



# WHY BIOMASS?

**Alaska Wood Energy Conference**

**Fairbanks, Alaska**

**April 15-16, 2019**

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**Natural Resources Canada**



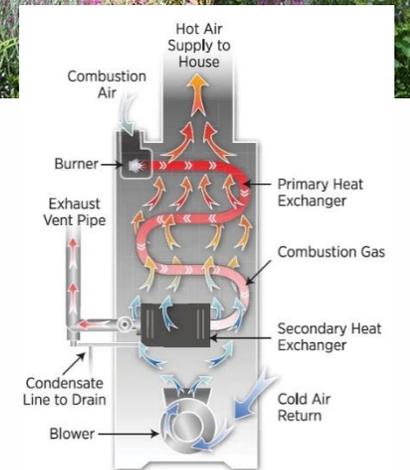
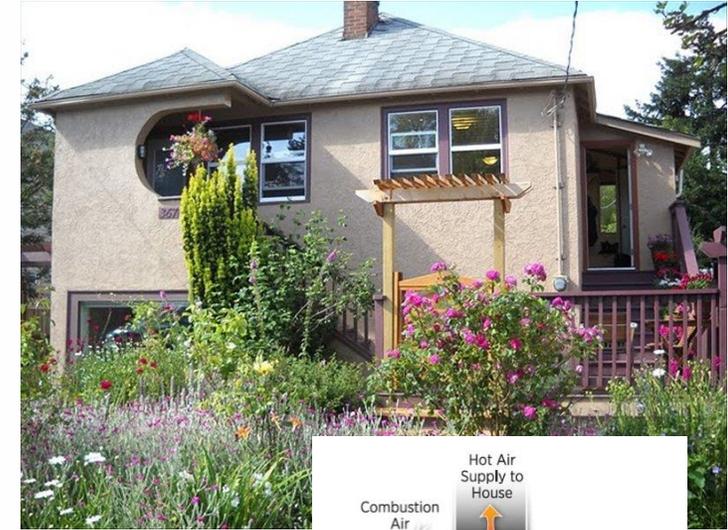
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# DISCLOSURE

Victoria, BC



High-Efficiency Gas Furnace



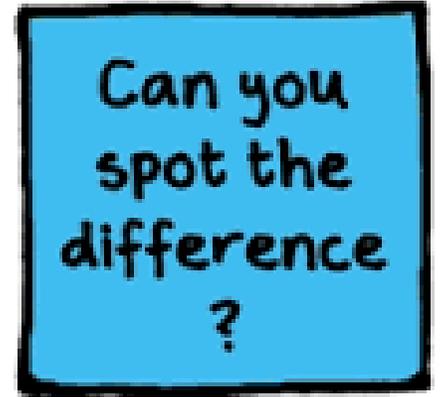
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I AM...

NOT

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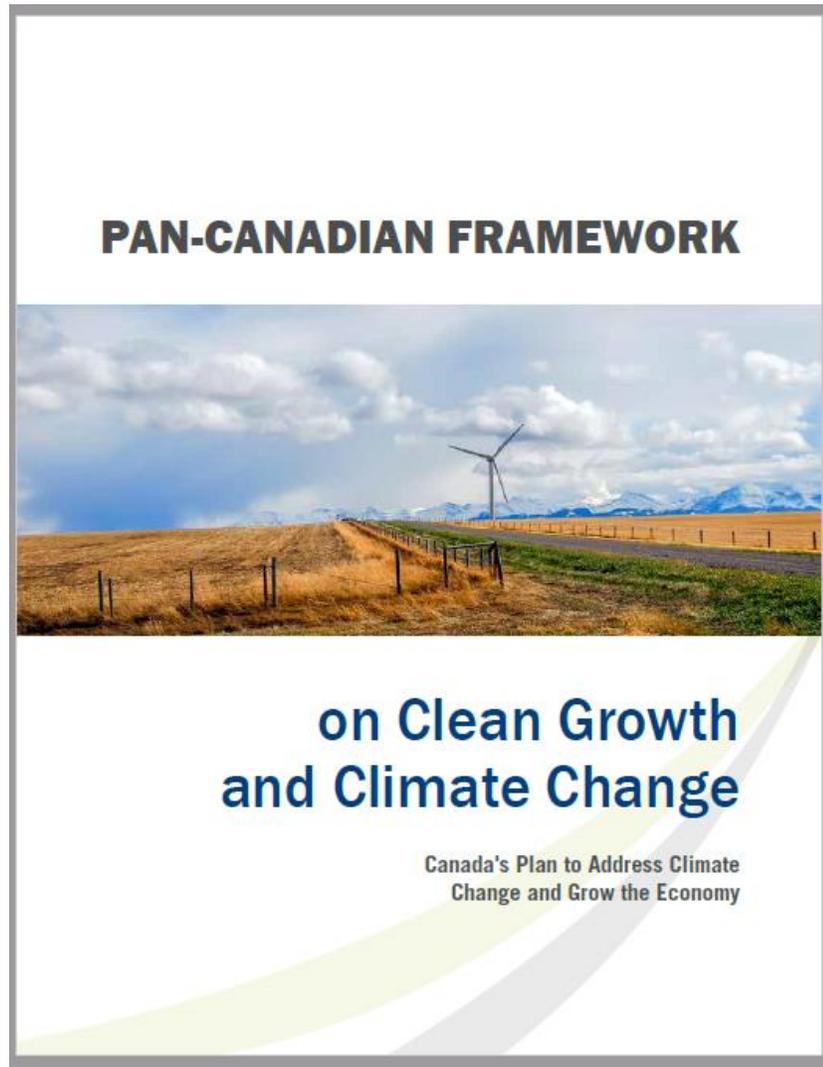
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The Pan-Canadian Framework on Clean Growth and Climate Change is Canada's plan – developed with the provinces and territories and in consultation with Indigenous peoples – to meet our emissions reduction targets, grow the economy, and build resilience to a changing climate.

The Framework commits to reducing GHG emissions by supporting rural and remote communities in their transition toward more **secure, affordable, clean** energy.

## Clean Energy BC

// FACT SHEET

BIOMASS



Biomass energy can be stand alone heat generation such as the lumber dry kilns associated with sawmills. Conversely it can be stand alone power generation such as Capital Power's Williams Lake facility. It can also be cogeneration of both heat and electricity such as the configuration at many BC pulp mills. When configured as cogeneration, energy efficiencies often exceed 80%.

### What is Biomass?

- Biomass energy generation is the creation of heat and/or power from carbonaceous substances such as solid wood or wood residues, agricultural crop residues, aquatic plants, animal wastes, and dedicated energy crops such as tree farms.
- The technologies utilized to create bioenergy include direct combustion, gasification, fast pyrolysis, fermentation and gas collection.
- Biomass technologies are generally considered to be renewable and carbon neutral. This is due to the short processing cycle involved, combined with the regeneration of carbon through replanting, referred to as "biogenic carbon".
- Bioenergy production in British Columbia is limited to wood and wood residues, as well as landfill gas collection. Over 600 MW of capacity is currently in operation in the province at large pulp and paper facilities (largely self-generation). A further 30 MW is produced by plywood mills. 65 MW is currently produced by Clean Energy Producers (0.5% of the province's total generation portfolio).
- Future woody Biomass sources in the province include existing mill wood residues, roadside debris and standing pine beetle. Generation potential for existing mill residue is in excess of 200 MW. The total generation potential for all wood sources is in the order of 2,300 MW. Ultimately fuel crops will likely be utilized for bioenergy production. To put this potential in perspective, 1,000 hectares of fast growing poplar is capable of sustaining 1 MW of power.



*Biomass generation, pursued on a sustainable basis, is endorsed by Greenpeace, the Sierra Club, and the David Suzuki Foundation.*

**Clean Energy BC**

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## Yukon Biomass Energy Strategy

February 2016



**Yukon**  
Government



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The screenshot shows the Natural Resources Canada website. The header includes the text "Natural Resources Canada" and the "Canada" logo. A navigation menu contains links for Energy, Mining/Materials, Forests, Earth Sciences, Hazards, Explosives, and Canada's Green Future. A search bar is located in the top right. The breadcrumb trail reads: Home → Forests → Forest Resources → Federal programs → Indigenous Forestry Initiative. On the left, a sidebar lists "Forests", "Forest Topics", and "Forest Resources". The main content area is titled "Indigenous Forestry Initiative" and features a green box with the text: "Applications to the Indigenous Forestry Initiative can be submitted year-round."

## Indigenous Forestry Initiative:

focuses on economic development and forestry, with a bioenergy component

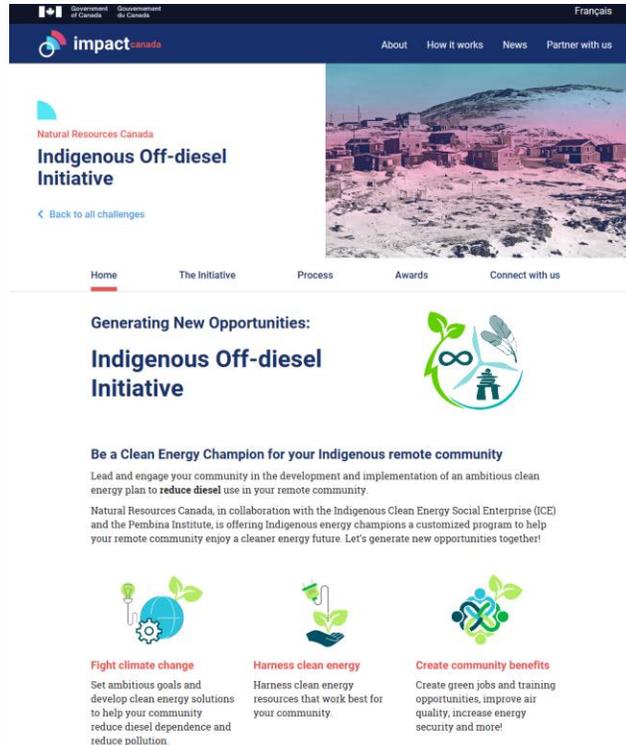
## Strategic Partnership Initiative:

focuses on promoting participation in the forest bioeconomy

The screenshot shows the Natural Resources Canada website. At the top, there is a navigation bar with the following menu items: Energy, Mining/Materials, Forests, Earth Sciences, Hazards, Explosives, and Canada's Green Future. Below this is a search bar and a breadcrumb trail: Home → Energy → Energy Resources → Funding, Grants and Incentives → Green Infrastructure programs → Clean Energy for Rural and Remote Communities: BioHeat, Demonstration & Deployment Program Streams. The main content area features a sidebar on the left with the following categories: Energy Sources and Distribution, Energy Efficiency, Energy Resources, Energy Pipeline Projects, and Mission Innovation. The main heading is 'Clean Energy for Rural and Remote Communities: BioHeat, Demonstration & Deployment Program Streams'. Below the heading is an illustration of a rural community with solar panels, a wind turbine, and houses.

## Clean Energy For Rural and Remote Communities: Bioheat Stream

focus on capital projects to develop biomass heating systems and reduce fossil fuels in remote communities



## Indigenous Off-Diesel initiative:

Aimed at reducing diesel reliance in remote Indigenous communities through supporting leaders that can develop renewable energy solutions in their communities

# BIOENERGY PROJECTS IN BC AND YUKON

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## CANADIAN BIOMASS

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### Kwadacha Nation installs wood gasification system

February 01, 2018  
Written by Taylor Fredericks



Feb. 1, 2018 - Chief Donny Van Somer of the Kwadacha Nation can still vividly recall the moment almost seven years ago when he first began thinking about the possibility of reducing his community's carbon footprint with renewable energy.

Now, after years of research, partnership-building, and hard work, that dream has become a reality, with the Kwadacha Nation the proud new operators of North America's first wood gasification system for district energy.

The wood gasification system, composed of three linked Borealis CHP biomass generators and a dryer, became operational in April last year.

The system, composed of three linked Borealis CHP biomass generators and a dryer, became operational in April last year, and will be used to provide heat to greenhouses, a local school, and electricity for the majority of the community. Each of the three units independently produces 45 kW of electricity and 108 kW of heat in the form of hot water.

Photos courtesy Borealis Wood Power Corp.

"It's hard to believe looking back, but this is a project that we have been thinking about for years now," explains Van Somer. "I remember negotiating with a mining company on a mine that was underway in our region back around 2011, and it occurred to me then that our lands and our country deserved a greener future."

Whatever inking Van Somer might have had then about what such a future might look like, he admits he still had much to learn about the effort required to realize it.

**From fossil fuels to fast friends**

Located in Fort Ware, B.C., the Kwadacha Nation is an off-the-grid remote community more than 570 kilometres north of Prince George. Home of the Tsek'ene people, the community has an estimated population of 380, and approximately 80 homes. Due to its remote location, the community has traditionally relied on costly diesel generators to provide electricity, and propane for heat.

Looking for sustainable, green initiatives that might help to reduce their ecological footprint, the Kwadacha council quickly identified reduced reliance on greenhouse gas-producing diesel and propane as a priority. From there, the question became how an off-the-grid community might achieve such a goal.

"We began consulting with some people associated with some of Canada's green initiatives, and researching what it would take to make our community greener from an energy perspective," explains Van Somer.

While Chief Van Somer and the Kwadacha council were looking for the kind of technology and innovation that could provide their community with reliable and sustainable energy at an affordable price, Dale Thomas, director of operations, and the team at Borealis Wood Power Corp., were busy looking for their first major biomass project in Canada.

Founded in 2012, Borealis is the exclusive distributor of the Borealis CHP generator, a 45kW combined heat and power (CHP) wood gasification system developed and manufactured by German-based Spanner Re2 GmbH, a longtime supplier of biomass heat and power systems in both Europe and Japan.

## Kwadacha First Nation: CHP Project



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# BIOENERGY PROJECTS IN BC AND YUKON

## Tsay Keh Dene: CHP Project

Government of Canada / Gouvernement du Canada

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### Canada Invests in Biomass and Indigenous Participation in the Forest Sector in Prince George

From: [Natural Resources Canada](#)

#### News release

January 23, 2019 Prince George, British Columbia Natural Resources Canada

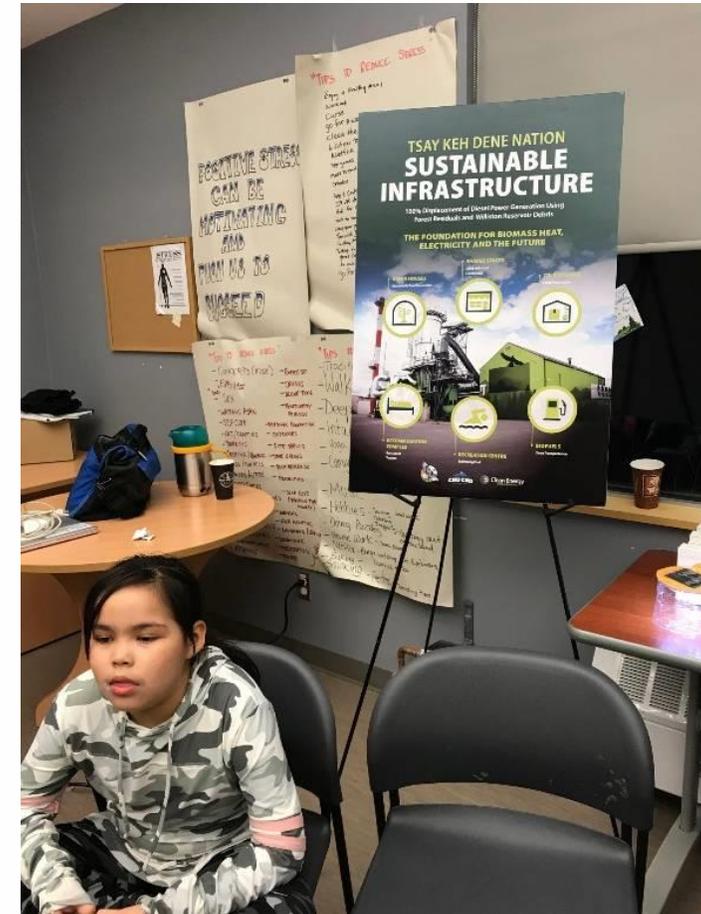
Our government is investing in our resources — Canada's natural advantage — to boost economic competitiveness while protecting our environment. This includes investments in new technologies that tap into the vast potential of forest-based biomass and bioenergy.

Canada's Minister of Natural Resources, the Honourable Amarjeet Sohi, today announced a \$589,629 investment in three Indigenous forestry projects in British Columbia that will create jobs and boost the local economy.

They are:

- \$475,000 for Chu Cho Environmental to support an Indigenous bioheat project in Tsay Keh Dene Nation as part of our commitment to creating good jobs and building a clean growth economy. The funding will enable Chu Cho Environmental — a Tsay Keh Dene Nation-owned company — to assess the feasibility of using biomass to generate heat and power. Once completed, this project would be among the first of its kind to heat and power an Indigenous community in the province, demonstrating the power of innovation to create opportunities in a remote community.

This is the second project announced under Natural Resources Canada's (NRCan) [Clean Energy for Rural and Remote Communities](#) program. The goal of the program is to reduce the reliance of rural and remote communities on fossil fuel for heat and power with particular emphasis on Indigenous communities.



# BIOENERGY PROJECTS IN BC AND YUKON

## Visitors flock to Yukon village to see bioenergy system in action



Hundreds of people have travelled to learn about Teslin's biomass heating system

Alexandra Byers - CBC News - Posted: Mar 30, 2019 12:00 PM CT | Last Updated: March 30



Blair Hogan explains Teslin's biomass heating system to visitors from B.C. and the N.W.T. (Nelly Albérola/Radio-Canada)

4 comments 

The Yukon village of Teslin has become a world-leading model in biomass heating, with more than 900 people from around the globe having visited to learn about the facilities.

Once a month, and even up to once a week in the summer, the Teslin Tlingit Council leads tours of its system, where biomass boilers heat ten of the community's major buildings. It went into operation almost a year ago, and has been attracting visitors like Fred Behrens ever since.

**Teslin Tlingit Council – Hargassner biomass boiler district heating system.**



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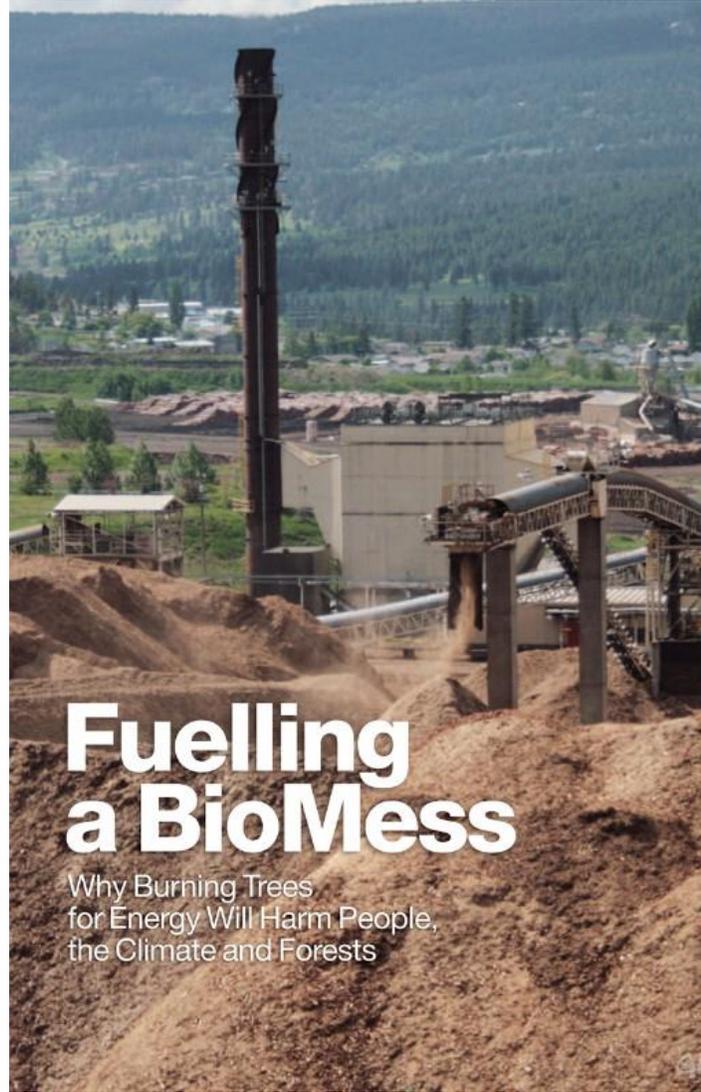
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# FEEDBACK FROM FOREST BIOMASS PROJECTS

- Energy cost savings from systems that burn wood more efficiently.
- Local economic development and jobs.
- Training, employment and business opportunities.
- Decreased costs and risk of impacts from transportation/use of fossil fuels.
- Energy independence and keeping \$\$ in the community.
- Use of forest residues from other forestry activities and construction projects.
- Use of dead wood and fire smart residuals.
- Community pride.
- Members returning to the community because of employment opportunities.
- Makes sawmilling profitable if there is a market for the waste.
- Investment in future of community

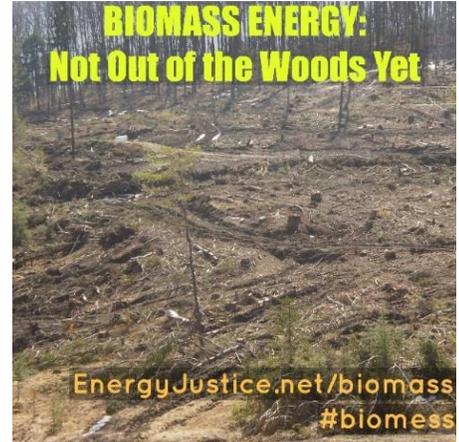


## Dis-Advantages of Biomass



## Fuelling a BioMess

Why Burning Trees for Energy Will Harm People, the Climate and Forests



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**“Burning forest biomass to make electricity releases substantially more carbon dioxide per unit of electricity than coal”.**

“We see this biomass industry as one of the biggest threat to these forests”.

“I'm far from convinced that the biomass industry is policing itself, or being policed, forcefully enough.”

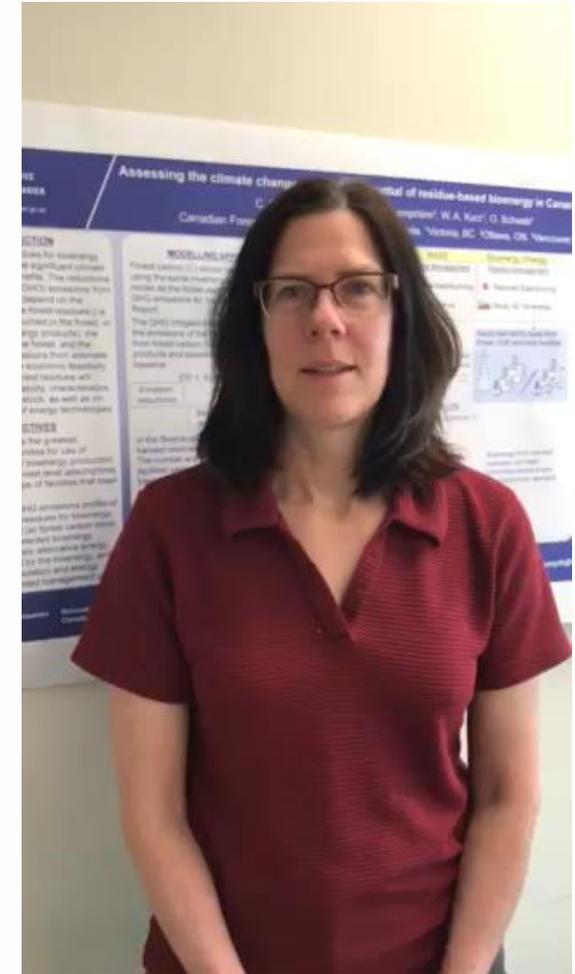
“The most dangerous component of combustion is the particulate matter which is produced by biomass power generation”.

**Burning trees for energy ‘like pouring gasoline to put out a fire’**





# I WORK WITH SMART PEOPLE



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# IT DEPENDS: WHAT FOSSIL FUEL ARE YOU DISPLACING

Natural gas



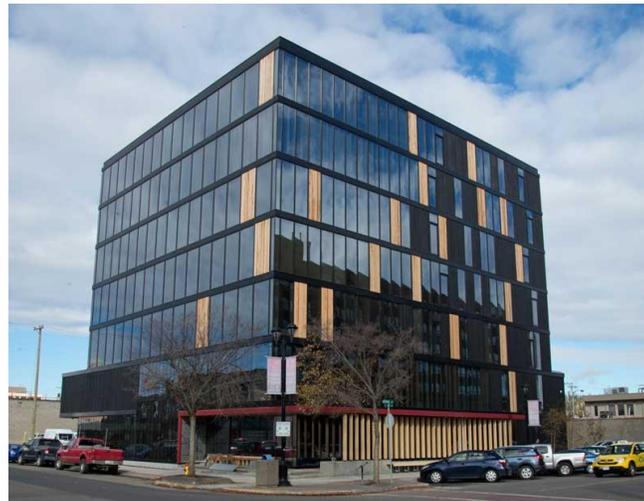
Coal



Diesel in off-grid communities



# IT DEPENDS: WHAT IS THE SOURCE OF FEEDSTOCK



- Biomass comes from a dynamic natural system that continuously sequesters from, and releases carbon to, the atmosphere.
- The use of biomass for bioenergy can be carbon positive, negative or neutral.  
**It depends** on the **assumptions** made when calculating the carbon impact of bioenergy use.
- To compare energy sources, a **full life-cycle accounting** of all carbon emissions and sequestration is required.

- Sustainable forest management planning must guide biomass practices.
- When evaluating the impact, must consider the baseline or alternative use.
- The over removal of dead trees or woody residue could reduce the stock of coarse woody debris with possible negative impacts on biodiversity and soil fertility.

Potential economic benefits/revenue from bioenergy:

- Selling power
- Construction of facilities
- Feedstock collection
- Tourism
- Products
- Use of local fuel source versus trucking in diesel
- Stability of a local fuel source

How do we have a balanced dialogue about bioenergy?



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# HOW TO HAVE A DISCUSSION ABOUT BIOENERGY

## Visitors flock to Yukon village to see bioenergy system in action



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Once a month, and even up to once a week in the summer, the Teslin Tlingit Council leads tours of its system, where biomass boilers heat ten of the community's major buildings. It went into operation almost a year ago, and has been attracting visitors like Fred Behrens ever since.

### Comments from CBC Website regarding the Teslin Article:

“Biomass is not a great long-term solution to diesel power generation. For one, it is a myth that it is 'carbon neutral'. According to the IPCC, compared to natural gas, the burning of wood puts out 2 times more CO<sub>2</sub>, 60 times more methane and 400 times more Nitrous Oxide (N<sub>2</sub>O) for each unit of energy burned. It also puts out more CO<sub>2</sub> and N<sub>2</sub>O than the burning of oil or even coal.

It also releases a huge amount of fine particulate matter (PM<sub>2.5</sub>) which is very harmful to people's health. So if it is located near communities it could be creating a lot of harm, increasing health impacts and, therefore, costs. Is there any air quality testing set up as part of this? Are there any health studies mandated to assess the impacts?

And what happens when all the Fire Smart wood in the area is harvested? Biomass plants demand an ongoing source of wood for decades to come, that can outstrip the supply of wood chips (which are being shipped from where?) and lead to harvesting of live trees”.



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# CONCERNS REGARDING THE MYTH THAT BIOMASS IS CARBON NEUTRAL

## Comments from CBC Website regarding article on the Teslin Biomass Project:

# 1: “Biomass is not a great long-term solution to diesel power generation. For one, it is a myth that it is 'carbon neutral’”.

Biomass Energy: A clean and renewable Fuel:

“Contrary to what many people think, biomass is very environmentally friendly fuel. Growing trees capture and feed on CO<sub>2</sub>, which is present in the air. When wood is burned, CO<sub>2</sub> is released into the atmosphere restarting the cycle. This is why biomass is considered neutral for the production of GHG unlike all the fossil fuels that pollute the atmosphere”.

- The knowledge of carbon accounting has evolved.
- Canadian scientists are moving away from using the term carbon neutral when discussing forest biomass.
- We should have consistent messaging on bioenergy and GHG.

## Comments from CBC Website regarding article on the Teslin Biomass Project:

# 2: “According to the Intergovernmental Panel of Climate Change (IPCC), compared to natural gas, the burning of wood puts out 2 times more CO<sub>2</sub>, 60 times more methane and 400 times more Nitrous Oxide (N<sub>2</sub>O) for each unit of energy burned. It also puts out more CO<sub>2</sub> and N<sub>2</sub>O than the burning of oil or even coal”.

### Conclusions regarding deployment: Key messages about bioenergy

Bioenergy has significant potential to mitigate GHGs if resources are sustainably developed and efficient technologies are applied.

Forest products and biomass residues and wastes can deliver significant GHG mitigation performance—an 80 to 90% reduction compared to the fossil energy baseline.

Special Report on Renewable Energy

Sources and Climate Change Mitigation

Summary for Policymakers: A Report of Working Group III of the IPCC

# CONCERN REGARDING EMISSIONS AND HEALTH

## Comments from CBC Website regarding article on the Teslin Biomass Project:

# 3: “It (burning of wood) also releases a huge amount of fine particulate matter (PM2.5) which is very harmful to people's health. So if it is located near communities it could be creating a lot of harm, increasing health impacts and, therefore, costs. Is there any air quality testing set up as part of this? Are there any health studies mandated to assess the impacts”?

- Modern boilers / stoves have much lower emissions than conventional stoves because they use advanced emissions control technologies. Most modern equipment is imported from Europe and meet stringent European standards. Canadian Council of Ministers of the Environment are currently developing a guide for managing air emissions from small scale combustion systems (between 50kW and 5MW). Larger systems would require permitting / authorization from provincial bodies.

The International Organisation for Standardisation (ISO) has developed standards for solid biofuels which have been adapted by the Canadian Standard Association (CSA).

# CONCERN REGARDING WOOD SUPPLY AND SUSTAINABILITY

## Comments from CBC Website regarding article on the Teslin Biomass Project:

# 4: “And what happens when all the Fire Smart wood in the area is harvested”?

# 5: “Biomass plants demand an ongoing source of wood for decades to come, that can outstrip the supply of wood chips (which are being shipped from where?) and lead to harvesting of live trees”.

- Firesmart activities are usually not a one entry treatment
- Harvesting of live trees specifically for biomass energy use is a valid point of concern.
- In the case of Teslin Tlingit Council, they are sourcing feedstock from several sources including:
  - Trees that were removed for construction and road building;
  - Fire killed trees;
  - They also plan to use sawmill residuals when the sawmill becomes operational.



# LESSONS I LEARNED: HOW TO HAVE A BALANCED DISCUSSION

- Be respectful of other's opinions.
- When having discussions, you got to know when to hold 'em, know when to fold 'em, know when to walk away, and know when to run.
- Using terms like good/bad/carbon neutral does not help.
- It might help to change the terminology e.g. advanced wood heat.
- The science around bioenergy is complicated, multi-faceted and evolving.
- Put the conversation into context and be specific and clear on assumptions.

# CHALLENGE

- KEEP LEARNING AND EDUCATING YOURSELVES AND OTHERS ON BIOENERGY
- BRING YOUR PASSION TO THE DISCUSSION
- ALSO BRING CREDIBILITY TO THE DISCUSSION

