



Hale & Twomey

**Emissions Trading Scheme
Transport Fuels
Technical Advisory Group
Expert Advisory**

Prepared for

**Emissions Trading Group/ Ministry for the
Environment**

April 2008

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Thinking Energy

1.0 Introduction

A Transport Fuels Technical Advisory Group (TF TAG) has been established to provide advice and input for the development of the Climate Change (Liquid Fossil Fuels) Regulations 2008. The TF TAG has requested expert advice from Hale & Twomey in the form of recommendations to a number of issues that came out of the first meeting of the TF TAG and to issues raised in the Emissions Trading Bulletin No. 2. The list of questions asked is included in Appendix 4.

2.0 Issues to Resolve

2.1 Definition of Obligation Fuels

2.1.1 Customs and Excise Tax Definitions

Fuels have been defined in the draft regulations by reference to the Customs and Excise Act or the Tariff. Another option is to define fuels by way of technical description (e.g. Petroleum Product Specifications Regulations - PPSR). A preference during the first meeting of the TF TAG was expressed to use the Customs and Excise Act or Tariff definitions. However this does raise some issues as some of the definitions in these Acts are not well defined.

Some feedback has suggested that there should be a single set of definitions for petroleum fuels in one Act that all other legislation/regulation borrows. However this may require significant change to existing legislation which may be too difficult to consider at this stage.

Comment was also made that the regulations should state the intent - that all liquid domestic fuels typically directly combusted when used are included in the ETS. It should also state a process of how new fuels should be included (it was seen as impossible to try and predict future fuels and define them now).

Given the feedback and the intention to use the customs definitions the following is a summary of the issues:

- The regulations should state the intent of what should be included as obligations fuels
- The regulations should include a process on how to include a new fuel as an obligation fuel
- The excise definition for premium and regular motor spirit should be adjusted so the break point is 95 octane (note - Customs would not want to use the PPSR definition for regular as it would want to capture regular gasoline of under 91 octane that might then be blended with ethanol to make it on specification for the PPSR)
- It may be worth listing fuels specifically excluded for clarity (e.g. LPG, lighting kerosene, solvents, chemicals, lubricants)
- Fuel oil definitions need to be changed as covered in Section 2.1.2

On the excise definition for motor spirit, one company has suggested that there should only be one factor for motor spirit rather than two as is done in most other countries. This is a possibility although to remain consistent with the calculation of New Zealand's greenhouse gas inventory that would need to be changed as well as currently different factors are used. However it would avoid any need to change the excise definitions if only one factor was used.

Recommendations:

- *State the intent of what fuels are to be included as obligation fuels in the Regulations – e.g. all liquid fuels used in New Zealand that are typically directly combusted when*

consumed (note based on the Biofuel Bill, biofuels will be included as obligation fuels so the definition doesn't need to exclude them)

- *The regulations to include a process on how a new fuel is included as an obligation fuel*
- *Adjust the octane break point in the excise definition for premium and regular motor spirit to 95 octane (unless decision is made to change to a single motor spirit emissions factor)*
- *List fuels specifically excluded in the regulations for clarity (e.g. LPG, lighting kerosene, solvents, chemicals, lubricants)*

2.1.2 Fuel Oil Definitions

The Regulations currently lists five type of fuel oil as obligation fuels (6 (g) through 6 (k)). Light fuel oil, medium fuel oil, heavy fuel oil and bunker fuel oil are all grades regularly sold in New Zealand to defined specifications while power station fuel oil can vary depending on the requirements of the customer (and is generally infrequently produced).

The regulations also refer to 2710.19.93 which may not be correct. These are referred to as hydraulic oils which are different than the residual fuel oils being covered here. Residual fuel oils would be covered either by 2710.19.71/2710.19.73 (residual fuel oils) or other 2710.10.95/2710.19.99 (other). The residual fuel oil category does not split fuel oils at all where as "other" splits it into light, medium and heavy.

NZRC provides historic data on light, heavy and bunker fuel oil (medium fuel oil is a recent grade) but as sales data is only split between light fuel oil and heavy fuel oil, emissions factors are only produced for these grades for use in calculating New Zealand's greenhouse gas inventory. Power station fuel oil and bunker fuel oil are included as heavy fuel oil sales.

There is only a 0.3% difference in the energy content (MJ/l) between heavy and bunker fuel oil which results in a very similar emissions factor. It is reasonable to group heavy fuel oil, bunker fuel oil and power station fuel oil as a single group of heavy fuel oils with a single emissions factor (the factor derived for heavy fuel oil as these are the bulk of the sales) for the group. A definition for heavy residual fuel oil would cover bunker fuel oil and power station fuel oil without any adjustment.

There is also an argument that there should be no separate factor for medium fuel oil as these sales are grouped with light fuel oil in the sales data (and therefore greenhouse gas inventory). Arguably all fuel oils could be grouped as a single grouping of residual fuel oil although light fuel oil's emissions factor is 3% lower than heavy fuel oil (tonnes CO₂/kl) so the difference is reasonably significant.

Recommendations:

- *Reduce the current five categories of fuel oil to two.*
- *Refer to definition 2710.19.71/2710.19.73 for both light and heavy fuel oil as follows:*
 - (g) Light residual fuel oil referred to in item number 2710.19.71 0C or 2710.19.73 00F in chapter 27 of the Tariff and having a kinematic viscosity at 50°C of less than 80 centistokes
 - (h) Heavy residual fuel oil referred to in item number 2710.19.71 00C or 2710.19.73 00F in chapter 27 of the Tariff and having a kinematic viscosity at 50°C of greater than 80 centistokes

2.2 Complete list of obligation fuels

The current list of obligation fuels contains all the main fuels. It has already been agreed to not include minor fuels where the emissions from the fuels are negligible or the cost of collection of the necessary information about the fuel outweighs the benefit of including the

fuel in the ETS. The excluded minor fuels are fuels such as lighting kerosene, solvents, chemicals and lubricating oils.

A liquid fuel used that is not covered is reprocessed lubricant. This is turned into a fuel and used where residual fuel oil might have been used. As it doesn't pass an excise point this would currently be missed by the system. Assuming this is not going to be picked up in the stationary fuels section of the ETS it would need to be included here (in New Zealand the reprocessed lubricant fuel is used in the cement industry).

One issue raised is what if one of the excluded minor fuels becomes more significant over time and/or it begins to be used in similar service as one of the existing obligation fuels. This is perhaps best handled by the ability to add new obligation fuels and the definition of what is being covered in obligation fuels. For instance if a vehicle type started using lighting kerosene as a fuel this would be seen as a use change and something that should be covered by the definition of obligation fuels.

The current list is complete based on current and likely medium term expectations (future fuels covered in the next section). However it should be noted that the Biofuel Bill is amending the Customs and Excise Act 1996 and the Tariff Act 1988 so that the definitions referred to in Section 6 (obligation fuels) will now include biofuels and biofuel blends.

Far more likely is changes in what constitutes a biofuel – currently only biodiesel and ethyl alcohol (ethanol) produced from biomass are defined as qualifying biofuel. The Biofuel Bill allows a new biofuel to be prescribed by an Order in Council and this will be used if there are new biofuels (this is required so companies can count biofuels towards their obligation).

Rather than duplicate the Biofuel Bill it makes sense for the Climate Change Regulations to refer to qualifying biofuels which is defined in the Biofuel Bill. Feedback on this issue is dealt with in the Section 2.3.

Recommendation:

- *Decide if it is most appropriate to capture reprocess lubricant in the liquid fuels regulations and how it might be done.*
- *As covered in Section 2.1.1 the regulations need a process on how to handle adding new obligation fuels to cover changing use of existing fuels and/or new fuels.*

2.3 Future Fuels

Questions have been raised as to how to capture future fuels that are not on the current list of obligation fuels and how the government might keep up with changes in the market place.

Future fuels may include:

- Fuel produced from gas, coal or biomass to liquids processes (e.g. Fischer-Tropsch) which may be similar to an existing product (e.g. jet fuel, diesel) or classified as new products
- A low octane blend of petrol than is used as a blendstock for ethanol blending that, when blended, will meet the regular specification
- Biofuels (or renewable fuels) that are indistinguishable from their petroleum equivalents

In some of these cases the fuels should automatically be captured in the current definitions. For instance a fischer-tropsch diesel if being sold to the current diesel specifications will be covered as would a low octane petrol blendstock by the proposed definition.

However there could well be a new fuel developed that needs a new definition. In this case (as covered in 2.1.1) a process to add new fuels is required. In terms of the Government keeping up with the market and new fuels, the government (MED) needs to do this on a

monthly basis in reporting energy use (internally and to the International Energy Agency). Given the cost exposure it would seem industry and the government have a shared interest of clarity in establishing early liability or otherwise for new fuels.

Even if a new fuel is covered by an existing definition there is the ability in the proposed regulations to apply for a different emissions factor if significant. It has been suggested that this process should be included in the regulations not just in the supporting documentation.

Recommendation:

- *Consider including process for applying for a new emissions factor in the regulations.*

2.4 Fuels made from biomass

This issue has been partially covered in Section 2.2. A problem may arise if a biofuel blend has been produced by processing crude oil (or a crude oil derivative) and biomass together. In this case how is the amount of liable obligation fuel calculated?

As referred to in Section 2.2, in order for a biofuel (in addition to biodiesel and ethanol) to be accepted as a biofuel an Order in Council is required (Biofuel Bill). Companies will have an incentive to have any new biofuel accepted to count towards their biofuel obligation. For situations where biomass and crude oil are processed together there will need to be agreement as to what proportion shall be classified as biofuel from biomass.

Rather than duplicate a process that will take place under the Biofuel Bill, these Regulations should refer to qualifying biofuels under the Biofuel Bill. That will take care of new biofuels as they are accepted under the Biofuel Bill and use any proportional calculation agreed. If a biofuel is not accepted as qualifying biofuel under the Biofuel Bill then an emissions charge would apply depending on the type of product (what obligation fuel it is classified as).

Recommendation:

- *No special change needs to be made to take account of possible future biofuels. This is best managed through the Biofuel Bill - references to biofuels should refer to qualifying biofuels under the Biofuel Bill.*

2.5 Background policy documents

There has been discussion on whether some of the information in the background documents should be included in the regulations. The general view of officials to date (in drafting the regulations) is that to include them may be confusing to those using the regulations. However feedback from companies (as discussed in some of the previous sections) is that some of this background information should be included in the regulations.

These include (all from Emissions trading bulletin No 2: Climate Change (Liquid Fossil Fuels) Regulations 2008: draft for consultation):

- Emissions factors – the process of applying for a new emissions factor and the variation requirements should be included in the regulations.
- Stating the intent of what fuels should be (and shouldn't be) captured in obligation fuel definitions
- Including a process covering how new fuels are added to the obligation fuel definitions

Another suggested change was that emissions factors be expressed as tonnes CO₂/ KL rather than tonnes CO₂/ litre. This point is covered in Section 3.0.

Recommendation:

- *Consider including the items listed above in the regulations for additional clarity.*

2.6 Method of accounting for biofuels

The current methodology for calculating emissions proposes removing the biofuel component from the calculation by multiplying by the non-biofuel percentage of the fuel (factor B in the calculation in 8).

Companies are likely to meet their biofuel obligation a number of different ways. It is unlikely that they will have a uniform percentage of biofuel across a complete grade everywhere in the country. In order to calculate a factor as proposed in the climate change regulations they would first need to calculate all the litres of biofuel they are using (which they will be doing for their calculations required for the biofuel obligation).

Given that the industry works in litres and will have the data in litres it would be more logical to subtract the litres of biofuels from the litres of obligation fuel during the calculation in 7. While at the moment biofuels aren't obligation fuels they will be following modification of Schedule 3 of the Customs and Excise Act as proposed in the biofuel regulations. Therefore below are proposed changes to section 7.

Recommendation for Section 7 revision:

Collection of information for purposes of calculating emissions

An obligation fuel participant must collect the following information in relation to each type of obligation fuel owned by the participant at the time the fuel is removed for home consumption in accordance with the Customs and Excise Act 1996 or otherwise removed from a refinery in a year:

- a) the number of litres of obligation fuel removed for home consumption not including any qualifying biofuel as defined in Biofuel Bill.*
- b) the number of litres of obligation fuel removed from a refinery other than for home consumption not including any qualifying biofuel as defined in Biofuel Bill:*
- c) the number of litres of obligation fuel sold to any person for use on an international aviation or marine trip (other than a fishing trip) where the sale is zero rated for goods and services tax purposes not including any qualifying biofuel as defined in Biofuel Bill:*
- d) the number of litres of obligation fuel sold to an obligation jet fuel participant:*
- e) the number of litres of obligation fuel exported where the related sale is zero rated for goods and services tax purposes not including any qualifying biofuel as defined in Biofuel Bill –*
 - a. whether or not the fuel was previously removed for home consumption;*
 - and*
 - b. other than the circumstances in paragraph (c).*

There are other recommended changes to this section which are covered in Section 4.0.

2.7 Definition of a litre

When calculating excise taxes and duties the volume is measured in litres at 15°C which is standard for calculating volume. This is possible at the excise point as product is surveyed to give all the information for the calculation (specifically temperature and density and static tanks to survey from). To do a similar calculation when selling product is impossible unless similar information is obtained (which would be so expensive it would be prohibitive).

Therefore when selling product in New Zealand all sales are at ambient temperature. This is typical practice internationally including for jet fuel. For New Zealand this has never been seen as much of an issue as ambient temperatures are close to 15°C (in the main centres

they vary from 15.1°C in Auckland to 11.0°C in Dunedin¹). If the ambient temperature is higher than 15°C the volume will be overstated (you will get less than if it was measured at 15°C) and if the ambient temperature is lower than 15°C you will get more volume. While on average this would suggest the oil companies are losing out, the fact that New Zealand's average ambient temperature is lower than 15°C is probably offset by having more sales during the day when the temperature is a bit higher (although most sales are made from underground storage where if anything temperatures would be lower than ambient temperature).

To give an idea of the order of magnitude if one litre of petrol or diesel was purchased at the following temperatures this would be the corrected volume received (corrected to volume at 15°C).²

| Temperature | Petrol Volume | Jet Volume | Diesel Volume |
|-------------|---------------|------------|---------------|
| 5°C | 1.0122 | 1.0093 | 1.0086 |
| 10°C | 1.0061 | 1.0046 | 1.0043 |
| 15°C | 1.0000 | 1.0000 | 1.0000 |
| 20°C | 0.9939 | 0.9953 | 0.9957 |
| 25°C | 0.9877 | 0.9907 | 0.9913 |

Therefore for +/- 10°C swing in temperature petrol volume varies just over +/- 1% and diesel just under 1%. Given a debate about ambient temperatures in New Zealand is only dealing with variations of 1 or 2°C from 15°C, this variation can be regarded as insignificant.

One company proposed analysing all the companies jet sales by region and international/domestic split to see what the ambient temperature of domestic sales would be. This would take a reasonable amount of analysis and given the answer is expected to be very close to 15°C due to the weight of sales at Auckland this was not seen as adding a lot of value.

Recommendation:

- *Continue to use measure litres on the basis as already done in New Zealand – all imports and refinery production measured at 15°C and all sales at ambient temperature.*
- *No further work is done on this issue.*

2.8 Flow diagram

Simple flow diagrams of the fuel supply chain are shown in Appendix 1 along with the proposed calculation of volumes for the ETS. Two diagrams are shown – one with and one without biofuels. Biofuels complicates the flow diagram substantially.

2.9 Jet fuel left in tank at time of filling up

At times airlines use the same aircraft for both domestic and international flights. Domestic flights will incur an emissions charge for fuel used where as international flights won't.³

Therefore there is an issue regarding the status of the fuel in tank when an aircraft is switched between services (either the jet fuel left in tank will have incurred an emissions

¹ NIWA climate record information for the 1971-2000 period (see Appendix 3)

² Source of data for table Caleb Brett Petroleum Tables – Table 54B.

³ Note domestic fuel sales are captured separately from international sales as these are charged GST.

charge when it is now going to be used international or it won't have incurred a charge when it is now going to be used in domestic service).

It has been suggested that this problem could be resolved by airlines calculating their emissions on fuel burnt while aircraft are on domestic service rather than fuel purchased. This would mean:

- There is no issue with start and finish inventories when an aircraft changes service as only fuel used on domestic trips will be included.
- It prevents companies intentionally "importing" more jet fuel by aiming to have higher fuel levels when coming from an international flight than when they finish their domestic business in New Zealand (i.e. minimise jet fuel purchases for domestic use in New Zealand to avoid emissions charges).

However it does also have some downsides. These include:

- There will no longer be any definitive reconciliation between oil company sales to jet fuel participants (7(d)) and what an airline uses to calculate their emissions (10) although the numbers should be close.
- Where as jet fuel sales between an oil company and a jet fuel participant are firm numbers (invoiced amounts) fuel burnt is entered by the pilots and does not have the same rigour behind the number.
- It is likely to be more complicated to audit the airline as a lot more data will be required on consumption than with the proposed method (using domestic fuel purchased).

One airline had done some calculations on the difference between fuel purchased domestically and that from fuel burnt statistics and found a variation of 5% (fuel purchased domestically was higher). However on average one would expect the numbers to be similar especially as most of the planes used domestically (737s) do not have the capability to do a significant amount of bunkering across the Tasman. That is inventory on landing following an international trip (before switching to domestic service) should be similar to that just prior to loading fuel after domestic service before an international trip.

Recommendation

- *Unless a way can be found to have an auditable system for fuel burnt (and all airlines agree to the change) it is more straight forward to use the proposed system of basing domestic fuel used on sales of domestic jet fuel.*

3.0 Update of emissions factors

The emission factor details issued last year have been updated to include 2007 NZRC data. While this is a minor update as 10-year averages are used, it is important for premium petrol and diesel as in these cases the average energy contents used are only since the specification change at the end of 2005.

In general 2007 showed consistent properties with 2006 data. There is a small change to the diesel factor from a change to the average energy content but other changes are insignificant. These factors would now be set for the 2009-2012 period unless there was significant change as detailed in the Emissions Trading Bulletin No. 2, February 2008.

The other change to the emissions factors is to include the oxidation factor for the CO₂ emissions in the calculation of the factor. This means it can be taken out of the calculation in sections 8 and 10 of the Regulations and avoids the problem of it being factored into the CH₄ and N₂O emissions factors when it should not be.

BP has suggested that the factor be expressed in tonnes CO₂/ KL rather than tonnes CO₂/ litre. This seems logical so the change can be made if agreed. In addition in the Regulations (Schedule 2) the units should be shown

The form still shows five fuel oil grades but this will be reduced to two or three depending what is agreed from item 2.1 (b). The new factors are in Appendix 2.

Recommendation:

- *For TAG group to accept the factors as calculated for use in the ETS*
- *To adjust the units used for the factor to tonnes CO₂/ KL*
- *Include the units in Schedule 2 of the Regulations*
- *To reduce the fuel oil emissions factors to two/three in line with the proposed fuel oil split*

4.0 Calculation Changes

There is a question on the proposed calculation in Section 7/8. The calculation in 7 includes both (a) the number of litres of obligation fuel removed for home consumption and (b) the number of litres of obligation fuel removed from a refinery other than for home consumption. It was written this way as there was concern that "removal for home consumption" only covered petrol and automotive diesel, goods that were explicitly mentioned in Schedule 3 of the Customs and Excise Act.

The actual definition of removal for home consumptions in the Act is as follows:

"For the purposes of this Part of this Act, goods are deemed to be removed for home consumption when the goods are physically removed from a Customs controlled area otherwise than when they are –

- a) Moved to another Customs controlled area pursuant to an approval given by the Chief Executive and for such purposes as may be approved by the Chief Executive; or*
- b) Temporarily removed pursuant to an approval given by the Chief Executive and for such purposes as may be approved by the Chief Executive; or*
- c) Removed for export or to an export warehouse"*

Goods is not a defined term and our view the definition applies to any good removed for home consumption (i.e. all product streams) not just those listed in Schedule 3. It should be noted that all the refinery product streams are captured as goods in the Tariff Act.

Using this interpretation there is no need to capture (b) as that only captures refinery exports that are then subtracted in (e). Factor (b) could be removed but factor (e) may still be required to capture any product returned to the refinery for reprocessing/reblending (or in extreme cases exported).

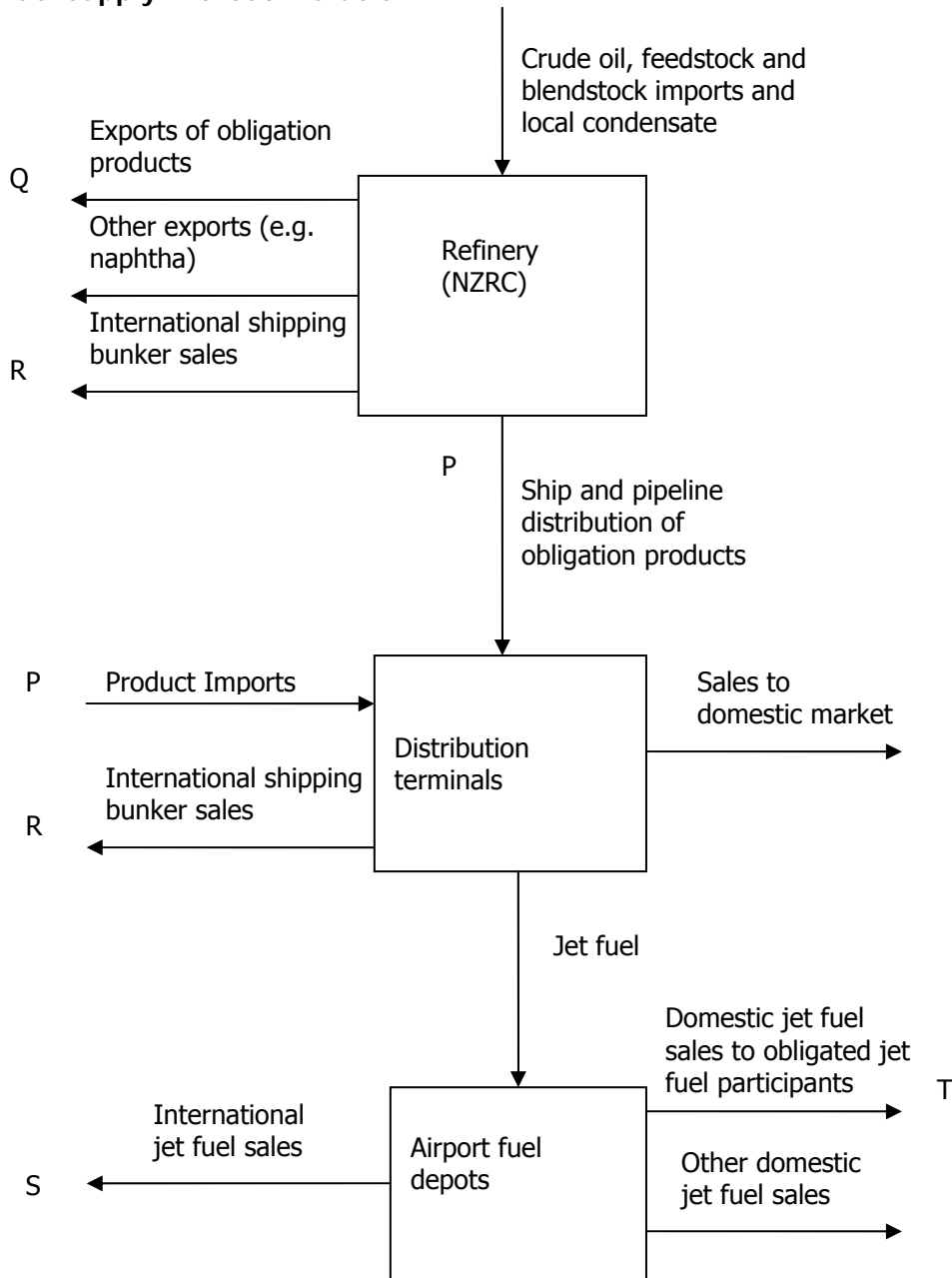
It should also be noted that if this interpretation is not correct (if we interpret removal for home consumption to only cover petrol and diesel) then the proposed calculation is not correct. It would not capture imported jet fuel, aviation gasoline and fuel oil as none of these would be "removed for home consumption" when imported and would not be picked up in (b) when the refinery produced product is picked up.

Recommendation:

- *Get a legal view to ensure the definition of Removal for home consumption in the Customs and Excise Act covers all fuels. If it does modify the calculation in 7 to remove (b) and modify (e) – (e) should only cover any product returned to the refinery after passing through the excise point or exported after passing the excise point. If the opinion is the definition only covers petrol and diesel then modify the definition of (b) to ensure all imported products not captured in (a) are covered.*

Appendix 1: New Zealand's Fuel Supply

1. Fuel supply without Biofuels



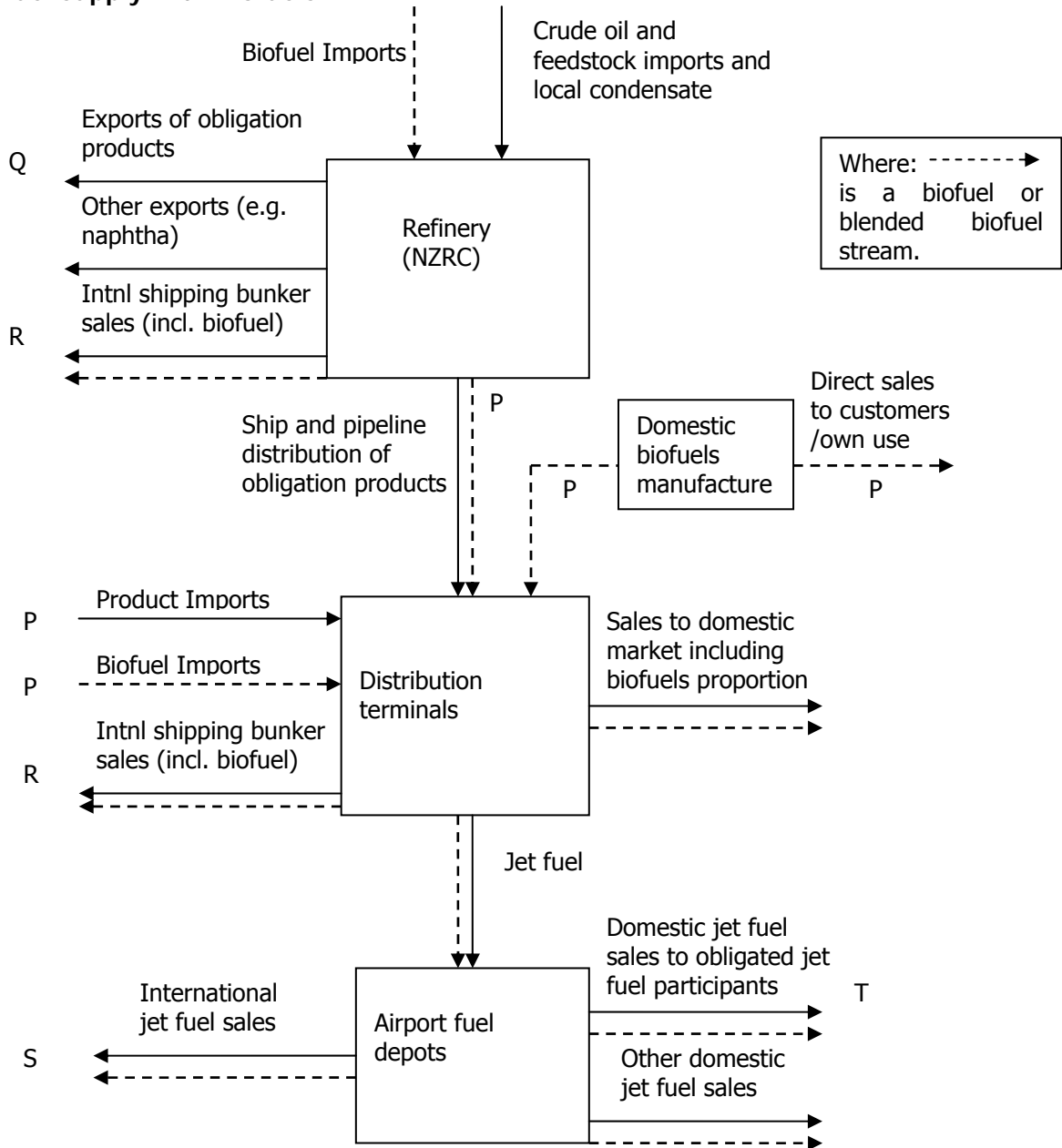
Where:

- P = Excise tax location
- Q = Exports from a bonded location
- R = sales of international bunkers (excluding jet)
- S = International jet fuel sales
- T = Sales of domestic jet fuel to obligated jet fuel participants

And:

- 7(a) $A = \sum \text{volume across P}$
- 7(b) $B = \sum \text{volume across Q}$
- 7(c) $C = \sum \text{volume across R \& S}$
- 7(d) $D = \sum \text{volume across T}$
- 7(e) $E = \sum \text{volume across Q}$
- $L = (A+B) - (C+D+E)$

2. Fuel supply with Biofuels



Where:

P = Excise tax location (removal from bonded location for home consumption)

measuring total and biofuel volumes (required for biofuel obligation)

Q = Exports from a bonded location

R = Sales of international bunkers (excluding jet)

S = International jet fuel sales

T = Sales of domestic jet fuel to obligated jet fuel participants

And:

7(a) $A = \sum \text{volume across P} - \sum \text{biofuel volume across P}$

7(b) $B = \sum \text{volume across Q}$

7(c) $C = \sum \text{volume across R \& S} - \sum \text{biofuel volume across R \& S}$

7(d) $D = \sum \text{volume across T} - \sum \text{biofuel volume across T}$

7(e) $E = \sum \text{volume across Q}$

$L = (A+B) - (C+D+E)$

Appendix 2: Updated Emissions Factors

Emission factors to be used for the ETS

| Emission Source Category | Emission Source | Gas | CO2 Emission Factor ktCO2/PJ | Energy Contents MJ/litre | GWP | Oxidation Factor | Emission Factors (includes GWP) tCO2/l | |
|--------------------------|---------------------------|------------------------|---------------------------------|-----------------------------|-------|------------------|--|----------|
| Petrol | Premium 98 | CO2 | 67.0 | 35.24 | 1 | 99% | 0.00234 | |
| | | CH4 | 0.01852 | 35.24 | 21 | 100% | 0.000014 | |
| | | N2O | 0.00143 | 35.24 | 310 | 100% | 0.000016 | |
| | | Total | | | | | 0.002367 | |
| | Premium 95 | CO2 | 67.0 | 35.24 | 1 | 99% | 0.00234 | |
| | | CH4 | 0.01852 | 35.24 | 21 | 100% | 0.000014 | |
| | | N2O | 0.00143 | 35.24 | 310 | 100% | 0.000016 | |
| | | Total | | | | | 0.002367 | |
| | Regular 91 | CO2 | 66.2 | 34.81 | 1 | 99% | 0.00228 | |
| | | CH4 | 0.01852 | 34.81 | 21 | 100% | 0.000014 | |
| | | N2O | 0.00143 | 34.81 | 310 | 100% | 0.000015 | |
| | | Total | | | | | 0.002310 | |
| Diesel | Automotive diesel | CO2 | 69.5 | 38.12 | 1 | 99% | 0.00262 | |
| | | CH4 | 0.00380 | 38.12 | 21 | 100% | 0.000003 | |
| | | N2O | 0.00371 | 38.12 | 310 | 100% | 0.000044 | |
| | | Total | | | | | 0.002670 | |
| | Marine diesel | CO2 | 69.5 | 38.12 | 1 | 99% | 0.00262 | |
| | | CH4 | 0.00380 | 38.12 | 21 | 100% | 0.000003 | |
| | | N2O | 0.00371 | 38.12 | 310 | 100% | 0.000044 | |
| | | Total | | | | | 0.002670 | |
| | Aviation | Aviation gasoline | CO2 | 65.0 | 33.87 | 1 | 99% | 0.00218 |
| | | | CH4 | 0.00190 | 33.87 | 21 | 100% | 0.000001 |
| | | | N2O | 0.00190 | 33.87 | 310 | 100% | 0.000020 |
| | | | Total | | | | | 0.002201 |
| Jet fuel | | CO2 | 68.1 | 37.10 | 1 | 99% | 0.00250 | |
| | | CH4 | 0.00190 | 37.10 | 21 | 100% | 0.000001 | |
| | | N2O | 0.00190 | 37.10 | 310 | 100% | 0.000022 | |
| | | Total | | | | | 0.002525 | |
| Fuel Oil | | Light fuel oil (40cst) | CO2 | 72.0 | 40.38 | 1 | 99% | 0.00288 |
| | | | CH4 | 0.00665 | 40.38 | 21 | 100% | 0.000006 |
| | | | N2O | 0.00190 | 40.38 | 310 | 100% | 0.000024 |
| | | | Total | | | | | 0.002908 |
| | Medium fuel oil (80 cst) | CO2 | 72.8 | 40.60 | 1.00 | 99% | 0.00292 | |
| | | CH4 | 0.00665 | 40.60 | 21 | 100% | 0.000006 | |
| | | N2O | 0.00190 | 40.60 | 310 | 100% | 0.000024 | |
| | | Total | | | | | 0.002953 | |
| | Heavy fuel oil (180 cst) | CO2 | 73.5 | 40.81 | 1 | 99% | 0.00297 | |
| | | CH4 | 0.00665 | 40.81 | 21 | 100% | 0.000006 | |
| | | N2O | 0.00190 | 40.81 | 310 | 100% | 0.000024 | |
| | | Total | | | | | 0.002999 | |
| | Bunker fuel oil (380 cst) | CO2 | 73.5 | 40.94 | 1 | 99% | 0.00298 | |
| | | CH4 | 0.00665 | 40.94 | 21 | 100% | 0.000006 | |
| | | N2O | 0.00190 | 40.94 | 310 | 100% | 0.000024 | |
| | | Total | | | | | 0.003009 | |
| | Power station fuel oil | CO2 | 73.5 | 40.81 | 1 | 99% | 0.00297 | |
| | | CH4 | 0.00665 | 40.81 | 21 | 100% | 0.000006 | |
| | | N2O | 0.00190 | 40.81 | 310 | 100% | 0.000024 | |
| | | Total | | | | | 0.002999 | |

Notes

- 1 Energy emissions factors from GHG inventory
- 2 All energy contents NZRC average 1998-2007 except:
 - Premium petrol (2006/2007)
 - Diesel (50ppm diesel average only)
 - Aviation gasoline (Table L2 MED Energy Data File)
- 3 All petrol 95 octane and above is assumed to have the same emissions factor
- 4 All diesel is assumed to have the same emissions factor (as long as only one grade produced and sold in New Zealand)
- 5 GWP: Global warming potential
- 6 Medium fuel oil qualities are assumed at the average of light and heavy fuel oil
- 7 Power station fuel oil is assumed to be the same as heavy fuel oil (180cst)
- 8 Qualities will be reviewed annually but change will only be made if there is an ongoing significant trend (greater than 0.5% movement) showing a change from the data used to calculate these factors.

Appendix 3: NIWA Climate Data

SUMMARY CLIMATE INFORMATION FOR SELECTED NEW ZEALAND LOCATIONS

Data are mean annual values for the 1971-2000 period, for locations having at least 5 complete years of data

Extreme temperatures are for the full historical record

Station details for each location are available in separate table

Monthly temperature and rainfall data for each location are recorded in separate tables

| Location | Rainfall | Wet-days | Sunshine | Temperature | | | Ground frost | Wind | Gale days |
|------------------|-------------|-----------|-------------|-------------|-----------------------|----------------------|--------------|--------------------|----------------------------------|
| | mm | >= 1.0 mm | hours | Mean °C | Very Highest °C | Very Lowest °C | days | mean speed km/h | mean speed at least 63km/h |
| KAITAIA | 1334 | 134 | 2070 | 15.7 | 30.2 | 0.9 | 1 | 15 | 2 |
| WHANGAREI | 1490 | 132 | 1973 | 15.5 | 30.8 | -0.1 | 11 | 16 | 1 |
| AUCKLAND | 1240 | 137 | 2060 | 15.1 | 30.5 | -2.5 | 10 | 17 | 2 |
| TAURANGA | 1198 | 111 | 2260 | 14.5 | 33.7 | -5.3 | 42 | 16 | 5 |
| HAMILTON | 1190 | 129 | 2009 | 13.7 | 34.7 | -9.9 | 63 | 12 | 2 |
| ROTORUA | 1401 | 117 | 2117 | 12.8 | 31.5 | -5.2 | 57 | 13 | 1 |
| GISBORNE | 1051 | 110 | 2180 | 14.3 | 38.1 | -5.3 | 33 | 15 | 2 |
| TAUPO | 1102 | 116 | 1965 | 11.9 | 33.0 | -6.3 | 69 | 13 | 2 |
| NEW PLYMOUTH | 1432 | 138 | 2182 | 13.7 | 30.3 | -2.4 | 15 | 20 | 5 |
| NAPIER | 803 | 91 | 2188 | 14.5 | 35.8 | -3.9 | 29 | 14 | 3 |
| WANGANUI | 882 | 115 | 2043 | 14.0 | 32.3 | -2.3 | 7 | 18 | 5 |
| PALMERSTON NORTH | 967 | 121 | 1733 | 13.3 | 33.0 | -6.0 | 38 | 17 | 3 |
| MASTERTON | 979 | 130 | 1915 | 12.7 | 35.2 | -6.9 | 60 | 11 | 1 |
| WELLINGTON | 1249 | 123 | 2065 | 12.8 | 31.1 | -1.9 | 10 | 22 | 22 |
| NELSON | 970 | 94 | 2405 | 12.6 | 36.3 | -6.6 | 88 | 12 | 2 |
| BLenheim | 655 | 76 | 2409 | 12.9 | 36.0 | -8.8 | 60 | 13 | 4 |
| WESTPORT | 2274 | 169 | 1838 | 12.6 | 28.6 | -3.5 | 26 | 11 | 2 |
| KAIKOURA | 844 | 86 | 2090 | 12.4 | 33.3 | -0.6 | 27 | 15 | 28 |
| HOKITIKA | 2875 | 171 | 1860 | 11.7 | 30.0 | -3.4 | 54 | 11 | 2 |
| CHRISTCHURCH | 648 | 85 | 2100 | 12.1 | 41.6 | -7.1 | 70 | 15 | 3 |
| MT COOK | 4293 | 161 | 1532 | 8.8 | 32.4 | -12.8 | 140 | 10 | 5 |
| LAKE TEKAPO | 600 | 78 | 2180 | 8.8 | 33.3 | -15.6 | 149 | 7 | 1 |
| TIMARU | 573 | 81 | 1826 | 11.2 | 37.2 | -6.8 | 84 | 12 | 6 |
| MILFORD SOUND | 6749 | 186 | 1800* | 10.3 | 28.3 | -5.0 | 56 | 9 | 9 |
| QUEENSTOWN | 913 | 100 | 1921 | 10.7 | 34.1 | -8.4 | 107 | 12 | 2 |
| ALEXANDRA | 360 | 66 | 2025 | 10.8 | 37.2 | -11.7 | 148 | 6 | 3 |
| MANAPOURI | 1164 | 129 | 1700* | 9.3 | 32.0 | -8.1 | not measured | 10 | not measured |
| DUNEDIN | 812 | 124 | 1585 | 11.0 | 35.7 | -8.0 | 58 | 15 | 8 |
| INVERCARGILL | 1112 | 158 | 1614 | 9.9 | 32.2 | -9.0 | 94 | 18 | 18 |
| CHATHAM ISLANDS | 855 | 133 | 1415 | 11.4 | 28.5 | -2.3 | 4 | 25 | 16 |
| SCOTT BASE | not measure | 89** | not measure | -19.6 | 6.0 | -57.0 | 365 | 21 | 27 |

* Estimated from mapped NZ sunshine hours

** Days with snow

Appendix 4: Request for Recommendations

TF TAG Memo

25 March 2008

Request for recommendations by external expert

Background

The Transport Fuels Technical Advisory Group would like to receive advice in the form of recommendations from Hale and Twomey regarding a series of issues that relate to the Climate Change (Liquid Fossil Fuels) Regulations 2008 and the related commentary (contained in Emissions Trading Bulletin No. 2).

The source of the issues in this list is:

- Emissions Trading Bulletin No.2
- Further Items noted for discussion at the first meeting of the TF TAG
- New items noted in the minutes of the first meeting of the TF TAG.

The minutes of the first meeting of the TF TAG are attached for your reference.

Issues to resolve

1. Definition of obligation fuels

- a. Obligation fuels have been defined in the draft of the regulations by reference to the Customs and Excise Act 1996 or the Tariff.

Another option would be to define the fuels by way of a technical description, as has been done in the Petroleum Products Specifications Regulations. These regulations cover only petrol and diesel. They have been defined as follows:

- Premium grade petrol means petrol supplied as having a research octane number of 95 or higher.
- Regular grade petrol means petrol supplied as having a research octane number of at least 91 but less than 95.
- Diesel means a refined petroleum distillate having a viscosity and distillation range that is intermediate between those of kerosene and light lubricating oil, whether or not it contains additives, and that is intended for use as fuel in internal combustion engines ignited by compression.

During the first meeting of the TF TAG a preference was expressed by members to use the definitions as contained in the Customs and Excise Act 1996 and the Tariff.

Please provide a recommendation on how best to define obligation fuels in the regulations, taking into consideration the views of the TF TAG.

- b. There are two obligation fuels that are not defined in the Bill: these are bunker fuel oil and power station oil.

During the first meeting of the TF TAG it was suggested that these fuels would be caught by the item 'heavy hydraulic oils and other heavy oils' that is on the obligation fuel list (reference in the draft regulations is 6(i)).

Please confirm that this definition would cover bunker fuel oil and power station oil as the draft regulations stand. Alternatively advise if further clarification would be useful such as through an explanatory note to the Regulations.

2. Complete list of obligation fuels

A complete list of obligation fuels is required to ensure the ETS captures all material sources of greenhouse gas emissions from liquid fossil fuels. The list of obligation fuels should not include those fossil fuels that do not tend to be used in such a way that results in emissions (i.e., are not combusted).

It should also not include fuels where the emissions from the fuel are negligible or the cost of collection of the necessary information about the fuel outweighs the benefit of including the fuel in the ETS. Thus, the ETS should not cover lightening kerosene, solvents (e.g., naphtha), chemicals (e.g., methanol) and lubricating oils because the emissions associated with them are negligible (about 0.0235 tCO² per year) and further they are often not combusted and therefore may not result in emissions.

Members of the TAG indicated that they were not aware of any additional fuels, except the New Zealand Refining Company, who uses other fuels during their production process. Officials have had a follow-up discussion with NZRC who will inform officials about an appropriate name or names for the intermediate products that they use.

Please confirm that based on current and likely medium term expectations about New Zealand fuel supply industry, whether the list is complete list or not.

3. Future fuels

At present the draft liquid fossil fuel regulations include a finite list of obligation fuels. It would not therefore capture a fuel that is not on the list. If a fuel is imported or produced in New Zealand that is a fossil fuel but is not on the list, then it would not be captured by the ETS without amendment to the regulations. One possibility would be to amend the Bill to provide for such a situation and require the participant concerned to obtain a unique emission factor. Without a change to the Bill, it is effectively up to the government to keep abreast of what is happening in the market and add new fuels to the obligation fuels covered by the regulations (with default emission factor) as they come to market.

It is not clear how likely it is that a fuel that is not listed in the regulations would be supplied in New Zealand. Also, the way in which the fuels are defined will influence whether a new fuel is more likely to be captured or not.

Please provide comment and if possible a recommendation about how to capture fuels that are not currently supplied in New Zealand and that may not be caught by the current list of obligation fuels.

This issue was not discussed at the TF TAG meeting. Therefore feedback has been sought by email from members. Date of feedback was not specified – therefore officials will follow-up this week. Please take feedback received prior to Friday 28 March into consideration.

4. Fuels made from biomass

Biofuels are exempt from the ETS and are therefore not listed as an obligation fuel. Biofuel blends are managed through the use of the biofuel factor when calculating emissions from a particular fuel. However, if a fuel is made by processing crude oil and biomass together, the biofuel factor may not enable a reduction in emissions from fossil fuels to be recognised. This situation needs to be clarified in the liquid fossil fuel regulations so that emissions from fossil fuels are not overstated (i.e., so the ETS does not capture emissions from fuels made from biomass).

Please recommend how these fuels could be taken into consideration. For example, could the use of the term 'biomass' rather than 'biofuels' be sufficient?

This issue was not discussed at the TF TAG meeting. Therefore feedback has been sought by email from members. Date of feedback was not specified – therefore officials will follow-up this week. Please take feedback received prior to Friday 28 March into consideration.

5. Background policy documents

This commentary contains some substantive background information relevant to the draft of the liquid fossil fuel regulations. The content of the draft is made up of the core elements of the methodology for monitoring and calculating emissions. These are the aspects of the methodology that will have legal force.

However, in theory, the regulations could contain some or all of the 'decisions' contained in this commentary. For example, the regulations could set out the process for calculation of the emission factors that are reflected in Annex 1 and include the table, which provides full details of the calculation of the emission factors for all fuels.

The draft regulations reflect the view that these matters are appropriately dealt with outside the regulations and to include them would merely be confusing to those using the regulations.

Please comment on whether you think the regulations contain correct information or if some of the details contained in the commentary (the emissions trading scheme Bulletin No2, February 2008).

This issue was not discussed at the TF TAG meeting. Therefore feedback has been sought by email from members. Date of feedback was not specified – therefore officials will follow-up this week. Please take feedback received prior to Friday 28 March into consideration.

6. Method for accounting for biofuels

There is a need to ensure that the methodologies account for accurately and simply.

The way biofuels are handled in the present draft of the regulations may be difficult as biofuels could be both blended in the obligation fuel and in the calculation of 7(c) - not common but possible in sales of international bunkers. The alternative is - in calculation 8 (2) each of the factors A through E should have any biofuel component subtracted before doing that calculation (strictly speaking this should be done anyway as biofuel is not an obligation fuel so shouldn't be counted in the first place even if blended). There would then be no need to multiply by B.

Please provide some recommended amendments to the regulations to ensure that biofuels get accounted for appropriately. This may mean accounting for biofuels at each of 7 (a) to (e) rather than after summing all of the litres from 7 (a) to (e) for each obligation fuel. Noting that officials support the suggestion that under 8 (1) T would be separately identified for each product/obligation fuel.

7. Definition of a litre

During the first TF TAG meeting, the issue of how to define a litre was raised.

Please analyse the financial and emissions materiality of using a definition of 15 degrees for all transactions relating to the calculation of emissions under the regulations vs. using ambient temperature or some other measure.

8. Flow diagram

Please prepare a flow diagram of the fuel supply chain (including where biofuels may come into the picture) and the calculation of emissions for the emissions trading scheme.

9. Jet fuel left in tank at time of filling up

During a follow-up meeting with members of the airline industry, the question of how to manage any fuel left in the tank of aircraft where the use of the aircraft is switched between domestic and international flights.

Please provide brief comment on the financial and emissions materiality of attempting to account for this fuel, as well as the administrative costs.