

Eucalypt plantations for mine site rehabilitation, carbon sequestration and wood products in the Hunter Valley, Australia¹

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Abstract: Coal mining is central to economic development in the Hunter Valley, New South Wales, Australia with >100 million tonnes of black coal produced annually. Rehabilitation is mandatory following the mining process and it is estimated that 20,000 ha of open-cut mine rehabilitation is required in the Upper Hunter coalfields where mean annual rainfall is ~700 mm. The traditional post-mining land use has been extensive grazing of beef cattle; however, replicated plantation forest trials were established in the late 1990s and early 2000s on buffer sites and reshaped overburden in the Upper Hunter coalfields to investigate the potential commercial viability of growing plantation forests as an alternative post-mining industry – either for wood products or carbon offsets. Following on from earlier establishment trials, the focus of this paper is the ongoing management of the dryland plantations, which are now ~15 years old, with the objective of quantifying the benefits of an early non-commercial thinning and pruning regime. Seven hardwood species were trialled in this project: *Corymbia maculata*, *Eucalyptus camaldulensis*, *E. argophloia*, *E. molluccana*, *E. sideroxylon*, *E. camaldulensis* x *grandis* and *E. camaldulensis* x *globulus*. The best all round performer to date has been *C. maculata* (Spotted gum). While it has grown well on buffer sites, most stands have performed as well or better on the reshaped overburden. Thinning at age 10-12 years has not yet led to an increase in overall stand volume; however at the majority of sites it has resulted in an increase in the mean diameter and height of trees. Initial assessments indicate that thinning is likely to produce stands of better form resulting in the growth of higher value timber products. We used an economic model to compare expected returns from grazing with Spotted gum forestry and agroforestry using growth and yield projections. Net present values and internal rates of return were generated and we conclude that forestry and agroforestry deliver comparable commercial returns (from carbon and wood products) to grazing but with a different investment and risk profile.

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