AN ASSESSMENT OF THE BIOFUELS INCENTIVE MODEL

1 Introduction

The biofuels regulatory framework aims to encourage the production of biofuel on a commercial scale by establishing transparent criteria for selecting biofuel manufacturing projects. To achieve a 2% penetration of biofuels into the local transport fuel pool, an incentive scheme was announced in 2013 that will provide a guaranteed return on assets of 15% to an efficient biofuels producer. It is hoped that the commercial production of biofuels will stimulate significant economic development and employment in the agricultural sector. The fiscal production incentive for biofuels will be funded by a biofuels levy on all petrol and diesel sold for domestic consumption. The level of the incentive required to generate the 15% return on assets in an indicative efficient biofuels plant will be determined on a monthly basis via a biofuels incentive model. Should a biofuels manufacturer's return on assets exceed 20%, a 'claw-back' would come into effect, in terms of which it would pay the 'excessive' profits back to the subsidy scheme.

The Department of Energy's 2014 *Position Paper on the South African Biofuels Regulatory Framework* envisages a two-stage selection process – qualification for the subsidy, followed by the adjudication of qualifying projects. Should the manufacturing capacity of the qualifying projects exceed the target of 2% penetration, adjudication criteria related to the socio-economic objectives of the Biofuels Industrial Strategy would be used to select the projects to be subsidised. The size of the subsidy per project is not explicitly included in the selection criteria (in that the return on assets is fixed), and neither is the cost-effectiveness of biofuels production (for example, bioethanol from sugarcane would require a much larger average incentive than bioethanol from sorghum).

The biofuels incentive model, initially developed in 2011, is a reference financial model comprising three individual models, respectively for sorghum-, sugarcane- and soya-based bioethanol plants. In addition to a number of financial assumptions (e.g. the future basic fuel price for petrol and diesel, feedstock prices and inflation), the model also relies on assumptions about engineering and capital costs, parameters such as plant size, and various input requirements, such as sorghum, sugarcane and soya feedstocks, chemicals, water and electricity.

The National Treasury requested this performance and expenditure review (PER) to understand the calculations behind the biofuels incentive model, conduct sensitivity analysis on the nature and magnitude of potential risks, and identify risk mitigation options. This study will assist the Treasury in assessing its fiscal risk and engaging effectively with stakeholders. The PER was conducted between January and December 2014 by DNA Economics. Some of its key outputs, insights and recommendations are summarised here. The full report and the costing model are available at www.gtac.gov.za/programmes-and-services/public-expenditure-and-policy-analysis.

2 Economic and regulatory theory assessment

The proposed incentive mechanism, which is based on a targeted guaranteed return on assets, is equivalent to a feed-in tariff – it provides investors with a hedge against changes in operation and maintenance costs, as well as a fixed, guaranteed return. Feed-in tariffs offer cost-based compensation to renewable energy producers through long-term contracts linked to the generation cost of each technology. These contracts provide price certainty and help finance renewable energy investments. Feed-in tariffs often include mechanisms by which the price (or tariff) ratchets down over time in line with (or to encourage) technological cost reductions. Under the proposed regime, a firm would receive a variable price along with a variable subsidy (with an inverse relationship to the biofuel price). The net effect is similar to receiving a fixed price, as under a feed-in tariff regime.

A targeted guaranteed return on assets is a recognised approach to developing new industries in the low-carbon space. However, the proposal does not minimise the cost of the incentive scheme over time through market completion and increased learning in the way that, for instance, the Renewable Energy Independent Power Producer Procurement Programme does. At the very least, sorghum-based plants should be preferred to sugarcane plants where possible.

The biofuels regulatory framework envisages the subsidy to be provided for a period of 20 years, but anticipates that the subsidy amount would be reduced over this period. It is not clear how this would be possible, given the expectation of a fixed return on assets. There might be an assumption that market dynamics would lead to the model-calculated incentive falling naturally over time. Should that be the case, these assumptions need to be clearly specified and assessed.

The rationale for the 15% target is not clear from either the model or its supporting documentation. It seems high, given that the risks of changes in input and output prices are removed. No justification for this level is provided, beyond a statement that the same level of return was used in the now-defunct Marketing of Petroleum Activities Return framework in the liquid fuels industry.

The stipulation that producers only pay back excessive profits once the return on assets exceeds 20% seems unnecessary. Since the return is guaranteed (for an efficient plant), it is not clear that such a high rate is required to incentivise biofuels investment. Given that the incentive calculation is based on the theoretical assets of an efficient reference plant, past support could start to be recouped as soon as the return on assets exceeds 15%, without undermining firms' incentives to raise efficiency.

Also, at this level of support, there should be no need for firms to receive additional incentives. In contrast to the suggestion of the *Biofuels Pricing and Manufacturing Economics* study, firms that qualify for the biofuels incentive should not access additional investment incentives, such as an accelerated depreciation allowance. The Department of Energy has indicated that producers in the scheme would not qualify for additional incentives, but the position paper did not address the issue.

The biofuels incentive model proposes paying current market rates, closely linked to international commodity prices, for feedstock. It is unclear how this will incentivise an increase in agricultural output to the extent envisaged, when farmers can already get these prices on the open market. Even if demand for certain feedstocks were to lead to temporary shortages, and thus to higher prices or prices based on import-parity pricing, a significant local supply response (as would be required to generate the desired economic benefits) would drive prices down to current levels. In addition, in response to higher prices, firms may choose to import feedstocks in the short term rather than source locally. In any event, if biofuels demand is to change the pricing dynamics of feedstocks over time, the expected changes should be reflected in the model – which is not currently the case.

The model provides valuable insights into the economics of biofuel production and is clearly the result of significant time and effort. It is, however, not currently conducive to policy development. It does not provide an indication of the most likely path of incentives, eschewing forecasts in favour of random data (albeit data that does trend upwards) to calculate possible incentive levels, and does not facilitate scenario or sensitivity analysis. Instead of allowing users to input values for forecasts of the various parameters, the model relies on random data to generate an incentive path. This complicates scenario development, since it obscures the cumulative impact of short- or medium-term trends. More fundamentally, however, it recalculates random values automatically whenever any cell value is changed., making it impossible to compare the impact of changes in the assumptions.

The model also does not provide sufficient information to calculate the expected cost of the incentive scheme over time. It does not generate estimates of the total costs of the scheme to consumers. The cost of the incentive per litre of biofuel is calculated, but neither the size of the resulting fuel levy nor the total cost of the levy on the national fuel pool is calculated. While the cost of the scheme can be manually calculated by applying estimated fuel levy values to total liquid fuel consumption, this is not currently possible since only petrol (and not diesel) volume estimates are included in the model. The model also does not run for the full 20-year horizon of the planned incentive.

Critically, the desired rate of return cannot currently be easily changed in the model. It is thus not possible to compare the fiscal implications of different levels of support to the biofuels industry.

The model assumes that production continues even in periods when revenues fall below the cost of raw material. In the model, this shows as negative gross profit (Biodiesel Economic Model sheet cell AQ37). If revenues are below variable cost, the efficient solution is not to produce, since:

- The cost of the subsidy would be lower, as it would not have to cover net negative marginal costs (it would cover fixed costs plus the required return, thus plants would still make the required return on assets).
- The economy's allocative efficiency is improved, as inputs are diverted from biofuels production to alternative uses that generate more value.

A stricter condition should thus be considered, which only permits production if revenue exceeds total variable costs (raw materials plus other variable cost). In roughly half the months between June 2010 and December 2013, this condition was not satisfied with the model's original assumptions. This will not jeopardise either the viability of the biofuel plants (which would still make their 15% return on assets) or the long-term feedstock supply (which is diverted to alternative uses). Given that a policy decision has been taken to achieve 2% biofuels penetration in the national fuel pool, it is likely that there will be a preference for production at all times. However, it needs to be recognised that the reduction in allocative efficiency would impose additional costs on the economy.

The position paper states that biofuel manufacturers 'will be paid the subsidy calculated from the reference financial models (in cents per litre) multiplied by the manufacturer's actual volumes *produced and delivered* to blenders' [emphasis added]. Production and delivery are not necessarily equal when a product can be stored; therefore, the criteria for qualifying for an incentive payment need to be clarified. While using 'production' as a criterion avoids the incentives for gaming by storing the product until the subsidy increases, it does open the door for receiving the subsidy and then exporting the biofuel. Given that biofuel is a highly tradable commodity, having 'delivered' biofuel to blenders is probably the appropriate criterion for receiving the incentive.

3 Engineering, capital and financial assumptions

Much of the information in the model may have become dated since 2011 (when it was developed), as input and cost assumptions are not updated consistently. Some values are updated monthly, some annually, and others simply inflated by either the consumer or the producer price index. Given that the incentive is expected to be disbursed monthly, as many values as possible should be updated on a monthly basis. Capital costs, in particular, may need to be revisited, as the literature suggests that the capital cost of biofuels plants may have declined since 2011. The rand–US dollar exchange rate is also significantly weaker than the 7.2:1 on which the initial capital cost estimates were based. At the very least, as many of the inputs, variables and assumptions as possible should be updated on a once-off basis before the model is used to calculate biofuel incentive rates.

The incentive scheme also allows for some upside benefit (an additional 5% return on assets) should input costs and output prices result in a return on assets above 15%. If investors believed that prices would move in their favour in future, they would expect returns exceeding 15%. Thus, if the required rate of return is indeed 15%, the scheme should guarantee a rate below 15% such that once the expected returns from favourable price movements are included, the result is the required 15%.

Investors typically do not make decisions based on the rate of return on assets, but rather on the return on equity. This means that access to finance, financing rates, and the ability to leverage operations are important considerations in the investment decision. The more volatile the earnings of a firm, the higher the likelihood of financial distress and the lower its efficient level of leveraging. Because debt is by definition cheaper than equity, the efficient level of leverage is where the benefits of higher debt (i.e. lower cost of capital) begin to be outweighed by the increasing probability (costs) of financial distress. The proposed scheme directly affects this relationship by reducing the volatility of earnings. If a firm were to maintain a 'normal' level of efficiency, its returns would be very stable. Thus firms on the scheme would be able to leverage their operations substantially, which in turn would substantially increase their return on equity. Indeed, even if optimal leveraging were not possible immediately, investors would be able to increase leveraging over time as they build a performance record. They would factor this expectation into their decision upfront, which would further reduce the minimum return on assets required to induce investment.

The documentation accompanying the model does not seem to address these considerations. It is unclear what process was followed to decide on the 15% return on assets. Given that the subsidy scheme is expected to match the 20-year lifespan of a plant, the size of the subsidy should be set with great care; it should be based upon a sound understanding of the underlying risks and investor sentiment about both the markets in general and this industry in particular.

Biofuels plants qualify for an accelerated depreciation allowance over three years of 50%:30%:20%. While for accounting purposes depreciation should be calculated at the maximum rate allowable, for economic purposes it should be calculated over the useful life of the assets (20 years). This amounts to incentive double-dipping. The biofuels incentive was set at a 15% return on assets because policymakers believed this to be a level of return that would incentivise entry into the industry. If this were the case, no further incentives would be justified. It is therefore suggested that either biofuel plants be excluded from qualifying for an accelerated depreciation allowance, or the return on assets be calculated on an after-tax basis that explicitly considers the impact of the allowance.

4 Model design issues

Issues with the mechanics of the model have also been identified, relating to the way in which costs, inputs, asset values and depreciation are adjusted for inflation and how working capital is defined. It also assumes that no capital expenditure would be required for plant maintenance over the 20-year life of the biofuel plants. Updating and refining the model is also justified on the basis that the biofuels producer incentive is expected to be much more expensive than anticipated in the position paper. The framework mentions an expected increase in the fuel levy of about 4.5 cents per litre on all petrol and diesel consumed in South Africa, implying an expected total cost of around R900 million per year. Based on forecasted input values, the model indicates that the actual cost of the fuel levy is likely to be about R1.59 billion per year. The average monthly fuel levy over the 91-month period from June 2010 to December 2017 required for producers to achieve a 15% return on assets is 5.1 cents per litre for sorghum-based bioethanol, 8.9 cents per litre for sugarcane-based bioethanol, and 8.5 cents per litre for soya-based biodiesel.

5 Sensitivity analysis

A sensitivity analysis highlighted that the expected total cost of the biofuel incentive is particularly sensitive to changes in the basic fuel price for petrol and diesel, as well as feedstock prices. It is also relatively sensitive to changes in the size of the initial capital investment and the amount of feedstock required to produce a unit of biofuel. All else being equal, the basic fuel price of petrol and diesel would need to be approximately 18% higher than forecasted for the incentive scheme to cost less than R1 billion per year.

6 Administration of the scheme

A number of issues relating to the implementation of the biofuels producers' incentive have not yet been addressed. Primary amongst these is how the incentive and the related fuel levy will be implemented. Communications with the Department of Energy highlighted the expectation that varying the biofuels fuel levy on a monthly basis might require monthly changes to the fuel levy regulations administered by the South African Revenue Service. It is not clear how feasible this would be in practice.