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Sugar & Energy Markets

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energy from nature

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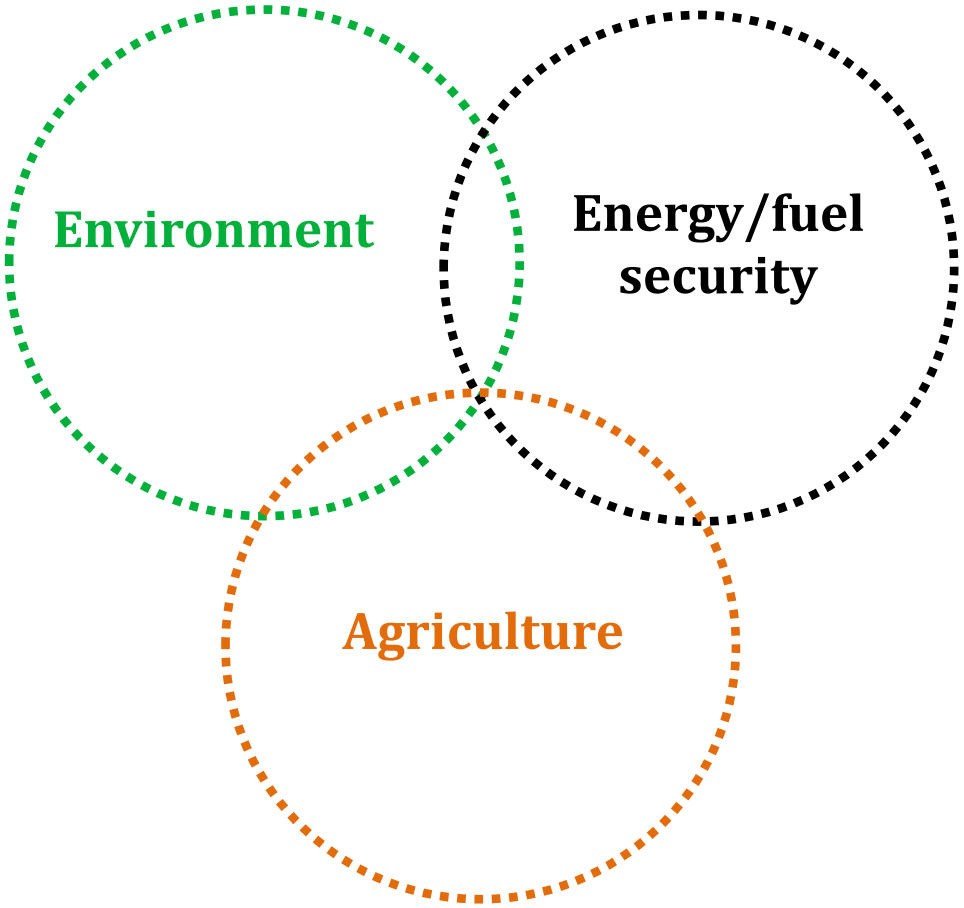
Main drivers for biofuels production & use



The potential for **biofuels** production and use is due to factors such as:

- Environmental concerns – Kyoto & Bali Protocols, and potential to mitigate climate change through greenhouse gas emission reductions
- Important variation in crude oil prices
- International security concerns related to regions reach in crude oil resources (Middle East, Africa/Nigeria, Central America, Russia)
- Actions to improve farm incomes and boost rural economies
- Energy access in underserved areas: poor urban and rural off-grid communities
- Potential to improve trade balances
- New job creation , investment opportunities, increasing economic output

Different feedstocks used for ethanol production

Advantages of using sugarcane ethanol in terms of productivity & environmental performance

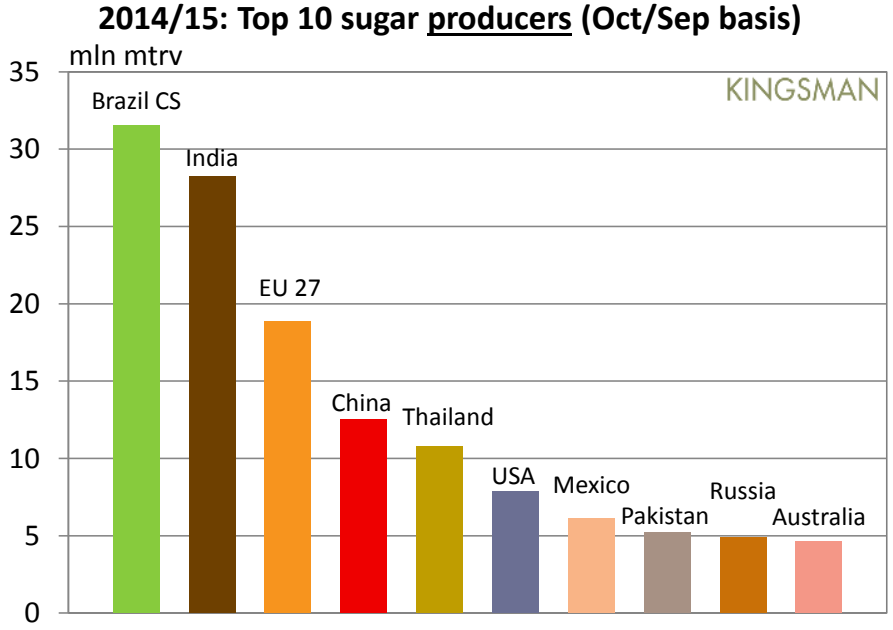
Country/Union	**USA**	**EU**	**EU**	**Brazil**
Feedstock	Corn	Wheat	Sugar beet	Sugar cane
Productivity (litres/ha)	3,800/4,000	2,500	5,500	7,000/7,100
GHG reduction EU &US legislations considered)	< 38%	16% - 69%	52%	61%-91%

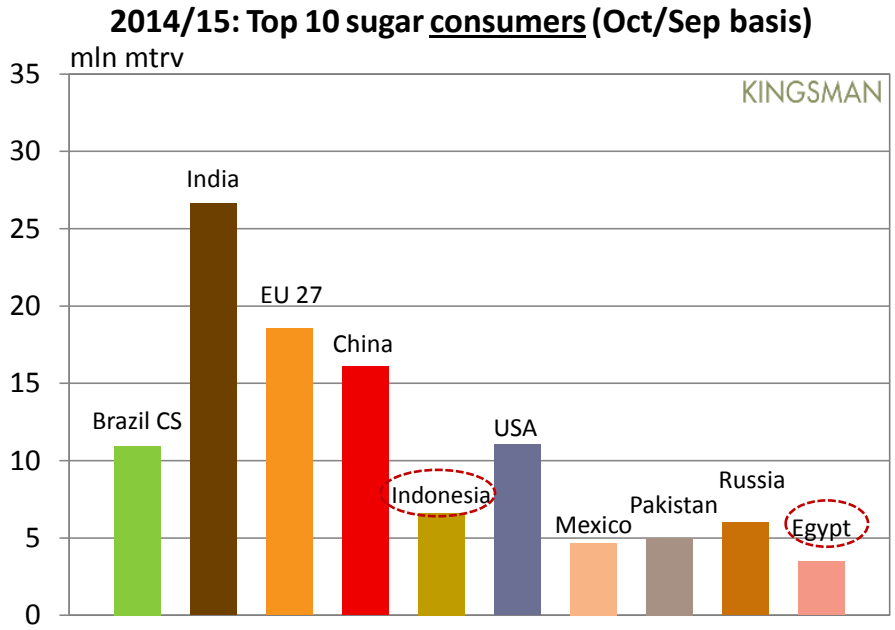
**Sources: IEA, EU Commission, EPA, UNICA*

- Sugarcane is the principal feedstock used for ethanol production in Brazil and is considered as an advanced biofuel in the US due to its high percentage (over 61%) reduction of total life cycle GHG emissions including ILUC

- Brazilian ethanol is somewhere at the border between 1st generation of biofuels and the 2nd generation ones. **U.S. pays a premium for this, while the E.U. doesn't**

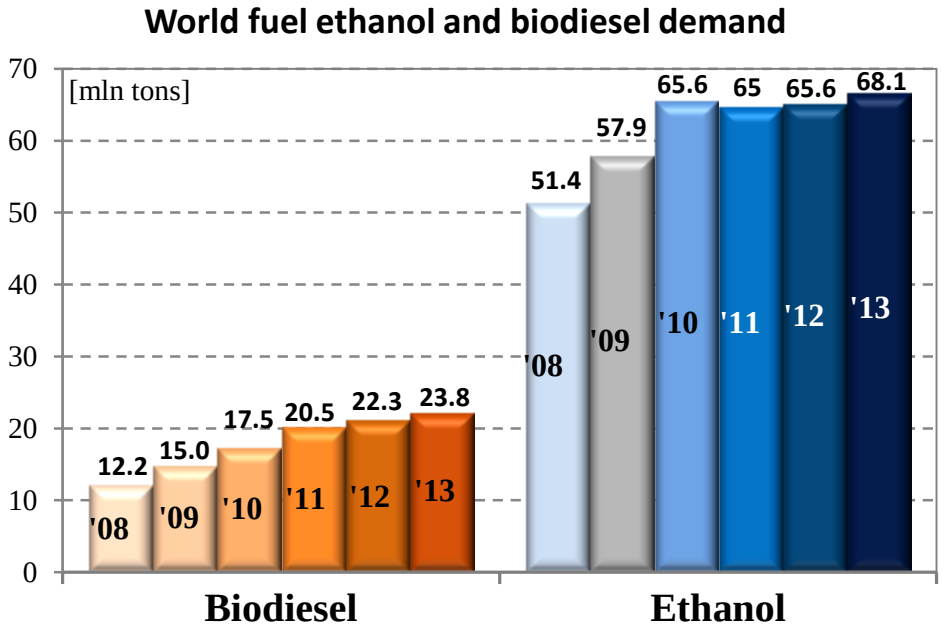
The world sugar ranking

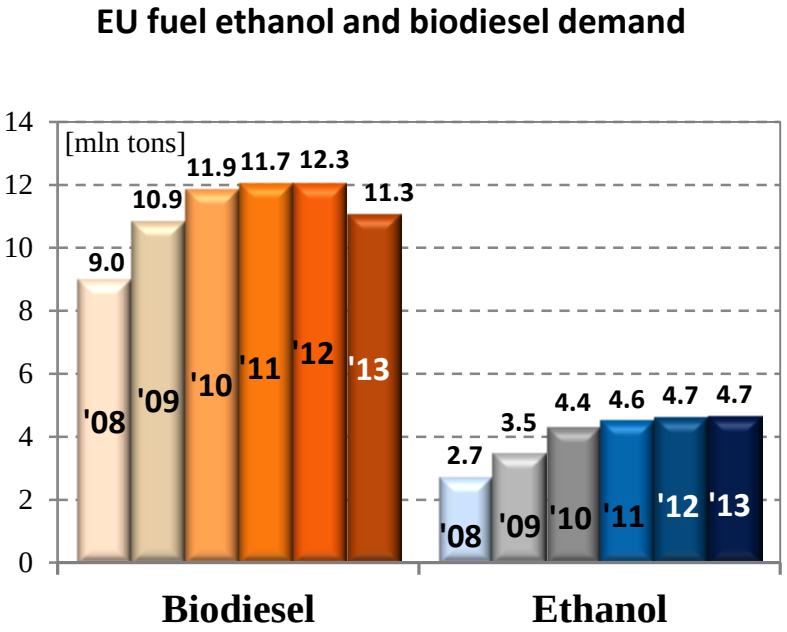




- CS Brazil is the biggest sugar producer in the world
- CS Brazil is the 5th world sugar consumer
- CS Brazil has 54-55% share in world raw sugar exports

Evolution of biofuels demand. Ethanol is the main global market





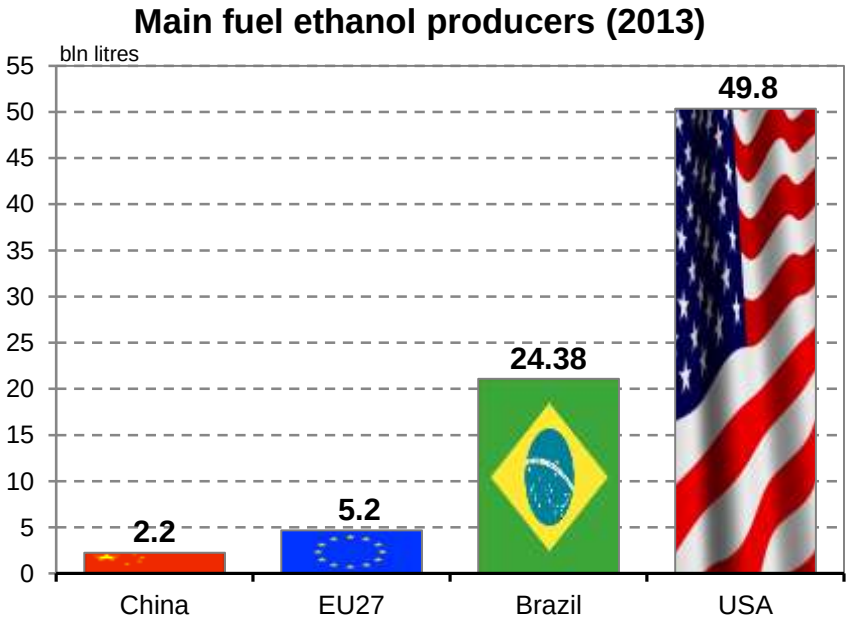
*Due to its early implementation in Brazil and the US, after the oil crisis from '70s, the world ethanol market increased annually and dominate the biofuels world. Biodiesel was implemented much later but it managed to grow rapidly in recent years

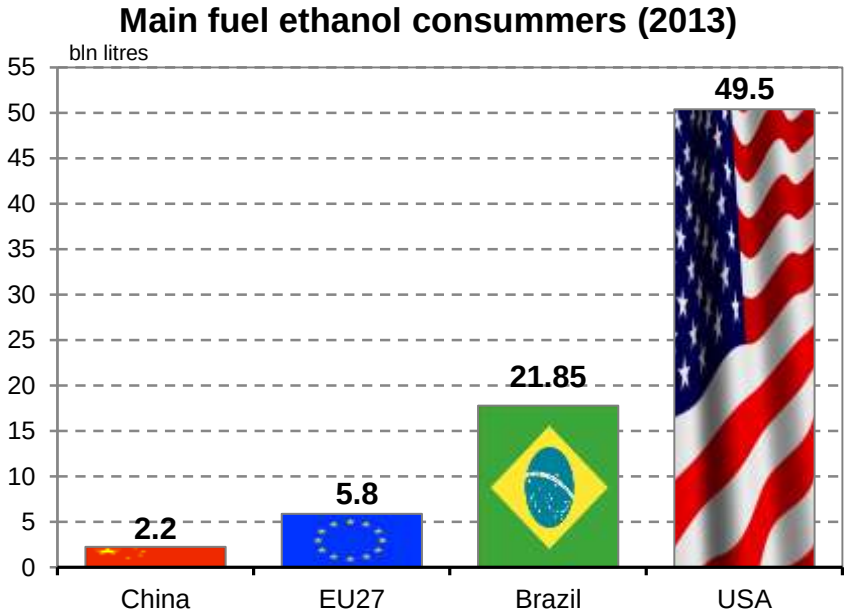
In 2013 world ethanol demand was **2.8** x higher than the biodiesel one while in 2008 was almost **3.9** x bigger.

***IEA forecast for 2016 - Biofuels production: +28% from 2010 figures

Main fuel ethanol players

No major changes were seen in the past decade as main players are the same





- US, Brazil and the EU27: about **91%** of world fuel ethanol production
  about **88%** of world fuel ethanol consumption
- US & Brazil: more than 75% of World exports

US RFA mandates

Biofuels demand driven by mandates/Renewable Fuel Standards (Obligations)

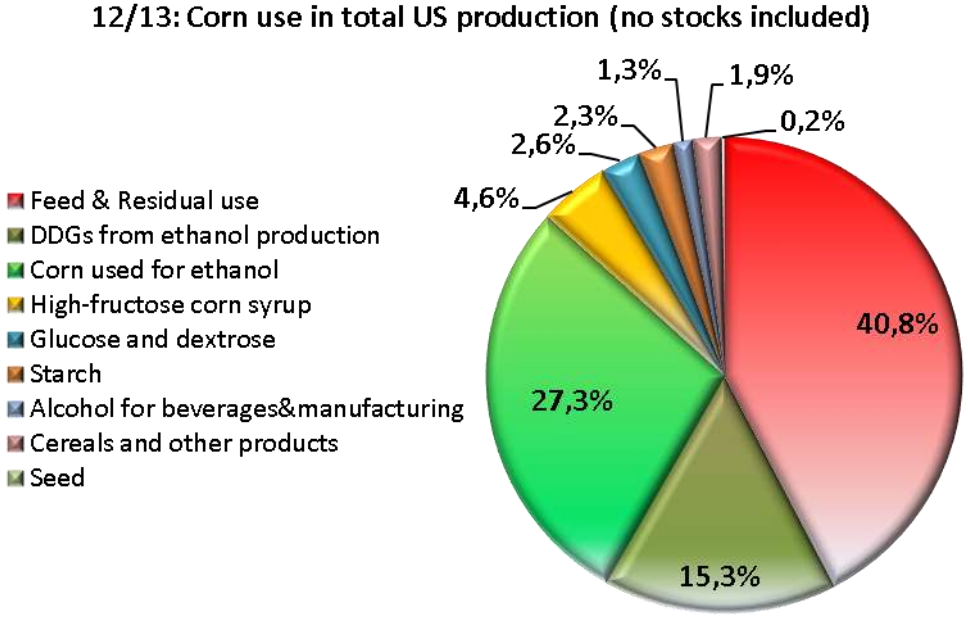
RFS2 OBLIGATIONS in [bln gal]	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Cellulosic biofuel	-	0.1	0.25	0.5	1	1.75	3	4.25	5.5	7	8.5	10.5	13.5	16
Biomass-based diesel	0.5	0.65	0.8	1	1	1	1	1	1	1	1	1	1	1
Any other advanced biofuel	0.1	0.2	0.3	0.5	0.75	1	1.5	2	2.5	3	3.5	3.5	3.5	4
Advanced biofuel	0.6	0.95	1.35	2	2.75	3.75	5.5	7.25	9	11	13	15	18	21
Any other renewable biofuel	10.5	12	12.6	13.2	13.8	14.4	15	15	15	15	15	15	15	15
Total Renewable fuel	11.10	12.95	13.95	15.20	16.55	18.15	20.50	22.25	24.00	26.00	28.00	30.00	33.00	36.00

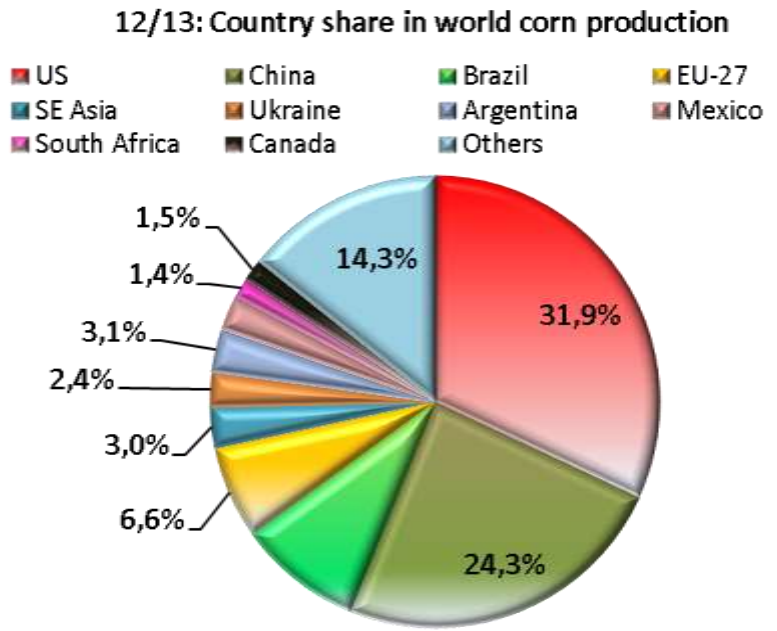
Increased to 1.28 in Sept12 for 2013

Subject to further annual increases

Usually cut/waived as not much cellulosic biof. capacity exists

USA – main feedstock used for ethanol production is **corn**





Source: USDA WASDE reports

*About **99%** of the US ethanol production uses **corn** as feedstock. Among the other feedstock used which sum up 1% one can mention: wheat starch, milo, waste ethanol, separated food waste, etc.

*The US corn used for ethanol production accounted for **42.6%** of total corn produced in the US with **35.9%** of it being recovered from the ethanol production process in the form of DDGs.

In **Europe** ethanol is mainly made from **grains**

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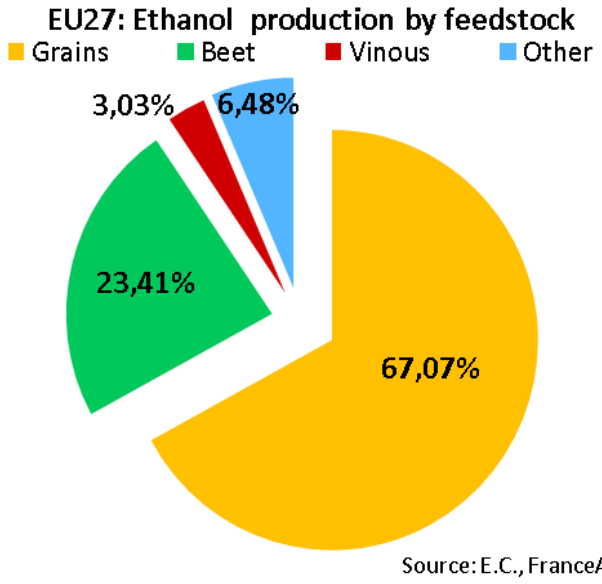
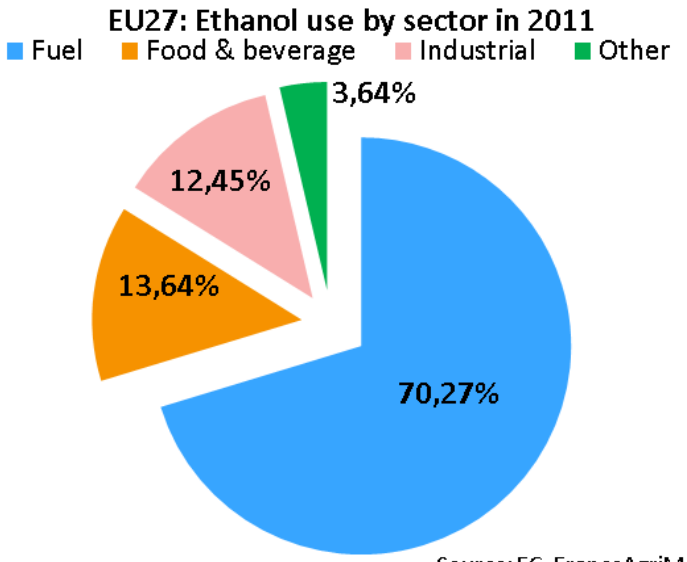
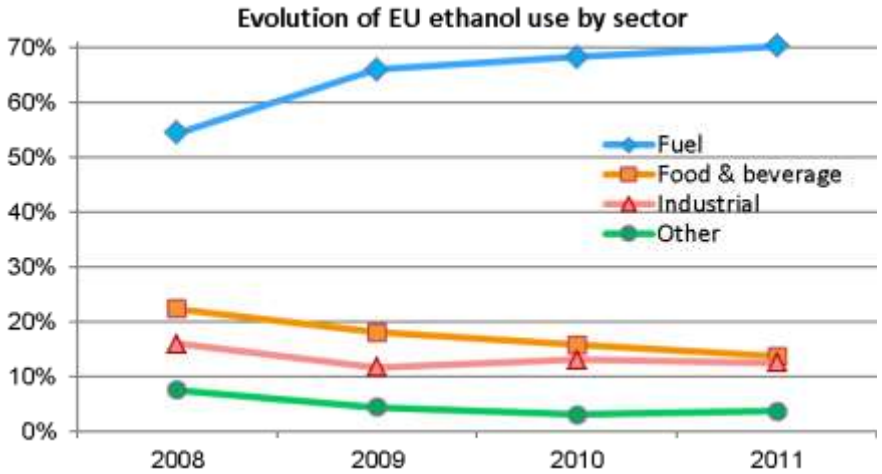
…it represents only 3.7% in total consumption of cereals in the EU27



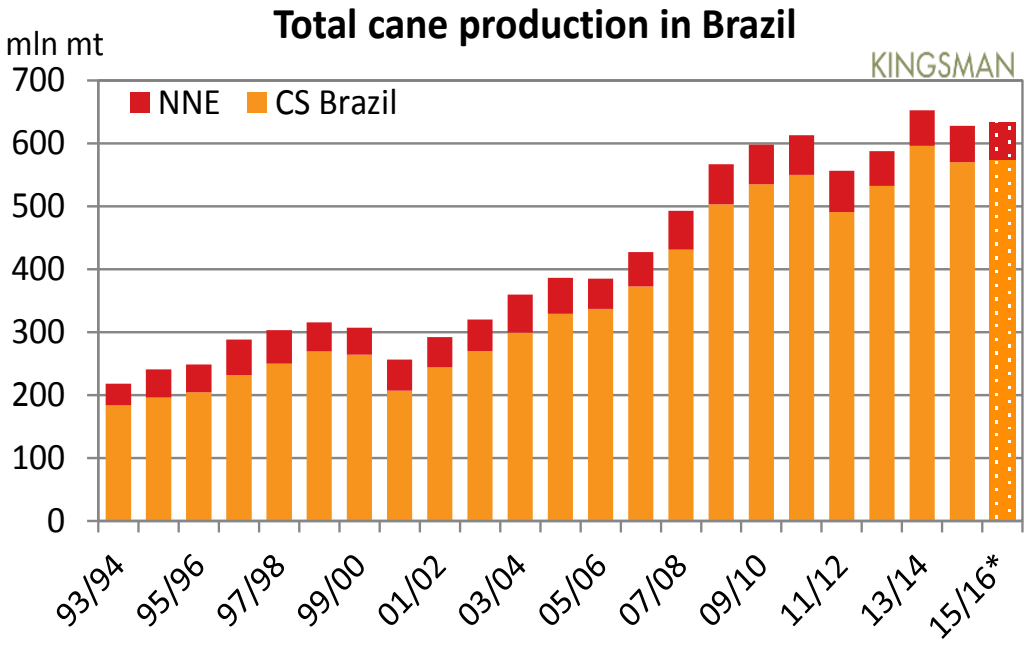
Source: E.C., FranceAgriMer

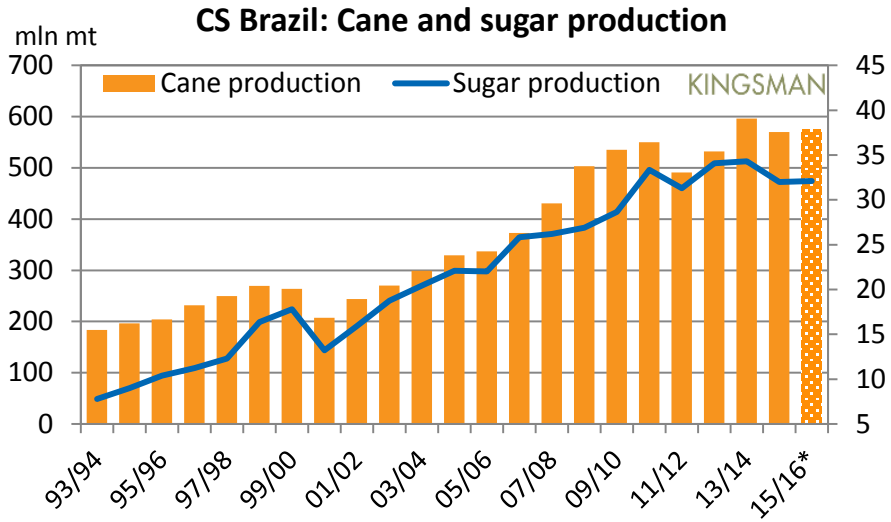


Source: EC, FranceAgriMer



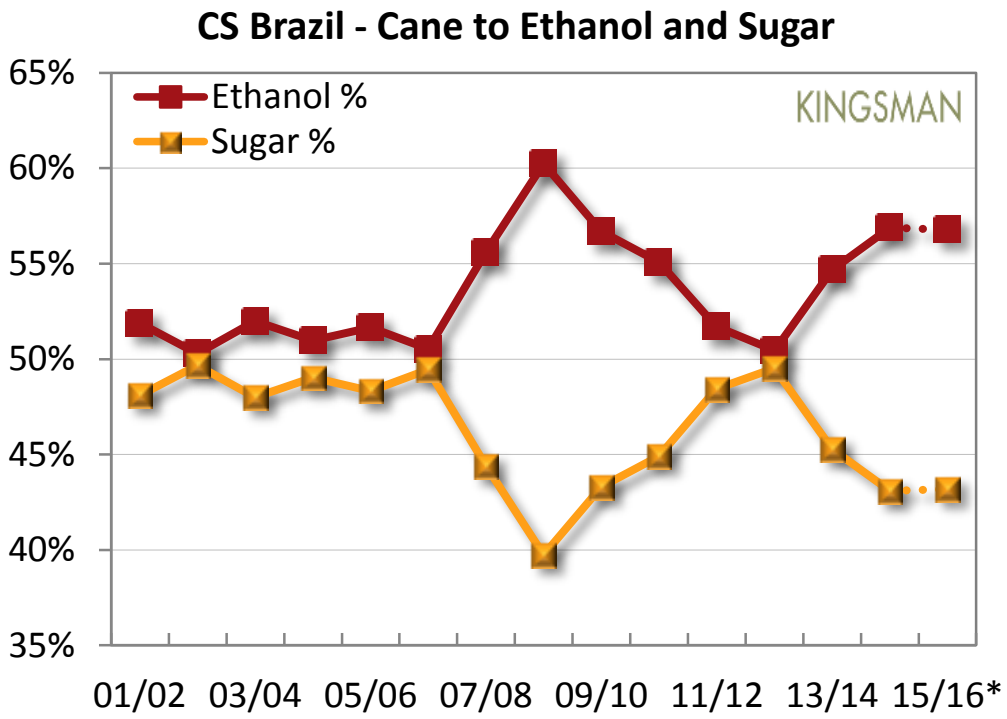
Brazil: Same cane used for both sugar and ethanol production





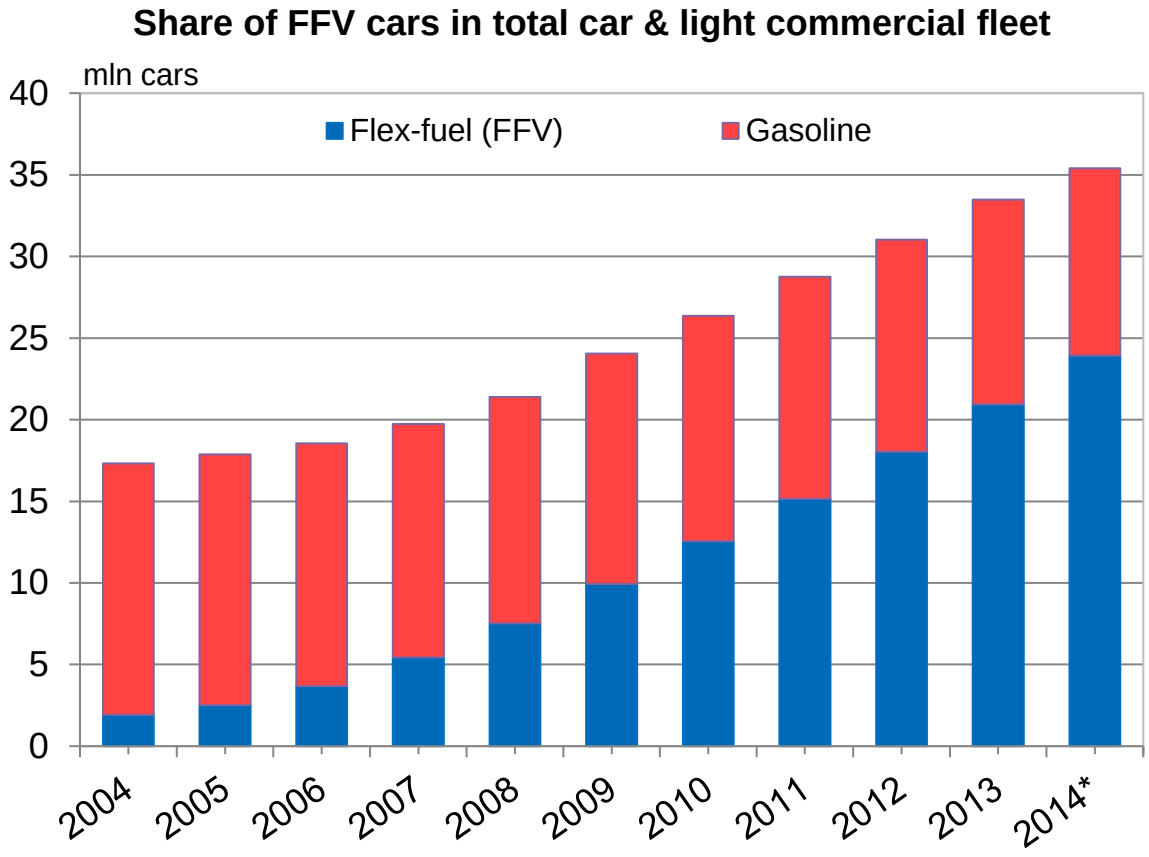
- Sugar and ethanol production seen as functions of cane output
- CS Brazil has a 90-93% share in total Brazilian cane production

Brazil: Sugar/Ethanol production mix



- In Brazil there is a flexibility to switch between sugar and ethanol
- Starting 2006 the industry growth switched to ethanol due to an increasing number of FFV vehicles and an increased demand for fuel ethanol
- Sugar mix was maximized in 11/12 due to high global sugar prices
- Since then, things came back to *normal* as Brazilian ethanol is feeding an increasing domestic demand and also the world market

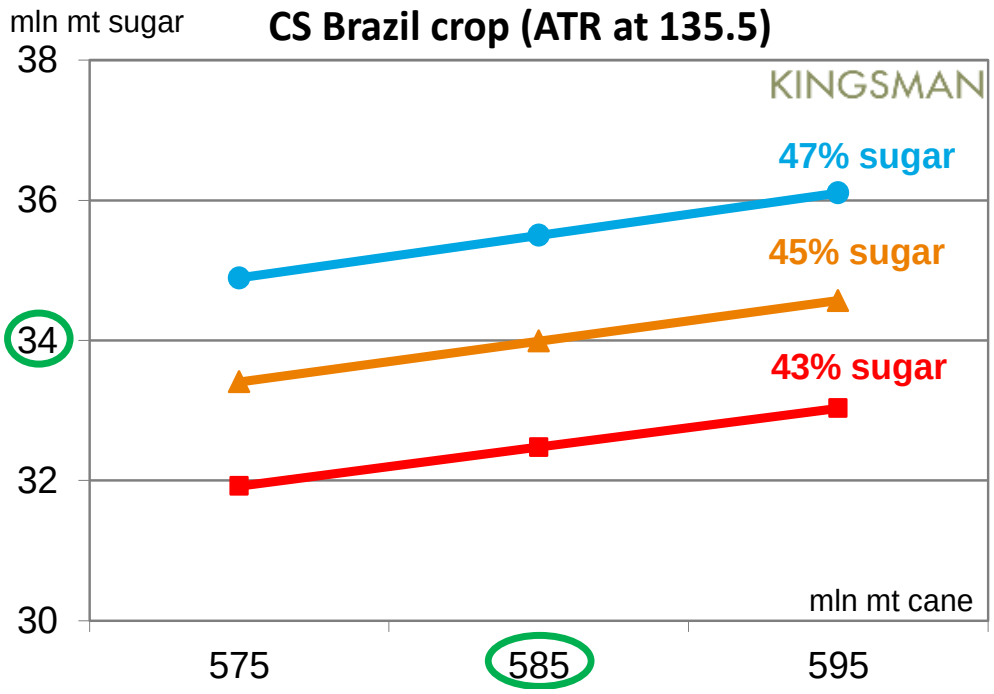
Brazilian car fleet structure



Flex-fuel cars have the capacity to increase ethanol consumption and impact the sugar production as **total fuel demand** increased by **30%** in 2008-2013 period and by **79%** in 2004-2013 period

- Flex-fuel cars account for 87-94% of monthly sales
- Flex-fuel cars share in total fleet is increasing: now around 57%-58%

Brazil: How is the mix impacting both sugar and ethanol production?

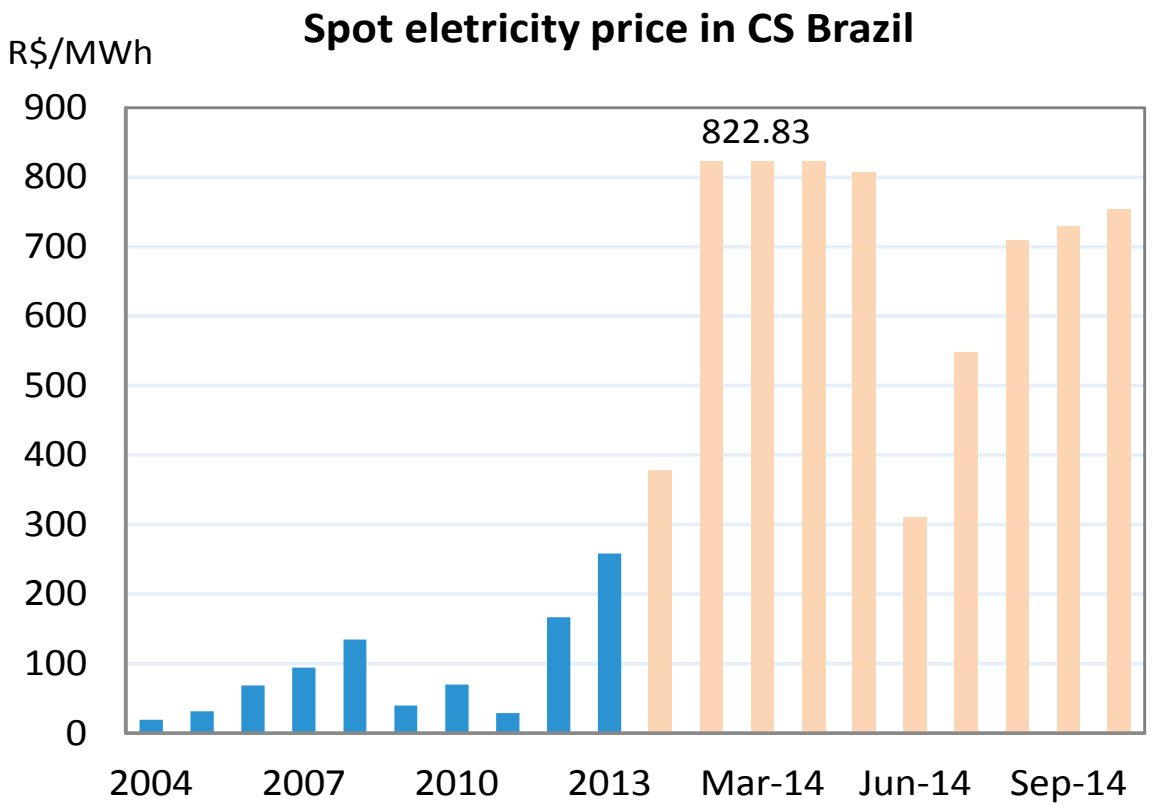


- A 2% variation in the sugar mix represents around 1.55 mln mt of sugar or 1 bln ltr of ethanol
- At 585 mln mt of cane, an avg ATR at 135.5 the ± 2% variation of the sugar mix represents a range of **3 mln mt** of sugar (or 2 bln ltr of ethanol)
- At a global sugar market in balance, only the Brazilian mix could turn the balance from **1.6 mln deficit** to a **1.6 mln surplus**

- The effect of the sugar mix on the sugar production is very important: it can bring the world market into a surplus, into balance or into a deficit

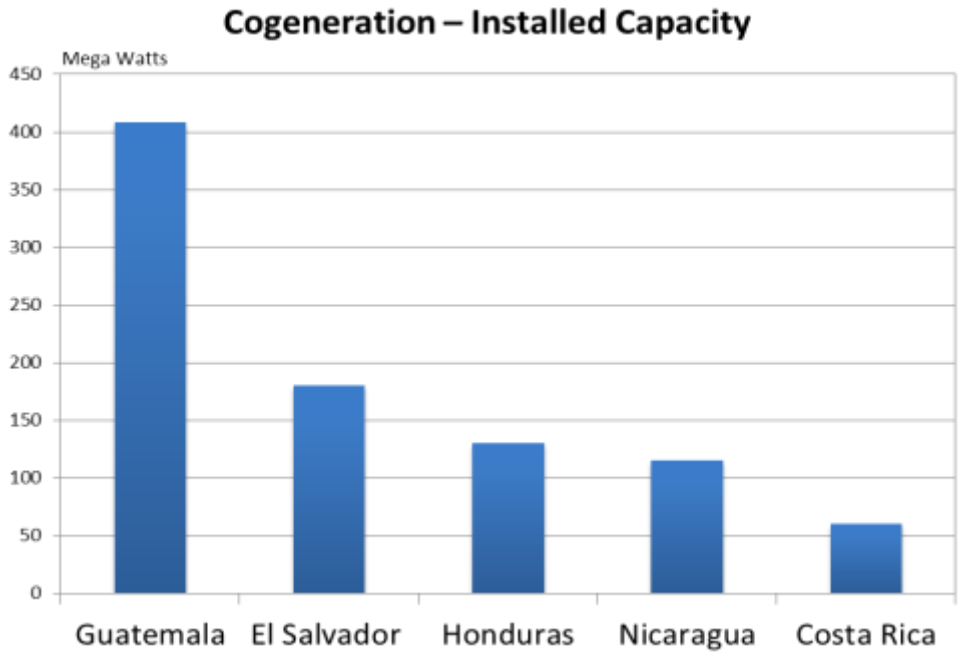
Can electricity prices change the mix? …make mills more profitable?

- Why a higher ethanol mix could also happen?
- the “liquidity” of ethanol: it can be sold more quickly (especially hydrous)
- high electricity prices encouraging mills to maximize cogeneration by producing more hydrous ethanol (less steam is used in the process)



Diversification already happening in other countries (co-gen, bio-plastics)

- Diversification: ethanol, electricity, bio-plastics
- Market potential for bio-plastics is enormous: production capacity expected to rise from 1.4 mln mt/year (2012) to 6.2 mln mt/yr (2017)
- Many countries have already well-established cane-bagasse electricity programs. Important co-generation installed capacity in Central America
- Nicaragua and Guatemala having reached levels above 25% of total energy consumption sourced from bagasse co-generation
- Co-generation growth will be the main driver behind the rise in cane acreage in the region



Thank you for your attention!

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