperforming and at capacity” (Canada, 2015, p. 41)

Increasingly, diesel generating systems are being supplemented, or in some cases replaced, by renewable energy systems (Karanasios and Parker 2016c; Qulliq Energy Corp., 2018). Between 2013 and 2016, 11 communities in Northern Ontario

installed solar photovoltaic facilities to supplement electrical generation beyond diesel (Karanasios and Parker, 2016c). As of 2016, a further eight installations were being planned. A study of 25 remote Indigenous communities in Northern Ontario found that all 25 had average solar radiation levels sufficient for power generation (Karanasios and Parker, 2016c).

In the Northwest Territories, there are more than 200 solar installations in remote communities (Karanasios & Parker, 2016b). As the Government of the Northwest Territories (GNWT, 2016) points out, access to grids has always been limited in the territories. Remote cabins have been using solar generation for both light and heat in the NWT since 2001. The GNWT (2016) indicates solar potential in the territory is promising due to long hours of sunlight during the spring and summer months. Twenty-one communities in the NWT have solar installations providing 1.8 million watts of power. There are plans to develop an additional 1.52 million watts of solar generation over the next five years (GNWT, 2019). These will displace 570,000 litres of diesel fuel per year and reduce emissions by an additional 1,660 tonnes CO₂ per year (Karanasios and Parker, 2016b).

The Diavik mine in the North West Territories introduced four wind turbines to reduce

its combustion of diesel fuel (Karanasios and Parker, 2016b). The \$31 million investment produced nine million watts of power and reduced diesel consumption by four million litres annually. Renewable energy generation now saves the company \$5 million per year in fuel purchases. This means that the cost of the wind turbines will be paid back in fuel savings within six years — which is two years earlier than the company had projected (Karanasios and Parker, 2016b). Based on this outcome, the town of Inuvik will now install a 1.8 million-watts of wind generation that will supply approximately 18 percent of its annual electrical needs.

In May, 2019 Natural Resources Canada announced \$10.4 million contribution toward the first phase of converting the entire island of Haida Gwaii to renewable energy (Natural Resources Canada, 2019 c). The island currently derives 65 percent of its energy needs from burning ten million litres of diesel annually (Swilawiid Sustainability Society, 2019). In a multiphase project, whose total cost will be \$30.42 million, federal funding will help complete the expansion of a hydroelectric facility. It will then develop two million watts of solar capacity making the island's energy supply 100 percent renewable (Natural Resources Canada, 2019c)

Implications for a Canadian Climate Policy

The Pan-Canadian Framework on Clean Growth and Climate Change has identified housing as a key sector for reducing GHG emissions (Canada, 2016). Seventeen percent of Canada's greenhouse gas emissions come from energy used to heat and cool buildings (CMHC 2015b; NRC, 2018; Canada, 2016). The Framework indicates construction costs for net zero buildings have dropped by 40 percent since 2009 (Canada, 2016). The Pan-Canadian Framework has set a target of increasing Canada's building codes in steps to reach "net-zero energy ready" by 2030. Step increases are set

to begin in 2022. As of 2020, California's building code has already mandated that all construction of new residential buildings must be net zero. Since California builds over 100,000 new homes annually, the state is expected go from 140 net zero units in 2015 to 150,000 by the end of 2020 (Randolph and Masters, 2018; Hawken, 2017).

All of this indicates that the kinds of skills ATEC/Pewapun have built at NCN will be in high demand in First Nations in coming years. Thirteen young people at NCN have become certified solar installers.

Replicating ATEC

ATEC has pioneered holistic development that combines localised production, retention of income, skill development, personal healing, and sustainable energy use. ATEC is now working to broaden its impact by creating a network of facilities among First Nations that will share this experience. The network will not only train indigenous young people in technical skills, but will also nurture management and leadership ability, provide counselling and culturally-based healing, and support graduates as they enter the workforce. Graduates will be encouraged to lead and manage social enterprises that emerge from this training.

Pewapun has already moved to the second phase of its social enterprise development. It is nurturing some of its first apprentices to move into management of the company. In addition to their journeyman carpentry qualifications, the graduates are now enrolled in construction company management training. They currently hold decision-making roles in the company.

ATEC has partnered with YouthBuild International, an organisation that has a 40-year track record in the US of youth training, leadership development, and housing renewal. YouthBuild's international arm has worked in 19 countries

over a 20-year period to nurture similar work outside of North America (YouthBuild, 2020).

YouthBuild does not replicate programs from site to site. Instead, it shares experiences, and in some cases shares resources. The network encourages each site to develop according to local needs. Indigenous YouthBuild Canada will develop local chapters tailored to local conditions and localized cultural characteristics.

Indigenous YouthBuild Canada has created an initial network of four training sites. These include the Manitoba Institute of Trades and Technology (MITT) in Winnipeg, Thompson Rivers University in Kamloops, Akwesasne Reserve near Montréal, and ATEC at NCN. The Assembly of First Nations has passed a resolution supporting Indigenous YouthBuild Canada (AFN, 2019). IYBC has letters of intent from six additional sites to eventually create a network of ten learning centres across the country. Each site is unique, but each will apply principles that have been pioneered at ATEC. At Assiniboine Community College (ACC) in Brandon, for example, training will be linked to a production facility for RTM housing. When this site is added, it is hoped that First Nations communities will order RTM housing manufactured by their own students from the site's RTM facility.

ATEC Intake Process

Central to the effectiveness of the ATEC program is its intake process. IYBC will attempt to replicate this holistic approach in all future sites. Unlike other admissions processes, which create a bar that eliminates those who do not meet a minimum level of readiness, the ATEC process does not disqualify students. Instead, it attempts to assess the nature of applicant need. Once a student is assessed, ATEC tries to tailor training to help the applicant move forward with their learning and life goals. Assessments sometimes involve referrals for personal healing, or for addictions treatment at NCN's Medicine Lodge. Once applicants have completed treatment they are then welcomed into training. If a student relapses during training they are simply asked to return to the Medicine Lodge for further treatment. Once treatment is completed, they can resume training. As one instructor stated "I've had some students in my course three or four times. As long as they want to learn, why would I say they can't be there?" (Instructor, 2019). Program directors find that the prospect of receiving training, and eventually obtaining a job, provides incentives for young people to pursue treatment, and to continue in sobriety.

Personal Experience of ATEC

A number of students were interviewed related to their experiences of ATEC training and Pewapun construction work. They were asked about changes in their lives that training and employment had brought about. Comments by students were naturally varied. However, a number of themes emerged from the interviews. These included the following:

- Common experiences of dropping out of education
- Barriers in the community to successful education
- Supports at ATEC that made education successful

- Participation in ATEC, Pewapun, and IYBC opened unexpected opportunities
- ATEC and Pewapun are creating change in the community
- Students have improved expectations for their immediate futures

The following excerpts from interviews illustrate these themes.

1. Common Experiences of Dropping Out of Education

Ten of the sixteen students interviewed mentioned they had dropped out before finishing high school. (The number who dropped out may have been greater. The topic did not come up in every interview. Only three mentioned that they had completed Grade XII before coming to ATEC).

(Student Four) - I grew up in Winnipeg and then moved to Nelson House. Financial problems in my family made me drop out. So, I had to get a job to help out ... when I tried to return back to school I was too old and so I got told to go to the ATEC ... if it wasn't for ATEC ... I'd be working a dead-end job with no education.

(Student Five) - I dropped out too. But this teacher who was a teacher at the high school... he came and looked for me at my house. He came and grabbed me and said "get the hell back to school" he said. "I want to see you in my classroom tomorrow morning."

And my dad looked at me like "you go".

So I went to his classroom. And he sat down and had a talk with me and said "you know ... I have something to give you that will make you finish school faster" then he said "It might give you a career too if you look forward onto it..." And he asked me "Have you heard of the trades?" And I said "Yeah" ... He said "you'll be getting paid as well as taking the course ...". And I said "Ok" so I took it. And I took carpentry. And I

graduated within the year. I got all my credits. I was getting paid for it ... I had a kid at the time in high school already.

(Student Six) - I haven't really been a high school student because I dropped out in my first year ... When you become a teenager you get into a sex, drugs, and alcohol. That's what I got into when I was a teenager. And then I became pregnant when I was like 21.

2. Barriers in the Community to Successful Education

(Student One) - There was a housing problem I ran into ... I couldn't focus on school because I was so busy trying to find a new house... A place to live.

Because the housing is so limited in Nelson House right? Or any reserve for that matter. I had to take my mind off school and just completely focus on getting a house. That was my one obsessive thought there for a while was "I got to get a house... I need a house". Forget about school. I need shelter. It was winter... It was cold.

(Student Two) - A lot of people have to like focus on like taking care of their siblings or something like that because their parents are out on benders or whatever you know... They're surrounded by negative environments...

(Student Five) - Another reason people dropout is having bad friends. They want to be cool with them so that's the reason why they're not motivated. That's why they dropout

(Student Two) - Especially in Nelson House with the housing and everything like that. Like a lot of people struggle just to get some sleep. Because they're sardined into one house.

(Student Six) - when I went away last year to university — they were going to locate my house

to somebody else. That's when I withdrew from my program at university in Thompson, and left ... I would have been homeless if I didn't leave the University. I wouldn't have had a home to come back to to take care of my kid in ... So, it's almost like if you leave the rez you can't come back ... you won't have nowhere to live.

(Interviewer) - What were some of the reasons people wouldn't show up for school?

(Student Two) - Financial problems, just things that they're going through in their regular daily life.

(Student One) - Another thing too is (there are) not many jobs that people want that are offered in the community. Most people don't want to leave the community. But the jobs that they want are not there. And they don't really want to settle with the jobs that everyone else has, or are fighting for, or are just being passed around.

3. Supports at ATEC Help Make Education Successful

(Student Two) - ATEC makes it very easy for students to succeed as long as they're willing to, you know, put in the work and effort, and be determined.

(Student Six) - Plus at ATEC too they offer daycare. So, if you have a little child, like a baby, and you can't afford a babysitter, because you're only getting 10 bucks a day to come to school, so the daycare is provided for the student. It's free.

(Student Six) - In the morning they would give me a ride to school... They're just doing that for us to show up ... Especially for people from my area, Dog Point. Because it takes me half an hour to walk to Dog Point.

That's how easy it is here. We get transportation, we get daycare, we get student allowance...

College preparation (course) is the upskilling class for people who dropped out, or want to come back to school and the need some upskilling. I did that “social readiness” (course). I did it twice. I like that because it helps students who are just coming into this education system learn more and be comfortable.

(Student Two) - Like my friends are going off to university now. They're all going into the city. They're having hard times because they're not getting what we got at ATEC. We got one-on-one interaction with your instructor. Like going to school elsewhere you have to book an appointment, and you have to ask the right questions, and like you only get one chance. Other than that, you're on your own.... But at ATEC, the (teacher) will sit down with you, explain it to you, make sure everybody gets it, before he moves on to the next thing. It was good.

The barriers these students outlined are similar to educational challenges faced by Indigenous students more generally. Many of these have been documented on the reserves and in other CCPA publications (MacKinnon, 2015, 2016).

4. Participation in ATEC, Pewapun, and IYBC Opened Unexpected Opportunities
Students found that ATEC and YouthBuild provided more than just training. Doors were opened for them to grow into greater opportunities.

Two students travelled to Philadelphia to attend a YouthBuild International conference.

(Student Two) - We went to Philadelphia. We went through workshops the entire week on like different things like facilitating, and like what our problems are, and stuff. We had big discussions. And at the end, like the last day ... they told us “okay, after going through all these workshops... I want you guys to sit down ... we want you guys to have a solution. A solution to

the problems and barriers you talked about all week. We were the only ones who had a (really) legitimate solution. ATEC was the solution...

And they told us at the end... there's going to be like 40 funders there. There was a lot of funders there, like a lot ... And it was like overwhelming because a lot of them kept coming up to me and B and asking a bunch of questions and we didn't even know what to say ...

And MasterCard was one of those 40 sponsors. And I got interviewed ... But they didn't even contact me until about like maybe a month or two after the conference ... I didn't expect it at all. And all of a sudden like Jody's messaging me “MasterCard is trying to get a hold of you”. And I was like. “What? Why? What do I got to do with anything?”

(Pewapun Manager) - Mastercard awarded her \$100,000 to teach leadership

Two students from the carpentry program attended the Manitoba Indigenous Youth Summit in Winnipeg in March, 2019 (Crowspreading-wings, 2019; ISC, 2019). Students were asked to pitch ideas for development in their home communities. They were competing among 100 attendees for four prizes of up to \$1 million each to implement their projects. The ATEC students meticulously practised their pitch. Their proposal was for construction of four energy-efficient houses. ATEC students won \$1 million for their project, and the team used the resources to go to Alberta to prefabricate the houses. They learned to manufacture SIP panels for the homes.

(Student Four) - We got sent out to Alberta to manufacture those panels. And we shipped them home and built the houses with them.

(Student Five) - We made two and a half houses in a week. They could have built four ... But the process was slowed down because they had to teach us how to make them.

(Pewapun Manager) - Because those four houses are finished... ISC gave us more money to put solar panels on those units. So that's an extra \$170,000 ... These ones will have solar and battery backup.

(Student Two) - See, these are some opportunities that we are talking about, that ATEC has given us. We got these because we went to ATEC. And we didn't even ask.

5. ATEC and Pewapun are Creating Change in the Community

(Interviewer) - So is ATEC having an impact on the Nelson House community?

(Student One) - Oh yeah. Yeah for sure.

(Interviewer) - What kind of impact or changes are you seeing?

(Student Two) - Opportunities, you know. D was saying when he was trying to look for an opportunity there wasn't even any. So, opportunities is the first big one.

Not only that. These guys are making houses. So, the more houses we're getting in the community the easier it is to like follow through on everything. Because then people aren't worrying about where are they going to sleep.

(Student One) - I think it will probably change the attitudes of people in Nelson House ... You can tell, just by the application rates and the amount of people that apply. Right? ... (When I applied) there was only about 30 people that applied and only eight got accepted.

We got 200 to 300 people applying. We got a huge waiting list. There was no waiting list in 2010. Not even close. We had empty space — empty classrooms. Now all those classrooms are maxed out.

People want to DO something in Nelson House now because of ATEC. That's what I see.

It's given people in Nelson House a really positive outlook. Especially the younger people. People in their 20s and 30s.

It's got to the point where there is not even enough room to teach all those students. It's really amazing.

(Student Four) - the problem we're having now is not enough seats and too many students that are interested. So now it's competition.

(Student Two) - now you're having these two sides of lifestyles clashing.... Because there's some people that are still living that unhealthy lifestyle. Trying to drag these people down. And all these people are trying to do is find other people they can uplift. So it's like a whole conflict thing right now.

The unhealthy lifestyle of social assistance is being de-normalized.

6. Students Have Improved Expectations for Their Immediate Futures

Finally, students were asked about their expectations for themselves in the future, and for their community. (This interview was a focus group, so often students were in conversation with each other)

(Student Four) - In five years I see myself still staying in Nelson House. (But I have) got my red seal, (and I'm) helping to train more apprentices.

... Within the next 10 years I see myself taking an engineering course, or architecture, or something. I'm really interested in designing my own home. Not just designing it, but building it too because I'm going to be a red seal.

(Student Five) - I feel almost the exact same thing. I always wanted to be an architect. So

basically me and him almost have the same path. I want to be an architect after 10 years.

But in five years, I still see myself as a red seal and making sure students who really (have) the passion of carpentry, to make sure they go all the way, and motivate them. And make sure they do it and make it where I am.

In five years I (want to) see a student where I'm sitting. I want him to be right here, or even further. That's where I can see my five years. I want to make sure I can put a student here, just like a teacher did for me.

(Student Two) – I hope all the buildings that are being thought about would be up. The new school, the water treatment plant, new hospital, teacher (residences). A whole new development. Paved roads all around. All the way to Thompson. More red seals, and the programs grow bigger. Art programs, mechanics. Trades and business are very important. People that are getting ready to retire don't have anyone to replace them. It's a huge problem

That's the reason ATEC stepped up. Started bringing in business, and carpentry. Carpentry, because obviously a big problem is the housing. People can't focus on anything else if they don't have a proper home.

(Student One) – I would like to see more individuals running their own businesses. The band office kind of has a monopoly on business. It runs 90 percent of businesses. I find it interesting that Pewapun was able to get started. These boys should be able to start their own construction. It would be nice if there was a second gas station. But (the Band Council) is blocking that. They don't want another gas station. It would be nice to have another grocery store. Compete against them. Same with IT. But the band controls a little bit too much.

It might be questioned whether there is sufficient demand in the community for competition for these businesses. Currently, they represent a source of retention of income for the community. The student's point, however, was that he wanted to see the band hire ATEC graduates. He felt that the community should hire their own people and recognise the expertise that is developing.

We are training all these people at ATEC. We need to give them a shot. Don't hire these outside consultants ... We have people in Nelson House that are trained to do this. Let's not put somebody through school for four years then put them on welfare. If you don't give them a job they'll go somewhere else... We are not hiring the best of the best people. We're pushing them away. It looks like. We are going to lose our best people if Nelson House keeps down this path.

(Student Four) - And another messed up thing too is like this one outside company that comes in-the guys have no schooling that are building the buildings.

We are in our third year of schooling. These guys haven't even finished high school ... They're unqualified people. Just experienced labourers.

(Student Five) - But what our instructor says "anybody can bang boards together. But you gotta have the experience of how to know how to build it right.

(Student Four) - take pride in your work. That's what a lot of people don't do. Just want to get the job done fast and get out of there.

But we look at it like "Oh, that's not done properly. We've got to do this again. There's going to be a family living here. We got make this nice".

(Student Five) - We put pride in our work. Sometimes we take a little while, because we

want to make sure it's done right. Because we're trained by the book. So, we want to make sure it's built by the book. If it is by the book, it'll stand long.

Our instructor says, "if you see someone doing something not by the book — hit him with it! — Tell him to read it"

(Student Two) - and the problem is, because that is happening a lot of the time—our houses deteriorate quickly. Become condemned super quickly because it was half-assed work. A lot of our houses are rotting really quickly, because it was built by labourers who were hired by housing. These guys who don't even know what they're doing.

(Student Four) - this outside company came into the community and they built ten houses two or three years ago. I know this one guy that's staying in one of those houses. He had to redo an entire wall of his house because it had already rotted and deteriorated all of the studs. And that's like a two or three-year-old house. It shouldn't be doing that.

(Student Five) - this outside company too was building those houses by my house. And that one person that stays in that house, he says "it's cracked right down the middle. Ready to split in half". And it was built two years ago. That's what

I mean. If it's not built by the book it's not going to last very long.

(Student Four) - I take pride in my work. I want to see in 50 years time that house still up. And go inside and see how it looks. That it still looks how it was when I put it up 50 years ago.

(Student Two) - ha ha! Not a crack down the middle.

(Student Five) - Not a crack down the middle.

(Student Four) - This is the main site for YouthBuild Canada, right? So, I would like to see Nelson House expanding more. Like these guys said, a mechanic garage, or apartment complexes, or hotel or something. There's like no place for outside people to stay in our community.

And not only does Nelson House have a shortage of housing. Every community in northern Canada, well all of Canada, has problems. And that's the thing. Like everyone wants to know what we are doing at ATEC, and how it's so successful ...

I would like to see that for other communities. To send people to come here to get training, and then for us, as red seals, to take people back to their communities. And then help them build stuff properly, and get them started.

Conclusion

The ATEC/Pewapun initiative is still in its early stages. However, the impact in the community and on the lives of young people is observable. Inspired young people now want to contribute to community improvement. Resources flowing into the community are being retained and circulating for the benefit of community members. Local residents are finding skills and employment. The community is becoming self-reliant in energy.

Each layer of this development model strengthens and reinforces other layers. Skills lead to employment, employment leads to income retention,

income retention leads to increased infrastructure, infrastructure leads to energy self-reliance. It is hoped that pioneering work begun at ATEC can be replicated in other First Nations communities. The vision that allowed ATEC to grow to its current level is being shared through the IYBC network. The increasingly net zero community at Nisichawayasihk is a model not only for Indigenous communities but for residential neighbourhoods everywhere in Canada. NCN is concretely demonstrating the process of a just transition to net zero emissions.

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