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Greenhouse gas emissions from Australian Agriculture are approximately 16% of the total, but with simple changes in agricultural practices, this figure could probably be substantially reduced. Although there are no immediate plans to include agriculture in current Emission Trading Schemes, adaptations which Australian Agriculture should consider and prepare to undertake for the future include:

1. solar thermal power – this is now only about twice as expensive as coal or diesel. The most economic method (ie. requiring low capital investment) appears to be the linear arrays of parabolic mirrors which heat tubes of oil. This heated oil can then be stored underground in large vats which can retain the heat for months. When heat or energy is needed on farm it can be simply drawn off using steam turbines to generate electricity. Australia receives approximately 1000Wm^{-2} over most of its land surface on average eight hours per day most days throughout the year this energy is entirely renewable with zero impact to the environment, and Australia should be leading the world in its implementation.
2. zero till in addition to saving on diesel consumption, zero or minimal till practices retain more organic matter in the soil and reduce the need for synthetic fertilizers. This in turn reduces loss of nitrogen to the atmosphere, including the potent GHG gas, nitrous oxide. The ploughing of soil is a convention that follows from the requirement for loosening and oxygenation of the damp and fertile geologically young glacial clays of Europe. In the cold temperatures of winter, not much organic matter is lost via oxidation, but this is a major problem with tropical and subtropical soils if they are overworked. Organic matter is required for satisfactory water retention in Australian soils which tend to be geologically old with low calcium/magnesium and high sodic contents.
3. methane from intensive livestock waste lagoons – methane release from intensive livestock lagoons is a significant contributor to the total greenhouse gas emission from Australian agriculture. Primary anaerobic lagoons should be covered and the methane collected as a useful source of power. In southern and inland parts of Australia it does get cold enough for livestock sheds to require some heating during winter. Collection of methane from waste lagoons has recently proved useful for the winter heating of farrowing sheds in Queensland
4. collection of green waste material for conversion to biochar: recent studies by the CSIRO have shown that addition of ground charcoal (or biochar) to soil improves soil fertility, and over the long term would form a useful way of sequestering carbon. As the nearly pure carbon product is dry, lightweight and free flowing, transport and application costs are reduced compared to those of conventional compost. More research needs to be done into the

suitability/fertility of various source materials, and the economics of production and application.

5. use of intensive livestock solids waste for conversion to biochar – sludge when pumped from the base of intensive livestock lagoons and applied directly to land is responsible for significant release of methane to the atmosphere. This sludge should be compressed, dried and the remaining separated solids converted to biochar. Engineering design work needs to be carried out to optimise biochar production and application processes.
6. use of intensive livestock effluent for algal based biodiesel production – this nitrogen and phosphorus rich stream is abundantly available from the various intensive livestock industries across Australia. Rather than being used to irrigate poor quality soils which may suffer rapid loss of nutrients via deep drainage or overland flow or, effluent water could be used to grow algae for fuel in a controlled environment. Research is now well underway at USQ, UM and the Korean government into how to convert microalgae into fuel oil or biodiesel using photobioreactors. With fuel costs projected to significantly increase into the future, this technology could represent a very promising method for economic and carbon neutral on-farm fuel production.