5th Bolivian Gas and Energy Congress 2012

Ethanol from sugar cane: recent experience and future prospects

Andy Duff, Food & Agribusiness Research, Rabobank Brasil

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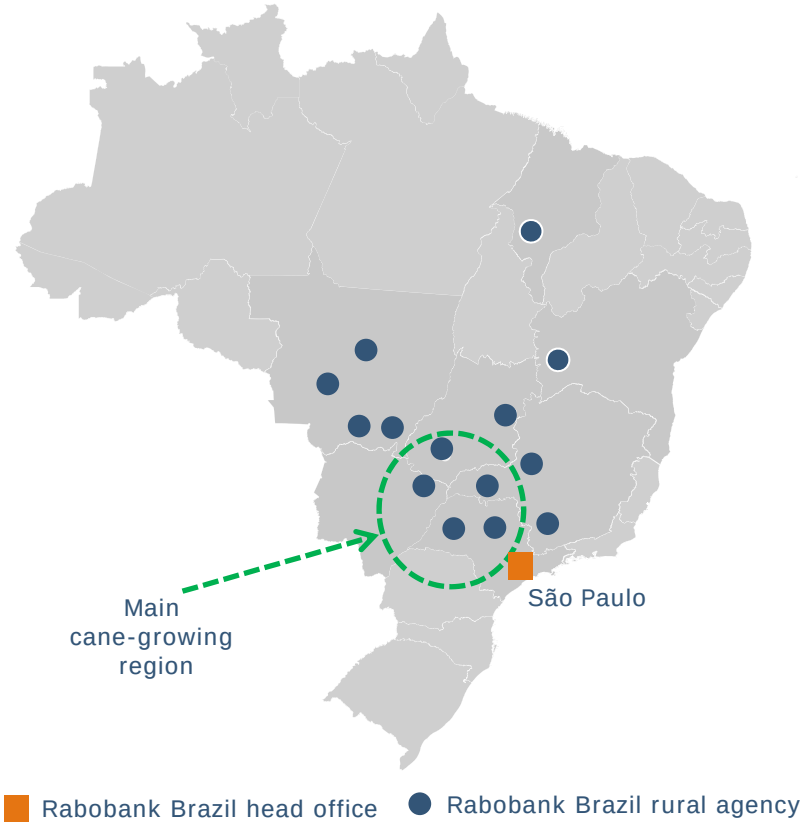
Rabobank Brazil and the cane ethanol sector

- One of the leading banks financing the Brazilian sugar and ethanol sector
- Financing both sugar and ethanol companies and independent cane growers
- USD 1.8 billion currently committed to the sector, equivalent to 40% of Rabobank Brazil´s total loan portfolio
- Objective is to establish, maintain and grow long term partnerships with solid players in the sector, fostering sustainable long term growth for our clients
- Dedicated team of sugar and ethanol specialists, covering lending, M&A, commodity price & exchange rate risk management, and research

Rabobank presence in Brazil



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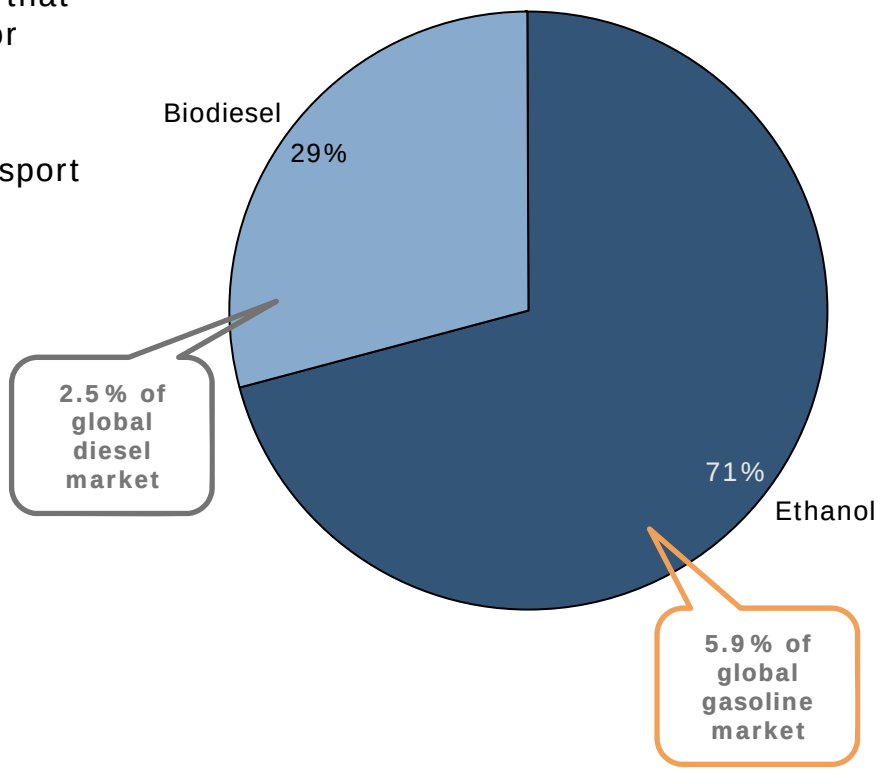
Why should we discuss ethanol?

- Widespread introduction of legislation that makes use of renewable energy and/or biofuels mandatory
  - Emissions reductions from the transport sector
  - Energy security
  - Rural development
- Opportunities for new business
  - Fuel
  - Plastics & chemicals

Share of global biofuel market, avg 2009 - 2011

[% of market in oil equivalent]



Source: OECD, Rabobank calculations

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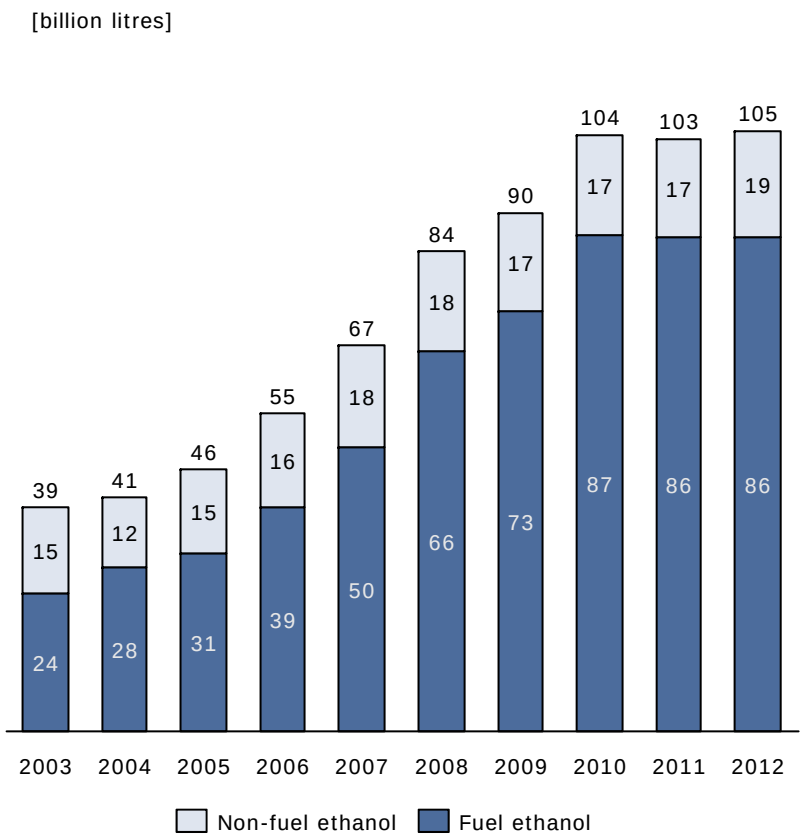
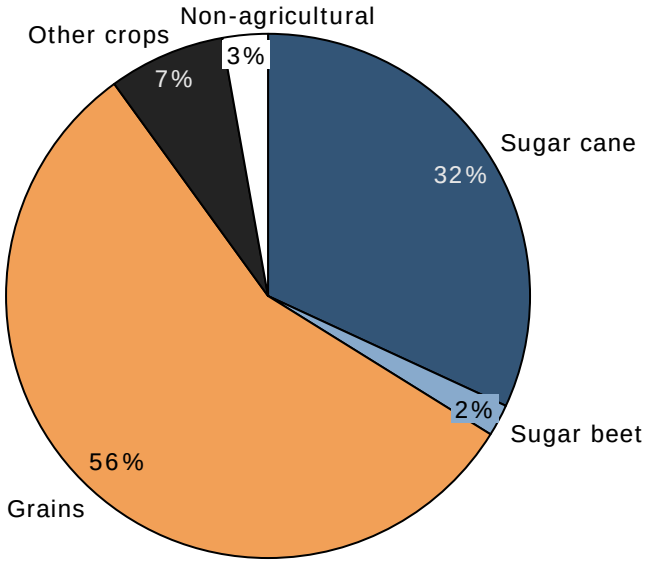
Because of biofuel initiatives, the use of fuel ethanol has grown rapidly in recent years…

Evolution of global ethanol production



Source: F O Licht, IEA, Rabobank estimates

Share of global ethanol production by raw material



Source: OECD

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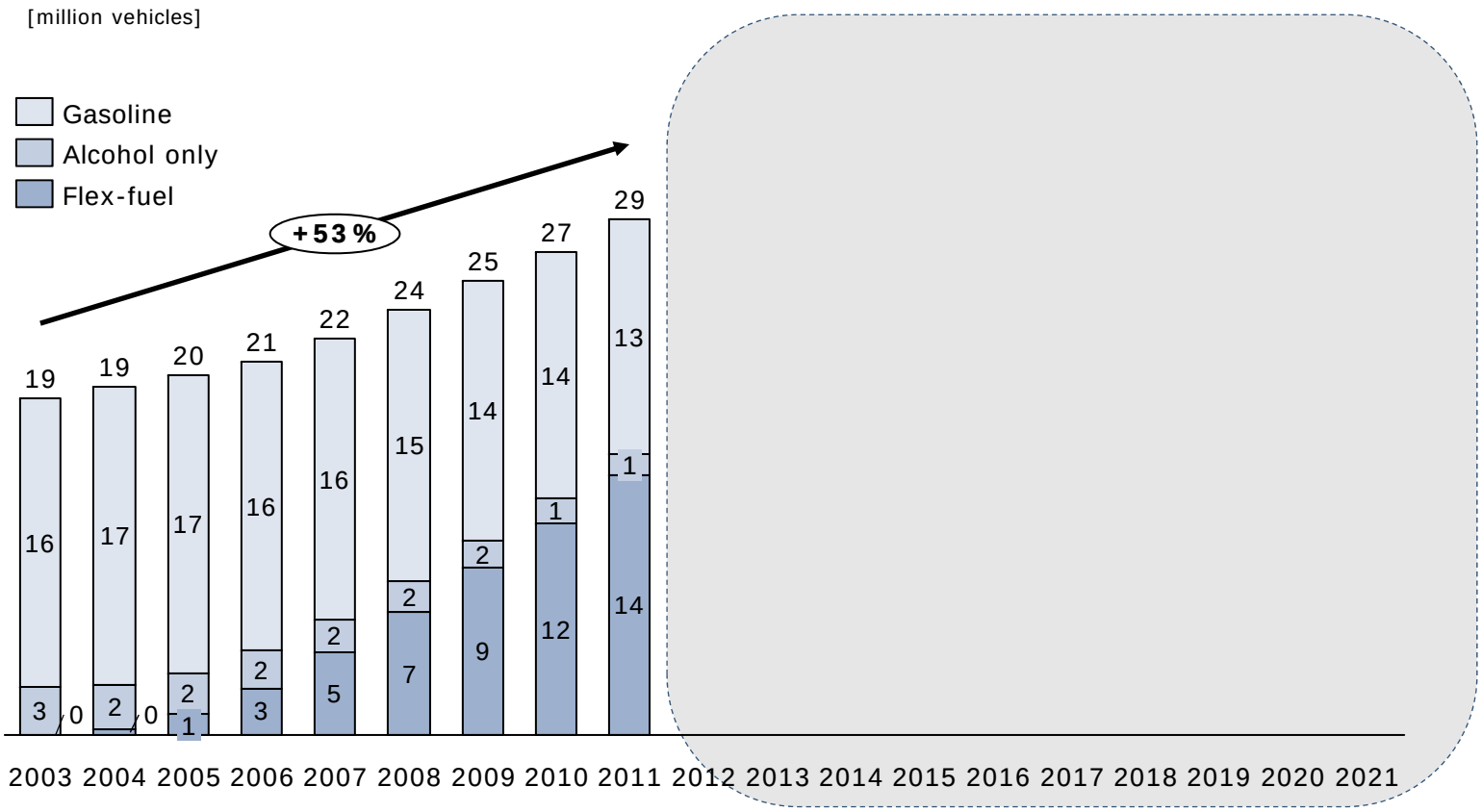
…but technical change in the car business has also helped to boost ethanol use

Development of the flex-fuel vehicle fleet in Brazil



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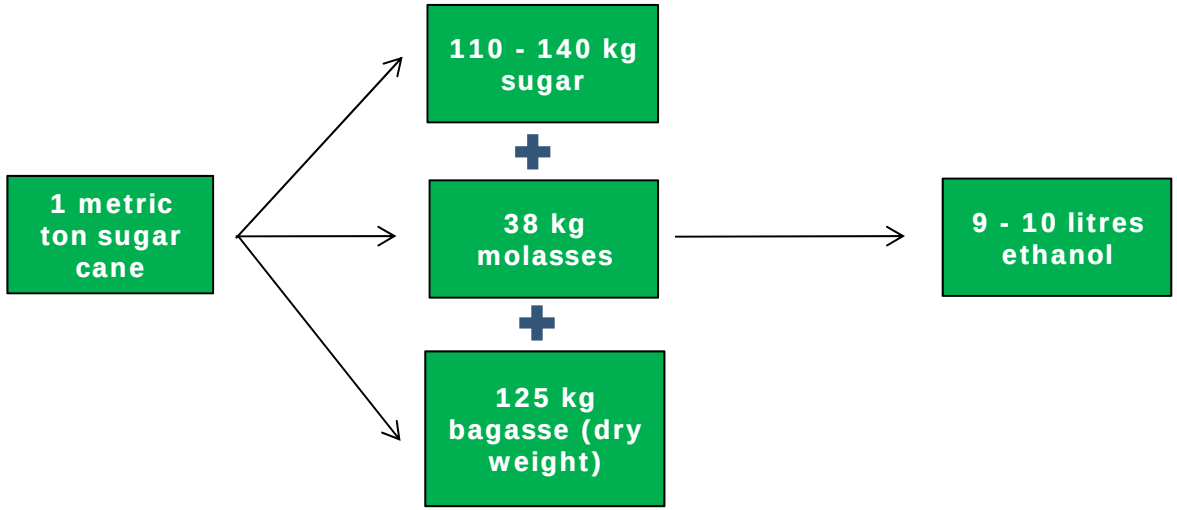
How is ethanol produced from cane? Two ways...

1. “Conventional”



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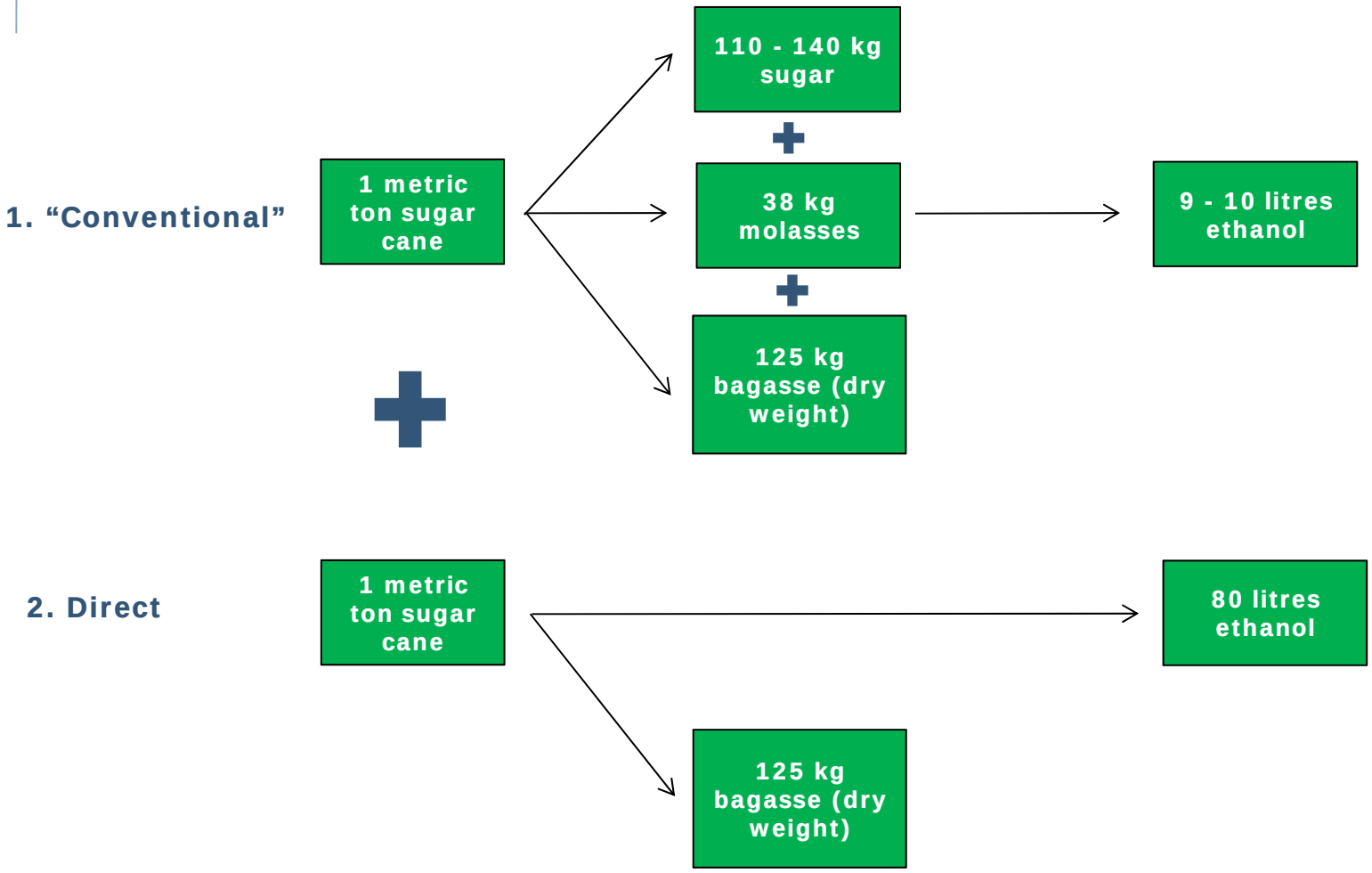
How is ethanol produced from cane? Two ways...



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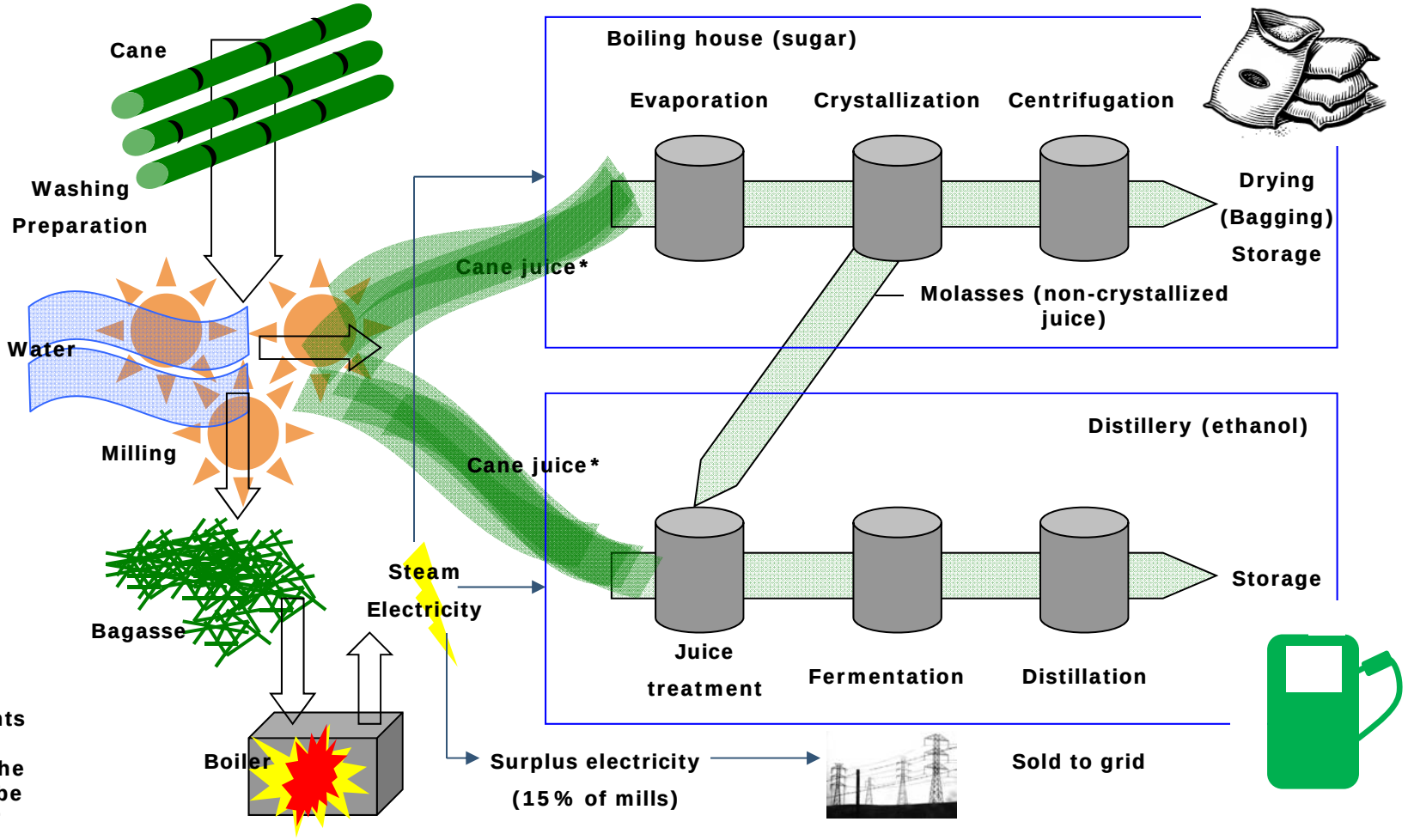
A typical Brazilian cane mill



*Capacity constraints in the boiling house and distillery limit the % of cane that can be processed for either sugar or ethanol

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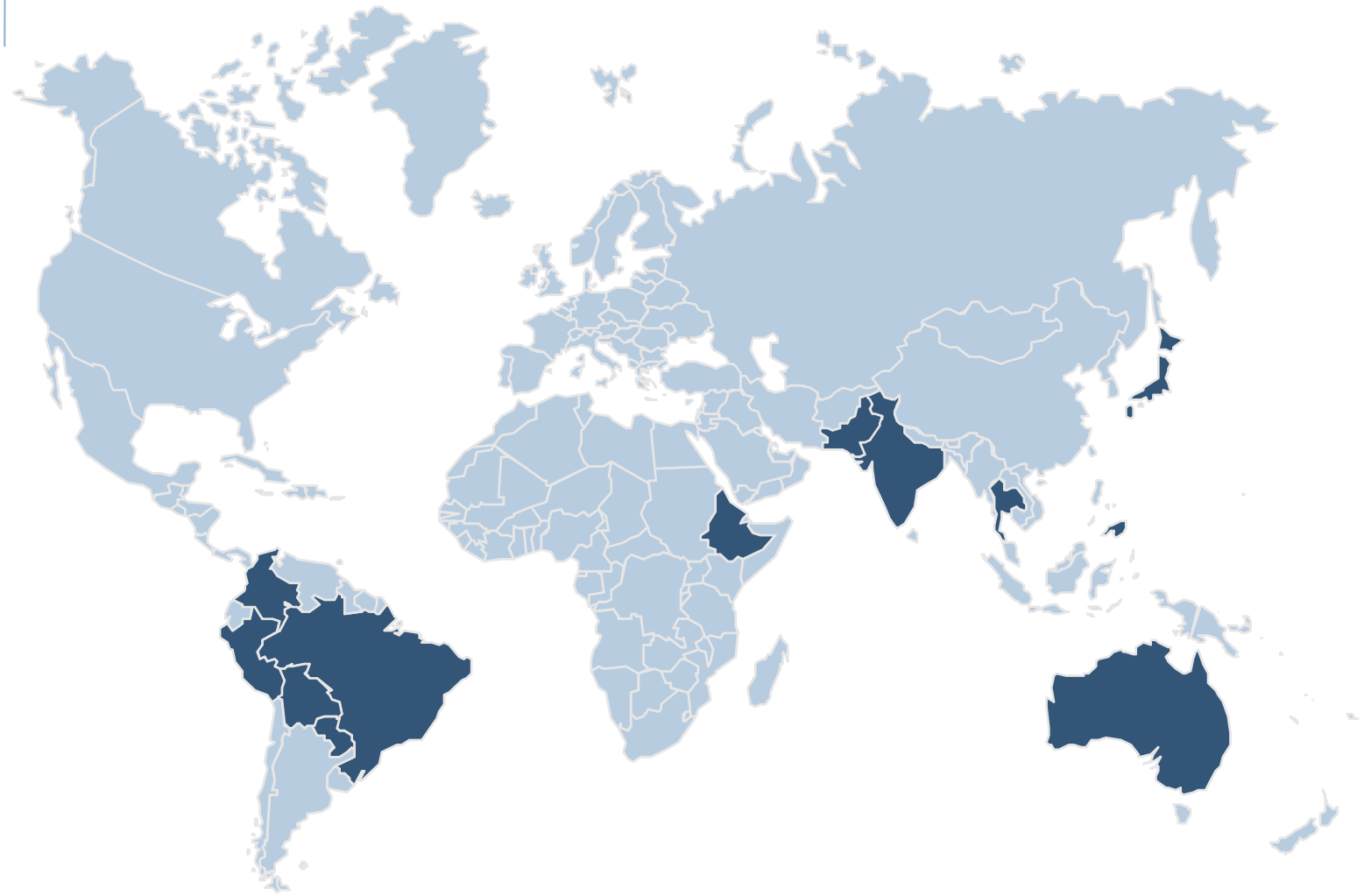
Where is ethanol produced from cane or from cane molasses for fuel purposes?



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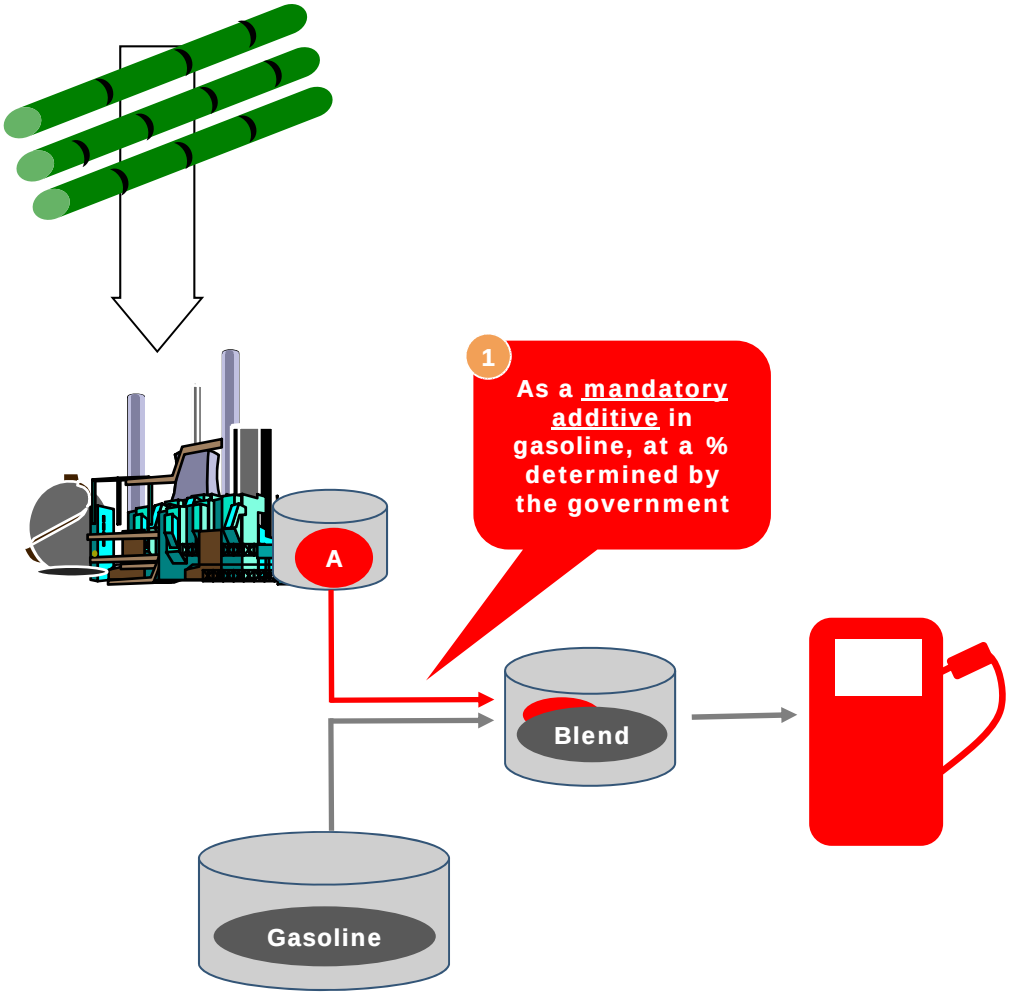
How is fuel ethanol used? Two ways – one, as an additive…



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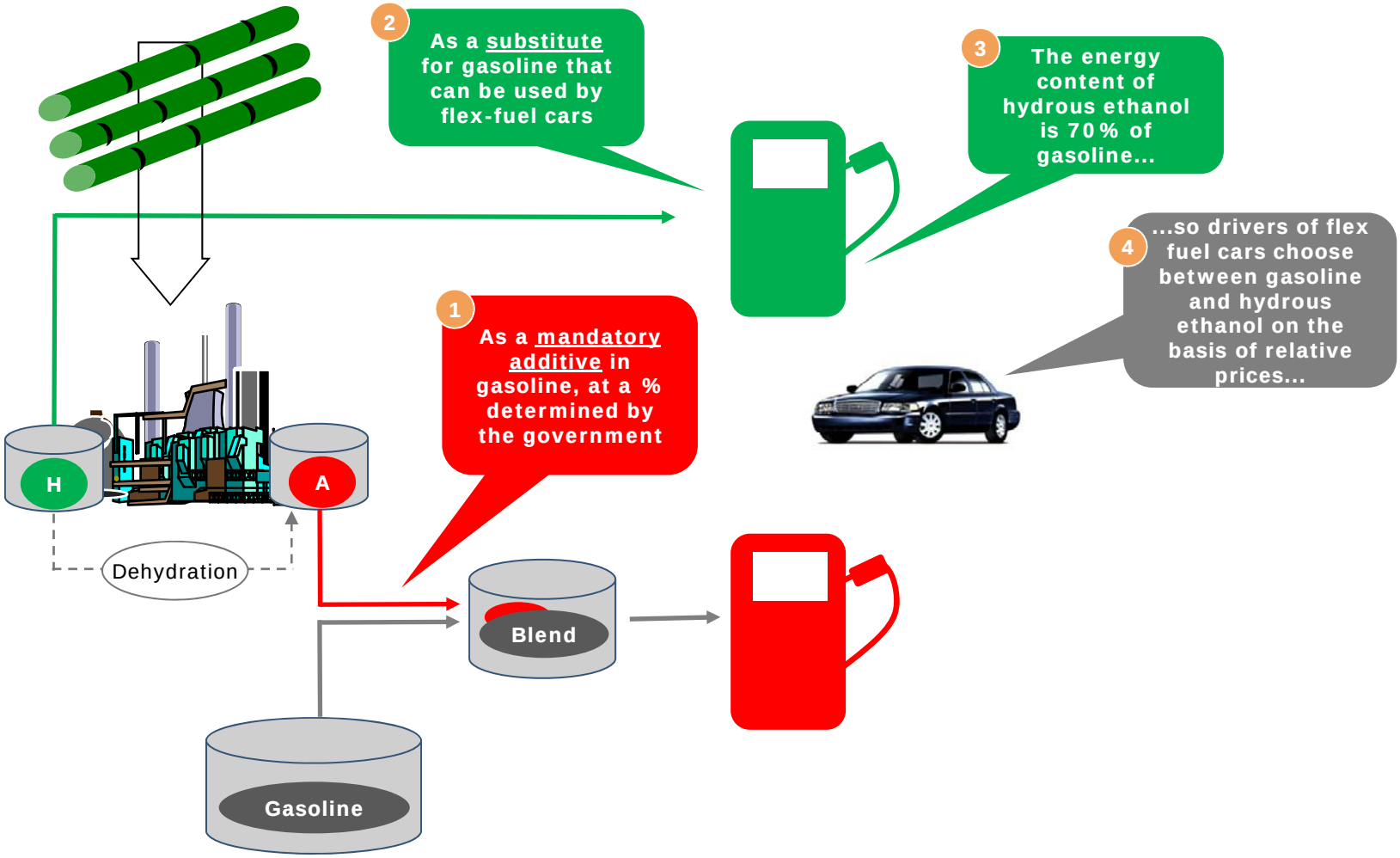
How is fuel ethanol used? Two ways – one, as an additive…and two, as a substitute



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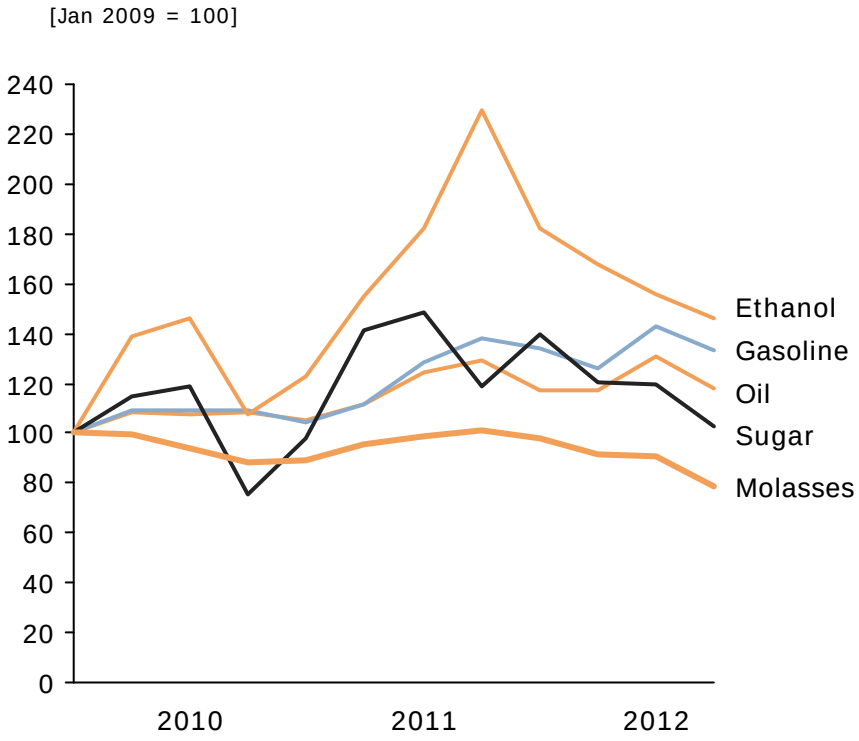
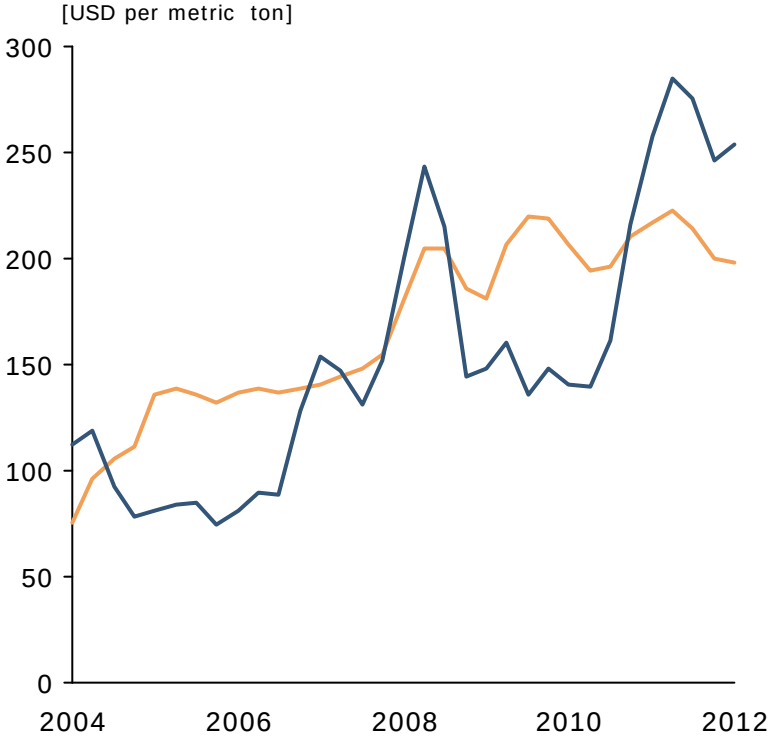
What have we learned to date? Volatility and economics

- Despite blending mandates and tax breaks, the lack of correlation between agricultural commodity prices and energy prices can discourage ethanol production if there are more remunerative options for raw material use

Commodity price movements



Corn and molasses prices



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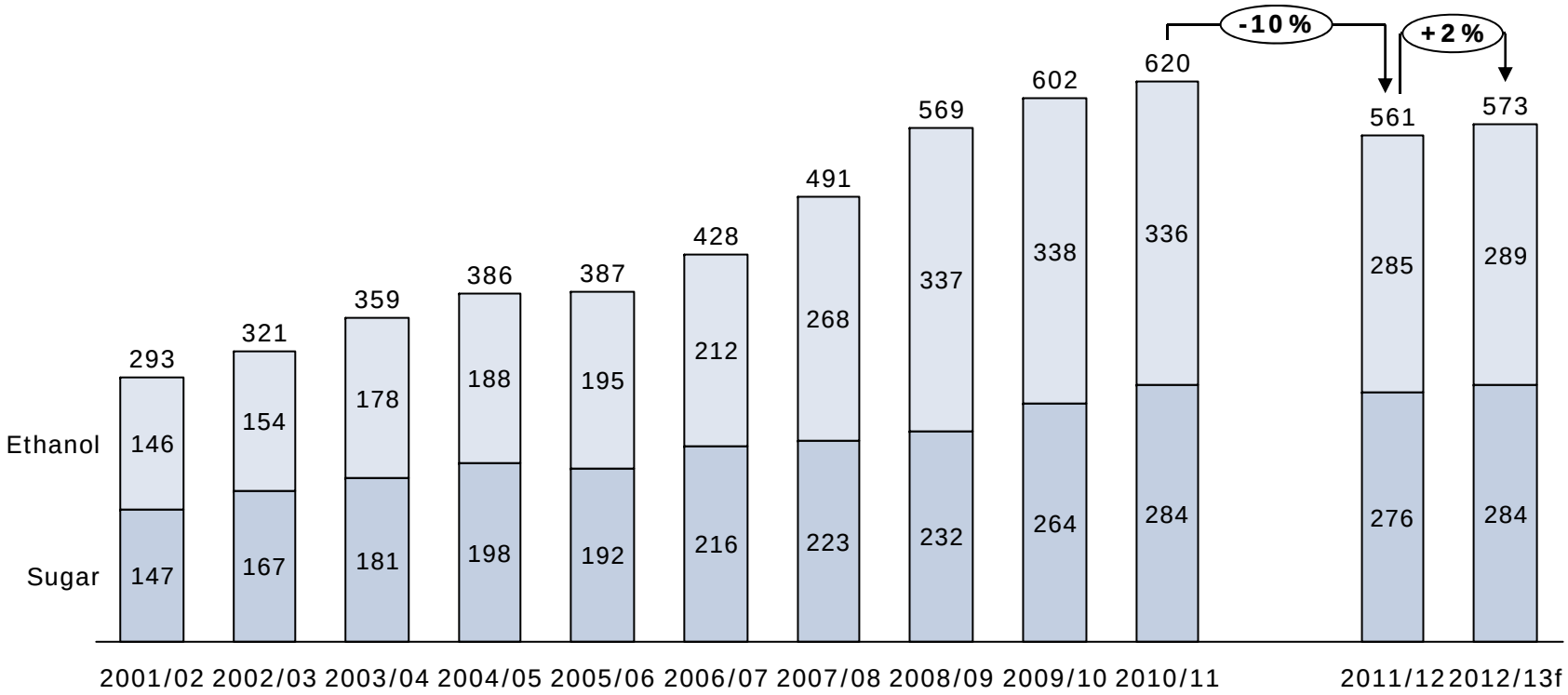
What have we learned to date? Volatility and economics

Cane milled in Brazil for sugar and ethanol

[Million tonnes]



Source: UNICA

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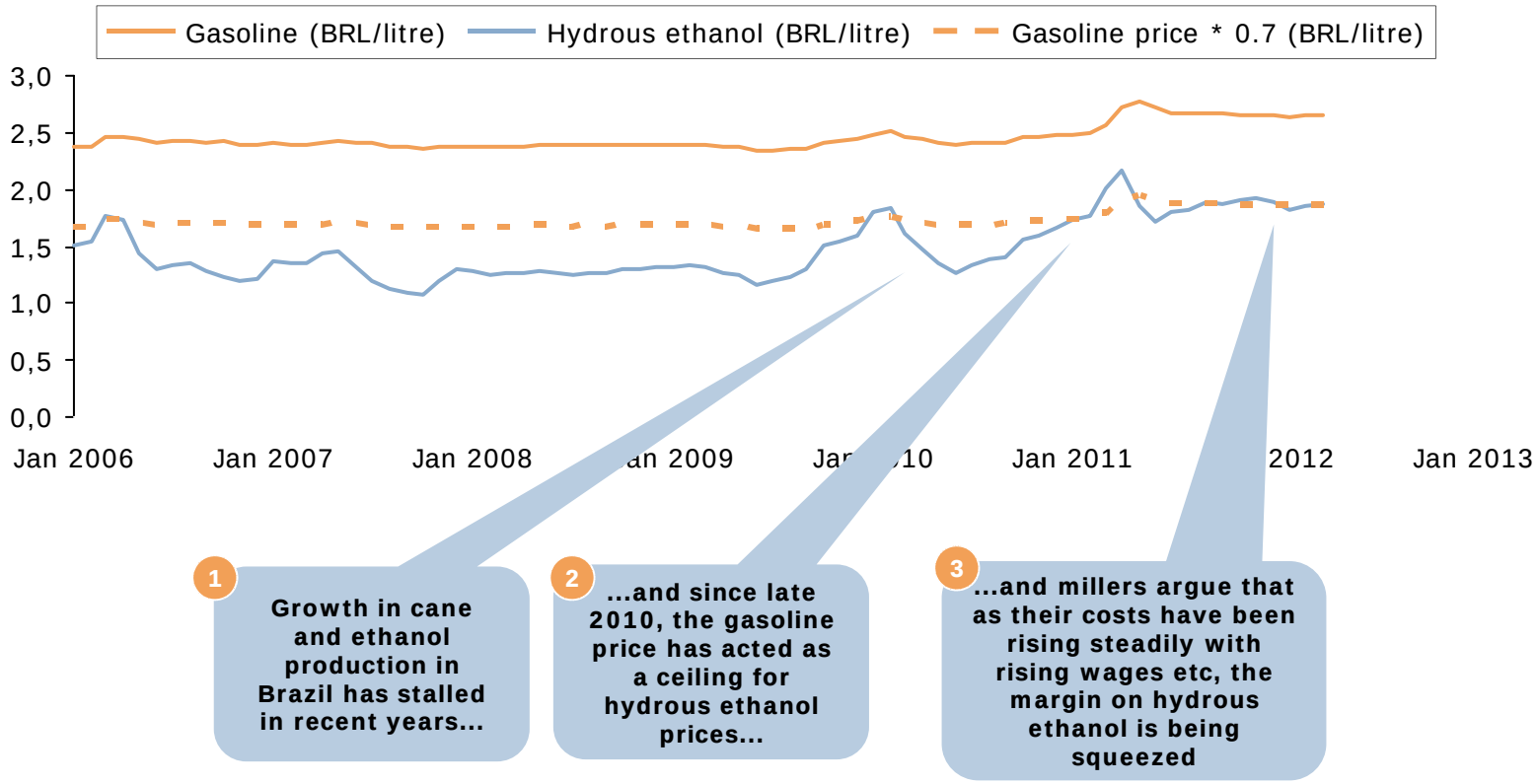
What have we learned to date? Volatility and economics

Brazil: Hydrous ethanol and gasoline prices at the pump, São Paulo state

[BRL/litre]



Sources: ANP

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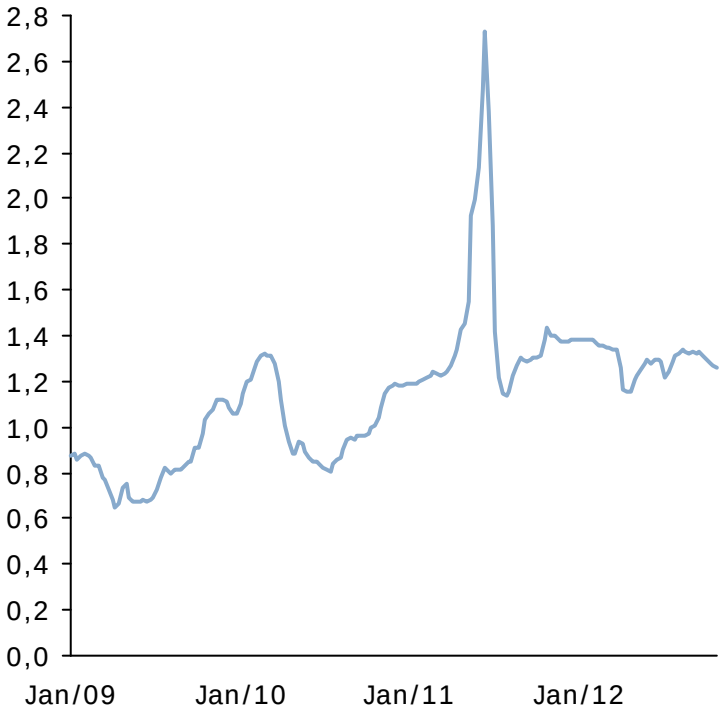
What have we learned to date? Volatility and policy

- The combination of *mandated* blending with an *agricultural* feedstock (the supply of which may be dependent on the weather and on the prices of alternative crops) can generate abrupt changes in prices can force policy change/policy failure

Anhydrous ethanol prices Brazil

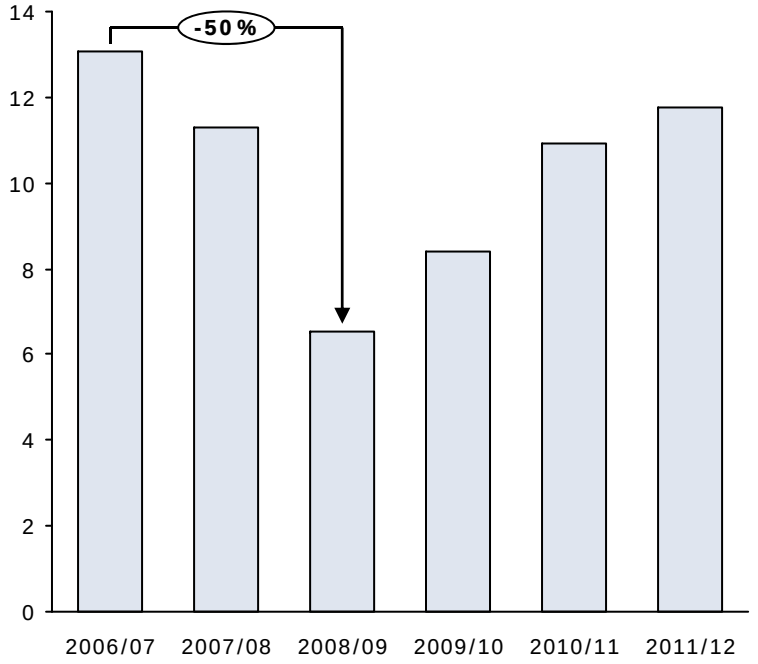
[BRL per litre]



Source: Bloomberg

Molasses production, India

[Million metric tons]



Source: LMC International

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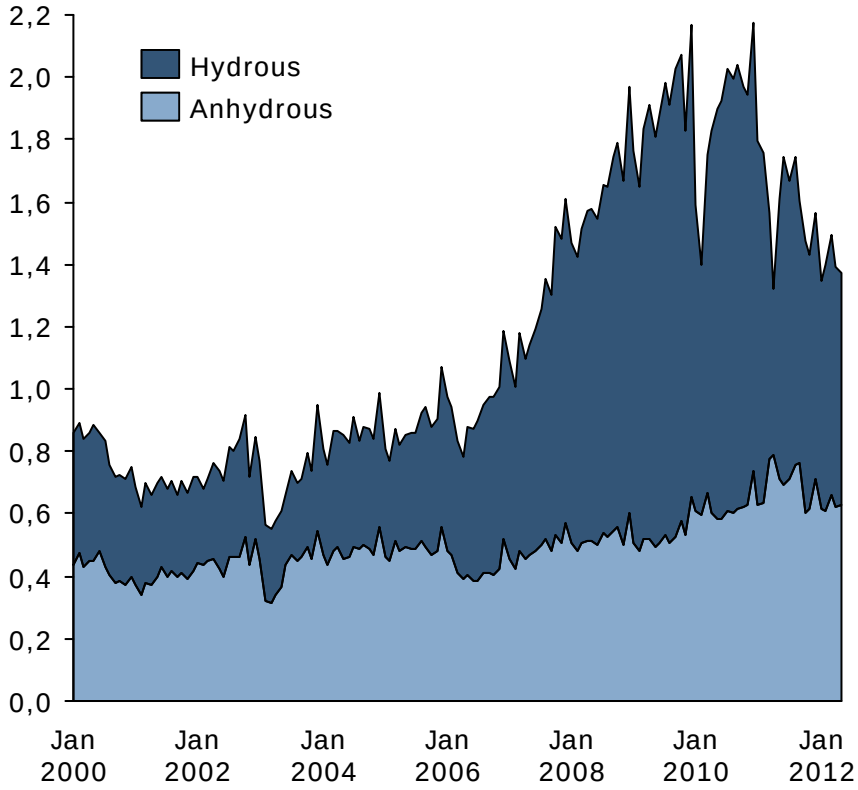
What have we learned to date?

- There has been a strong rise in biofuel use as a result of the initiatives made around the world...
- ...but there have also been problems fulfilling mandates or meeting expectations because of raw material supply problems or pricing problems...
- ...and biofuels in general have at times been crticized for creating a “food versus fuel” dilemma...
- ...though this criticism is primarily targetted at the use of grains for ethanol production rather than the use of molasses and cane

Brazil: monthly ethanol sales



Source: ANP

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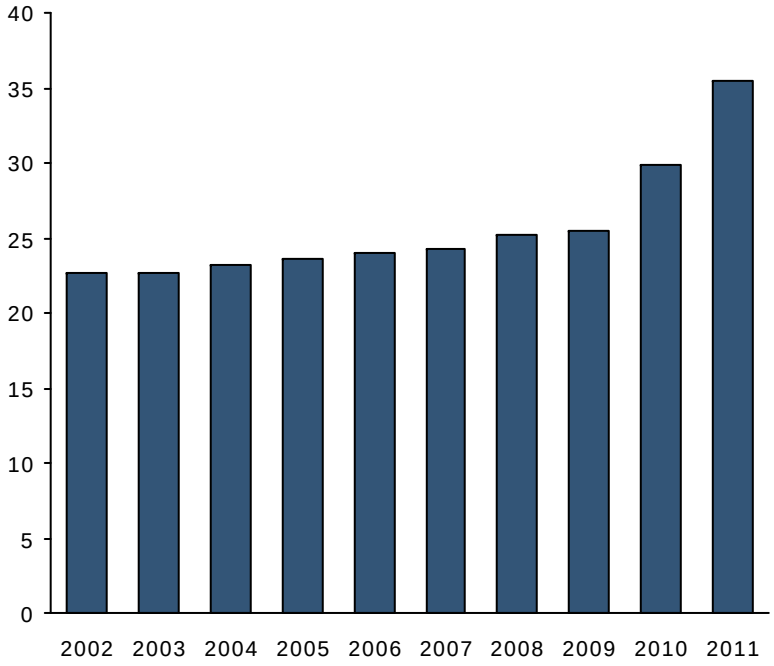
Whose problem?

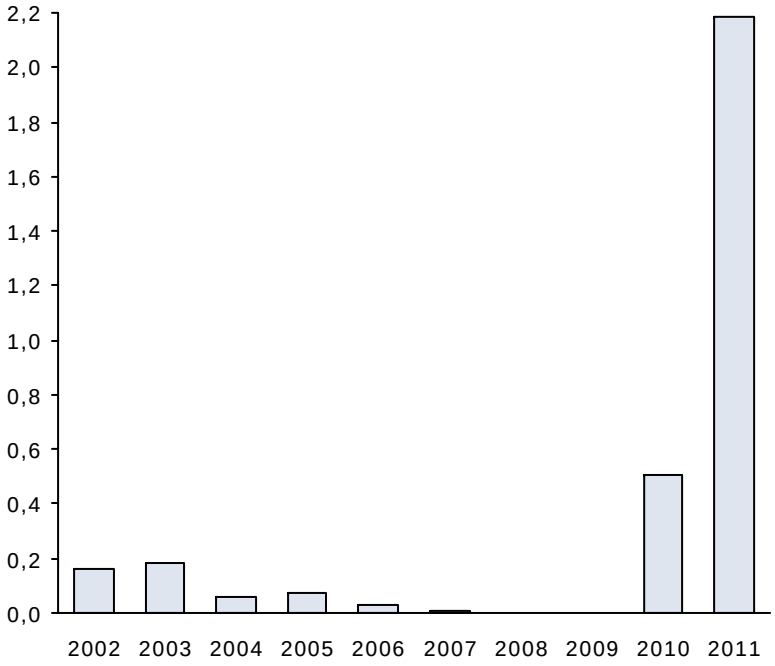
Brazil: gasoline consumption

[Million cubic metres]



Brazil: gasoline imports

[Million cubic metres]



Source: ANP

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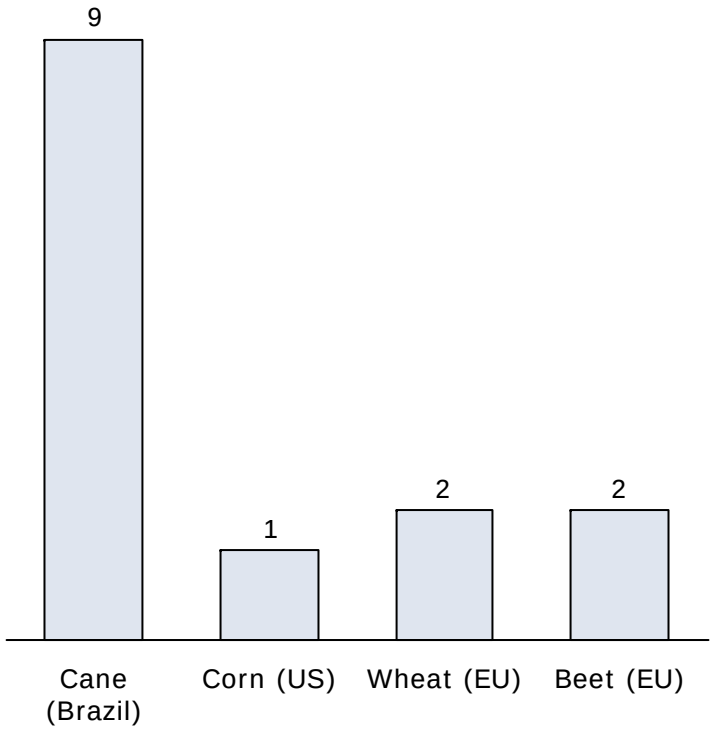
The future

- Despite some problems in achieving blending targets, biofuels currently represent a practical means of achieving transport sector emissions reductions using current transport sector infrastructure
- Among first generation biofuels, cane ethanol has a favourable environmental performance – something that may help it to gain market share over ethanol from other first generation sources in the coming years
- Other technologies to reduce transport sector emissions (e.g., electric vehicles) may emerge over the long term, but do not seem ready to compete with biofuels in the short to medium term

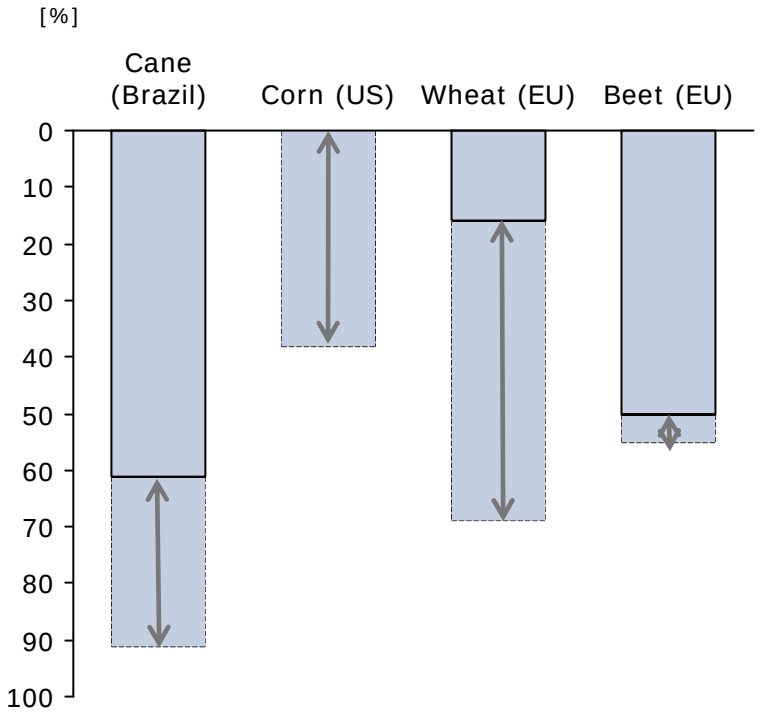
The future – demand: environmental factors may favour cane ethanol over other 1° gen. biofuels

Energy balance* of ethanol by raw material



***Units of renewable energy produced per unit of fossil fuel input**

Estimated range s for GHG emissions reductions of ethanol versus gasoline by raw material



Source: UNICA

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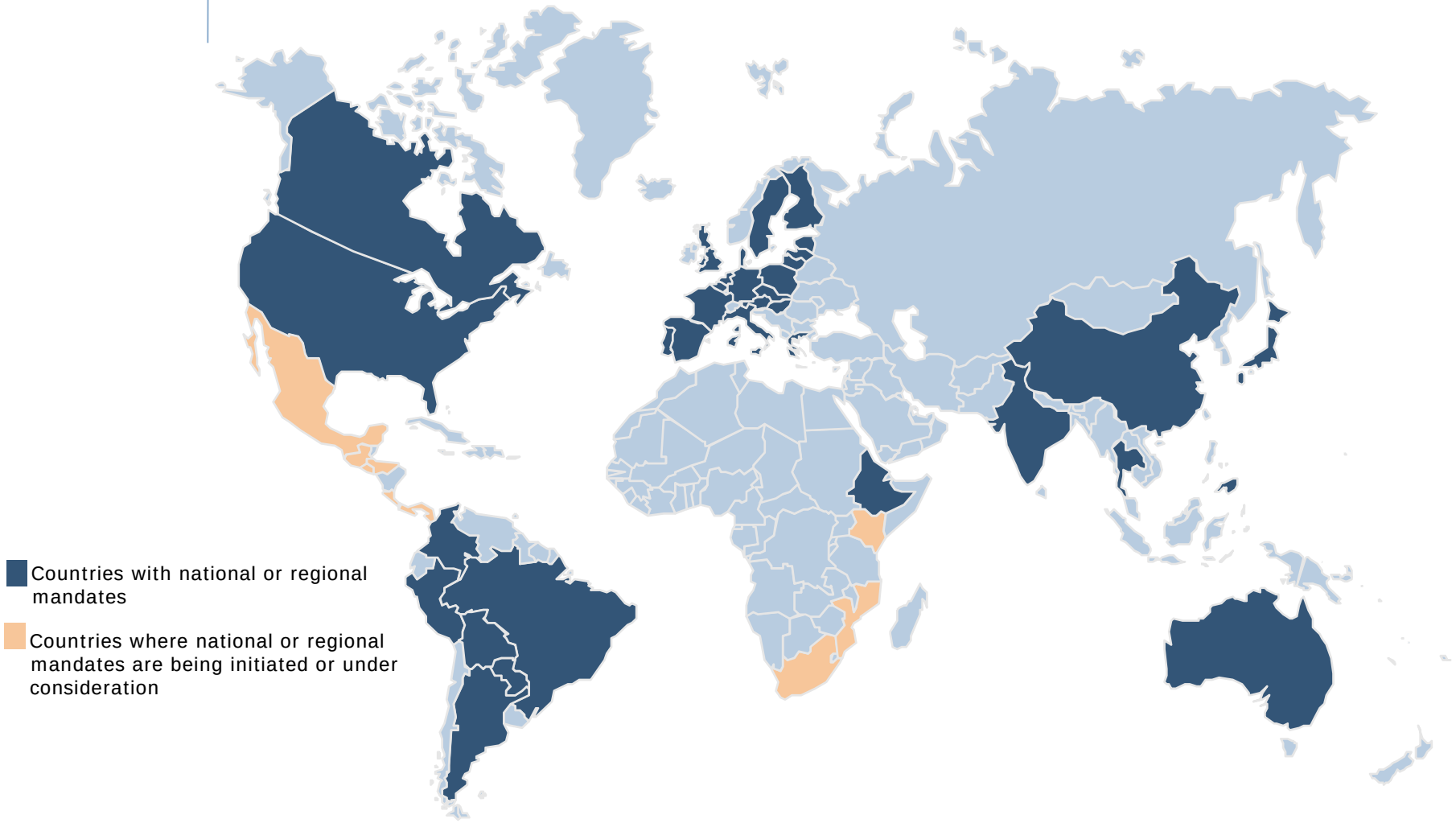
The future – demand: more countries are considering mandated blends...



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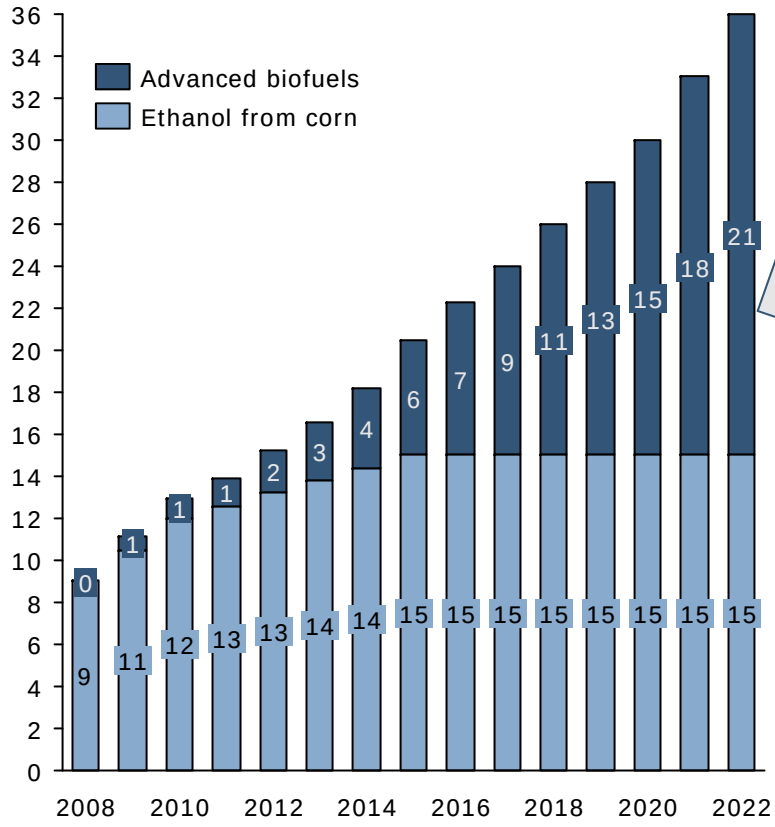
The future – demand: Current US policy is ambitious

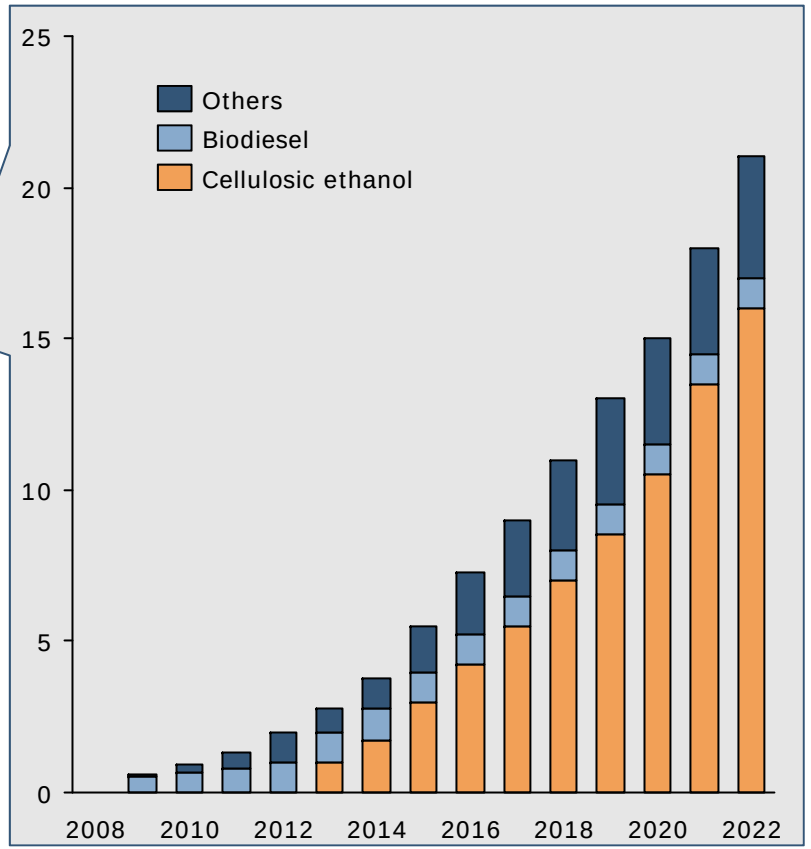
US Renewable Fuels Standard (RFS) requirements

[billion gallons]



Advanced biofuels component of RFS

[billion gallons]



Source: EPA

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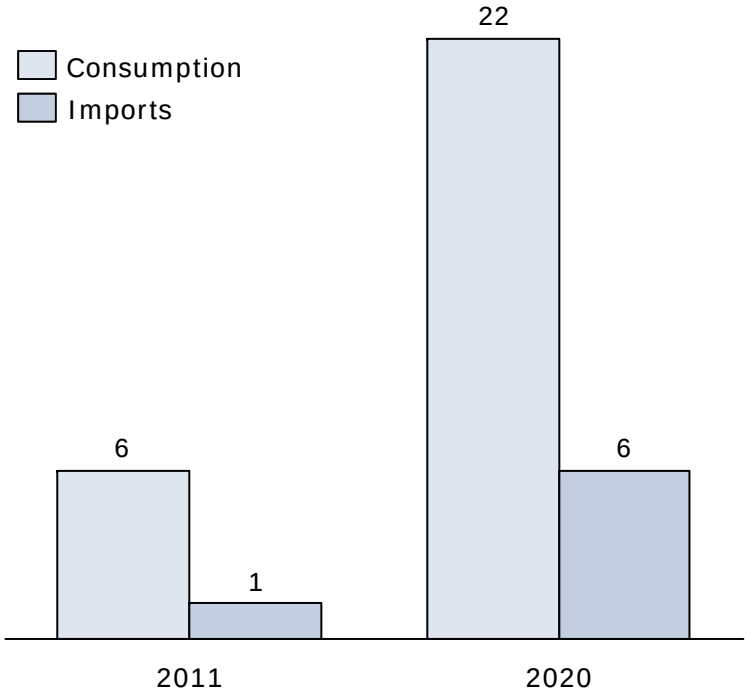
The future - demand: Current EU policy is ambitious too

- 10% mandatory renewable energy target by 2020
- Green house gas emission saving targets will gradually become more strict, sustainability requirements for feedstock

Projection of EU fuel ethanol use by 2020

[billion litres]



Source: EU Commission

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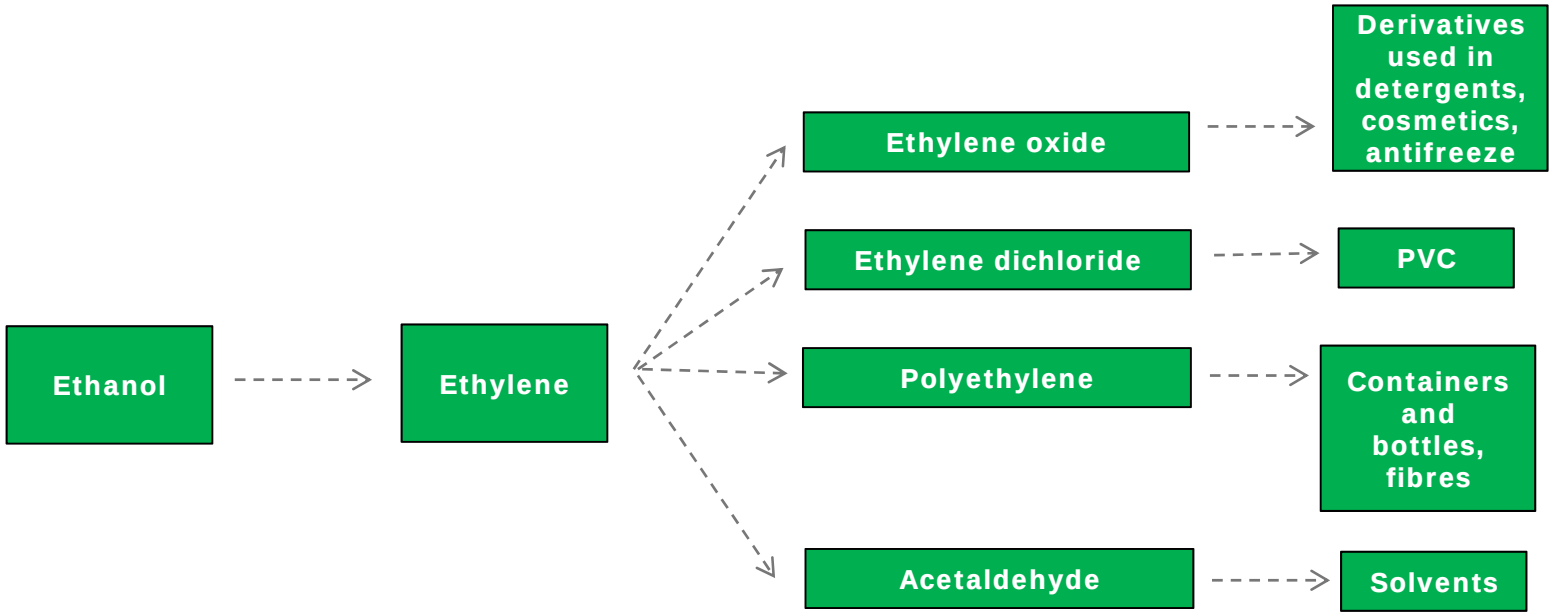
The future - demand: significant non-fuel markets for ethanol may develop

- Current global ethanol use for plastics & chemicals estimated at 1 bn lires/year; projected to rise to 4 bn litres by 2020 according to the International Sugar Organisation



Source: ISO

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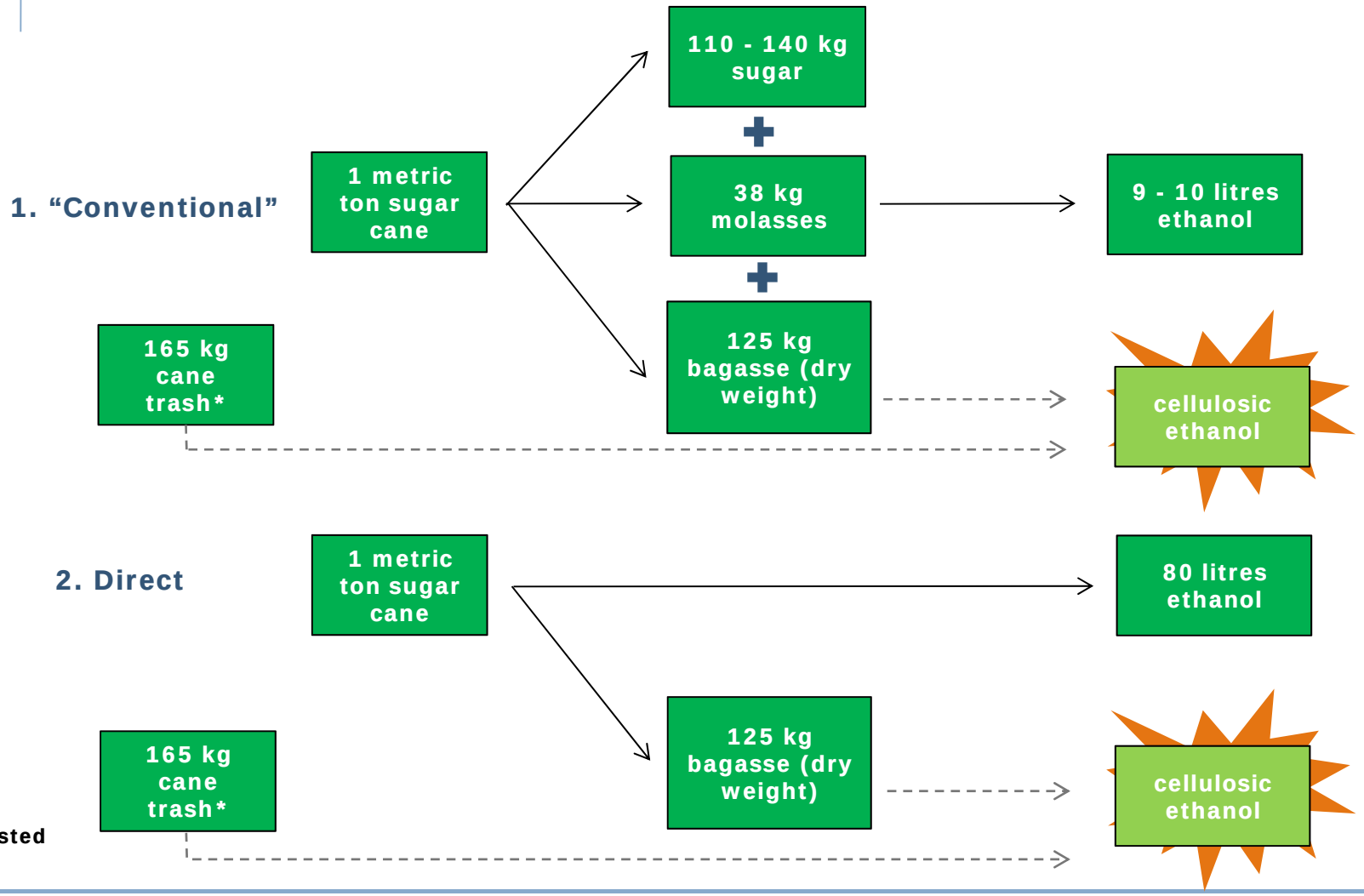
The future – supply: tomorrow there may be 3 ways to produce ethanol from cane…



*if cane is harvested mechanically

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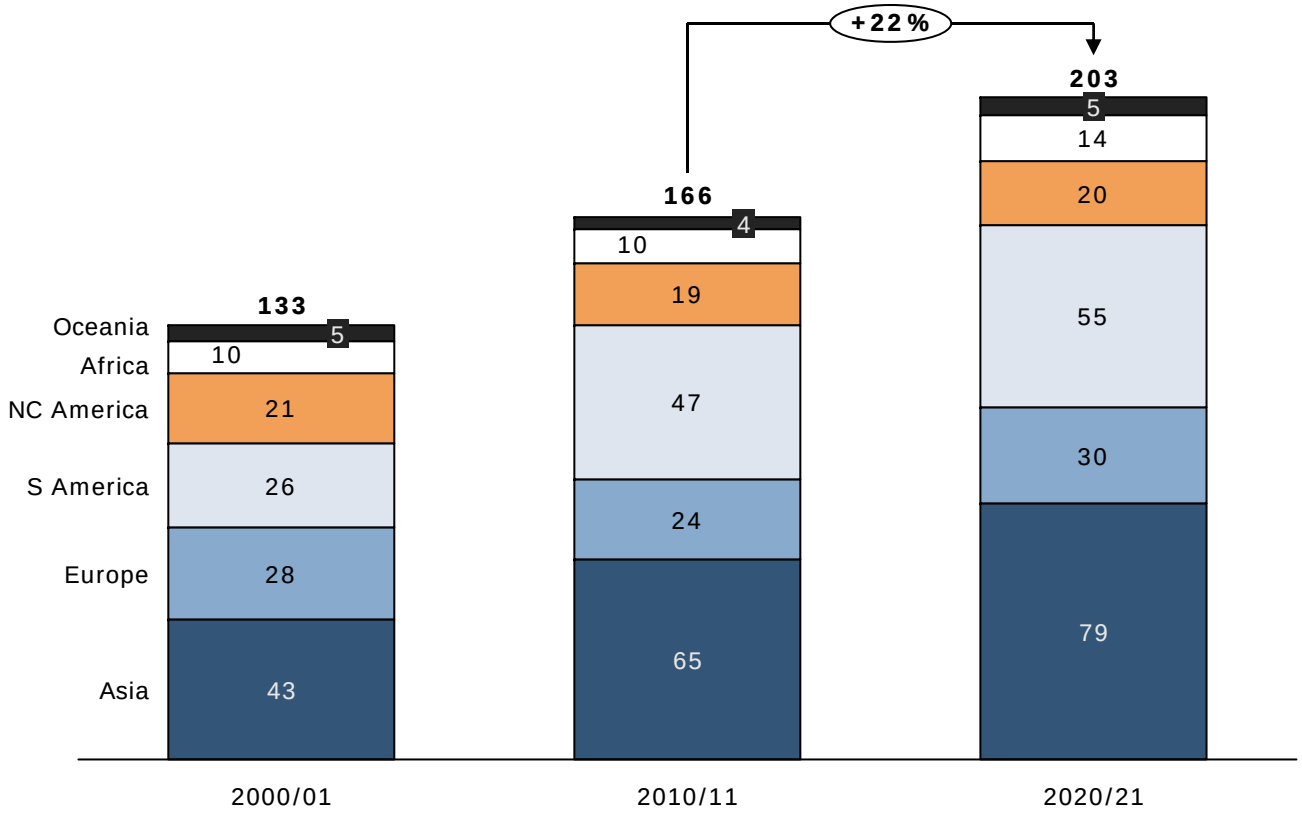
The future - supply: global sugar and molasses production will continue to grow

Projected regional growth in sugar production to 2020/21

[mn mt raw value]



Source: F O Licht, Rabobank projections

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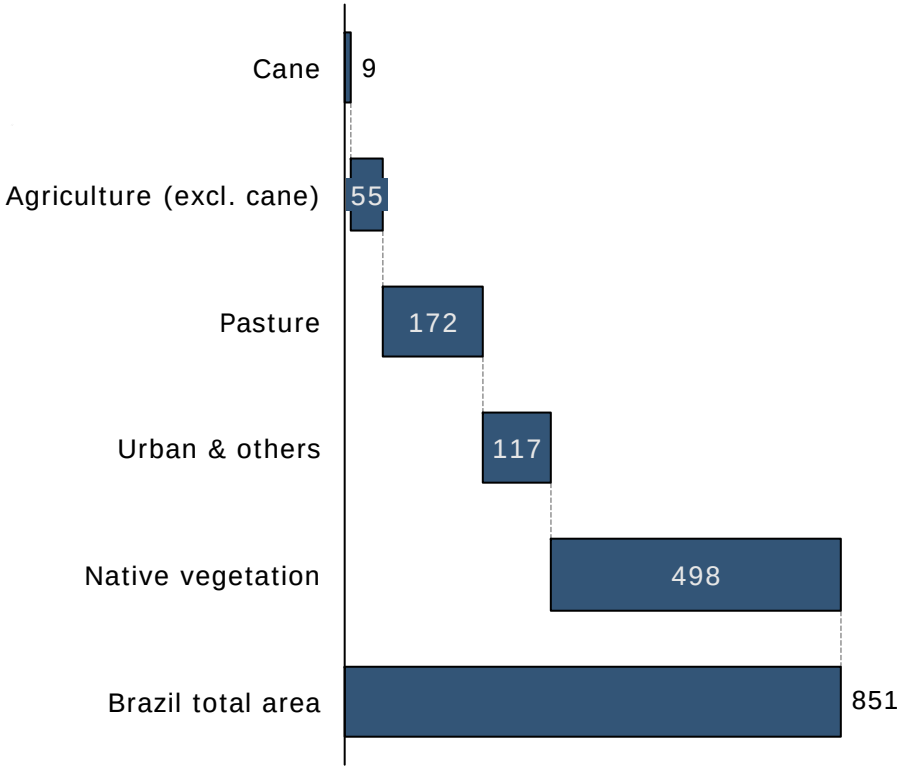
The future – supply: Brazil has tremendous scope to expand cane production

Distribution of land use in Brazil

[Million hectares]



Source: UNICA

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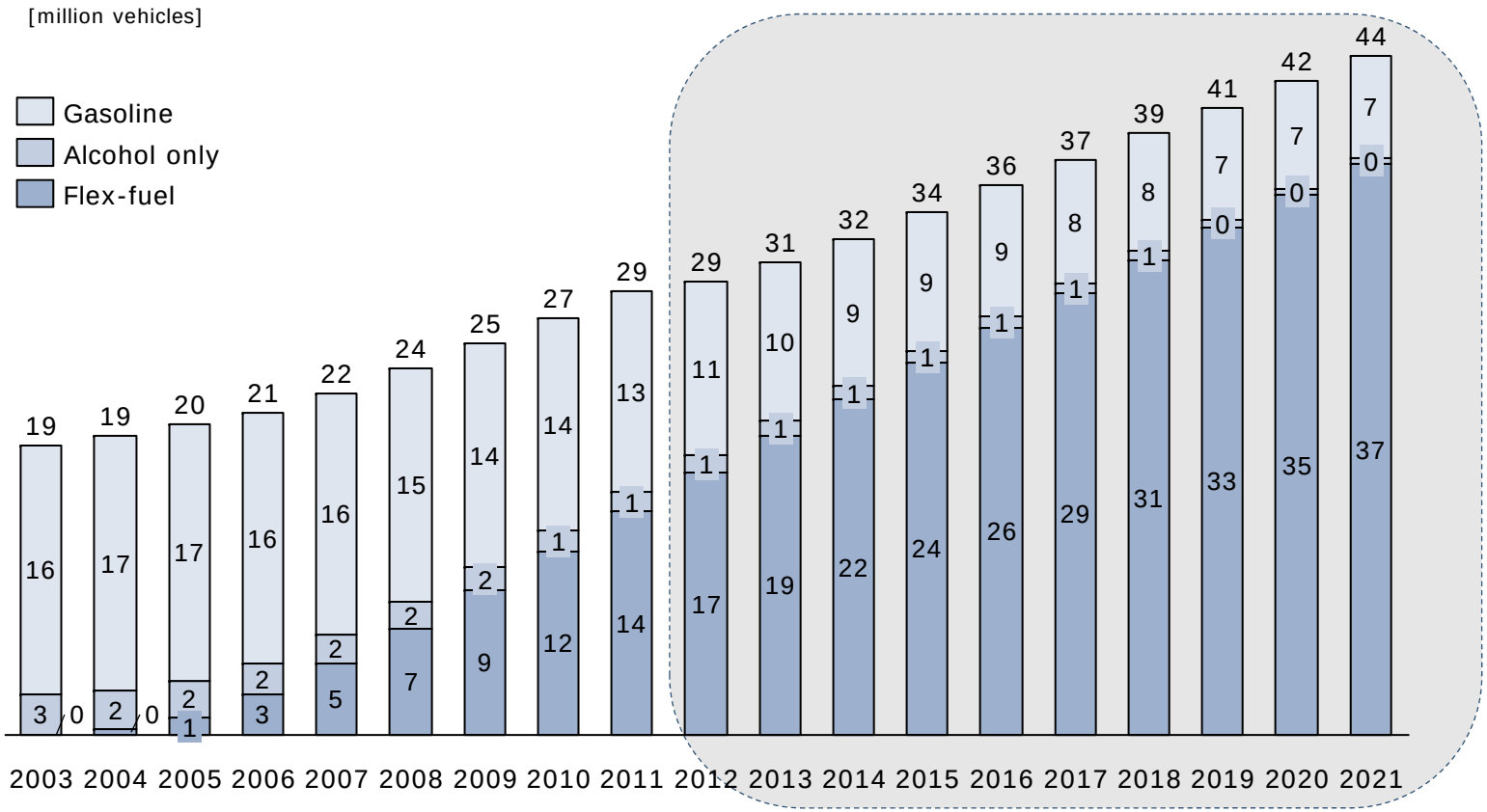
The future – demand: Brazil has tremendous scope for domestic market growth

Projected development of the flex-fuel vehicle fleet in Brazil



Source: ANFAVEA, Sindipeças, Rabobank estimates

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The future: conclusions

- Fuel ethanol production and consumption has grown rapidly over the last decade as biofuels policies have been implemented in a number of countries
- There is considerable growth in ethanol demand to come in the future owing to (i) growing commitments under current policies and (ii) the introduction of new policies around the world
- The likelihood is that most of the future growth in fuel ethanol consumption will be through its use as an additive blended with gasoline rather than as a substitute, owing to logistics & infrastructure issues
- Given its sustainability performance compared to other first generation biofuels, cane ethanol may be increasingly favoured by major markets that need to import ethanol to satisfy mandated blending requirements
- The arrival of commercially viable 2nd generation cellulosic ethanol technology will change the fuel ethanol business, but is likely to represent an opportunity rather than a threat for today´s cane based ethanol businesses, in Brazil and elsewhere

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