Chapter 4

Biofuel Production and Its Implications in a Transitive Low Carbon Development Country: The Case of South Africa

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ABSTRACT

This chapter explains the implication of South Africa’s transport fuel 2% blending. Using dry grain sorghum as feedstock with guaranteed food security has lower emission of 24.93kg/ha with emerging farmers who constituted 30% of the suppliers with a 3-year payback period. Using irrigated sorghum with food security as a priority has a relatively lower emission level of 11.47kg/ha from emerging farmers with a 9-year payback period. Using sugar beet has lower emission level of 0.12kg/ha with emerging farmers and a 3-year payback period. Soil organic content has significant influence on emissions from land use practices. Commercial sugar beet ethanol production caused high emission (4.84kg/ha) but has a short payback period of only 2 years which enhanced household food consumption by 12.5% and 31.50%.

DOI: 10.4018/978-1-5225-3631-4.ch004
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**INTRODUCTION**

In a transitive economy country like South Africa, energy is a key factor for achieving economic growth and a major contributor to greenhouse gas (GHG) emission. In South Africa, the main sources of energy are: coal (56.69%), crude oil (11.9%), electricity (8.8%), gas (1.35%), hydro-power (0.16%), nuclear power (1.5%), petroleum products (14.8%), and renewable energy and waste (4.8%) (Statistics South Africa, 2009). The energy sector contributes about 15% of the country’s Gross Domestic Products (GDP) followed by the mining industry with 8.8% (GCIS, 2012) and creates over 86000 jobs (Statistics South Africa, 2010). Over the past 20 years, the country’s energy sector has been characterized by low investment and low research and development (R&D), and accounts for 0.4% of GDP (Department of Science and Technique (DST), 2010). With economic growth, the energy demand has increased significantly especially in the transport and industrial sectors. In addition, over 30% of the population does not have access to electricity and 13.7% lives on less than 1.25 USD a day (World Bank, 2013).

Between 2000 and 2010 South Africa’s Green House Gas (GHG) emission increased significantly by as much as 32% and yielded 4,879,334 Gg Carbone dioxide (CO₂) equivalents. Of this quantity, the energy sector contributed 67% of the total emission, followed by transport sector with 9.24% (Department of Environmental Affairs (DEA), 2011). In 2009, the country contributed 1.49% of global emission that yielded 9.18 tons of CO₂ per capita and was the 14th emitter of the intensive energy user countries (International Energy Atomic Agency (IEA), 2009). The electricity sector contributes a large share of the country’s energy related emission of 53%, followed by the transport sector (DEA, 2011).

In order to address the global climate change challenges, the country acceded to GHG emission reduction by responding to several international emission reduction commitments. Following Conference of Parties (COP) 15th, several reforms were undertaken to reduce the country’s GHG emission intensity, principally from the energy sector. This included the launch of National Climate Change Response White Paper by the Department of Environmental Affairs (DEA) (DEA, 2011), the 2012 Integrated Energy Plan (IEP) (DOE, 2013), the National Transport Master Plan (NATMAP 2050) (DOT, 2010), the 2010 Integrated Resources Plan (IRP), which was later revised to adjusted IRP and launched by the Department of Energy (DoE),
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