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Supporting Online Material for

Wood Energy in America

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This PDF file includes

Correction 13 March 2009: The originally posted SOM materials are not incorrect, but they are calculations for the original submission. The revised SOM shows calculations for the Policy Forum as published.

Supplemental Calculations to the Policy Forum
"Wood Energy in America"

1. Estimates of financial investments and returns, and wood consumption from a hypothetical 5-year wood-energy program in a medium-sized U.S. state, for example, North Carolina.

Estimates of wood combustion, investments, and returns on investment were obtained as follows.

- Average AWC project size at about 75 horsepower or 0.75 MW.
- Construction rate: 1 AWC project in each of 100 North Carolina counties per year; 500 projects statewide constructed in five years.
- Incremental cost per AWC project over fossil-fuel facility, $1 million.
- Delivered fuel prices: (a) green wood at 40% moisture at $30/ton or $3.33 per mmBtu; (b) No. 2 fuel oil at $2.50/gal or $21.74/mmBtu; (c) Natural gas at $11.00/mcf or $13.41/mmBtu (*S1*).
- Operating hours per year at 8000.
- Labor costs at 1 hr per day, 275 days/y, at $30/hr.
- Yearly fuel consumption and costs per project: (a) wood at 2232 tons or $66,960; (b) No. 2 fuel oil at 174,680 gal or $436,700; (c) Natural gas at 24,500 mcf or $269,500.
- AWC program investment over 5 years $500 million.
- Net savings AWC program over 5 years versus No. 2 oil including labor at $181 million per year.
- Net savings AWC program over 5 years versus natural gas including labor at $97 million per year.
- Wood combustion by AWC program after 5 years at 1.12 million tons per year.
- Sustainable volumes of energy wood have been estimated in North Carolina and Pennsylvania at about 6 to 13 million tons per year (*S2, S3*).

2. Estimates of the quads of energy in the U.S. Strategic Petroleum Reserve (SPR) and in the national sustainable annual supply of wood energy (*S4*).

Quads of energy in SPR:

- The SPR contains about 706 million barrels of crude oil (*S5*).
- At 5.8 million Btus per barrel, the SPR contains an equivalent of about 4.1 quads of energy.

Quads of energy in sustainable annual supplies of energy wood from U.S. forests:

- According to (*S4*), about 368 million dry tons per year is the sustainable supply of energy wood in the United States.

- At 15,000 Btu kg^{-1} of dry wood, the annual supply totals contains more than 5 quads, indicating that each year wood may supply slightly more than the amount of energy contained in the U.S. SPR.
- Wood energy may contribute much more than 5 quads per year, as new AWC systems may have higher thermal efficiencies than fossil-heating systems they replace, and the sustainable supply of energy wood (*S4*) does not contain wood currently harvested for low-value products and none from short-rotation energy plantings.

Supplementary References

S1. A. B. Curtis, "Fuel Value Calculator" (USDA Forest Service, Washington, DC, 1978).
S2. C. D. Ray, "Pennsylvania Low-Use Wood Potential." (Pennylvania State University, State College, USA, 2007); http://www.outreach.psu.edu/programs/goddard/files/Ray.ppt#256
S3. C. Hopkins, "Potential of Biomass to Support a Renewable Portfolio Standard in North Carolina." (North Carolina State University, Raleigh, USA, 2006); http://www.ces.ncsu.edu/nreos/forest/feop/Agenda2006/energy/presentations/hopkins.pdf
S4. R. D. Perlack *et al*., *Biomass as a Feedstock for a Bioenergy and Bioproducts Industry* [U.S. Department of Agriculture/Department of Energy (DOE), ORNL TM-2005/66, Oak Ridge, TN, 2005].
S5. D. G. Victor, S. Eskreis-Winkler, *Foreign Aff.* **87**, 70 (2008).