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RESEARCH REPORT

A Review of Projected Biofuel Prices for the United Kingdom: Evaluating the role of the FQD model for road transport fuels

Chris Charles

May 2013

www.iisd.org/gsi

Published by the International Institute for Sustainable Development.

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Head Office
161 Portage Avenue East, 6th Floor, Winnipeg, Manitoba, Canada R3B 0Y4
Tel: +1 (204) 958-7700 | Fax: +1 (204) 958-7710 | Website: www.iisd.org

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International Institute for Sustainable Development
Global Subsidies Initiative
International Environment House 2, 9 chemin de Balexert, 1219 Châtelaine, Geneva, Switzerland
Tel: +41 22 917-8373 | Fax: +41 22 917-8054

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Prepared by Chris Charles

Acknowledgements

A number of individuals were generous with time and advice in peer reviewing the report. Any mistakes remain the responsibility of the authors. In particular, we thank:

- Steve Coombe (BigOil.net; Retail Motor Industry Federation, United Kingdom)
- A number of anonymous peer reviewers

The opinions expressed and the arguments employed in this report do not necessarily reflect those of the GSI's funders, nor should they be attributed to them.

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List of Acronyms

DECC	Department for Energy and Climate Change
DfT	Department for Transport
EU	European Union
OECD	Organisation for Economic Co-operation and Development
ppl	pence per litre
RED	Renewable Energy Directive
RTFO	Renewable Transport Fuel Obligation
TOE	Tonne(s) of Oil Equivalent
UNCTAD	United Nations Conference on Trade and Development

Conversion Factors

CONVERSION FACTORS		
	Tonnes	Litres
Ethanol	1	1,324
Biodiesel	1	1,132
	Tonnes	Tonne(s) of Oil Equivalent (TOE)
Ethanol	1	0.64
Biodiesel	1	0.86

1.0 Introduction

In April 2013 the United Kingdom will mandate the blending of 5 per cent biofuels with petrol and diesel (Department for Transport [DfT], 2012). This is one of a number of initiatives intended to meet the European Union's (EU) Renewable Energy Directive (RED) commitment to increase the renewable energy content of the transport fuel mix to 10 per cent by 2020 (European Commission, 2009a, 2009b). To help develop biofuel and related transport policy, the United Kingdom's Department for Transport (DfT) developed a model, an internal tool, for assessing the impacts (the costs and benefits of related policies) of biofuels in implementing the EU's Fuel Quality Directive (FQD) for the years 2010 to 2020.[1]

The national legislation introduced in the United Kingdom is the Renewable Transport Fuel Obligation (RTFO). This is a volume-based obligation. In order to achieve the same percentage target for renewable energy use as set by the RED, which is based on energetic value, additional biofuels will need to be consumed in the United Kingdom, given biofuels have a lower energy value on a per-liter basis compared to the petrol and diesel for which they substitute (DfT, 2009).

The "FQD model" is a tool used by the DfT to estimate the costs and benefits of using specific volumes of biofuels within the United Kingdom's road transport fuel mix. The FQD model projects future biofuel prices based on a number of input assumptions relating to fossil-fuel prices (petrol and diesel) and the operational costs (OPEX) of biofuel producing refineries (principally input costs relating to the use of biofeedstocks).[2]

The FQD model was supplied by the DfT to the International Institute for Sustainable Development (IISD) under the terms of the Environmental Information Regulations 2004 and Freedom of Information Act 2000 (DfT, 2011). The provision of the FQD model and supporting data to IISD has allowed for this analysis to be undertaken; however, the results and findings of the study are strictly those of IISD and are not linked to the DfT.

This study uses an ex-post analysis method to assess a selection of key data relating to the use of the FQD model and the development of biofuel price projections to determine if the assumptions hold true. The aim of this paper is to assess whether the model's results matched what actually happened. Understanding whether the costs and benefits of British biofuel policies are panning out as projected is important because biofuels receive public funding in the form of subsidies, the benefits of biofuels are increasingly subject to challenge, and a number of unintended consequences can result from expanding biofuel production.

Real market data for the years 2010 to November 2012 are compared against (a) projected biofuel prices generated by the DfT's FQD model in 2009, (b) projected fossil-fuel costs for diesel and petrol developed by DfT and used in FQD modelling runs, and (c) biofeedstock price projections developed by the DfT using the OECD-FAO AGLINK-COSIMO modelling system[3] (Organisation for Economic Co-operation and Development [OECD], 2012)[4] and used as part of the FQD model's assumptions.

[1] The RED, or Renewable Energy Directive, is an agreement negotiated by all EU-27 countries to produce a pre-agreed proportion of energy consumption from renewable sources so that the EU as a whole achieves at least 20 per cent of total energy consumption from renewables by 2020. For the transport sector, 10 per cent (targets by energy content, rather than volume) renewable energy use by 2020 is set as an objective (European Commission, 2009a). The Fuel Quality Directive, or FQD, requires the carbon intensity of European road transport fuel be reduced by 6 per cent by 2020 compared to a baseline scenario and also contains sustainability criteria relating to the use of biofuels (European Commission, 2009b).

[2] In the United Kingdom, the main feedstocks for ethanol production are wheat and sugarbeet, and for biodiesel it is rapeseed.

[3] A copy of the AGLINK-COSIMO modelling system was licensed to the British Government for their use.

[4] The AGLINK-COSIMO modelling system involves the OECD's AGLINK model, an economic model of world agriculture with very detailed agricultural sector representation of OECD countries as well as Argentina, Brazil, China and Russia. This was subsequently enhanced by a similar agricultural model developed by the FAO called the COSIMO model representing the agricultural sectors in a large number of developing countries. The combined AGLINK-COSIMO model is a partial equilibrium model for global agriculture.

2.0 Background

While modelling studies generate some insight into how new policies may perform in the future, it is also important to be realistic about the challenges associated with modelling biofuel policies in the face of significant short- and medium-term uncertainties and in the absence of historical empirical data.

A key part of the analysis in this study considers the recent price volatility and increases for a number of food commodities used as biofeedstocks (Food and Agriculture Organization et al., 2011) and for petroleum prices, which have a bearing on biofuel production costs and final consumer prices. Projected biofuel prices generated by the FQD model rely on assumptions about the prices of these related commodities. Volatility, in basic terms, refers to changes in prices over time. Volatility in oil prices in 2008, for example, while high, remained substantially below the swings of the early 1970s. Commodity prices have shown considerable volatility over the past decade (United Nations Conference on Trade and Development [UNCTAD], 2012), although long-term comparisons illustrate that recent volatility in prices is not extraordinary for specific commodities (Calvo-Gonzales, Shankar and Trezzi, 2010). However, the swiftness and breadth of price swings that have been observed for a broad range of commodities clearly differentiates recent price fluctuations from earlier ones (Baffes and Haniotis, 2010). More specifically, the scale of the most recent price upswing has been above historical averages for food and metals, and while the scale of the rebound for oil prices has been consistent with historical averages, the rebound has been faster than normal (UNCTAD, 2012). The relationships between biofeedstocks, petroleum products and the production costs for biofuels can therefore be volatile and difficult to predict. Financial and commodity market volatility can create additional complications as the price of key inputs for biofuel production becomes increasingly difficult to predict and, in turn, reduces the predictability of future biofuel prices.

While variations between projected and actual prices for ethanol, biodiesel, petrol and diesel on a pence-per-litre (ppl) basis can be small and, from a planning purpose, not seem hugely relevant to government and stakeholders, they are extremely important when considered at a national level or on a per-annum basis. For example, in 2011 the volume of motor fuels consumed in the United Kingdom was approximately 49 billion litres (Department for Energy and Climate Change [DECC], 2011). Small variations in per-litre prices, when multiplied across the volumes of transport fuels used in the British domestic market, can result in billions of pounds per annum of additional fuel costs borne by consumers (Charles & Wooders, 2011).

3.0 Study Methodology and Data

The study focused on the "Central Scenarios" used in the FQD model's biofuel price projections, DfT's fossil-fuel price projections, and the OECD-FAO AGLINK-COSIMO model's price projections for wheat, sugarbeets and rapeseed. The Central Scenario of these modelling exercises generally represents the most likely anticipated outcome given the known input parameters. The Central Scenarios are the focus of the study, as modellers and policy-makers anticipate they will represent the most likely outcome or behavior for the specific market. There is, however, a range of different scenarios developed to reflect uncertainty and generally covering a wide distribution of potential outcomes.

The following data were assessed:

Biofuel retail prices for years 2010 (starting January) to 2012 (November) from the DfT's FQD model: The FQD model provides price projections across a range of price scenarios—Low, Central, High, and High High—based on a range of cost assumption for inputs such as fossil fuels and biofeedstocks. The FQD model's Central Scenario for ethanol and biodiesel price projections (expressed in ppl) for 2010, 2011 and 2012 were compared to monthly average price quotes (converted into annual averages) for ethanol and biodiesel for the United Kingdom sourced from BigOil.net (2012) (a provider of daily market and fuel price data to the downstream petroleum industry) and managed by the Retail Motor Industry Federation[5] of the United Kingdom. Ethanol and biodiesel price quotes used by BigOil.net were sourced from Platts European Market Scan.

Feedstock/crop price projections generated by the OECD-FAO AGLINK-COSIMO model, introduced to the DfT's FQD model in order to develop British biofuel price projections: Modelling runs for feedstock/crop prices generated for the specific years 2009, 2010 and 2011[6] by the AGLINK-COSIMO modelling system in 2009 were used to develop FQD model biofuel price projections (ethanol/biodiesel) from 2010 through 2020. Feedstock/crop prices generated by OECD-FAO AGLINK-COSIMO modelling runs published in 2009 were then subsequently updated in 2010 for the United Kingdom's main biofeedstocks used to produce ethanol and biodiesel: wheat, sugarbeets (ethanol) and rapeseed (biodiesel). It should be stressed that the projections of agricultural commodity prices are not forecasts. They represent a plausible outcome for prices based on specific assumptions about macroeconomic variables and weather conditions. The prices generated by the OECD-FAO AGLINK-COSIMO model for these biofeedstocks were assessed against actual EU market prices.

Fossil-fuel (petrol and diesel) price projections provided by the DfT: DfT's diesel and petrol price projections across Low, Central, High, and High High scenarios used in the FQD model's initial 2009 model run were assessed against actual diesel and petrol prices for 2010, 2011 and 2012. New DfT diesel and petrol price projections generated in 2010 and used to update the FQD model were also compared against actual diesel and petrol retail prices for the years 2010, 2011 and 2012 (fuel prices were classified as being ex-Vat and any government duties).

[5] Retail Motor Industry Federation website: http://www.rmif.co.uk.
[6] The timeframe assessed for commodity prices is from 2009 to 2011 and varies from the other timeframes used for biofuel prices and fossil-fuel prices because commodity price data for 2012 weren't available.

4.0 Main Results

I. Biofuel Prices

Biodiesel

Table 1 describes projected biodiesel prices as higher than actual prices in 2010, by 10.7 ppl. Biodiesel prices increased significantly in 2011, moving 7.1 ppl above the FQD model's projected price of 71 ppl, with actual and projected biodiesel prices converging in 2012.

TABLE 1. ACTUAL BIODIESEL MARKET PRICES VERSUS FQD MODEL PRICE PROJECTIONS.

(Note: FQD model prices based on "real prices" from 2009.)

	BIODIESEL PRICES (PPL)			
	FQD MODEL, CENTRAL SCENARIO PROJECTIONS	ACTUAL PRICES	VARIATION	VARIATION FROM PROJECTED PRICE (%)
2010	72	61.3	-10.7	-15
2011	71	78.1	7.1	10
2012	72	71.1	-0.9	-1

Sources: FQD model's Central Price Scenario; actual prices, BigOil.net/Platts European Market Scan.

Biodiesel prices projected by the FQD model for 2010–2012 and actual market prices for those years are illustrated in Figure 1 below. (Note: FQD model prices based on "real prices" from 2009.)

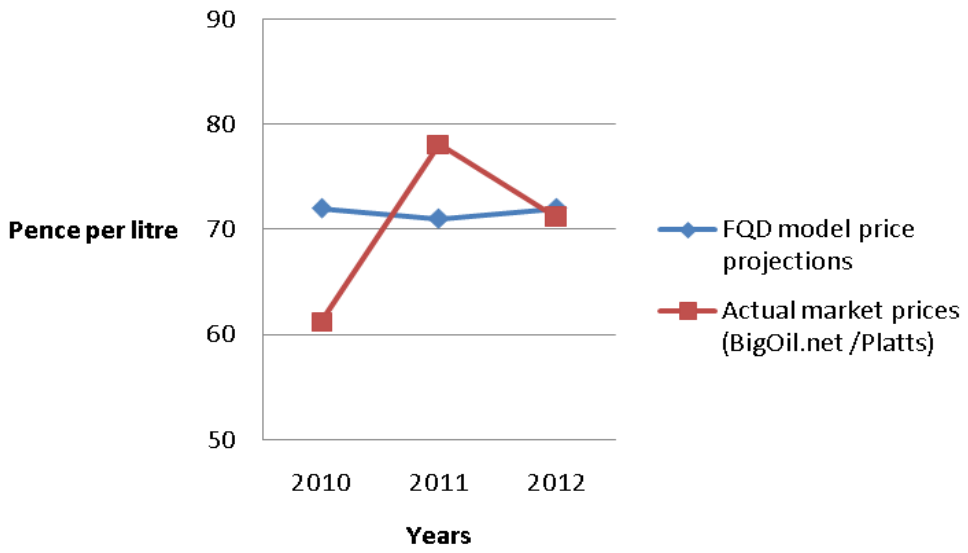

FIGURE 1. BIODIESEL PRICES IN THE UNITED KINGDOM: ACTUAL VERSUS PROJECTED CENTRAL SCENARIO PRICES.

Sources: FQD model's Central Price Scenario; actual prices, BigOil.net/Platts European Market Scan.

Ethanol

Table 2 describes that in 2010, actual ethanol prices were below projected prices generated by the FQD model's Central Scenario by 4.2 ppl. In 2011 projected prices were forecasted to drop to 46 ppl, but instead actual market prices rose to 53.2 ppl. Actual market prices remained above projected prices in 2012, at 51.2 ppl.

TABLE 2. ACTUAL ETHANOL MARKET PRICES VERSUS FQD MODEL PRICE PROJECTIONS.

(Note: FQD model prices based on "real prices" from 2009.)

	ETHANOL PRICES (PPL)			
	FQD MODEL, CENTRAL SCENARIO PROJECTIONS	ACTUAL PRICES	VARIATION	VARIATION FROM PROJECTED PRICE (%)
2010	50	45.9	-4.2	-8
2011	46	53.2	6.8	15
2012	49	51.2	2.1	4

Sources: FQD model's Central Price Scenario; actual prices, BigOil.net/Platts European Market Scan.

Ethanol prices projected by the FQD model for 2010–2012 and actual market prices for those years are illustrated in Figure 2 below. (Note: FQD model prices based on "real prices" from 2009.)

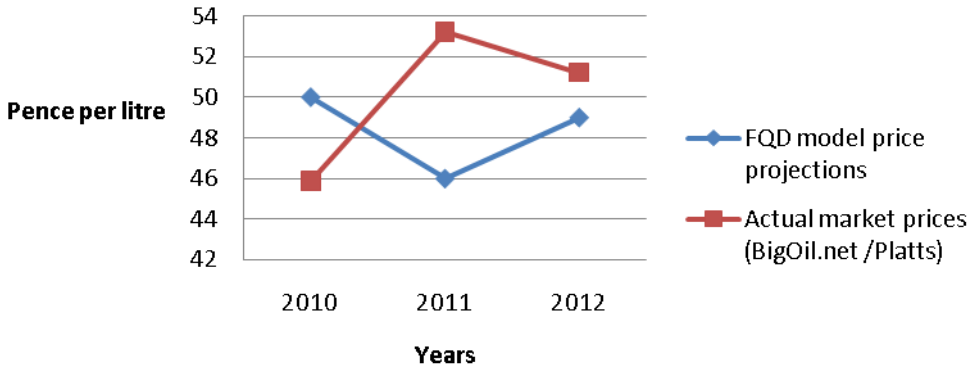

FIGURE 2. ETHANOL PRICES IN THE UNITED KINGDOM: ACTUAL VERSUS PROJECTED CENTRAL SCENARIO PRICES.

Sources: FQD model's Central Price Scenario; actual prices, BigOil.net/Platts European Market Scan.

BOX 1. VARIATIONS IN BIOFUELS PRICES AND THE RIPPLE EFFECT THROUGH THE FUELS MARKET.

Biofuel consumed in the United Kingdom in 2011 amounted to 647 million litres of ethanol and 920 million litres of biodiesel (EurObserv'ER, 2012).[7] Using projected ethanol and diesel prices (ppl) under the FQD's models (2011 scenario), it was projected consumers would spend GBP 324 million on ethanol and GBP 662 million on biodiesel (as an absolute figure and not measured against a baseline of fossil-fuel prices). Based on actual market prices consumers spent more in relation to projected prices, spending GBP 344 million on ethanol and GBP 719 million on biodiesel (in absolute figures and not measured against fossil-fuel prices). When starting with the consumers' anticipated expenditure on biofuels (as projected by the FQD model) and comparing that against actual expenditure or, in other words, actual expenditure driven by higher than anticipated biofuel prices, we see the extent of the additional cost of biofuels for motorists. Higher than anticipated biofuel prices resulted in additional expenditure over and above the baseline amount estimated by the FQD model. This expenditure amounted to an additional GBP 20 million for ethanol and GBP 57 million for biodiesel, with a combined total of GBP 77 million in additional expenditure. To highlight how increasing the United Kingdom's blending mandate can introduce more uncertainty into the extent of additional costs passed through to consumers, the following calculation takes the unanticipated additional costs paid by motorists and expands it, based upon increasing biofuel consumption driven by a rising mandate. A basic doubling of the United Kingdom's biofuel blending mandate from 4.5 per cent to 9 per cent could, in theory, double the additional unanticipated annual costs borne by consumers, raising GBP 77 million to GBP 154 million.

II. Fossil-Fuel Costs

This section compares DfT's Central Scenario for projected petrol and diesel prices against actual price data from the United Kingdom. The table below shows premium unleaded[7] and diesel prices against three sources of data: (a) DfT's diesel and petrol price projections (based on the Department of Energy and Climate Change's [DECC] oil price projections) published in 2009 and used as inputs to the FQD model, (b) updated DfT petrol and diesel price projections introduced into the FQD model in 2010, and (c) average petrol and premium unleaded prices from January 2010 to November 2012 (sourced from DECC energy statistics).

[7] The FQD model refers to petrol, while DECC's energy price statistics refer to "premium unleaded." For this analysis premium unleaded is considered to be the same as petrol.

TABLE 3. A COMPARISON OF ACTUAL PETROL (PREMIUM UNLEADED) AND DIESEL PRICES (EXPRESSED IN PPL)VERSUS DFT'S PROJECTED FUEL PRICES.

(Notes: DECC's oil price projections provide a range of price scenarios from Low, Central, High, and High High based on a number of factors affecting global supply and demand of oil and related petroleum products. Petrol and diesel prices for 2009 drawn from the FQD model's assumptions, originally generated as part of DfT's fossil-fuel price projections; prices are presented as "real prices" for 2009. Petrol and diesel prices for 2010 drawn from FQD model assumptions, originally generated as part of DfT's fossil-fuel price projections; prices are presented as "real prices" for 2010.)

	PETROL (PREMIUM UNLEADED) AND DIESEL PRICE PROJECTIONS PUBLISHED IN 2009 AND UPDATED IN 2010 (FIGURES IN PENCE PER LITRE)												
PETROL (PREMIUM UNLEADED)	LOW 2009	LOW 2010	CENTRAL 2009	CENTRAL 2010	HIGH 2009	HIGH 2010	HIGH HIGH 2009	HIGH HIGH 2010	ACTUAL PRICES	VARIATION FROM 2009 PROJECTED CENTRAL PRICE SCENARIO	(%) VARIATION FROM 2009 PROJECTED CENTRAL PRICE	VARIATION FROM 2010 PROJECTED CENTRAL PRICE SCENARIO	(%) VARIATION FROM 2010 PROJECTED CENTRAL PRICE
2010	30	30	36	39	42	46	50	54	42	6	18	3	8
2011	30	30	36	40	43	47	53	58	53	17	46	13	32
2012	31	31	37	40	45	49	57	62	55	19	50	15	38
Diesel													
2010	30	32	39	43	46	46	55	55	44	5	13	1	3
2011	30	32	40	43	47	47	59	59	57	18	45	14	33
2012	31	33	40	44	49	49	63	63	60	20	51	16	37

Sources: DfT's fossil-fuel price projections – published in 2009 – sourced from the FQD model provided to IISD by DfT in 2011; DfT's fossil-fuel price projections – published in 2010 – provided to IISD by the DfT in December 2012 and used to update the FQD model's assumptions; actual petrol (premium unleaded) and diesel prices for 2010, 2011 and 2012 sourced from DECC (2012), Energy Price Statistics 2012.

Diesel Prices

Diesel price projections for 2010 under the fossil-fuels Central Scenario and published by DfT in 2009 were 5 ppl below actual market prices for that year. For year 2012 the gap between projected and actual prices increased to 20 ppl with projected prices being 40 ppl and actual prices 60 ppl. New diesel price projections generated by DfT in 2010 were marginally higher for 2010, 2011 and 2012, compared to DfT's earlier 2009 forward price projections. However, comparing the updated price projections for the year 2012 against actual prices, the difference was still 16 ppl. Actual diesel prices for 2010, 2011 and 2012 still fell within DfT's upper range of projected diesel prices as part of their High High price scenario.

Diesel prices projected by DfT for 2010–2012 and actual market prices for those years are illustrated in Figure 3 below.

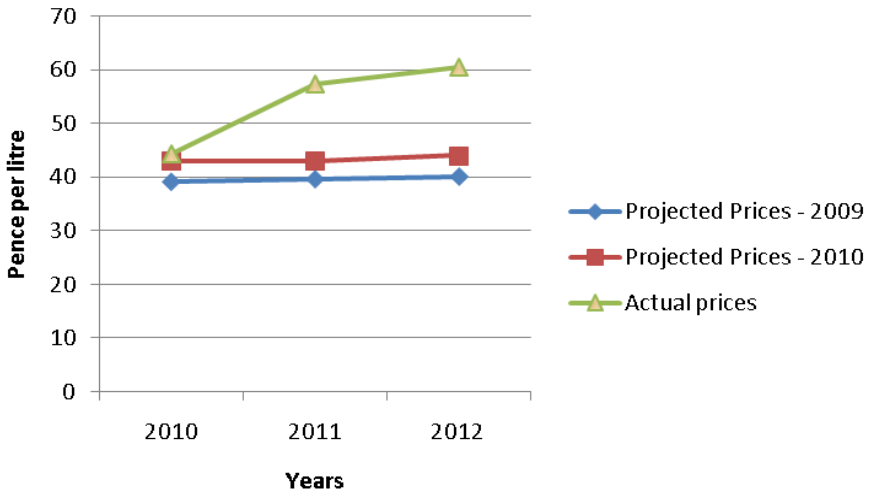

FIGURE 3. DIESEL PRICES IN THE UNITED KINGDOM: ACTUAL VERSUS PROJECTED CENTRAL SCENARIO PRICES.

Sources: DfT's fossil-fuel price projections – published in 2009 – sourced from the FQD model provided to IISD by DfT in 2011; DfT's fossil-fuel price projections – published in 2010 – provided to IISD by the DfT in December 2012 and used to update the FQD model's assumptions; actual petrol (premium unleaded) and diesel prices for 2010, 2011 and 2012 sourced from DECC (2012), Energy Price Statistics 2012.

Petrol Prices

Petrol price projections under the fossil-fuels Central Scenario published by DfT in 2009 revealed that for the year 2010 projected prices were 6 ppl below actual market prices. For the year 2012 the gap between projected prices and actual prices had increased to 19 ppl, with projected prices being 37 ppl while observed prices were 55 ppl (in real costs). New diesel price projections published by DfT in 2010 were higher for 2010, 2011 and 2012, compared to DfT's earlier 2009 price projections. However, comparing the updated price projections for 2012 against actual prices, the difference was still 15 ppl. Actual petrol prices for 2010, 2011 and 2012 still fell within the DfT's upper range of projected prices as part of their High High price scenario.

Petrol prices projected by DfT for 2010–2012 and actual market prices for those years are illustrated in Figure 4 below.

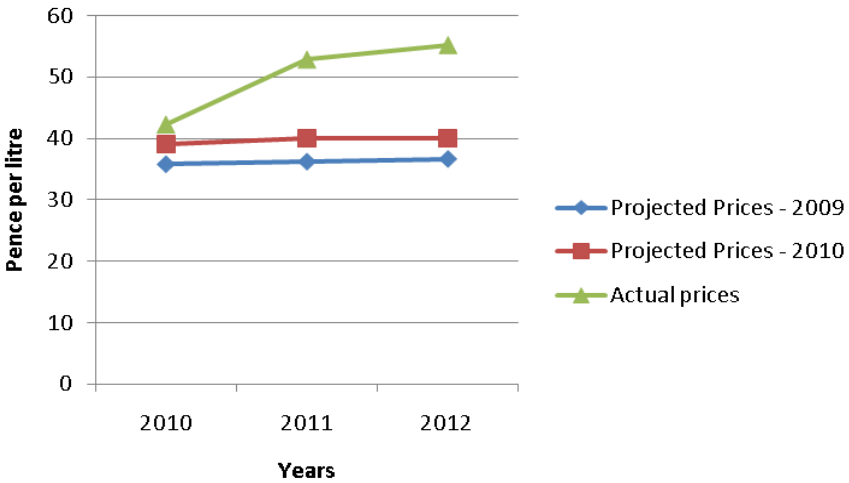

FIGURE 4. PETROL PRICES IN THE UNITED KINGDOM: ACTUAL VERSUS PROJECTED CENTRAL SCENARIO PRICES.

Sources: DfT's fossil-fuel price projections – published in 2009 – sourced from the FQD model provided to IISD by DfT in 2011; DfT's fossil-fuel price projections – published in 2010 – provided to IISD by the DfT in December 2012 and used to update the FQD model's assumptions; actual petrol (premium unleaded) and diesel prices for 2010, 2011 and 2012 sourced from DECC (2012), Energy Price Statistics 2012.

III. Commodity Prices

This section analyzes the prices for the United Kingdom's main feedstocks used in the production of ethanol (wheat and sugarbeet) and biodiesel (rapeseed). Price projections for 2009, 2010 and 2011 for wheat, sugarbeet and rapeseed generated by the AGLINK-COSIMO model in 2008 (based on nominal prices) under a "Mid-Oil Price Scenario" are compared against actual EU market prices for those commodities for those years.[9]

TABLE 4. EU COMMODITY/FEEDSTOCK PRICES: ACTUAL VERSUS PROJECTED.

(Notes: Prices for rapeseed were actual prices in USD converted to EUR (exchange rates 2009, 1 USD =.72 EUR, 2010, 1 USD = .75 EUR); rapeseed prices for 2011 were unavailable from FAOSTAT; variation of actual prices from projected prices generated by the AGLINK-COSIMO model represented as a percentage with the projected prices acting as a reference price.)

	2009				2010				2011			
PRICES	PROJECTED PRICES	ACTUAL PRICES	VARIATION	VARIATION AS A %	PROJECTED PRICES	ACTUAL PRICES	VARIATION	VARIATION AS A %	PROJECTED PRICES	ACTUAL PRICES	VARIATION	VARIATION AS A %
EU-27 Wheat Price (€/metric tonne)	143.3	115.4	-28.0	-20	136.3	153.6	17.4	13	142.3	197.5	55.1	39
EU-27 Rapseed Price (€/metric tonne)	285.2	252.0	-33.2	-12	281.1	312.9	31.8	11				
EU-27 Sugarbeet Price (€/metric tonne)	27.3	32.7	5.4	20	27.3	33.6	6.3	23	25.6	35.5	9.8	38

Sources: Projected prices: AGLINK-COSIMO model 2008 (nominal prices); actual prices, wheat, sugarbeet: Eurostat (2012); actual prices, rapeseed: FAOSTAT (2012).

[9] The Department for Environment, Food and Rural Affairs (DEFRA) supplies the DfT with new projections for feedstock prices on an annual basis, i.e., when the annual baseline projection is released by the OECD-FAO.

EU commodity prices for wheat and rapeseed in 2009 were generally lower than projected prices, while sugarbeet prices in 2009 were slightly higher. In 2010 and 2011 EU wheat, sugarbeet and rapeseed prices were higher than projected prices in the Mid-Oil Scenario of the OECD-FAO AGLINK-COSIMO model.

Commodity prices projected by the OECD-FAO AGLINK-COSIMO model for 2009–2012 and actual market prices for those years are illustrated in Figure 5.

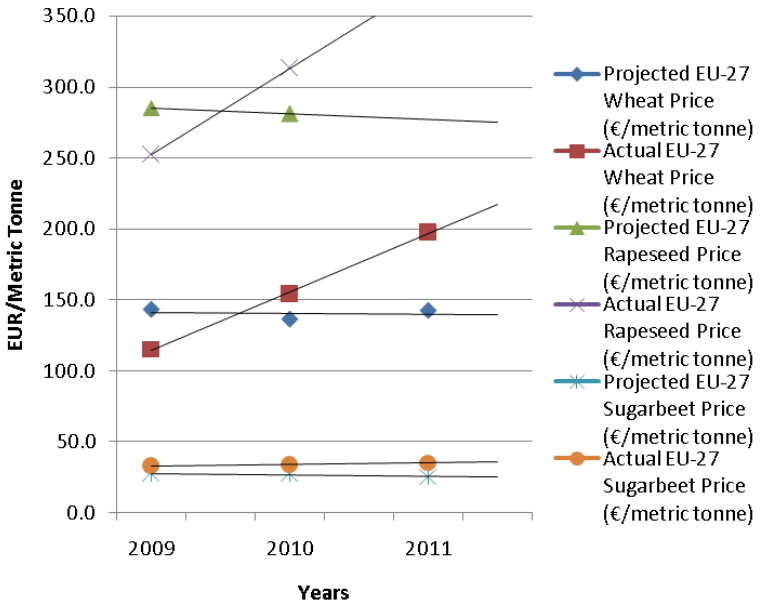

FIGURE 5. PROJECTED EU COMMODITY PRICES (MID-OIL SCENARIO) VERSUS ACTUAL MARKET PRICES.

5.0 Conclusions

The following conclusions were drawn from the study:

- This analysis has only assessed a short period relating to the FQD model's projected biofuel prices, so it is not possible to conclude biofuel prices have permanently diverged from projected estimates. However, we observe:
  - Ethanol prices for the last two years, 2011 and 2012, have moved above the FQD model's projected Central Scenario prices.
  - Biodiesel prices for 2011 fluctuated well above the projected Central Scenario prices, which were similar to the FQD model's projected prices for 2010 and 2012.
- Actual petrol and diesel prices were consistently higher for 2010 through 2012 than DfT's projected Central Price scenarios published in 2009 and then updated in 2010.
- Observed EU commodity prices for wheat, rapeseed and sugarbeet were compared against projected prices (per ton) generated by the OECD-FAO AGLINK-COSIMO model (under license by the British government) for the years 2009, 2010 and 2011. A small sample of years and commodities were analyzed limiting the extent to which major conclusions can be drawn on the degree of the variation between actual and projected prices generated by the OECD-FAO AGLINK-COSIMO model. However, this simple comparison of prices helps highlight that there are differences between projected prices and observed EU market prices, although it is not unusual that actual market prices differ significantly from the price paths projected by the AGLINK-COSIMO model, given variation or changes in underlying macroeconomic variables and weather conditions.
- While small variations between projected and actual prices for ethanol, biodiesel, petrol and diesel on a pence-per-litre basis may seem small, when these price differences are multiplied across the volumes of transport fuels used in the United Kingdom there are a number of knock-on effects. These can include additional costs borne by consumers from using more expensive biofuels and lower or higher than anticipated excise tax revenue from variations in the sale of volumes of petrol and diesel. Consequently, the level of accuracy with which the DfT is able to accurately project fossil-fuel and biofuel prices is important in developing policy and communicating to stakeholders anticipated fuel price trends. It is also important in evaluating whether the costs of the policy outweigh the related benefits.
- There is some uncertainty in accurately projecting production costs and final prices for ethanol and biodiesel; consequently, increasing the United Kingdom's biofuel blending mandate from 4.5 per cent (by volume content) would result in an increased amount of biofuels sold in the British fuels market at a price that is (a) difficult to project, and (b) potentially higher than anticipated.
- The analysis revealed that petrol and diesel prices were higher than forecasted during 2010 to 2012. Higher than anticipated petrol and diesel prices meant the additional costs biofuel mandates impose on consumers is reduced as the gap between the pump price for fossil fuels and biofuels closes, as fossil-fuel prices rise relative to the more expensive biofuels.
- The volatility in commodity markets (especially for British biofeedstocks such as wheat, sugarbeet and rapeseed) and oil markets (and the prices of refined petroleum products such as petrol and diesel produced from crude oil) is difficult to replicate within the FQD model. The FQD model assumes a linear trend from 2010 to 2020 for inputs such as biofeedstocks and fossil-fuel prices. Recent high volatility in commodity and oil markets will affect United Kingdom and European biofuel prices. Given the linear nature of the FQD model, any market fossil-fuel or commodity volatility during the 2010 to 2012 period would not be represented in the FQD model's ethanol and biodiesel price projections for 2010 to 2012.

- The model's usefulness is blunted by the extent of the range of outcomes represented by the Low, Central, High and High High scenarios, although this needs to be balanced against the need to provide ranges reflecting the uncertainty involved. The validity of the model requires ongoing assessment to determine if actual ethanol and biofuel prices begin to diverge from projected prices.
- This study emphasizes the uncertainty under which policy-makers must operate when developing biofuel price projections and trying to forecast the direction of markets impacting the production costs and final price for biofuels. The insights generated by modelling exercises—such as the DfT's—need to be balanced against the intrinsic challenges in anticipating long-term changes in prices, price responses and technology or the development of society, whether in response to international commodity or fuels markets or specific British or European policies.

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GSI Global Subsidies Initiative

iisd International Institute for Sustainable Development / Institut international du développement durable

Further details and contact information

For further information contact Kerryn Lang at: klang@iisd.org or +41-22-917-8920.

International Institute for Sustainable Development
Global Subsidies Initiative
International Environment House 2, 9 chemin de Balexert, 1219 Châtelaine, Geneva, Switzerland
Tel: +41 22 917-8373 | Fax: +41 22 917-8054