Development/Adaption of Standards for Solid Biomass Fuel in Canada

Sebnem Madrali, CanmetENERGY / NRCan
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Problem Statement

Poor business environment for use of solid biomass fuels for comfort / water heat in remote & off-grid communities, commercial & institutional sectors and small scale industrial users:

- lack of policy clarity
- variations in environmental regulations between jurisdictions
- inconsistent and non-uniform fuel quality
Market Development & Assessment

Bioheat Growth in Canada

- About 230 bioheat installations as of March 2013
- 16 biomass community energy plants started up between 2009-2011; 12 more under construction; 26 more at various stages of planning

Canadian Power Utilities

- OPG Atikokan GS is to be on-line as of Dec 2014; Thunder Bay GS is to burn advanced solid biomass fuel
- Development of their own fuel specs; $ 3 million investment estimates for developing fuel specs (between OPG and NSPI)
- Power utilities have the expertise, knowledge and trained staff
Market Development & Assessment

Canadian Wood Pellet Production Growth

Global Totals:
2012: 1,369,000 tonnes
2013: 1,640,347 tonnes
BC: 85-90% of Canadian exports

Source: World Trade Atlas

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<thead>
<tr>
<th>Country</th>
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</table>
Drivers: Policy and Regulatory Differences in Canadian Jurisdictions

- Many jurisdictions implementing strategies and policies to help develop bioheat
- Environmental approval requirements varies from jurisdiction to jurisdiction.
Drivers: Infrastructure and Operations

Variability in Solid Biomass Fuels:
- Sizes range from dust to pieces of 2x4
- Ash content ranges from <1% to >20%
- MC ranges form dry to wet (up to 60%)
- Relative low HV (compares to FO and NG)
- Low bulk density

Fuel Properties - Quality and Performance
- Combustion systems are designed for a specific fuel
- Failure to meet fuel specifications result in reduced performance and increased emissions
- Without standards, a trained personnel must know fuel specs

Safety and Confidence
- Explosibility
- Off gassing
- Storage
Objectives

Improve the business and policy environment for non-residential use of solid biomass fuels for comfort/heat that are suitable for remote communities, commercial/institutional applications for the scale of 150kW to 3MWth

- Facilitate and support switching to biomass fuelled heat in Canada
- Minimize environmental and health impacts from increased utilization of efficient biomass fuelled heat
- Gain confidence in biomass heat through data gathering and sharing
- Improve forest and agricultural resource utilization
Approach

- Develop / Adopt standards for solid biomass fuels
  - improve consistency and quality of solid biomass fuels
  - link fuel quality to equipment performance

- Develop / Adopt standards for biomass heating equipment
  - establish minimum equipment performance characteristics
  - lead to increased performance consistency across Canada
  - link equipment performance to fuel quality

- Establish better understanding and best practices for storage of forest biomass
  - changes brought about through storage
  - optimisation of storage
  - impact of storage on biomass characteristics for subsequent processes
Why Standards for Solid Biomass Fuels? Game Changer

to become a commodity fuel that users can buy with confidence of trouble free operation (eg. reliable, efficient, clean and safe operation).

- Facilitate free and fair cross-border trade
- Facilitate quality assessment of solid biomass resources
- Facilitate efficient permitting of bioenergy systems (biofuel specifications and certified combustor)
- Minimize emission of pollutants
- Ensure safe handling and storage of solid biofuels
Standards for Biofuels

CEN/TC335 Solid Biofuels

Voting by CEN members

27 Technical Specifications published

36 EN Standards published (national Standards withdrawn)

National Standards
- BS
- CTI
- DIN
- DK
- ONORM
- NT
- NTA
- SFS
- SIS

ISO/TC238 Solid Biofuels

25 Voting Nations
9 Observing Nations

55 – 60 Standards to be published

2010 Vienna Agreement

Working Groups
1. Terminology, Definitions and Descriptions
2. Fuel Specifications and Classes
3. Fuel Quality Assurance
4. Physical and Mechanical Test Methods
5. Chemical Test Methods
6. Sampling and Sample Preparation

ASABE/ASAE

ASTM

US Pellet Fuels Institute (PFI)

Super Premium
Premium Standard Utility

US Pellet Fuels Institute (PFI)

Premium Standard Utility

CANplus

ENplus

Ontario

Canada

Natural Resources Canada

Ressources naturelles Canada
ISO 17225 Solid Biofuels – Fuel Specifications and Classes

Part 1 General Requirements

Biomass and Sources Matrix
Wood, herbaceous, fruit, aquatic, blends and mixtures

Typical and Informative Characteristics

Physical
Dimensions, bulk density, durability, fines content, ash, volatile matter, moisture, calorific value etc.

Chemical
CHNS, chlorine, major elements, minor elements

Parts 2 - 8 Specified Graded Biofuels

Part 2
Graded Wood pellets
A1/A2/B *
I1/I2/I3

Part 3
Graded wood briquettes
A1/A2/B

Part 4
Graded wood chips
A1/A2/B1/B2

Part 5
Graded firewood
A1/A2/B

Part 6
Graded non-woody pellets
A/B

Part 7
Graded non-woody briquettes
A/B

Part 8
Thermally treated and densified biomass fuels
TW1/TW2/TW3
TA1/TA2/TA3
(briquettes or pellets)

Biomass Origin and Sources

Physical
Dimensions, bulk density, durability, fines content, ash, volatile matter, moisture, calorific value etc.

Chemical
CHNS, chlorine, major elements, minor elements

* Enplus & CANplus quality certification
Canada is a voting member of ISO Technical Committee 238 (ISO/TC238) Solid Biofuels

In 2013 CSA decided to develop standards for solid biofuels to respond to demand from industry and government agencies

Canadian Standards Association (CSA) is accredited by Standards Council of Canada (SCC) as a standards developer in Canada

An agreement was struck in 2013 between SCC and CSA to merge the CSA initiative with Canadian effort under ISO/TC238

Members of SMC are stakeholders representing industry, interest organizations and government

Voting members and observers
## ISO 17225-2 Specification of commercial & residential wood pellets - Table 1

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<tr>
<th>Property</th>
<th>Standard</th>
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<td>1.3.1 Chemically untreated used wood</td>
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<tr>
<td>Diameter and length (D and L, mm)</td>
<td>ISO 17829</td>
<td>D06, 6 ± 1; 3,15 ≤ L ≤ 40</td>
<td>D06, 6 ± 1; 3,15 ≤ L ≤ 40</td>
<td>D06, 6 ± 1; 3,15 ≤ L ≤ 40</td>
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<td>D08, 8 ± 1; 3,15 ≤ L ≤ 40 (1 % longer, &lt;45mm)</td>
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<td>Moisture (M, w-%)</td>
<td>ISO 18134</td>
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<td>Ash (A), % d</td>
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<td>Bulk density (BD, kg/m³)</td>
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New ISO TC 238 Working Group 7 – Biomass Safety

• Safe handling and storage in commercial and industrial applications – Part 1: General

• Safe handling and storage in commercial and industrial applications – Part 2: Detection, Suppression and management of fires and explosions

• Safe handling and storage of wood pellets in residential and other small-scale Applications

• Determination of self-heating

• Determination of off-gassing and oxygen depletion
Safety Certification Module under WG-7

- A New module proposed by Canada
- Primarily targets pellet plants with applicability also for sawmills and beyond
- Best Practices for Safe Design, Operation and Maintenance of production plants
- Potentially to form the basis for an ISO Safety Certification Standard
Role for the Forest Industry

- Support and start using the new CSA standards
  - Facilitate building capacity within the supply chain that smaller biomass fuel users will benefit from.
  - The pulp and paper industry purchases biomass for their energy systems as well as pulp chips for their process. If they are asking for these standards then harvesting contractors and supplying mills will start to utilize the new standards.

- Share / Participate knowledge and experience on biomass storage & handling
Conclusions

- Standardization of solid biomass fuels and heating equipment is critical to ensure the right fuels are used in the equipment designed to handle them.

- Markets for solid biomass are fast growing and offer significant opportunities.
Conclusions

- Moving forward – increase economic competitiveness of Canadian producers & companies in international and domestic markets, increase consumer confidence, reduce negative impacts on environment and human health,

**Canadian fuel and heating equipment standards will need to be developed / adopted.**
Acknowledgements

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- Staffan Melin, Wood Pellet Association of Canada
- Ahmad Husseini, Canadian Standard Association
Thank you

For more information
sebnem.madrali@nrcan.gc.ca