The Economic Potential for, and Impacts of, Co-Firing Biomass in the Southeast

Purpose: The purpose of the analysis is to determine the potential for co-firing biomass in Southeastern coal utilities and estimate the macroeconomic impacts.

Approach: The analysis uses several of the models described in other summary sheets to estimate county level biomass quantities and prices in 8 Southeastern states (AL, GA, KY, MS, NC, SC, TN, VA). Biomass resources include forest residues (logging and cull), primary mill residues, urban wood wastes (MSW, C&D, yard trimmings), agricultural residues (corn stover and wheat straw), and bioenergy crops (switchgrass, hybrid poplar, willow). Electricity facilities considered are classified as utilities that utilize coal (cyclone and pulverized technologies) for electricity generation. An electricity distribution model (ORCED) is used to estimate the maximum price each utility can pay for biomass under different emissions credit scenarios (i.e., different credits for SOx, NOx, and carbon). A GIS-based transportation model (ORIBAS) is used to estimate the delivered cost of the biomass feedstocks sufficient to meet utility demand levels under a 2% and 15% co-fire scenario given utility location, feedstock distribution, prices in surrounding counties, and added capital and operating costs needed to co-fire biomass. A regional input-output model (IMPLAN) is used to estimate macroeconomic impacts.

Results: The analysis is complete, but the results are not fully compiled and analyzed. Preliminary results indicate that under the base case scenario (no carbon or NOx credits, $142/ton SOx credit), approximately 113 MW of capacity (using 562,000 dMT of biomass) could be economically viable for co-firing under the 2% co-fire scenario. No plants can economically co-fire at the 15% level under the base scenario. Inclusion of a NOx credit of $2,374/ton and a carbon credit of $70/ton, economically viable production of electricity from co-firing under the 2% co-fire level increases to 808 MW and to 4528 MW at the 15% co-fire level. Electricity generated from co-firing residues, wastes, and dedicated crops ranges from 2,478 to 137,054 Kwh in the Base Case/2 % Co-fire and the High Carbon/15% Co-fire scenarios, respectively (Table 1).

The analysis presented most likely underestimates the amount of co-firing that could be economically viable because this analysis utilizes utility demand levels for the entire utility as opposed to each individual unit of the utility (i.e., if the utility has 5 units, each unit requiring 10,000 MT of biomass, a demand level of 50,000 MT was used in the analysis). The higher demand level means that the delivered cost of biomass feedstock will be higher

for the entire plant than for each individual unit. Thus several of the larger utilities are not cost effective for biomass co-firing, while individual units within the utility might be. This analysis can be conducted, but the existing analysis requires 432 individual runs for the biomass feedstock supply side analysis alone, resulting in 432 output files that must be compiled and analyzed. For each individual unit added, an additional 432 runs must be made. Additional resources are needed to compile and analysis this additional data.

Table 1: Combined Annual Industrial, Agricultural, and Transportation Impacts

Scenarios	Number of Utilities	MW Capacity	Electricity Produced from Residues (Kwh)	Total Industry Output (million $)	Jobs (Number)	Total Value Added (million $)
Base Case/2% Co-fire	24	12,400	2,478	$22.8	224	$11.0
Low Carbon/2% Co-fire	76	71,772	19,429	$370.5	4,782	$146.5
Low Carbon/15% Co-fire	64	55,842	112,852	$2,001.0	25,646	$835.0
High Carbon/2% Co-fire	76	71,772	18,661	$367.0	4,756	$145.0
High Carbon/15% Co-fire	72	68,754	137,054	$3,060.5	39,197	$1,242.0