PRELIMINARY ANALYSIS: UNITED STATES POLICY & MARKET ANALYSIS ON CRUDE OIL, GASOLINE, CORN AND ETHANOL

- AS REQUESTED BY GMA -

FOCUS ON: THE RENEWABLE FUELS STANDARD (RFS), THE FEDERAL TAX CREDIT FOR RENEWABLE ETHANOL (VEETC) AND THE RELATED IMPORT TARIFF FOR FUEL ETHANOL

A Preliminary Analysis Prepared for GMA

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TABLE OF CONTENTS

I. EXECUTIVE SUMMARY – OVERVIEW PG. 3-10

PROJECT SCOPE – SUMMARY OF TASKS PG. 3

ANALYSIS REGARDING TO ITEM A: PG. 4

OVERALL MARKETPLACE ECONOMICS & PUBLIC POLICY BACKGROUND PG. 4

ANALYSIS REGARDING ITEM B PG. 7

ANALYSIS REGARDING ITEM C PG. 9

ANALYSIS REGARDING ITEM D PG. 10

II. APPENDICES PG. 11

APPENDIX A: BASE CASE 2008 ($.51 VEETC) PG. 13

APPENDIX B: BASE CASE 2008 ($.40 VEETC) PG. 15

APPENDIX C: BASE CASE 2008 ($.35 VEETC) PG. 17

APPENDIX D: BASE CASE 2008 ($.30 VEETC) PG. 19

APPENDIX E: BASE CASE 2008 ($.25 VEETC) PG. 21

APPENDIX F: BASE CASE 2008 ($.00 VEETC – ELIMINATION) PG. 23

APPENDIX G: BASE CASE 2009 ($.45 VEETC) PG. 25

APPENDIX H: BASE CASE 2009 ($.40 VEETC) PG. 27

APPENDIX I: BASE CASE 2009 ($.35 VEETC) PG. 29

APPENDIX J: BASE CASE 2009 ($.30 VEETC) PG. 31

APPENDIX K: BASE CASE 2009 ($.25 VEETC) PG. 33

APPENDIX L: BASE CASE 2009 ($.00 VEETC – ELIMINATION) PG. 35

Preliminary Hart Policy and Market Analysis Related to Crude, Gasoline, Corn and Ethanol as Requested by GMA

- The United States crude oil, gasoline, corn, and ethanol markets are currently in a wide state of market and price fluctuation. Primary global drivers include:
  - Enormous incremental demand and strategic price transformation in global crude oil markets as established by the OPEC countries – and record new crude oil and refined product demand worldwide - primarily driven by the subsidized wholesale and retail gasoline and diesel motor fuel markets in India and China,
  - Record high worldwide crude oil prices, and the large resulting pressure on US wholesale and retail gasoline prices – all of which established new historic highs in calendar year 2008,
  - New supply pressures on the US corn market created by inclement weather and widespread flooding in 2008,
  - New demand for corn both from the growing US renewable ethanol gasoline market, and expanding global export markets for corn, due in part to abnormally dry weather
  - An unexpectedly large depreciation (20-30%) in the value of US currency compared to other major trading partners such as the European Union, China, Canada, and Brazil over the last two years.

- Hart has been asked by GMA to assist in attempting to quantify impacts on these widely fluctuating markets by analyzing potential changes in the US Public Policy arena related to the following:
  - The Renewable Fuel Standard (RFS) – Established by the Energy Independence Security Act (EISA) in December 2007
  - The Federal Excise Tax Credit for Renewable Ethanol (VEETC)
  - Changes or Elimination of the Current Import Duty for Renewable Ethanol Imported into the United States - Primarily from the Country of Brazil (Not Including the Caribbean Nations Already Importing Ethanol Largely Duty-Free).

- Specifically, Hart was asked to:
  - **Item A**: Analyze the impacts of changes in the corn RFS for 2008 and 2009 on wholesale gasoline prices, including reductions in the RFS to 6.5 billion gallons, 7 billion gallons, 7.5 billion gallons, and 8 billion gallons.

  - **Item B**: Analyze the impacts of changes in the tax credit for corn ethanol on the wholesale price of gasoline prices, such as reductions to 40 cents, 35 cents, 30 cents, and 25 cents in 2008 and 2009. Hart was also asked to analyze the impact of reducing the tax credit to 0.

  - **Item C**: Analyze the impacts of changes in the tariff on imported renewable ethanol on wholesale gasoline prices. In addition, Hart was also asked to provide a scenario with the removal of the tariff on imported renewable ethanol for fuel use.

  - **Item D**: Analyze the impact of potential changes in the RFS, and potential changes on VEETC on global petroleum prices.

This preliminary analysis is assisted by foundation analytical work which is provided in the Base Case for

the current market comparing a range of costs related to ethanol production – with estimated ethanol transaction values with US refiners and gasoline marketers based on varying crude oil, gasoline prices, and refiner blend values. These comparisons for the Base Case are provided in Appendix A. Additional refining value analysis and ethanol cost calculation beyond the current Base Case is showcased in Appendices B – L.

With regard to Item A:

Analyze the impacts of changes in the corn RFS for 2008 and 2009 on wholesale gasoline prices, including reductions in the RFS to 6.5 billion gallons, 7 billion gallons, 7.5 billion gallons, and 8 billion gallons.

Overall Marketplace Economics and Public Policy Background

With the passage of the ***Energy Policy Act of 2005 (EPACT)***, the ethanol production capacity which was financed for calendar years 2007, 2008 and 2009 was largely built with four fundamental policy and marketplace considerations (Note: It takes approximately 2-3 years from project concept to finance, construction and operation.):

1. The ***Energy Policy Act of 2005*** established the minimum renewable fuels standard (RFS) of 7.5 billion gallons annually,
2. The existence of the Federal Excise Tax Credit for renewable ethanol at $.51 per gallon,
3. The assumption that world crude oil prices were going to be trading higher than historical averages, and may trade as high as $75 - $125 per barrel, and
4. Corn price assumptions for ethanol production generally ranged in the $3.35 - $4.50 per bushel range at that time.

Given these fundamental market economics, ethanol production and sales in the United States have consistently traded above the market minimum established by the Renewable Fuels Standard (RFS). The rationale for ethanol blending above minimum RFS levels is at the existence of the prevailing corn price, Federal Tax Credit (VEETC), and market prices for both crude oil and gasoline. These factors provided positive economics for refiners and gasoline marketers to blend ethanol above RFS market minimums. These combinations of factors have also consistently provided positive economics for ethanol production.

Table 1: US Renewable Ethanol Market 2006-2009

Calendar Year	*RFS Market Minimum (billion gallons)*	*Ethanol Sold to US Refiners & Gasoline Blenders (billion gallons)*	*Ethanol Blending Above RFS Market Minimum (billion gallons)*
2006	4.0 (b/gal)	5.3 (b/gal)	1.3 (b/gal)
2007	4.7 (b/gal)	6.93 (b/gal)	2.23 (b/gal)
2008	9.0 (b/gal)	10.2 (b/gal)	1.2 (b/gal)
2009	10.5 (b/gal)	11.0 – 12.5 (b/gal) Projected [1]	0.5 – 2.0 (b/gal) Projected [1]

[1] *Hart projections, depending on market conditions.*

However, it will be the implementation of the ***Energy Independence & Security Act of 2007 (EISA)***, passed by the Congress and signed into law by President Bush on December 19, 2007, that is determining incremental ethanol capacity investments, refinery blending and terminal infrastructure investments, and calendar year ethanol sales in the 2010-2015 period.

Hart has established year-end ethanol capacity figures for the calendar years 2006 - 2010. (See below.)

Table 2: US Fuel Ethanol – Year-End Production Capacity
(Billion gallons per year)

Year	Year End Production Capacity	Estimated CY Production
2007	7.6	6.5
2008	12.74	10-10.5
2009	13.88	11-12.5*

** Dependant on Market Conditions*

Source: Hart Energy Consulting

Table 3: Apparent Ethanol Blending Economics – 2008

Unit Displayed is Dollars Per Gallon	NYH Conventional Gasoline					
	January	**February**	**March**	**April**	**May**	**June**
Wholesale Gasoline/RBOB[1]	2.33	2.38	2.50	2.76	3.09	3.27
Ethanol Rack NY Harbour[2]	2.41	2.40	2.54	2.62	2.56	2.59
Apparent Gross Blending Margin[3]	-0.08	-0.02	-0.04	0.14	0.53	0.68
Federal Tax Credit (VEETC)	0.51	0.51	0.51	0.51	0.51	0.51
Apparent Ethanol Margin with Tax Credit (VEETC)	0.43	0.49	0.47	0.65	1.04	1.19
Apparent Margin on Gasoline-Ethanol Blend	0.04	0.05	0.05	0.07	0.10	0.12
	NYH RBOB Gasoline					
	January	**February**	**March**	**April**	**May**	**June**
Wholesale Gasoline/RBOB[1]	2.32	2.36	2.47	2.84	3.24	3.43
Ethanol Rack NY Harbour[2]	2.41	2.40	2.54	2.62	2.56	2.59
Apparent Gross Blending Margin[3]	-0.09	-0.04	-0.07	0.22	0.68	0.84
Federal Tax Credit (VEETC)	0.51	0.51	0.51	0.51	0.51	0.51
Apparent Ethanol Margin with Tax Credit (VEETC)	0.42	0.47	0.44	0.73	1.19	1.35
Apparent Margin on Gasoline-Ethanol Blend	0.04	0.05	0.04	0.07	0.12	0.14

Apparent Margin on Gasoline-Ethanol Blend for the first week in August .11 cents

[1] Spot Prices for Petroleum products, Energy Information Administration

[2] Ethanol & Biodiesel News and Ethanol Market.com

[3] Excludes octane or other quality contributions, terminal/infrastructure costs and tax credit

Note: Ethanol Price Provided to Producer is Approximately 20 Cents Less than NY Rack to cover transportation and bulk storage and handling

Each ethanol production facility generally has a different start-up date, different capacity, varied debt and investment cost structure, and may operate on either coal or natural gas as a fuel source. However, generally the profitability of these cash operations can be gauged by the ranges offered in the appendices of this report. Hart has provided a wide range of corn and crude oil price assumptions which can serve to highlight ethanol production and profitability ranges.

- Hart concludes as long as it is profitable for ethanol to be produced from corn at prevailing crude prices above the 2008 RFS minimum of 9.0 billion gallons, and the RFS minimum of 10.5 billion gallons in 2009, there would be virtually no effect on gasoline prices with such a regulatory change. (See table Below for supported ethanol cash cost of production ranges): The table below itemizes the approximate

US corn acquisition price that ethanol production facilities in the United States can support on a cash-cost operating basis given varying levels of crude oil priced to US refiners.

Table 4: Approximate Ethanol Cash Costs of Production

Prevailing Crude Oil Market Price	Maximum Supported Market Corn Price in 2008 (Bushels)	Maximum Supported Market Corn Price in 2009 (Bushels)
$ 150 per barrel	$2.50 - $9.00	$2.50 - $9.00
$ 140 per barrel	$2.50 - $9.00	$2.50 - $9.00
$ 130 per barrel	$2.50 - $8.50	$2.50 - $9.00
$ 120 per barrel	$2.50 - $7.50	$2.50 - $8.00
$ 110 per barrel	$2.50 - $7.00	$2.50 - $7.50
$100 per barrel	$2.50 - $6.00	$2.50 - $6.50

Note 1: *- The corn price ranges above do not include bank finance charges, return on capital (ROC), or depreciation which will vary based on individual financial structure of each ethanol facility.*

Note 2: *Slightly higher corn prices than those displayed above could be supported in the 2008-2009 calendar years – but doing so would require a reduction in the blending incentive (covering profit and terminal and logistic costs) for US refiners and gasoline marketers. The ethanol blending incentive offered to refiners and blending marketers assumed by Hart in 2008 averages $.70 per gallon, and in 2009 $.50 per gallon.*

- More clearly stated, if the average US crude oil price was to rise $150 per barrel in 2008 – US gasoline refiners and ethanol producers could each support a maximum corn price of $9.00 per bushel, or any price lower. (Again, ethanol costs are on a cash basis.)

  Similarly in 2008, if the crude oil price was to trade at $130, ethanol production could still support a corn price of $8.50 per bushel, or lower. For calendar year 2008, it appears to Hart that current ethanol facilities will run profitably in the near-term at cash-cost break-even corn and crude price ranges in the areas highlighted in both yellow and green colors in Appendix A.

- Similarly, for corn acquisition prices in the range of $5.00-$8.00 per bushel, ethanol plants will operate successfully in 2008on a cash basis when crude prices generally range from $80 to $120 per barrel. ***Note:*** This assumption requires that the VEETC of $.51 per gallon is in effect during CY 2008.

- Should prices of crude oil or corn represent themselves in the marketplace outside these colored ranges (lower for crude, and higher for corn) in 2008, then further analysis forthcoming by Hart will likely yield a result where cash-cost profitability does not exist. Therefore, a simple direct formula might be applied for determining a cost impact of the RFS when either corn or crude oil prices do not allow profitable ethanol cash costs of production.

  If production of ethanol is not profitable above the production level established by the RFS, a simple direct formula might be applied for determining the impact of the RFS on increased costs to US refiners and related gasoline marketers.

  - Assuming the price of ethanol would need to be $.20 per gallon higher than offered at prevailing crude or corn prices to justify a 9 billion gallon RFS in 2008 (*rather than 6.5 billion as posed by GMA*), then the direct gasoline price impact would be approximately $.20 per gallon X 2.5 billion gallons of ethanol – increasing costs to US refiners and

gasoline marketers $500,000,000 annually. A secondary effect is also likely. (More analysis required.)

- On the other hand, if the price of corn and the prevailing prices of crude oil required US refiners and gasoline marketers to absorb a $.50 price above break even transaction prices for ethanol above the prevailing transaction price, then the direct effect on increasing the cost of US refining costs and wholesale gasoline is $.50 per gallon X 2.5 billion gallons, or $1.25 billion annually. A secondary effect is also likely, but not quantified here.

- Carried across the entire US gasoline pool, the $.20 per gallon cost increase to support the 9 billion gallon RFS would equate to $.0035 per gallon.
  - Similarly, a $.50 increase would equate to $.0089 per gallon across the entire pool.
  - Again, if the prevailing price of corn and crude oil requires US refiners to purchase ethanol at $1.00 per gallon above the break-even blending price, then the direct price effect would be $2.5 billion gallons X $1.00, or $.017 per gallon across the entire gasoline pool. A secondary price impact will also be expected. (More analysis required)

Related to Item B:

Analyze the impacts of changes in the tax credit for corn ethanol on wholesale gasoline prices, such as reductions to 40 cents, 35 cents, 30 cents, and 25 cents in 2008 and 2009. Hart was also asked to analyze the impact of reducing the tax credit to 0.

- In all virtually all reasonable scenarios envisioned by Hart for analysis required in Item B, Public Policy action which resulted in reducing or eliminating the current tax excise credit for corn ethanol would have an increasing effect on the price of gasoline.
- In simple terms, the direct increase effect of eliminating the tax incentive on the price of gasoline would approximate the delta between the current incentive of $.51 per gallon and the varying levels of analysis as suggested by GMA. (i.e. $0.51 per gallon - $0.40 per gallon in Case B, or $0.11 per gallon). The secondary effect would likely be larger.

Assuming that the average production rate over the 2008-2009 period is 10 billion gallons, the direct increasing gasoline price effect would be as follows:

- 10 billion gallons times each of the differentials (Note: As the current blending incentive in the marketplace offered by US ethanol producers to US refiners and gasoline blenders in all cases in 2008, and most likely in 2009, is greater than the possible reductions in the Federal Tax Credit, it is not assumed that any current ethanol blending in the marketplace would actually be eliminated. Therefore it is not likely that any ethanol production would actually leave the market as ethanol market prices would be able to rise equal to the reduction in the tax credit. Again, this is because the current blending incentive offered to the petroleum marketplace is actually greater than the level of the tax credit itself.) The crude oil price assumption for this statement is assumed to remain in the $120 - $150 per barrel range for this conclusion.

  Table B-1 provides both the total direct cost of tax credit reduction at the 10 billion gallon sales level, and defines the direct price impact over the entire gasoline pool.

Table B-1: The Direct Gasoline Price Increase is Likely to Be as Follows[1]

Case	Gasoline Price Increase Total	Per Gallon Increase
Base Case A ($.51)	10 billion gallons X $.00 = $0 billion annually	$0.00
Case B ($.40)	10 billion gallons X $.11 = $1.1 billion annually	$0.0078
Case C ($.35)	10 billion gallons X $.16 = $1.6 billion annually	$0.0114
Case D ($.30)	10 billion gallons X $.21 = $2.1 billion annually	$0.015
Case E ($.25)	10 billion gallons X $.26 = $2.6 billion annually	$0.0185
Case F (Elimination Case)	10 billion gallons X $.51 = $5.1 billion annually	$0.0364

[1]Profitability in current US refining operations and wholesale gasoline marketing is assumed to be held constant.

Table B-2 identifies the direct impact of tax credit reduction if half of the reduction was absorbed by the refiner and half by the ethanol producer.

Table B-2: The Direct Gasoline Price Increase is Likely to Be as Follows[2]

Case	Gasoline Price Increase Total	Per Gallon Increase
Base Case A ($.51)	10 billion gallons X $.00 = $0 billion annually	$0.00
Case B ($.40)	10 billion gallons X $.055 = $0.55 billion annually	$0.0039
Case C ($.35)	10 billion gallons X $.08 = $0.8 billion annually	$0.0057
Case D ($.30)	10 billion gallons X $.105 = $1.05 billion annually	$0.0075
Case E ($.25)	10 billion gallons X $.13 = $1.3 billion annually	$0.0093
Case F (Elimination Case)	10 billion gallons X $.255 = $2.55 billion annually	$0.0182

[2]Profitability in current US refining operations and wholesale gasoline marketing is assumed to be reduced – equally splitting the tax credit reduction with the ethanol producer (ethanol producer absorbs 1/2 of tax credit reduction from lower ethanol sales price).

Note: Because the current marketplace incentive offered to refiners to blend ethanol is equal to or greater than the Federal Tax Credit, no ethanol facilities were assumed to close. If ethanol production facilities closed, in most scenarios envisioned where crude oil prices are above $100 per barrel, the gasoline price effect would be somewhat higher than indicated in the table above.

- To the extent that such an elimination of the Federal Tax Credit for renewable ethanol either shut in, or closed ethanol production on the one hand, or forced a rise in the ethanol price net above gasoline -- each of these factors would serve to raise the cost of manufacturing gasoline as well as tighten the motor fuel supply – and therefore would likely increase gasoline prices to US consumers.

  Hart is not yet able to precisely quantify how large this increased wholesale or retail price impact may be, but generally assumes that the gasoline cost increase effect would be larger if ethanol production facilities are closed as a result of elimination or reduction of the Federal Tax Credit for renewable ethanol. The secondary impact would likely be larger than the direct costs associated with the elimination of the Federal Excise Tax Exemption for renewable ethanol.

Related to Item C:

Analyze the impacts of changes in the tariff on imported renewable ethanol on wholesale gasoline prices. In addition, Hart was also asked to provide a scenario with the removal of the tariff on imported renewable ethanol for fuel use.

- In the 2008-2009 US Gasoline/Ethanol market, it is assumed that a reduction of the current import tariff on renewable ethanol, or its elimination, would have the following direct price impacts:
  - Immediately serve to provide two direct marketplace effects:
    1. Provide an increase in the real net price of Brazilian ethanol sold to US refiners and gasoline marketers. Realistically, depending on market conditions, this increase could range from as little as $.10 per gallon of imported ethanol, to as much as $.40 per gallon. Any price increase not equal to the existing tariff of $.54 per gallon, would therefore first become profit to the US refiner and gasoline marketer - to the extent that the gasoline refiner and gasoline marketer did not retain all of the profit available to him which was not taken by the Brazilian ethanol exporter price increase.

    2. It is reasonable to conclude that a fraction of the tariff reduction could lower gasoline prices if the profit differential was not taken by US refiners and petroleum marketers. At this stage, Hart is able to approximately quantify this direct effect.
       - For complete elimination of the tariff, upon which the Brazilian ethanol supplier raised prices by only $.27 per gallon, then potential savings to the gasoline market (assuming no increased profitability by US Refiners and Gasoline Marketers) would equate to the following:
         - 500,000,000 gallons @ $.27 per gallon = $ 135,000,000 annually
         - Direct Gasoline Price savings could also be as much as $270,000,000 (1 billion gallons @ $.27 per gallon)
         - ***Note:*** It is not likely that reducing or eliminating the tariff in the 2009-period would result in Brazil being able to supply much more than 1 billion gallons of ethanol to the US gasoline market in the 2009.

           However, to the extent that Brazil was able to supply 2 billion gallons, and somehow still raised ethanol prices by only $.27 per gallon (and refiners and gasoline marketers did not increase their profitability) – the potential direct savings could therefore be $540 million (which is 2 billion gallons @ $.27 per gallon).

           It is obviously more likely, that while these savings are potential – some of these savings would be assumed as increased profitability by US refiners and marketers purchasing Brazilian ethanol tariff free.

         - Beyond the direct effect, the calculated savings over the gasoline pool would be as follows:

Volume of Ethanol Imported Duty-Free	Expected Annual Savings	Impact Per Annual Gallon of US Gasoline
0.5 billion gallons	$135,000,000 per year	$0.000964 per gallon
1.0 billion gallons	$270,000,000 per year	$0.001928 per gallon
2.0 billion gallons	$540,000,000 per year	$0.003857 per gallon

Note: The United States sells approximately 140 billion gallons of gasoline per year to US Consumers.

Related to Item D:

Analyze the impact of potential changes in the RFS, and potential changes on VEETC on global petroleum prices.

- It is noted that the United States consumes approximately 40% (42.2%) of the world's gasoline annually, and 20% (20.4%) of global crude oil which is refined into petroleum products worldwide.

  Under almost any scenario envisioned by Hart, near term policy changes to the RFS and/or Tax Credit for renewable ethanol related to their impacts on the global petroleum marketplace would be calculated based on the amount of:

  - The amount of increased ethanol production volumes, or
  - Decreased ethanol production over existing markets assumed in the baseline analysis.

The impacts of these incremental changes on global gasoline prices and/or global crude oil prices would seem to be infinitely small under any realistic scenario.

However, to provide an example: if one assumes that the Public Policy change would have an impact of reducing ethanol production by 2.5 billion gallons (*a scenario available in only a portion of corn and crude oil assumptions possible*) the expected effect of reducing ethanol production would actually increase global gasoline prices and/or crude oil prices. (More analysis required.)

By removing 2.5 billion gallons of ethanol from the US gasoline pool, there would be an increase in global crude requirements somewhere about one-tenth of 1%. Related to gasoline, the increase supply effect would approximate one-half of 1% of the total supply globally. (More analysis required.)

While additional analysis in these areas is no doubt required, given both the time-frame allowed thus far for the analysis, and the complexity of market and public policy factors involved – Hart has thus far been able to provide the comments and analytical conclusions for GMA as addressed above.

Further analysis in these areas will be forthcoming to GMA in the latter part of July - with a Final Report expected for delivery on or before July 31, 2008.

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