



Canadian Wood Pellet Industry Opportunities for Korea

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Outline

- Canadian pellet production and markets
- Canadian pellet fibre sources
- Potential for Korea pellet use
- Canadian pellet initiatives
- Reasons to invest in Canada



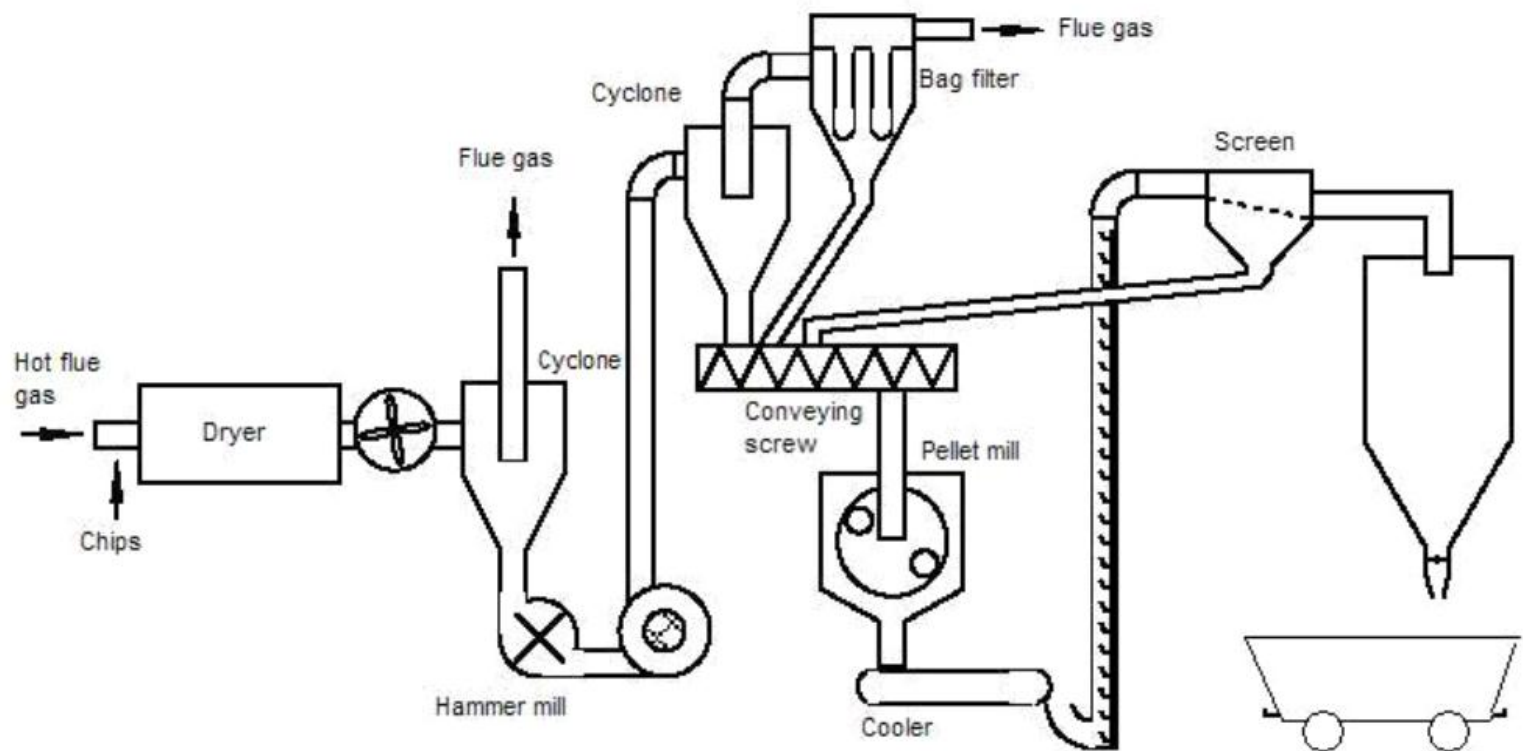
Wood Pellets

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





Pellet Manufacturing Process



Source: Envirochem 2006



Wood pellets used for:

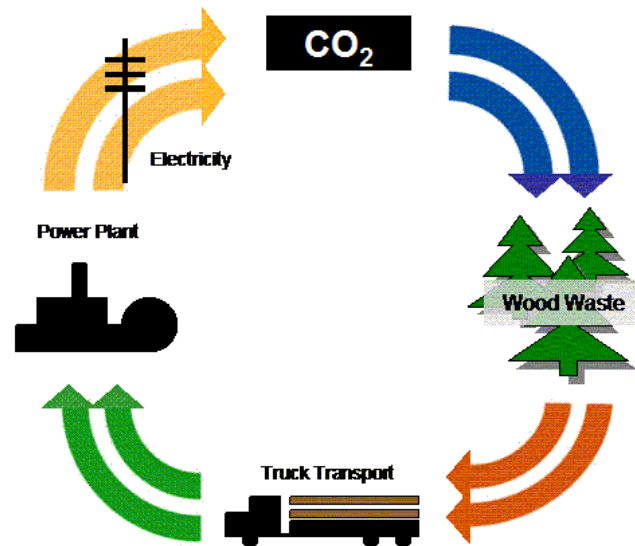
- Fuel for heat, cooling, electricity
- Residential – stoves and furnaces
- Commercial buildings, district heating/cooling
- Large scale power production – co-fired with coal or in biomass power plants



Avedøre Power Plant
Copenhagen

Environmental Benefits

- Renewable & carbon neutral
- Reduces SO_x, NO_x, Mercury, etc.



Carbon Cycle



Canadian Production

- 33 pellet plants ~ 2 million tonnes capacity
- Production in 2009 ~ 1.3 million
- 90% shipped to EU – Belgium, Netherlands, Denmark, and UK
- Mostly used for co-firing
- Canadian market almost non-existent



British Columbia Situation

- BC is closest province to Korea
- 10 pellet plants ~ 1.2 million tonnes capacity
- Shipped from two ports – Prince Rupert and Vancouver
- Vancouver to South Korea ~ 8,200 km
- Vancouver to Rotterdam ~ 16,500 km



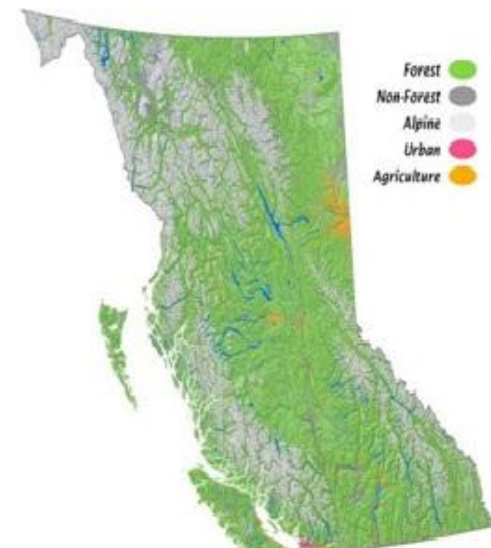
Pinnacle Pellet - Meadowbank





Fibre Sources

- BC forests: 60 million hectares
- 95% public owned
- BC leads in sustainable forestry
- Pellets are made from sawmill residuals, harvest residuals, diseased, insect damaged trees



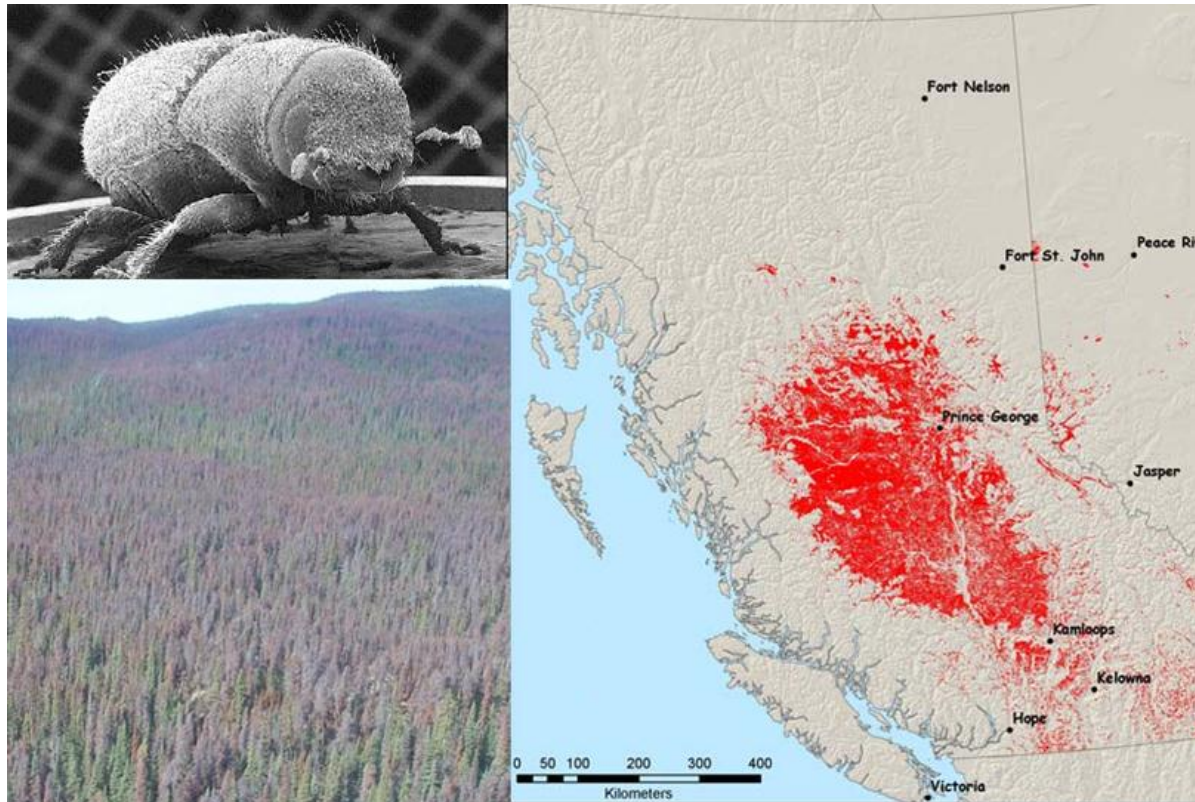


Mountain Pine Beetle Infestation

- Cumulative affected area in BC – 16.3 million hectares (source BC Min. of Forests)
- Infestation is 16 times the size of South Korea
- 675 million cubic metres of dead timber
- Access mainly by agreement with sawmills, BC Timber Sales, and First Nations



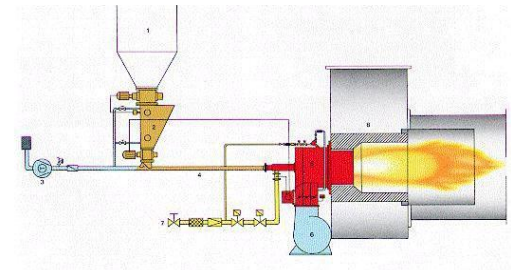
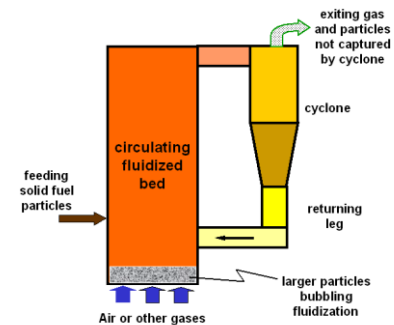
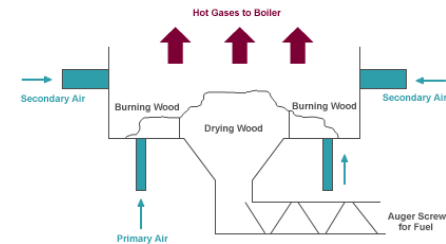
Scope of BC Infestation





Large Scale Combustion

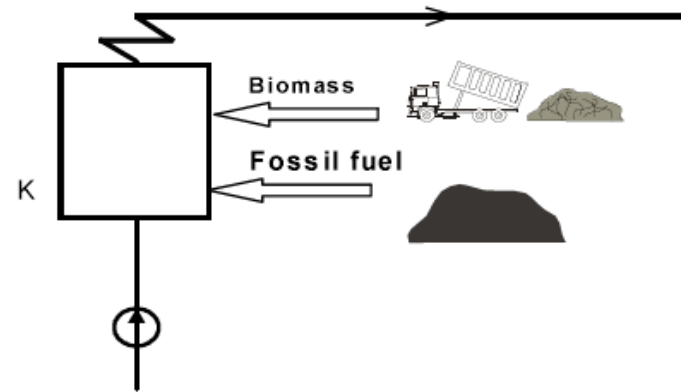
- Fixed bed combustion
- Fluidized bed combustion
- Dust combustion



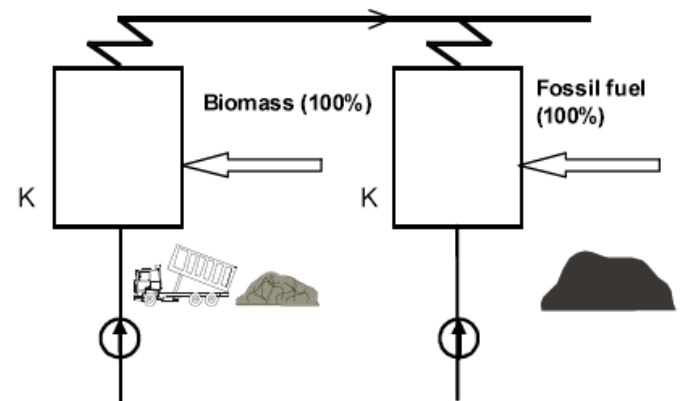


Co-firing Methods

- Direct co-firing



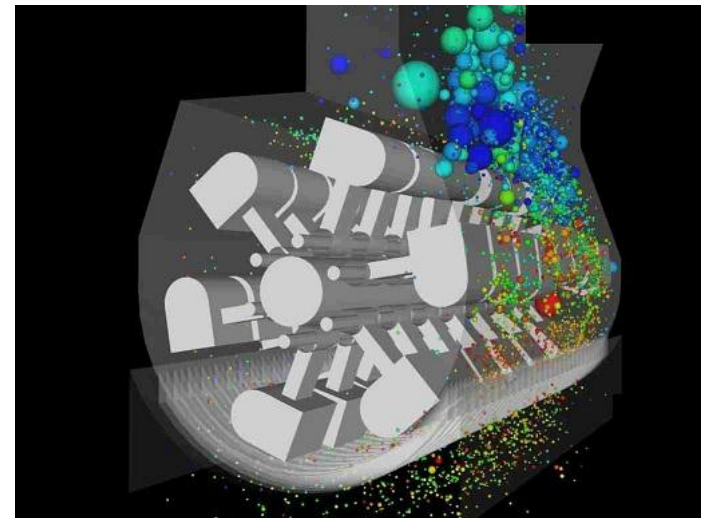
- Parallel co-firing





Power Plant Modifications to Co-Fire

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





Comparing Coal and Wood Pellets

Property	Coal	Wood without bark	Bark
Ash content (db)	8,5-10,9	0,4-0,5	2-3
Moisture content (w%)	6-10	5-60	45-65
NCV (MJ/kg)	26-28,3	18,5-20	18,5-23
C, %db	76-87	48-52	48-52
H, %db	3,5-5	6,2-6,4	5,7-6,8
N, %db	0,8-1,5	0,1-0,5	0,3-0,8
O, %db	2,8-11,3	38-42	24,3-40,2
S, %db	0,5-3,1	<0,05	<0,05
Cl, %db	<0,1	0,01-0,03	0,01-0,03
K, %db	0,003	0,02-0,05	0,1-0,4
Ca, %db	4-12	0,1-1,5	0,02-0,08

db – dry basis



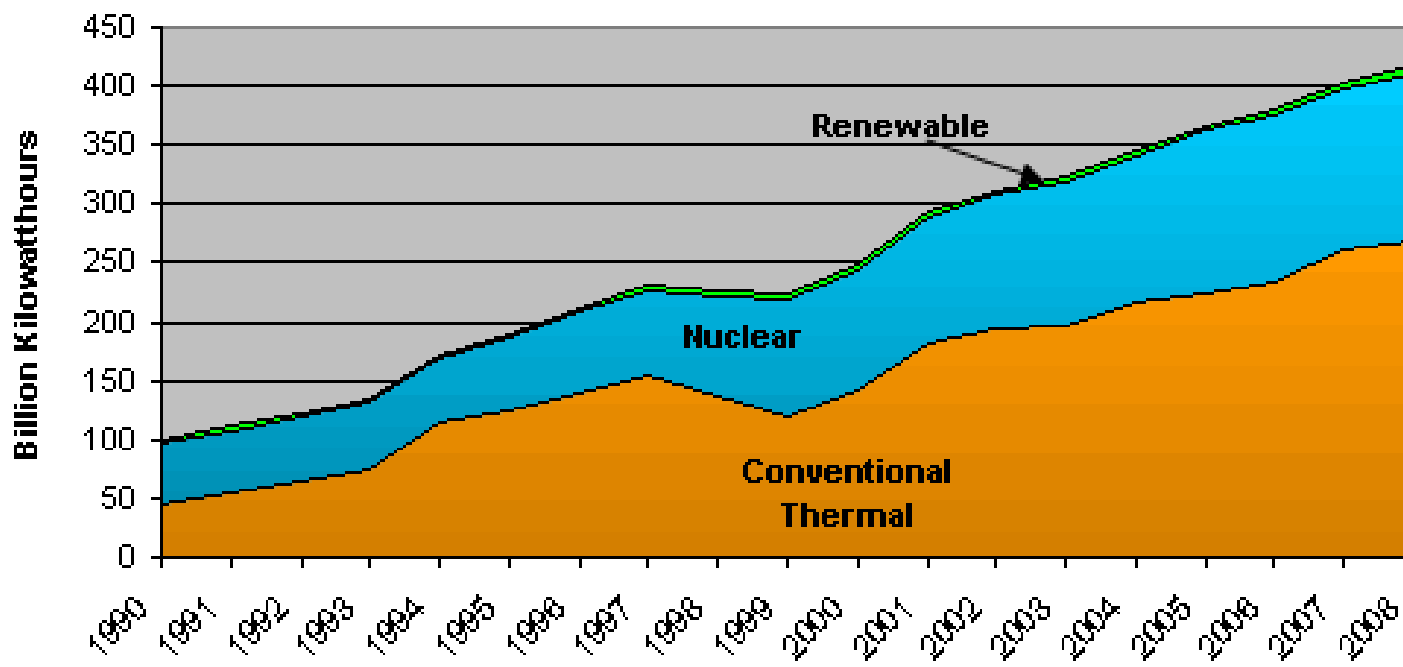
Korean Energy Situation

- Rapid economic growth
- World's 10th largest energy consumer
- 5th largest crude oil importer
- 2nd largest coal importer
- 64% of electricity is thermal



Electricity Generation by Type

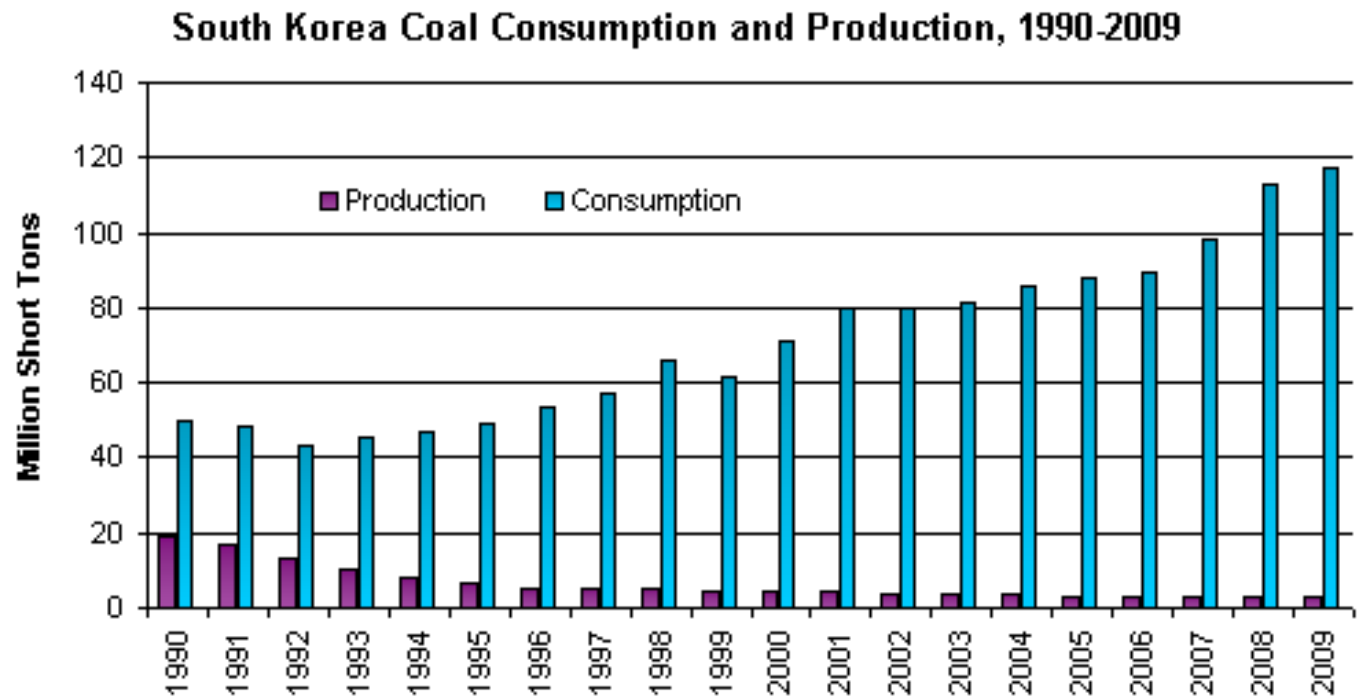
South Korea Net Electricity Generation by Type, 1990-2008



Source: EIA



Coal Consumption is Growing



Source: EIA



Korean Coal Consumption (2008)

- Power generation: 64 million tons
- Steel mills: 58 million tons
- Total: 122 million tons
- Co-firing 5% with wood pellets would require 6 million tons of wood pellets (assuming 1.5 tons pellets per ton of coal)
- Equals 3 times Canada's current capacity



Korean GHG Strategy

- Nov 2009: announced 30% reduction from projected level by 2020
- Equivalent to 4% reduction from 2005 level
- Sep 2010: announced 374 companies must meet government GHG reduction targets



Canadian GHG Strategy

- Committed to 17% GHG reduction
- No plan yet to accomplish this
- Policy is to wait for Americans
- Interest in co-firing is minimal from governments and power industry
- Planning to impose natural gas emission standards on coal plants



Benefits of Canada to Korea

- Willing pellet sellers – potential for long term supply contracts
- 2 million tonnes existing capacity
- More capacity can be built – potential for Korean investment
- Huge raw material supply
- Environmental/forest certification



Wood Pellet Association of Canada

- Producers, shippers, ports, equipment suppliers, engineers
- Purpose is to promote wood pellet industry and to conduct research and development



Thank
you!

**QUESTIONS
ANSWERED**

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

**DUMB LOOKS
ARE STILL FREE**