

The interaction between the sugar & biofuel industry

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Civil Society Representative at Brazil's
National Council on Energy Policy (CNPE)

2017 EU Agricultural Outlook Conference

Food & Farming

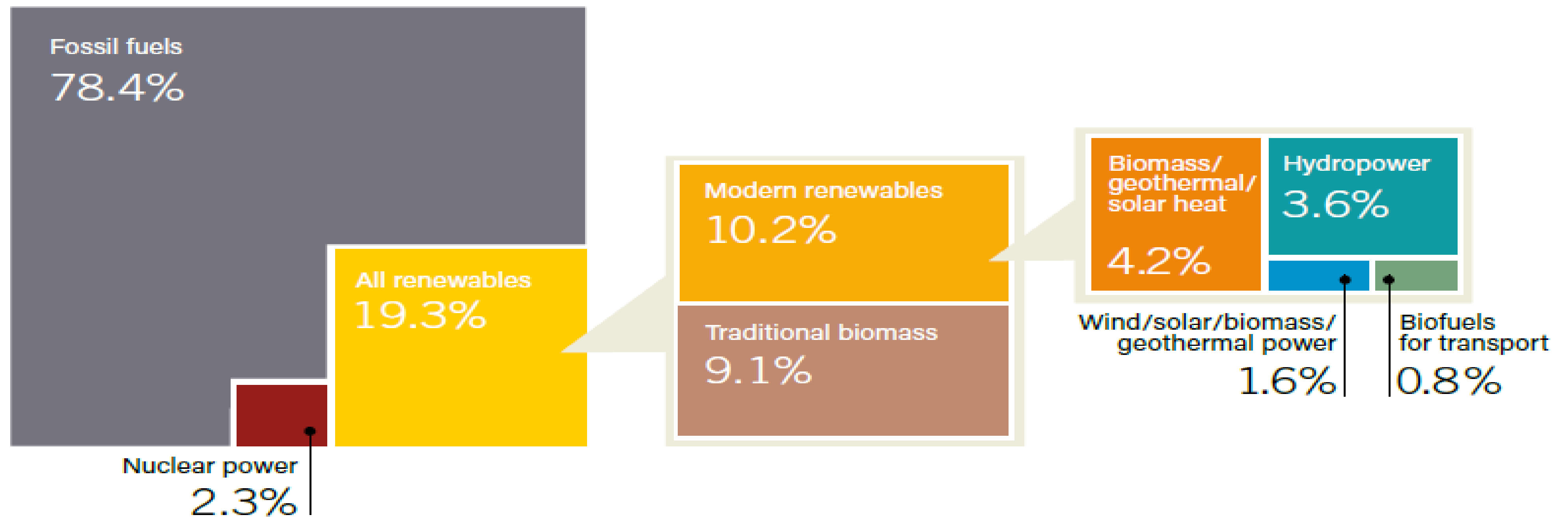
Brussels, December 18-19, 2017

Room De Gasperi, Charlemagne Building



Relevance of Biofuels in World Energy Consumption

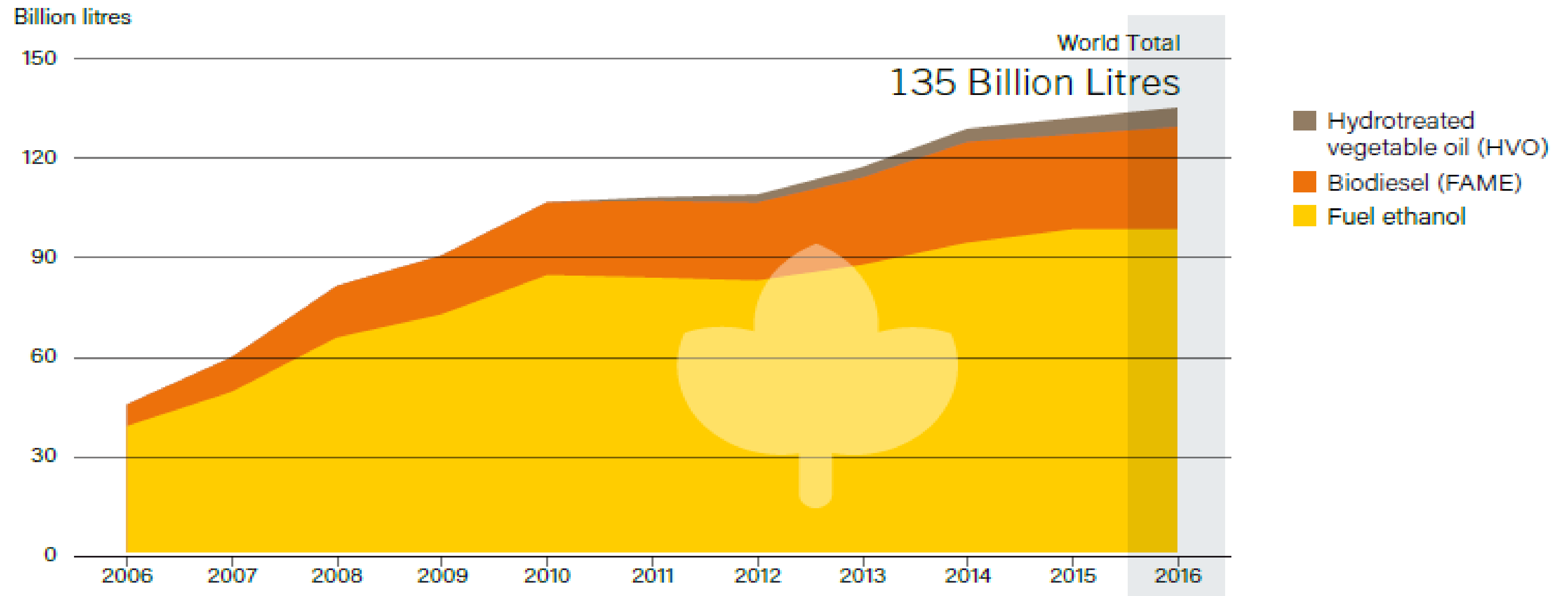
Estimated Renewable Energy Share of Total Final Energy Consumption, 2015



Source: REN21, 2017.

Trends in World Ethanol & Biodiesel Production

Global Trends in Ethanol, Biodiesel and HVO Production, 2006-2016

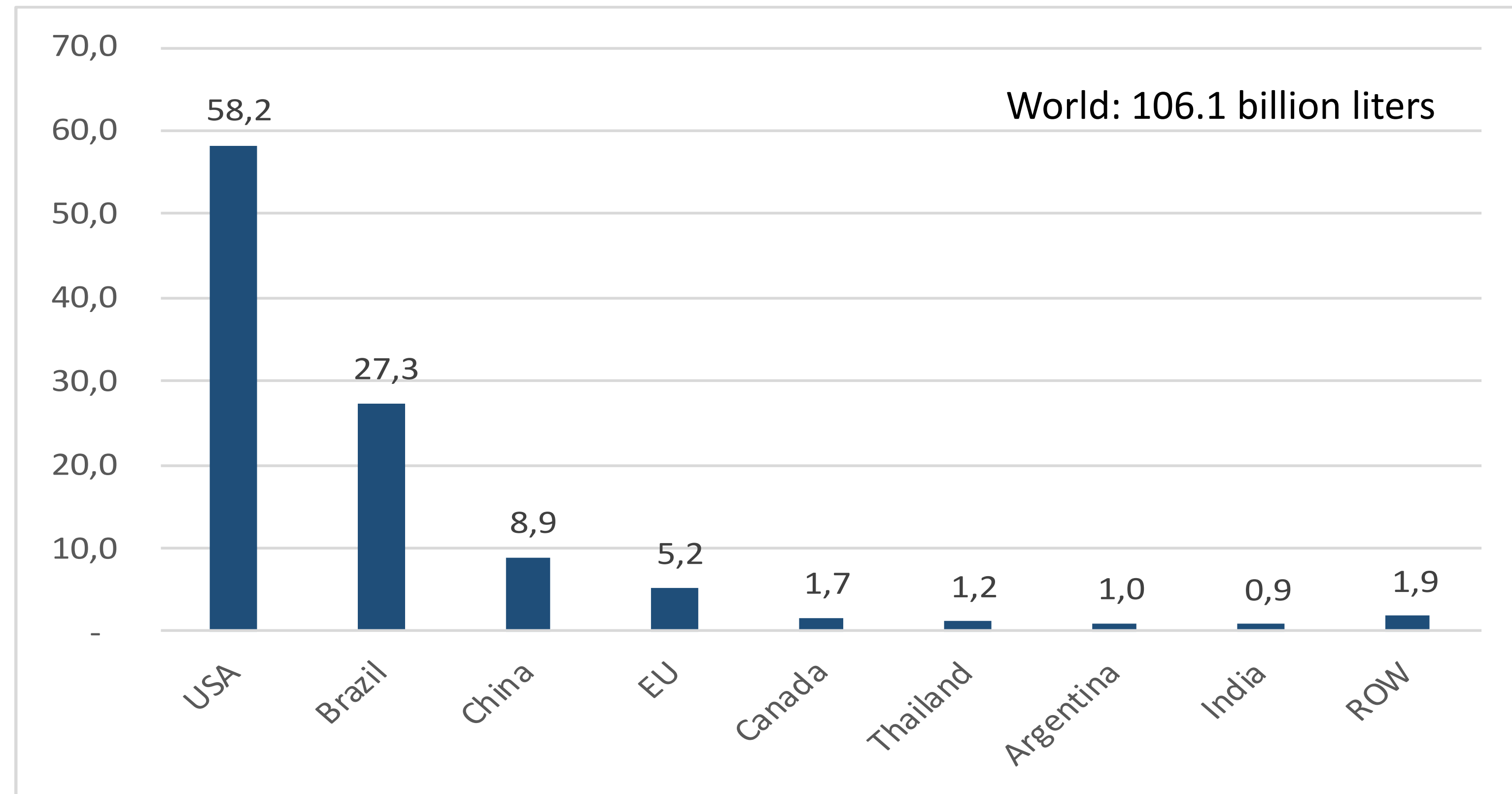


Source: REN21, 2017.

World Ethanol Production, 2016

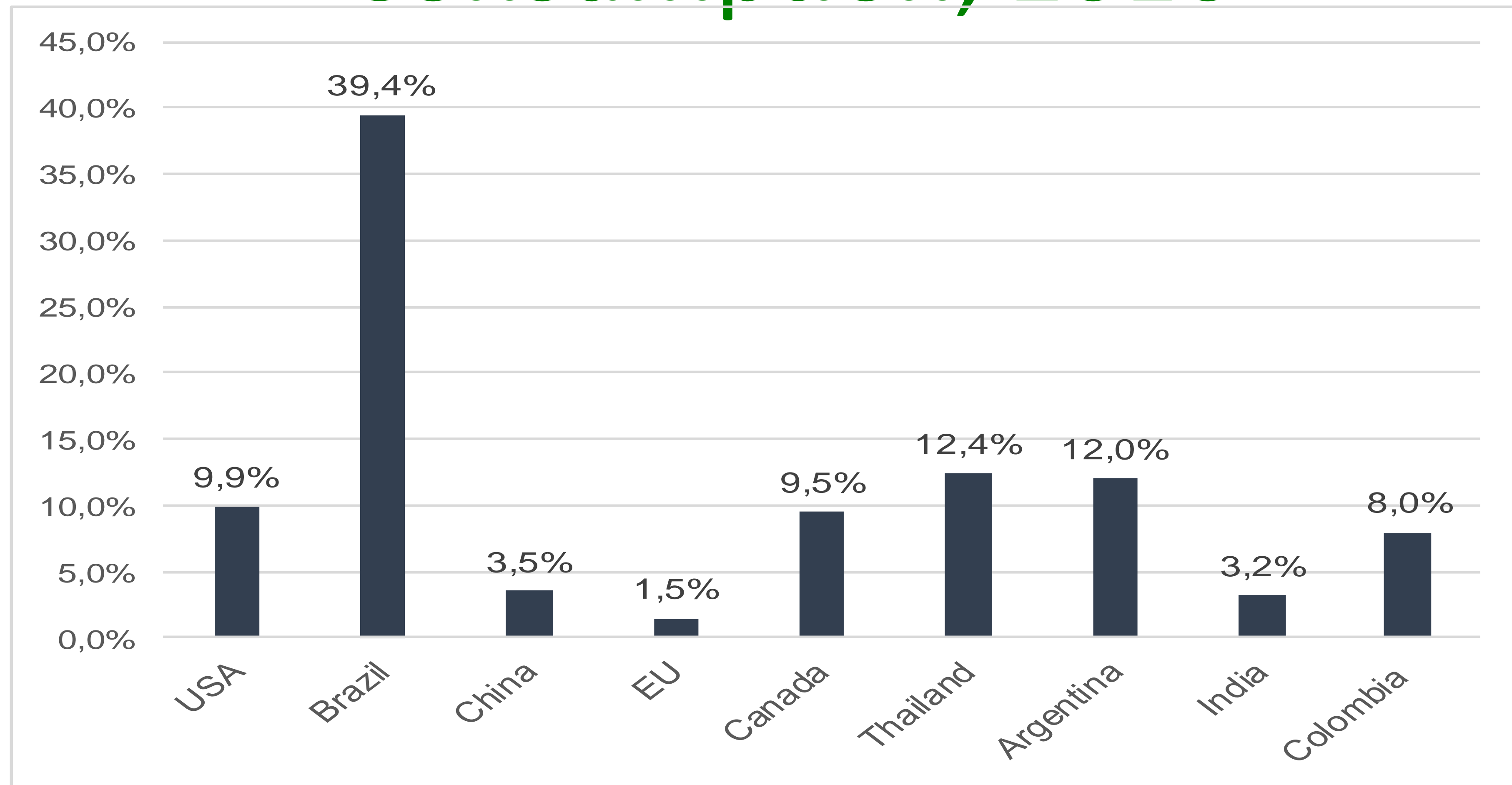
(fuel + non-fuel)

Billion liters



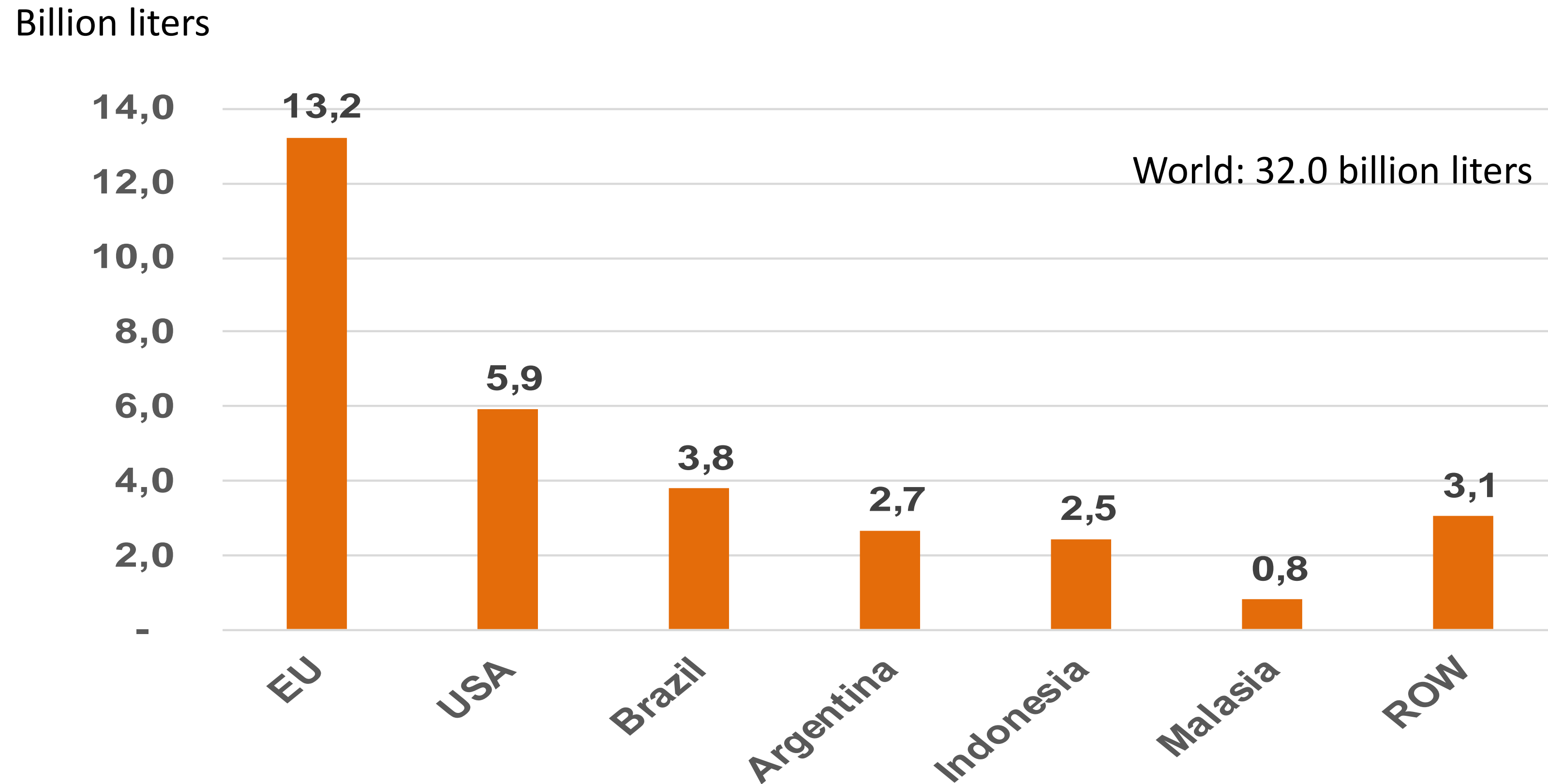
Source: Various compiled by DATAGRO

% of Ethanol in Otto cycle Fuel Consumption, 2016



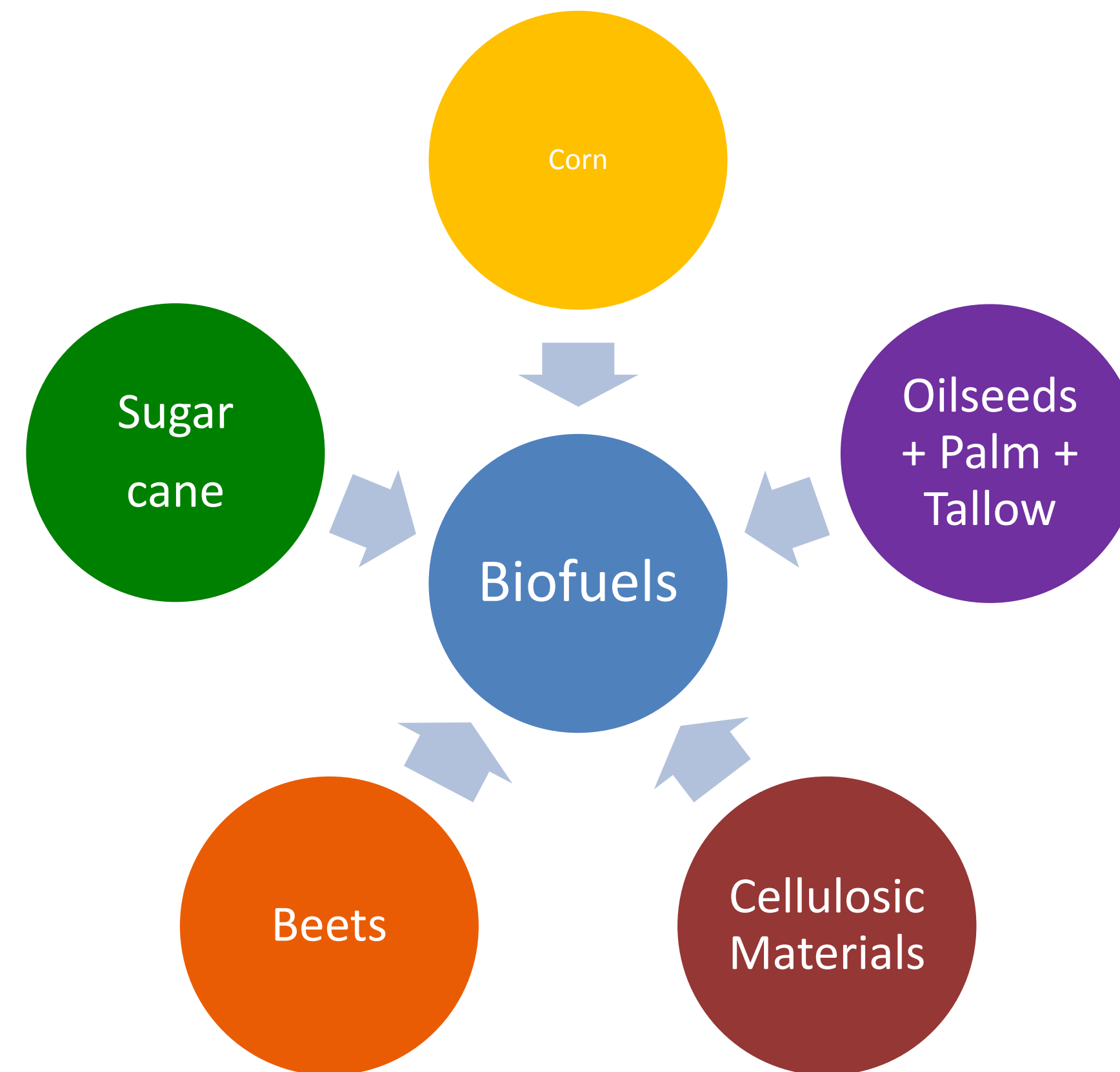
Source: DATAGRO

World Biodiesel Production, 2016



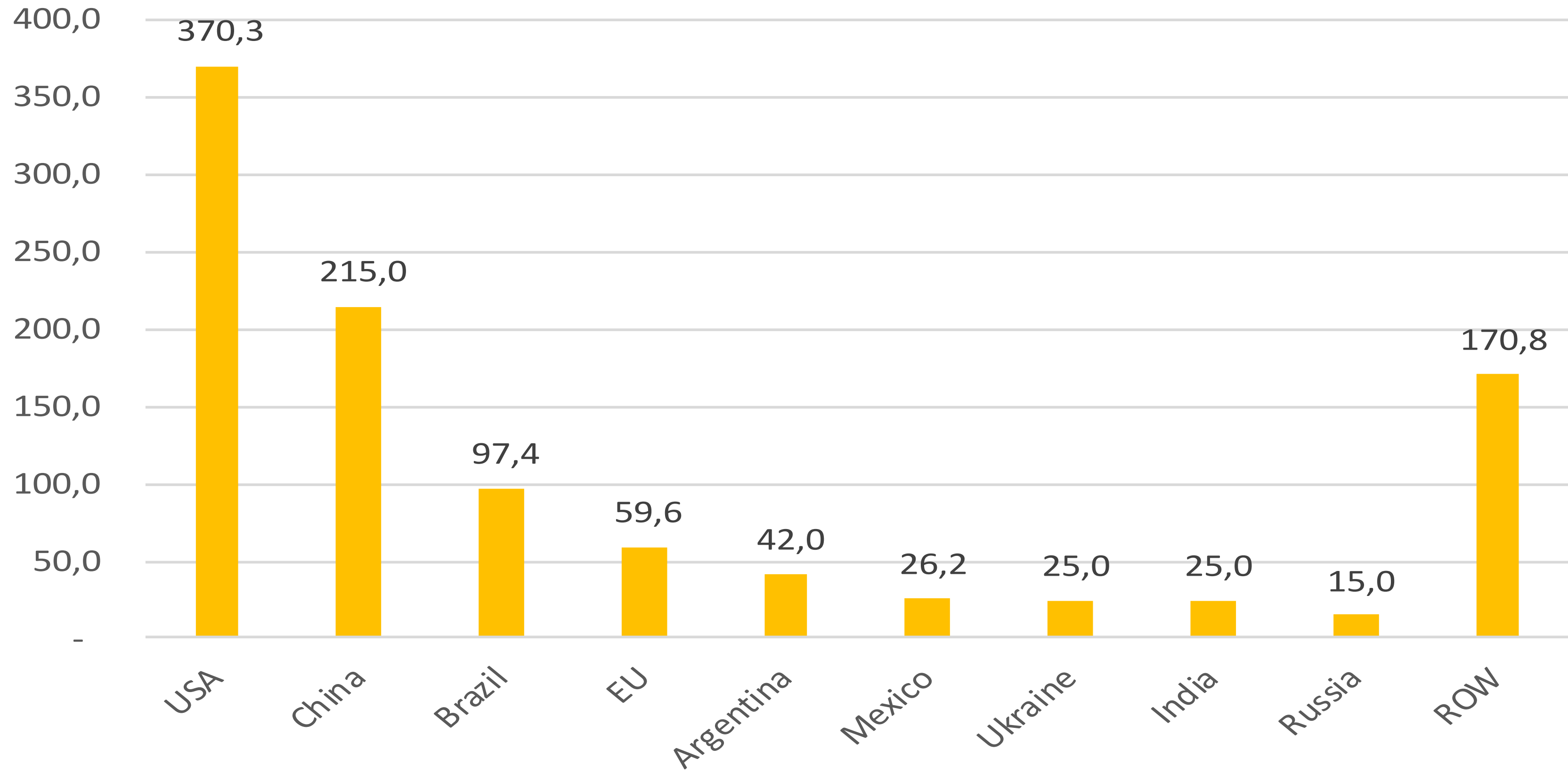
Source: Various compiled by DATAGRO

Sugar & Biofuel Feedstocks



World Corn Production, 2016

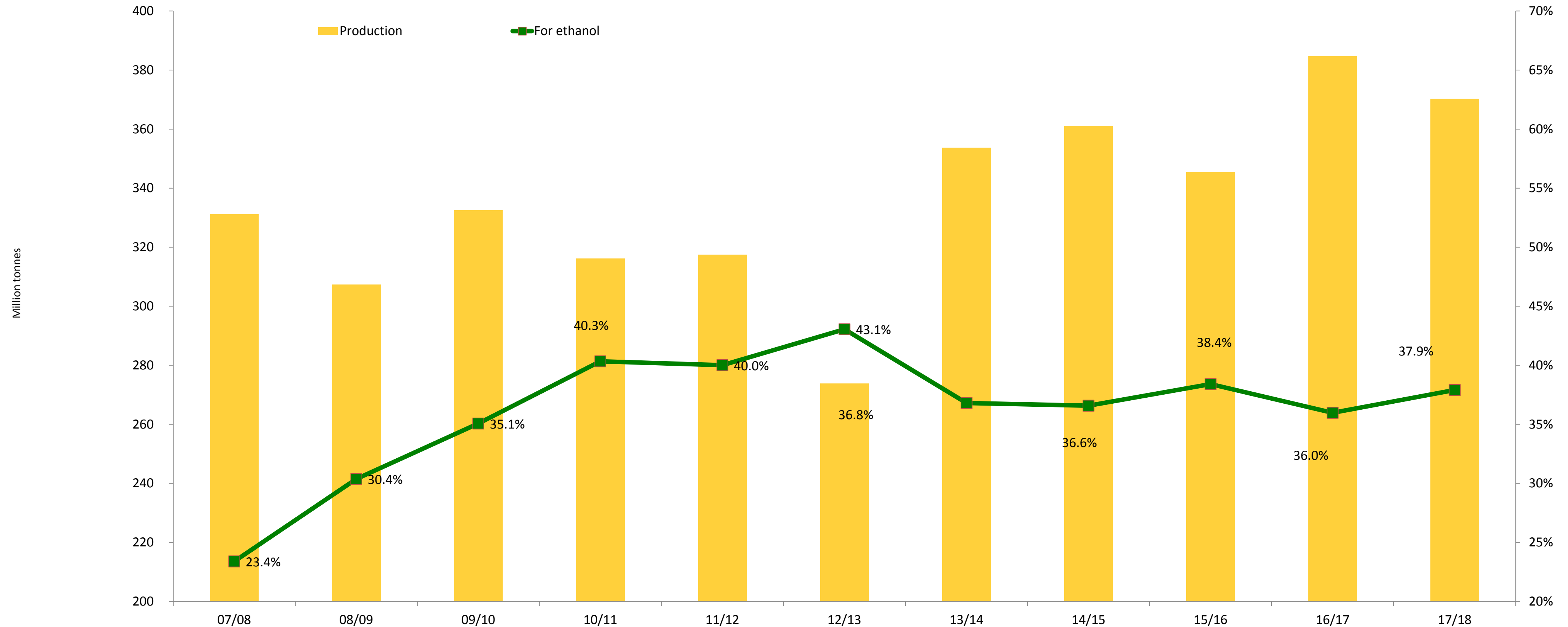
Million tonnes



Source: Various compiled by DATAGRO

% of US Corn converted to Ethanol

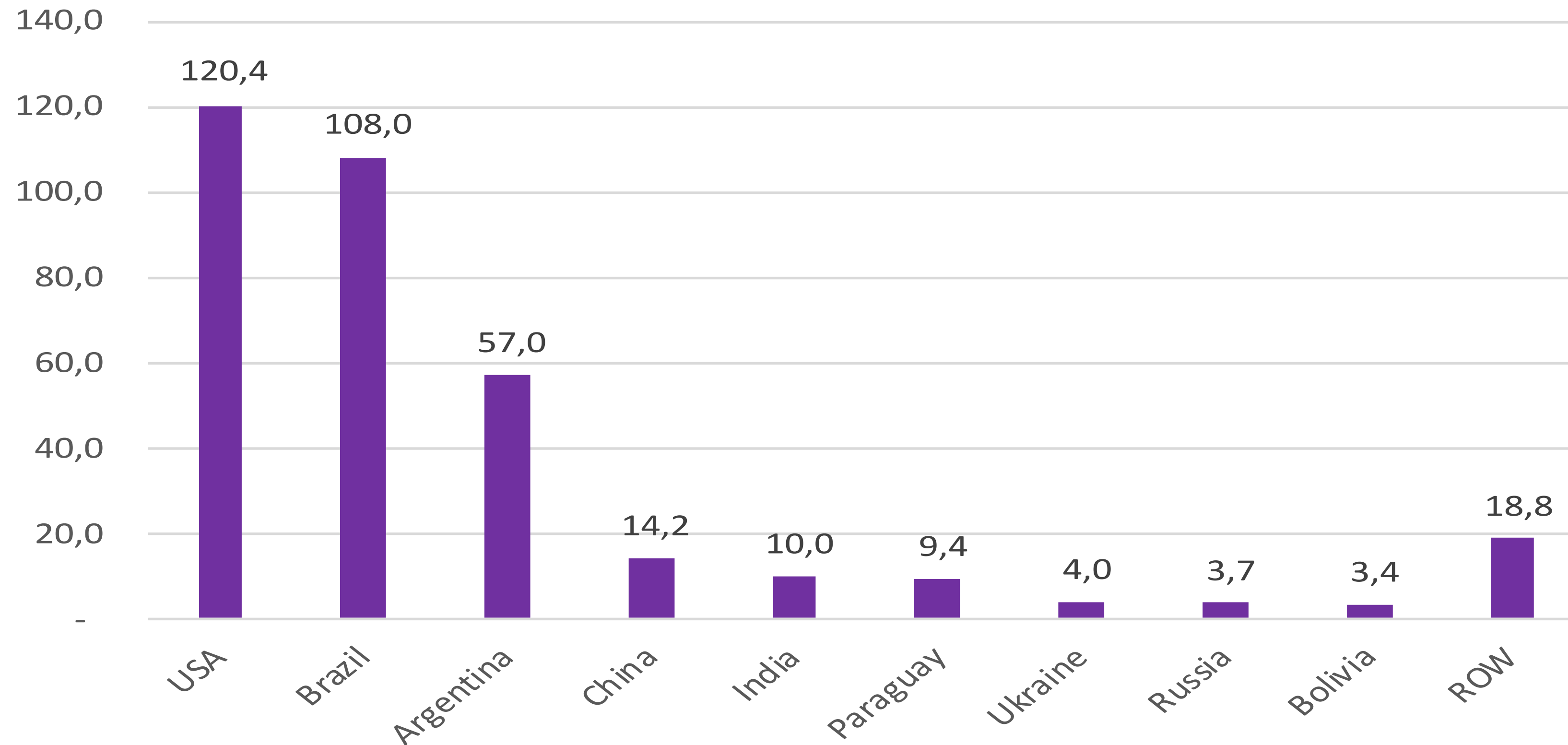
What would happen to grain markets if ethanol was not absorbing all this corn?



Source: USDA, RFA.

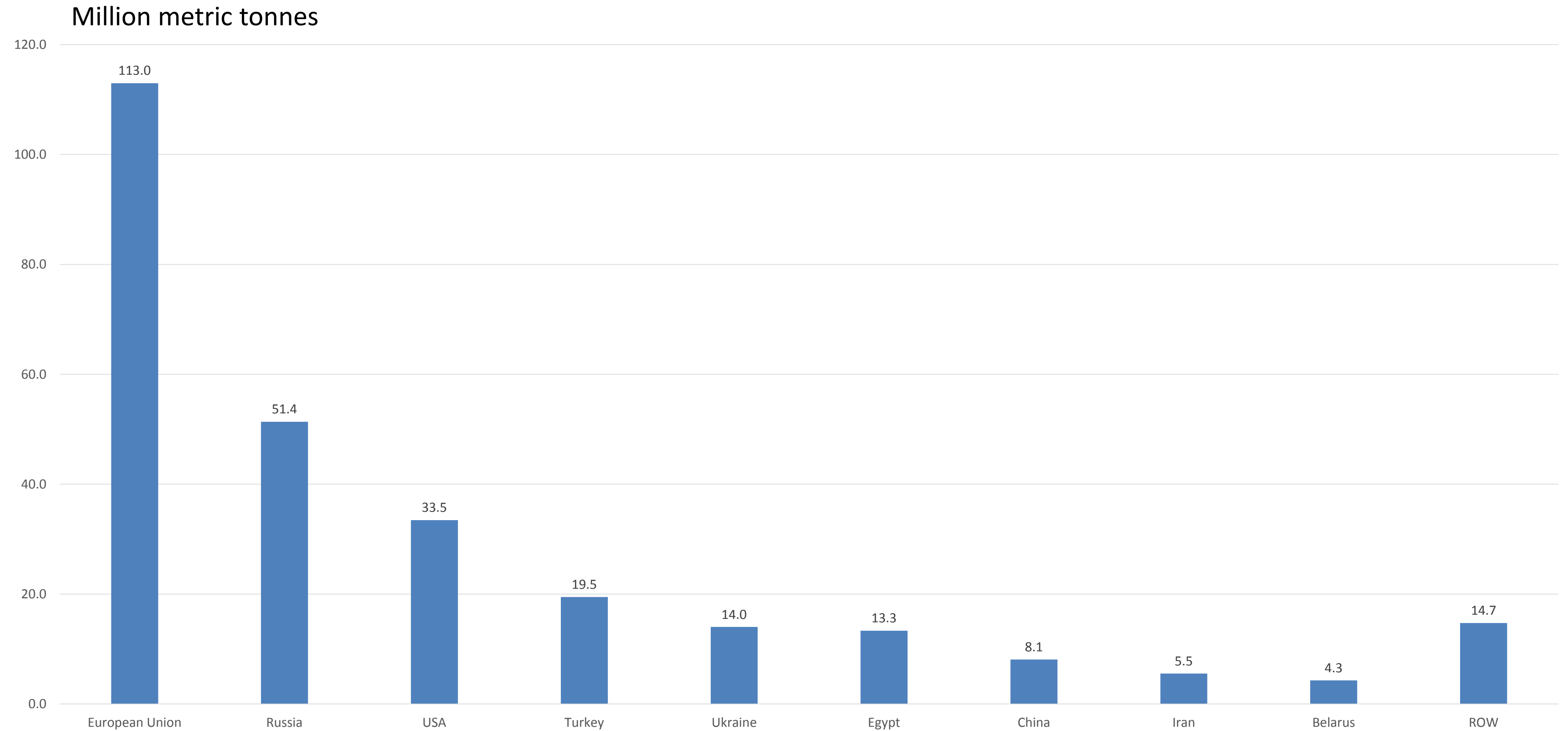
World Soy Production, 2016

Million tonnes



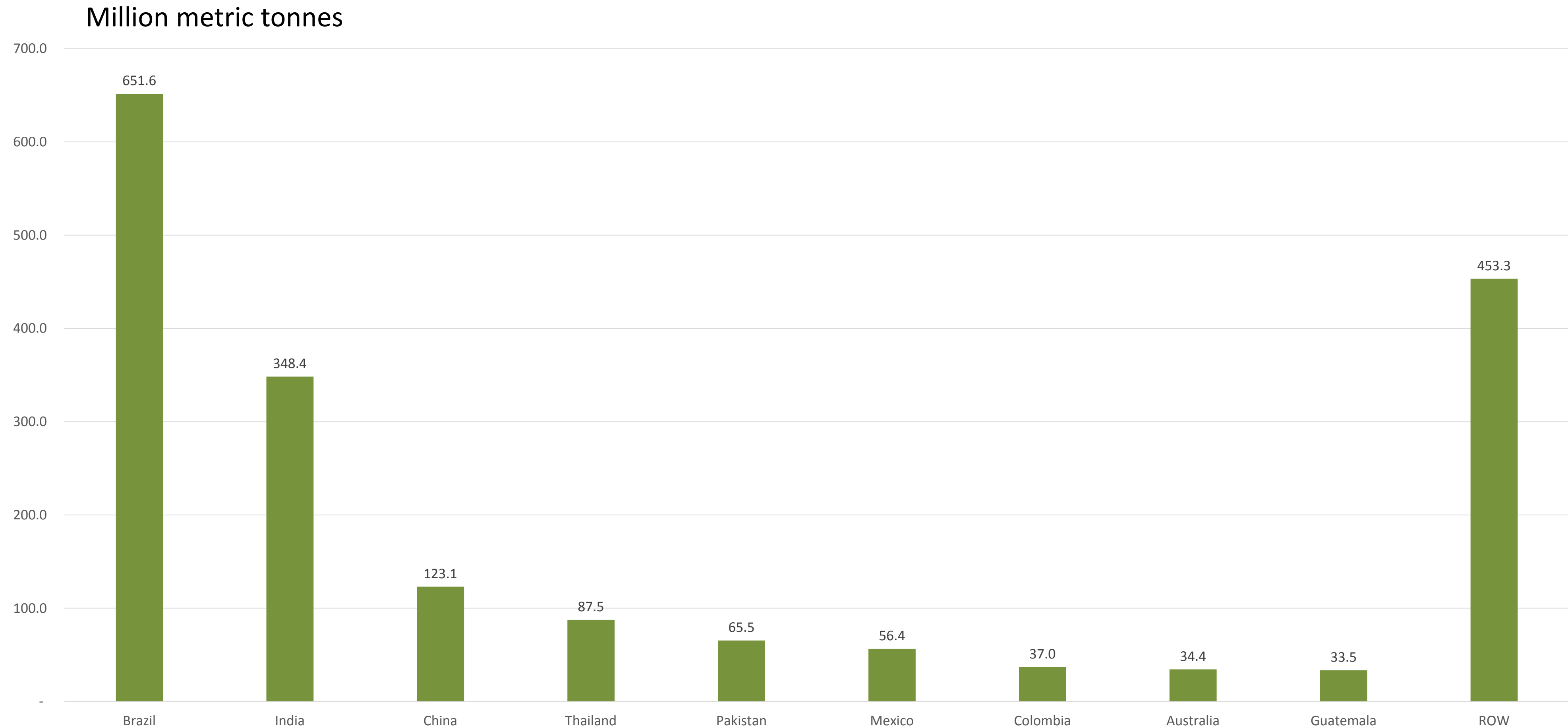
Source: Various compiled by DATAGRO

World Beet Production, 2016



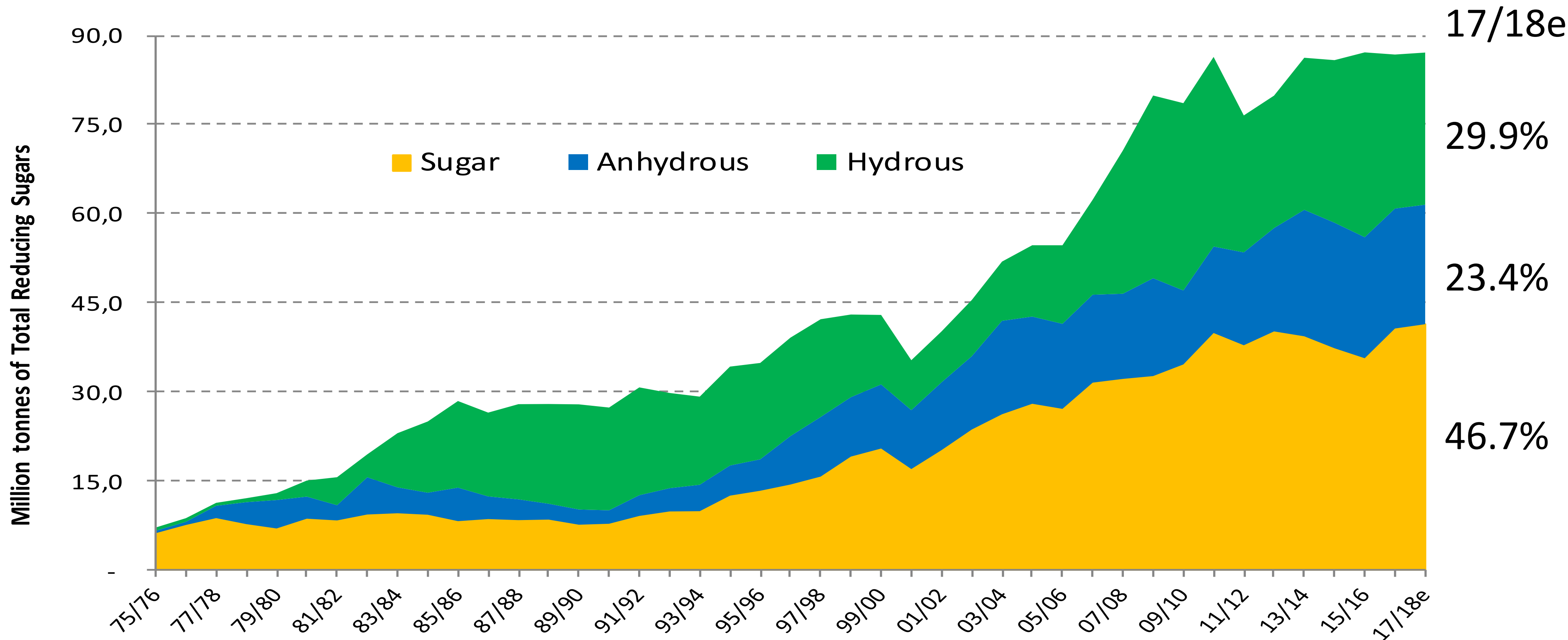
Source: Various compiled by DATAGRO

World Cane Production, 2016



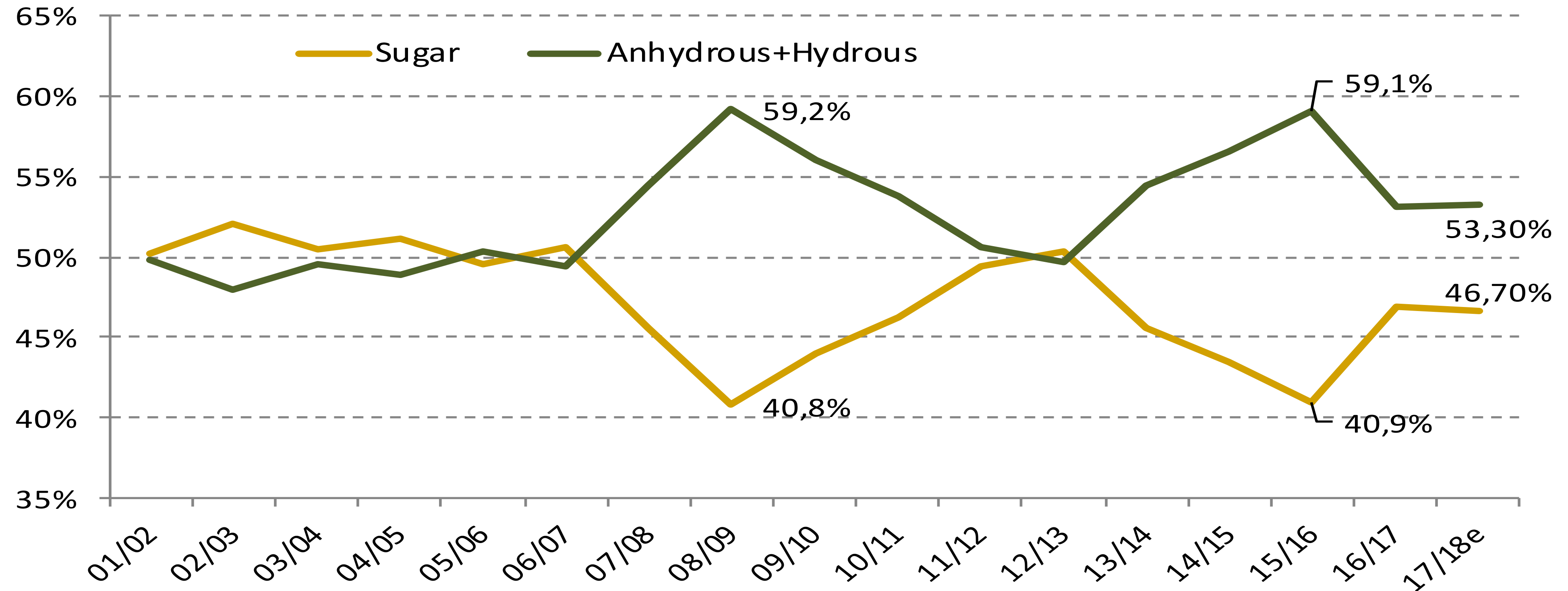
Source: Various compiled by DATAGRO

% of Brazil's Cane converted to Ethanol



Source: DATAGRO

Brazil's sugar cane production mix

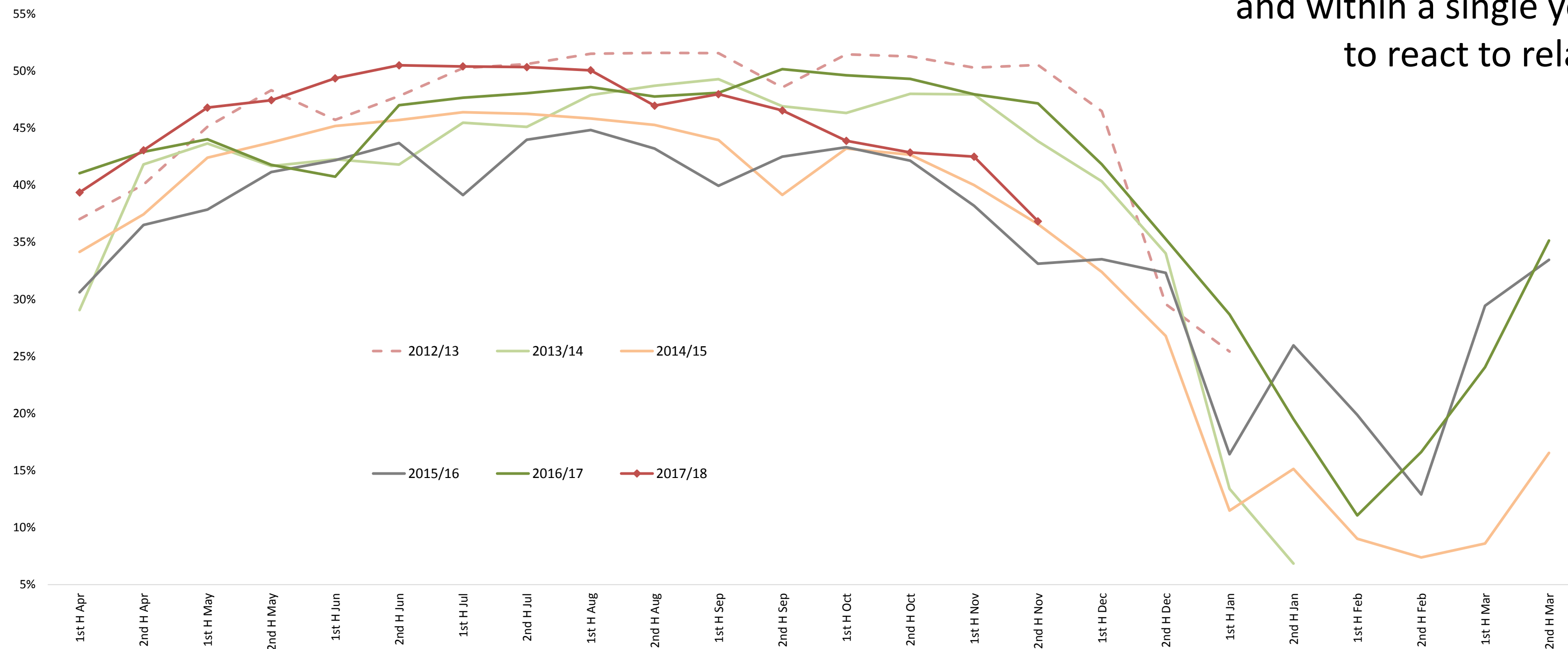


Source: DATAGRO

Centre-South Brazil sugarcane mix for sugar

(biweekly series)

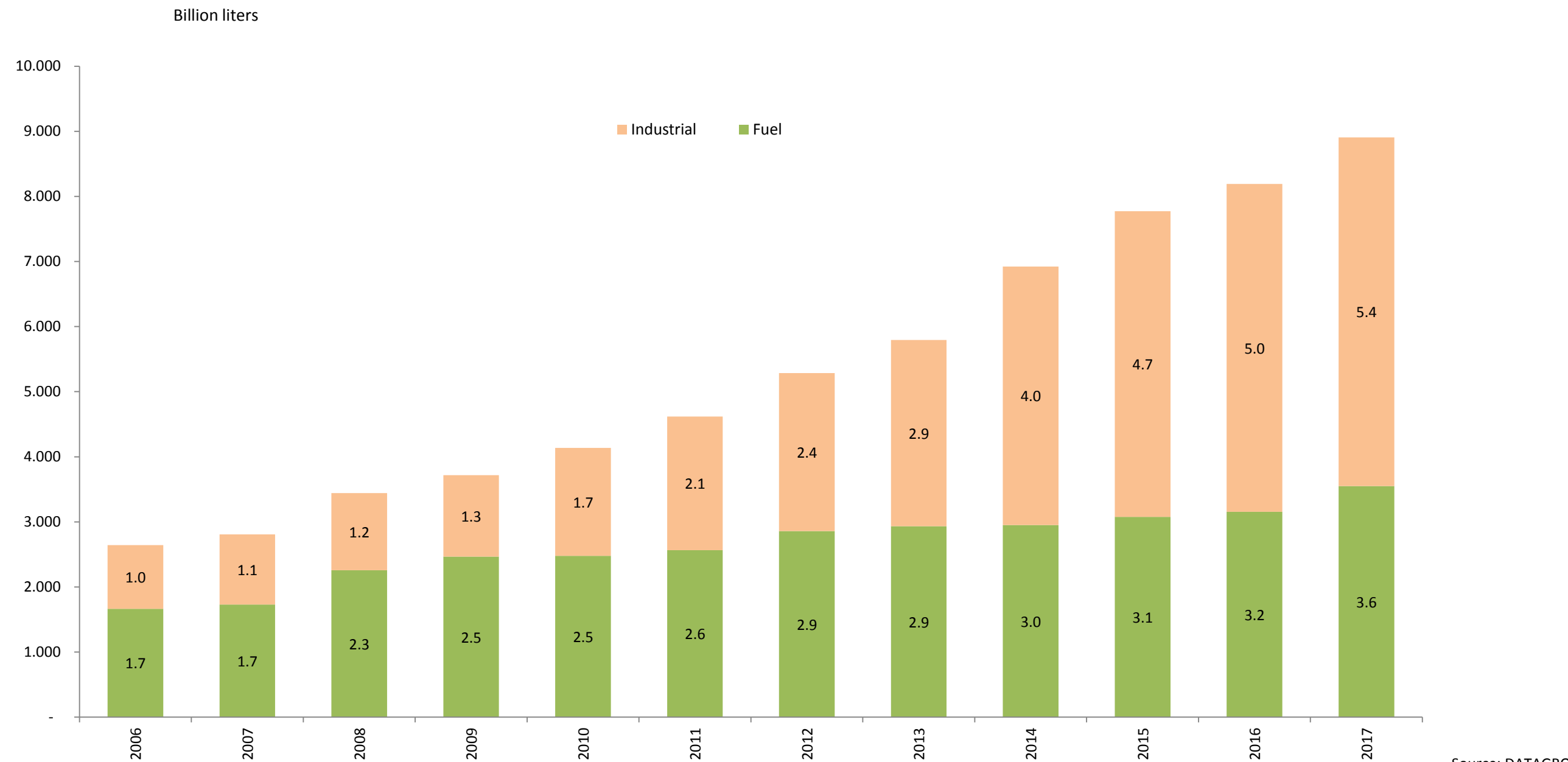
Adaptability through diversification:
relevant mix flexibility over the years,
and within a single year, reveals ability
to react to relative prices



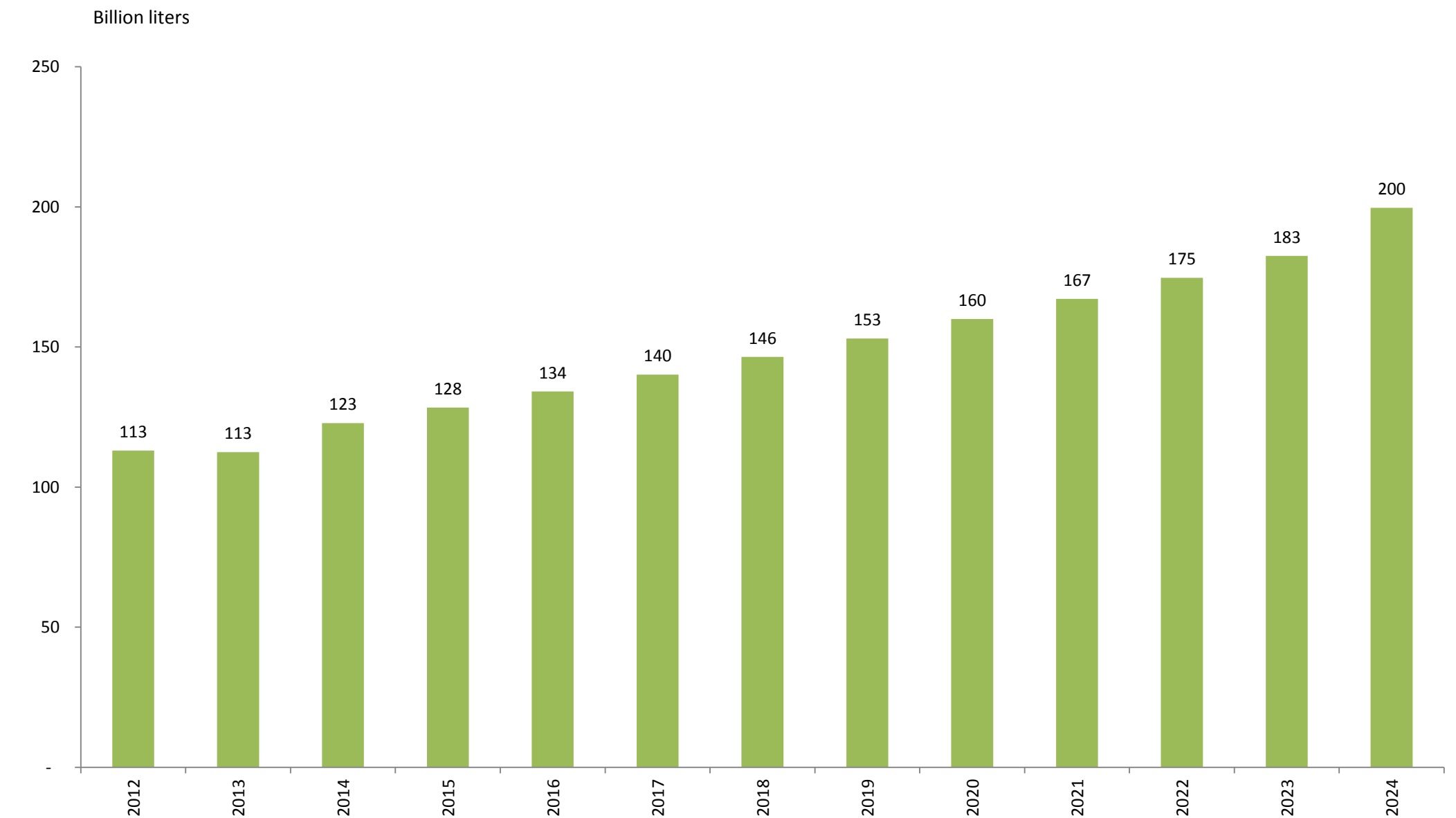
Source: DATAGRO

China sets 2020 target for nationwide 10% ethanol blend

China's Ethanol Production



China's Gasoline Consumption

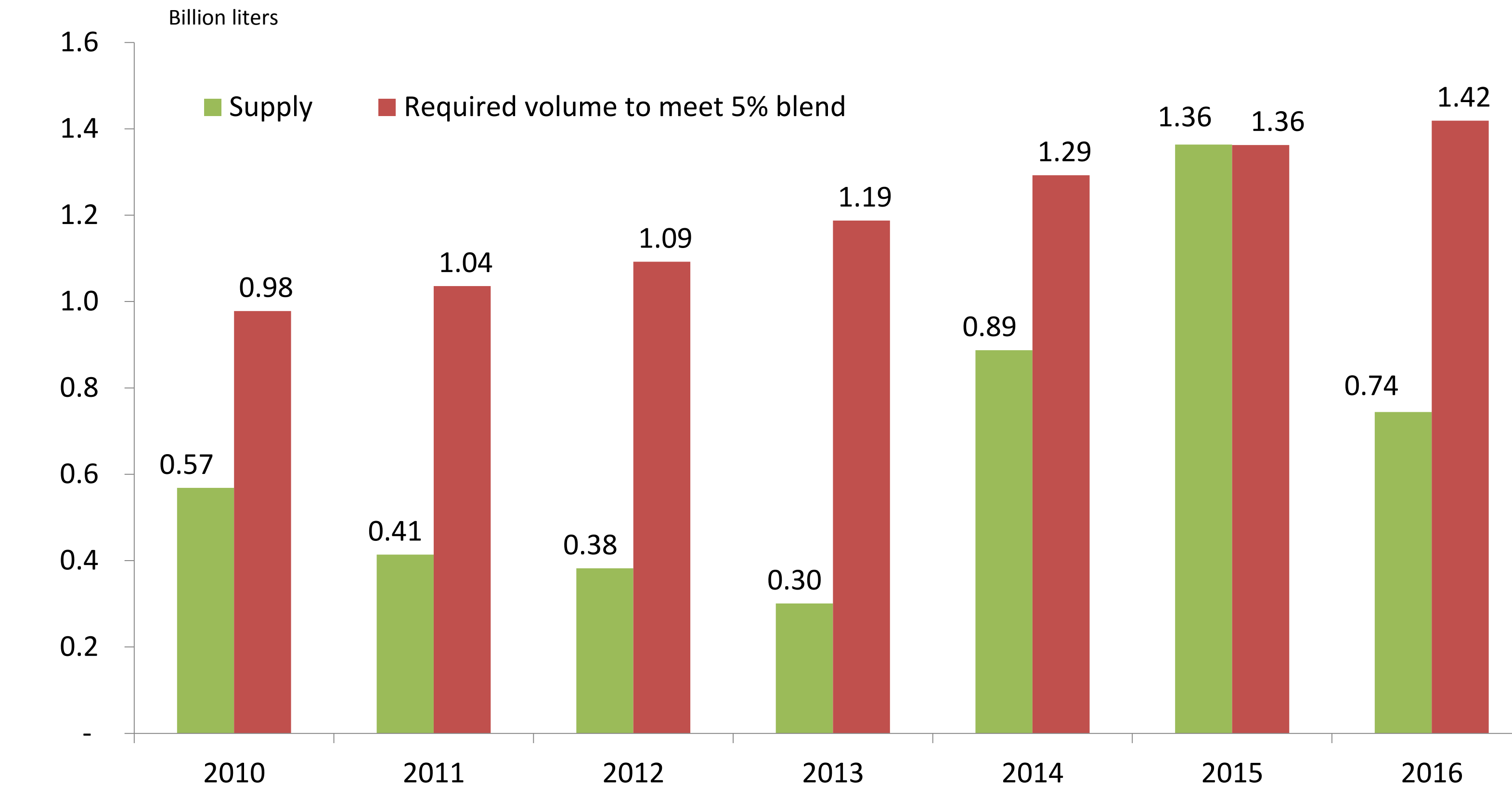


- China's ethanol production will rise 8.7% to 8.91 billion liters in 2017, of which 3.55 billion liters for fuel purpose (+12.5%, as the country implements measures to boost ethanol output, in a drive to encourage consumption of its huge corn stocks.

- Chinese gasoline consumption is projected to increase by around 5.1% CAGR until 2024 to 200 billion liters.
- It could mean building as many as 35 new plants each with 500,000 cubic meters per year of capacity to meet the demand.

India new ethanol policy

Fuel Ethanol Demand and Supply - India

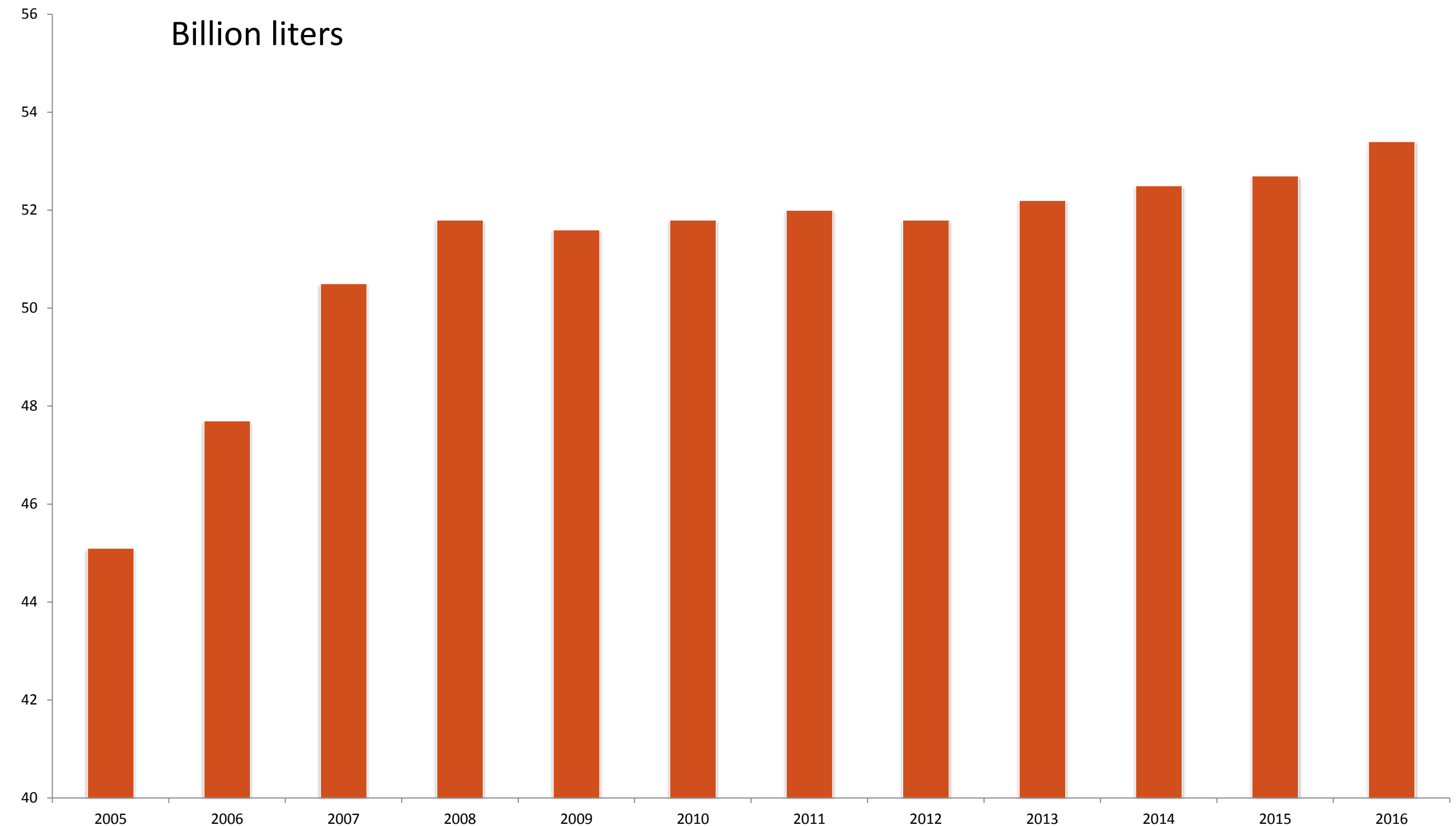


- India has set a target to blend 10% ethanol in all gasoline sold in the country.
- To encourage 2G ethanol, India plans to increase the blend mandate from 10% to 22.5%.
- While India does not allow ethanol imports for fuel purposes, imports are projected to increase in order to meet industrial demand.

Russia aims 10% ethanol blend in 2020

- To help its ethanol industry achieve 10% blend by 2020, Russia is prepared to lift a heavy \$1.62 per liter excise tax currently levied upon domestic fuel ethanol by year's end.
- Such a move will stimulate production as the tax represents 90% of production price, and aims to bring investors to the table to help ramp up production.
- The excise tax was used as means to avoid vodka being produced under the disguise of fuel ethanol.
- Russia consumes almost 53 billion liters of gasoline annually.

Russia's Gasoline Demand



Source: EIA.

COP23-Fiji in Bonn



Declaration of Vision, by 19 Nations representing over 50% of world population, 37% of world GDP + IEA + IRENA
Bonn, November 16, 2017

Target for 2030 (2DS)

- % of **Bioenergy** in world energy demand must **double**.
- % of sustainable low carbon **Biofuels** in transport fuels, including sea and air transport, must **triple**.

Scaling up the bioeconomy is possible, given smart agricultural practices, better use of rural and urban waste, and proper policies.



RenovaBio

- Innovation and efficiency in biofuel production and use have been at center of Brazil's strategy for the use of low carbon sources of energy.
- RenovaBio is not subsidy, nor carbon tax.
- Applies to all biofuels: ethanol, biodiesel, biogas / biomethane, bio-kerosene.



RenovaBio

RenovaBio is a regulation based on 2 pilars:

- Induction of energy efficiency in production and use of biofuels;
- Recognition of the capacity of each biofuel to promote carbon reduction.



RenovaBio

Target

- Market-driven carbon pricing mechanism (endogenous, not exogenous determination), rewarding achievement of individual efficiency, not a common or equal coverage.
- Unleash market forces to implement and drive innovation for increased competitiveness in biofuel/bioenergy production.
- Stimulate continued demand growth, independent of government mandate.
- RenovaBio does not elect/predefine champions – expansion of bioenergy will be driven by energy-environmental efficiency and sustainable production.



RenovaBio

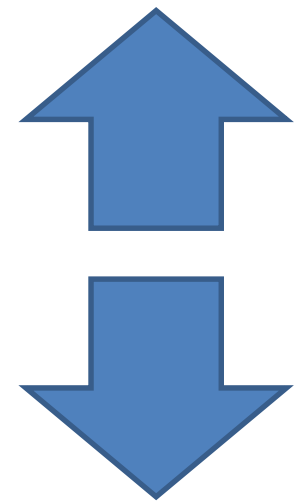
Mechanism

- Voluntary certification of biofuel producers for their energy-environmental efficiency, based on life-cycle assessment (LCA), which will determine ability to request issuance of Decarbonization Credits (CBios);
- Financial institutions will issue Decarbonization Credits (CBios) to be freely negotiated at public exchange;
- Definition of long term country carbon reduction target for the fuel sector will lead to individual fuel distributor carbon reduction targets, to be met with acquisition of CBios.

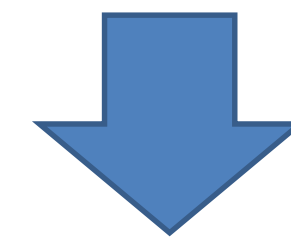


Producer Voluntary Certification to receive a Energy-Environmental Efficiency Grade

- Energy Efficiency: MJ/cbm or tonne;
- Environmental impact: g CO₂e / cbm or tonne;



$$\frac{\text{g CO}_2\text{eq/cbm}}{\text{MJ/cbm}} = \text{g CO}_2\text{e / MJ}$$



- **g CO₂e / MJ** differential between fossil & biofuel will define Grade for each biofuel producer.



Relevance of the distribution system

- Brazil can take advantage of its fuel distribution system for:
 - Hydrous Ethanol used as sole fuel, in fleet which is already 65% flex and growing,
 - Anhydrous Ethanol blended at 27% v/v in all gasoline nationwide (E27) – Brazil has been using “mid-level blends” for a long time,
 - Biodiesel blended in all fossil-based diesel nationwide (B8), going to B10 in March/18.
- **Biofuel is SOLAR ENERGY captured, stored and distributed in an efficient, economical & safe manner.**



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 - Biodiesel blended in all fossil-based diesel Nationwide (B8), going to B10 in March/18.
- Biofuel is **HYDROGEN** captured, stored and distributed in an efficient, economical & safe manner.



RenovaBio

Objective

- Stimulate & reward investments in efficiency / competitiveness, leading to lower costs & lower prices to consumers, and sustainable bioenergy expansion.



RenovaBio

- A reward for those who do right, not punishment for doing wrong (use of fossil energy).
- Market-driven mechanism for carbon pricing.
- Stimulate private investment for expansion of energy-environmental efficient biofuel/bioenergy production.
- Legislation approved 24 days after introduction in both Houses of Congress (PLC 160/2017), on December 12, 2017.



RenovaBio

Simultaneously addresses Public Policy objectives in the areas of

- Energy
- Environment
- Agriculture
- Industry
- Social & Economic Development
- Economy reform



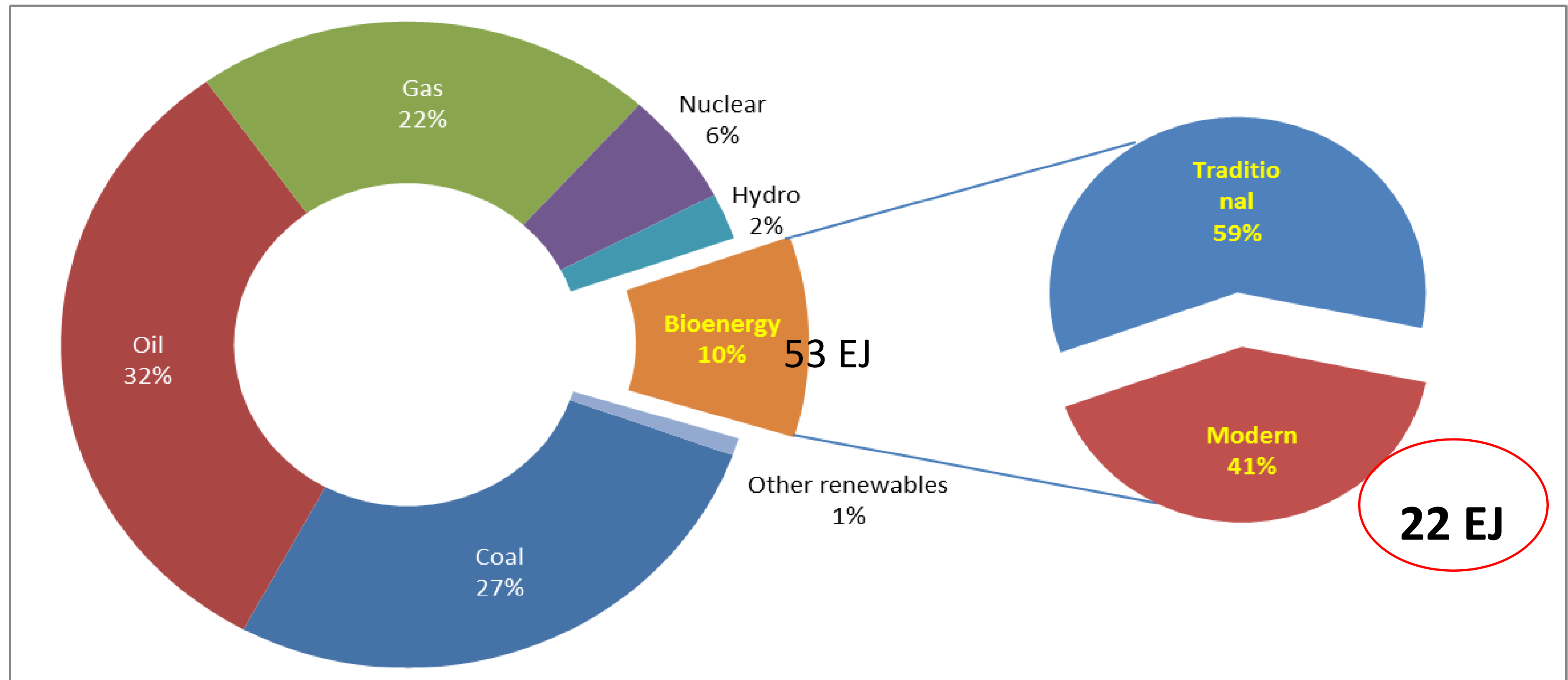
RenovaBio

Relevant strategy for achievement of
Brazil's commitments before the
Paris Climate Agreement.

Can be applied to other countries, as well.

Current World Energy Demand: 533 EJ

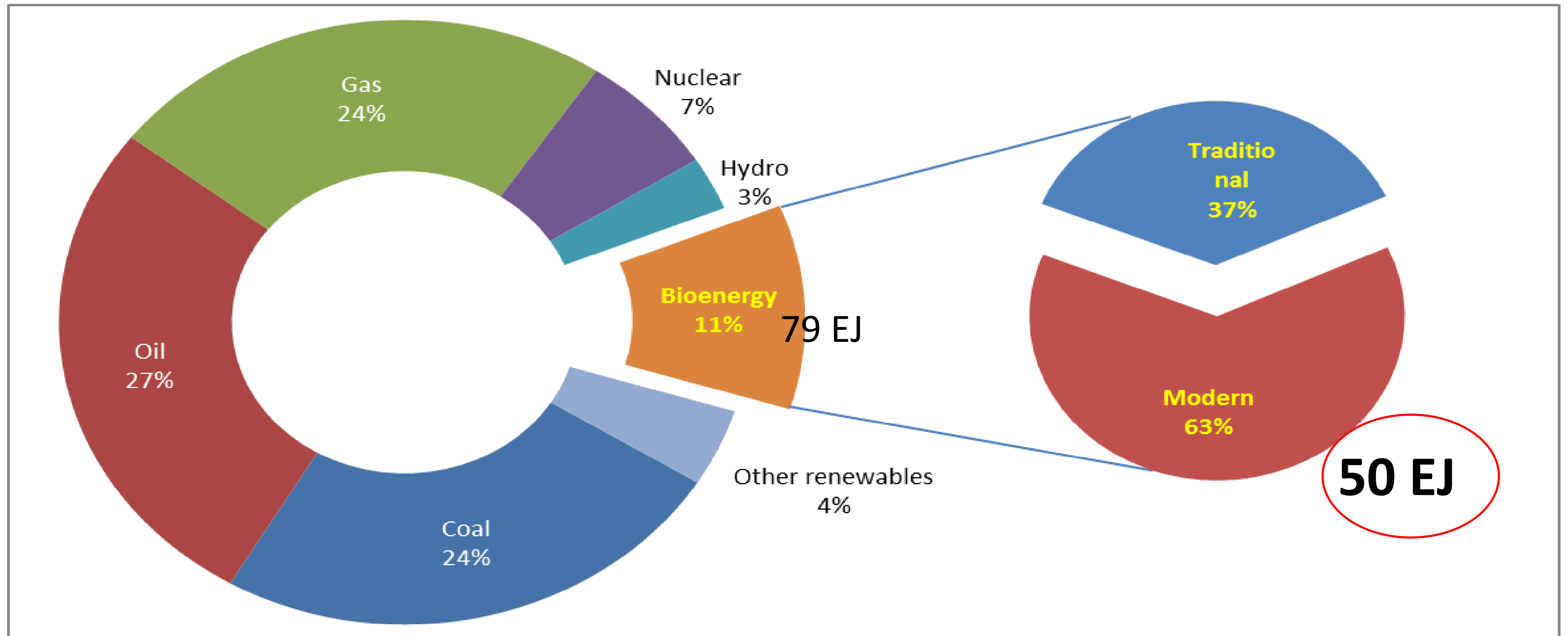
Modern Bioenergy is projected to rise from **22 EJ**



Source (compiled from Table 2.1 and data on page 219 on IEA, World Energy Outlook)

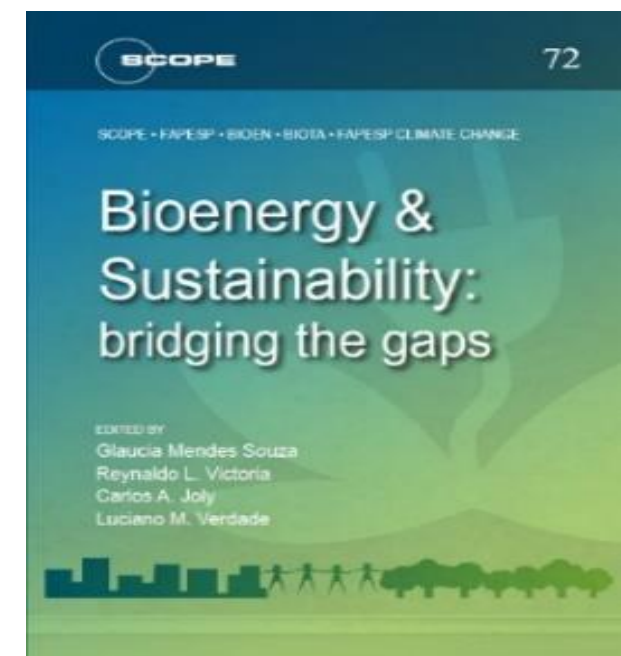
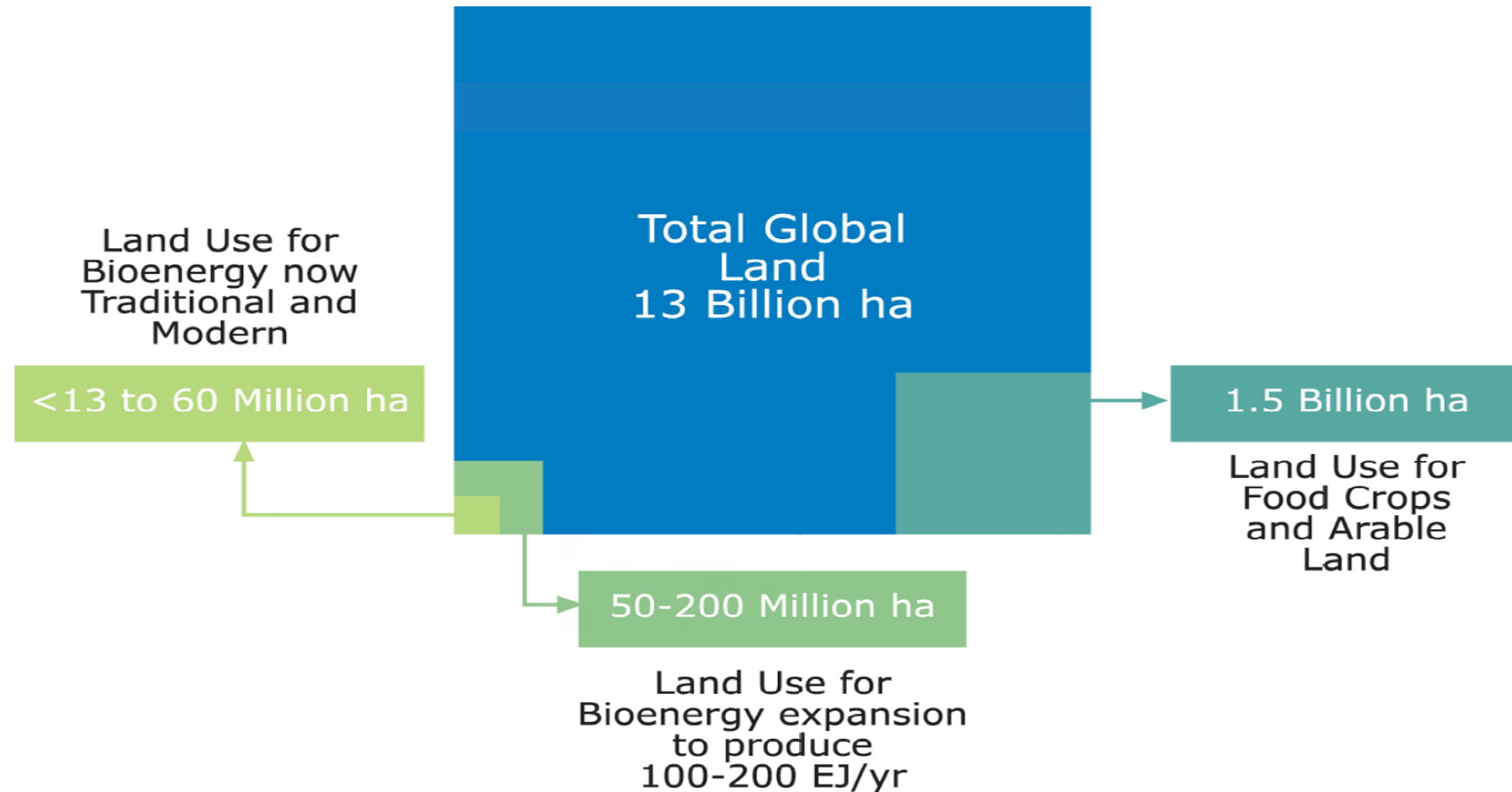
World Energy Demand, 2035: 720 EJ

to 50 EJ in 2035 - WEO New Policy Scenario



Source (compiled from Table 2.1 and data on page 219 on IEA, World Energy Outlook

Area required in the world for bioenergy production is achievable with technology ready to implement



Recently, electric battery cars have
captured a lot of attention
worldwide

But it is the Conceptual Vision
that will define the Technological Pathway
adopted for Fuel & Auto Technology

Well-to-Wheel (WtW)

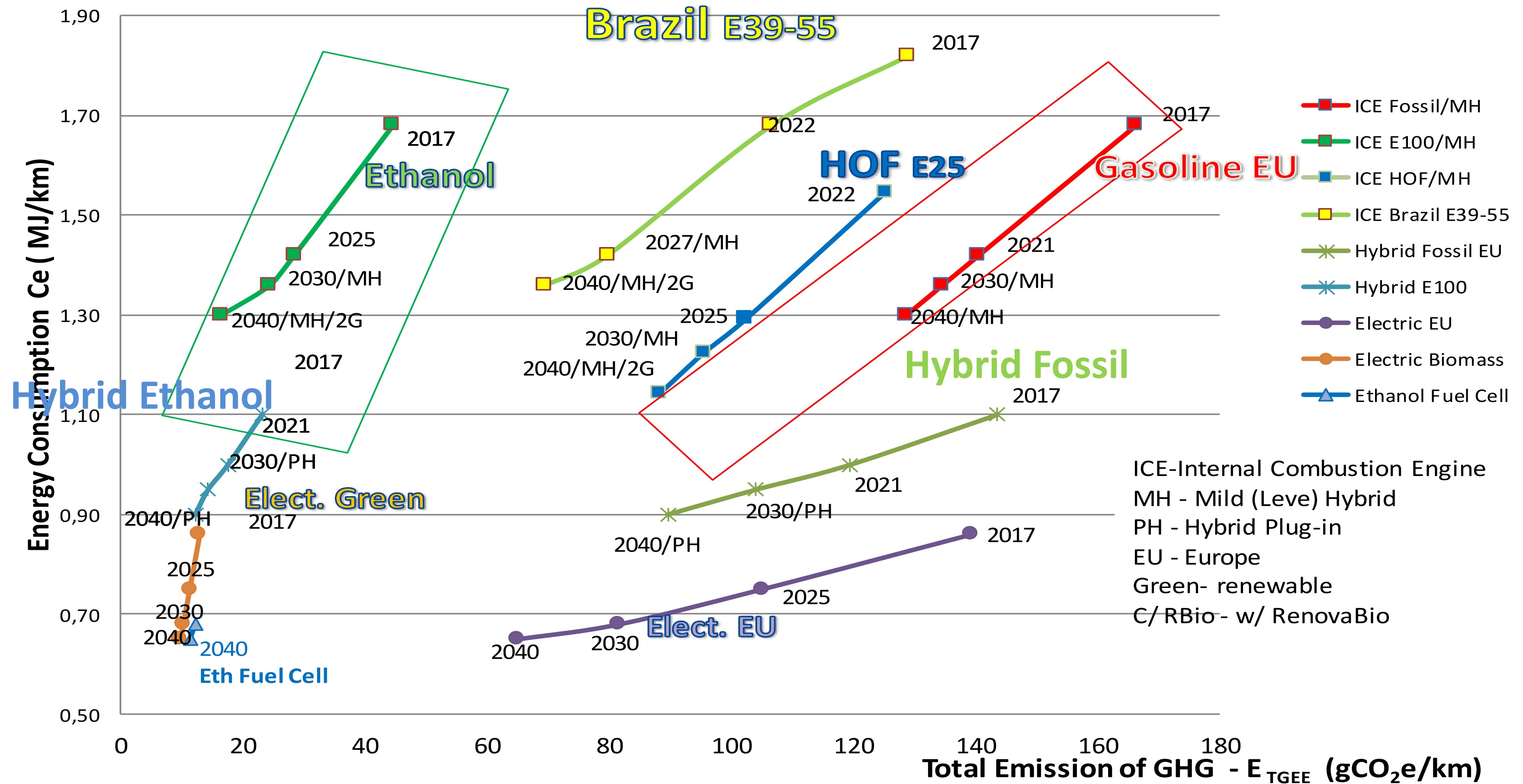
Life-Cycle Assessment

or

Tank-to-Wheel (TtW)

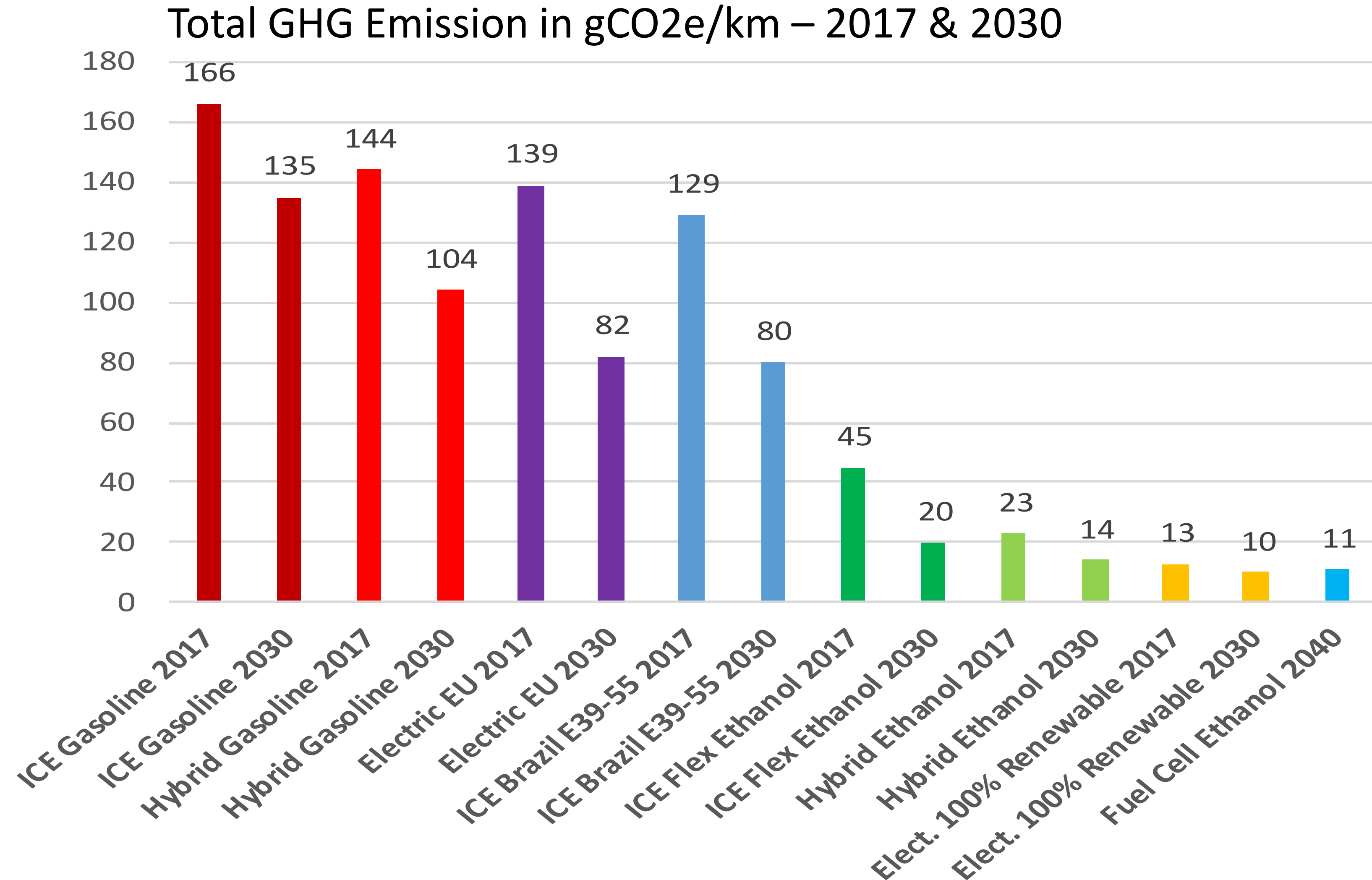
Ethanol is a modern & efficient option (WtW)

$C_e \times E_{TGGE}$ - Energy Consumption (MJ/km) x Total Emission of GHG (gCO_2e/km)



Source: AEA , Brazilian Association of Automotive Engineering

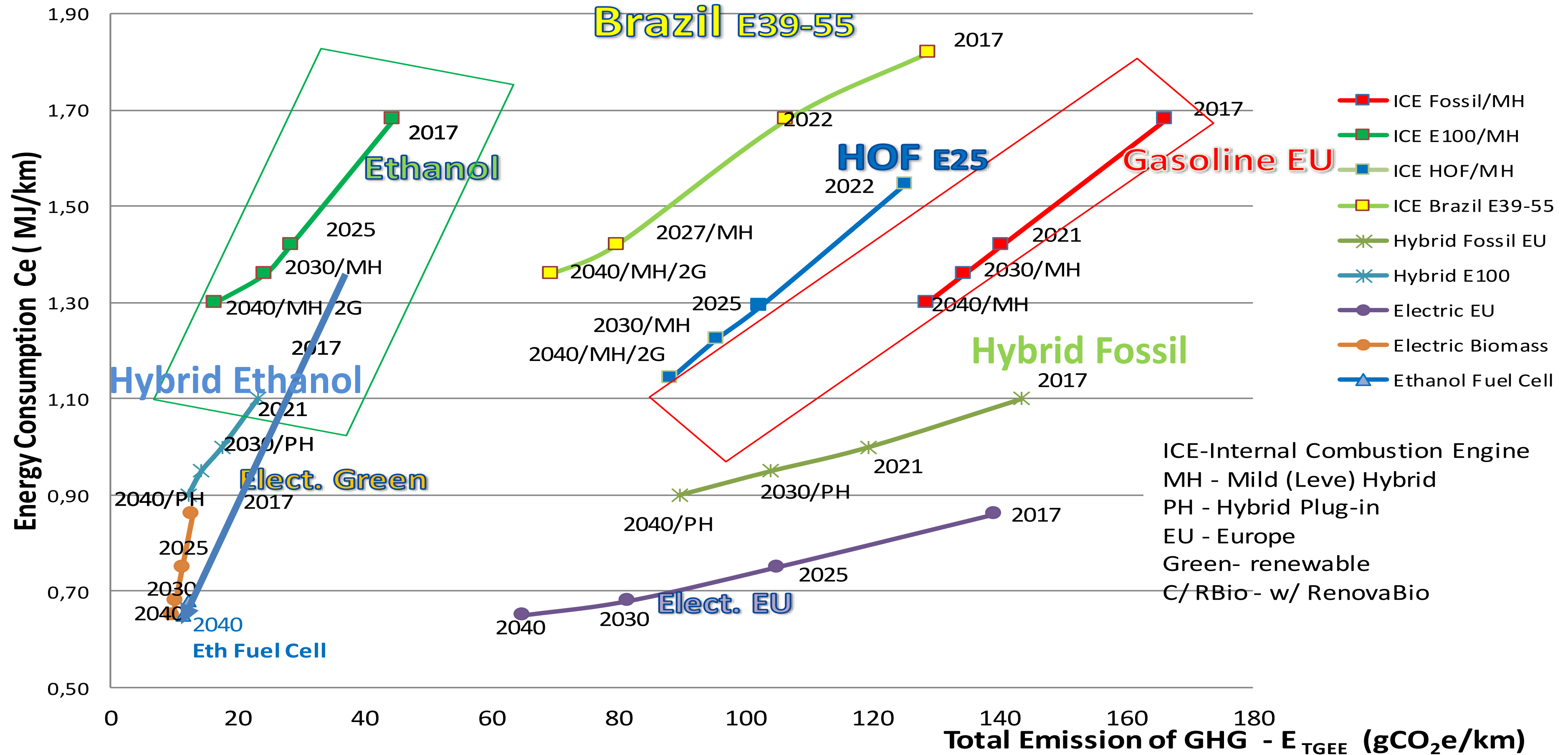
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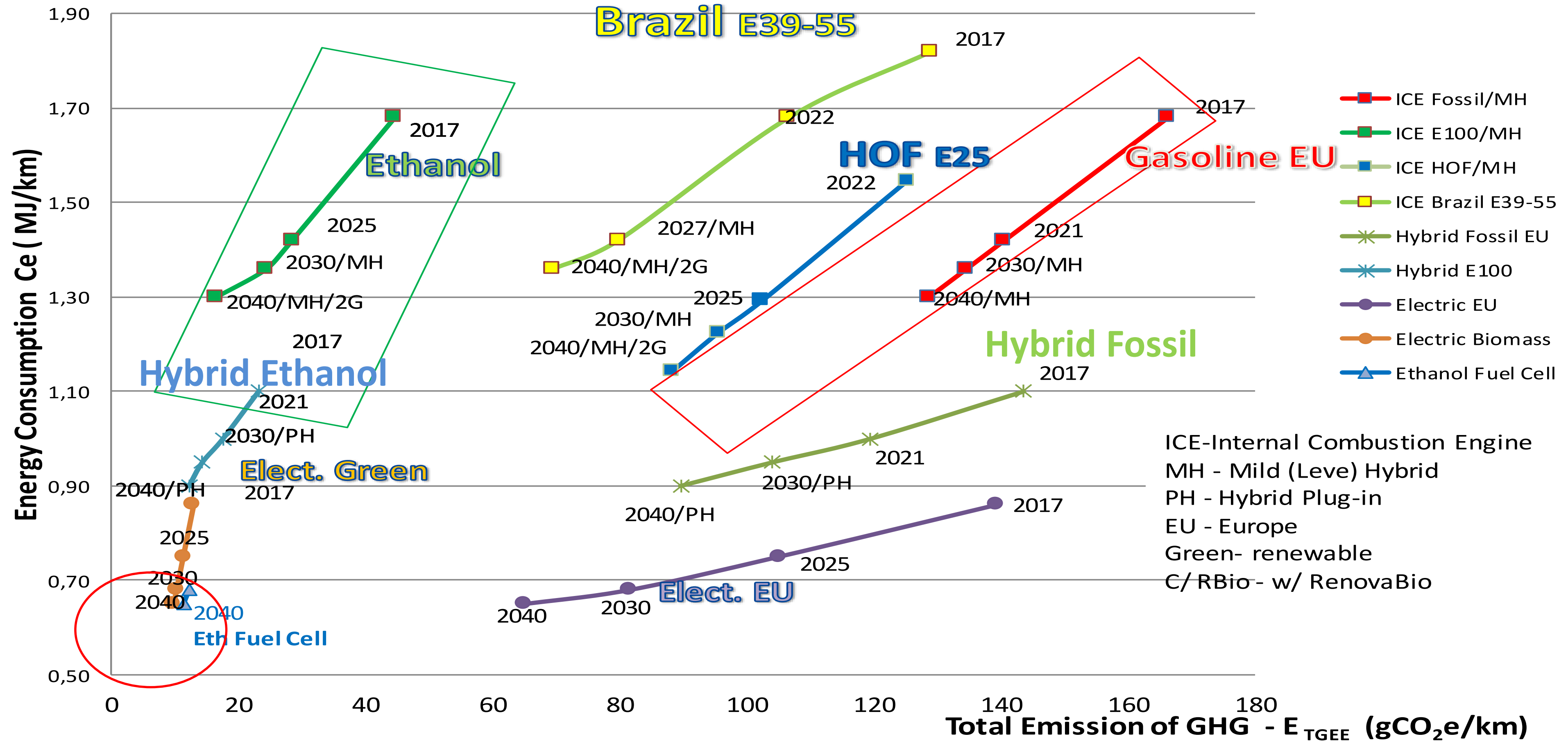
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ICE-Internal Combustion Engine
 MH - Mild (Leve) Hybrid
 PH - Hybrid Plug-in
 EU - Europe
 Green- renewable
 C/RBio- w/ RenovaBio

Electrification with Biofuels

- Electrification with biofuels is environmentally clean & accessible.
- Electric battery car is clean only if source of energy is clean & it is also very expensive, i.e. has low accessibility.

Electric Battery Cars are really clean?



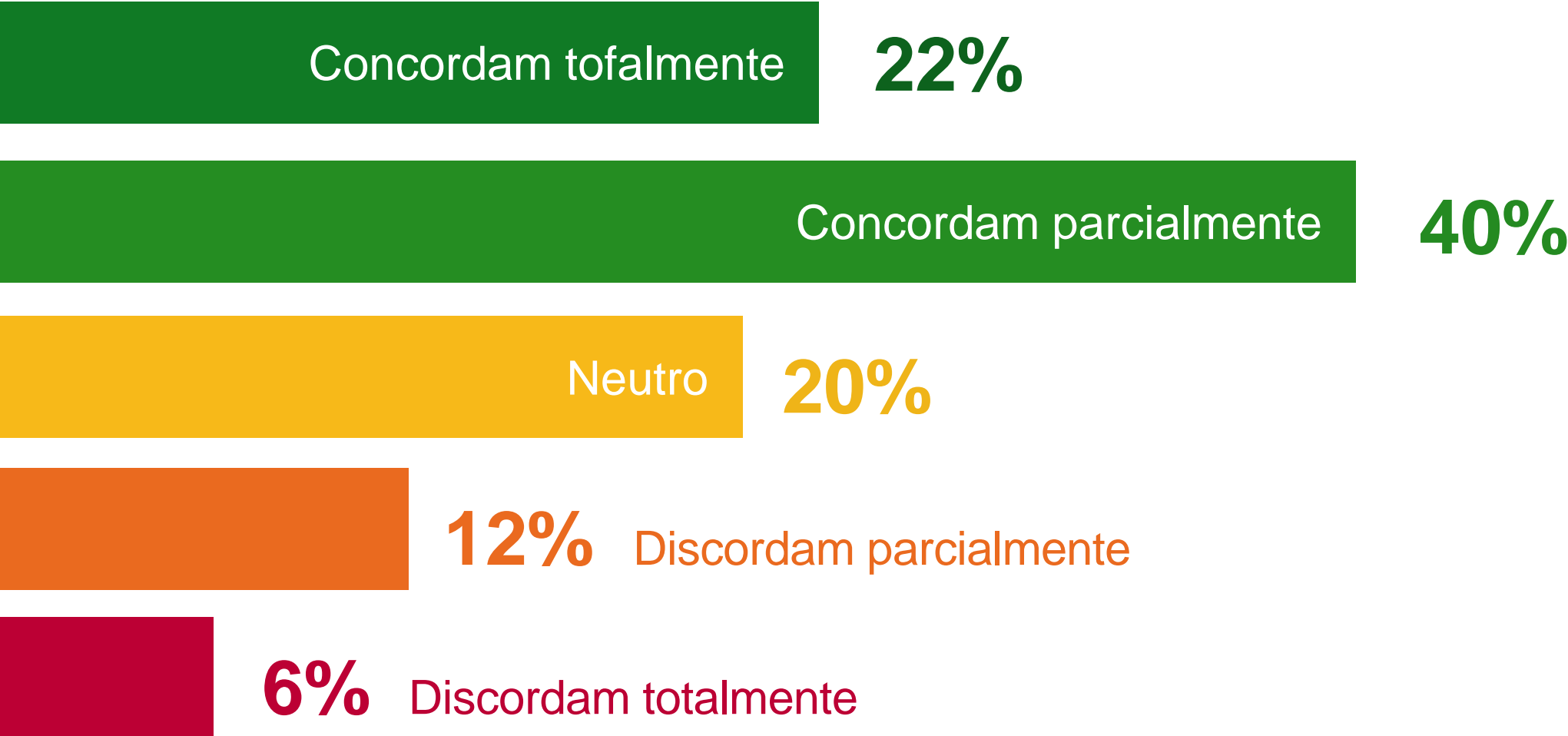
"Runs completely on electricity – generated by a tiny coal-burning power plant."



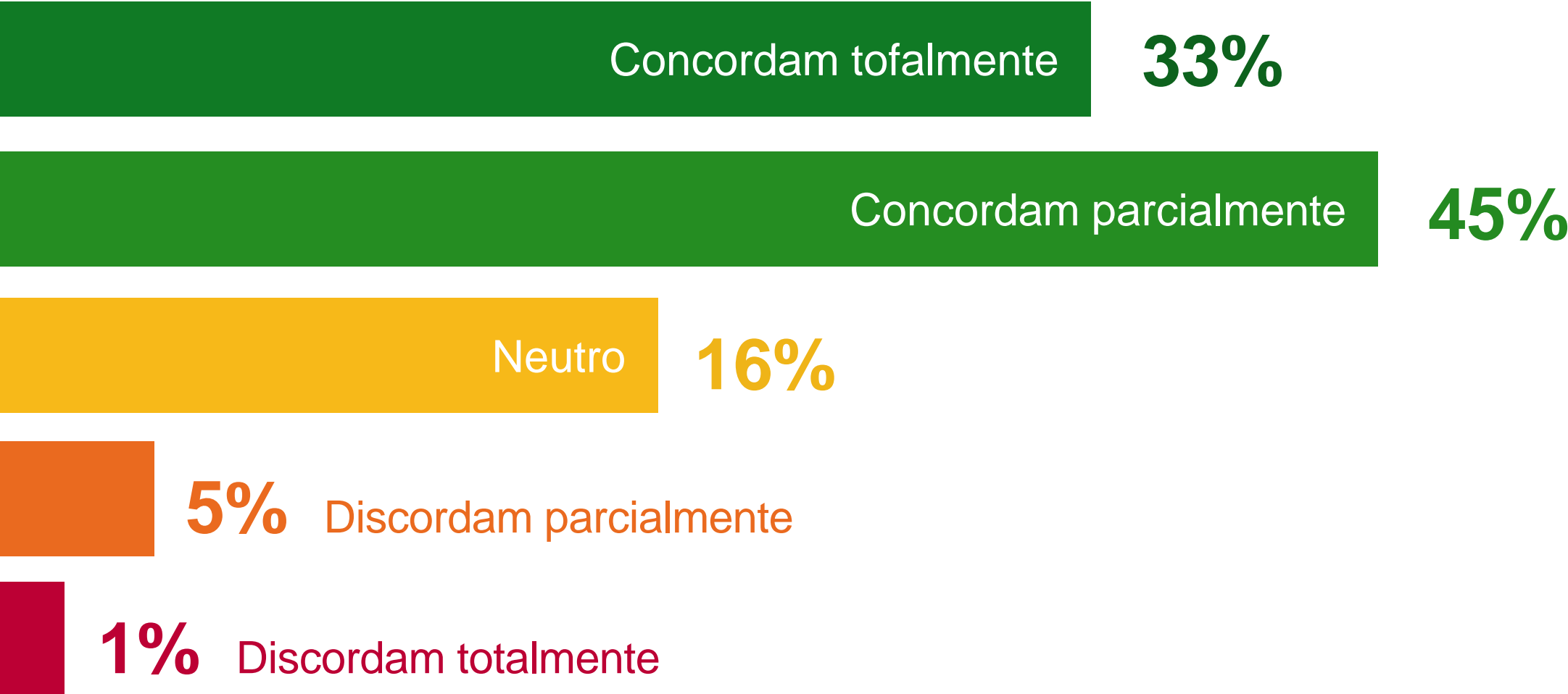
KPMG Global Automotive Executive Survey 2017

Electric Battery Vehicles (EBVs) will fail due to infrastructure challenges, while Fuel Cell Vehicles (FCVs) represent the real advance in electrification in mobility

62% of executives agree totally or partially that EBVs will fail due to infrastructure challenges



78% of executives agree totally or partially that FCVs represent the real advance in electrification in mobility



Source: 

18th consecutive Global Automotive Executive Survey, Feb 2017

2-Degree Scenario: Transport Energy by Fuel

2010-2075

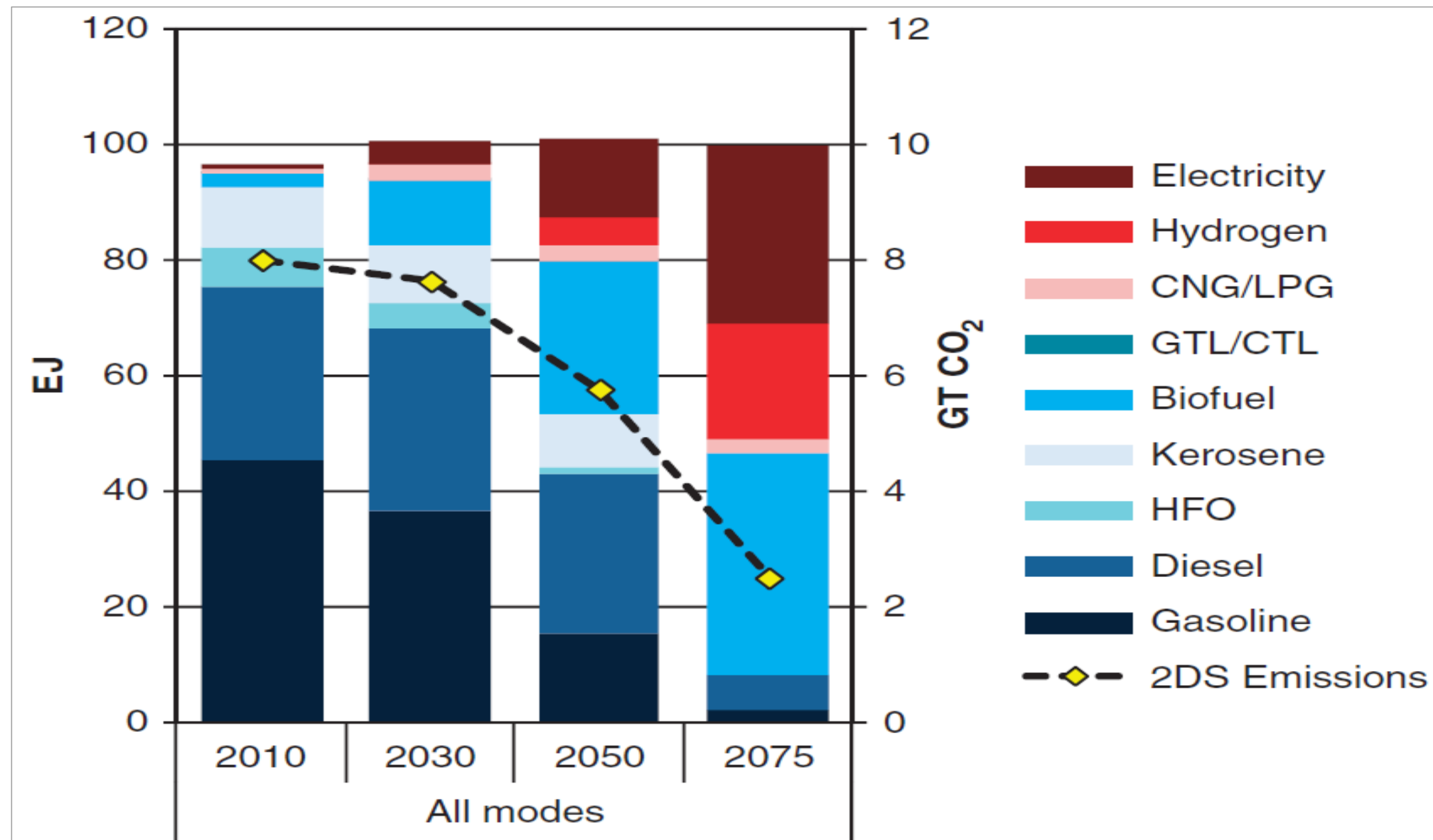


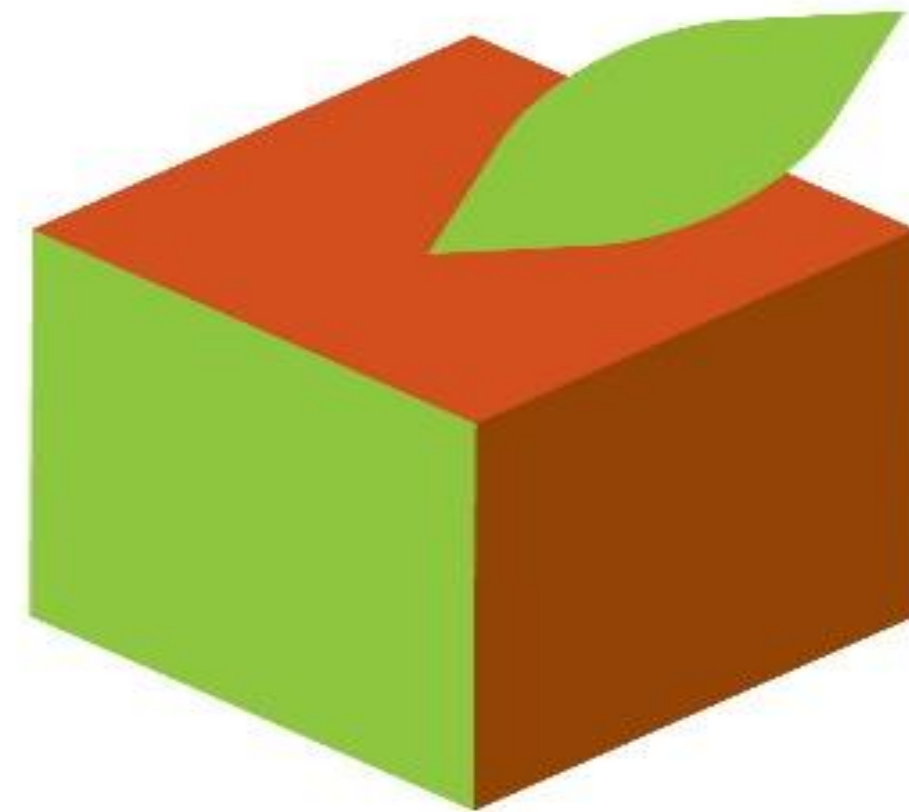
Figure 4. Transport energy use by fuel and year, displaced CO₂ emissions by fuel and year, and total CO₂ emissions from all sectors for the 2DS.

- Even with aggressive reductions in travel growth, shifts to mass transport modes, strong efficiency improvements, and deep market penetration by vehicles running on electricity and hydrogen, there remains a large demand for dense liquid fuels in 2050 (80% of transportation fuel) and even in 2075 (50%).

Source: Fulton et al., Biofuels, Bioprod. Bioref. 9:476–483 (2015); doi: 10.1002/bbb.

Biofuels & Sugar

- Energy Agriculture has proven to be a sustainable, viable and beneficial complement to Food Agriculture.
- Biofuels provide stability to sweeteners & grains markets, absorbing surpluses, reducing price volatility, and enabling production where it would otherwise not be feasible.
- Biofuels contribute to energy independence, cleaner environment, lower GHG emissions, lower health costs, decentralized economic development and can represent a superior alternative for electrification in transport.



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Next events

9 May 2018 (New York Sugar Dinner)

XII ISO DATAGRO New York Sugar & Ethanol Conference

New York Midtown Hilton

New York, NY

23-24 July 2018

Global Agribusiness Forum 2018

Grand Hyatt Sao Paulo

São Paulo, Brazil