



Wood Pellet Co-firing

Presentation to Canadian Clean Power Coalition

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Outline

- Introduction to wood pellets
- Comparing fuel properties
- Global and Canadian pellet production/markets
- Global co-firing experience
- Co-firing methods



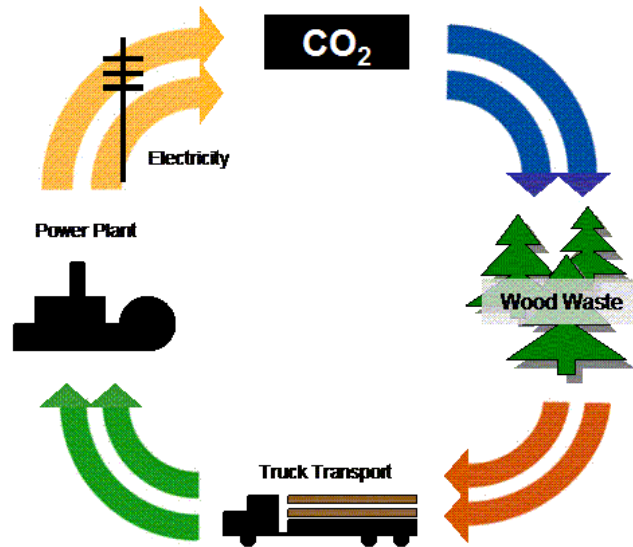
Wood Pellets

- Made from compressed wood fibre.
- Lignin binds the fibre. No adhesives needed.
- Made from sawdust, shavings, logging debris, diseased and insect-killed trees.



Environmental Benefits

- Renewable & carbon neutral
- Reduce emissions: SO_x , NO_x , C_4H_4 , Mercury, etc.



Carbon Cycle



Typical Fuel Properties

Property	Coal	Wood Pellets	Agriculture Residues
Ash content%	8.5-10.9	0.4-0.5	5
Moisture content%	6-10	5-10	17-25
Net calorific value - GJ/tonne	26-28.3	18.5-20	17.4
C% - db	76-87	48-52	45-47
H% - db	3.5-5	6.2-6.4	5.8-6.0
N% - db	0.8-1.5	0.1-0.5	0.4-0.6
O% - db	2.8-11.3	38-42	40-60
S% - db	0.5-3.1	<0.05	0.05-0.2
Cl% - db	<0.1	0.01-0.03	0.14-0.97
K% - db	0.003	0.02-0.05	0.69-1.3
Ca% - db	4-12	0.01-1.5	0.1-0.6

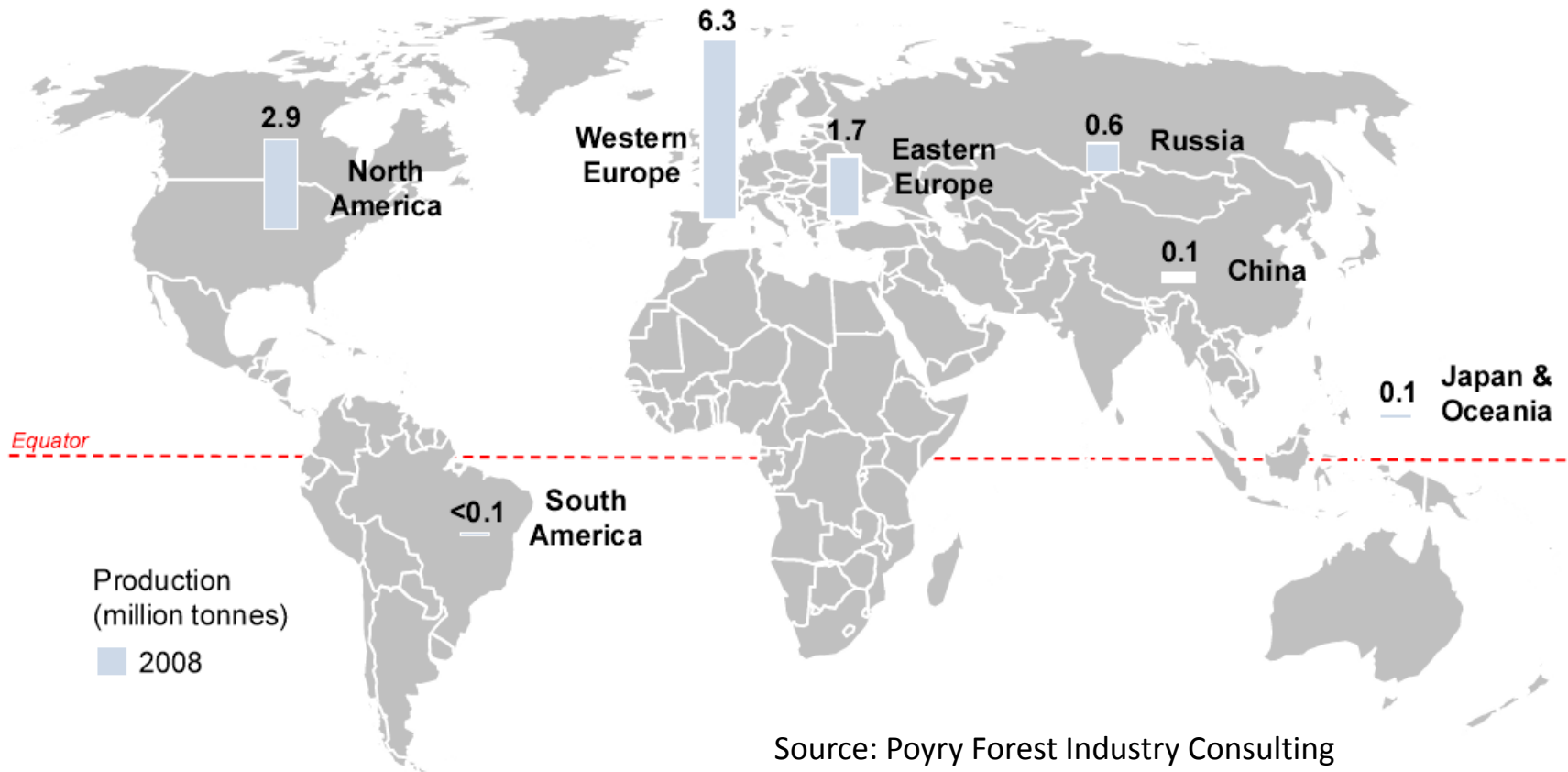


Pellet advantages over raw biomass

- Homogeneous
- Dry
- High bulk density
- Lower transportation cost
- No self-heating
- Not perishable
- Complete combustion (pyrolysis at low temp)
- No slagging, fouling, corrosion like ag residues
- Reduced pre-treatment requirement

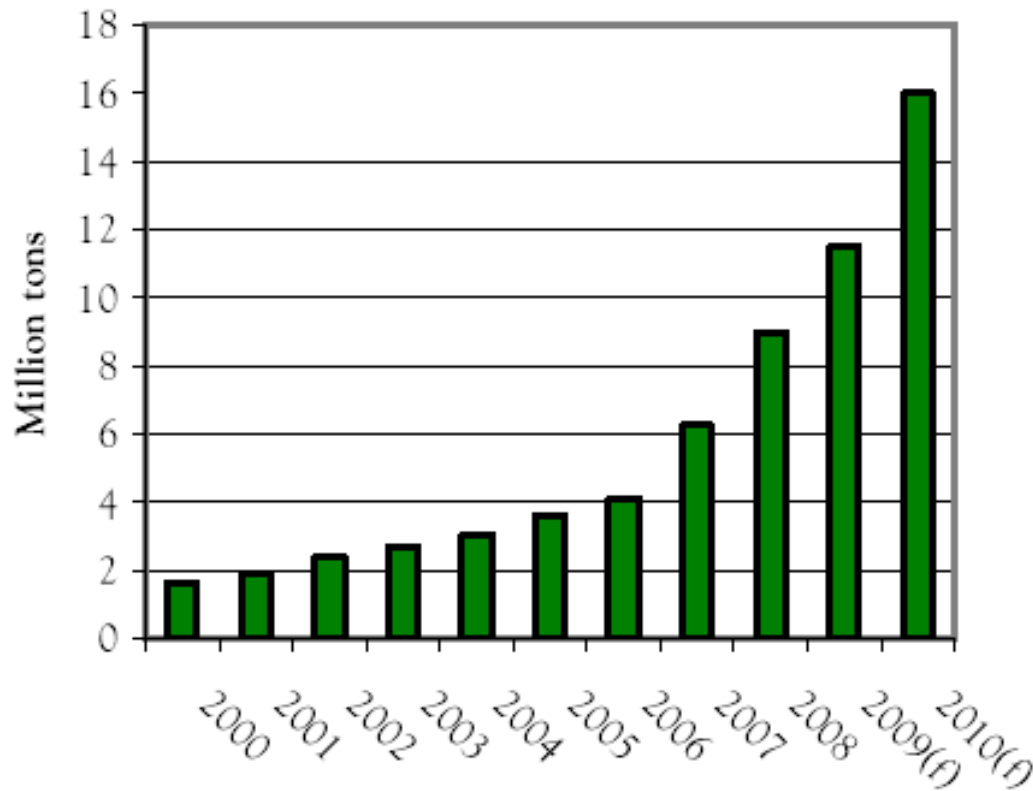


Global pellet production in 2008: 11.7 million tonnes





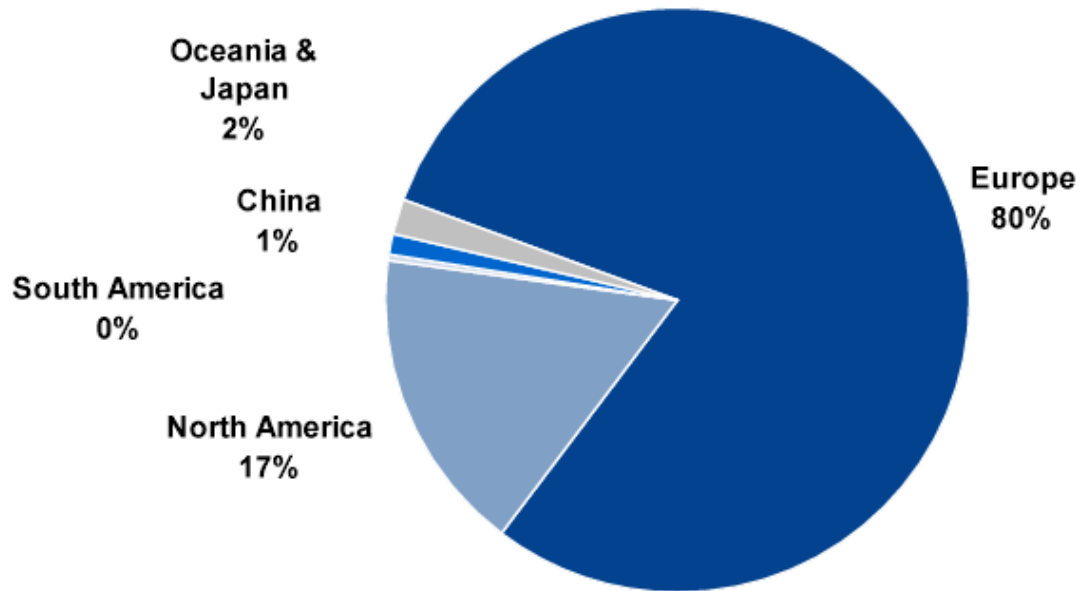
Global pellet production growth since 2000



Source: FAO & UNECE



Global pellet consumption: 2008



~12 M tonnes

Source: Poyry Forest Industry Consulting



Canadian annual pellet production capacity as of January 1, 2011 – tonnes

	Plants	Average	Largest	Total	%
Western Canada	16	118,000	400,000	1889,000	71%
Eastern Canada	18	43,000	120,000	774,000	29%
All of Canada	34	78,000	400,000	2663,000	100%



Canadian pellet shipments – tonnes

	2010	2011F
Europe	1,350,000	1,750,000
North America	90,000	90,000
Japan	60,000	100,000
	1,500,000	1,990,000

*estimates only – Statistics Canada does not track wood pellets as a separate product and producers are reluctant to share data



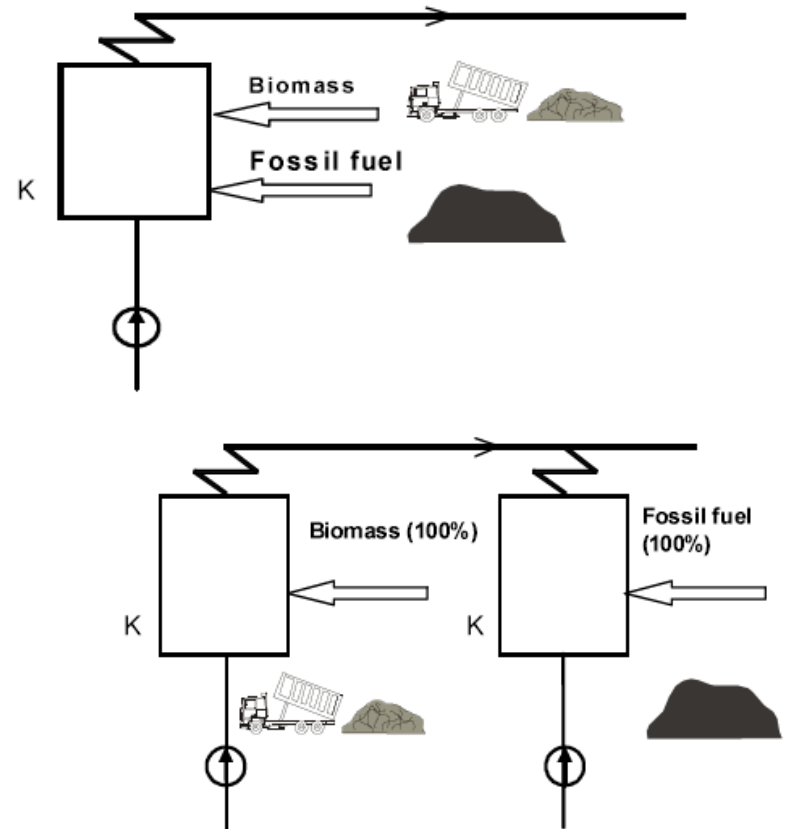
Large Scale Combustion

- Fixed bed combustion – flexible fuel
- Fluidized bed combustion – flexible fuel
- Dust combustion – pellets only
 - Co milling and injection
 - Separate milling and injection



Co-firing Methods

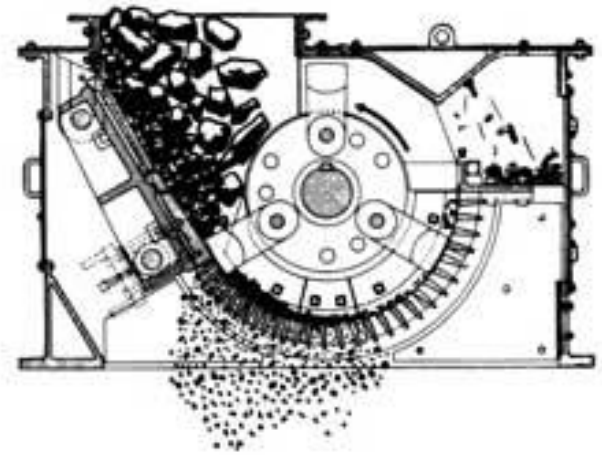
- Direct co-firing
- Parallel co-firing
- Indirect co-firing (gasification)





Power Plant Modifications to Co-Fire

- Front end only
- Covered pellet storage
- Separate conveyors
- Hammer mills (coal mills will plug)



Hammermill



Why co-fire?

- We are allies of the coal power industry
- Cost is higher than for coal-only
- Reduce emissions – regulations coming
- Social licence to keep coal burning
- Cheapest choice of renewable options



Avoid this!



UK Protester



Ontario



Oregon



TransAlta - Washington State





Thank
you!

**QUESTIONS
ANSWERED**

SIMPLE	50¢
GUESSES	\$1.00
INTELLIGENT	\$2.00
HONEST	\$5.00

**DUMB LOOKS
ARE STILL FREE**