



STRATAS
ADVISORS
A HART ENERGY COMPANY



Global Biofuels Outlook to 2025: Selected Findings

Paul Niznik, Manager

Biomass Research and Development Board,
Technical Advisory Committee, May 20th, 2015

UPSTREAM | MIDSTREAM | DOWNSTREAM | FUEL & TRANSPORT



DISCLAIMER

This Presentation contains forward-looking statements, including, but not limited to, statements regarding the value and effectiveness of Stratas Advisors' services, that involve risks, uncertainties, assumptions and other factors which, if they do not materialize or prove correct, could cause Stratas Advisors results to differ materially from those expressed or implied by such forward-looking statements. All statements, other than statements of historical fact, are statements that could be deemed forward-looking statements, including statements containing the words "predicts," "plan," "expects," "anticipates," "believes," "goal," "target," "estimate," "potential," "may," "will," "might," "could" and similar words. Stratas Advisors intends all such forward-looking statements to be covered by the safe harbor provisions for forward-looking statements contained in Section 21E of the Exchange Act and the Private Securities Litigation Reform Act of 1995. Actual results may differ materially from those projected in such statements due to various factors, including but not limited to: risks and uncertainties inherent in our business; our ability to attract new customers and retain existing customers; our ability to effectively sell, service and support our products; our ability to manage our international operations; our ability to compete effectively; our ability to develop and introduce new products and services or enhancements to existing products; our ability to continue to promote and maintain our brand in a cost-effective manner; our ability to manage growth; our ability to attract and retain key personnel; the scope and validity of intellectual property rights applicable to our products; adverse economic conditions in general and adverse economic conditions specifically affecting the markets in which we operate.

Past performance is not necessarily indicative of future results. The forward-looking statements included in this presentation represent Stratas Advisors' views as of the date of this presentation. Stratas Advisors anticipates that subsequent events and developments will cause its views to change. Stratas Advisors undertakes no intention or obligation to update or revise any forward-looking statements, whether as a result of new information, future events or otherwise. These forward-looking statements should not be relied upon as representing Stratas Advisors' views as of any date subsequent to the date of this presentation.

© 2014 Stratas Advisors. All rights reserved. Stratas Advisors is a trademark or registered trademark of Hart Energy Publications, LLLP in the U.S. and other countries. Other company names, product names and company logos mentioned herein are the trademarks, or registered trademarks of their owners. This material may not be published, broadcast or distributed in whole or part without express written permission of Stratas Advisors.



Stratas Advisors Overview

Our Research Divisions

Strategic insights across the energy value chain



Upstream

Drill down with a ground-level look at the fields, wells and companies involved in E&P.



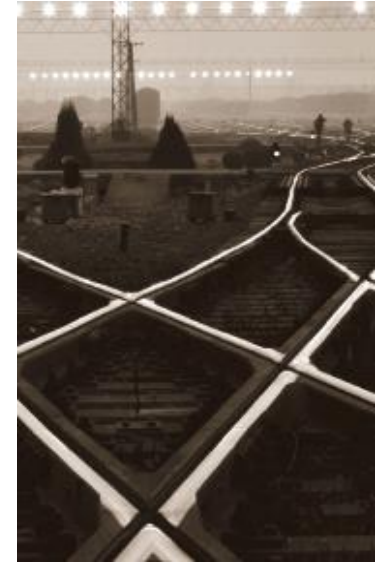
Midstream

Move confidently in new frontiers that are being shaped by changing supply/demand dynamics coupled with investments in pipeline, rail and ship logistics.



Downstream

Thrive in an environment where crude oil supply dynamics and product demand trends are structurally evolving.



Fuel & Transport

Accelerate innovation with a comprehensive understanding of policies pertaining to petroleum-based fuels, biofuels and other alternative fuels.

Our Research Divisions

Strategic insights across the energy value chain

F&T Consulting Groups

- **Global Biofuels Assessment** – Biofuels Consulting
- **Global Alternative Fuels** – Alternative Fuels Consulting
- **Global Fuel Specifications** – Fuel Quality Consulting
- **Global Automotive** – Characteristics and Composition

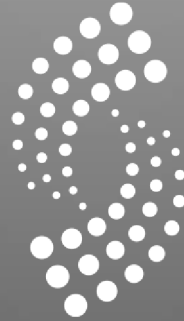
Connected Downstream Outputs

- **Global Biofuels Outlook** – Supply, Demand and Price
- **Global Refining and Products** – Supply, Demand, Pricing



Fuel & Transport

Accelerate innovation with a comprehensive understanding of policies pertaining to petroleum-based fuels, biofuels and other alternative fuels.



Executive Summary

Biofuels' contribution to fuel pool asserted but consolidating

Main Findings

Despite lack of growth in the U.S. and EU 28, these regions remain leaders in consumption

Current Policy Framework

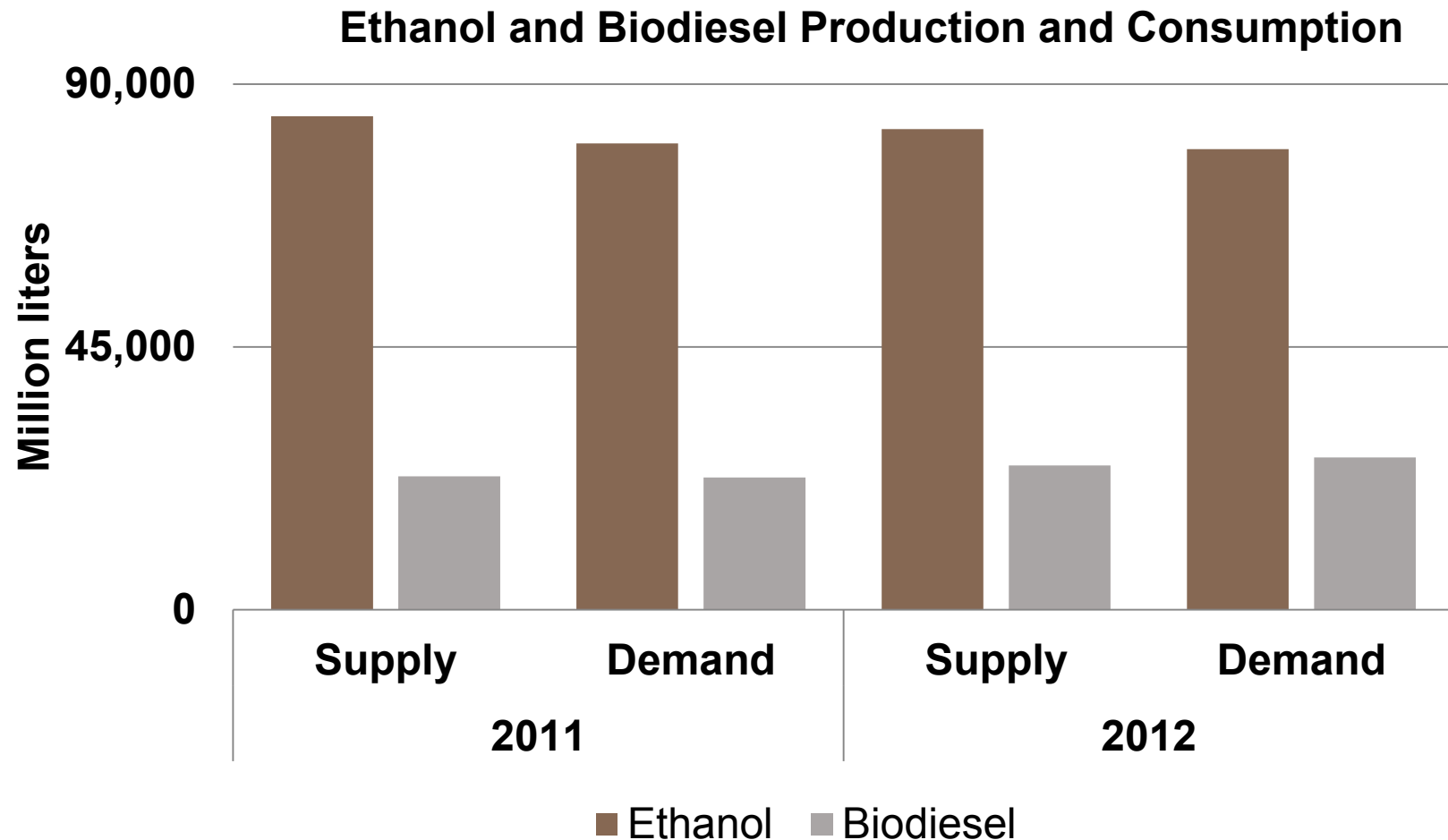
- U.S. and the EU 28: Biofuels policies not making further progress. Ambitious targets will not be met and follow-up policies not yet decided.
- Latin America and Asia Pacific are generally increasing their biofuels blend mandates.
- Energy security is once again one of the main drivers behind alternative fuels developments, which leads to biofuels promotion in some regions and side-tracking in others.

Current Market Situation

- Ethanol market continues to be dominated by the U.S. and Brazil, even if strongest growth is expected in Asia Pacific. The U.S. and EU 28 will have decreasing ethanol markets between 2015 and 2025.
- Biodiesel market expected to remain dominated by the EU 28, although supply from Asia Pacific could surpass that of the EU 28 by 2025. Strongest growth in biodiesel demand expected to happen in Asia Pacific, depending on palm oil price vs diesel.

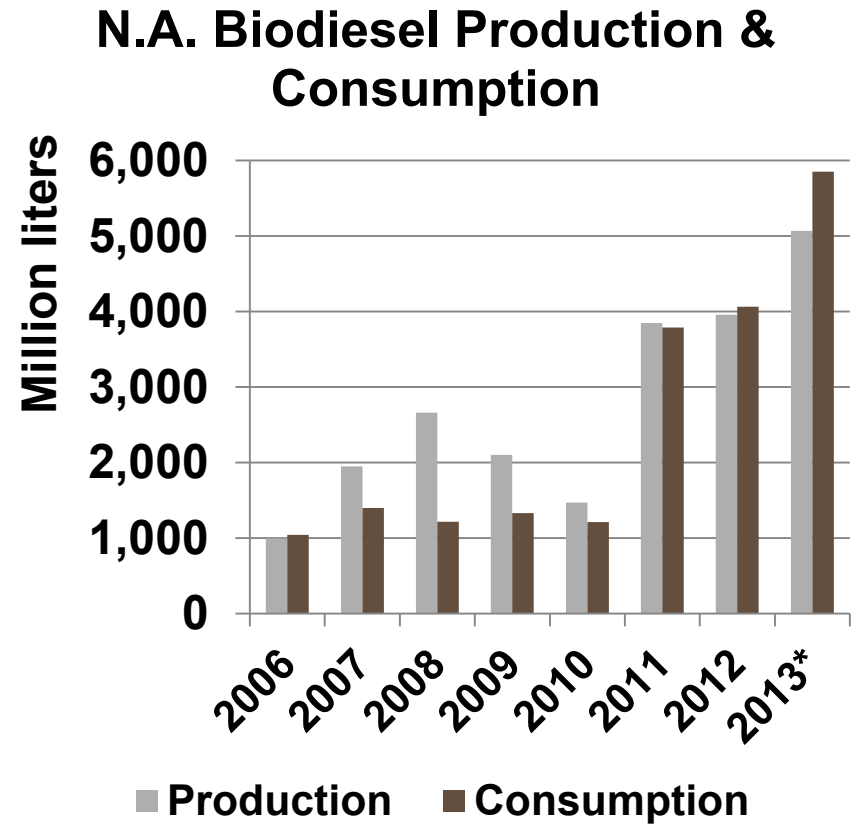
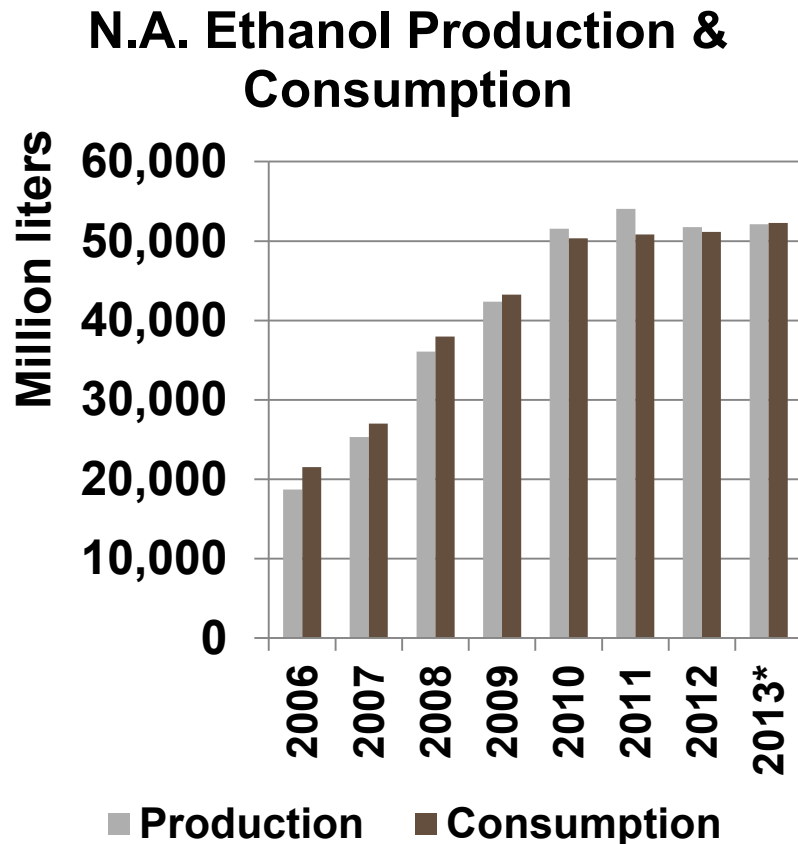
Historical Biofuels Production & Consumption

Ethanol ahead as main biofuel used



Historical Biofuels Production & Consumption

North American blending limits stagnate consumption, trade barriers hurt production

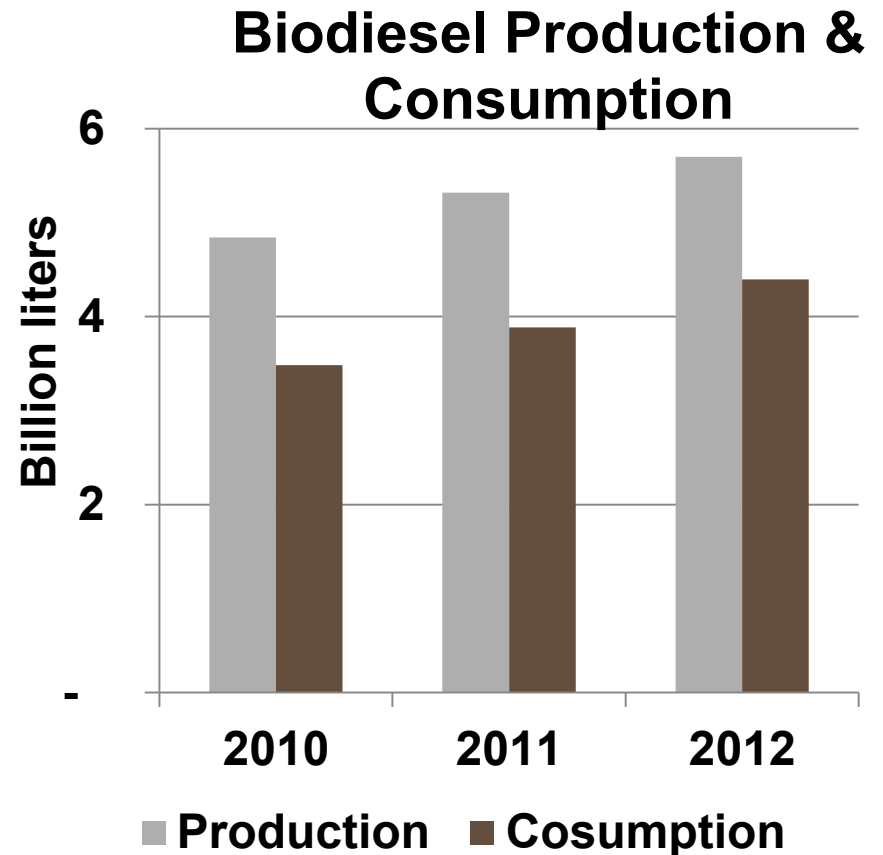
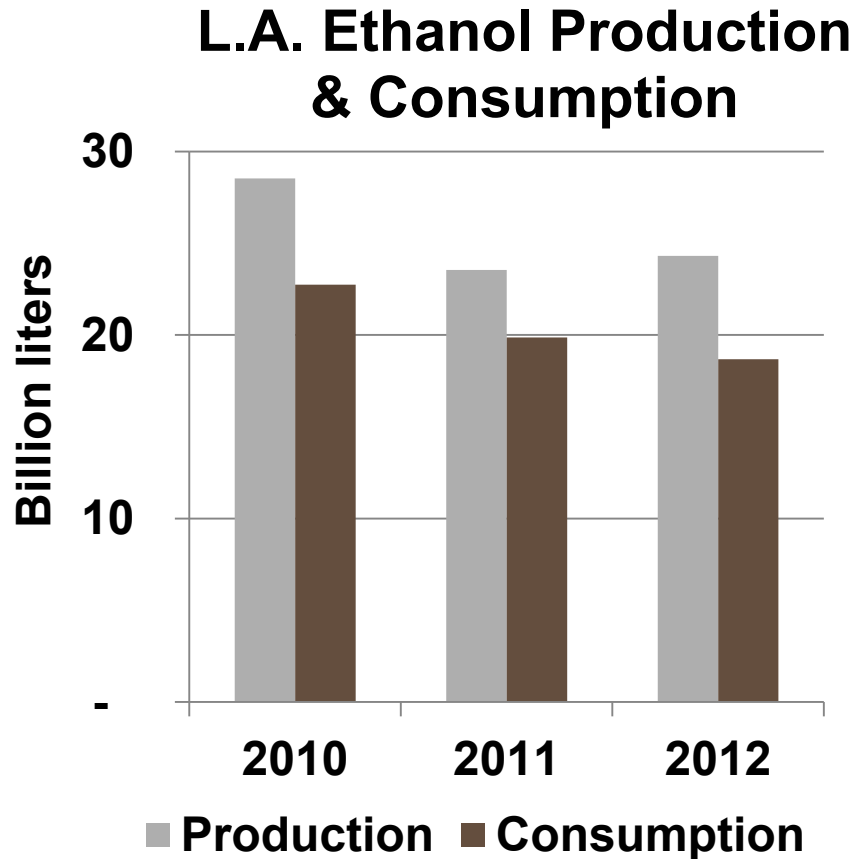


**Canadian Volumes are estimated*

Source: Stratas Advisors, EIA, USDA, 2014

Historical Biofuels Production & Consumption

The Latin American region is an exporter of both ethanol and biodiesel

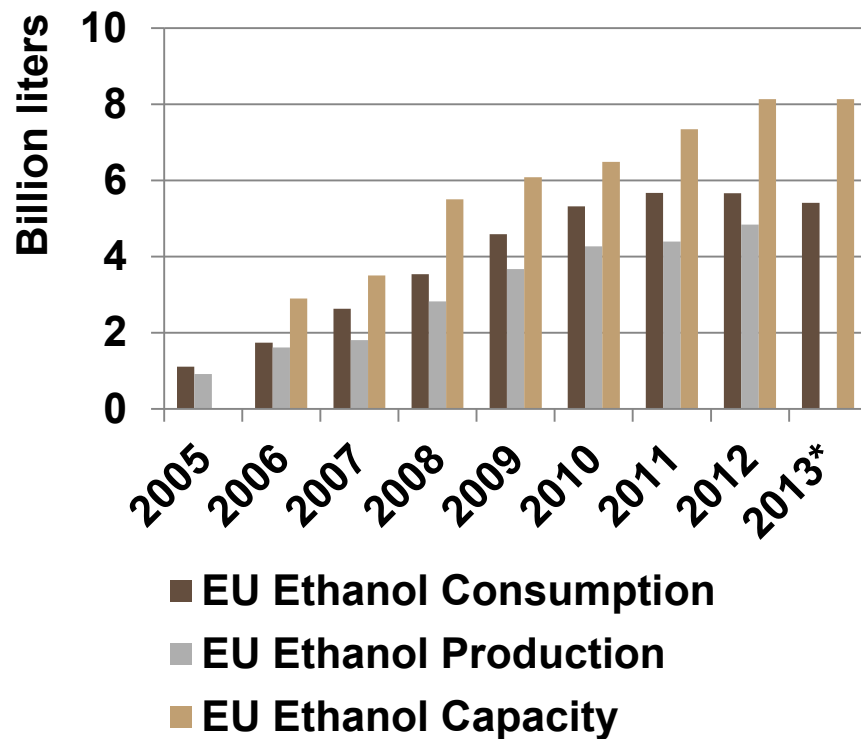


Source: Stratas Advisors, 2014

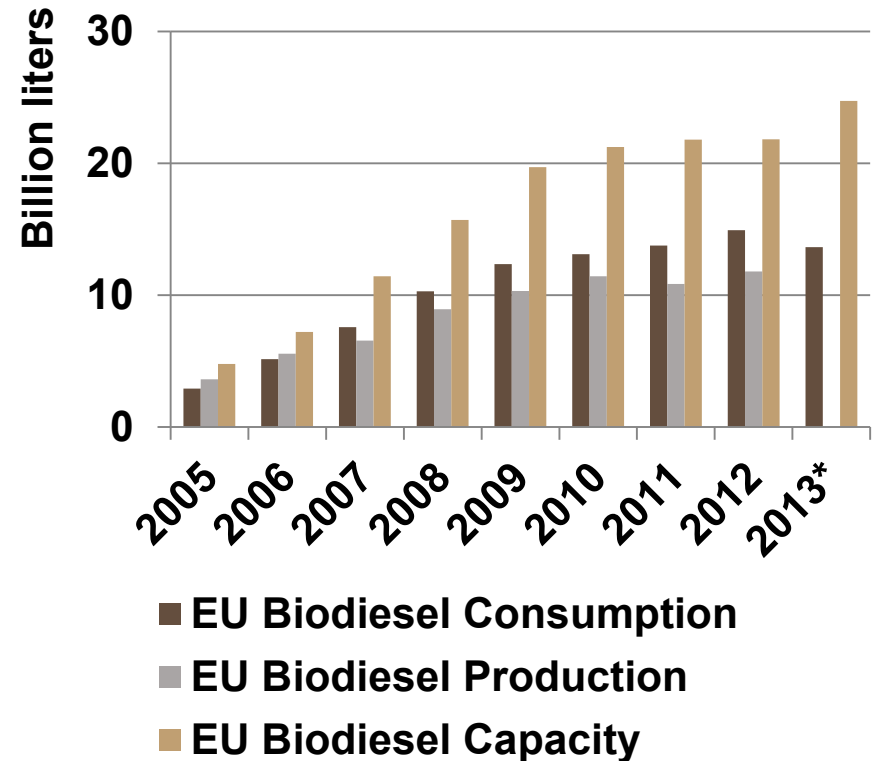
Historical Biofuels Production & Consumption

In 2012, EU met 85% of its ethanol and 79% of its biodiesel demand with national production

E.U. Ethanol Production, Consumption & Capacity



E.U. Biodiesel Production, Consumption & Capacity



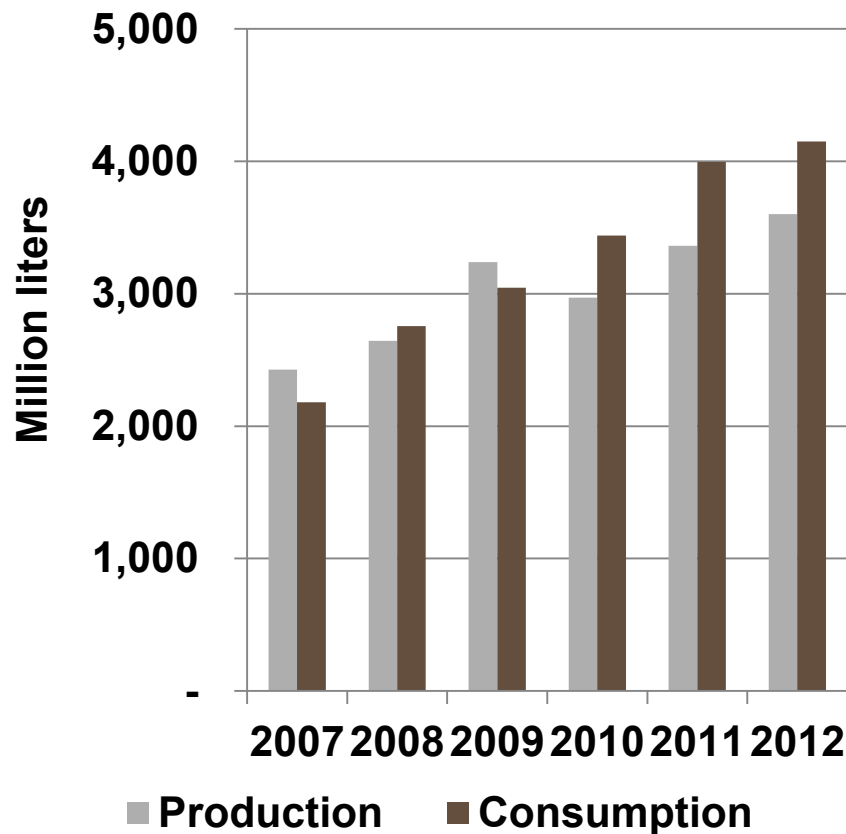
*2013 production data not available

Source: Stratass Advisors citing data from the Biofuels Barometer and MS Report to the European Commission, 2014

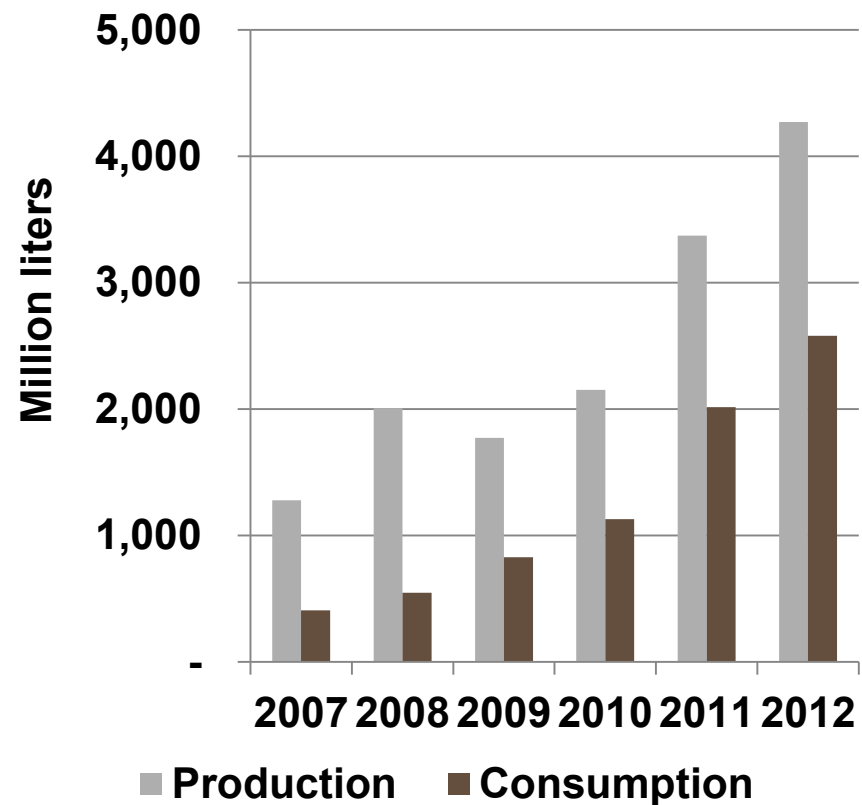
Historical Biofuels Production & Consumption

Asia has been a net importer of ethanol but exporter of biodiesel

Asian Ethanol Production & Consumption



Asian Biodiesel Production & Consumption



Source: Stratas Advisors, 2014

Summary of Biofuels Policy

N.A. and E.U. policy reassessments yield blend stagnation

Current N.A. Policy Framework

- Canadian RFS successful but not a driver for future additional demand
- U.S. RFS schedule “modified” downward through new rulemaking technique in the 2014 proposal

Current E.U. Policy Framework

- Renewable Energy Directive 2009/28/EC (RED)
- Fuel Quality Directive 98/70/EC as amended by Directive 2003/17/EC and Directive 2009/30/EC (FQD)

Summary of Biofuels Policy

Ethanol continues to dominate Latin America's biofuel sector

Country	2014 Ethanol Mandate: Vol%
Argentina	5 (10 as of Dec. 2014)
Brazil	25
Colombia	10 (Effective 8 and 0)
Paraguay	25
Peru	7.8
Uruguay	5

Country	2014 Biodiesel Mandate: Vol%
Argentina	10
Brazil	7
Colombia	10 (Effective 10, 8, 2, 0)
Paraguay	1
Peru	5
Uruguay	7

Source: Stratas Advisors, 2014

Summary of Biofuels Policy

Most countries in the region add biofuels into their transportation-fuels pool

China: E10 in 10

provinces (April 2008); B5 (January 2010) – partial mandates

S. Korea: B2 (2010)

India: Ethanol to account for 5% of total gasoline (2013)

Thailand: E10 (voluntary) (January 2013); B7 (June 2014)

Indonesia: Ethanol to account for 0.5% of total gasoline sold and biodiesel to account for 10% of total diesel sold (January 2014)

Australia: Ethanol to account for 6% of total volume of gasoline sold in NSW (July 2011); B2 in NSW (January 2010)

Japan: Volumetric target of 7 vol% ETBE and E3

Taiwan: B2 (2010 – July 2014)

Philippines: E10 (2013); B2 (February 2009)

Malaysia: B5 (partial mandate from June 2011, nationwide from December 2014)

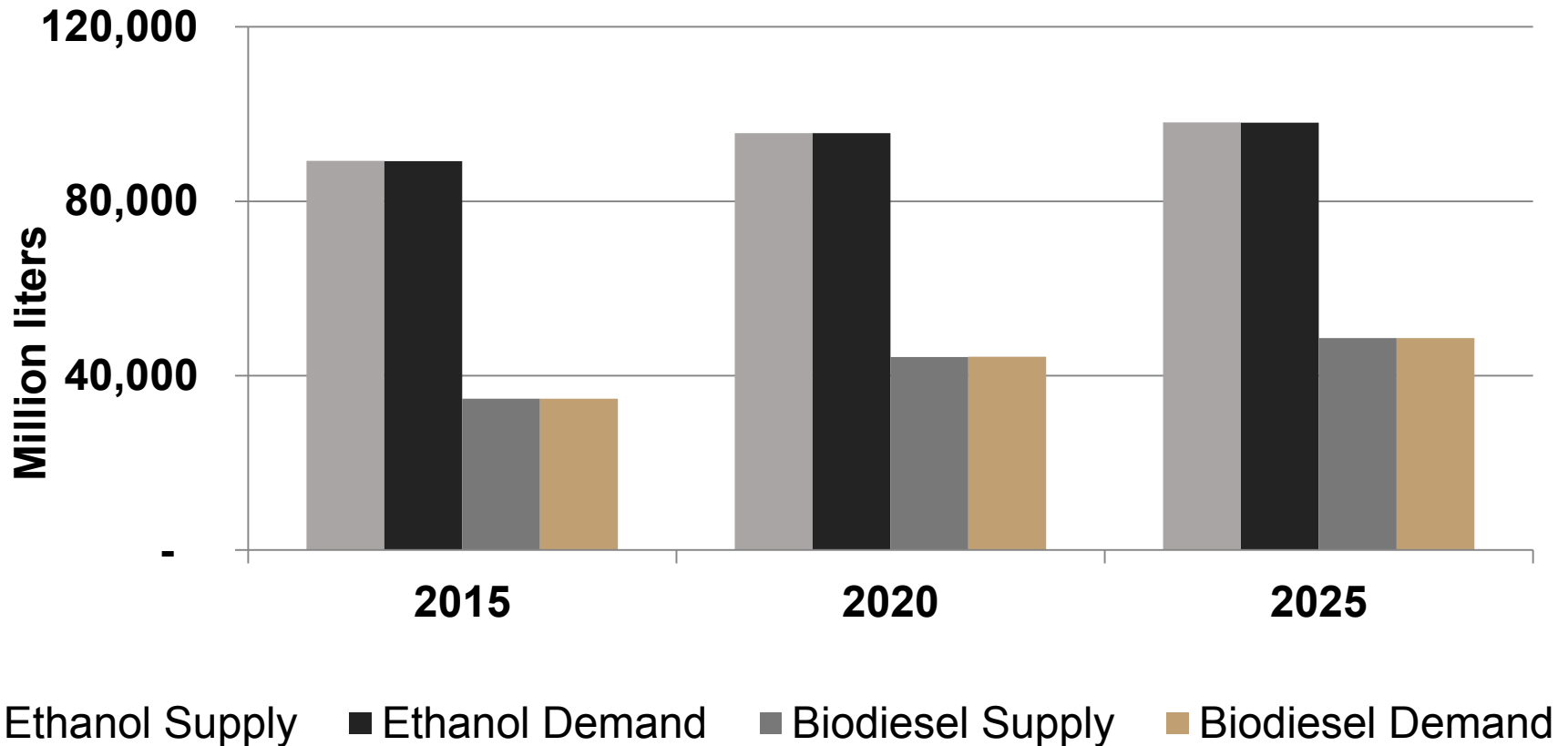


Source: Stratas Advisors, 2014

Biofuels Supply & Demand Forecast

Biofuels losing impetus in the U.S. and EU, but other regions ensure continued growth

Global Ethanol and Biodiesel Outlook



Source: Stratas Advisors

Advanced Biofuels

Handful of successes does not lead to industry takeoff

On-road biofuels

- In spite of several units operating successfully, such as HVO/renewable diesel plants in Europe or Asia and new cellulosic ethanol plants in Europe and North America, these projects are not followed by investments in new plants
- Sustainable feedstock sourcing, financing and economics/product prices are still major hurdles that advanced biofuels producers struggle to overcome

Aviation biofuels

- Few production pathways have been certified so far, and sustainable feedstock sourcing in addition to final product price remain major barriers
- Significant numbers of test and demonstration flights have taken place on all the continents, but few countries actively promote aviation biofuels
- In order to lower GHG emissions from aviation, several options seem more cost-effective than biofuels, yet those have been used as marketing tools by airlines



Paul Niznik pniznik@stratasadvisors.com 713 260 1073

Stratas Advisors, a Hart Energy company, is a global consulting and advisory firm that covers the full spectrum of the energy sector and related industries. We can help you develop a deeper understanding of the developments that are shaping the future of oil & gas. Our support includes customized consulting that is focused on a client's specific strategic objectives, competitive challenges and asset base. Additionally, we offer support through subscription services and comprehensive market studies.

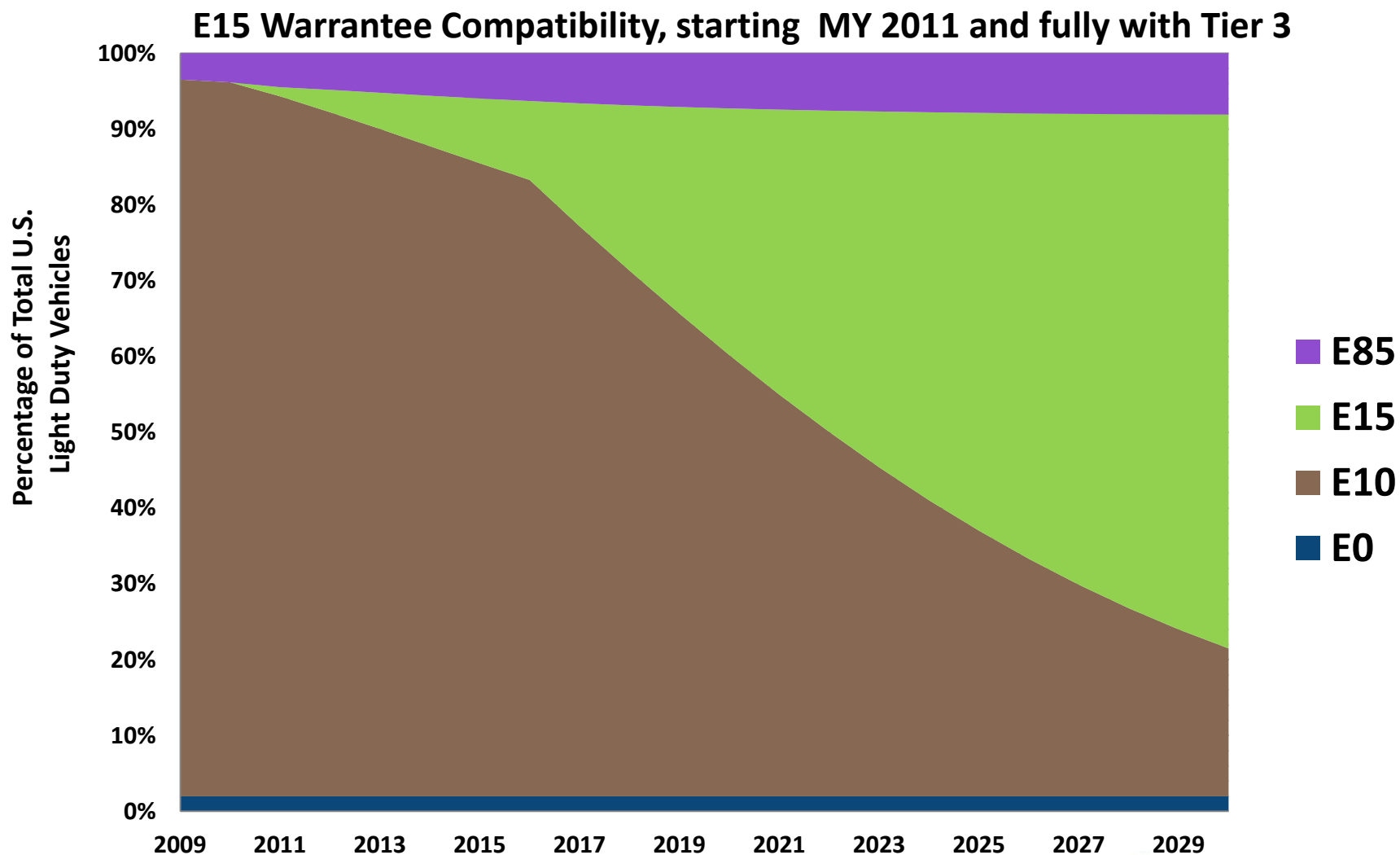
UPSTREAM | MIDSTREAM | DOWNSTREAM | FUEL & TRANSPORT

1616 South Voss Road Suite 675 | Houston, TX 77057 United States | TEL +1.713.260.6426 | stratasadvisors.com

Bogotá | Brussels | Denver | Houston | London | Melbourne | Mexico City
New Delhi | New York | San Diego | São Paulo | Singapore | Washington, D.C.

Additional Slides

Understanding E15 Fleet Compatibility

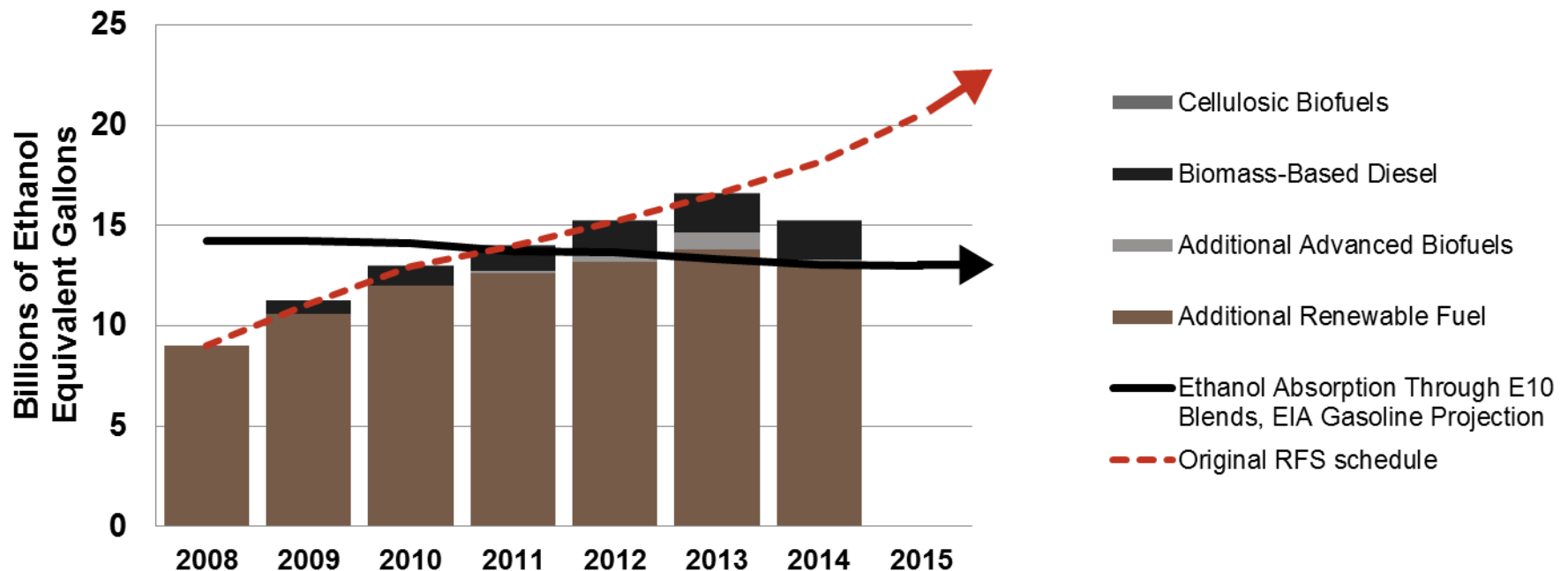


Ethanol Consumption Forecast

RFS revised to reflect current consumption

- Historically unconvincing/inconsistent economics for retailers = limited industry investment in mid or high ethanol blends infrastructure, limited customer enthusiasm = limited OEM FFV offerings
- Recently, Tier 3 dumps E15 as certification fuel, CAFE credits for flex-fuel cars fade after 2017

RFS Mandates vs. Ethanol Consumption at 10%



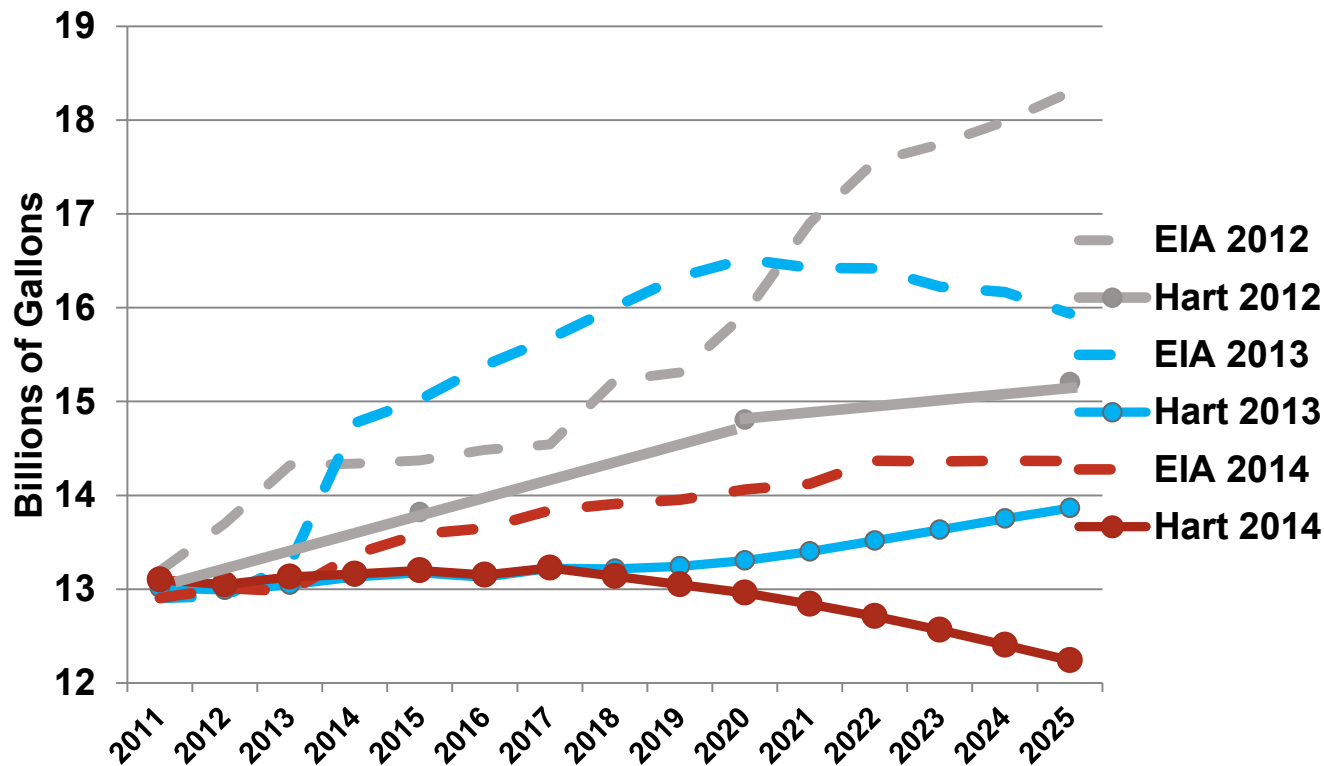
Source: Stratas, EPA 2013

Ethanol Consumption Forecast

Coming around to the Stratas view

Stratas has consistently focused on model variables that are strong limiters of ethanol absorption which have proven increasingly accurate predictors of consumption limits. The EIA and EPA are moving toward this same understanding.

EIA vs. Stratas Ethanol Consumption Forecasts

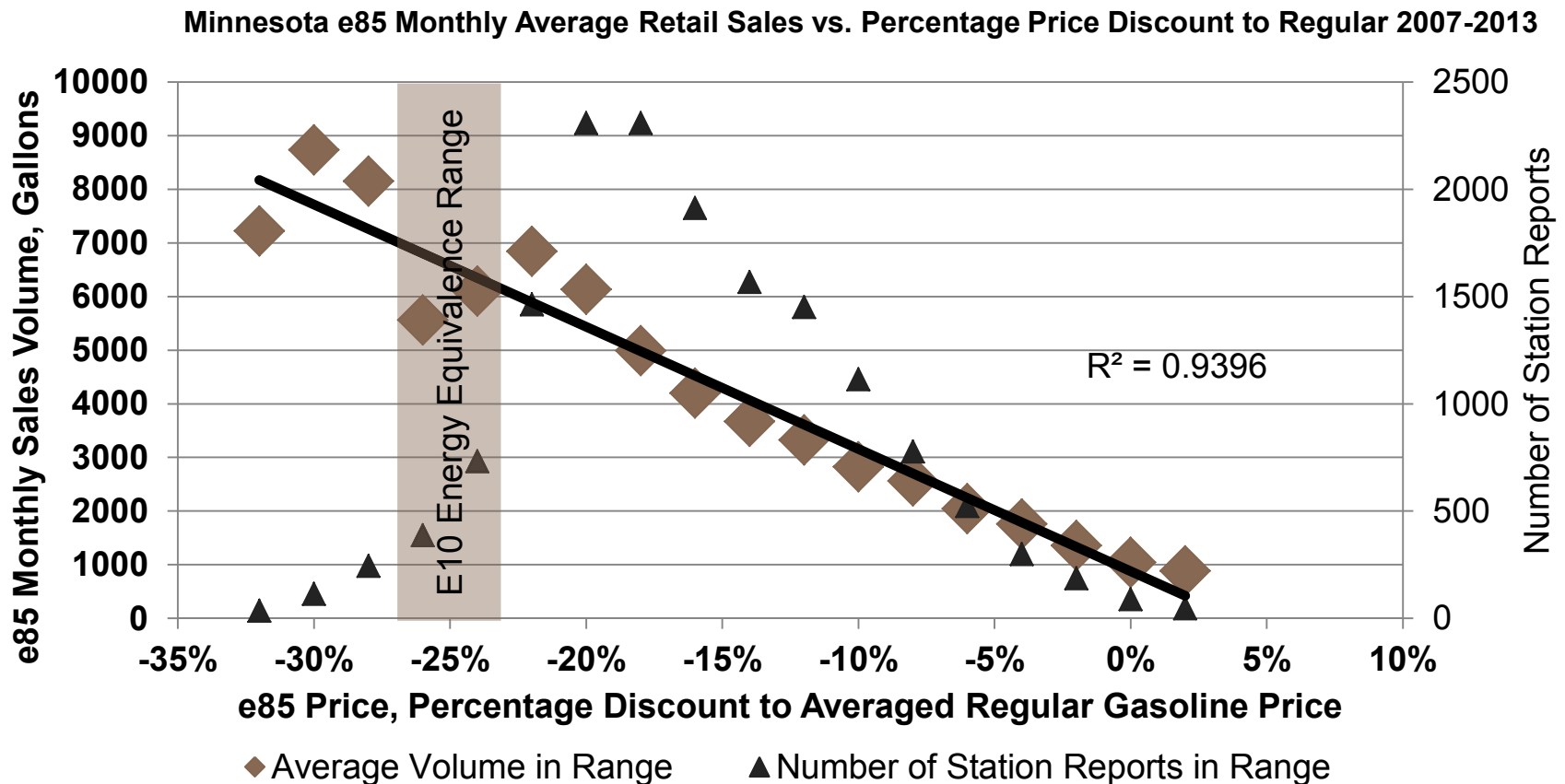


Source: Stratas, EIA 2014

E85: Failure to Launch

Stratas research into U.S. customer response to e85 price

LDV customers unresponsive to the energy-value proposition of e85 vs. regular gasoline, as seen in data from Minnesota e85 station surveys from 2007 to 2013.

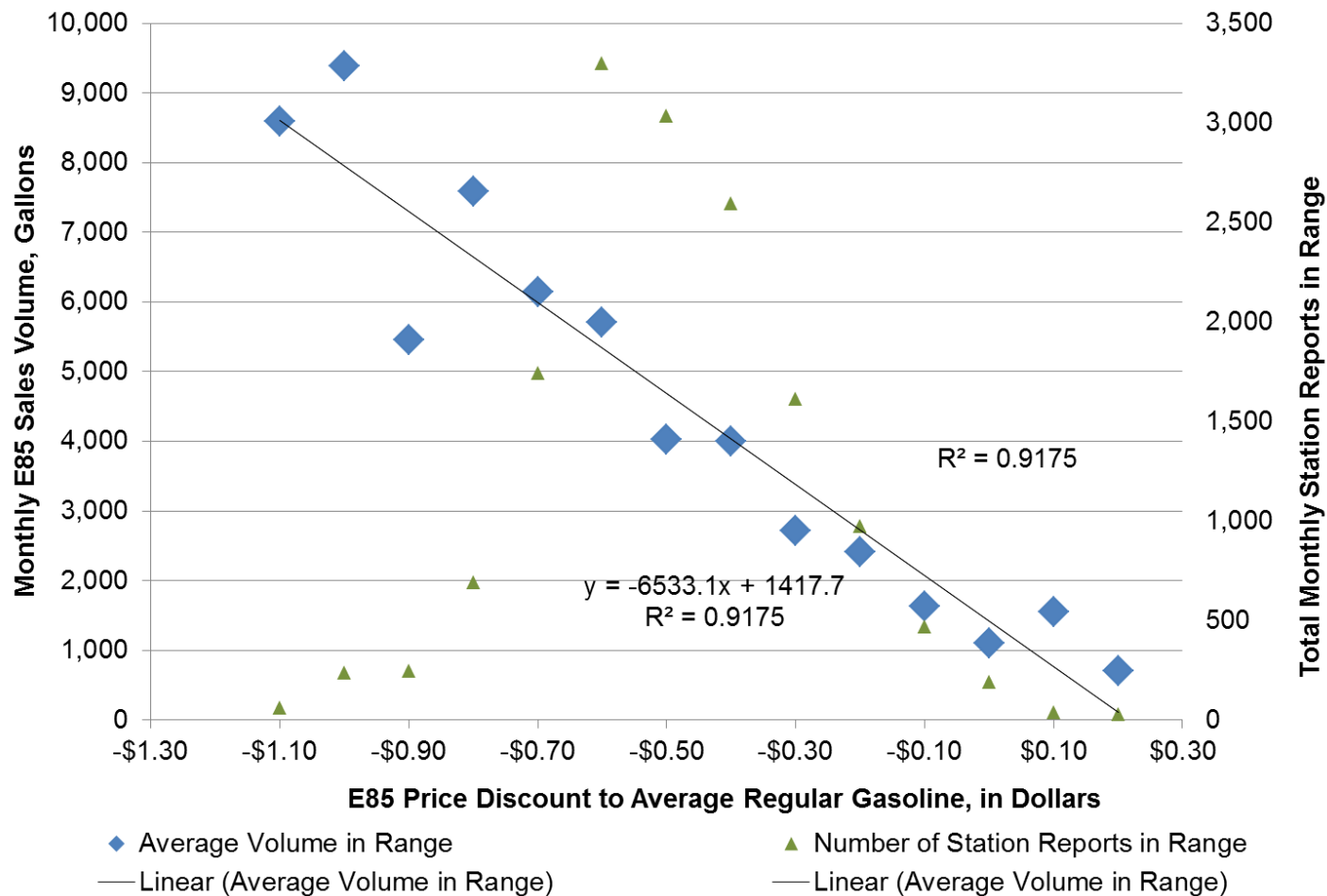


Source: Stratas Advisors 2014

E85: Failure to Launch

Stratas research into U.S. customer response to e85 price

Minnesota e85 Monthly Average Retail Sales vs. Actual Price Discount to Regular 2007-2013

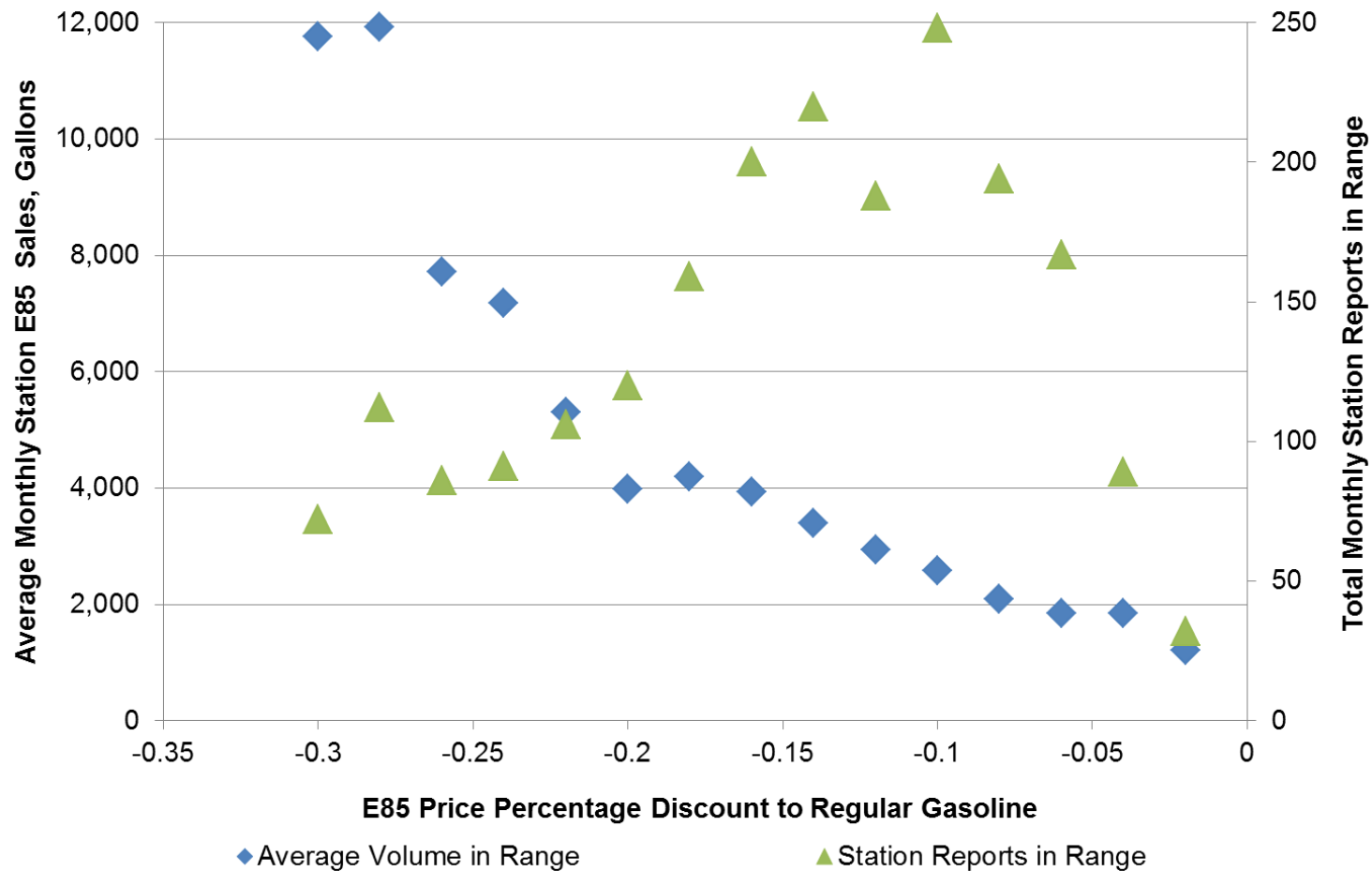


Source: Stratas Advisors 2014

E85: Failure to Launch

Customer price-response in 2013 was only slightly better

2013 Minnesota e85 Monthly Average Retail Sales vs. Actual Price Discount to Regular



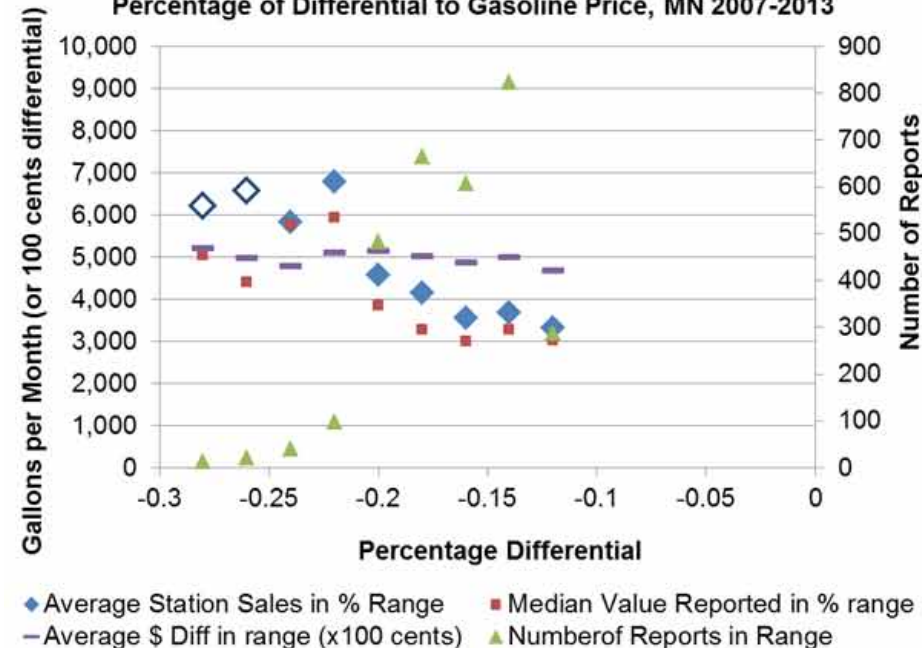
Source: Stratas Advisors 2014

E85: Failure to Launch

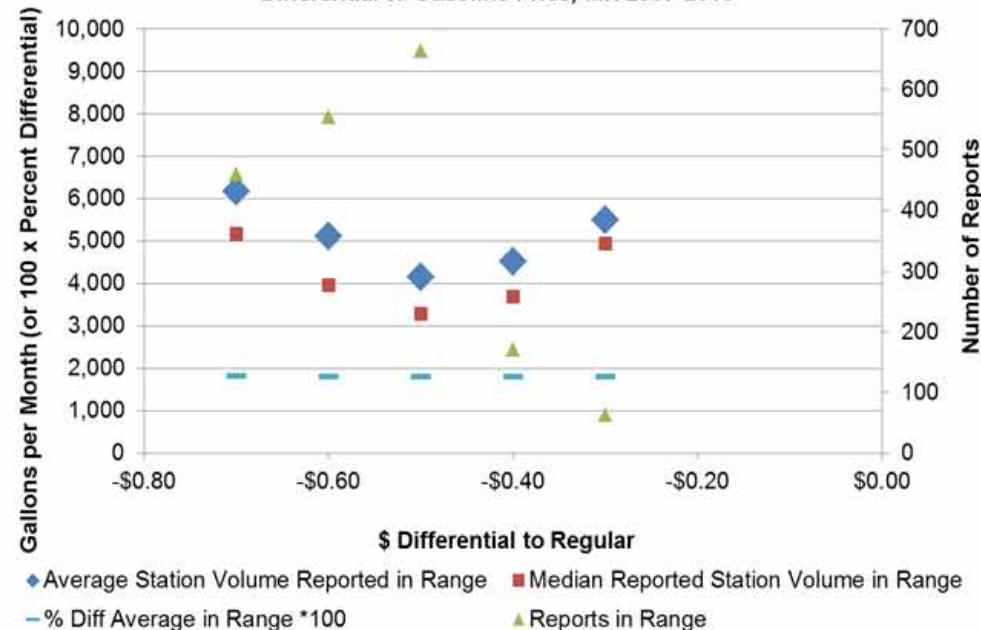
Customer price response is uneven

Customers seem uneducated on value proposition, no consistent reaction to E85 energy value.

Fixed E85 Price Differential to Gasoline (\$0.50 +/- \$0.05) vs Percentage of Differential to Gasoline Price, MN 2007-2013



Fixed E85 Percentage Differential to Gasoline (17.0-18.99%) vs Price Differential to Gasoline Price, MN 2007-2013



Source: Stratas Advisors 2014

E85: Failure to Launch

Retailers uninterested despite record wholesale economics

Supplier Name	Location	Price*	Ethanol Content	Source
<u>Absolute Energy</u>	St. Ansgar, Iowa	\$1.35	83%	DTN
Cenex	Des Moines Terminal	\$1.75	70%	OPIS
Flint Hills Resources	Des Moines Terminal	\$1.70	70%	OPIS
Hartland Fuel Products	Des Moines Terminal	\$1.81	75%	OPIS
Hartland Fuel Products	Des Moines Terminal	\$1.86	70%	OPIS
HollyFrontier	Des Moines Terminal	\$1.94	70%	OPIS
<u>Little Sioux Corn Processors</u>	Marcus, Iowa	\$1.46	70%	DTN
Noble Mansfield	Des Moines Terminal	\$1.70	70%	OPIS
<u>Quad County Corn Processors</u>	Galva, Iowa	\$1.49	75%	Company Website
<u>RPMG</u>	Des Moines Terminal	\$1.65	70%	OPIS
<u>Siouxland Energy Cooperative</u>	Sioux Center, Iowa	\$1.45	75%	Company Website
<u>The Andersons-Denison</u>	Denison, Iowa	\$1.44	76%	DTN
Valero Corp.	Des Moines Terminal	\$1.92	70%	OPIS
OPIS Des Moines Rack	Average Regular Gasoline (for comparison)	\$2.70		OPIS

Source: Iowa Renewable Fuels Association, 2014

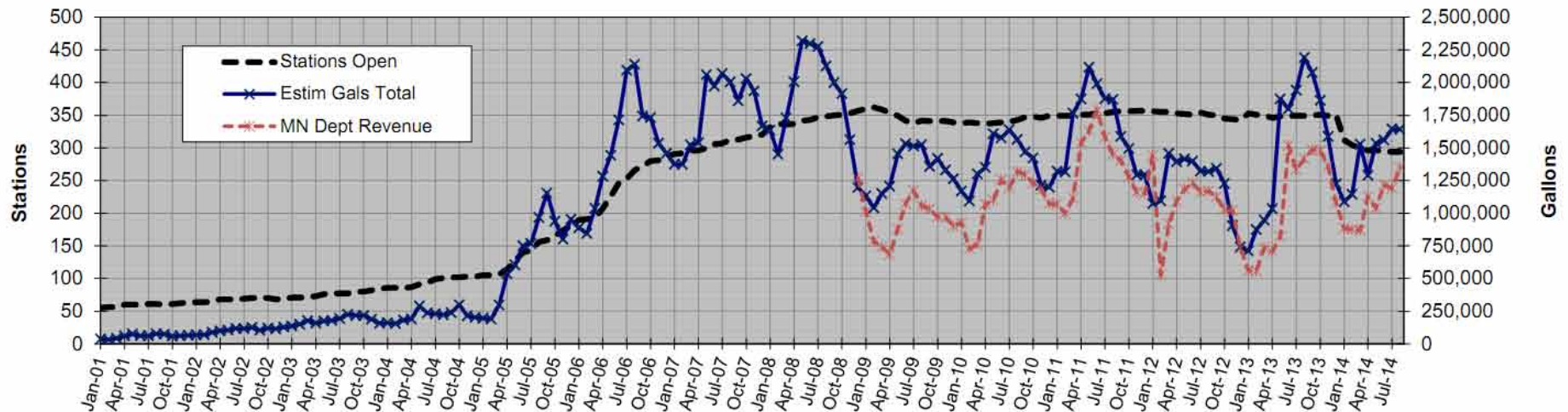
Text Questions: (713) 855-4009

E85: Failure to Launch

Stratas research into U.S. customer response to e85 price

- Minnesota and Iowa e85 sales in 2014 are not record-setting despite a record corn harvest, excellent ethanol-to-gasoline price spreads, increased natural gasoline use, and high-but-stable RIN prices.
- Some Minnesota stations stopped offering e85 despite excellent per-gallon profits in 2013-2014.
- OEM's have reduced incentives from mandates to continue to offer FFV's, and no customer demand.

Monthly Minnesota e85 Sales

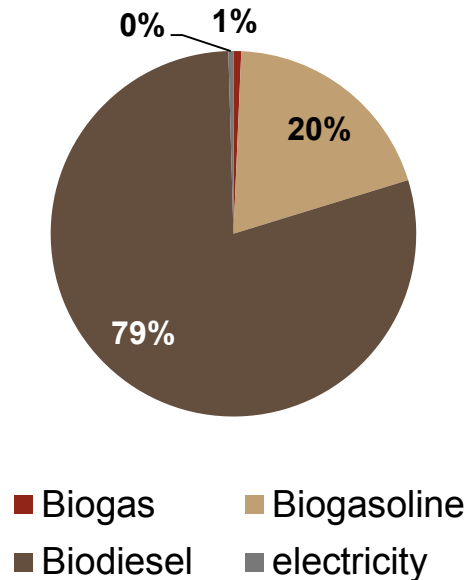


Source: Minnesota Department of Commerce 2014

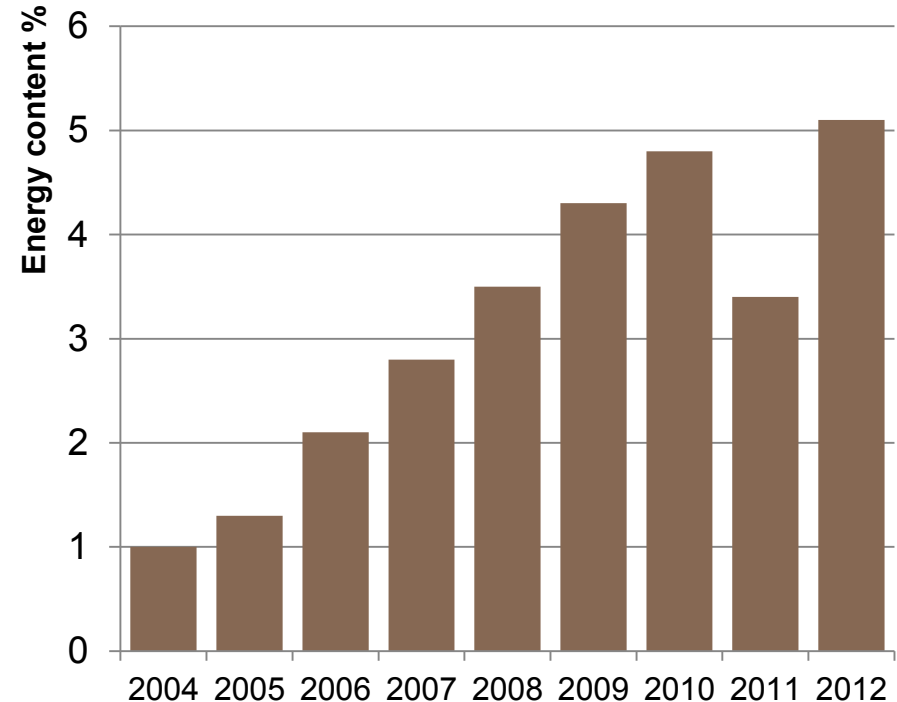
EU Biofuels Policy

Renewable energy in transport for the EU reached 5.1% by energy content in 2012

**Renewable Energy, Road Transport
2012**



**Share of Renewable Energy in Fuel
Consumption of Transport**



Source: Stratas Advisors citing data from Eurostat, 2014

Stratas Advisors has demonstrated for several years that the EU could not meet its 2020 10% renewable energy in transport target as well as its 6% GHG reduction target.