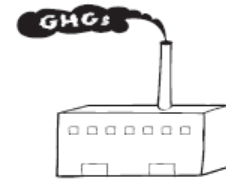


# ENVIRONMENTAL FOOTPRINT COMPARISON TOOL

A tool for understanding environmental decisions related to the pulp and paper industry



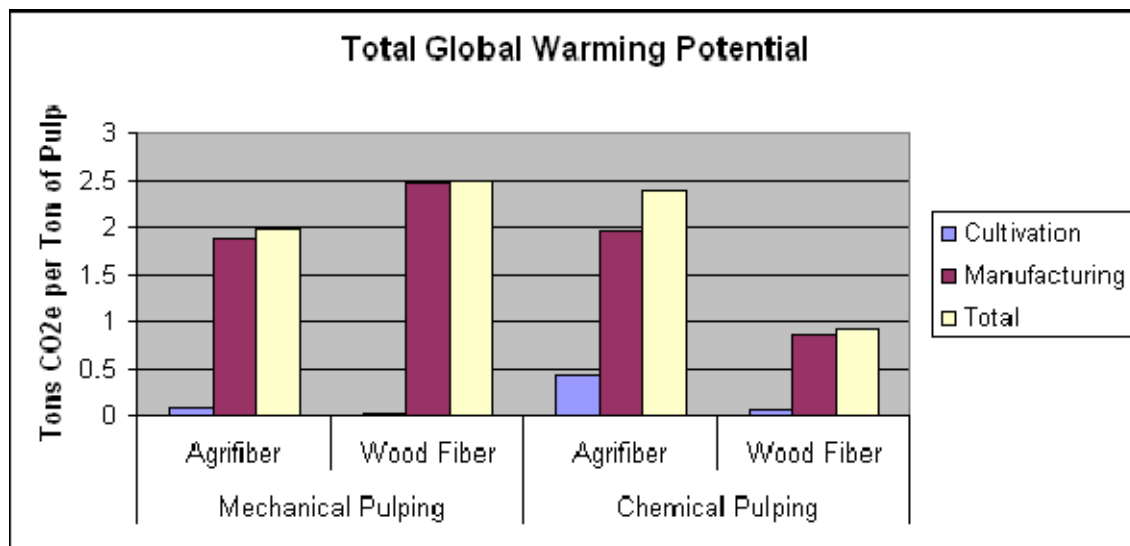
GREENHOUSE GASES

## EFFECTS OF NON-WOOD FIBER USE ON GREENHOUSE GAS EMISSIONS

### Wood vs. Agrifiber Products

Life cycle assessment (LCA) is a relatively blunt tool for deriving generalizations about the environmental merits of cultivating agricultural fiber compared to those related to wood-derived fiber. Differences in local conditions and site-specific practices can significantly affect the results of such an analysis.

Limited analysis suggests that the overall global warming potential of agrifiber pulps could be about 20% less than that of wood fiber where mechanical pulping is employed. In contrast, agrifiber's global warming potential could be nearly two and one-half times greater where chemical pulping is employed. The advantage that wood fiber pulping has in its access to wood-derived fuels is apparent in Figure N3.



**Figure N3. Comparison of Global Warming Potential for Agrifiber vs. Wood Fiber Pulped using Mechanical and Chemical Pulping Processes**

For purposes of illustration, it is reasonable to apply an emission potential of 1.5 metric tons CO<sub>2</sub>e per 100 cubic meters harvested wood. Based upon experience with food crop production, an emission level of 1.2 metric tons CO<sub>2</sub>e per hectare was used for agricultural fiber. Pulp yields were considered comparable in comparing the chemical pulping of wood and blends of kenaf fiber components, at about 1.15 tons per acre. For mechanical pulping, respective yields for wood and agrifiber were taken as 2.5 and 5.5 tons per acre.

The relative magnitude of emissions having significance to global warming potential is dependent upon the pulping process employed. The mechanical pulping of kenaf has a 30% energy advantage over softwood. That difference, by one estimate, is on the order of 600 kwh per air dry ton of pulp (Paper Task Force 2006). If one assumes an emission level of two pounds CO<sub>2</sub> per kwh (representative of coal), the CO<sub>2</sub> emissions associated with mechanical pulping of softwood would exceed those associated with kenaf by 0.6 tons per ton of air dry pulp.

## **Effects of Non-Wood Fiber Use on Greenhouse Gas Emissions**

### ***Wood vs. Agrifiber Products***

When pulped chemically, agricultural fiber retains a significant overall energy consumption advantage. However, agrifiber energy requirements must be largely accommodated by purchased fossil fuels sources. Drawing upon Paper Task Force estimates, purchased energy requirements to pulp kenaf exceed requirements for pulping softwood by amounts ranging from 6.5 to 13.4 MBTU per ton of pulp (Paper Task Force 2006). At an approximate emission factor of 0.2 lbs CO<sub>2</sub> per MBTU, the difference amounts to 1.3 to 2.6 tons CO<sub>2</sub> per ton of pulp. Though overall energy requirements may be greater for wood fiber, wood fiber pulping benefits from the prospect that two-thirds or more of its energy requirements are met by wood-derived energy sources.

## **Reference**

Paper Task Force. 1996. *Non-wood plant fibers as alternative fiber sources for papermaking*. White Paper 13. [http://c.environmentalpaper.org/documents/1634\\_WP13.pdf](http://c.environmentalpaper.org/documents/1634_WP13.pdf)