Why Coal Produces "Greener" Electricity than Biomass in Nova Scotia

Consider the following...

1 tonne of mixed species wood chips (1000kg)

1 tonne of bituminous coal (1000kg)

0%M (moisture content), i.e., "oven-dried wood":
-carbon content (% of mass) ≈ 50[1] (500kg)
-energy content (kWh/kg) ≈ 5.14[2] (5140kWh)

20%M (moisture content), i.e., "air-dried wood":
-carbon content (% of mass) ≈ 40 (400kg)
-energy content (kWh/kg) ≈ 4.00[2] (4000kWh)

50-60%M (moisture content), i.e., "wet wood"
(fuel type used at Point Tupper boiler)
-carbon content (% of mass) ≈ 30 (300kg)
-energy content (kWh/kg) ≈ 2.00[2] (2000kWh)

2-5%M (moisture content):
-carbon content (% of mass) ≈ 80[3] (800kg)
-energy content (kWh/kg) ≈ 8.00[2] (8000kWh)

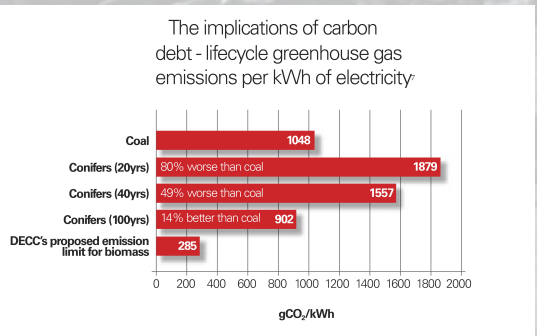
1 tonne of dried wood chips (20%M) produces approximately half the heat energy of 1 tonne of coal (2-5%M)[2].
Therefore, because a fuel's carbon content is directly proportional to the CO_2 emitted by the combustion of said fuel[4]...
The combustion of 1 tonne of dried wood chips (20%M) releases approximately half the CO_2 of 1 tonne of coal (2-5%M).

HOWEVER...

It requires approximately 4 times (4 tonnes) as much wet wood chips (M50-60%)
to produce approximately as much heat energy as 1 tonne of coal (2-5%M)[2], so...
Combustion of 4 tonnes of wet wood chips (M50-60%) releases approximately 150% as much CO_2 as 1 tonne of Coal (M2-5%).

By this analysis, wet wood is *physically incapable* of releasing less CO_2, per kWh of electricity produced, than coal.
In other words, biomass-fueled electricity, as it is currently produced in Nova Scotia, *cannot* be considered "green".

The facts above do not address the "carbon debt" issue of using trees to make electricity. The old "burn a tree, grow a tree" carbon accounting strategy has been empirically shown to be dangerously wrong. It takes up to 100 years for the carbon debt of burning a tree to be "paid off". In the meantime, the burned tree is not sequestering CO_2 that it otherwise would have, if the tree was not burned.[5]



So, even if biomass is combusted under ideal conditions (see above), it takes up to 100 years for biomass-fueled electricity to become carbon neutral...

WE DON'T HAVE 100 YEARS!

[1,2,3,4,5]see attached references

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Consider the following...

References:

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[3] **An Introduction to Coal Quality**, Schweinfurth, S.P., 2009, The National Coal Resource Assessment Overview: U.S. Geological Survey Professional Paper 1625–F, Chapter C
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[4] **Hydrocarbon Combustion,** University of Calgary, Energy Education Centre, 2013
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[5] **Sound Principles and an Important Inconsistency in the 2012 UK Bioenergy Strategy**
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