

EUROPE REPORT

BIOMASS IS GOING MAINSTREAM

Key Learnings for Canada



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EXECUTIVE SUMMARY

The Wood Pellet Association of Canada (WPAC) recently attended the annual World Sustainable Energy Days event in Austria from February 28 to March 3, 2023. The conference highlighted the critical role of the energy transition in securing our clean energy future and the progressive policies, technologies, and markets that will be required to get society there.

As part of the event, the European Pellet Conference took place on March 1 to discuss climate change, European policy developments, the future of wood pellets, technology and innovation, and world markets. There was considerable focus on pellets for residential and commercial heating – highlighting that, in many places, biomass is clearly playing a significant role in displacing fossil fuels.

The discussions at the conference indicate that, in Europe especially, the benefits of bioheat are now accepted as mainstream and the focus is on how to grow markets, improve technology, and continue to get positive messaging out to counter the claims of anti-biomass activists.

Leading the charge is the region of Upper Austria where biomass now accounts for 42 percent of space heating and 18 percent of energy used in manufacturing. Their efforts have paid off and provide important lessons for Canada.

Today, wood pellets sourced from responsible producers in well-regulated countries like Canada are unquestionably sustainable and part of the solution. Good public policy, incentives to support domestic needs, and responsible use of the forest resource will all be required to meet this demand.

The conference captured important takeaways for Canadian pellet producers, regulators and policy makers, supply chains, and public administrators.

KEY TAKEAWAYS

- 1. Develop a thermal energy (heat) strategy** that includes wood pellets;
- 2. Provide consumer capital financial support/incentives** to address costs associated with installing boilers or wood pellet stoves. This support would be based on GHG outcomes, not only electricity-based solutions;
- 3. Accelerate bioheat public procurement** as the Government of Prince Edward Island has done;
- 4. Introduce renewable heat incentives** like the highly successful program in the United Kingdom and Austria;
- 5. Fund fuel switching feasibility studies for industry** like those available from SaveEnergyNB for switching from fossil fuels to electricity;
- 6. Fund district energy feasibility studies** for municipalities; and
- 7. Revise standards that restrict the required technology and equipment** from entering Canada.



INTRODUCTION

The Wood Pellet Association of Canada recently attended the annual **World Sustainable Energy Days** event in Wels, Austria. More than 650 participants from 60 countries attended the four-day conference from February 28 to March 3. The theme of this year's conference was "Energy Transition = Energy security!" and highlighted the critical role of the energy transition in securing our clean energy future and the progressive policies, technologies, and markets that will be required to get society there.

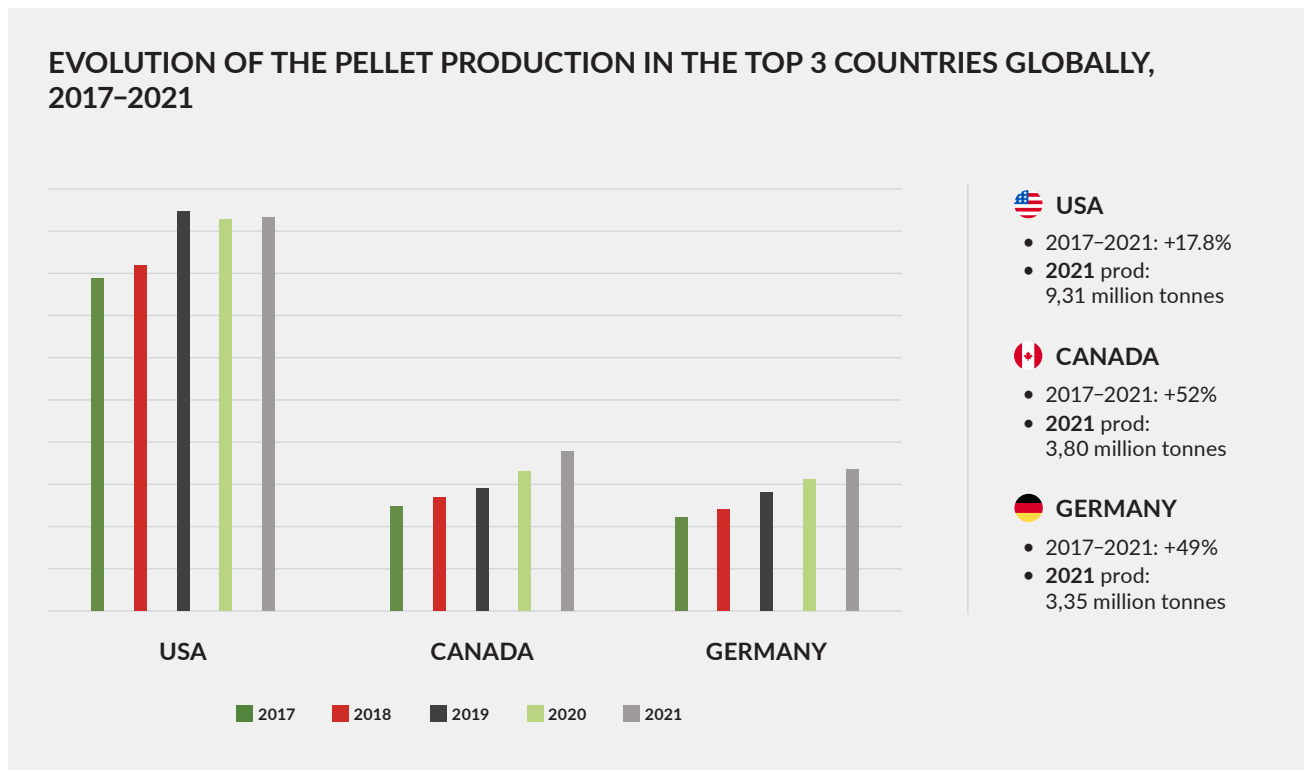
The European Pellet Conference took place on March 1 as part of the overall offerings at the event, attracting more than 400 participants to discuss climate change, European policy developments, the future of wood pellets, technology and innovation, and world markets. There was considerable focus on pellets for residential and commercial heating – highlighting that in many places biomass has become mainstream and is clearly playing a significant role in displacing fossil fuels.



GLOBAL TRENDSETTERS: PRODUCTION & CONSUMPTION

Using the data from the European Pellets Council's recently released annual statistical report (current to the end of 2021) Irene di Padua, Director of Policy at Bioenergy Europe, reported on global market trends. She highlighted that the UK, South

Korea, and Denmark top the list in countries reaping the benefits of bioenergy from wood pellets, while North America continues to be a powerhouse when it comes to producing the supply needed to meet the growing demand for biomass.



Source: Bioenergy Europe

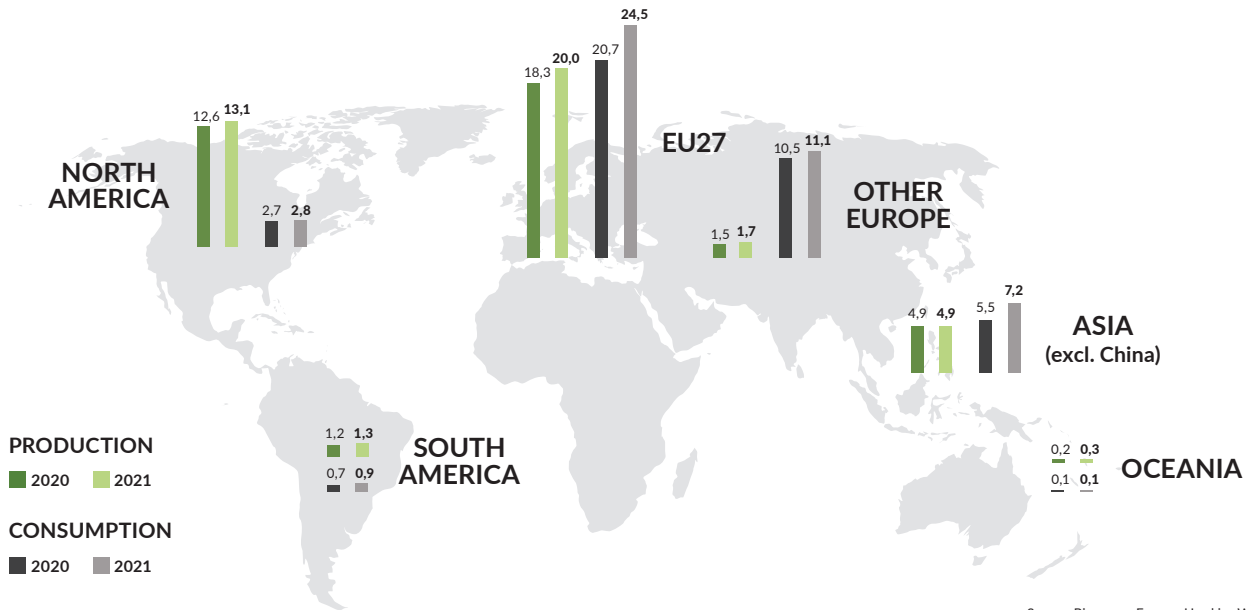
Today, nearly three quarters of the world's renewable energy is from biomass. Bioenergy accounts for about 10 percent of total final energy consumption and two percent of global electricity generation. In the United States and the European Union, bioenergy accounts for 60 percent of all renewable energy. In fact, over the past 20 years, bioenergy is responsible for the most greenhouse gas (GHG) reductions, much in the form of bioheat.

While the focus of the conference was on Europe, we'd be remiss not to mention Asia. Renewable energy is also considered indispensable to Japan's

pledged decarbonization strategy and, as part of its goal to become carbon-neutral by 2050, the country is accelerating its use of biomass. For the first time, Japan has surpassed the UK in pellet imports from Canada. Today, Canadian wood pellets—made entirely from sawmill and harvesting residuals and low quality or damaged logs—are being used in hundreds of power plants across Japan providing a critical source of energy for that country's power grid.

Korea is also increasingly turning to responsible biomass to meet its climate targets and displace

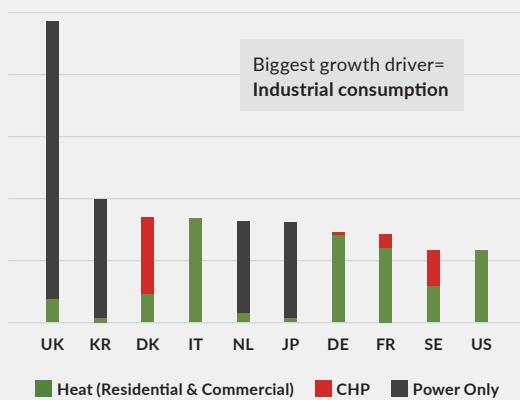
PELLET PRODUCTION IN THE WORLD



Source: Bioenergy Europe, Hawkins Wright

fossil fuels like coal. Today, it has become the second largest market for wood pellets, an increase of 21 percent from 2020 to 2021.

TOP PELLET CONSUMING COUNTRIES IN 2021 PER END USE



Largest absolute increases from 2020–2021

- JAPAN + 1,1 MILLION TONNES**
(around 50% relative increase)
- NETHERLANDS + 940,000 TONNES**
(around 40% relative increase)
- KOREA + 700,000 TONNES**
(around 21% relative increase)

Source: Bioenergy Europe



As WPAC reported recently, the case for biomass is also clear in India, which recognizes the need to reduce greenhouse gas emissions and transition to clean energy.

Significant opportunity exists in capitalizing on India's domestic biomass production to support

its ambitious climate change goals. India burns approximately 670 million tonnes of coal annually for power generation, but the Government of India (GOI) has recently mandated biomass co-firing in its coal plants.

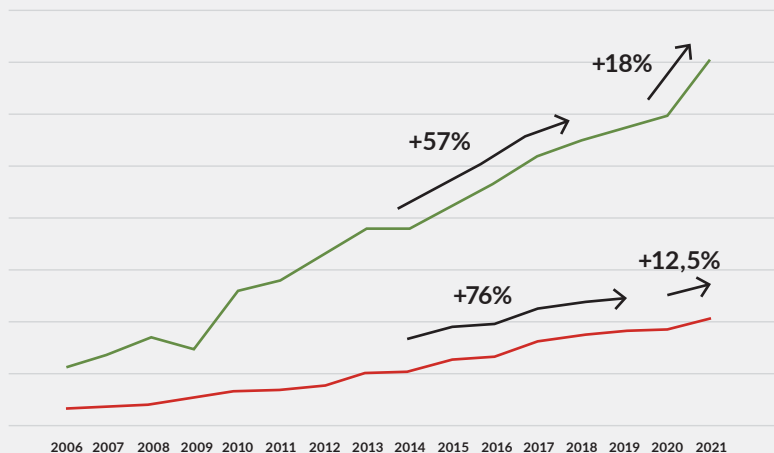
The GOI estimates this action could save 38 million tonnes of carbon dioxide emissions. However, to achieve these goals approximately 96,000 tonnes per day of biomass pellets would be needed. The current capacity in India is approximately 7,000 tonnes per day. Annually, this demand could reach upwards of 35 million tonnes of biomass pellets.

BIOMASS IS MAINSTREAM: RECORD GROWTH IN RESIDENTIAL & COMMERCIAL

There has been a significant growth in the demand for biomass in residential and commercial buildings – globally now comprising 48 percent of wood pellet consumption. This growth is most apparent in Europe:

- Residential demand grew by 18 percent from 2020 to 2021 and 57 percent from 2014 to 2020.
- Commercial demand grew by 12.5 percent from 2020 to 2021 and 76 percent from 2014 to 2020.

EVOLUTION OF EUROPEAN PELLET CONSUMPTION FOR RESIDENTIAL (<50kW) AND COMMERCIAL (>50kW) HEAT EXCLUDING CHP (TONNES)



RESIDENTIAL

From 2014 to 2020:

- +57% consumption over 6 years
→ +9,5 pp increase/year

From 2020 to 2021:

- +18% consumption

COMMERCIAL

From 2014 to 2020:

- +76% consumption over 6 years
→ +12,6 pp increase/year

From 2020 to 2021:

- +12,5% consumption

Source: Bioenergy Europe

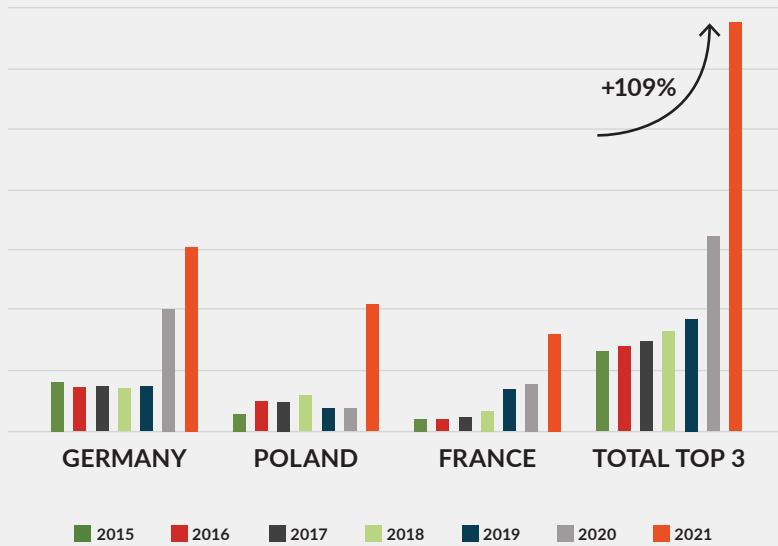
Other significant indicators of growth were seen in the demand for boiler sales, which grew by 109 percent. Di Padua puts it best: “2021 was an exceptional year for pellets, with increased production, consumption, and sales of boilers and stoves.”

While achieving climate targets is a key driver, the price of other energy sources is as well. In a sample of EU member states between April 2021 and November 2022, gas prices increased by

185 percent, heating oil by 91 percent, and electricity by 135 percent.

Bagged pellets have also experienced record price increases with prices tapering off the last quarter of November 2022. A similar trend was seen for bulk pellets.

EVOLUTION OF THE ANNUAL SALES OF RESIDENTIAL BOILERS IN THE TOP 3 EU27 MARKETS (N° OF UNITS)



Residential Boilers: increase in sales by +109%

GERMANY

- Booming in sales in the past 2 years → +51% sales from 2020 to 2021 (20k unites)

POLAND

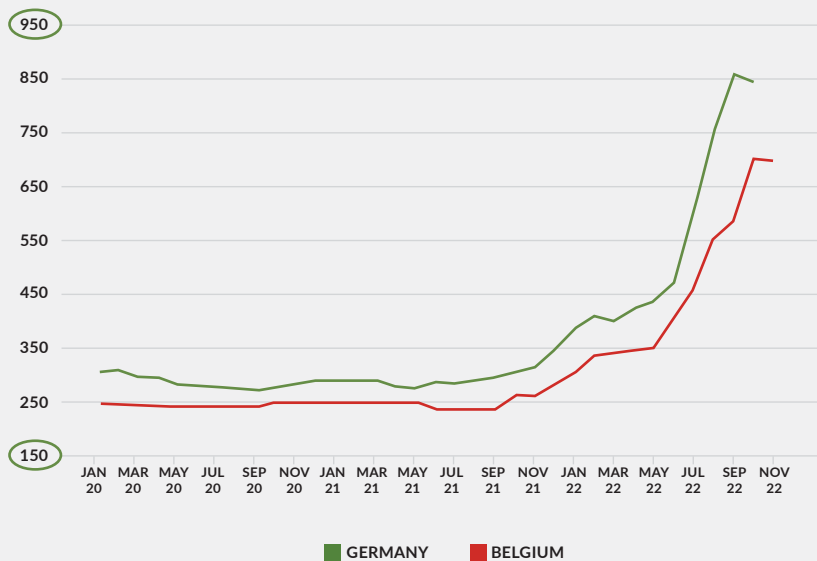
- Biggest growth every witnessed → +425% sales (34k units)
- Clean Air Programme (government incentive)

FRANCE

- Steady growth for the past years
- 2021 exceptional → +100% sales (32k unites)

Source: Bioenergy Europe

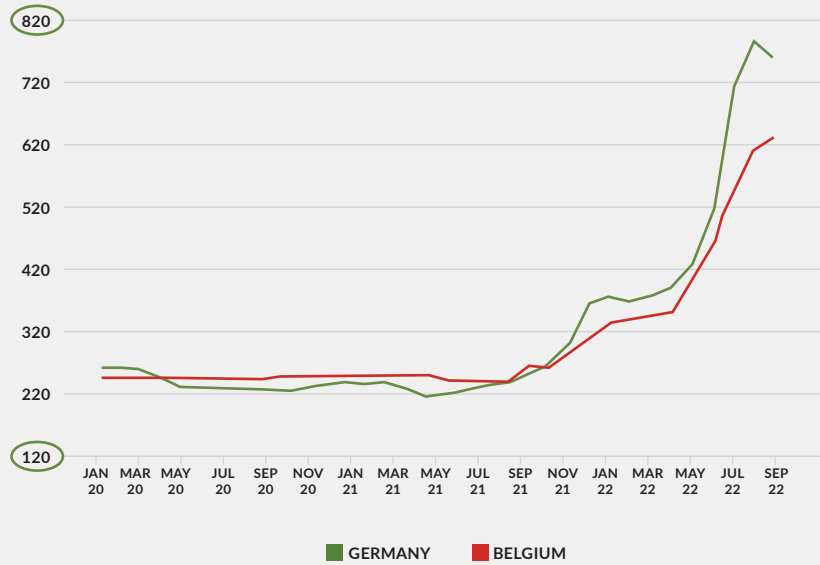
BAGGED PELLET PRICES IN GERMANY AND BELGIUM, JANUARY 2020 - NOVEMBER 2022 (RETAIL PRICE 1 PALLET IN €/TONNE VAT INCL.)



- Similar trend across the member states: → Record increases
- September 2022: 857€/ton
- October/November 2022 → beginning of price decreases

Source: Bioenergy Europe, C.A.R.M.E.N, Valbiom

BULK PELLET PRICES IN GERMANY AND BELGIUM, JANUARY 2020 - OCTOBER 2022 (RETAIL PRICE 1 PALLET IN €/TONNE VAT INCL.)



- Similar trend across the member states
→ Record increases
- Close to 800€/ton delivered
- October/November 2022
→ beginning of price decreases

Source: Bioenergy Europe, C.A.R.M.E.N, Valbiom

“CARROTS, STICKS, AND TAMBOURINES”: UPPER AUSTRIA

The region of Upper Austria is about one-sixth the size of New Brunswick with a population of 1.5 million people. According to Christiane Egger, Deputy Manager of the Energy Agency of Upper Austria, in her region biomass accounts for 42 percent of space heating and provides 18 percent of energy used in manufacturing. The use of fossil fuels for heating is banned in all new home construction and heating system replacements, a key driver behind the 72,000 modern automatic biomass and 360 biomass district heating plants now operating in the region.

The results are clear: Austria has succeeded in making biomass a mainstream fuel and taken 30,000 homes off fossil fuels.

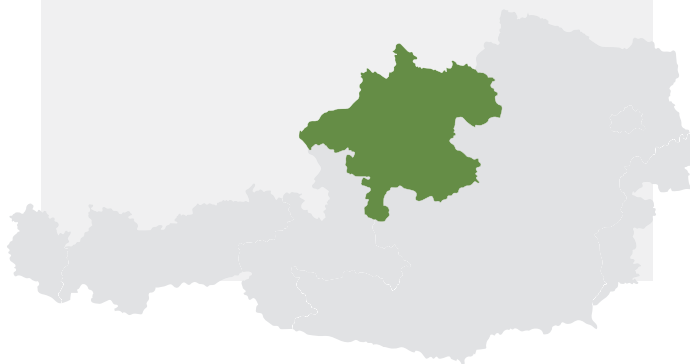
Their **strategy** was simple and provides an important example of leadership at all levels.

A COMPREHENSIVE BIOMASS POLICY PACKAGE

Regional policy has been a crucial driver in developing the modern biomass heating industry by providing stable support to the market for the past 30 years. Upper Austria's elaborate policy package consists of “carrots” (financial incentives, mostly investment grants), “sticks” (regulatory requirements for emissions and efficiency), and “tambourines” (information activities such as energy advice, outreach campaigns, training, etc.). Together, these policies stimulate innovations in equipment and fuels as well as boost consumer confidence in new technologies. There are also strong synergies with other elements of the region's energy strategy, such as the regional government's commitment to eliminate oil heating and replace it with renewables.

UPPER AUSTRIA'S BIOMASS SECTOR – KEY FACTS AND FIGURES

- **15% of the region's total primary energy** comes from sustainable biomass.
- **35% of all dwellings** are heated with modern, clean biomass.
- **More than 25% of all modern small-scale biomass boilers** installed in the EU are manufactured by Upper Austrian companies.
- **One of the highest densities** of small-scale automatic heating systems in the world.
- **Over 1 billion Euro per year** are invested in biomass fuels and equipment.
- **350 biomass district heating networks** are in operation.



GOODBYE OIL, HELLO BIOMASS!

Although over a third of all dwellings are heated with clean biomass, the 18 percent that are still heated with oil are responsible for 45 percent of the buildings' CO₂. The region has put oil customers on notice: by 2035, there will be no more oil heating.

To drive this point home, in 2019 the region's energy agency OÖ Energiesparverband launched "AdieuÖl", a large-scale information and public awareness campaign supported by the Regional Minister of Energy. True momentum has been created for achieving a critical mass where oil heating is simply no longer an environmentally or socially acceptable source of energy. So far more than half of the oil heating systems removed were replaced with modern biomass installations. The results also highlight how decreasing dependence on imported fossil fuels can benefit the climate as well as the economy.

STABLE AND LOCAL SUPPLY OF EQUIPMENT AND TECHNOLOGY

A comprehensive policy approach led to the establishment of a well-developed biomass heating market and supply chain. Biomass heating systems have become a standard solution in the region and Upper Austria has one of the highest densities of small-scale automatic heating systems in the world. Over 1 billion Euro per year are invested in biomass fuels and equipment. Bioenergy has emerged as

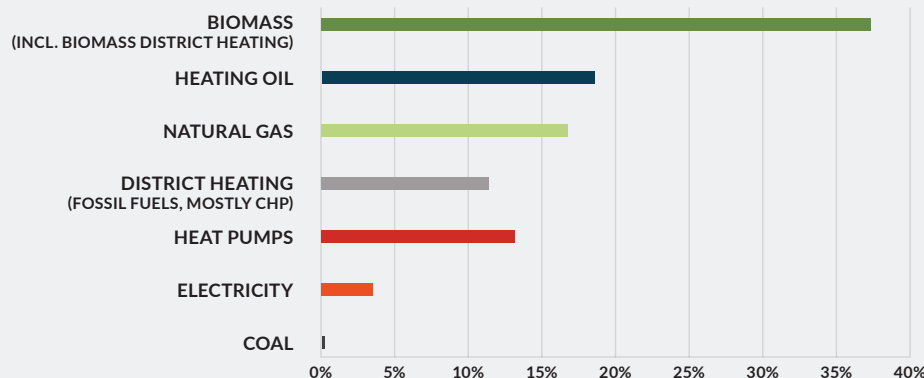


an important economic driver for the region and plays a key role in its ambitions for achieving the energy transition.

The region is home to leading biomass boiler companies. More than 25 percent of all modern small-scale biomass boilers installed in the EU are manufactured by Upper Austrian companies.

The manufacturers cooperate in the Cleantech-Cluster Energy, managed by the regional energy agency, OÖ Energiesparverband (ESV).

HEATING IN UPPER AUSTRIA % OF ALL DWELLINGS



58,000 automatic biomass systems:

- 32,000 pellets
- 26,000 wood chips

350 biomass district heating plants

CANADA: OPPORTUNITY IS KNOCKING

At 2.8 million tonnes of annual consumption of wood pellets, North America lags Europe (35.6 million tonnes, including UK) and Asia (7.2 million tonnes) – despite being the world’s largest producer of wood pellets. In Canada, this is due in part to many of our provinces having access to hydro electricity and natural gas. However, in some Maritime provinces and remote Northern and Indigenous communities energy poverty is a reality.

Canada is the world’s second largest producer of wood pellets, but more than 90 percent of our pellets are exported. Why?

We have work to do on promoting wood pellets to make Canadians more aware, but the fact is we see publicly funded incentives for competing products and yet incentives for local, efficient, and responsible solutions are absent. Today, governments at provincial and federal levels provide

incentives for heat pumps or are investing in far-off solutions like hydrogen when there are solutions right in our own backyard.

One example is the Province of New Brunswick, which has among the highest carbon emissions from heating in the world and risks large cost increases to consumers caused by the prevalence of electric heating. New Brunswick needs a new strategy for affordable, low carbon heat. Wood pellets offer a practical, affordable, proven solution to this problem.

New Brunswick is home to five wood pellet plants that produce approximately 350,000 tonnes per year. This fuel has an energy content of over six Peta Joules (PJ) and could replace all electricity, heating oil, and natural gas consumed by commercial and institutional buildings in New Brunswick. However, due to little local demand and lagging public policy, over 90 percent of New Brunswick’s wood pellet production is exported. Most of these

Wood Pellets Gaining Local Traction

Bioheat from wood pellets is already gaining traction in New Brunswick. One such example is the CCNB-UDM Shippagan Campus in New Brunswick. The school replaced its three old oil steam boilers with a large enough heating system that would meet the requirements of the expanded footprint while at the same time be cost-efficient and support its environmental goals. The investment in a steam boiler system heated with local wood pellets is delivering immediate benefits:

- Heats 36,000 square feet with 100% locally sourced wood biomass.
- Combustion chamber heats up to 800 degrees Celsius.
- On average uses 30 tonnes of pellets over 20 days or 548 tonnes/year.
- Uses 20% less fuel even though footprint grew by 36,000 sq. ft.
- Payback on the project expected 6-7 years.
- Emissions reduced by 85% (to 108 tonnes of CO₂ from 752).

The Grand Falls General Hospital used to burn 300,000 litres of oil annually. Today the new biomass boiler system, installed in 2013, has reduced GHG emissions and uses harvest and sawmill residuals that originate in local, sustainably managed forests. Photo Credit: BSB/Group Savoie.



exports are destined for Europe, where customers value the quality and environmental credentials of these pellets and their role in realizing significant GHG reductions.

New Brunswick also has among the largest electricity demand peaks in North America, but lacks the low-carbon dispatchable resources of other jurisdictions. In fact, New Brunswick's electricity used for heating is remarkably dirty with more than 30 percent fueled by coal, fossil gas, and heavy oil, most of which is burned in winter to meet electric heating needs. New Brunswick is facing difficult choices. Coal generation must stop in 2030. At the same time, electricity demand will increase as transportation moves more to electric cars. New generation capacity will be very expensive. Getting space heating off the electrical grid by using wood pellets is a solution that cannot be overlooked.

Ironically, the greener solution lies in the province's very own sustainably managed forests. Making wood pellets by converting sawmill and harvesting residuals into responsible, renewable clean energy just makes sense in today's world. Maritime wood pellets have garnered global respect as a responsible and effective way to displace fossil fuels, tackle climate change, and heat homes and buildings. Wood pellets can deliver all that and more in Canada's Maritimes including supporting local economies, creating jobs, meeting local climate targets, and enhancing forest health.

The good news is that significant inroads to biomass have already been made in Canada's Maritime provinces and Northern and remote communities. In New Brunswick, local wood pellets are increasingly being viewed as an important part of the equation.

There are excellent examples of this progress from the King Street Elementary School in Miramichi to the Université de Moncton (UDM) Shippagan Campus.

Canada's North and Arctic are warming at three times the global rate, with significant impacts on infrastructure. We know that reducing our reliance on fossil fuels is key to fighting climate change. The Northwest Territories 2030 Energy Strategy has set ambitious but realistic targets, including reducing GHG emissions from electricity generation in diesel-powered communities by an average of 25 percent and increasing the share of renewable energy used for space heating to 40 percent. The interest in switching to more responsible sources of bioheat were clear in the record attendance at the recent Northwest Territories Biomass Week conference, which highlighted the growing importance of biomass in reducing reliance on fossil fuels. In Yellowknife alone, 33 percent of the territorial government buildings are heated with wood pellets.

In Eastern Canada, Ontario Power Generation, which produces half of the province's electricity, is a pioneer in 100 percent coal-to-biomass conversion and today operates the largest biomass plant in North America. It attributes its investment to the fact that biomass can deliver dispatchable renewable power, providing system capacity and peaking and ramping capability, which result in a 1:1 displacement of GHGs from sources such as coal and natural gas.

The Honourable Dan Vandal, Minister of Northern Affairs Canada, pointed out in his opening remarks at Biomass Week, that clean energy, like biomass, means better health and better environmental outcomes for Northern and Indigenous communities while creating economic opportunities and jobs for residents.

THE SHIFT TO MAINSTREAM WILL REQUIRE GOOD POLICY

Today, biomass is recognized by the Government of Canada as low carbon technology, typically saving 90 percent GHG emissions over fossil alternatives. It can contribute to the elimination of heating oil and natural gas heating in Canada and mitigate the effect of closing coal power plants by providing high efficiency, low carbon heat energy in replacement of fossil-derived electric heating.

But to reach its full potential, it will take more than recognition. What's needed today is good public policy from the ground up and fair incentives from governments. Upper Austria provides a blueprint for success:

- **Carrots:** financial incentives, mostly investment grants
- **Sticks:** regulatory requirements for emissions and efficiency
- **Tambourines:** information activities such as energy advice, outreach / marketing campaigns, training

At the forest level, in British Columbia we are already seeing the province's commitment to reduce "waste" through projects funded by the Forest Enhancement Society of British Columbia, which will help get more fire-damaged wood and logging waste to the mills that need it. Despite efforts to date, more than 10 million cubic metres of residuals are left behind after harvesting each year in British Columbia.

The Government of Canada also recognizes the role of forest bioenergy in reducing Canada's emissions under the 2030 Emissions Reduction Plan. Programs like the Clean Technology Investment Tax Credit are key to expanding clean technology solutions in places like New Brunswick and Nova Scotia. However, biomass boilers must be afforded a level playing field with other clean technologies like heat pumps.

Over the next decade, both these provinces' electricity capacity is forecasted to drop by 50 percent. Heat pumps alone will not solve the problem, which will require the current fossil fuel grid to run the heat pumps. Including biomass from wood pellets is good for Canadians' pocketbooks; it's good for the environment; it's good for local economies.

We've also got work to do on removing trade barriers that restrict the importation of European boilers into Canada. Currently, we don't make boilers in Canada and we can't import them as they are manufactured because Canada does not recognize the European boiler pressure standard. So, the only significant market for our pellets is offshore, to be used in homes and businesses around the world as a sustainable source of renewable energy and heat. Canada's wood pellet consumption is minute by global standards, entirely due to the lack of access to modern, highly automated wood pellet boilers. We are making good progress on this front and expect to see further developments soon.

KEY TAKEAWAYS FOR CANADA

European countries have created a blueprint for success when it comes to making biomass and bioheat mainstream. Europe has moved past the basics of educating policy makers and the public about the benefits of bioheat. The benefits are now accepted as mainstream and instead the focus is on how to grow markets, improve technology and to continue to get positive messaging out to counter the claims of anti-biomass activists.

In Canada we have an opportunity to not only support global markets to reach their climate targets, but also to make a real difference in Canadian's lives by providing the incentives, policy environment, and strategic framework to grow the domestic market and alleviate energy poverty here at home.

Based on the learnings from the conference, solutions for change here in Canada include:

1. **Develop a thermal energy (heat) strategy** that includes wood pellets;
2. **Provide consumer capital financial support/ incentives** to address costs associated with installing boilers or wood pellet stoves. This support would be based on GHG outcomes, not only electricity-based solutions;
3. **Accelerate bioheat public procurement** as the Government of Prince Edward Island has done;
4. **Introduce renewable heat incentives** like the highly successful program in the United Kingdom and Austria;
5. **Fund fuel switching feasibility studies for industry** like those available from Efficiency NB for switching from fossil fuels to electricity;
6. **Fund district energy feasibility studies** for municipalities; and
7. **Revise standards** that restrict the required technology and equipment from entering Canada.



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