COMMENTS ON TALLOW RENEWABLE DIESEL

FOR THE

LOW CARBON FUEL STANDARD DEVELOPMENT

Prepared For:

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EXECUTIVE SUMMARY

California has taken a lead in North America of promoting, developing, and implementing a Low Carbon Fuel Standard (LCFS) for transportation fuels. The concept is that the effective carbon content of transportation fuels will be reduced by 10% by the year 2020. The means of achieving this reduction will be left to the marketplace but the benefits of all of the fuel options will be determined through a lifecycle assessment of each fuel. Other states and some Canadian provinces have announced plans to follow California's lead or are considering doing so.

The California Air Resources Board (CARB) has begun to release a series of papers, each one covering a fuel production pathway, and inviting comments on the results and findings of the California GREET model. A report covering Renewable Diesel fuel from Tallow was released on July 20, 2009. This pathway is not currently included in GREET and the most recent version of GREET released by CARB is from February 2009, so the details of this pathway are not currently available. The comments that are provided here are therefore based only on the draft document released by CARB.

The report shows that the GHG emissions for this pathway are 29.70 g CO_2eq/MJ of fuel. This represents a 68 % reduction compared to the reference diesel fuel. CARB has determined that there are no indirect land use emissions associated with this fuel.

The pathway is relatively simple and CARB have generally done a good job in identifying the relevant inputs into the process that are required for modelling purposes. The system that CARB has analyzed has not included the co-products from the rendering process and this oversight can have a significant impact on the emissions.

The energy consumed in the rendering process should be allocated between the two products, the tallow and the meat and bone meal. CARB has used energy allocation in the soybean pathway to allocate between the products and the same approach could be used here.

Using a mass ratio of 60% oil and 40% meal from the rendering process, the energy ratio of the products will be 77% allocated to the oil and 23% allocated to the meal. This would lower the emissions for the tallow production stage by 3.9 g/MJ. The lifecycle emissions for the tallow renewable diesel fuel would be reduced to 25.8 g/MJ.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

Climate change advocates point to increased levels of anthropogenic carbon emissions as the primary cause of global warming. As such, most greenhouse gas mitigation strategies are focused on reduction of carbon dioxide (CO_2) in the atmosphere. Since typically 30-40 percent of all carbon emissions are derived from mobile sources, automobiles and off-road equipment serve as focal points for many of these policies.

California has taken a lead in North America of promoting, developing, and implementing a Low Carbon Fuel Standard (LCFS) for transportation fuels. The concept is that the effective carbon content of transportation fuels will be reduced by 10% by the year 2020. The means of achieving this reduction will be left to the marketplace but the benefits of all of the fuel options will be determined through a lifecycle assessment of each fuel. Other states and some Canadian provinces have announced plans to follow California's lead or are considering doing so.

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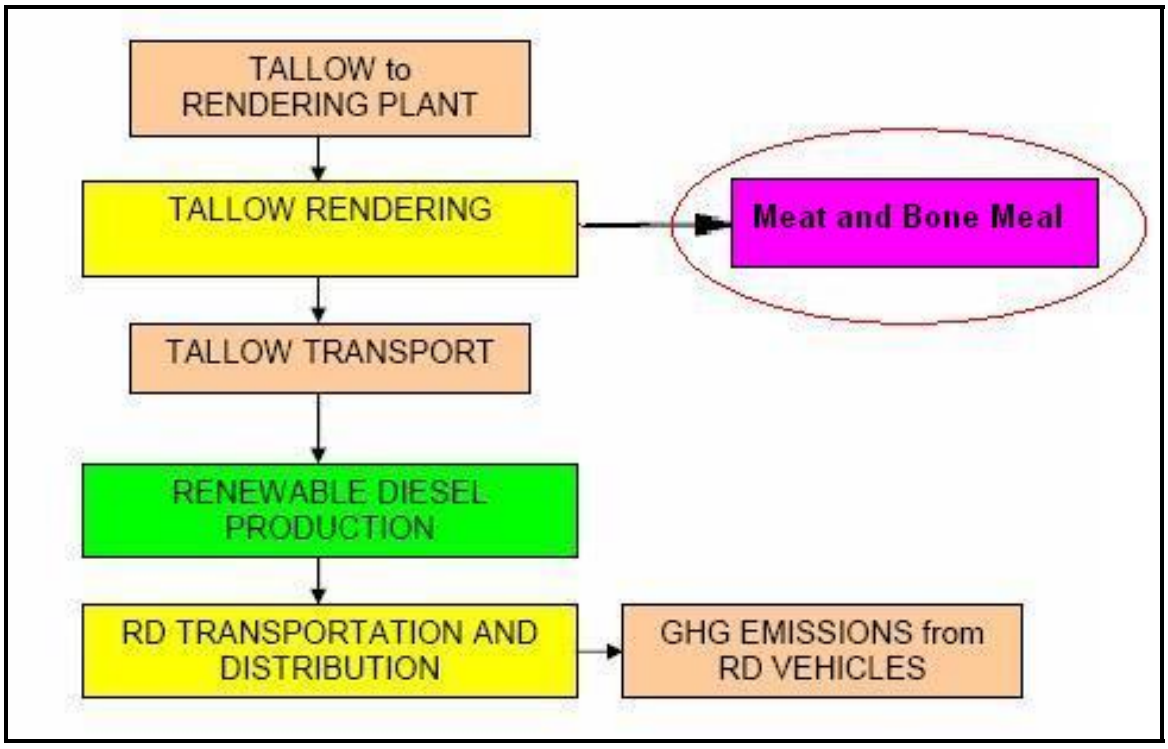
2. CO-PRODUCTS FROM RENDERING

Tallow is produced from the mechanical and thermal processing of animal carcass. The process converts the waste carcass into two products, a fat called tallow and a high protein meal called meat and bone meal. The tallow pathway as modelled by California is shown in the following figure. The meat and bone meal box circled in the following figure is missing from the CARB analysis.

Figure 2-1 RD from Tallow Pathway



The ratio of tallow to the meat and bone meal can vary from facility to facility due to feedstock variations and the specifications of the products produced. The US Census does produce monthly statistics for this sector. The data for 2007 and 2008 are summarized in the following table. The data for these two years is fairly consistent.

Table 2-1 US Production of Rendered Products

	2007	2008
	Million pounds	
Edible tallow	1,788.9	1,793.9
Inedible tallow and grease	6,628.3	6,351.1
Inedible tallow	3,808.5	3,550.9
Grease	2,819.7	2,800.2
Yellow grease	1,543.2	1,695.5
Other grease	1,276.5	1,104.7
Lard	465.7	490.7
Poultry fat	1,377.5	1,453.6
Total fats	**10,260.4**	**10,089.3**
Meat and bone meal and tankage	5,287.8	5,101.1
Feather meal	879.0	892.5
Poultry by-products meal	1,490.4	1,600.1
Total Meals	**7,657.2**	**7,593.7**

The energy consumed in the rendering process should be allocated between the two products, the tallow and the meat and bone meal. CARB has used energy allocation in the soybean pathway to allocate between the products and the same approach could be used here. The energy content of the tallow will be very similar to that of soy oil, 16,000 BTU/lb (37,333 MJ/kg) as used in the GREET model.

The energy content of meat and bone meal will vary with the feedstock mix. The final product can have varying moisture and ash contents, which will impact the energy content. Denafas et al reported energy contents from 15.7 to 18.1 MJ/kg for meat and bone meal from five different European countries.

Using a mass ratio of 60% oil and 40% meal from the rendering process, the energy ratio of the products will be 77% allocated to the oil and 23% allocated to the meal. This would lower the emissions for the tallow production stage by 3.9 g/MJ. The lifecycle emissions for the tallow renewable diesel fuel would be reduced to 25.8 g/MJ.

3. REFERENCES

Denafas, G., Buinevicius, K., Urniezaite, I., Puskorius, R., Rekasius, J. Meat and Bone Meal Incineration in Terms of Industrial and Energetic Infrastructure in Lithuania: Energetic and Environmental Aspects. Environmental Research, Engineering and Management, 2004. No.4 (30), P.36-48. http://www1.apini.lt/includes/getfile.php?id=188

US Census. 2009. Fats and Oils, Production, Consumption, and Stocks – M311K. http://www.census.gov/cir/www/311/m311k.html