



# INTRODUCTION TO SOLID WOOD BIOHEAT SYSTEMS

Solid Wood Bioheat Webinar Series

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FPINNOVATIONS

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# FPINNOVATIONS

FPInnovations is a not-for-profit private organization that specializes in the creation of solutions in support of the Canadian forest sector's global competitiveness.

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# AGENDA

- **BASIC TERMS**
- **TYPE OF BIOFUELS**
- **BIOHEAT COMBUSTION SYSTEMS**
- **BENEFITS OF BIOHEAT**



**LINK TO GUIDE:** <https://cribe.ca/resources/bioheat-guide-brochure-en-fr/>

# INTRODUCTION

## WHAT IS BIOMASS?

Organic materials of biological origin

## WHAT IS BIOFUEL?

Biomass that has been processed for use as a fuel

## WHAT IS BIOHEAT?

When biofuel is burned, it produces bioheat

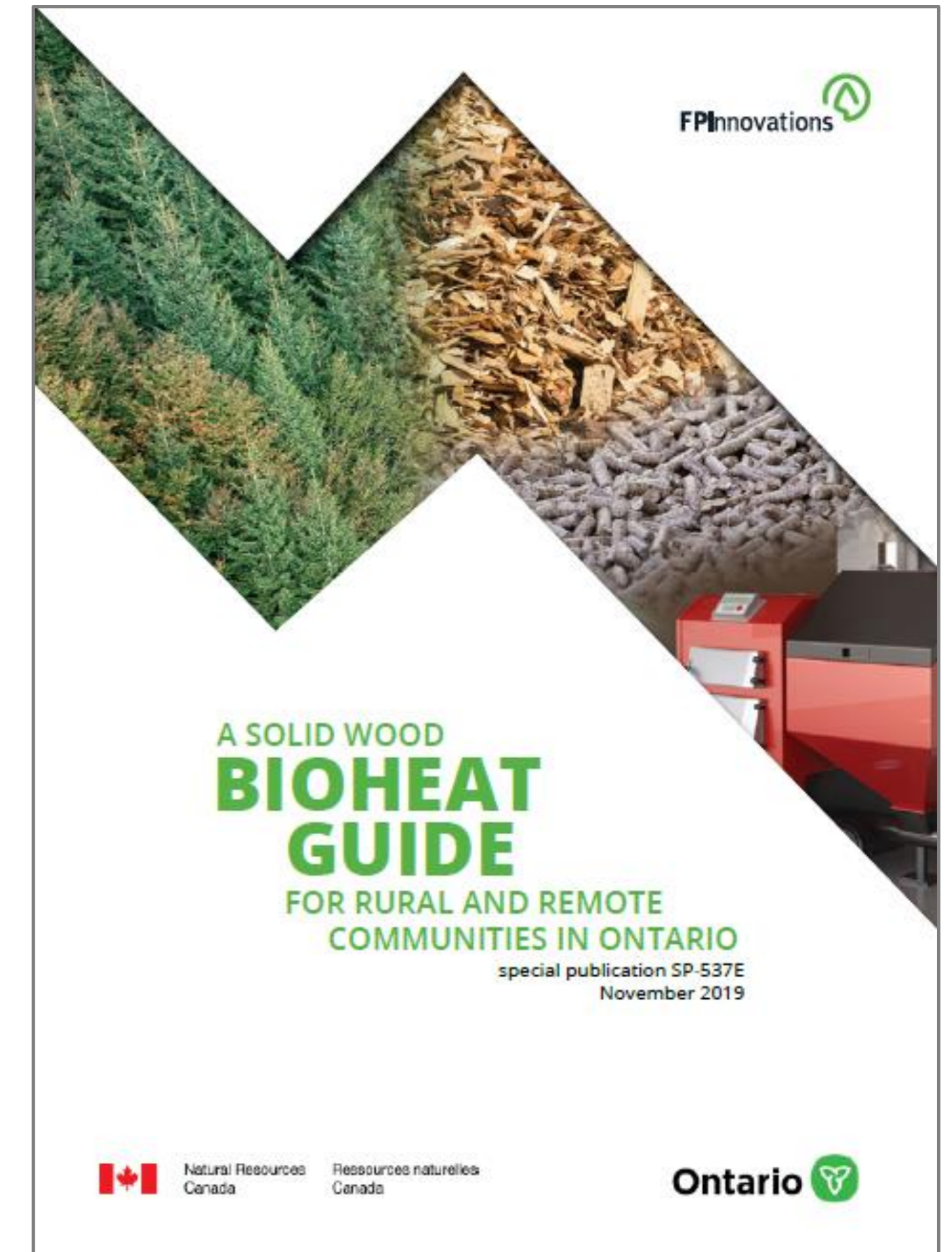
## GUIDE SCOPE

Space and hot water heating for institutional, commercial buildings, private homes.

Systems less than 1 MW in Ontario

## BIOHEAT TECHNOLOGY

Mature technology, widely used



# TYPES OF BIOFUELS

## BIOFUEL TYPES

- Cordwood
- Wood Chips
- Wood Briquettes
- Wood Pellets

## BIOFUEL STANDARDS AND PROPERTIES

- Key properties: Moisture content, bulk density, particle size, ash content, energy content
- CAN/CSA-ISO 17225 Solid Biofuels Standards

# TYPES OF BIOFUELS

## CORDWOOD

- Traditional fuel
- Common source: Unmerchantable timber
- Cut, split, and dried
- Must be stored under proper cover
- Can be harvested and processed by the end user
- High labour costs
- No automation for handling and burning



# TYPES OF BIOFUELS

## WOOD CHIPS

- Common source: sawmill, harvest by-product, low-quality timber
- Sub rectangular in shape, typical length of 5 mm to 50 mm, a low thickness, and produced by mechanical sheering of knives in chippers
- Lower quality than pulp chips
- Some aspects of handling can be automated
- Proper storage and handling is key



Photos: Biothermic Wood Energy Systems



# TYPES OF BIOFUELS

## WOOD BRIQUETTES

- Made of compressed sawdust and small wood shavings from sawmills (usually) or harvest residue (not often)
- Generally, no binders used
- Typical sizes: hockey puck, soup can, or log-sized
- Some automated handling available



Photo: CanmetENERGY, Natural Resource Canada

# TYPES OF BIOFUELS

## WOOD PELLETS

- Made of compressed sawdust (ground shavings, chips, sawdust) from sawmill by-product (often) and harvest by-products (sometimes)
- Generally, no binders used
- Fully automated handling available
- Sold in 18kg bags but bulk delivery now available in some locations



Photos: Biothermic Wood Energy Systems (left), ICS Lacroix Lumber (bottom)

# TYPES OF COMBUSTION SYSTEMS

## **BIOHEAT SYSTEMS – SPACE HEAT AND DOMESTIC HOT WATER**

- Stoves – Cordwood, Pellets
- Furnaces – Cordwood, Pellets
- Boilers – All fuels, most commonly wood chips and pellets

# TYPES OF COMBUSTION SYSTEMS

## WOOD STOVES

- Heat homes or other similar spaces
- Burns cordwood or pellets (not both)



Photos: Roland Kilpatrick (bottom left and right) SBI International (top right)

# TYPES OF COMBUSTION SYSTEMS

## WOOD FURNACES

- Heat homes or other similar spaces
- Burns cordwood or pellets (not both)



Photos: SBI International (top right, bottom right)

# TYPES OF COMBUSTION SYSTEMS

## WOOD BOILERS

- Heat homes to very large buildings
- Burns cordwood, pellets, or wood chips
- Thermal storage/buffer tank needed for cordwood boilers and some pellet and woodchip boilers



# BENEFITS OF BIOHEAT

**LOW AND STABLE ENERGY COSTS**

**RELIABLE FUEL SUPPLY AND ENERGY SECURITY**

**RELIABLE AND EASY TO OPERATE**

Fuel	Nominal Delivered Cost (\$ per unit volume)	Delivered Cost (\$/GJ)
Cordwood (firewood)	\$400/bush cord	\$22
Wood Pellets	\$300-316/tonne	\$16
Wood Chips (45% MC)	\$90-110/tonne	\$10
Heating Oil (No. 2)	\$1.14/L	\$33
Propane	\$0.8/L	\$35
Natural Gas	\$0.25/m <sup>3</sup>	\$6.70
Electricity	\$0.18/kWh	\$50



# BENEFITS OF BIOHEAT

## LOCAL JOBS AND ECONOMIC DEVELOPMENT

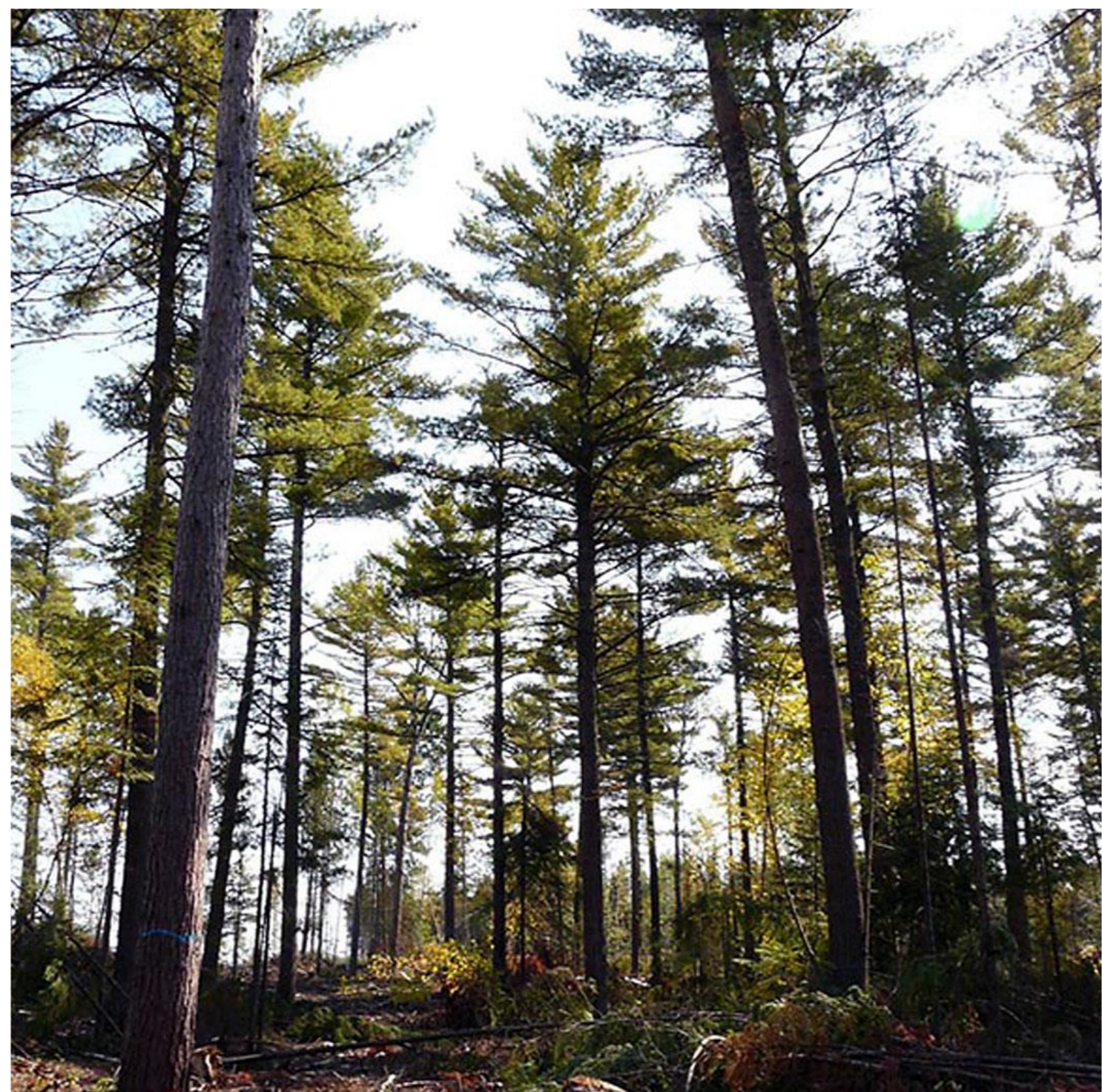


Photos: Biothermic Wood Energy Systems (top right and middle)



# BENEFITS OF BIOHEAT

**SUSTAINABLE AND RENEWABLE FUEL**  
**FUNDING FOR LOCAL FOREST STEWARDSHIP**



# BENEFITS OF BIOHEAT

- LOW-CARBON FUEL**
- LOW ENVIRONMENTAL RISK**
- LOW EMISSIONS**



Photos: Ontario's Ministry of Natural Resources and Forestry (right)

# SOLID WOOD BIOHEAT

- A modern and efficient method of heating
- Can provide benefits other types of heating systems cannot
- Bioheat is a local, sustainable, renewable fuel
- Resources are available to help those interested in starting a bioheat project



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