Energy Foundations

The Value Proposition for Financing Energy Efficient Homes in Indigenous Communities Canada-Wide

INDIGENOUS CLEAN ENERGY

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Indigenous Clean Energy (ICE) Social Enterprise is an independent, Indigenous-governed, non-profit organization. ICE advances Indigenous and broader sustainable prosperity by supporting First Nation, Métis, and Inuit clean energy participation in every region of Canada.

Energy Foundations is a detailed report on energy efficiency and housing in Indigenous communities. The report provides an analysis of the diverse and substantive social, economic, and environmental impacts that can be realized through investment in energy-efficient Indigenous housing. Energy efficiency is the foundation of any pyramid of clean energy opportunity and this report cements its role in the transition to a clean energy future.

The findings of *Energy Foundations* point to the importance of national action on new financing and implementation mechanisms to advance Indigenous energy efficient housing across Canada. *Energy Foundations* concludes with a proposal for a collaborative process, convened by ICE, to achieve these goals.

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Healthy Energy Living

Home is the heart of First Nations, Métis, and Inuit families. Like a heart, a home needs to keep people healthy, give them energy, and enable them to live fully. Homes need to empower a sense of *healthy energy living*.

Unfortunately, this is not the reality for many Indigenous communities across Canada. Rather than keep people healthy, homes leave occupants with respiratory, mental, and other negative health issues. Many homes also waste energy – draining the Earth and Indigenous people's livelihoods. How can Indigenous peoples live fully when such a vital support is broken?

Indigenous Clean Energy (ICE) is the national hub supporting Indigenous leadership and capacity-building for a clean energy future. Through our work and our connection to Indigenous clean energy leaders, we have heard and seen the need to take bold steps to dramatically improve the energy efficiency of Indigenous homes across the country. We see this action as essential to addressing the housing challenges faced by Indigenous communities. We also know investments in energy efficiency can be a dynamic economic generator – creating widespread employment and reducing home operating costs – while cutting greenhouse gas emissions.

In short, energy efficiency can be a catalyst for Indigenous *healthy energy living*.

In this report, *Energy Foundations*, we present the value proposition for financing energy efficiency for Indigenous homes Canada-wide. *Energy Foundations* is grounded in empirical research and validated by innovative energy efficiency projects being undertaken by Indigenous communities and partners.

This analysis is meant to foster dialogue and inform public policy surrounding economic development, housing infrastructure, and climate action. To this end, the final section of *Energy Foundations* proposes a *National Collaborative Process* to design and develop new financing platforms and mechanisms that enable energy efficient Indigenous housing.

The opportunity presented here is not out of reach. It is a compelling and robust social and business opportunity that can build on the leadership First Nations, Métis, and Inuit communities have shown to date in accelerating renewable energy development across the country.

Now is the time for a major national Indigenous housing initiative to increase energy efficiency. Now is the time for *healthy energy living.*

Darrell Brown
Chair, Board of Directors

Chris Henderson
Executive Director

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1.0 Executive Summary

In *Energy Foundations*, ICE has sought to answer three key questions.

1. What would be the cost of retrofitting existing homes and building new, energy-efficient housing infrastructure in every Indigenous community?
2. What kinds of economic and social impacts can investment in energy efficient Indigenous housing achieve across Canada?
3. How much economic return can investments in energy efficiency for Indigenous housing realize?

It is important to emphasize that, while *Energy Foundations* is principally an economic analysis, the scale of social and environmental impacts of investing in energy efficient Indigenous housing is ample justification for acting on the issue now. Currently, Indigenous communities face poor mental health, chronic diseases, high healthcare costs, higher rates of hospitalization, and overcrowding in homes compared to the rest of Canada. In fair measure, these health and quality of life factors are the results of poor-quality and inadequate housing that is energy insufficient.

The main findings of *Energy Foundations* are:

- The total cost of upgrading/retrofitting existing homes for energy efficiency and building new homes that meet advanced energy efficiency standards in all Indigenous communities totals **$5,362,544,341 by 2030**. This estimate has been developed through a rigorous, conservative, and transparent analysis based on an *Indigenous Housing Energy Efficiency Data Set* which is Section 2.0 of the report.
- Investment in energy efficient Indigenous housing yield significant direct economic impacts including creating over **47,000 FTE jobs, $1 billion in household expenditure savings over 10 years, and $11 billion in asset enhancement.**
- This investment also yields major indirect and induced impacts such as stimulating over **26,000 additional secondary jobs**, **avoiding an estimated 5 million tCO2e of greenhouse gas emissions over ten years, and important health outcomes for community members.**

After identifying these significant outcomes, we have proposed a *National Collaborative Process* to design and develop new financing platforms and mechanisms to catalyze energy efficient Indigenous housing Canada-wide.

In short, energy efficiency is the *foundation* for a clean energy future – reducing household emissions, improving quality of life, and creating jobs. Major action is needed to create the financing pathways that build and strengthen this core *energy foundation* to realize the potential impacts of the opportunities ahead.

Photo provided by *Conservation on the Coast*

Quick Facts

Baseline

Minor Retrofits
35,294

Major Retrofits
133,195

New Builds Needed by 2030
71,735

Investment

$5.363B
Total Energy Efficiency Investment Requirements

$282M
Minor Retrofits

$3.330B
Major Retrofits

$1.750B
New Build

Impacts

Direct & Indirect Jobs Created
+73,000

Total Cumulative Emissions Avoided Over 10-years
5,237,703 tCO2e

Asset Enhancement and Durability
$11.620B

2.0 Projecting the Cost of Energy Efficient Indigenous Homes

A national Indigenous energy efficient housing initiative must be grounded on solid data analysis. It is particularly important to estimate and project the investment requirements and impacts related to energy efficient housing separate from the overall housing needs and factors in Indigenous communities, such a major and minor repairs needed related to plumbing, electrical, and other functional aspects of the home. Unfortunately, a Canadian data set for this purpose does not exist.

We have therefore used three step process to develop an *Indigenous Housing Energy Efficiency Data Set*.

First, metrics on Indigenous populations and population growth, Indigenous housing, and other published data produced by the federal government, National Indigenous Organizations (NIOs) and other bodies have been accessed. These provide baseline estimates for growth, number of homes, and needs.

Second, ICE programs supporting Indigenous communities to take action on energy efficiency, such as Bringing it Home, provided real-world data elements such as: the percentage of existing homes requiring energy efficient infrastructure improvement and the costs of energy efficiency minor upgrades and major retrofit projects.

Third, input from energy efficiency practitioners doing home upgrades and retrofits, allowed ICE to describe what specific housing infrastructure measures should support *Healthy Energy Living* in Indigenous communities.

In following this process, we have used the best available data for baseline metrics and calculations. We recognize that estimates are always difficult on a national level given the variation in community realities across the country. Where relevant, we have shared factors that may affect the projections provided. Additionally, throughout our analysis we used conservative estimates for numbers and percentages. As a result, the outputs of this analysis represent the minimum potential investment and impact opportunities.

We see this data set as only the beginning of the analysis and work needed to move Indigenous-led energy efficiency forward. We welcome input and refinement from anyone who wishes to contribute.

2.1 Indigenous Housing Energy Efficiency Data Set

The *Indigenous Housing Energy Efficiency Data Set* comprises a set of data points that facilitate national cost estimates and economic and social impact projections.

- Data Point #1 - Indigenous Populations and Population Growth: *The Indigenous Housing Energy Efficiency Data Set* assumes that the 2020 Indigenous population across Canada is 1,751,975 individuals comprised of: 1,044,782 people identifying as First Nation, 638,738 as Métis, and 68,455 as Inuit. This assumption is based on baseline data from the Canadian 2016 Population Census, projecting forward using one-half the compound annual growth rate for each group. Growth rates were 3% for First Nations and Inuit peoples and 4% for Métis peoples.

- **Data Point #2 – Homes in Indigenous Communities:** The *Indigenous Housing Energy Efficiency Data Set* estimates that there is a total of 208,649 homes in Indigenous communities across Canada (120,980 First Nation, 12,774 Inuit, 74,895 Métis). These numbers are based on the Assembly of First Nations (AFN) *Fact Sheet – First Nations Housing On-Reserve* which stated that there were 107,625 housing units located in First Nations communities as of 2013, and *Housing as a Social Determinant of First Nations, Inuit, and Métis Health* which stated there were 11,379 Inuit households in Inuit Nunangat as of 2011 (Assembly of First Nations 2013, National Collaborating Centre for Aboriginal Health 2017). We then projected these housing numbers forward to 2020 using a conservative growth rate of one half of the population growth rate. Using population proportions, we inferred the number of Métis homes. It should be noted that these numbers generally reflect rural, remote, and on-reserve home and not urban Indigenous homes. According to the *For Indigenous By Indigenous National Housing Strategy,* the number of urban homes could be as much as double the non-urban housing numbers (Indigenous Housing Caucus Working Group 2018). This decision was made because urban housing introduces a greater range of housing styles such as apartment buildings which would require largely different cost structures for retrofits and new builds which was outside the scope of analysis at this stage.
- **Data Point #3 – Percentage of Indigenous Homes Requiring Minor Energy Efficiency Upgrades:** The *Indigenous Housing Energy Efficiency Data Set* assumes that 19.5% of homes in First Nations and the Inuit communities and 12.3% of homes in the Métis communities are in need of only *minor energy efficiency-related upgrades*. These estimates are based on illustrative case studies, and baseline energy findings and audits in the Guide Communities active in ICE's Bringing it Home program.

Box 1

Definition of Energy Efficiency Minor Upgrades and Major Retrofits in Indigenous Housing

To assess energy efficiency needs and costs in a simple way, the *Indigenous Housing Energy Efficiency Data Set* segments energy efficiency actions into two categories: minor energy efficiency upgrades and major energy efficiency home retrofits. Minor upgrades and major retrofits do not include generic and non-energy related home repairs which many homes may also need.

Minor Energy Efficiency Upgrades are light modifications that are easy to complete and offer relatively good value for money when it comes to energy impacts. Upgrades may include a combination of: *switching to LED, air sealing using caulking and weather stripping, replacing home appliances, installing smart thermostats and low flow water fixtures.*

Major Energy Efficiency Retrofits are significant home upgrades involving building envelope and mechanical systems. These major retrofits should see energy savings of 25% or more. Major retrofits may include the minor upgrades listed above and: *re-air sealing the whole home, adding insulation to the walls, attic/ceiling, and basement/crawlspace, installing a heat recovery ventilator, overhauling heating ventilation and air conditioning (HVAC) systems, and/or window replacement.*

Minor Updates Required

19.5%	19.5%	12.3%
First Nations	Inuit	Métis

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- **Data Point #4 – Percentage of Indigenous Homes Requiring Major Energy Efficiency Retrofits:** The *Indigenous Housing Energy Efficiency Data Set* assumes that 65% of homes in First Nations and Métis communities require major energy efficiency retrofits which is consistent with experiential information, and recent Indigenous community residential energy audits in an illustrative community which concluded that 57.4% homes required major energy efficiency retrofits. For Inuit communities, it is assumed that 46% homes require major energy efficiency-related upgrades. This is a very conservative estimate, the actuals could be higher

Major Upgrades Required

65%	46%	65%
First Nations	Inuit	Métis

- **Data Point #5 – Number of Homes in Indigenous Communities Requiring Minor Efficiency Upgrades and Major Energy Efficiency Retrofits:** Based on Data Points 1-4 above, the *Indigenous Housing Energy Efficiency Data Set* estimates that 35,294 homes in Indigenous communities currently require minor energy efficiency-related upgrades, and a further 133,195 homes need major energy efficiency-related retrofits.

Upgrades Required

35,294	133,195
Minor	Major

- **Data Point #6 – Cost of A Home Minor Energy Efficiency Upgrade:** The *Indigenous Housing Energy Efficiency Data Set* estimates it will cost $8,000 to undertake minor energy efficiency-related upgrades for a home in an Indigenous community. It was assumed that energy efficiency actions itemized in Box 1 above for minor energy efficiency-related upgrade would average $8,000-$12,000. To be conservative the lower figure has been used. It is noted that Indigenous communities that are remote and/or northern will face higher costs related to shipping and logistics.

Cost of Minor Upgrades

$8,000
per home

- **Data Point #7 – Cost of A Home Major Energy Efficiency Retrofit:** The *Indigenous Housing Energy Efficiency Data Set* estimates that it would cost $25,000 to undertake major energy efficiency-related retrofits for a home in an Indigenous community. This is based on expert consultations through ICE's *Bringing it Home* initiative. We have found that the cost of a major energy efficiency retrofit that achieves significant energy reductions in an Indigenous home typically ranges from $25,000 - $45,000. The lowest cost has been utilized for the purposes of this assumption. As with Data Point #6, it is noted that remote and northern communities will face higher infrastructure costs.

Cost of Major Retrofit

$25,000
per home

- **Data Point #8 – Total Cost of Minor and Major Energy Efficiency Upgrades of Homes in Indigenous Communities:** Using the metrics and cost estimates in Data Points 1-7 above, the *Indigenous Housing Energy Efficiency Data Set* projects that the total cost of required energy efficiency actions in Indigenous communities across the country is $3,612,219,302. Of this amount, $282,353,025 is the cost of minor upgrades, and $3,329,866,276 is the cost of major retrofits.

Total Cost of Minor and Major Energy Efficiency Upgrades

$282,353,025
Minor

$3,329,866,276
Major

Photo taken from Kohkom's House series

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- **Data Point #9 – New Homes Built in Indigenous Communities Needed by 2030:** The *Indigenous Housing Energy Efficiency Data Set* considered two factors to estimate the number of new homes needed by 2030: a) growth of Indigenous populations which will require new housing, and b) new homes needed to address pressing *existing* housing shortages in Indigenous communities. Using population growth rate as was done in Data Point #2, we have projected a need for 41,151 new homes by 2030. This is a very conservative projection. For reference, an *Assembly of First Nations Fact Sheet* from 2013, noted a need for over 130,000 new homes by 2030 on First Nation reserves alone (Assembly of First Nations 2013). In the second instance, the *Indigenous Housing Energy Efficiency Data Set* estimates a need for 30,584 additional homes to address current housing shortages. This number is calculated based on the housing need stated in the *2019 Inuit Nunangat Housing Strategy* (Crown-Indigenous Relations and Northern Affairs Canada 2019). The information from the *Housing Strategy* was then extrapolated to First Nation and Métis communities using overcrowding data and population proportions from Statistics Canada (Statistics Canada 2017). To be extra conservative in our estimate we are only using one half of the calculated numbers for housing need. In total, these numbers equate to 71,735 new homes needed across Indigenous communities by 2030 to accommodate population growth and housing shortages.

New Homes Built in Indigenous Communities Needed by 2030
71,735

- **Data Point #10 – Build Costs of New Homes in Indigenous Communities:** Home building information reviewed for the *Indigenous Housing Energy Efficiency Data Set* showed that build costs were $220,000 - $550,000 for a typical home of roughly 1,000 sq. ft. This is based on estimates from Indigenous communities through Bringing It Home and the *2019 Inuit Nunagat Housing Strategy* (Crown-Indigenous Relations and Northern Affairs Canada 2019). The wide range of cost reflects different build specifications and the high cost of building in remote and northern communities. A cost of $305,000 per home is being used for this analysis as a weighted average of the cost range.

Estimated Average Cost of a New Home

$305,000

- **Data Point #11 Additional Cost Required to Build an Energy Efficient New Home:** It is challenging to determine the additional costs of building an energy efficient new home relative to current costs and standards, which vary across Indigenous communities. Additional costs appear to range from 8 – 15% compared to the cost of a typical home built to standard building. To be conservative, the *Indigenous Housing Energy Efficiency Data Set* uses the lowest estimate of 8% as cost adder for an energy efficient new home in an Indigenous community. This translates to additional cost of $24,400 to build an energy efficient new home relative to current standards.

Additional Costs for Energy Efficiency on a New Build

$24,400

- **Data Point #12 – Total Additional Costs for Enhanced Energy Efficiency in New Homes by 2030:** Based on Data Points 10-11, the *Indigenous Housing Energy Efficiency Data Set* calculates the total additional cost for building energy efficient new homes in Indigenous communities to be: $1,750,325,039.

Total Additional Costs for New Homes

$1,750,325,039

- **Data Point #13 – Total Cost of Energy Efficiency Upgrades and Retrofits of Existing Homes & the Energy Efficiency Costs for New Homes for Indigenous Communities by 2030:** Based on all Data Points above, the *Indigenous Housing Energy Efficiency Data Set* projects that the total cost of energy efficiency upgrades/retrofits of existing homes, and building new, energy efficient new homes in Indigenous communities will be $5,362,544,341 by 2030.

Total Energy Efficiency Investment Required

$5,362,544,341

3.0 Impacts of Indigenous Housing Energy Efficiency

Investment in energy efficient Indigenous housing is like tossing a stone in a lake. Retrofitting existing homes or building energy efficient new housing triggers a cascade of impacts that can deliver economic returns for decades.

3.1 Categories of Economic Impact

The International Renewable Energy Agency (IRENA) report, *Renewable Energy Benefits: Measuring the Economics* describes three kinds of economic impacts associated with clean energy opportunities: direct, indirect, and induced (IRENA 2016).

- *Direct Impacts* are the immediate impact of project spending. For energy efficiency, these include outcomes such as purchasing energy efficiency goods, project employment, and reductions in the operational cost of housing.

- *Indirect Impacts* are secondary impacts that result from the initial project investments in energy efficiency projects these include: including secondary Indigenous and non-Indigenous employment, tax generation, etc.

- *Induced Impacts,* which are outcomes, separate from, yet related to, the initial investment. For energy efficiency, these look like: carbon emissions reduction, reduced environmental liabilities, and improved health and social conditions.

In the next section, we have identified the specific impacts of energy efficiency investments across each of these levels.

3.2 Direct Impacts

Direct economic impacts from energy efficiency investments in existing and new Indigenous housing include:

a) *Procurement of Energy Efficiency Goods:* The purchase of goods such as lightbulbs, insulation, appliances, etc. required to make housing more energy efficient.

b) *Housing Asset Enhancement and Durability:* Substantial and deep energy efficiency investments improve the durability of Indigenous homes, extending life span before replacement.

c) *Indigenous and Non-Indigenous Energy Efficiency Employment:* Employment related to the energy efficiency components of retrofitting existing homes and building new Indigenous housing.

d) *Reduced Household Costs:* Energy efficiency upgrades and retrofits decrease Indigenous housing and family living costs through reduced utility expenses for heat, air condition, and electricity. As Canada's carbon pollution prices increase, these savings will continue to grow.

e) *Indigenous Skills Development:* The economic value associated with Indigenous human resources skills development associated with large-scale housing energy efficiency efforts.

3.3 Indirect Impacts

Indirect economic impacts arising from energy efficiency investment in Indigenous housing include the following outcomes:

a) *Secondary Indigenous and Non-Indigenous Employment Impacts:* Energy efficiency stimulates a range of secondary employment pathways including: in the product supply and distribution chains; local businesses that support projects (such as accommodations and food services); and most significantly additional local/regional spending due to increased personal disposable income from those employed on projects and households who see energy savings.

b) *Tax Revenue & Other Public Revenue:* Tax revenue and other public revenue is generated by energy efficiency investment through HST, GST, income tax and related public revenue streams.

3.4 Induced Impacts

Induced economic impacts from energy efficiency investments are externalities and broader societal outcomes. Conventionally, such outcomes were considered extraneous to the value proposition of investments. However, the linkages to the investment, and the scale of impacts, is increasingly better understood and measured, thus making them more relevant.

a) *Positive Climate Impacts through Avoided Carbon Emissions:* Energy efficiency investments contribute to Canada's climate action efforts by reducing carbon emissions on a household level, particularly in regions reliant on fossil fuels for electricity and heat.

b) *Reduced Clean Up Liabilities:* Energy efficiency measure that reduce the use of hydrocarbons, such as diesel fuel, also reduce the opportunity for of fuel spills and related clean up liabilities within Indigenous communities.

c) *Indigenous Economic Development Foundation:* Enhancing the energy efficiency of Indigenous homes builds a foundation for long term community economic development through improved infrastructure, increased local employment and local clean energy know-how and skills.

d) *Reduction of Illness Morbidity and Health Care Costs:* Comprehensive housing energy efficiency retrofits have a major effect on various determinants of health. Better home energy infrastructure and management can improve indoor air quality, reduce or eliminate household toxins, and address detrimental living conditions, such as deficient cold climate heating – all of which effects human health and increase health care costs.

Photo provided by *Conservation on the Coast*

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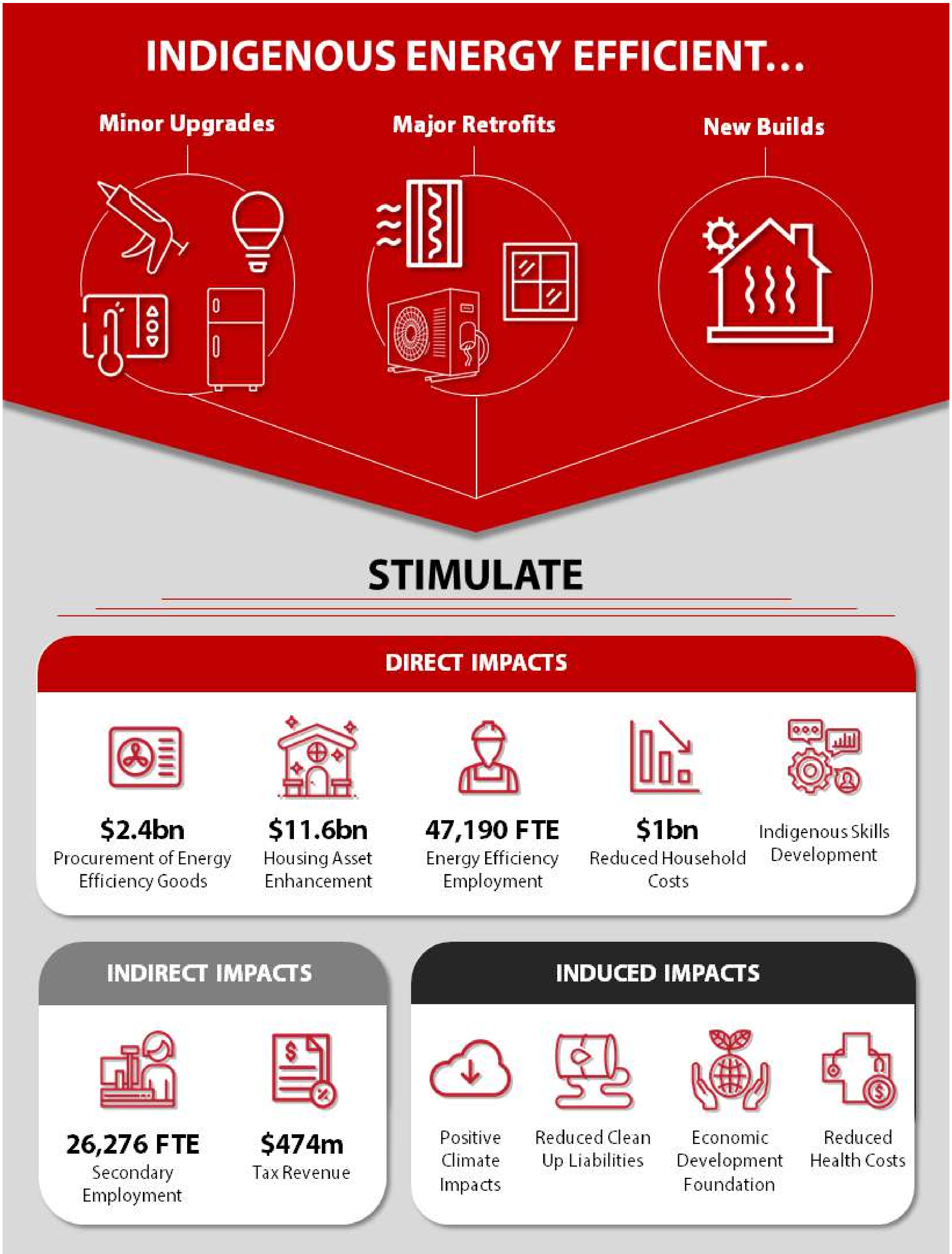
INDIGENOUS ENERGY EFFICIENT...
Minor Upgrades
Major Retrofits
New Builds
STIMULATE
DIRECT IMPACTS
$2.4bn
Procurement of Energy Efficiency Goods
$11.6bn
Housing Asset Enhancement
47,190 FTE
Energy Efficiency Employment
$1bn
Reduced Household Costs
Indigenous Skills Development
INDIRECT IMPACTS
26,276 FTE
Secondary Employment
$474m
Tax Revenue
INDUCED IMPACTS
Positive Climate Impacts
Reduced Clean Up Liabilities
Economic Development Foundation
Reduced Health Costs

4.0 Investment Impacts of Indigenous Housing Energy Efficiency

In description alone, the breadth and depth of impacts from energy efficiency investments is significant. To give greater substance to the economic results of these investments, we have used the *Indigenous Housing Energy Efficiency Data Set* to calculate projected financial outcomes for impacts identified above. Each of these calculations cover a ten-year span to cover through to 2030 to align with the projection of new homes needed.

Again, the data and assumptions made below are based on the best available information. We recognize the limitations of these generalizations given the dramatic variation of contexts for First Nation, Inuit, and Métis communities.

4.1 Direct Economic Impacts

4.1.1 Procurement of Technology and Materials

Data Points 6, 7, and 11 give us the costs for minor and major upgrades as well as the additional constructions costs for energy efficient new homes. Those costs include materials and the labour to perform the work. Based on the labour-intensive aspects to energy efficiency projects due to the need for high attention to detail, we attribute 55% of the costs of these projects to labour and 45% to materials. This breakdown is slightly less than the International Energy Agency's analysis of 60% labour costs on energy retrofits to account for the new builds where the costs of materials may be slightly higher (IEA 2020). Using Data Points 8 and 12 (the total costs for minor and major upgrades as well as additional energy efficiency costs), we can calculate the resulting technology and materials procurement impacts.

Minor Upgrades	Major Retrofits	New Builds
$282,353,025 * 45% = **$127,058,861**	$3,329,866,276 * 45% = **$1,498,439,824**	$1,750,325,039 * 45% = **$787,646,267**
	Total Expenditures on Materials: **$ 2,413,144,954**	

4.1.2 Asset Enhancement and Durability

By performing major energy retrofits and building homes to higher efficiency standards, we extend the life of homes. Efficiency can reduce wear on mechanical systems and reduce moisture and airflow through walls which have significant negative impacts on their life. Retrofit and construction projects can also build local community skills which may mean an increased availability of individuals who can help maintain homes, extending their lives further.

To provide estimates on the impact of energy efficiency on the durability of homes, we suggest that a major energy retrofit may extend the life of a home by approximately 10 years. Similarly, we suggest advanced energy efficiency efforts on new builds could add up to 20 years to home compared to the

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current quality of new homes built.

To evaluate the economic impact of this extended lifespan, we will value the asset based on monthly rent or mortgage charge that could be recovered. We have used a conservative rent amount of $350/month ($4,200/year). For reference, rental amounts can range as high as $2,597/month for a two bedroom apartment in remote Indigenous communities like Iqaluit (Hinchey 2017).

Based on these factors and Data Points 5 and 9, which give the number of homes requiring retrofits and new builds needed, we can calculate an estimate for the economic value of increasing the durability of homes through energy efficiency as follows:

Major Retrofit	New Build
$4,200/year * 10 years * 133,195 homes = **$5,594,175,345**	$4,200/year * 20 years * 71,735 homes = **$6,025,709,150**

Total Impact from Asset Enhancement:
$11,619,884,495

Note: We omitted minor energy upgrades from these calculations because while they have an impact on energy use and home occupant comfort, they typically have much less impact on the structural durability of homes.

4.1.3 Indigenous and Non-Indigenous Energy Efficiency Employment

Investment in energy efficient efforts creates direct employment through project managers, contractors, laborers, etc. employed in carrying out the work needed for retrofits and new construction. Employment is measured full time equivalent jobs. Based on our research we have found a variety of estimates for the number of direct and indirect full-time jobs created through the investment in energy efficiency. In terms of job creation per $1 million invested:

- The American Council for an Energy-Efficient Economy has found a range from 6.2 to 11 FTE (Bell, Barrett and McNerney 2015);
- The report *Economic Benefits of Investing in Clean Energy: How the economic stimulus program and new legislation can boost U.S. economic growth and employment* notes 7 FTE (Pollin, Heintz and Garrett-Peltier 2009);
- The NEUJOBS report *Job Creation Through Energy Renovation of the Housing Stock* estimates between 8 and 11.3 FTE created (adjusted to Canadian currency) (Meijer, et al. 2012);
- In a report for Clean Energy Canada and Efficiency Canada, Dunsky Energy Consulting calculates 16-30 FTE across all sectors (likely including direct and indirect jobs) however it is noted that "Goods Producing sector includes construction, manufacturing, utilities…" accounts for 35% of overall impact, this is a good approximation for direct jobs and equates to 5.6-10.5 FTE (Dunsky Energy Consulting 2018).

Based on this variation, we have taken the average of 8.8 FTE jobs created per $1 million invested in energy efficiency in Indigenous communities. We anticipate 75% of these jobs going to Indigenous peoples, particularly as skills are developed. Based on Data Point 12, the total cost of anticipated energy efficiency work, we can calculate the number of full-time jobs created directly through the investment over the next ten years.

Energy Efficiency Employment	
$5,362,544,341 investment * 8.8 FTE/$1million = **47,190 FTE**	
Indigenous Jobs	**Non-Indigenous Jobs**
47,190 FTE * 75% = **35,393 FTE**	47,190 FTE * 25% = **11,798 FTE**

4.1.4 Household Costs Savings

Providing a national estimate on the potential household cost savings due to energy efficiency measures is an extremely challenging task. Utility pricing, heating sources, housing quality, climate, and other factors cause significant variations in average household spending on electricity, heat, and air conditioning.

However, to give an approximation of the potential impacts of energy efficiency measures we will use Statistics Canada's metric for the national average household expenditure on water, fuel and electricity: $2,550 per year (Statistics Canada 2019). It should be noted that this average does not include averages from the Yukon, Northwest Territories, Nunavut, or on-reserve communities. Based on this, we anticipate the actual results would be much higher.

It is also important to note that as carbon pricing increases, the avoided costs due to energy efficiency actions will raise the estimated savings indicated below.

Based on input from energy efficiency experts we conservatively assume that:

- Minor energy efficiency upgrades can reduce consumption by 10%,
- Major energy retrofit can reduce consumption by 25%, and
- An 8% investment in energy efficient new build can result in a 50% energy savings for the home.

Based on these factors and the number of homes estimated for energy efficiency actions (Data Points 5 and 9), we can calculate a snapshot of the total expected annual household cost savings if all the work identified were completed.

Minor Upgrade	Major Retrofits	New Builds
$2,550/year * 10% * 35,294 homes = $9,002,533/year	$2,550/year * 25% * 133,195 homes = $84,935,465/year	$2,550/year * 50% * 71,735 homes = $91,487,373/year
Total Annual Household Cost Savings **$185,425,372**		

While the number above provides a single year snapshot, a more meaningful figure is the cumulative savings felt by communities as the work is implemented over a ten-year span. Using an estimate of 10% of energy efficiency work done per year (i.e. 10% of minor upgrades, major retrofits, and new builds), we can approximate the cumulative household savings as follows:

Minor Upgrades	Major Retrofits	New Builds
35,295 homes * 10% = 3,529 homes/year	133,195 homes * 10% = 13,319 homes/year	71,735 homes * 10% = 7,173 homes/year
3,529 homes * $255 savings/home = $900,253 savings/year	13,319 homes * $638 savings/home = $8,493,547 savings/year	7,173 homes * $1,275 savings/home = $9,148,737 savings/year
Cumulative 10-year savings: **$49,513,933**	Cumulative 10-year savings: **$467,145,059**	Cumulative 10-year savings: **$503,180,555**
	Total cumulative savings: **$1,019,839,547**	

4.1.5 Indigenous Skills Development

The depth of employment available through energy efficiency will require training at various levels for Indigenous peoples. Training and career opportunities will include:

- Specific trades such as carpentry, electricians, plumbing, HVAC, and more;
- Energy advisor services;
- Construction supervisors;
- High efficiency building specialties such as Passive House and Net-Zero Energy;
- Project management and administration; and
- Housing management.

As a result of the skills developed, community members could continue working in their community as part of a much-needed maintenance workforce as well as continuing to build new homes; or participate in the energy efficiency economy in non-Indigenous communities.

The economic impact of this skill development is noted as an area for future research.

4.2 Indirect Impacts

4.2.1 Secondary Indigenous and Non-Indigenous Employment

According to the report *The Economic Benefits of Investing in Clean Energy,* the average number secondary jobs generated through energy efficiency projects is 4.9 FTE per $1 million investment (Pollin, Heintz and Garrett-Peltier 2009).

Using this as our metric combined with our total investment estimate, we can assess the number of jobs indirectly created. Given the broader reach of these secondary jobs, we are estimating that only 30% will be Indigenous with the remainder filled by non-Indigenous peoples.

Secondary Job Creation	
$5,362,544,341 investment * 4.9 FTE/$1million =	
26,276 FTE	
Indigenous Jobs	**Non-Indigenous Jobs**
26,276 FTE * 30% =	26,276 FTE * 70% =
7,883 FTE	**18,394 FTE**

4.2.2 Government Tax Revenue Generation

Tax generation occurs at two levels when it comes to energy efficiency projects. First, is the taxes collected on goods. Based on the calculations in Section 4.1.1, we know this investment will lead to approximately $2,413,144,953 spent on materials and supplies. To simplify the estimation, we have calculated the national average for HST, PST, and GST: 10.9%. With these two numbers, we estimated the tax revenue from goods as:

Taxes Collected on Energy Efficiency Materials
$2,413,144,953 * 10.9% =
$263,032,800

Beyond taxes on materials, governments collect income taxes on wages earned. Given the nuances trying to assess the amount of full-time employment that would be held by First Nations people working on-reserve (as this has income tax implications), we have chosen to focus only on the non-Indigenous people directly employed through the investment.

Based on Section 4.1.3, there will be 16,356 FTE jobs available to non-Indigenous people. Accounting for the range of salaries from specialized experts to lay workers, we estimate that the average salary will be $65,000 per year. At that salary, federal income taxes are $7,912/year. We calculated the average provincial and territorial income tax rate to be: $5,011/year.

With these numbers, we calculate the total federal and provincial income tax revenue as follows.

Federal Income Taxes	Provincial/Territorial Income Taxes
$7,912/year * 16,356 FTE =	$5,011/year * 16,356 FTE =
$129,406,775	**$81,958,715**

Energy efficient five plex built in by the Mohawk Council of Akwesasne. Photo by Corey Tarbell.

4.3 Induced Economic Impacts

4.3.1 Positive Climate Impacts through Avoided Carbon Emissions

Energy efficiency actions help reduce carbon emissions resulting in positive impacts for our climate. The avoided emissions can come in the immediate form of reduced consumption of fossil fuels for heating and hot water, and/or as upstream impacts through reduced electricity consumption on grids that still use fossil fuels.

To estimate the scope of impact, we use an average number of greenhouse gas (GHG) emissions per household. Like household spending on utilities, it is difficult to find a precise estimate for household GHG emissions for Indigenous communities. However, *Comparing Household Greenhouse Gas Emissions Across Canadian Cities* provides us with average GHG amounts for households in seven Canadian cities ranging from Montreal at 0.94 tonnes CO2e to Edmonton at 15.35 tonnes CO2e (Fercovic and Gulati 2016).

In selecting an estimated household GHG emission number, we must accommodate for the fact that the majority of Indigenous communities are rural and remote (therefore more reliant on fossil fuels) and the quality of existing Indigenous housing is less energy efficient than in non-Indigenous communities. With this in mind, we have aired on the high side and chosen 13.1 tonnes of CO2e emissions per household (equivalent to household emissions in Calgary, Alberta).

Using the same efficiency metrics and calculations as in *Section 4.1.4 – Household Cost Savings*, we can estimate the avoided GHG emissions both as a snapshot when all the work is completed and cumulatively, again, assuming 10% of energy efficiency work is done each year.

Minor Upgrade	Major Retrofits	New Builds
13.1 tCO2e/year * 10% reduction * 35,294 homes = **46,235 tCO2e**	13.1 tCO2e/year * 25% * 133,195 homes = **436,212 tCO2e**	13.1 tCO2e/year * 50% * 71,735 homes = **469,862 tCO2e**

Total Annual Household Emissions Avoided

952,310 tCO2e

Minor Upgrade	Major Retrofits	New Builds
35,295 homes * 10% = 3,529 homes/year	133,195 homes * 10% = 13,319 homes/year	71,735 homes * 10% = 7,173 homes/year
3,529 homes * 1.31 tCO2e avoided/home/year = 4,624 tCO2e/avoided/year	13,319 homes * 3.28 tCO2e avoided/home/year = 43,621 tCO2e/avoided/year	7,173 homes * 6.55 tCO2e avoided/home/year = 46,986 tCO2e/avoided/year
Cumulative emissions avoided over 10-years: **254,294 tCO2e**	Cumulative emissions avoided over 10-years: **2,399,169 tCO2e**	Cumulative emissions avoided over 10-years: **2,584,240 tCO2e**

Total Cumulative Emissions Avoided Over 10-years:

5,237,703 tCO2e

As noted in Section 4.1.1, as prices on carbon rise, these avoided emissions become increasingly significant to the financial and investment picture for energy efficiency projects.

4.3.2 Reduced Clean Up Liabilities

Energy efficiency measures can reduce the demand for various fossil fuel-based energy sources like diesel and heating oil. Not only does this effectively reduce greenhouse gas emissions but it also reduces the opportunity for fuel spills and related contamination clean up.

Currently, opportunities for spills can be large such as when a fuel barge is off-loading its fuel into a remote community's tank farm. Or it can be on an individual home level when refilling an oil furnace.

The complete environmental and economic impact of this result is not known at this time.

4.3.3 Indigenous Economic Development Foundation:

Similar to the direct impact of local skill development, implementing energy efficiency projects helps communities establish a strong base for future economic development. This can come in several forms:

- Supporting the entrepreneurship of community members to start their own businesses;
- Establishing community-owned businesses to participate in future work outside of energy efficiency;
- Establishing the community's track record for implementing projects and therefore positioning them for future partnerships and investments;
- Creating a skilled workforce that can take advantage of future opportunities; and, most importantly,
- Strengthening the community's housing foundation by opening doors to changes in how housing is managed and sustained.

The scope of this impact has not been quantified at this time.

4.3.4 Reduction of Illness Morbidity and Health Care Costs

Perhaps the most significant induced impact for a community is the positive health impacts of energy efficiency efforts. Actions to improve heating sources, home insulation, and providing proper, efficient ventilation can have a range of impacts including:

- Improved respiratory health due to less particulate matter in the air;
- A reduction in mold growth and related health impacts including occurrences of bronchiolitis and asthma in infants and children (Kovesi n.d.);
- More consistent, comfortable heat throughout the home;
- Positive impacts on mental health;
- And more.

These improvements are not just beneficial for home occupants but also for Canada's health care system as it would result in fewer hospitalizations and treatment requirements. While only pockets of work have been done connecting energy efficiency to health in Canada, the research and evidence is strong internationally.

The American Council for an Energy-Efficient Economy estimates that targeted energy efficiency efforts could save $228 million USD per year in avoided healthcare costs (Hayes, Kubes and Gerbode 2020). At one ninth the national population, that equates to approximately $26.1 million USD ($31.6 million CDN) in Canadian healthcare savings.

In the UK, the National Health Service has been directly funding energy efficiency measures as proactive approaches to health care. For example, the Health and Innovation Programme, delivered by National Energy Action (NEA), saw £26.2 million ($45,306,860 CDN) invested into three streams of energy efficiency. The programme launched in April 2015 and reached 9,000 households for energy efficiency improvements. Through the programme general health was improved by up to 36.2% and mental health by 35.3%. (Ruse and Garlick 2018).

More research is needed to quantify the benefits of this impact for First Nations, Inuit, and Métis people.

5.0 A Proposed National Collaborative Process

5.1 From Opportunity to Action

The energy efficiency financing requirements and resulting impacts present a game changing opportunity for Indigenous communities to have a sustainable foundation for families and livelihoods. They are also a critically important driver for economic development and climate action Canada-wide. Realizing this potential, however, will require a large placement of capital.

The challenge now is how to go from opportunity to action.

We believe that a *National Collaborative Process* is needed to catalyze investment in energy-efficient Indigenous housing. This process can connect the substantive shared interests of: Indigenous communities; the federal and provincial/territorial governments, capital markets; and the energy efficiency solutions sector. However, tinkering at the edges, and not taking comprehensive, community-wide Indigenous energy efficiency action, will have minimal impact. This should not, and cannot be, business-as-usual.

Simply put, we do not have the solutions we need. Attention and intention, without the invention of alternate mechanisms and systems, will mean unrealized opportunity.

ICE is ready to step up and play a co-convening role to deliver this *National Collaborative Process* and accelerate action on energy-efficient Indigenous housing across Canada. ICE welcomes collaborations from Indigenous organizations, governments, social finance entities, sustainable energy and climate bodies, capital firms, and philanthropic organizations to help uncover pathways forward.

5.2 Making Financing Work

There is a pressing requirement to establish new relationships and design core systems and approaches for implementing energy efficiency projects in First Nations, Métis, and Inuit communities. These new approaches must integrate: a) Indigenous community-centered and community-wide housing energy efficiency plans and opportunities; b) federal and provincial-territorial policies and programs, and; c) private infrastructure pools of capital.

Making Indigenous energy efficiency financing work in this integrated way, requires solutions to questions in three key areas.

1. Community Preparation – What structures are needed to receive financing and execute projects?

a. What capacity and management systems are needed at the community level?

b. What planning is required to prepare retrofit projects to be investment ready?

c. What procedures and/or checks and balances are needed?

d. What capacity building and project feasibility supports do communities need?

2. Investment Requirements – What are the interests and requirements of prospective energy-efficient infrastructure lenders?

a. What information is needed from Indigenous communities?

b. How will investments be securitized?

c. What investment structuring is possible?

d. What due diligence processes are essential?

e. How can infrastructure investment be de-risked?

3. Blended Finance – How might Indigenous housing retrofits and energy efficient new builds be advanced through new blended finance models?

a. What new structural arrangements are needed to deploy capital?

b. Who are prospective infrastructure players that will contribute the infrastructure investment?

c. How do climate benefits, carbon tax, and health impacts play into resourcing?

d. How can federal and provincial/territorial funding be leveraged?

5.3. National Collaborative Process

We envision that the *National Collaborative Process* will unfold over the next year, moving into a proof of concept phase by March 2022. The National Collaborative Process will have three Activity Tracks:

1. Engagement of Indigenous rights holders and collaborating parties to build on *Energy Foundations* and set out specific goals to be achieved.
2. Development of alternative Indigenous energy efficiency financing models that integrate financing sources into various blended finance structures and mechanisms.
3. Applying Indigenous energy efficiency financing options in a select group of First Nations, Métis and Inuit communities, and getting specific on project and transaction details. These communities would then serve as the proof of concept for the financing models in the second phase of the *National Collaborative Process*.

The involvement of certain public and private sector bodies is essential to *National Collaborative Process*. These organizations include:

» National Indigenous Organizations;

» Representative Indigenous communities pioneering housing energy efficiency across the country;

» Canada Mortgage and Housing Corporation;

» Indigenous Services Canada;

» Canada Infrastructure Bank;

» Other Federal Departments including: Finance Canada, Infrastructure Canada, and Natural Resources Canada;

» First and Second Tier Canadian Banks;

» Major Pension Funds: including CPPIB, OMERs, Teachers and others;

» Indigenous financial, trust, Tribal Councils, and economic development organizations;

» Philanthropic organizations and charitable foundations, especially ones that are active with sustainable and social finance, clean energy and climate, and Indigenous reconciliation;

» Electricity sector organizations including utilities and the Canadian Electricity Association;

» Insurance Companies and the Insurance Bureau of Canada;

» Social Finance Corporations such as the Community Forward Fund; and

» Social, Clean Energy and Climate Investment Intermediaries and Facilitators.

The above list is only representative. We anticipate other organizations and bodies may also be involved in the *National Collaborative Process*.

To remain focused and outcome oriented, we suggest the *National Collaborative Process* be centered around a core group of collaborators, led by ICE and other co-convenors, with specific opportunities for broader, inclusive engagement of a larger set of organizations.

5.4 ICE's Role in a National Collaborative Process

ICE approaches the challenge and opportunity of Indigenous energy efficiency efforts from the vantage point of its major program Bringing it Home. A national initiative, Bringing It Home is working to foster community-centered *healthy energy living* through energy efficiency for new and retrofitted homes and facilities, now and for future generations.

Bringing it Home is working with Indigenous Guide Communities across the country to develop the local capacity, skills, and processes to implement community-scale energy efficiency projects.

The Bringing it Home program supports Guide Communities to develop an Indigenous Energy Efficiency Enabling Environment at the community level to take community-scale projects forward. The Enabling Environment focuses on the six components identified in the diagram on the right.

This work positions the Guide Communities to be ideally suited to implement the new financing mechanisms and structures identified through the *National Collaborative Process*. It also positions them to strategically inform the process based on the realities faced in Indigenous communities. This includes the diversity of housing ownership and management structures in Indigenous communities such as housing authorities, rental homes, private homes, community housing and social/affordable housing.

ICE's Bringing it Home program, and the Guide Communities will bring a unique set of Indigenous experiences and insight to *National Collaborative Process* to accelerate action on Indigenous housing energy efficiency across Canada.

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