

Agriculture Digest

Corn, Ethanol and RFS2 – 2014 EPA rule shifts market dynamics; bearish RINs and bearish feedstock grains down the line...

- Commodities
- Agricultural Growth
- Regulations

- On November 15th the US Environmental Protection Agency formally issued its rule proposal for the 2014 Renewable Fuel Standard (RFS2)¹. The new proposal is substantially less binding than what was outlined in the original RFS2 law. The nearly 3-bn gal reduction to the 2014 total biofuel blending mandate from 18.2-bn gal to 15.2-bn gal exceeded the level of policy relaxation commodities markets seemed to be anticipating earlier this year (although OMB drafts leaked publicly and widely reported upon during October did correctly outline this proposal and had already spawned the next leg lower in prices for Renewable Identification Number (RIN) credits²). The 2014 rule appears to be a boon for independent refiners that were financially hit hardest on 2013 compliance costs, but it may face legal challenges from the biofuel industry.
- While there remains little clarity about the longer-term future of RFS2 and a permanent legislative fix to the Energy Independence and Security Act (EISA), the impact of this annual adjustment to blending mandates should reverberate throughout the corn, ethanol and RIN markets³. The proposal shows the EPA is both cognizant and aware of the E10 blend-wall issue and considers E15/E85 mid-level blends an implausible large-scale evacuation route in the near term. The sharp volumetric cut to the conventional corn ethanol carve-out from 14.4-bn gal per the statutory schedule to 13-bn gal is unlikely to curb the industry outlook during 2013/14, but it is perhaps setting the stage for placing a ceiling on corn consumption and ethanol output growth in the medium-term.

Aakash Doshi

+1-212-723-3872

aakash.doshi@citi.com

Eric G Lee

+1-212-723-1474

eric.g.lee@citi.com

Edward L Morse

+1-212-723-3871

ed.morse@citi.com

Anthony Yuen

+1-212-723-1477

anthony.yuen@citi.com

Xing Xing

xing.xing@citi.com

With thanks to

Lei Wu

¹ See Quick Post: Doshi, Aakash. "[EPA issues wider ranges for 2014 RFS2 Proposal – Bearish RINs.](#)" Citigroup: 15 November 2013.

² Doshi, Aakash. "[Agriculture Digest: Corn, Ethanol, RINs and the Renewable Fuel Standard \(RFS2\).](#)" Citigroup: 16 October 2013.

³ For a primer on RFS2 and the 'blend-wall' issue please refer to: Doshi, Aakash. "[Lord of the RINs.](#)" Citigroup: 6 August 2013.

See Appendix A-1 for Analyst Certification, Important Disclosures and non-US research analyst disclosures.

Citi Research is a division of Citigroup Global Markets Inc. (the "Firm"), which does and seeks to do business with companies covered in its research reports. As a result, investors should be aware that the Firm may have a conflict of interest that could affect the objectivity of this report. Investors should consider this report as only a single factor in making their investment decision.

Corn, Ethanol and RFS2 (RINs) Dynamics

On November 15th the US Environmental Protection Agency formally issued its rule proposal for the 2014 Renewable Fuel Standard (RFS2)⁴. The new proposal is substantially less binding than what was outlined in the original RFS2 law. The nearly 3-bn gal reduction to the 2014 total biofuel blending mandate from 18.2-bn gal to 15.2-bn gal exceeded the level of policy relaxation commodities markets seemed to be anticipating earlier this year (although OMB drafts leaked publicly and widely reported upon during October did correctly outline this proposal and had already spawned the next leg lower in prices for Renewable Identification Number (RIN) credits⁵). The 2014 rule appears to be a boon for independent refiners that were financially hit hardest on 2013 compliance costs, but it may face legal challenges from the biofuel industry.

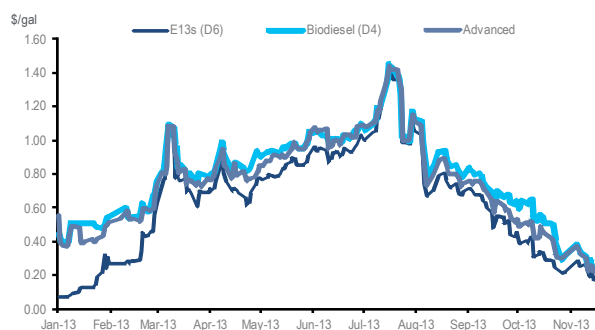
While there remains little clarity about the longer-term future of RFS2 and a permanent legislative fix to the Energy Independence and Security Act (EISA), the impact of this annual adjustment to blending mandates should reverberate throughout the corn, ethanol and RIN markets⁶. The proposal shows the EPA is both cognizant and aware of the E10 blend-wall issue and considers E15/E85 mid-level blends an implausible large-scale evacuation route in the near term. The sharp volumetric cut to the conventional corn ethanol carve-out from 14.4-bn gal per the statutory schedule to 13-bn gal is unlikely to curb the industry outlook during 2013/14, but it is perhaps setting the stage for placing a ceiling on corn consumption and ethanol output growth in the medium-term.

Figure 1. Renewable Fuel Standards from the 2007 EISA law or RFS2*

bn-gal	Corn Based Ethanol	Advanced Renewables	Total Biofuels
2011	12.6	1.4	14
2012	13.2	2	15.2
2013	13.8	2.8	16.6
2014	13.0 (12.7-13.2 range)	2.2 (2.0-2.5 range)	15.2 (15-15.5 range)
2015	15.0	5.5	20.5
2016	15.0	7.3	22.3
2017	15.0	9.0	24.0
2018	15.0	11.0	26.0
2019	15.0	13.0	28.0
2020	15.0	15.0	30.0
2021	15.0	18.0	33.0
2022	15.0	21.0	36.0

Source: EPA, Citi Research, *rounded to the nearest single decimal point; the original statutory schedule for 2014 suggested 14.4-bn gal conventional ethanol and 3.75-bn gal in advanced renewables for a total mandate of 18.15-bn gal

Figure 2. On-the-Run 2013 Conventional and Advanced RIN Prices



Source: Starfuels Inc., Citi Research

Where is the Renewable Fuel Standard (RFS2) heading?

The 2014 RFS2 rule proposal should be easy to achieve for most obligated parties for the following reasons: (1) it caps minimum required blending of conventional ethanol near the E10 (10% ethanol in domestic gasoline supply) blend-wall; (2) it reduces RIN shortages and should therefore continue to weigh on RIN credit prices; and (3) it provides a substantial cushion in the advanced biofuel carve-out.

The 2014 rule has for the first time cut the total mandate by significantly reducing its conventional and advanced blending carve-outs. This essentially caps mandatory absorption at or below any physical constraints, providing obligated parties compliance wiggle room next year.

Figure 3. 2014 Proposed RFS2 Standards

Category	Proposed Volume	Range
Cellulosic biofuel	17 mill gal	8-30 million gallons
Biomass-based diesel	1.28 bill gal*	1.28 billion gallons
Advanced biofuels	2.20 bill gal	2.0-2.51 billion gallons
Total Biofuels	15.21 bill gal	15.00-15.52 billion gallons

Source: EPA, Citi Research, *in ethanol equivalent (EE) terms, biomass-based diesel would be 1.92-bn gal; the other categories are in EE terms as listed

⁴ See Quick Post: Doshi, Aakash. [“EPA issues wider ranges for 2014 RFS2 Proposal – Bearish RINs.”](#) Citigroup: 15 November 2013.

⁵ Doshi, Aakash. [“Agriculture Digest: Corn, Ethanol, RINs and the Renewable Fuel Standard \(RFS2\).”](#) Citigroup: 16 October 2013.

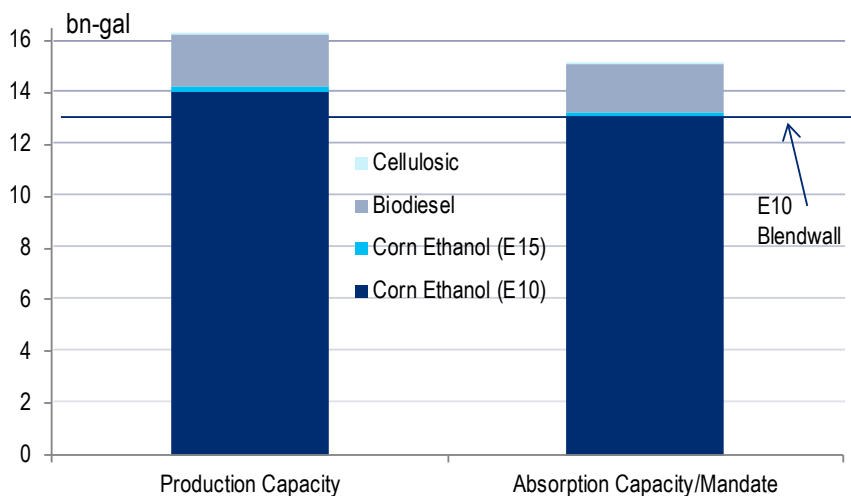
⁶ For a primer on RFS2 and the ‘blend-wall’ issue please refer to: Doshi, Aakash. [“Lord of the RINs.”](#) Citigroup: 6 August 2013.

1. **E10 blend-wall:** according to the November *Short-term Energy Outlook* issued by the EIA, US final gasoline demand in 2014 is assessed at ~133.2-bn gal inclusive of ~13.35-bn gal of ethanol volumes and ~119.85-bn gal of neat gasoline. This suggests a total blending rate of 10.1% with a mandated 9.8% level (E10) and the balance of ~0.2-bn gal for mid-level E85 fuels. In such a scenario, obligated parties are likely to *create* a surplus of about 0.35-bn gal in D6 RINs in 2014 as opposed to *drawing down* ~0.8-bn gal in credits this year.

Considering that in 2007 the EIA had assessed 2014 US gasoline demand at ~153.9-bn gal or 15% higher versus current estimates—it is clear that US government agencies responsible for developing forecasts for transportation fuel volumes are increasingly acknowledging the disconnect between the original mandated policy targets and realistic absorption capacity on the ground. While rule-setting and waiver authority is set only annually, the 2014 proposal points to a directional bias for ongoing policy easing until a legislative fix is offered or until technology and infrastructure on the ground warrant a more binding RFS2 standard.

The renewable fuel lobby is probably going to challenge the EPA 2014 rule which is currently under a 60-day comment period window and possibly will not publish as final until 3Q'14, as per our own estimates issued in August. While we do think the EPA has broad powers in interpreting RFS2, a different compromise on the final rule for the conventional carve-out (perhaps falling somewhere in between 13-bn gal and 14.4-bn gal old statutory schedule) could be the ultimate result, although the directional bias remains towards a substantial easing of total blending mandates in the coming years.

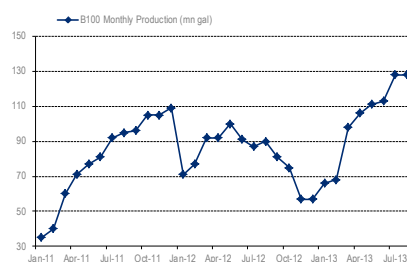
Figure 4. 2014 RFS2 compliance given 13-bn gal E10 blend-wall and 15.2-bn gal total mandate*



Source: EIA, EPA, Citi Research, *total domestic ethanol output capacity estimated at 14.25-bn gal/annum

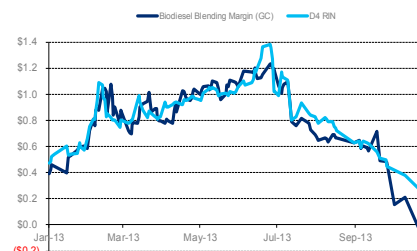
2. **RIN generation:** RIN credits have declined 7.5x-fold since July and are likely to trade at significantly lower values y/y in 2014 if the rule finalizes anywhere near the current proposal. Interestingly, the EPA has not accounted for carryover RINs which could be used to meet compliance in 2014; instead the agency assumes full physical blending—further reducing the pull on obligated parties to blend renewables into the final transportation supply (it might also be a point of contention for the biofuel lobby to argue for a higher binding mandate).

Figure 5. Pure Biodiesel Monthly Production



Source: EIA, Citi Research

Figure 6. GC Biodiesel Blending Margin and D4 RIN value typically move in tandem



Source: Bloomberg, EPA, Citi Research

3. **Advanced biofuel evacuation:** between the conventional carve-out of 13-bn gal and a total mandate of 15.2-bn gal is the advanced renewables gap of 2.2-bn gal in the new rule proposal versus what would have been a statutory volume of 3.75-bn gal in the original law. The flexibility provided in the revised 2014 rule provides an additional buffer for obligated parties next year.

The biodiesel mandate at 1.28-bn gal (1.92-bn gal in EE terms) was unchanged year-over-year and already clears 86% of the total advanced carve-out. Furthermore, it provides a cushion in that it is 0.7-bn gal below US biodiesel nameplate capacity in volumetric terms. Through October, biodiesel RIN generation has already exceeded the 2013 1.92-bn gal mandate by 190-mn gallons. D4 biodiesel RINs have tended to track biodiesel blending margins; surging during 1H'13 when the policy was more binding but have collapsed in recent months. The cellulosic mandate of 0.017-bn gal is essentially zero considering the total size of RFS2 and falls in line with Citi projections made earlier this year (and compares to a downwardly revised 0.006-mn gal for 2013). The balance of 0.27-bn gal could then be filled by Brazilian sugar-cane imports or additional biodiesel capacity—depending on which was lower cost (this would not prove difficult next year if current s/d trends held).

Figure 7. Gross Corn-Ethanol Crush Margins (\$/gal)



Source: CME, NYMEX, USDA, Citi Research

Economics still favor conventional ethanol production well above the 2014 physical blending mandate minimum, but policy relaxation could be a structural headwind for corn demand growth in the medium-term...

Figure 8. NY Ethanol – RBOB Differential 1M swap price (\$/gal)



Source: Bloomberg, Citi Research

In a strange twist of fate—despite the year/year decline in physical conventional ethanol blending requirements to ~13-bn gallons (essentially a ‘floor’ on ethanol output of ~848-k b/d or ~4.65-bn bushels of corn use)—we estimate corn ethanol production of ~13.8-bn gallons (~900-k b/d or ~4.92-bn bushels of corn use) for the 2013/14 marketing year ending August 31st 2014. The economics appear very supportive for elevated ethanol run-rates and blending, and could remain so for the next several quarters. Already the NY ethanol-RBOB differential 1M swap price has widened 20-30 cents in recent weeks versus its T2Y average of -\$0.43/gal. Gross corn-ethanol crush margins have averaged \$1/gal since the beginning of September versus less than \$0.14/gal during the first three months of the 2012/13 corn marketing cycle. We expect the crush spread could average between \$0.60-0.80/gal during 1H’14, more than double average cash margins observed in 1H’13.

To be sure, the lowest corn input costs in over three years, robust Asian and Mexican demand for ethanol production byproducts such as dried distiller grains (DDGs) where Gulf Coast basis has firmed up, stable natural gas prices and an inverted ethanol forward curve for processors to sell into, all buttress the favorable outlook for margins on the supply side. Meanwhile, an all-time low in ethanol inventories (total domestic stocks below 15.1-mn bbls), the potential for perhaps 500-mn gallons of exports (which our equity colleagues suggest could be as high as 1-bn gallons next year⁷) and E15/E85 evacuation of up to a few hundred million gallons all seem to support the demand side of the ledger as run-rates begin approaching maximum utilization.

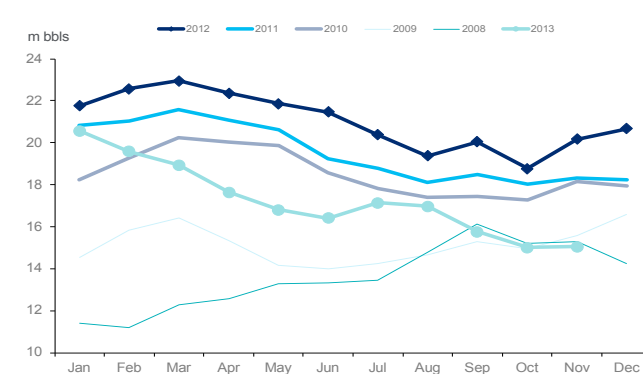
While the US Department of Energy estimates ethanol plant nameplate capacity of roughly 14-bn gal our equity colleagues estimate this total could be closer to 14.7-bn gal and we will therefore assume a middle ground at around 14.25-bn gal. Should domestic ethanol cash margins remain measurably higher than our forecast (i.e. staying at current levels of \$1.40/gal), and should the US push-out all Brazilian cane-ethanol exports save ~0.1-0.2-bn gal—this suggests periods of weekly ethanol output at or above 930-k b/d during 1H’14 or +150-k b/d in y/y production levels.

Figure 9. US Nameplate Fuel Ethanol Plant Production Capacity*

PADD	Number of Plants	2013	
		Nameplate Capacity (bn gal/year)	(k b/d)
PADD 1	4	360	23
PADD 2	172	12,598	822
PADD 3	5	419	27
PADD 4	5	190	12
PADD 5	7	285	19
U.S. Total	193	13,852	903

Source: DOE, Citi Research, *as of January 2013

Figure 10. US Fuel Ethanol Ending Stocks (monthly data + estimates)

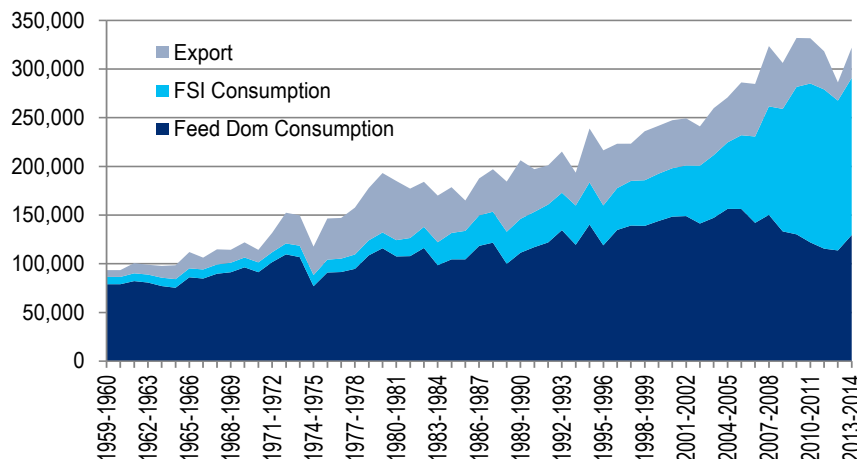


Source: EIA, Citi Research

⁷ Driscoll, David. “Ethanol Industry Update.” Citigroup: 18 November 2013.

Can corn use for ethanol hit a medium-term ceiling?

Figure 11. US Corn Demand Growth Since 2007 Driven by Ethanol Component of Food, Seed and Industrial (FSI) Consumption (000 metric tons)



Source: USDA, Citi Research

Figure 12. Citi Corn Price Outlook*

	2012A	2013F	2014F	2015F	2016F
CBOT Corn (USD/bu)	695	595	425	470	515

Source: Citi Research, *subject to revision

Economics and myriad market factors support annual ethanol production growth of ~6% in 2013/14 according to our forecast. But this is fast approaching a ceiling in our view—one that could soon be hit at ~5-5.1-bn bushels corn use in the next few years (less than 2% annual growth from 2013/14). To be sure, consider the 216% growth in US FSI (food, seed, industrial) corn demand in the past decade, almost entirely driven by additional ethanol output (corn use for biofuel production has been the largest, fastest and steadiest single component of aggregate US corn consumption since 2007). However, RFS2 easing should cap growth rates for US ethanol output, amid expectations of an even larger surplus grain market in 2014/15; further weighing on corn prices. CBOT levels are forecast between USD350-515/bu for 2H'13-2016 versus ~USD600/bu average from 2010-2012⁸.

Figure 13. US Corn Supply/Demand Balances*

Millions of Acres Millions of Bushels	USDA Estimates					Citi Estimates		
	09/10	10/11	11/12	12/13	13/14	12/13	13/14	14/15
Area Planted	86.5	88.2	91.9	97.2	95.3	97.2	96.0	90.8
Area Harvested	79.6	81.4	84	87.4	87.2	87.4	87.0	83.1
Percent Harvested	92%	92%	91%	90%	92%	90%	91%	92%
Yield per Harvested Acre	164.7	152.8	147.2	123.5	160.4	123.4	160.5	162.0
Beginning Stocks	1,673	1,707	1,127	988	823	989	808	1,837
Production	13,092	12,447	12,360	10,780	13,989	10,780	13,964	13,459
Imports	8	28	30	162	25	145	20	20
Total Supply	14,774	14,182	13,517	11,932	14,837	11,914	14,792	15,316
Feed and Residual	5,126	4,799	4,557	4,333	5,200	4,330	5,215	5,200
Ethanol Usage	4,591	5,019	5,000	4,648	4,900	4,650	4,915	5,000
Food, Seed and Industrial	5,961	6,426	6,429	6,044	6,350	6,046	6,340	6,470
Total Domestic Usage	11,087	11,225	10,985	10,377	11,550	10,376	11,555	11,670
Exports	1,979	1,830	1,542	731	1,400	730	1,400	1,520
Total Demand	13,066	13,055	12,527	11,108	12,950	11,106	12,955	13,190
Ending Stocks	1,708	1,128	989	824	1,887	808	1,837	2,126
Stocks to Usage	13.1%	8.6%	7.9%	7.4%	14.6%	7.3%	14.2%	16.1%

Source: USDA, Citi Research, *subject to revision

⁸ For our 2014 agriculture market outlook please refer to: Doshi, Aakash. "Agriculture Markets Easing: Looser balances and subdued prices can persist..." Citigroup: 18 November 2013.

Appendix A-1

Analyst Certification

The research analyst(s) primarily responsible for the preparation and content of this research report are named in bold text in the author block at the front of the product except for those sections where an analyst's name appears in bold alongside content which is attributable to that analyst. Each of these analyst(s) certify, with respect to the section(s) of the report for which they are responsible, that the views expressed therein accurately reflect their personal views about each issuer and security referenced and were prepared in an independent manner, including with respect to Citigroup Global Markets Inc and its affiliates. No part of the research analyst's compensation was, is, or will be, directly or indirectly, related to the specific recommendation(s) or view(s) expressed by that research analyst in this report.

IMPORTANT DISCLOSURES

Analysts' compensation is determined based upon activities and services intended to benefit the investor clients of Citigroup Global Markets Inc. and its affiliates ("the Firm"). Like all Firm employees, analysts receive compensation that is impacted by overall firm profitability which includes investment banking revenues.

For important disclosures (including copies of historical disclosures) regarding the companies that are the subject of this Citi Research product ("the Product"), please contact Citi Research, 388 Greenwich Street, 28th Floor, New York, NY, 10013, Attention: Legal/Compliance [E6WYB6412478]. In addition, the same important disclosures, with the exception of the Valuation and Risk assessments and historical disclosures, are contained on the Firm's disclosure website at https://www.citivelocity.com/cvr/eppublic/citi_research_disclosures. Valuation and Risk assessments can be found in the text of the most recent research note/report regarding the subject company. Historical disclosures (for up to the past three years) will be provided upon request.

NON-US RESEARCH ANALYST DISCLOSURES

Non-US research analysts who have prepared this report (i.e., all research analysts listed below other than those identified as employed by Citigroup Global Markets Inc.) are not registered/qualified as research analysts with FINRA. Such research analysts may not be associated persons of the member organization and therefore may not be subject to the NYSE Rule 472 and NASD Rule 2711 restrictions on communications with a subject company, public appearances and trading securities held by a research analyst account. The legal entities employing the authors of this report are listed below:

Citigroup Global Markets Inc

Aakash Doshi; Eric G Lee; Edward L Morse; Anthony Yuen; Xing Xing

OTHER DISCLOSURES

For securities recommended in the Product in which the Firm is not a market maker, the Firm is a liquidity provider in the issuers' financial instruments and may act as principal in connection with such transactions. The Firm is a regular issuer of traded financial instruments linked to securities that may have been recommended in the Product. The Firm regularly trades in the securities of the issuer(s) discussed in the Product. The Firm may engage in securities transactions in a manner inconsistent with the Product and, with respect to securities covered by the Product, will buy or sell from customers on a principal basis.

Securities recommended, offered, or sold by the Firm: (i) are not insured by the Federal Deposit Insurance Corporation; (ii) are not deposits or other obligations of any insured depository institution (including Citibank); and (iii) are subject to investment risks, including the possible loss of the principal amount invested. Although information has been obtained from and is based upon sources that the Firm believes to be reliable, we do not guarantee its accuracy and it may be incomplete and condensed. Note, however, that the Firm has taken all reasonable steps to determine the accuracy and completeness of the disclosures made in the Important Disclosures section of the Product. The Firm's research department has received assistance from the subject company(ies) referred to in this Product including, but not limited to, discussions with management of the subject company(ies). Firm policy prohibits research analysts from sending draft research to subject companies. However, it should be presumed that the author of the Product has had discussions with the subject company to ensure factual accuracy prior to publication. All opinions, projections and estimates constitute the judgment of the author as of the date of the Product and these, plus any other information contained in the Product, are subject to change without notice. Prices and availability of financial instruments also are subject to change without notice. Notwithstanding other departments within the Firm advising the companies discussed in this Product, information obtained in such role is not used in the preparation of the Product. Although Citi Research does not set a predetermined frequency for publication, if the Product is a fundamental research report, it is the intention of Citi Research to provide research coverage of the/those issuer(s) mentioned therein, including in response to news affecting this issuer, subject to applicable quiet periods and capacity constraints. The Product is for informational purposes only and is not intended as an offer or solicitation for the purchase or sale of a security. Any decision to purchase securities mentioned in the Product must take into account existing public information on such security or any registered prospectus.

Investing in non-U.S. securities, including ADRs, may entail certain risks. The securities of non-U.S. issuers may not be registered with, nor be subject to the reporting requirements of the U.S. Securities and Exchange Commission. There may be limited information available on foreign securities. Foreign companies are generally not subject to uniform audit and reporting standards, practices and requirements comparable to those in the U.S. Securities of some foreign companies may be less liquid and their prices more volatile than securities of comparable U.S. companies. In addition, exchange rate movements may have an adverse effect on the value of an investment in a foreign stock and its corresponding dividend payment for U.S. investors. Net dividends to ADR investors are estimated, using withholding tax rates conventions, deemed accurate, but investors are urged to consult their tax advisor for exact dividend computations. Investors who have received the Product from the Firm may be prohibited in certain states or other jurisdictions from purchasing securities mentioned in the Product from the Firm. Please ask your Financial Consultant for additional details. Citigroup Global Markets Inc. takes responsibility for the Product in the United States. Any orders by US investors resulting from the information contained in the Product may be placed only through Citigroup Global Markets Inc.

The Citigroup legal entity that takes responsibility for the production of the Product is the legal entity which the first named author is employed by. The Product is made available in **Australia** through Citi Global Markets Australia Pty Ltd. (ABN 64 003 114 832 and AFSL No. 240992), participant of the ASX Group and regulated by the Australian Securities & Investments Commission. Citigroup Centre, 2 Park Street, Sydney, NSW 2000. The Product is

made available in Australia to Private Banking wholesale clients through Citigroup Pty Limited (ABN 88 004 325 080 and AFSL 238098). Citigroup Pty Limited provides all financial product advice to Australian Private Banking wholesale clients through bankers and relationship managers. If there is any doubt about the suitability of investments held in Citigroup Private Bank accounts, investors should contact the Citigroup Private Bank in Australia. Citigroup companies may compensate affiliates and their representatives for providing products and services to clients. The Product is made available in **Brazil** by Citigroup Global Markets Brasil - CCTVM SA, which is regulated by CVM - Comissão de Valores Mobiliários, BACEN - Brazilian Central Bank, APIMEC - Associação dos Analistas e Profissionais de Investimento do Mercado de Capitais and ANBID - Associação Nacional dos Bancos de Investimento. Av. Paulista, 1111 - 11º andar - CEP. 01311920 - São Paulo - SP. If the Product is being made available in certain provinces of **Canada** by Citigroup Global Markets (Canada) Inc. ("CGM Canada"), CGM Canada has approved the Product. Citigroup Place, 123 Front Street West, Suite 1100, Toronto, Ontario M5J 2M3. This product is available in **Chile** through Banchile Corredores de Bolsa S.A., an indirect subsidiary of Citigroup Inc., which is regulated by the Superintendencia de Valores y Seguros. Agustinas 975, piso 2, Santiago, Chile. The Product is made available in **France** by Citigroup Global Markets Limited, which is authorised and regulated by Financial Services Authority. 1-5 Rue Paul Cézanne, 8ème, Paris, France. The Product is distributed in **Germany** by Citigroup Global Markets Deutschland AG ("CGMD"), which is regulated by Bundesanstalt fuer Finanzdienstleistungsaufsicht (BaFin). CGMD, Reuterweg 16, 60323 Frankfurt am Main. Research which relates to "securities" (as defined in the Securities and Futures Ordinance (Cap. 571 of the Laws of Hong Kong)) is issued in **Hong Kong** by, or on behalf of, Citigroup Global Markets Asia Limited which takes full responsibility for its content. Citigroup Global Markets Asia Ltd. is regulated by Hong Kong Securities and Futures Commission. If the Research is made available through Citibank, N.A., Hong Kong Branch, for its clients in Citi Private Bank, it is made available by Citibank N.A., Citibank Tower, Citibank Plaza, 3 Garden Road, Hong Kong. Citibank N.A. is regulated by the Hong Kong Monetary Authority. Please contact your Private Banker in Citibank N.A., Hong Kong, Branch if you have any queries on or any matters arising from or in connection with this document. The Product is made available in **India** by Citigroup Global Markets India Private Limited, which is regulated by Securities and Exchange Board of India. Bakhtawar, Nariman Point, Mumbai 400-021. The Product is made available in **Indonesia** through PT Citigroup Securities Indonesia. 5/F, Citibank Tower, Bapindo Plaza, Jl. Jend. Sudirman Kav. 54-55, Jakarta 12190. Neither this Product nor any copy hereof may be distributed in Indonesia or to any Indonesian citizens wherever they are domiciled or to Indonesian residents except in compliance with applicable capital market laws and regulations. This Product is not an offer of securities in Indonesia. The securities referred to in this Product have not been registered with the Capital Market and Financial Institutions Supervisory Agency (BAPEPAM-LK) pursuant to relevant capital market laws and regulations, and may not be offered or sold within the territory of the Republic of Indonesia or to Indonesian citizens through a public offering or in circumstances which constitute an offer within the meaning of the Indonesian capital market laws and regulations. The Product is made available in **Israel** through Citibank NA, regulated by the Bank of Israel and the Israeli Securities Authority. Citibank, N.A. Platinum Building, 21 Ha'arba'ah St, Tel Aviv, Israel. The Product is made available in **Italy** by Citigroup Global Markets Limited, which is authorised and regulated by Financial Services Authority. Via dei Mercanti, 12, Milan, 20121, Italy. The Product is made available in **Japan** by Citigroup Global Markets Japan Inc. ("CGMJ"), which is regulated by Financial Services Agency, Securities and Exchange Surveillance Commission, Japan Securities Dealers Association, Tokyo Stock Exchange and Osaka Securities Exchange. Shin-Marunouchi Building, 1-5-1 Marunouchi, Chiyoda-ku, Tokyo 100-6520 Japan. If the Product was distributed by SMBC Nikko Securities Inc. it is being so distributed under license. In the event that an error is found in an CGMJ research report, a revised version will be posted on the Firm's Citi Velocity website. If you have questions regarding Citi Velocity, please call (81 3) 6270-3019 for help. The Product is made available in **Korea** by Citigroup Global Markets Korea Securities Ltd., which is regulated by the Financial Services Commission, the Financial Supervisory Service and the Korea Financial Investment Association (KOFIA). Citibank Building, 39 Da-dong, Jung-gu, Seoul 100-180, Korea. KOFIA makes available registration information of research analysts on its website. Please visit the following website if you wish to find KOFIA registration information on research analysts of Citigroup Global Markets Korea Securities Ltd. <http://dis.kofia.or.kr/fs/dis2/fundMgr/DISFundMgrAnalystPop.jsp?companyCd2=A03030&pageDiv=02>. The Product is made available in Korea by Citibank Korea Inc., which is regulated by the Financial Services Commission and the Financial Supervisory Service. Address is Citibank Building, 39 Da-dong, Jung-gu, Seoul 100-180, Korea. The Product is made available in **Malaysia** by Citigroup Global Markets Malaysia Sdn Bhd (Company No. 460819-D) ("CGMM") to its clients and CGMM takes responsibility for its contents. CGMM is regulated by the Securities Commission of Malaysia. Please contact CGMM at Level 43 Menara Citibank, 165 Jalan Ampang, 50450 Kuala Lumpur, Malaysia in respect of any matters arising from, or in connection with, the Product. The Product is made available in **Mexico** by Acciones y Valores Banamex, S.A. De C. V., Casa de Bolsa, Integrante del Grupo Financiero Banamex ("Accival") which is a wholly owned subsidiary of Citigroup Inc. and is regulated by Comision Nacional Bancaria y de Valores. Reforma 398, Col. Juarez, 06600 Mexico, D.F. In **New Zealand** the Product is made available to 'wholesale clients' only as defined by s5C(1) of the Financial Advisers Act 2008 ('FAA') through Citigroup Global Markets Australia Pty Ltd (ABN 64 003 114 832 and AFSL No. 240992), an overseas financial adviser as defined by the FAA, participant of the ASX Group and regulated by the Australian Securities & Investments Commission. Citigroup Centre, 2 Park Street, Sydney, NSW 2000. The Product is made available in **Pakistan** by Citibank N.A. Pakistan branch, which is regulated by the State Bank of Pakistan and Securities Exchange Commission, Pakistan. AWT Plaza, 1.1. Chundrigar Road, P.O. Box 4889, Karachi-74200. The Product is made available in the **Philippines** through Citicorp Financial Services and Insurance Brokerage Philippines, Inc., which is regulated by the Philippines Securities and Exchange Commission. 20th Floor Citibank Square Bldg. The Product is made available in the Philippines through Citibank NA Philippines branch, Citibank Tower, 8741 Paseo De Roxas, Makati City, Manila. Citibank NA Philippines NA is regulated by The Bangko Sentral ng Pilipinas. The Product is made available in **Poland** by Dom Maklerski Banku Handlowego SA an indirect subsidiary of Citigroup Inc., which is regulated by Komisja Nadzoru Finansowego. Dom Maklerski Banku Handlowego S.A. ul.Senatorska 16, 00-923 Warszawa. The Product is made available in the **Russian Federation** through ZAO Citibank, which is licensed to carry out banking activities in the Russian Federation in accordance with the general banking license issued by the Central Bank of the Russian Federation and brokerage activities in accordance with the license issued by the Federal Service for Financial Markets. Neither the Product nor any information contained in the Product shall be considered as advertising the securities mentioned in this report within the territory of the Russian Federation or outside the Russian Federation. The Product does not constitute an appraisal within the meaning of the Federal Law of the Russian Federation of 29 July 1998 No. 135-FZ (as amended) On Appraisal Activities in the Russian Federation. 8-10 Gasheka Street, 125047 Moscow. The Product is made available in **Singapore** through Citigroup Global Markets Singapore Pte. Ltd. ("CGMSPL"), a capital markets services license holder, and regulated by Monetary Authority of Singapore. Please contact CGMSPL at 8 Marina View, 21st Floor Asia Square Tower 1, Singapore 018960, in respect of any matters arising from, or in connection with, the analysis of this document. This report is intended for recipients who are accredited, expert and institutional investors as defined under the Securities and Futures Act (Cap. 289). The Product is made available by The Citigroup Private Bank in Singapore through Citibank, N.A., Singapore Branch, a licensed bank in Singapore that is regulated by Monetary Authority of Singapore. Please contact your Private Banker in Citibank N.A., Singapore Branch if you have any queries on or any matters arising from or in connection with this document. This report is intended for recipients who are accredited, expert and institutional investors as defined under the Securities and Futures Act (Cap. 289). This report is distributed in Singapore by Citibank

Singapore Ltd ("CSL") to selected Citigold/Citigold Private Clients. CSL provides no independent research or analysis of the substance or in preparation of this report. Please contact your Citigold/Citigold Private Client Relationship Manager in CSL if you have any queries on or any matters arising from or in connection with this report. This report is intended for recipients who are accredited investors as defined under the Securities and Futures Act (Cap. 289). Citigroup Global Markets (Pty) Ltd. is incorporated in the **Republic of South Africa** (company registration number 2000/025866/07) and its registered office is at 145 West Street, Sandton, 2196, Saxonwold. Citigroup Global Markets (Pty) Ltd. is regulated by JSE Securities Exchange South Africa, South African Reserve Bank and the Financial Services Board. The investments and services contained herein are not available to private customers in South Africa. The Product is made available in **Spain** by Citigroup Global Markets Limited, which is authorised and regulated by Financial Services Authority. 29 Jose Ortega Y Gasset, 4th Floor, Madrid, 28006, Spain. The Product is made available in the **Republic of China** through Citigroup Global Markets Taiwan Securities Company Ltd. ("CGMTS"), 14 and 15F, No. 1, Songzhi Road, Taipei 110, Taiwan and/or through Citibank Securities (Taiwan) Company Limited ("CSTL"), 14 and 15F, No. 1, Songzhi Road, Taipei 110, Taiwan, subject to the respective license scope of each entity and the applicable laws and regulations in the Republic of China. CGMTS and CSTL are both regulated by the Securities and Futures Bureau of the Financial Supervisory Commission of Taiwan, the Republic of China. No portion of the Product may be reproduced or quoted in the Republic of China by the press or any third parties [without the written authorization of CGMTS and CSTL]. If the Product covers securities which are not allowed to be offered or traded in the Republic of China, neither the Product nor any information contained in the Product shall be considered as advertising the securities or making recommendation of the securities in the Republic of China. The Product is for informational purposes only and is not intended as an offer or solicitation for the purchase or sale of a security or financial products. Any decision to purchase securities or financial products mentioned in the Product must take into account existing public information on such security or the financial products or any registered prospectus. The Product is made available in **Thailand** through Citicorp Securities (Thailand) Ltd., which is regulated by the Securities and Exchange Commission of Thailand. 18/F, 22/F and 29/F, 82 North Sathorn Road, Silom, Bangrak, Bangkok 10500, Thailand. The Product is made available in **Turkey** through Citibank AS which is regulated by Capital Markets Board. Tekfen Tower, Eski Buyukdere Caddesi # 209 Kat 2B, 23294 Levent, Istanbul, Turkey. In the **U.A.E.**, these materials (the "Materials") are communicated by Citigroup Global Markets Limited, DIFC branch ("CGML"), an entity registered in the Dubai International Financial Center ("DIFC") and licensed and regulated by the Dubai Financial Services Authority ("DFSA") to Professional Clients and Market Counterparties only and should not be relied upon or distributed to Retail Clients. A distribution of the different Citi Research ratings distribution, in percentage terms for Investments in each sector covered is made available on request. Financial products and/or services to which the Materials relate will only be made available to Professional Clients and Market Counterparties. The Product is made available in **United Kingdom** by Citigroup Global Markets Limited, which is authorised and regulated by Financial Services Authority. This material may relate to investments or services of a person outside of the UK or to other matters which are not regulated by the FSA and further details as to where this may be the case are available upon request in respect of this material. Citigroup Centre, Canada Square, Canary Wharf, London, E14 5LB. The Product is made available in **United States** by Citigroup Global Markets Inc, which is a member of FINRA and registered with the US Securities and Exchange Commission. 388 Greenwich Street, New York, NY 10013. Unless specified to the contrary, within EU Member States, the Product is made available by Citigroup Global Markets Limited, which is regulated by Financial Services Authority. Pursuant to Comissão de Valores Mobiliários Rule 483, Citi is required to disclose whether a Citi related company or business has a commercial relationship with the subject company. Considering that Citi operates multiple businesses in more than 100 countries around the world, it is likely that Citi has a commercial relationship with the subject company.

Many European regulators require that a firm must establish, implement and make available a policy for managing conflicts of interest arising as a result of publication or distribution of investment research. The policy applicable to Citi Research's Products can be found at https://www.citivelocity.com/cvr/eppublic/citi_research_disclosures.

Compensation of equity research analysts is determined by equity research management and Citigroup's senior management and is not linked to specific transactions or recommendations.

The Product may have been distributed simultaneously, in multiple formats, to the Firm's worldwide institutional and retail customers. The Product is not to be construed as providing investment services in any jurisdiction where the provision of such services would not be permitted.

Subject to the nature and contents of the Product, the investments described therein are subject to fluctuations in price and/or value and investors may get back less than originally invested. Certain high-volatility investments can be subject to sudden and large falls in value that could equal or exceed the amount invested. Certain investments contained in the Product may have tax implications for private customers whereby levels and basis of taxation may be subject to change. If in doubt, investors should seek advice from a tax adviser. The Product does not purport to identify the nature of the specific market or other risks associated with a particular transaction. Advice in the Product is general and should not be construed as personal advice given it has been prepared without taking account of the objectives, financial situation or needs of any particular investor. Accordingly, investors should, before acting on the advice, consider the appropriateness of the advice, having regard to their objectives, financial situation and needs. Prior to acquiring any financial product, it is the client's responsibility to obtain the relevant offer document for the product and consider it before making a decision as to whether to purchase the product. Citi Research generally disseminates its research to the Firm's global institutional and retail clients via both proprietary (e.g., Citi Velocity and Citi Personal Wealth Management) and non-proprietary electronic distribution platforms. Certain research may be disseminated only via Citi's proprietary distribution platforms; however such research will not contain changes to earnings forecasts, target price, investment or risk rating or investment thesis or be otherwise inconsistent with the author's previously published research. Certain research is made available only to institutional investors to satisfy regulatory requirements. Individual Citi Research analysts may also opt to circulate published research to one or more clients by email; such email distribution is discretionary and is done only after the research has been disseminated.

The level and types of services provided by Citi Research analysts to clients may vary depending on various factors such as the client's individual preferences as to the frequency and manner of receiving communications from analysts, the client's risk profile and investment focus and perspective (e.g. market-wide, sector specific, long term, short-term etc.), the size and scope of the overall client relationship with Citi and legal and regulatory constraints. Citi Research product may source data from dataCentral. dataCentral is a Citi Research proprietary database, which includes Citi estimates, data from company reports and feeds from Reuters and Datastream.

© 2013 Citigroup Global Markets Inc. Citi Research is a division of Citigroup Global Markets Inc. Citi and Citi with Arc Design are trademarks and service marks of Citigroup Inc. and its affiliates and are used and registered throughout the world. All rights reserved. Any unauthorized use, duplication, redistribution or disclosure of this report (the "Product"), including, but not limited to, redistribution of the Product by electronic mail, posting of the Product on a website or page, and/or providing to a third party a link to the Product, is prohibited by law and will result in prosecution. The information contained in the Product is intended solely for the recipient and may not be further distributed by the recipient to any third party. Where included in this report, MSCI sourced

information is the exclusive property of Morgan Stanley Capital International Inc. (MSCI). Without prior written permission of MSCI, this information and any other MSCI intellectual property may not be reproduced, disseminated or used to create any financial products, including any indices. This information is provided on an "as is" basis. The user assumes the entire risk of any use made of this information. MSCI, its affiliates and any third party involved in, or related to, computing or compiling the information hereby expressly disclaim all warranties of originality, accuracy, completeness, merchantability or fitness for a particular purpose with respect to any of this information. Without limiting any of the foregoing, in no event shall MSCI, any of its affiliates or any third party involved in, or related to, computing or compiling the information have any liability for any damages of any kind. MSCI, Morgan Stanley Capital International and the MSCI indexes are services marks of MSCI and its affiliates. The Firm accepts no liability whatsoever for the actions of third parties. The Product may provide the addresses of, or contain hyperlinks to, websites. Except to the extent to which the Product refers to website material of the Firm, the Firm has not reviewed the linked site. Equally, except to the extent to which the Product refers to website material of the Firm, the Firm takes no responsibility for, and makes no representations or warranties whatsoever as to, the data and information contained therein. Such address or hyperlink (including addresses or hyperlinks to website material of the Firm) is provided solely for your convenience and information and the content of the linked site does not in anyway form part of this document. Accessing such website or following such link through the Product or the website of the Firm shall be at your own risk and the Firm shall have no liability arising out of, or in connection with, any such referenced website.

ADDITIONAL INFORMATION IS AVAILABLE UPON REQUEST
