

FARO90

GASOLINE PROFILES AND IMPACT OF ETHANOL BLENDING IN LATIN AMERICA

June, 2023

Ethanol Blending in Latin America

There are important fuel quality and environmental impact of vehicle emission challenges in the Region.

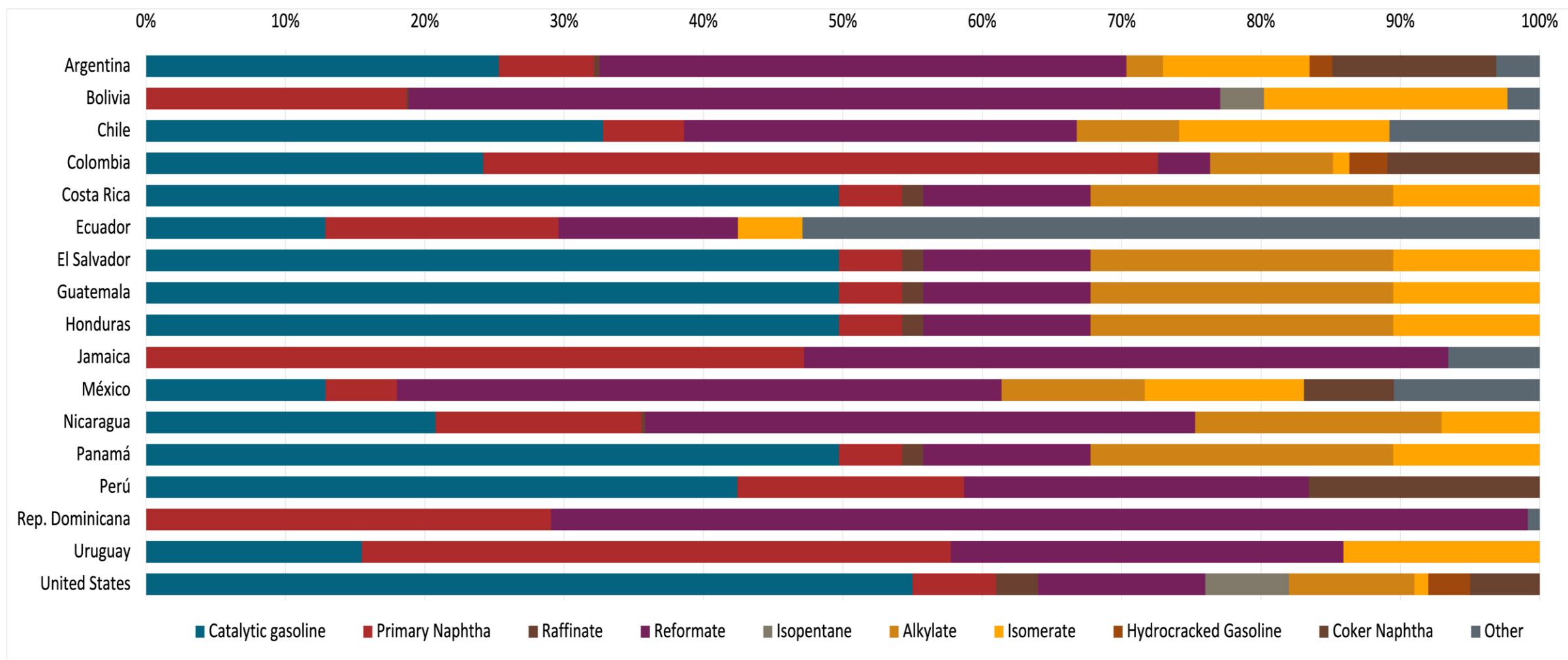
- The use of ethanol improves gasoline quality and creates flexibility in gasoline production.
- Ethanol use is a cost-effective way to increase gasoline octane and to replace more expensive gasoline components.
- Ethanol contributes to transport decarbonization and air quality improvement.
- There are opportunities across Latin America to increase the ethanol blend level and implement new policies on the use of gasoline-ethanol blends.

Sixteen countries with potential and additional use of ethanol were studied: 1) gasoline market profiles; 2) Optimization of gasoline blends with ethanol and 3) Environmental impact of gasolines blended with ethanol.



Gasoline Component Blending in Latin America

Gasoline is a blend of a base gasoline and other components. This blending is usually done at blending terminals as only 30% of the world's finished gasoline is distributed directly from refineries. Each component provides different properties to the final blend, for example, isomerates, alkylates and butanes increase the octane. The components commonly used in Latin America are:



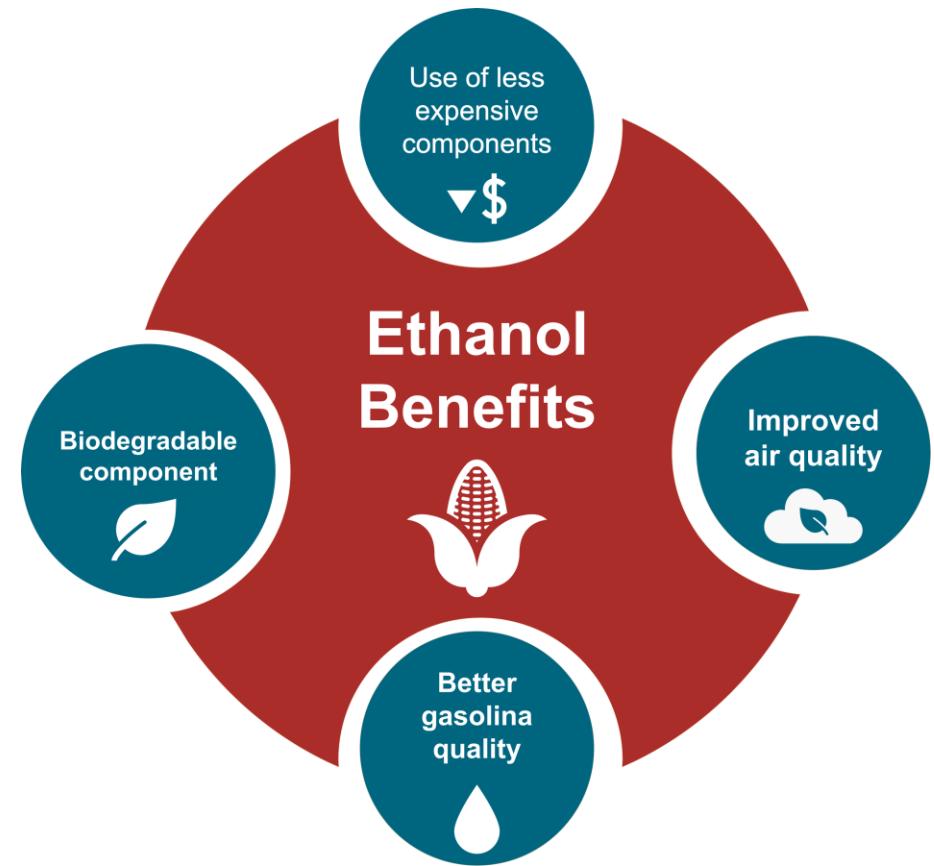
Gasoline Blending Optimization

In some parts of the world, ethanol is added to gasoline as a blending component. The advantages of ethanol include that it is a renewable fuel made of biomass; that it is an octane booster that helps to dilute sulfur; and that it allows the fulfillment of environmental objectives. To determine the optimal components to be blended with ethanol, a **blending model** was used. This model selects the components to add in the gasoline/ethanol blend based on:

- Components prices,
- Properties each component affects,
- Quality parameters by country, and
- Component availability by country.

Through iterations, the model obtains the %v/v of the components to be blended with 10%, 15%, 20%, 25% and 30% of ethanol, in such a way that the final blend complies with the required properties of a finished gasoline by country.

The blending model uses gasoline component spot average prices January 2022 – February 2023 and provides fuel prices that do not include country distribution costs, local taxes and subsidies and import or gas station margins.



Vehicle Emission Impact for Ethanol Gasoline Blending

The model used in this analysis takes as a reference the [International Vehicle Emissions Model \(IVE\)](#).

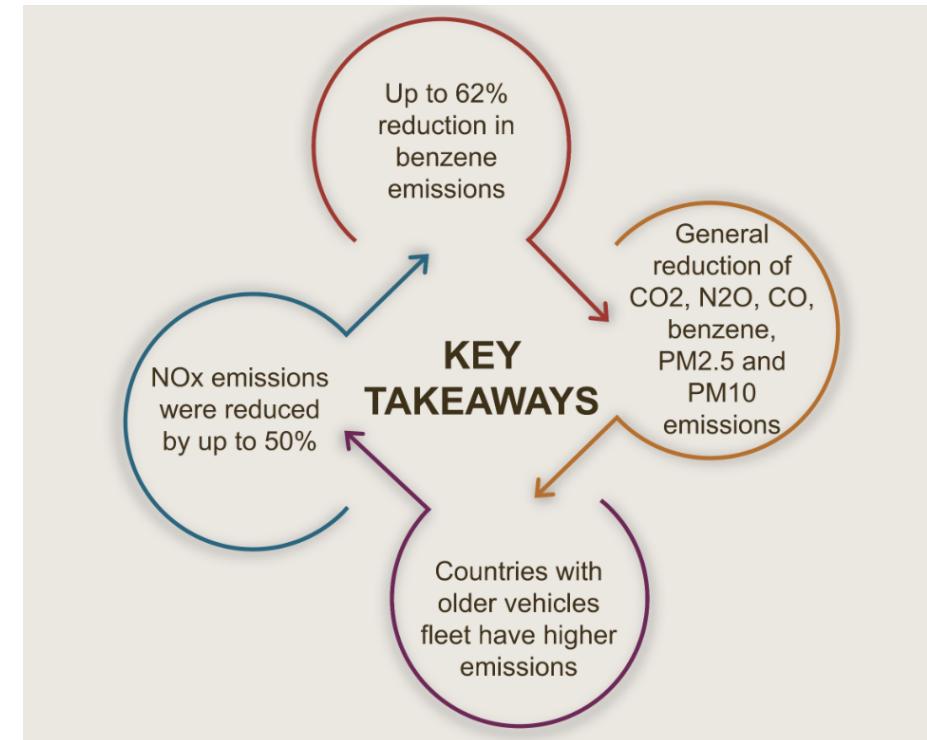
The model uses the Base Emission Rates from IVE model, as well as its Adjustment Factors based on:

- Vehicle technology (cars, trucks, buses, motorcycles),
- Vehicle fleet average age,
- Average traveled distance per vehicle by country, as well as
- Geographical and climatic conditions (altitude, humidity, temperature).

Emissions of criteria pollutants, toxic pollutants, and greenhouse gases (GHG) were calculated and calibrated with emission inventories, using real gasoline quality data. The reduction rates for gasoline/ethanol blends were obtained from various sources (IPCC, US Grains, among others).

Emission estimations for different pollutants for gasoline and gasoline/ethanol blends (10%, 15%, 20%, 25% and 30% ethanol) were determined using the IVE Model. A comparison between the results and the European (Euro 6) requirements is made. Results are also compared with real emissions of the United States vehicle fleet*.

Main Results



*Source: Bureau of transportation statistics.

Case Studies

1. Argentina
2. Bolivia
3. Chile
4. Colombia
5. Costa Rica
6. Dominican Republic
7. Ecuador
8. El Salvador
9. Guatemala
10. Honduras
11. Jamaica
12. México
13. Nicaragua
14. Perú
15. Panamá
16. Uruguay

Ethanol Blending in Gasoline - Argentina

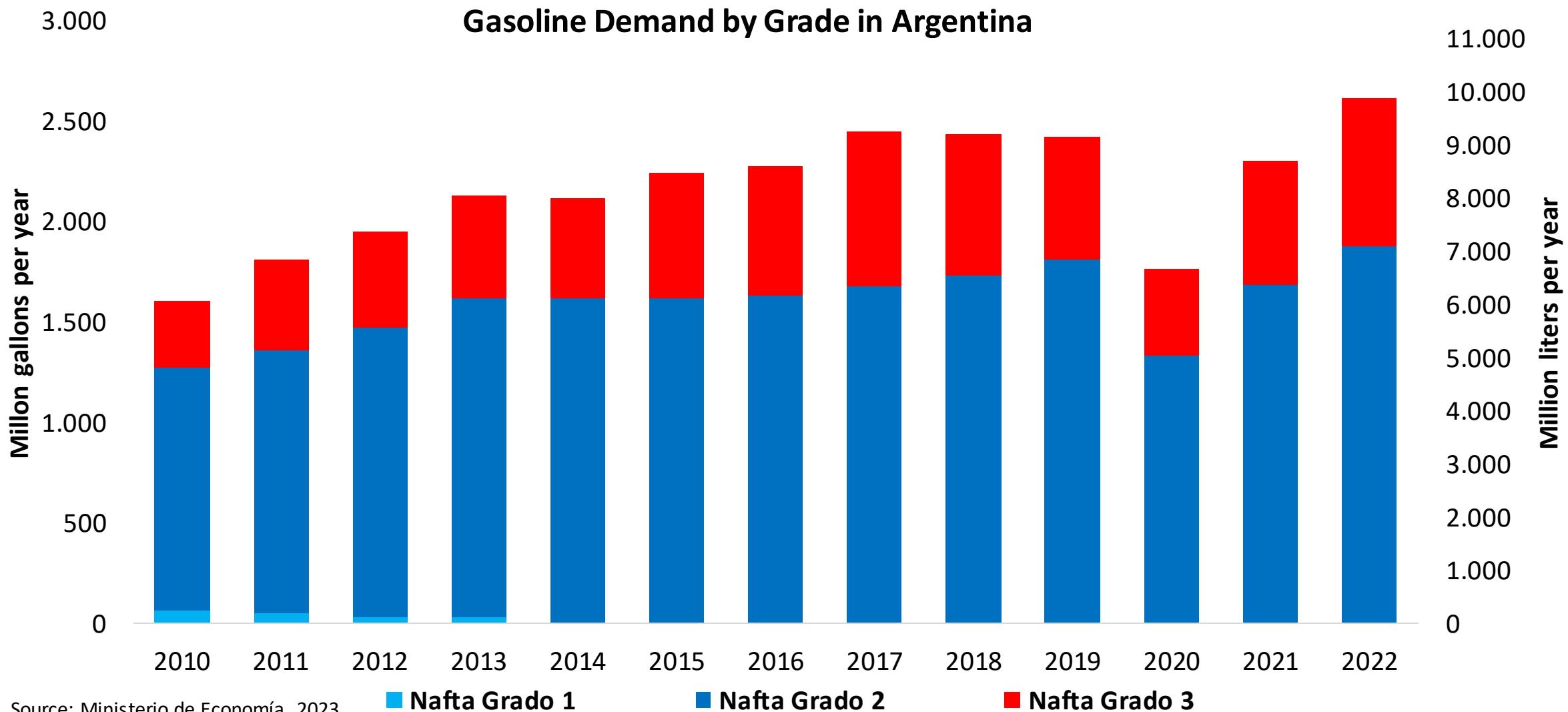


La demanda de gasolinas en Argentina fue poco más de 2,500 millones de galones en 2022 (9,000 millones de litros). Se cuenta con la siguiente participación por tipo de gasolina: 75% como Nafta Súper / Grado 2 (RON 93 – AKI 87) y 25% restante como Nafta Ultra / Grado 3 (RON 97 – AKI 92). Argentina produce casi la totalidad de la gasolina, las importaciones son menos de 250 millones de litros por año.

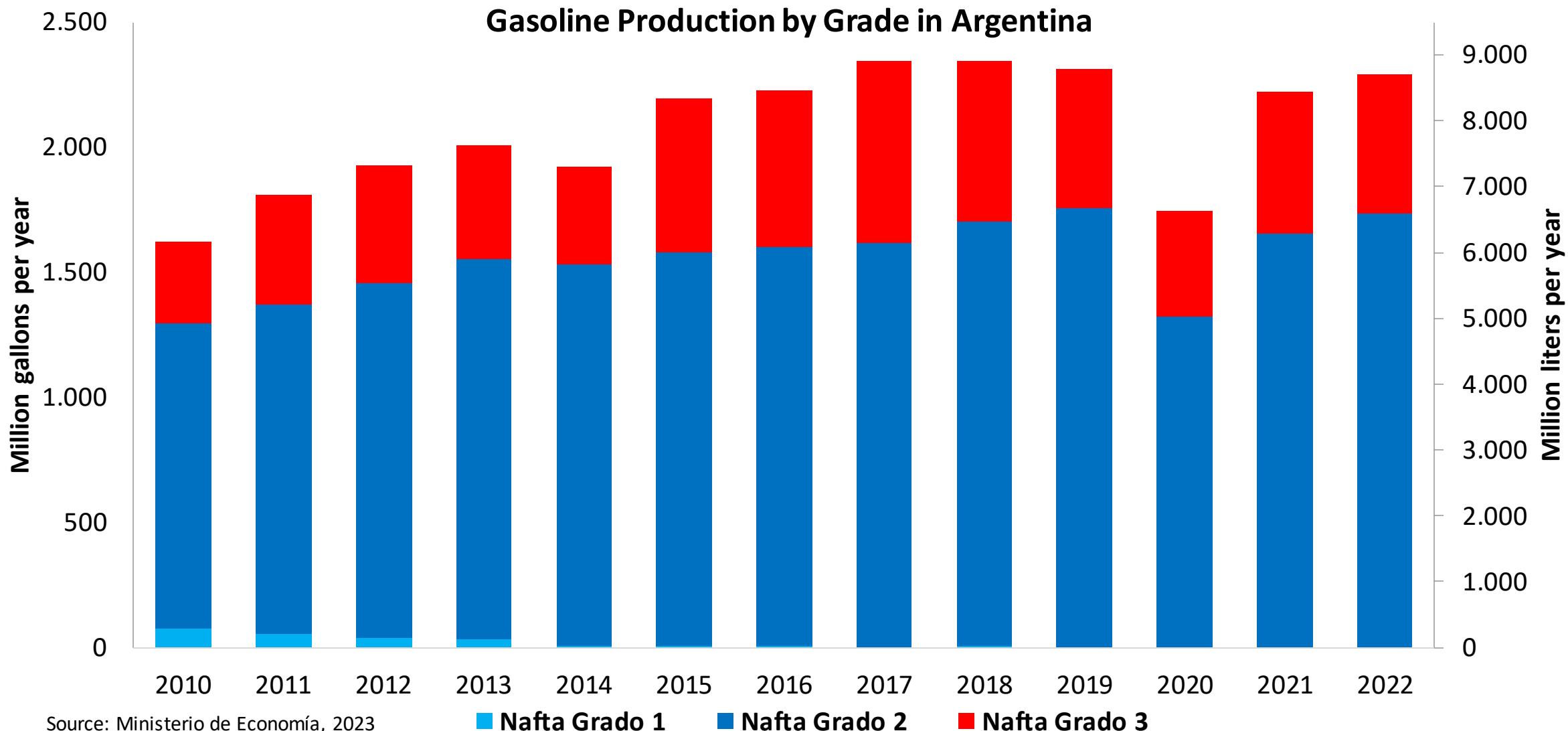
Argentina's policy is self-sufficiency and production and supply of ethanol for gasoline blend. Ethanol concentration varies according to local production. Currently, the concentration limit is 12% v/v. Ethanol production is almost equal to consumption.

Source: Ministerio de Economía, 2023

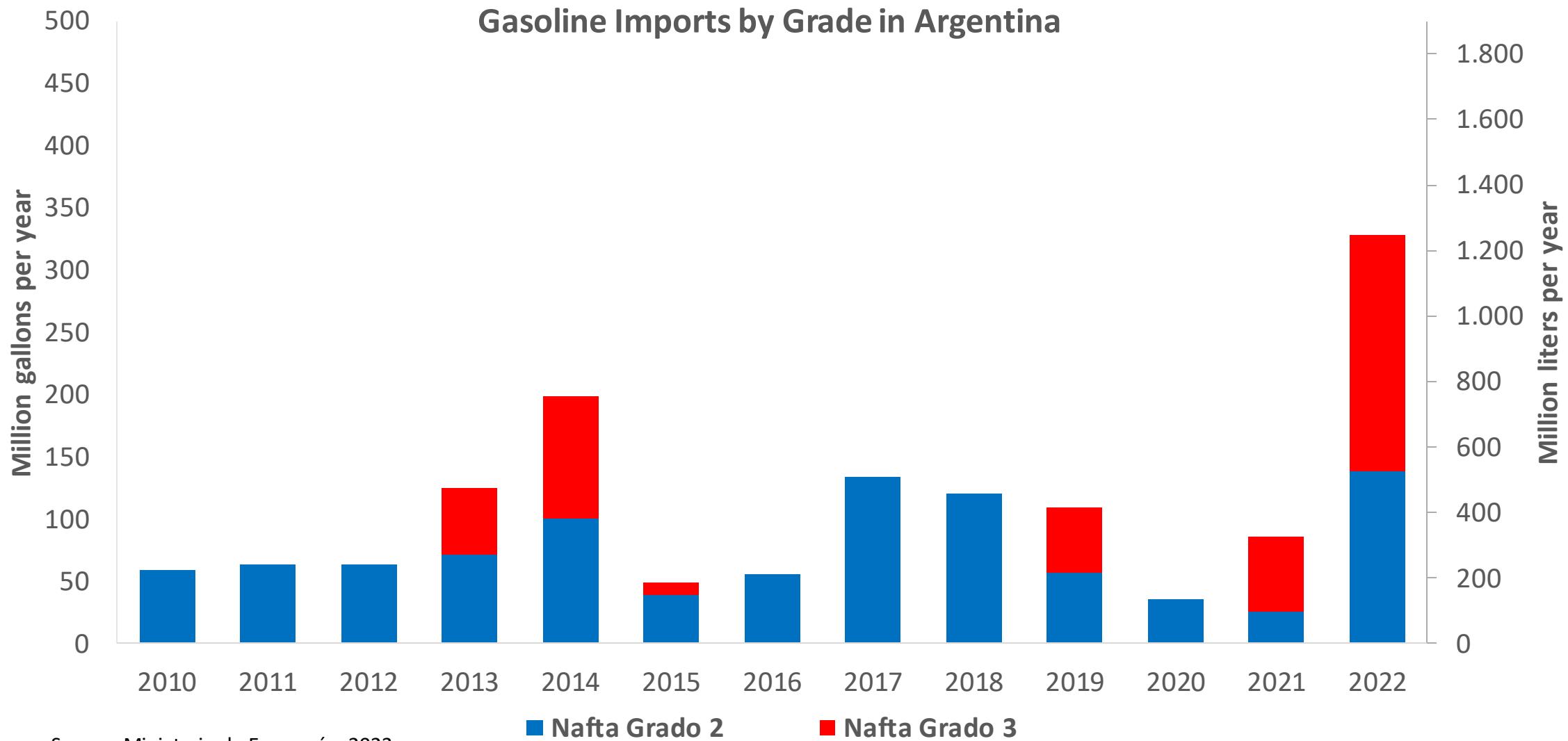
Gasoline Demand in Argentina



Gasoline Production in Argentina

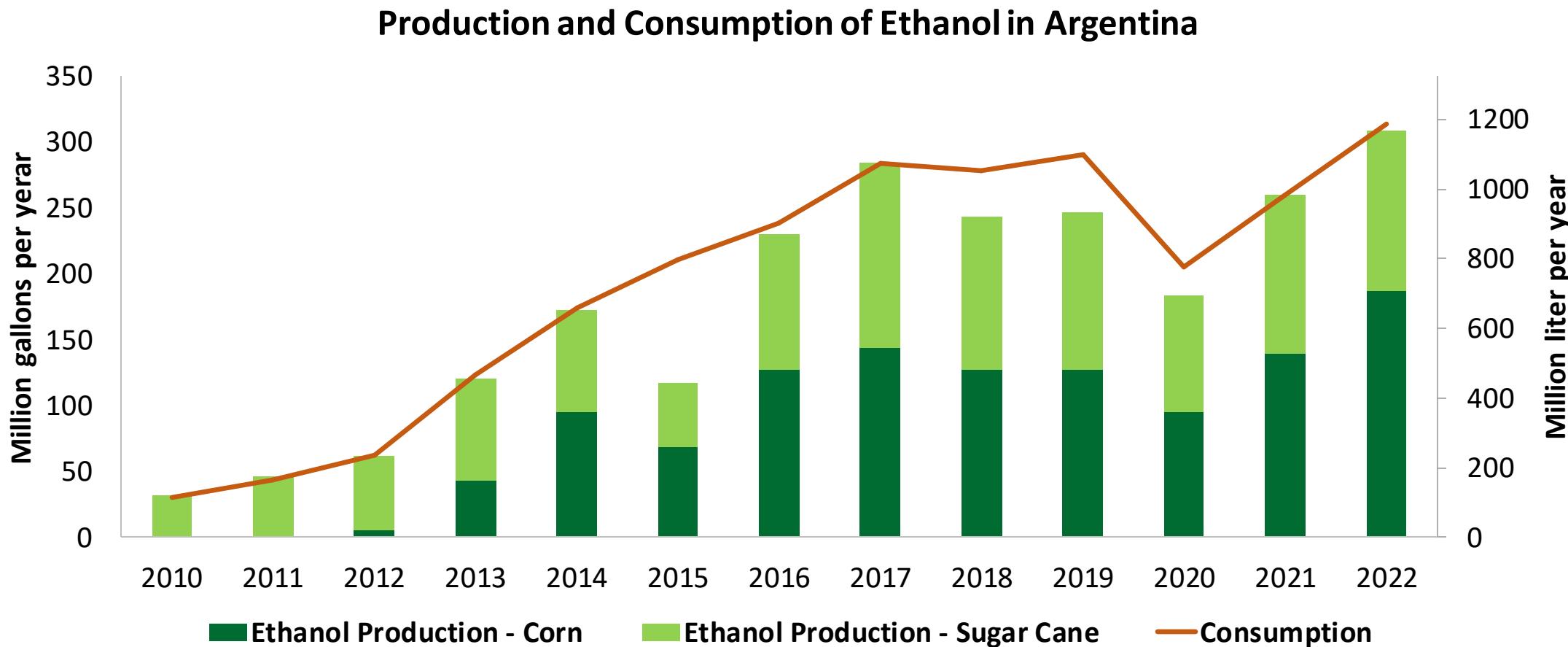


Gasoline Imports in Argentina



Source: Ministerio de Economía, 2023

Ethanol Balance in Argentina

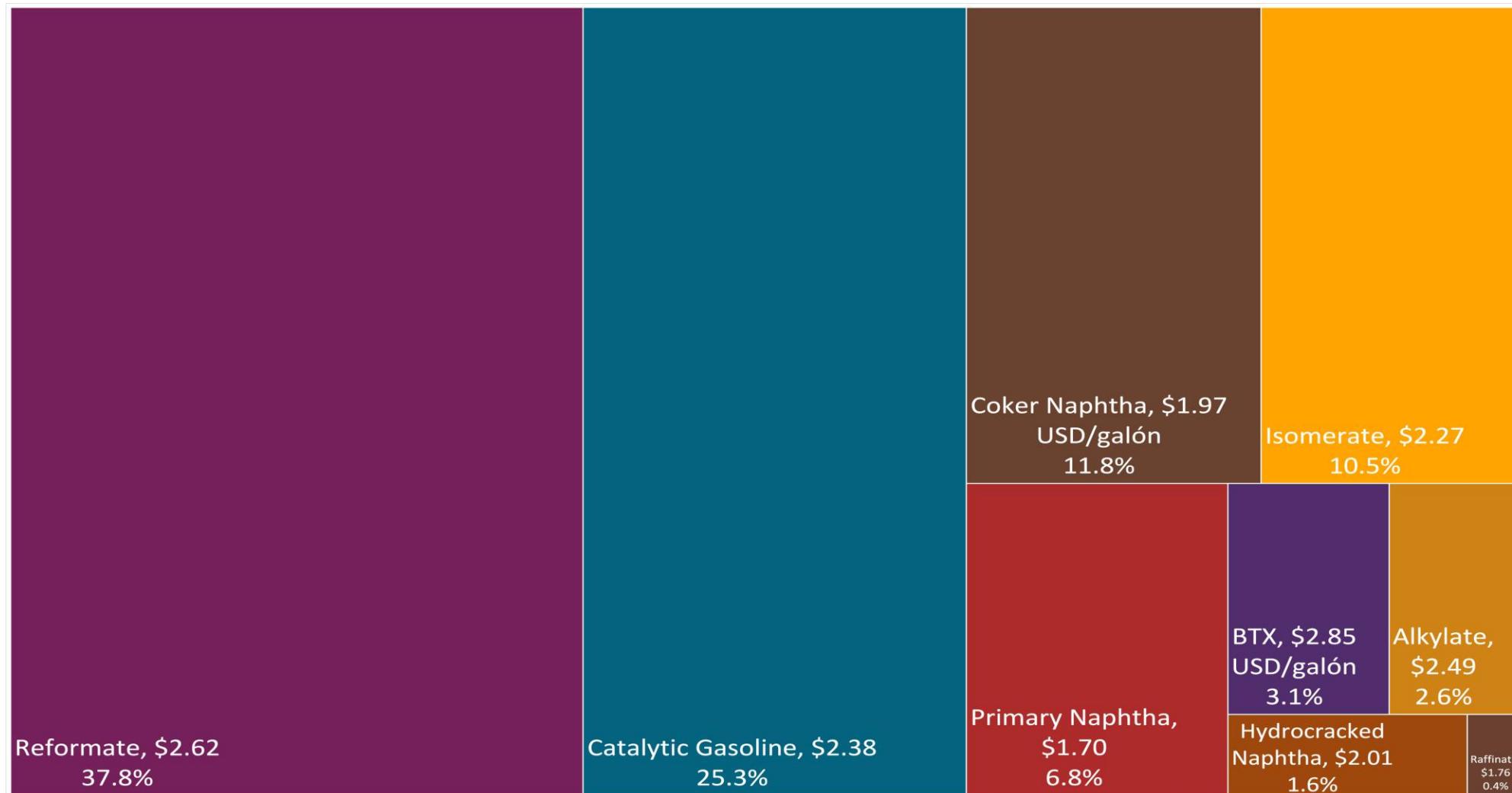


Source: Ministerio de Economía, 2023

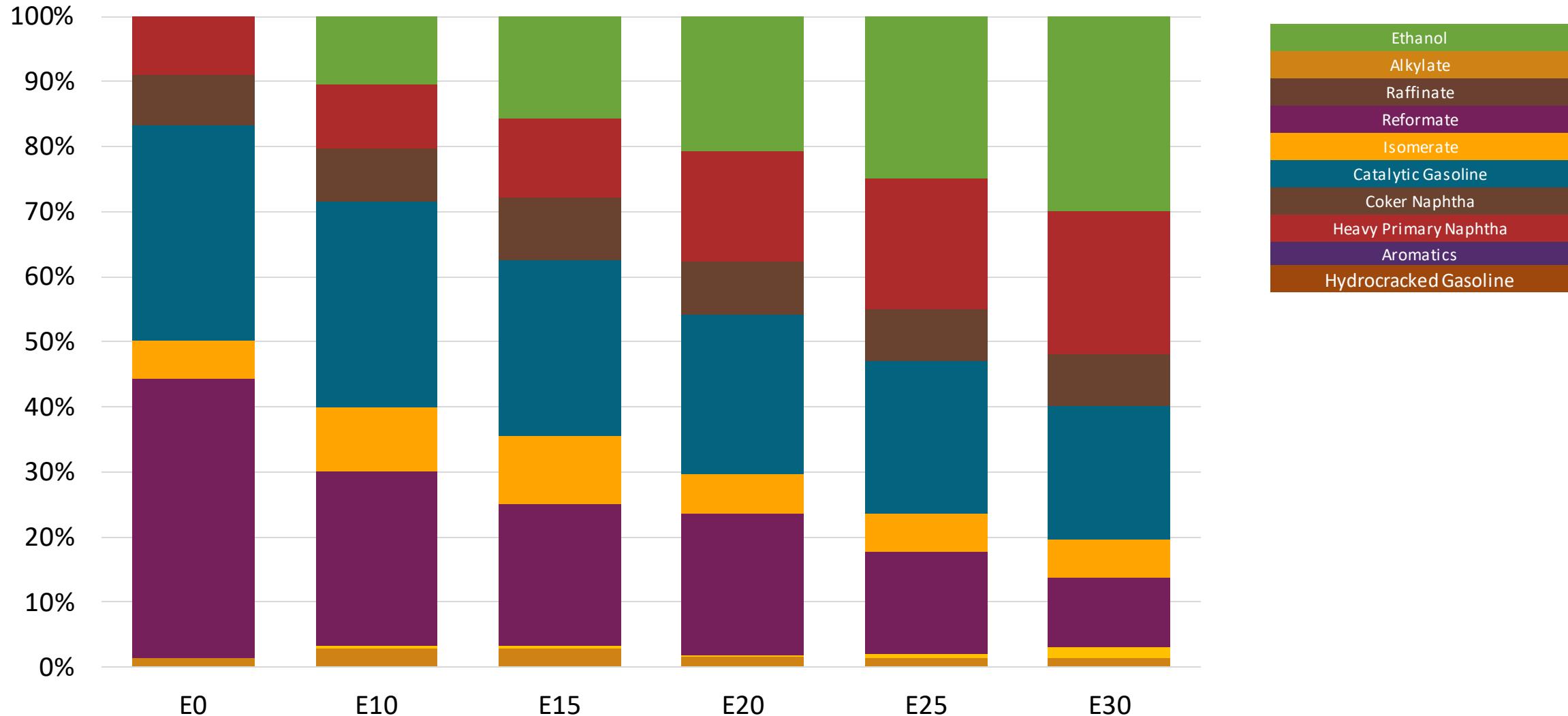
Gasoline Quality in Argentina

Name	Resolution 576/2019						EN 228:2012 + A1:2017 (Euro 6 enabling)			
Implementation Date	2019						2017			
Applicability	North Zone		Central Zone		South Zone		All countries			
Selected Grade	Gasoline Grade 2	Gasoline Grade 3	Gasoline Grade 2	Gasoline Grade 3	Gasoline Grade 2	Gasoline Grade 3	RON 95 E5	RON 95 E10	RON 98 E5	RON 98 E10
Benzene Content	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v
Aromatics	< 40 %v/v	< 40 %v/v	< 40 %v/v	< 40 %v/v	< 40 %v/v	< 40 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v
Olefins	-	-	-	-	-	-	< 18 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v
Lead Content	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l
Manganese	< 2.5 mg/l	< 2.5 mg/l	< 2.5 mg/l	< 2.5 mg/l	< 2.5 mg/l	< 2.5 mg/l	< 2.0 mg/l	< 2.0 mg/l	< 2.0 mg/l	< 2.0 mg/l
RON	> 93	> 97	> 93	> 97	> 93	> 97	> 95	> 95	> 98	> 98
MON	> 83	> 85	> 83	> 85	> 83	> 85	> 85	> 88	> 85	> 88
AKI										
Sulfur Content	< 150 mg/kg	< 10 mg/kg	< 150 mg/kg	< 10 mg/kg	< 150 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg
Oxygen Content	< 4.5 %m/m	< 4.5 %m/m	< 4.5 %m/m	< 4.5 %m/m	< 4.5 %m/m	< 4.5 %m/m	< 2.7 % m/m	< 3.7 % m/m	< 2.7 % m/m	< 3.7 % m/m
Ethanol (EtOH)	<> 12 - 14 %v/v	<> 12 - 14 %v/v	<> 12 - 14 %v/v	<> 12 - 14 %v/v	<> 12 - 14 %v/v	<> 12 - 14 %v/v	<5 %v/v	<10 %v/v	<5 %v/v	<10 %v/v
RVP 37.8°C (Summer)	<> 35 - 70 kPa	<> 35 - 70 kPa	<> 35 - 70 kPa	<> 35 - 70 kPa	<> 45 - 80 kPa	<> 45 - 80 kPa	<> 60 - 70 kPa *Depends on the country, RVP is regulated in the EU Fuel Quality Directive			
RVP 37.8 °C(Winter)	<> 45 - 80 kPa	<> 45 - 80 kPa	<> 55 - 90 kPa							
RVP 37.8°C (Transition)			<> 45 - 80 kPa	<> 45 - 80 kPa						
MTBE	< 15 %v/v	< 15 %v/v	< 15 %v/v	< 15 %v/v	< 15 %v/v	< 15 %v/v	-	-	-	-
Ethers 5 or more C Atoms	< 22 %v/v	< 22 %v/v	< 22 %v/v	< 22 %v/v	< 22 %v/v	< 22 %v/v	Based on oxygen content	<22 %v/v	Based on oxygen content	<22 %v/v

Available Blending Components



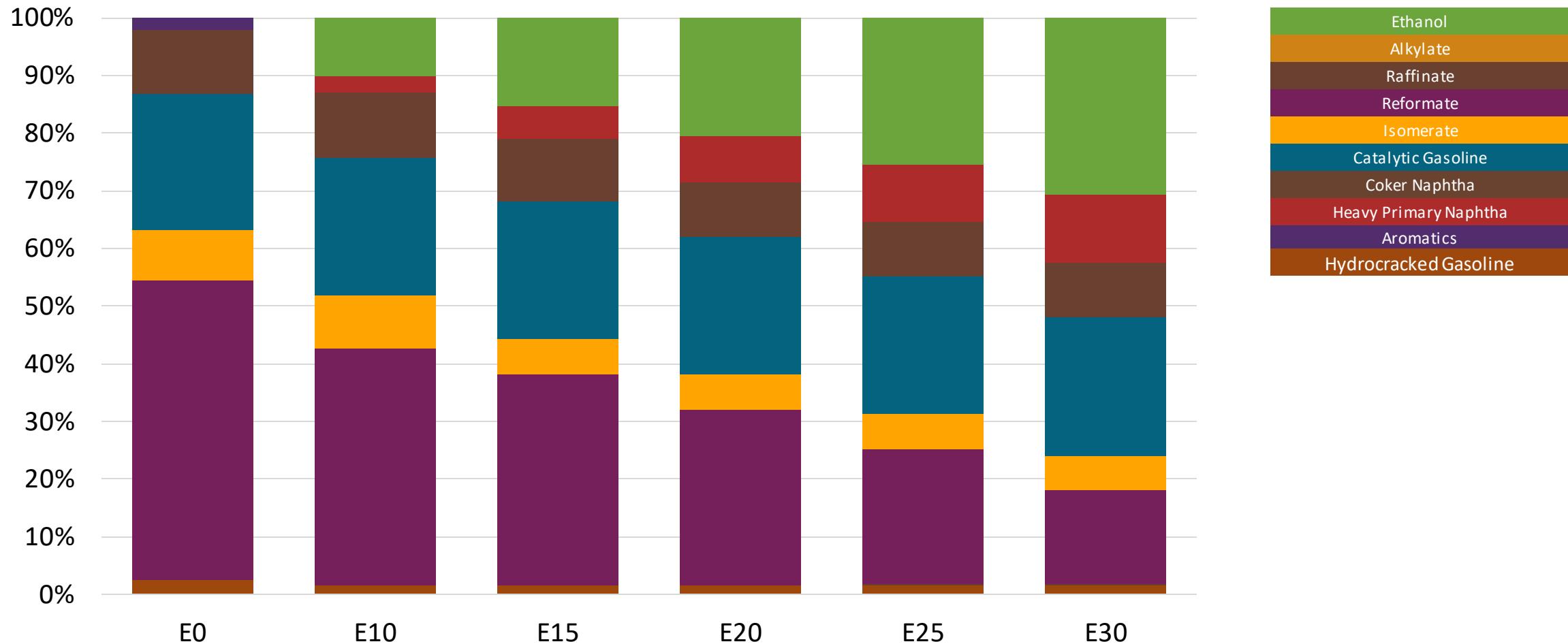
Argentina – Regular – Z. Norte y Centro – Constant Octane



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Octane (RON)	93.0	93.0	93.0	93.0	93.0	93.0
Price (USD/gal)	\$ 2.380	\$ 2.303	\$ 2.261	\$ 2.231	\$ 2.195	\$ 2.156

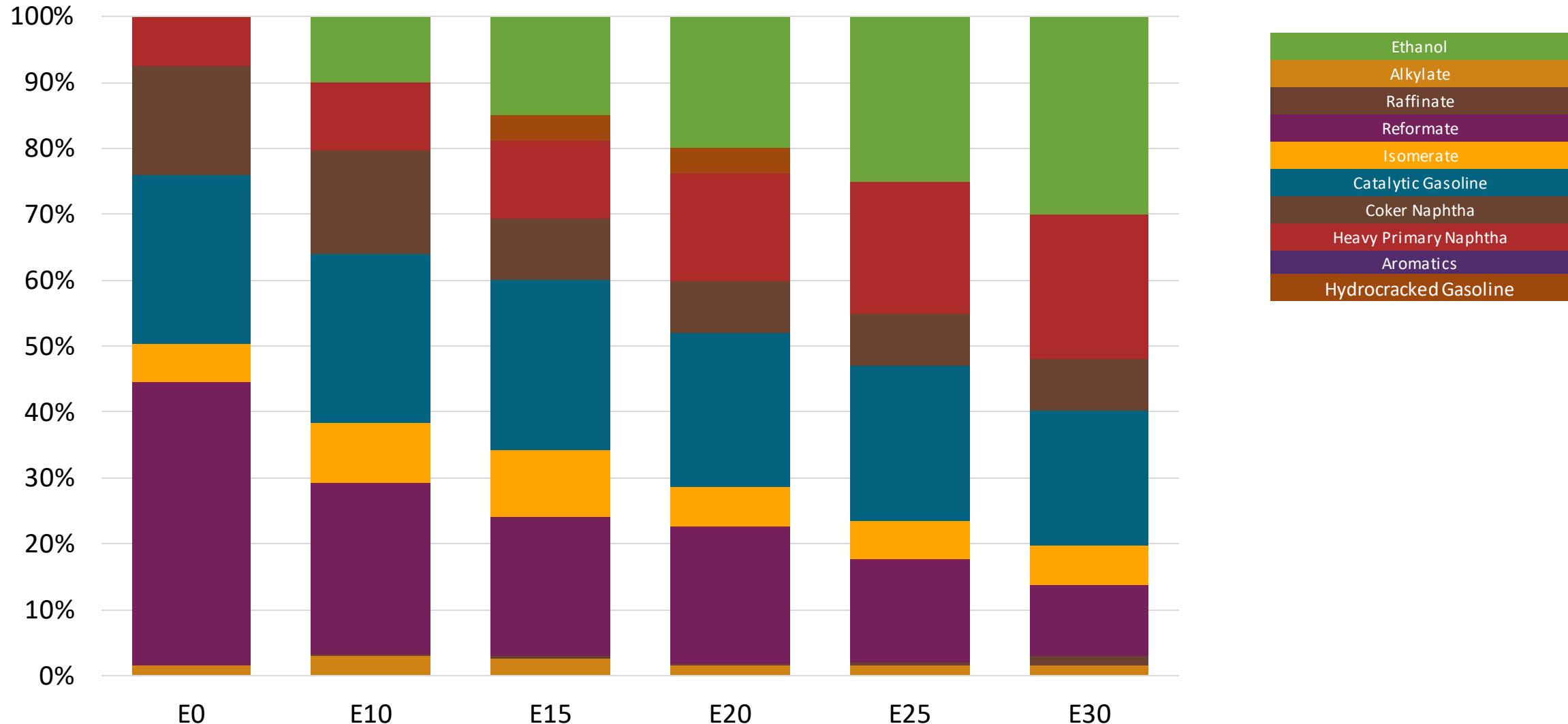
Argentina – Premium – Z. Norte y Centro – Constan Octane



Octane (RON)	97.0	97.0	97.0	97.0	97.0	97.0
Price (USD/gal)	\$ 2.465	\$ 2.385	\$ 2.352	\$ 2.318	\$ 2.281	\$ 2.243

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

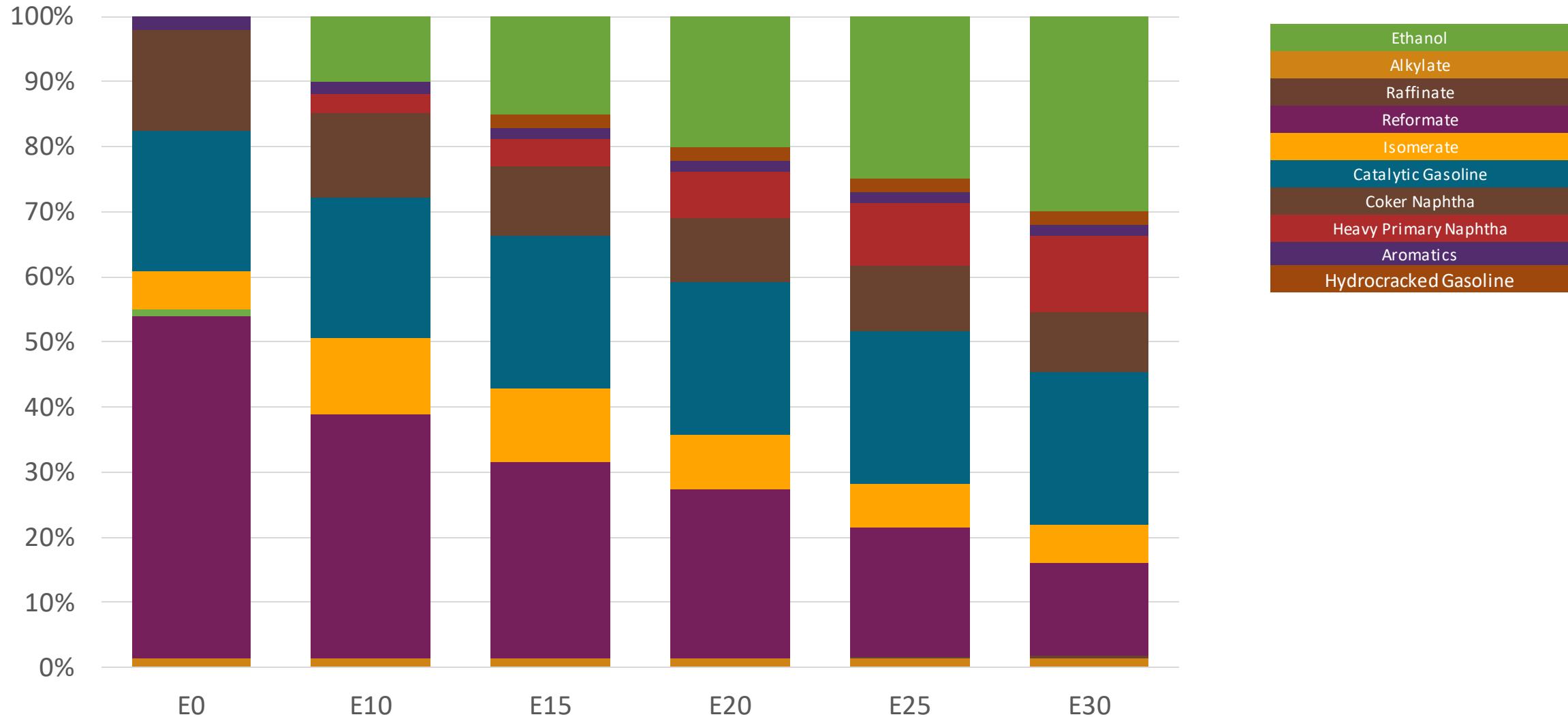
Argentina – Regular – Z. Sur – Constant Octane



Prices are average Jan 22 – Feb 23.
 They do not include local distribution costs,
 import or gas station margins, taxes and
 subsidies.

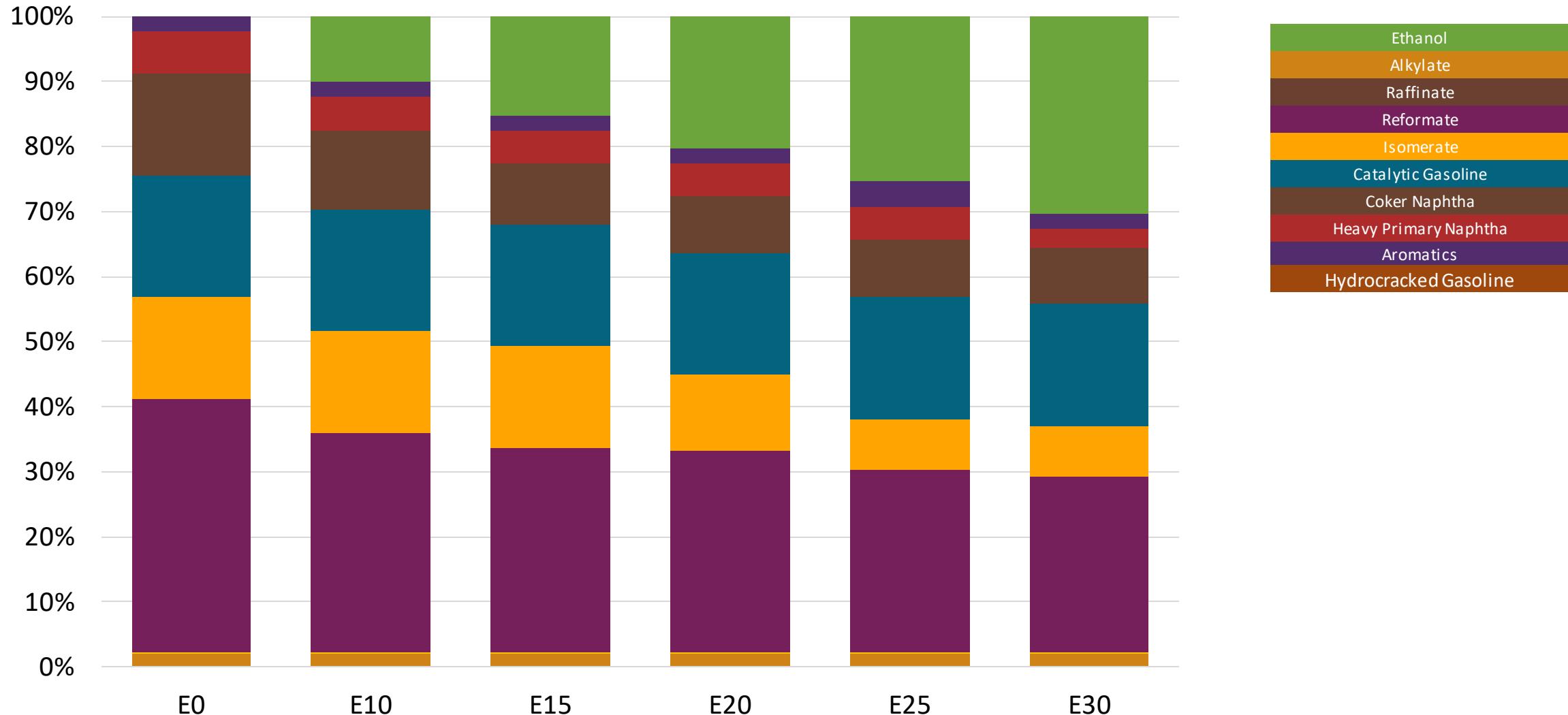
Octane (RON)	93.0	93.0	93.0	93.1	93.1	93.0
Price (USD/gal)	\$ 2.355	\$ 2.281	\$ 2.261	\$ 2.231	\$ 2.195	\$ 2.156

Argentina – Premium – Z. Sur – Constant Octane



Prices are average Jan 22 – Feb 23.
 They do not include local distribution costs,
 import or gas station margins, taxes and
 subsidies.

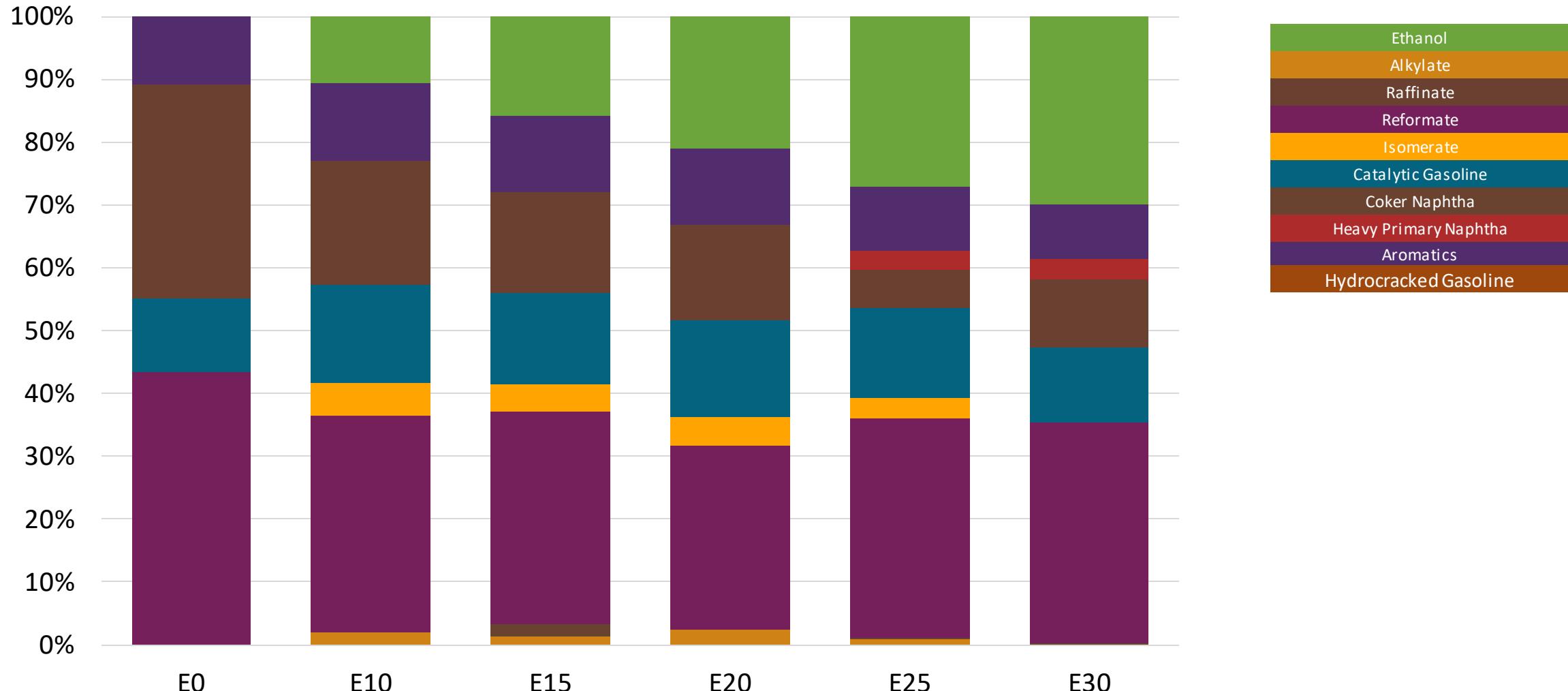
Argentina – Regular – Z. Norte y Centro – Octane Increment



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Octane (RON)	93.0	95.6	96.8	98.2	99.7	101.3
Price (USD/gal)	\$ 2.352	\$ 2.352	\$ 2.352	\$ 2.352	\$ 2.352	\$ 2.352

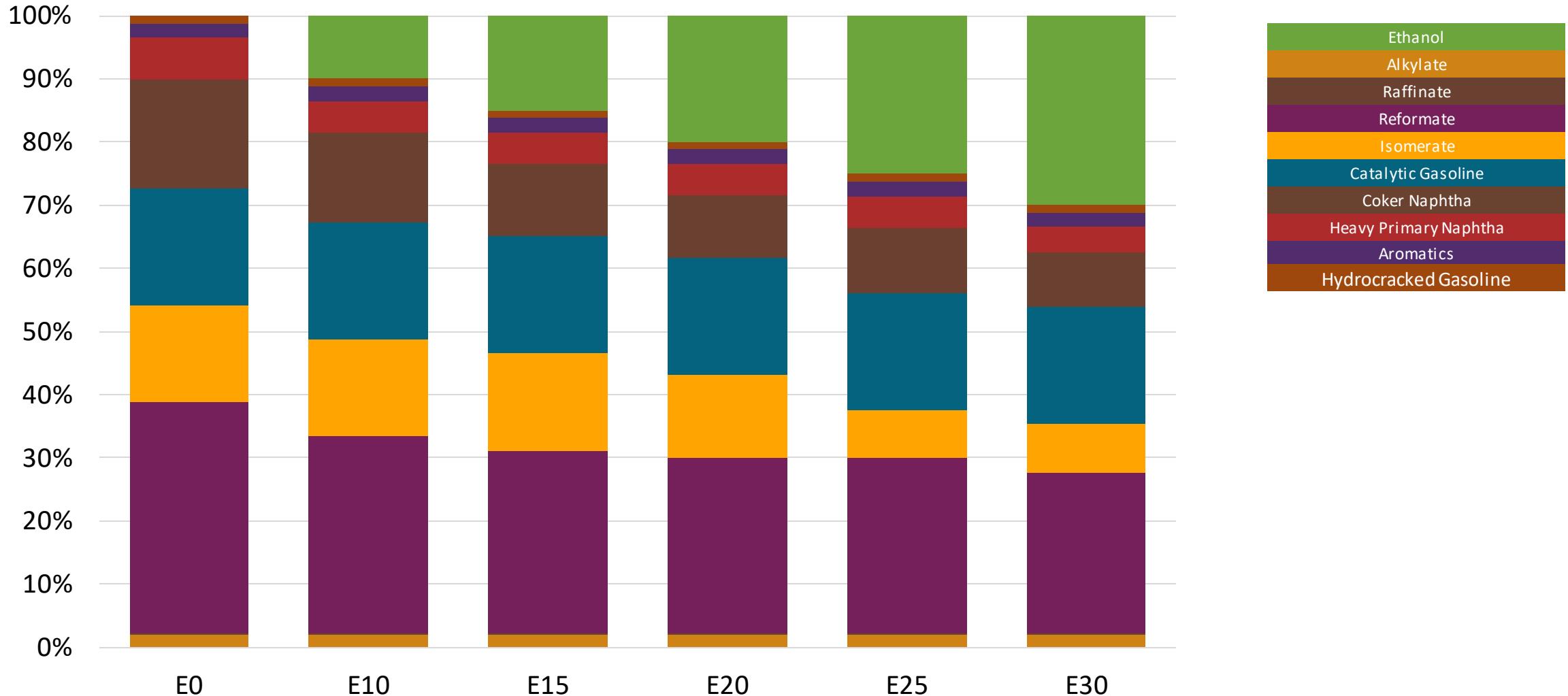
Argentina – Premium – Z. Norte y Centro – Octane Increment



Octane (RON)	97.0	98.2	99.2	100.7	101.2	103.4
Price (USD/gal)	\$ 2.402	\$ 2.402	\$ 2.402	\$ 2.402	\$ 2.402	\$ 2.402

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

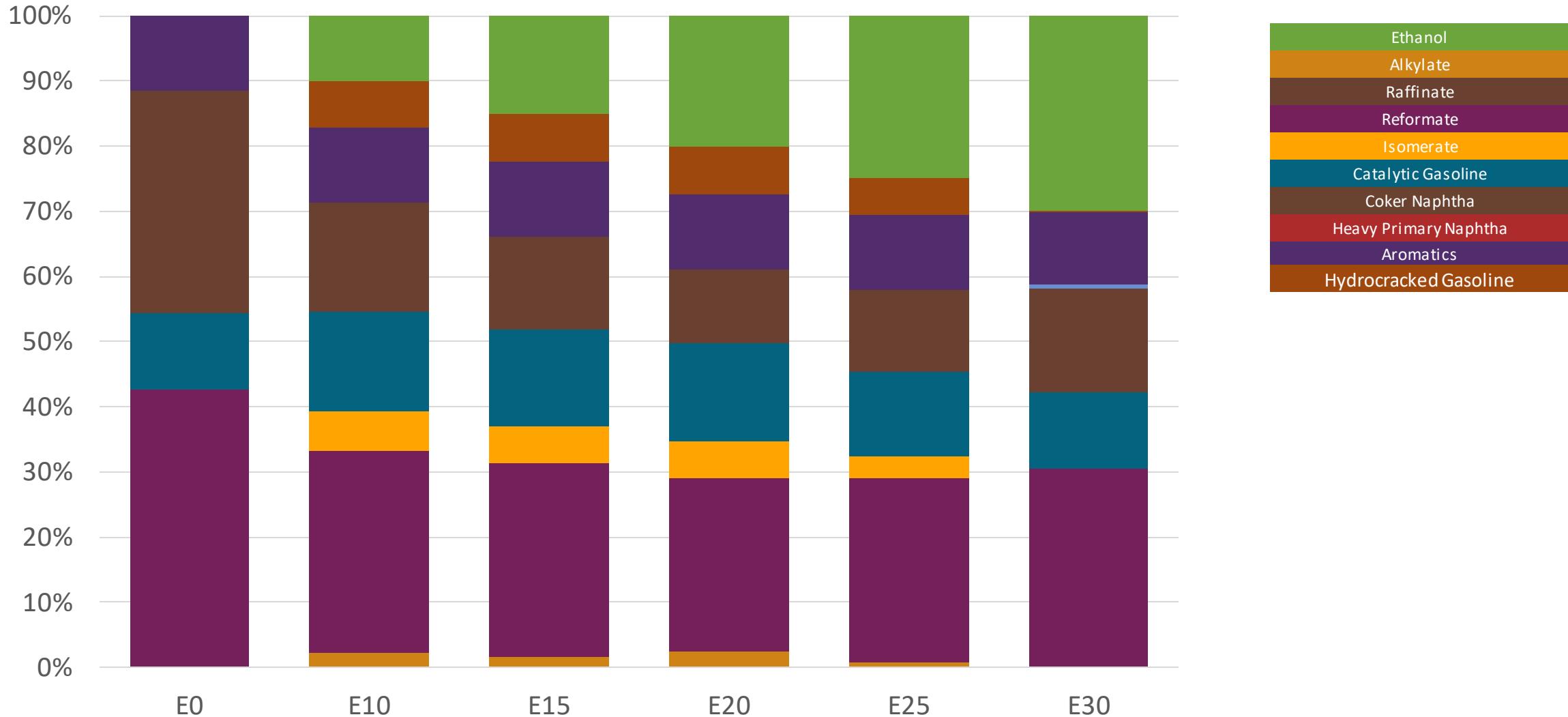
Argentina – Regular – Z. Sur – Octane Increment



Octane (RON)	93.0	95.3	96.5	97.8	99.3	100.7
Price (USD/gal)	\$ 2.338	\$ 2.338	\$ 2.338	\$ 2.338	\$ 2.338	\$ 2.338

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

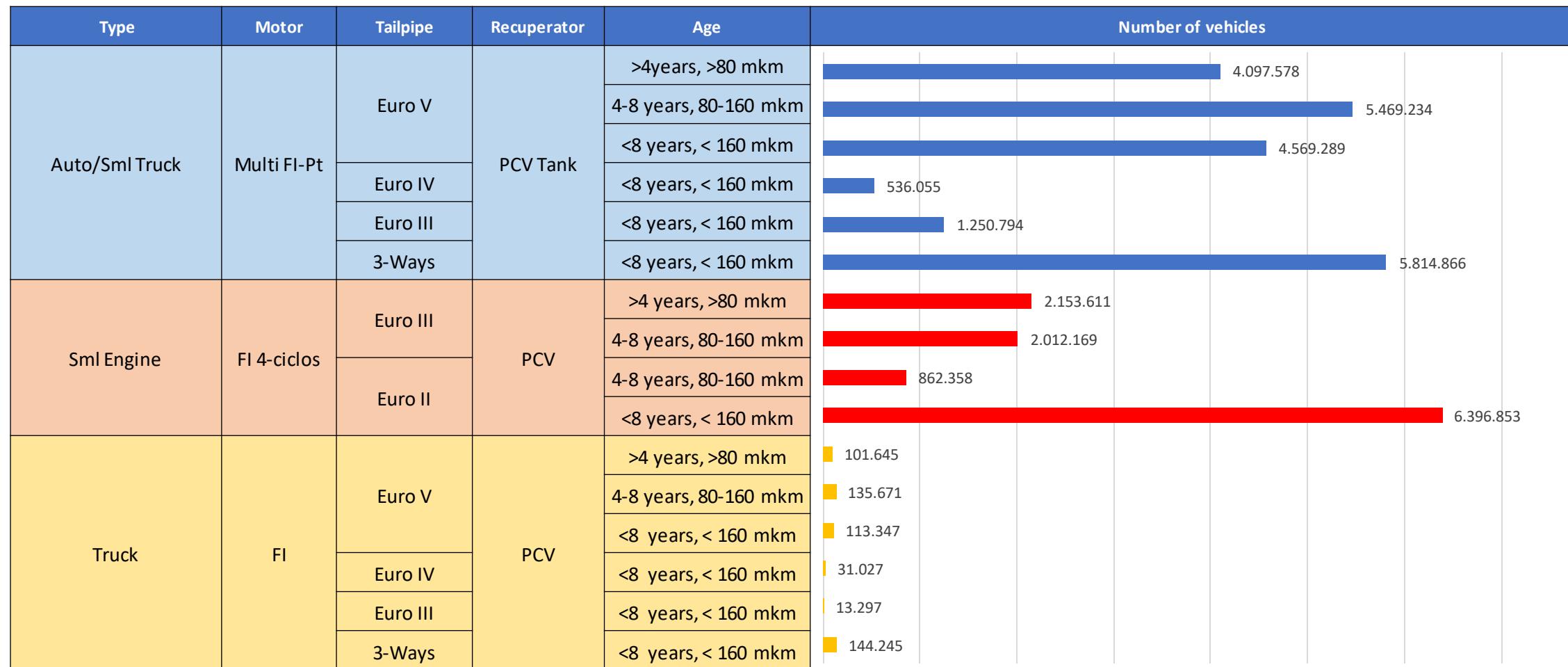
Argentina – Premium – Z. Sur – Octane Increment



Octane (RON)	97.0	97.9	99.2	100.3	102.0	104.0
Price (USD/gal)	\$ 2.402	\$ 2.402	\$ 2.402	\$ 2.402	\$ 2.402	\$ 2.402

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Gasoline Vehicle Fleet - Argentina



Vehicular Fleet: **33,702,039**

Average age: **12 year**

Argentina – Gasoline Vehicle Emissions

Emissions	E0 g/km	E10 g/km	E15 g/km	E20 g/km	E25 g/km	E30 g/km	E10 - E0	E20 - E0	E30 - E0	Euro 6	TIER USA
CO	5.82	4.88	4.49	4.10	3.80	3.47	-16%	-30%	-40%	1	3.5
VOC	0.81	0.69	0.65	0.61	0.57	0.53	-14%	-25%	-35%	95	255
VOCevap	0.39	0.39	0.40	0.41	0.42	0.42	0%	4%	7%	0.1	0.273
NOx	0.34	0.24	0.22	0.21	0.20	0.18	-30%	-38%	-46%	0.06	0.203
SOx	0.00	0.00	0.00	0.00	0.00	0.00	-15%	-28%	-41%		
NH3	0.07	0.07	0.07	0.07	0.07	0.08	-2%	0%	1%		
Butadiene	0.01	0.01	0.01	0.01	0.01	0.00	-11%	-19%	-26%		
Acetaldehyde	0.02	0.03	0.05	0.06	0.07	0.08	68%	249%	372%		
Formaldehyde	0.07	0.08	0.09	0.09	0.11	0.11	13%	39%	68%		
Benzene	0.03	0.03	0.03	0.03	0.03	0.03	-9%	-11%	-18%		
CO2	191.99	182.39	178.72	176.91	175.12	171.89	-5%	-8%	-10%		
N2O	0.00	0.00	0.00	0.00	0.00	0.00	-1%	2%	4%		
CH4	0.18	0.18	0.18	0.19	0.19	0.20	0%	4%	7%		
PM 2.5	0.01	0.01	0.01	0.01	0.01	0.00	-22%	-43%	-65%		
PM10	0.04	0.03	0.02	0.02	0.02	0.01	-22%	-43%	-65%	0.005	0.007
THC	0.31	0.32	0.35	0.38	0.40	0.42	6%	24%	39%		

Ethanol Blending in Gasoline - Bolivia

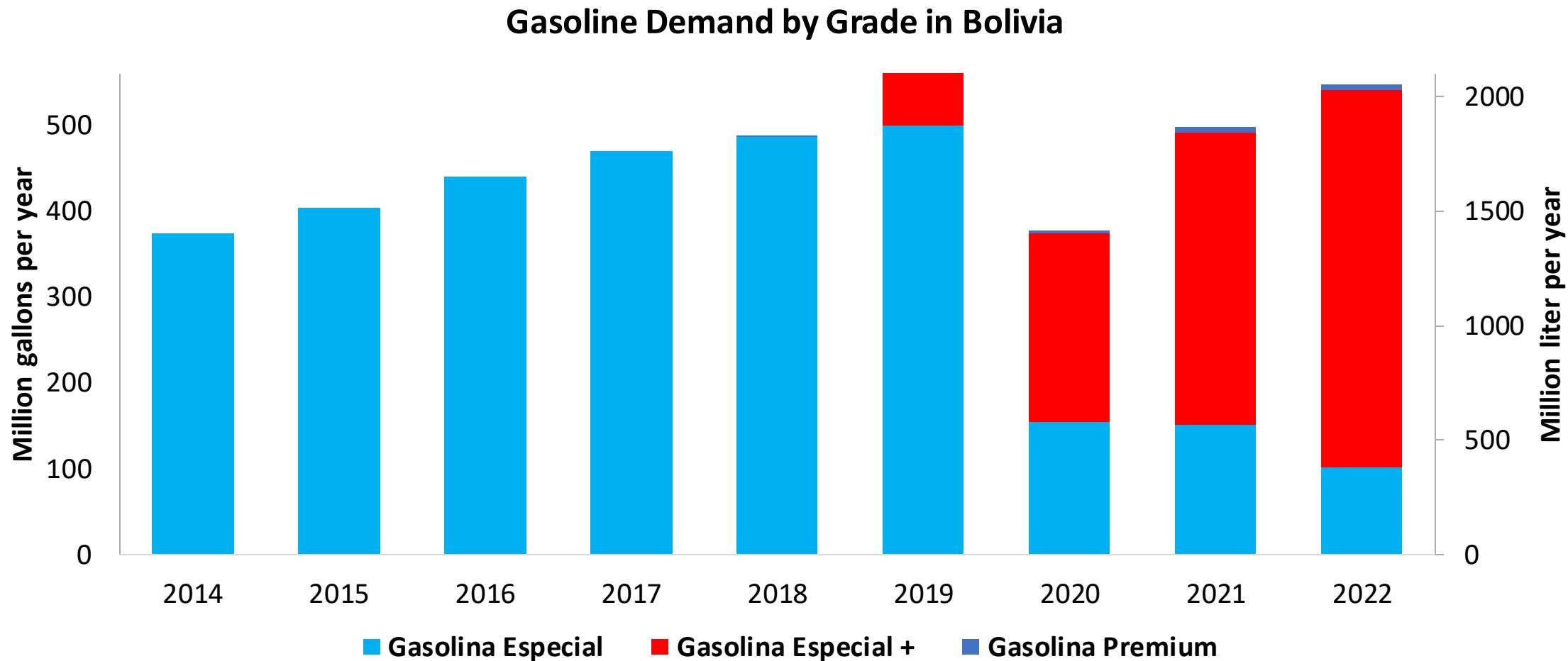


In 2022, gasoline demand was 526 million gallons (2,000 million liters). Gasoline Imports represented 38.4% of current demand, supplied from Brazil, Chile, Argentina, and the United States. Regular Gasoline (Especial) with 85 RON Octane represented 96% of demand and Premium Gasoline with a 95 RON octane the rest. In the short term, new intermediate octane gasolines will be available in the market.

80% of gasoline demand contains ethanol. Gasoline E8 and E12 are currently marketed. All ethanol consumed in Bolivia is produced by five local companies: Azúcar Aguaí, Unagro, Poplar Capital, Granosol, and Guabirá.

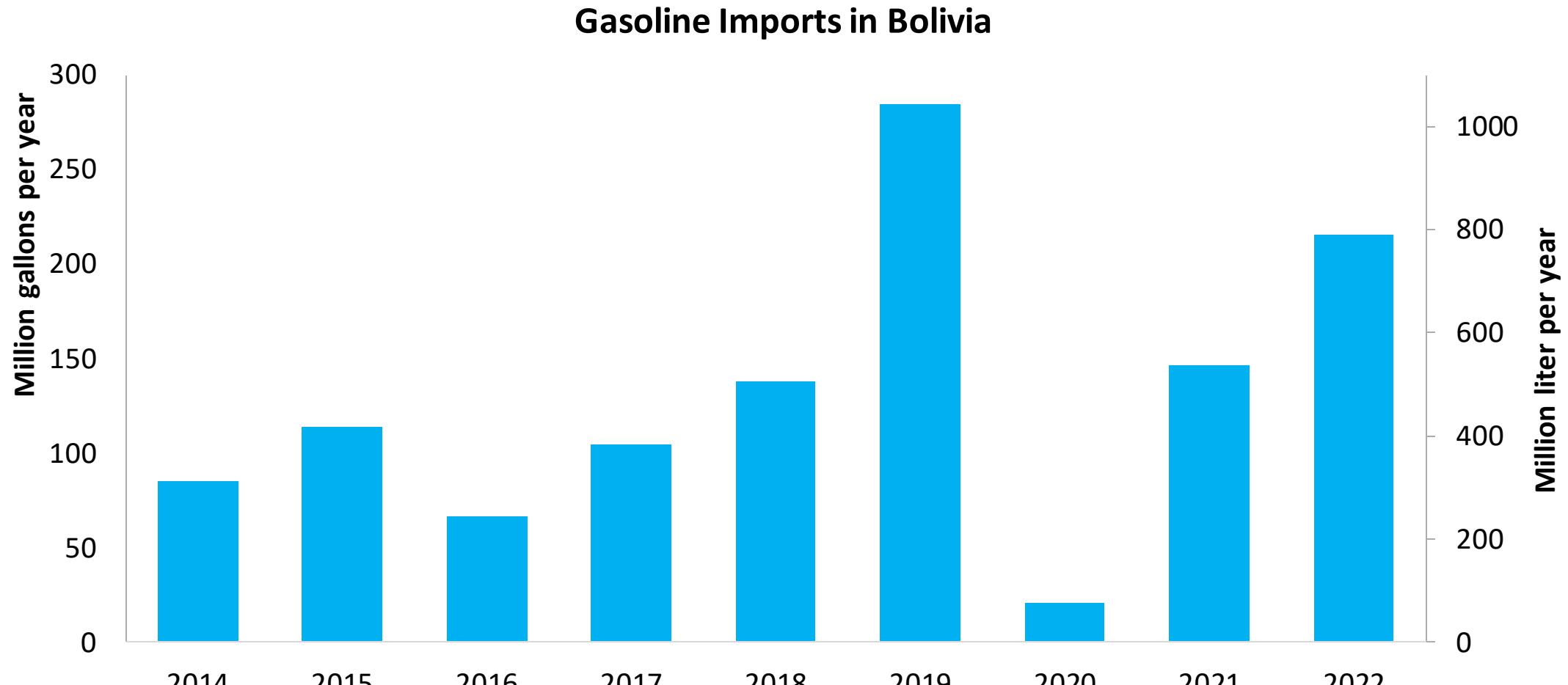
Source: ANH- Bolivia

Gasoline Demand in Bolivia



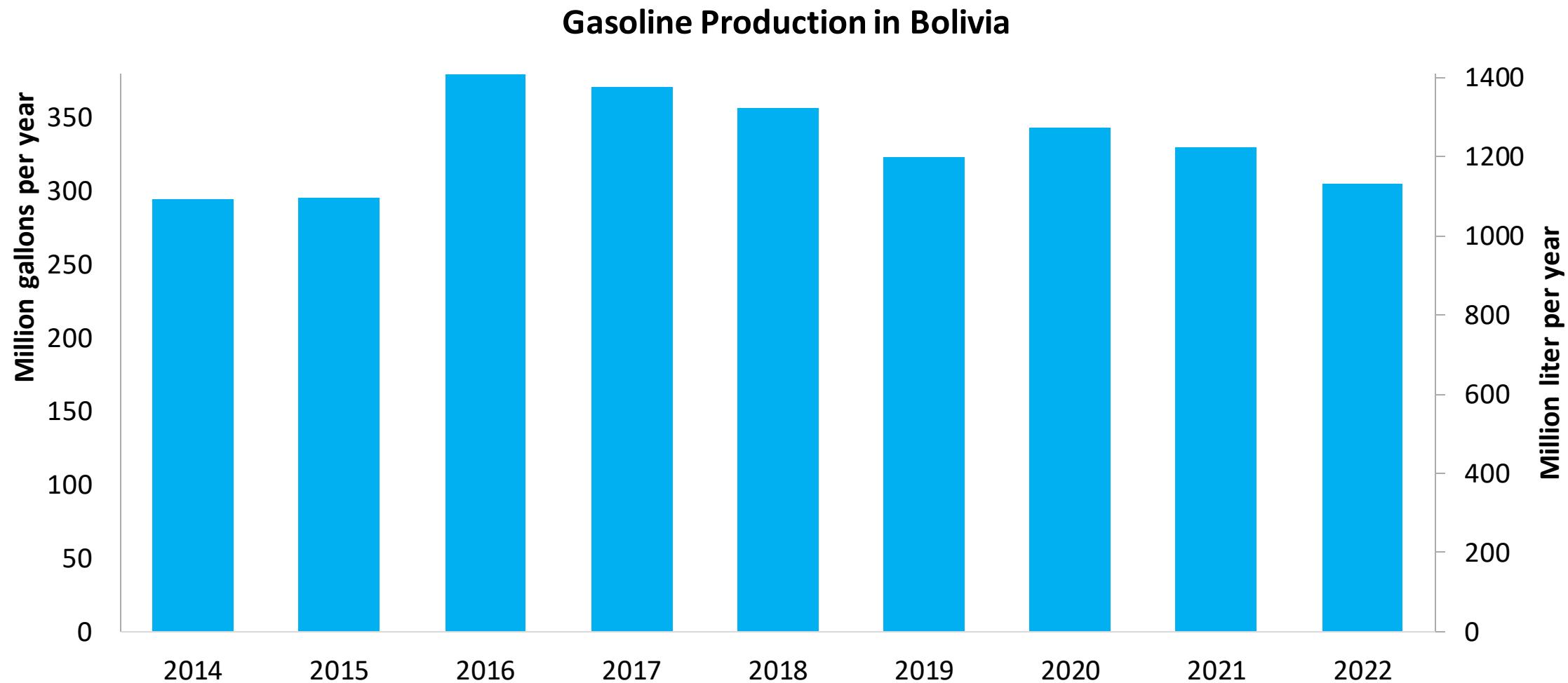
Source: ANH,INE - Bolivia

Gasoline Imports in Bolivia



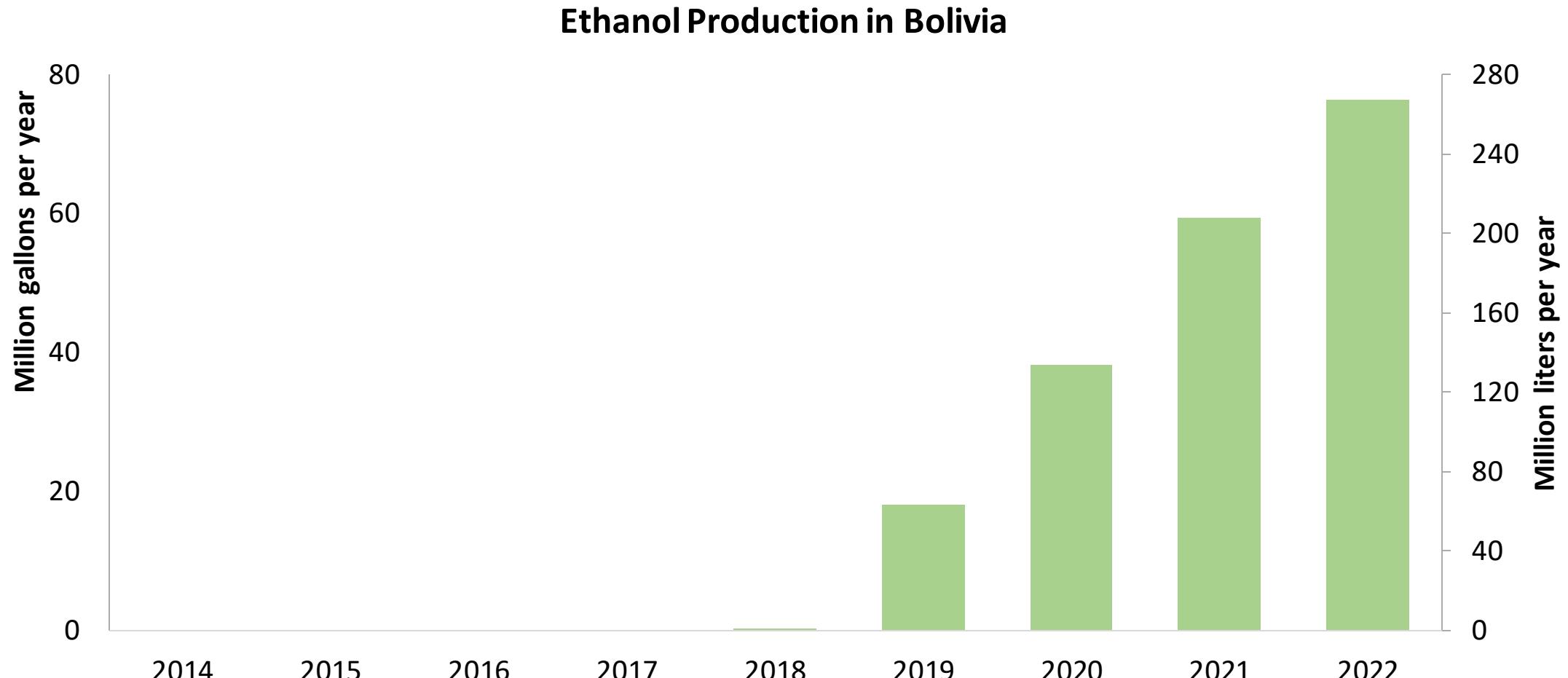
Source: ANH,INE - Bolivia

Gasoline Production in Bolivia



Source: ANH,INE - Bolivia

Ethanol Production in Bolivia



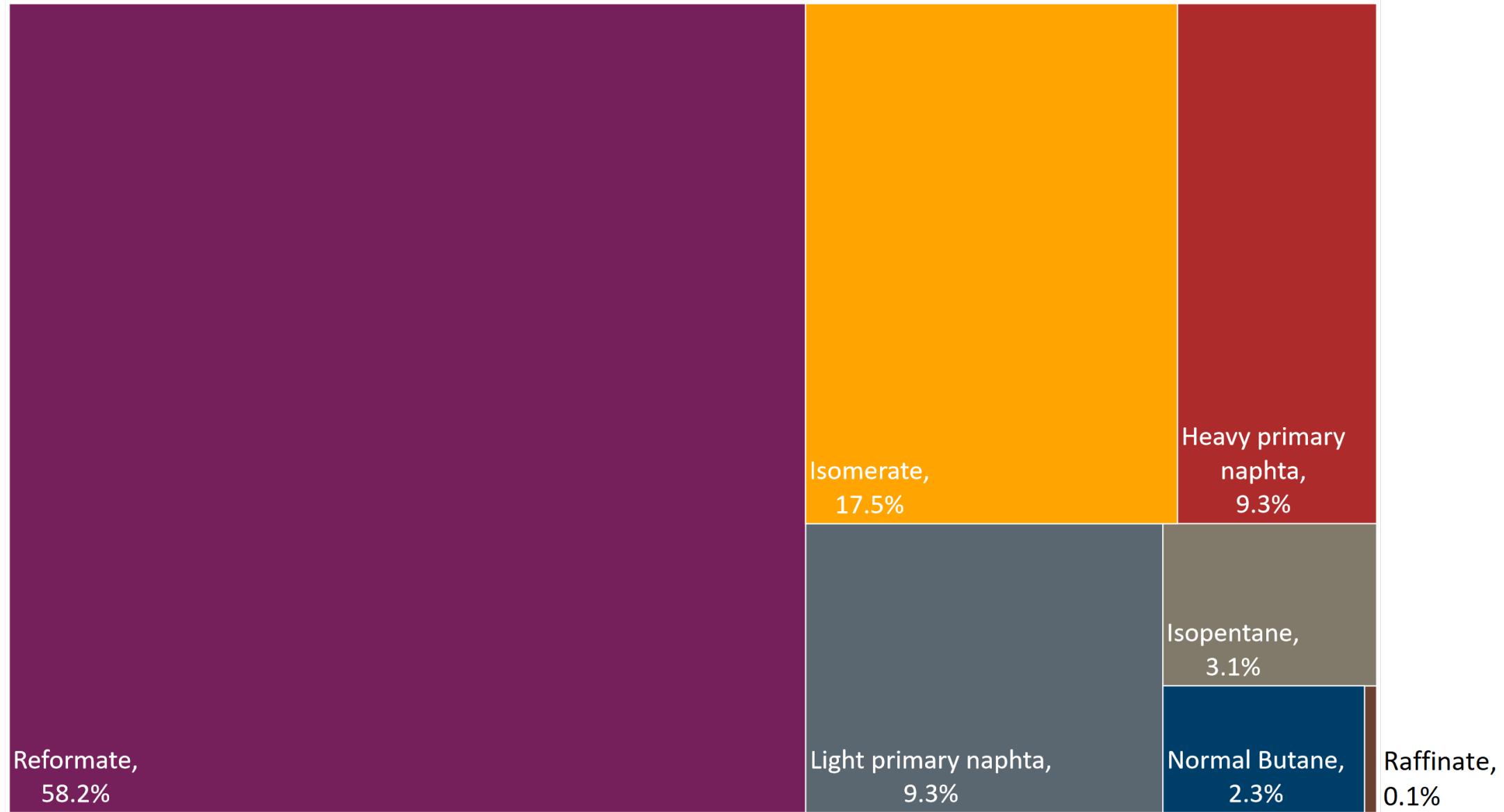
Source: ANH,INE - Bolivia

Gasoline Quality in Bolivia

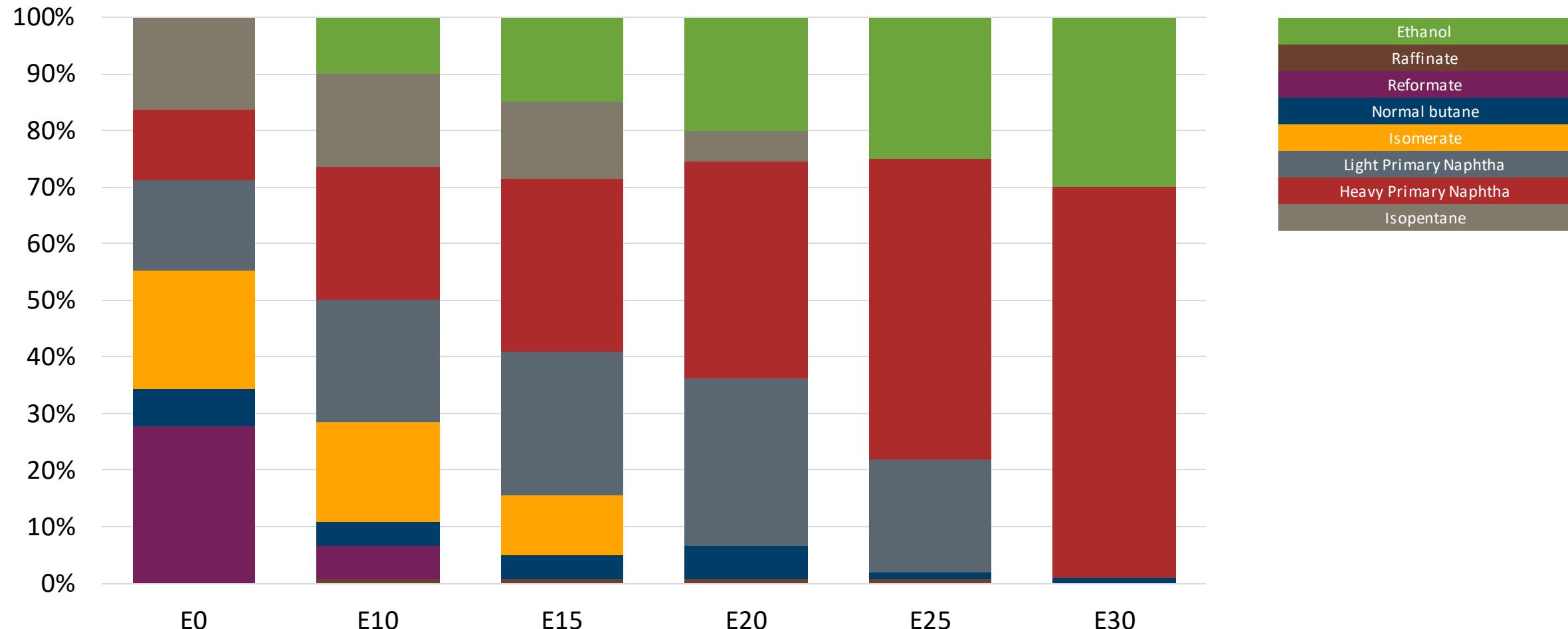
Name	Supreme Decree 2741		Resolution 121-18	Resolution 042-19	EN 228:2012 + A1:2017 (Euro 6 enabling)			
Implementation Date	2016		2018	2019	2017			
Applicability	Whole country	Whole country	Whole country	Whole country	All countries			
Selected Grade	Gasoline Regular	Gasoline Premium	Gasoline for E8	Gasoline for E12	RON 95 E5	RON 95 E10	RON 98 E5	RON 98 E10
Benzene Content	< 3% v/v (2,7% v/v for E12 in summer)	< 3% v/v (2,7% v/v for E12 in summer)	< 3% v/v (2,7% v/v for E12 in summer)	< 3% v/v (2,7% v/v for E12 in summer)	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v
Aromatics	< 42 % v/v	< 48 %v/v	< 42 %v/v	< 42 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v
Olefins	< 18 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v				
Lead Content	< 0,013 g/l	< 0,013 g/l	< 0,013 g/l	< 0,013 g/l	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l
Manganese	< 18 mg/l	< 18 mg/l	< 18 mg/l	< 18 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l
RON	> 85	> 95	> 85	> 92	> 95	> 95	> 98	> 98
MON	-	-	-	-	> 85	> 88	> 85	> 88
AKI								
Sulfur Content	< 500 mg/kg	< 500 mg/kg	< 500 mg/kg	< 500 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg
Oxygen Content	< 2,7 %m/m	< 2,7 %m/m	< 2,7 %m/m	< 2,7 %m/m	<2,7 % m/m	<3,7 % m/m	<2,7 % m/m	<3,7 % m/m
Ethanol (EtOH)	-	-	< 8 %v/v	< 12 %v/v	<5 %v/v	<10 %v/v	<5 %v/v	<10 %v/v
RVP 37.8°C (Summer)	<> 48-79 kPa	<> 48-79 kPa	<> 48-79 kPa	<> 48-79 kPa	<> 60 - 70 kPa *Depends on the country, RVP is regulated in the EU Fuel Quality Directive			
RVP 37.8 °C(Winter)								
RVP 37.8°C (Transition)								
MTBE					-	-	-	-
Ethers 5 or more C Atoms	-	-	-	-	Based on oxygen content	<22 %v/v	Based on oxygen content	<22 %v/v

Source: ANH

Available Blending Components

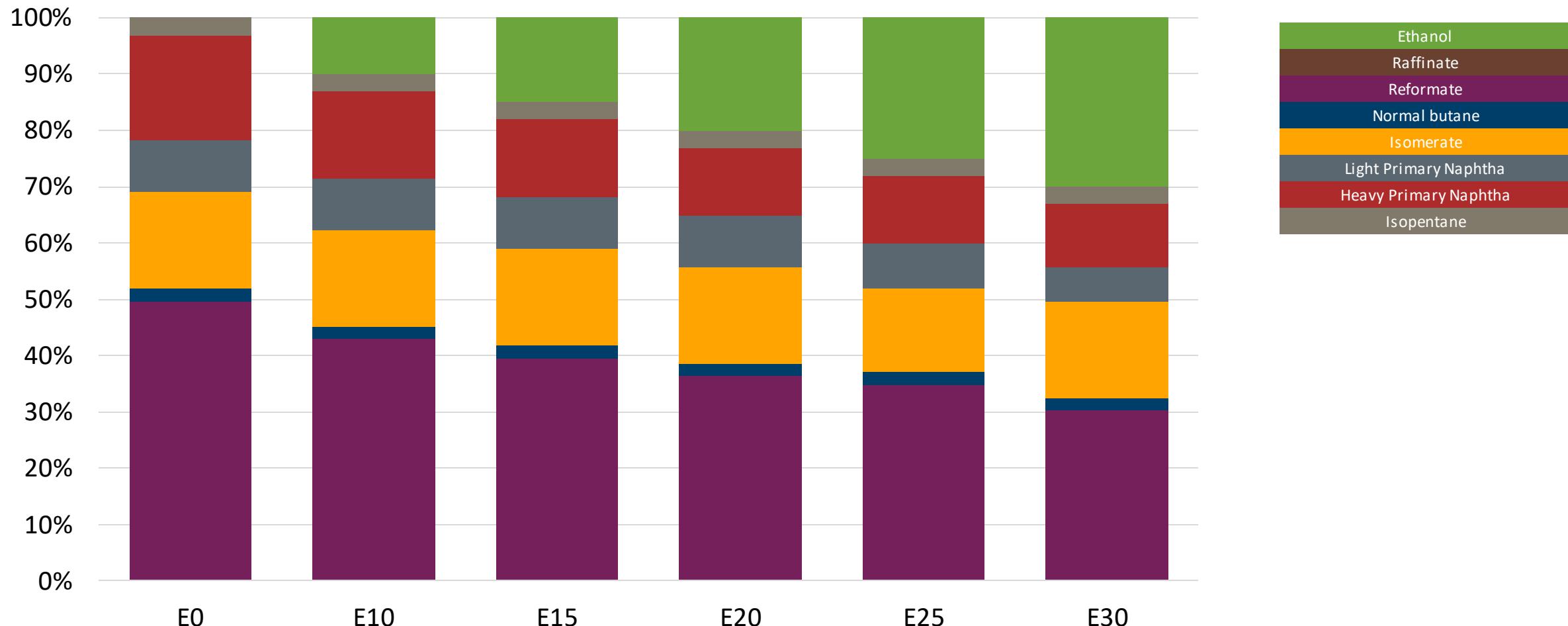


Ethanol Blending - Gasoline Especial – Constant Octane



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

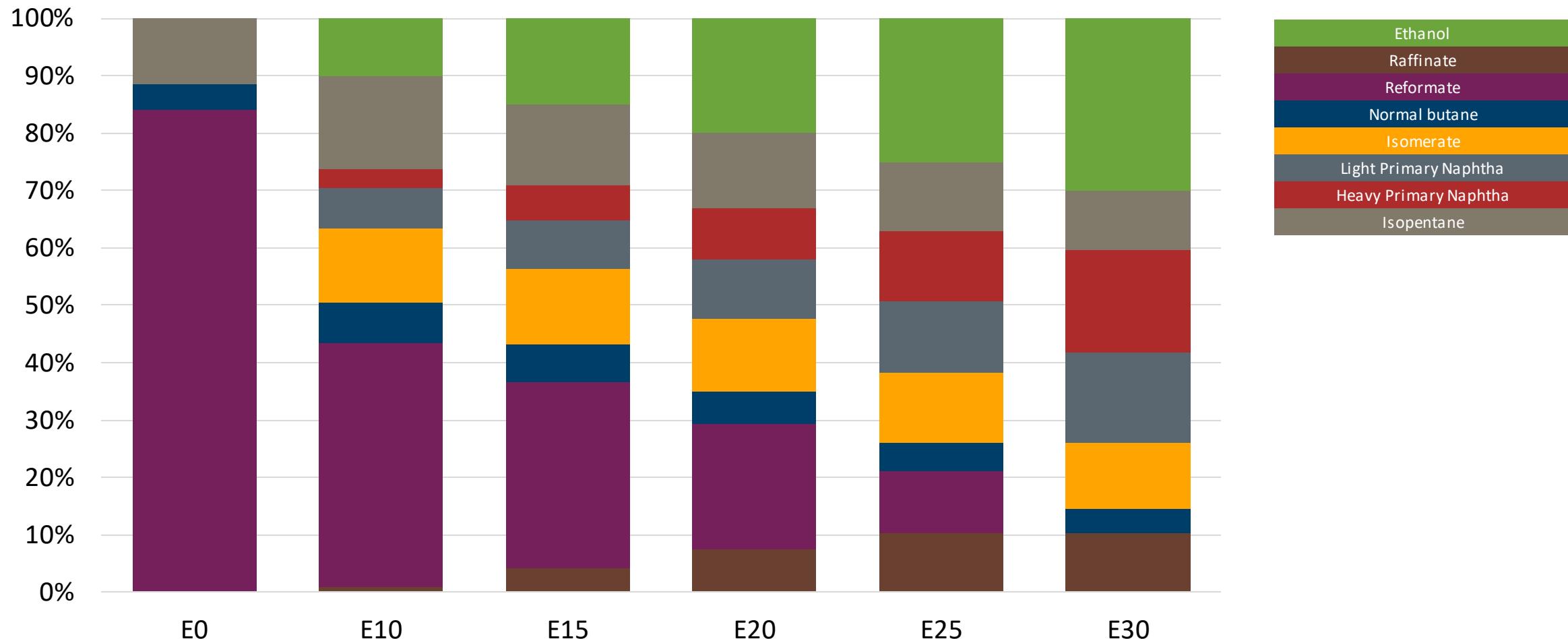
Ethanol Blending - Gasoline Especial – Octane Increment



Octane (RON)	85.0	90.9	93.6	96.2	98.5	100.8
Price (USD/gal)	\$2.24	\$2.24	\$2.24	\$2.24	\$2.24	\$2.24

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Ethanol Blending – Gasoline Premium – Constant Octane

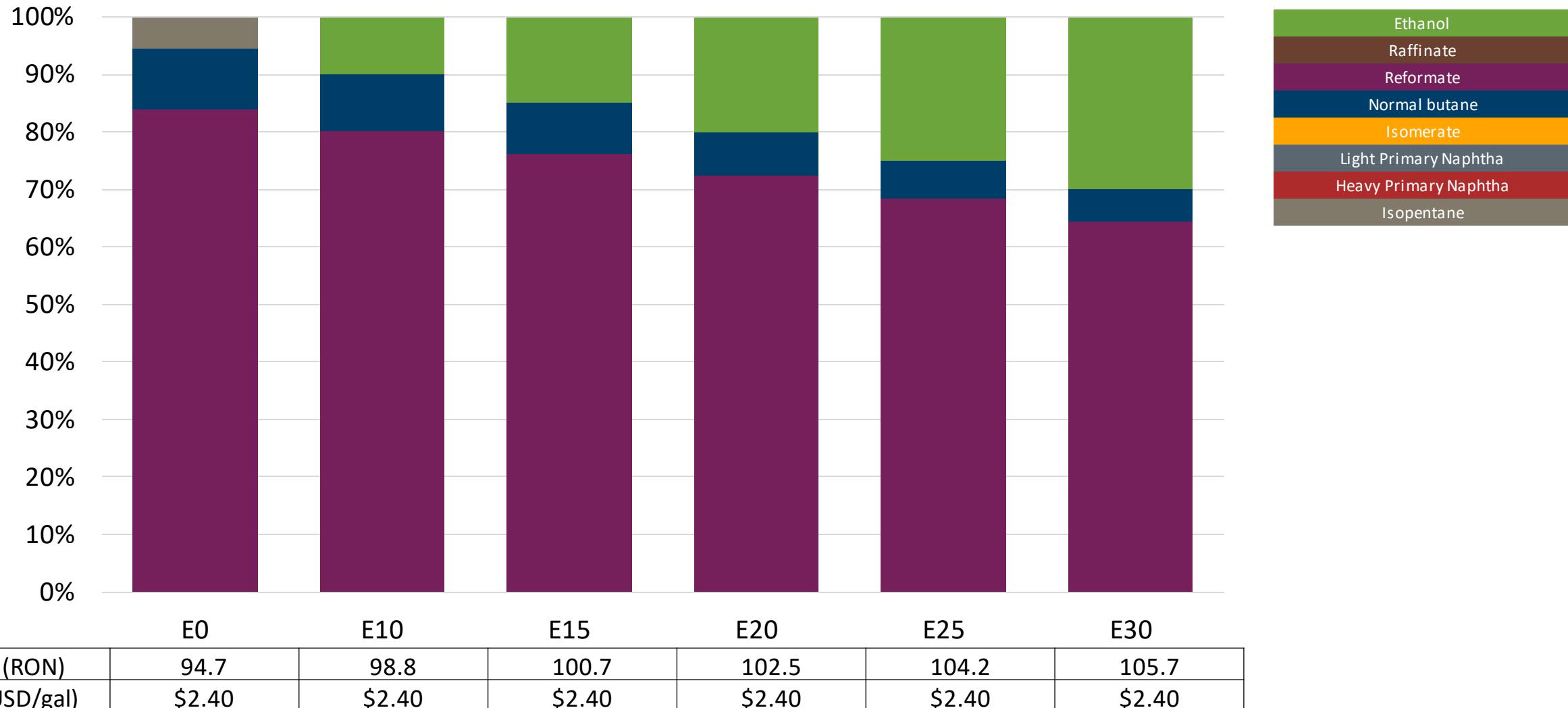


Octane (RON)	94.7	95.0	95.0	95.0	95.0	95.0
Price (USD/gal)	\$2.46	\$2.25	\$2.19	\$2.13	\$2.06	\$1.98

Prices are average Jan 22 – Feb 23.
 They do not include local distribution costs,
 import or gas station margins, taxes and
 subsidies.

Source: Faro90

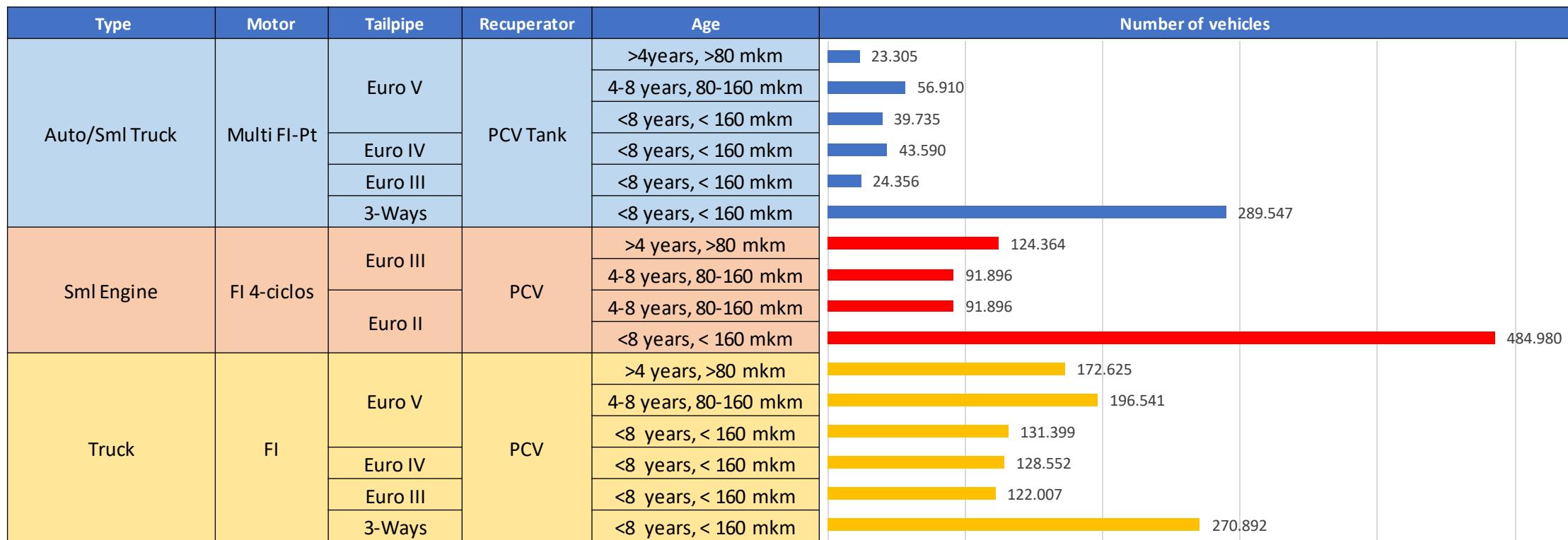
Ethanol Blending - Gasoline Premium – Octane Increment



Prices are average Jan 22 – Feb 23.

They do not include local distribution costs, import or gas station margins, taxes and subsidies.

Gasoline Vehicle Fleet Bolivia



Vehicular Fleet: **2,292,595**

Average Age: **11 years**

Motorcycles: **34.6%**

Source: Instituto Nacional de Estadística – Bolivia (INE), análisis Faro 90

Bolivia – Gasoline Vehicle Emissions

Emissions	E0 g/km	E10 g/km	E15 g/km	E20 g/km	E25 g/km	E30 g/km	E10 - E0	E20 - E0	E30 - E0	Euro 6	TIER USA
CO	34.46	31.89	31.11	30.44	29.97	29.27	-7%	-12%	-15%	1	3.5
VOC	3.02	2.83	2.78	2.75	2.73	2.68	-6%	-9%	-11%	95	255
VOCevap	0.82	0.82	0.83	0.85	0.86	0.88	0%	4%	7%	0.1	0.273
NOx	1.42	1.00	0.94	0.89	0.83	0.76	-30%	-38%	-46%	0.06	0.203
SOx	0.01	0.01	0.01	0.01	0.01	0.01	-15%	-28%	-41%		
NH3	0.05	0.05	0.05	0.05	0.05	0.05	-2%	0%	1%		
Butadiene	0.02	0.02	0.02	0.02	0.02	0.01	-7%	-10%	-13%		
Acetaldehyde	0.03	0.05	0.07	0.10	0.12	0.14	68%	249%	372%		
Formaldehyde	0.12	0.13	0.16	0.16	0.18	0.20	13%	39%	68%		
Benzene	0.16	0.14	0.14	0.14	0.13	0.13	-9%	-11%	-18%		
CO2	449.16	426.70	418.12	413.87	409.98	402.43	-5%	-8%	-10%		
N2O	0.04	0.04	0.04	0.04	0.04	0.04	-1%	2%	4%		
CH4	0.66	0.66	0.67	0.69	0.70	0.71	0%	4%	7%		
PM 2.5	0.04	0.03	0.03	0.02	0.02	0.01	-22%	-43%	-65%		
PM10	0.07	0.05	0.05	0.04	0.03	0.02	-22%	-43%	-65%	0.005	0.007
THC	0.98	1.01	1.06	1.11	1.15	1.19	2%	13%	21%		

Ethanol Blending in Ethanol - Chile



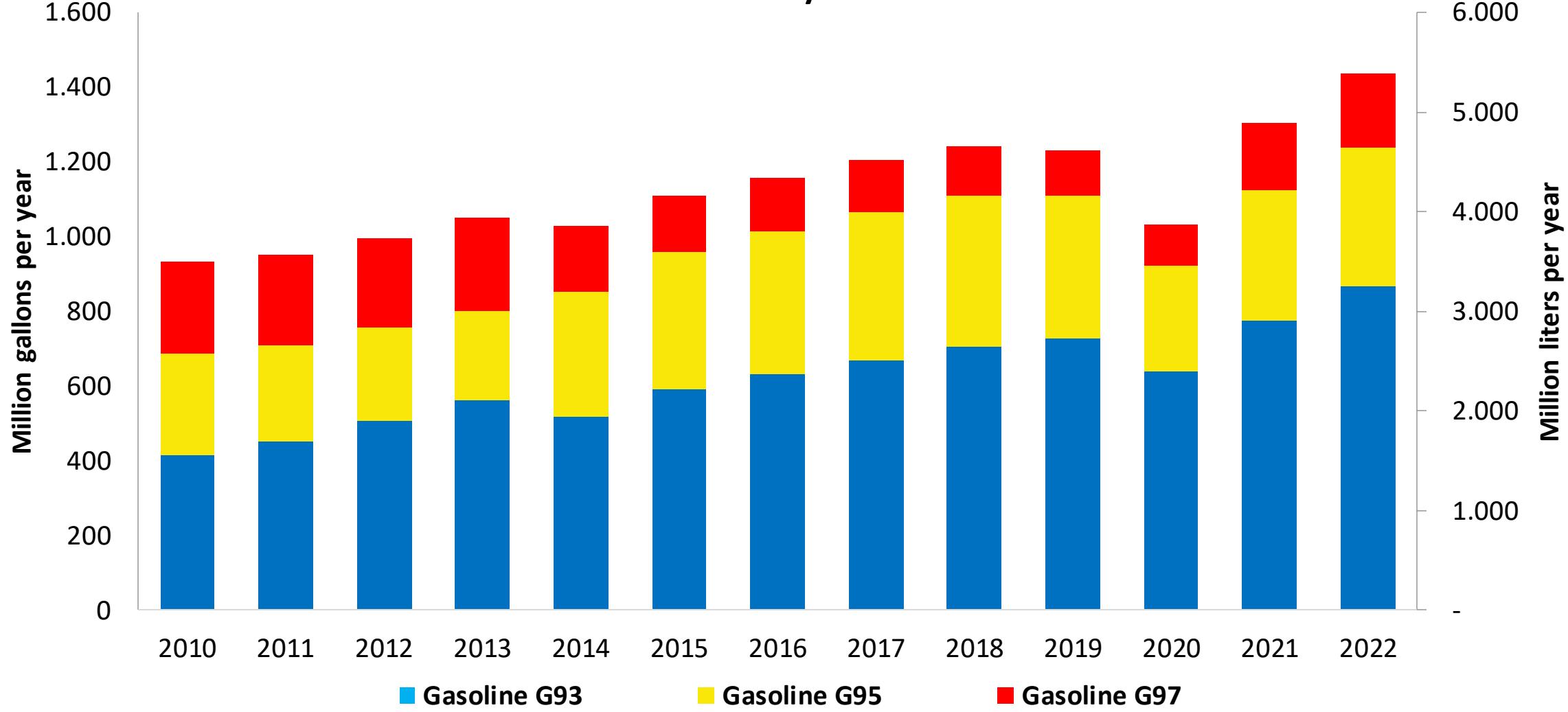
Chile's gasoline consumption is currently over 1,400 million gallons per year (5,000 million liters) in three grades: RON 93 (AKI 87), RON 95 (AKI 88) and RON 97 (AKI 92). There is a more stringent quality specification for Santiago Metropolitan Area. In 2022, the market share of RON 93 gasoline was 28%. Government company ENAP produces 80% of the total demand. Gasoline imports made in the country come mainly from Europe and the United States. Refineries only produce RON 93 and RON 97 gasoline, gasoline RON 95 is blended from these grades in gas stations.

Ethanol can be blended up to 5% v/v. However, ethanol is not used as a fuel or blended with gasoline.

Source: SEC, 2023

Gasoline Demand in Chile

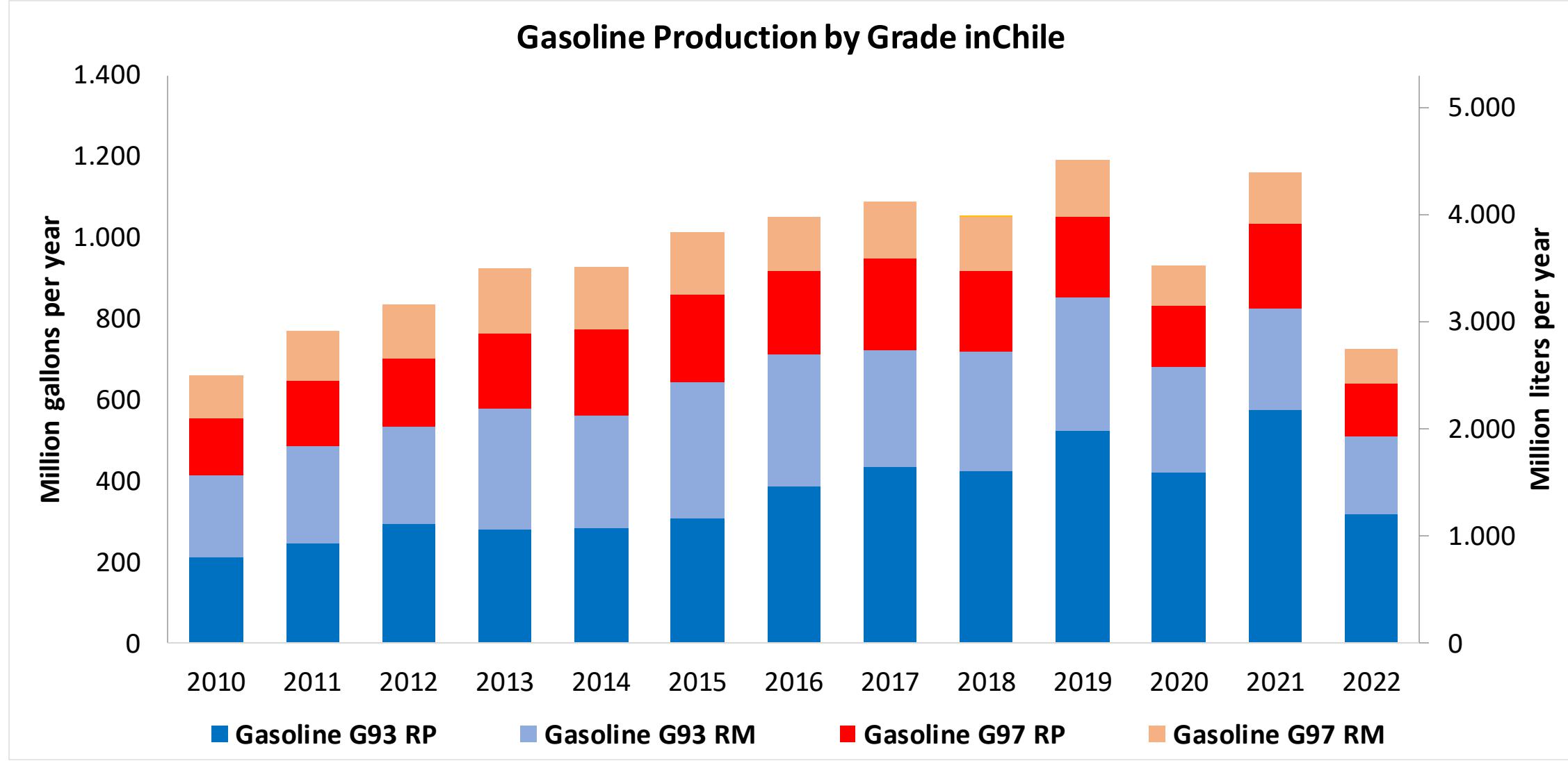
Gasoline Demand by Grade in Chile



Source: SEC, 2023

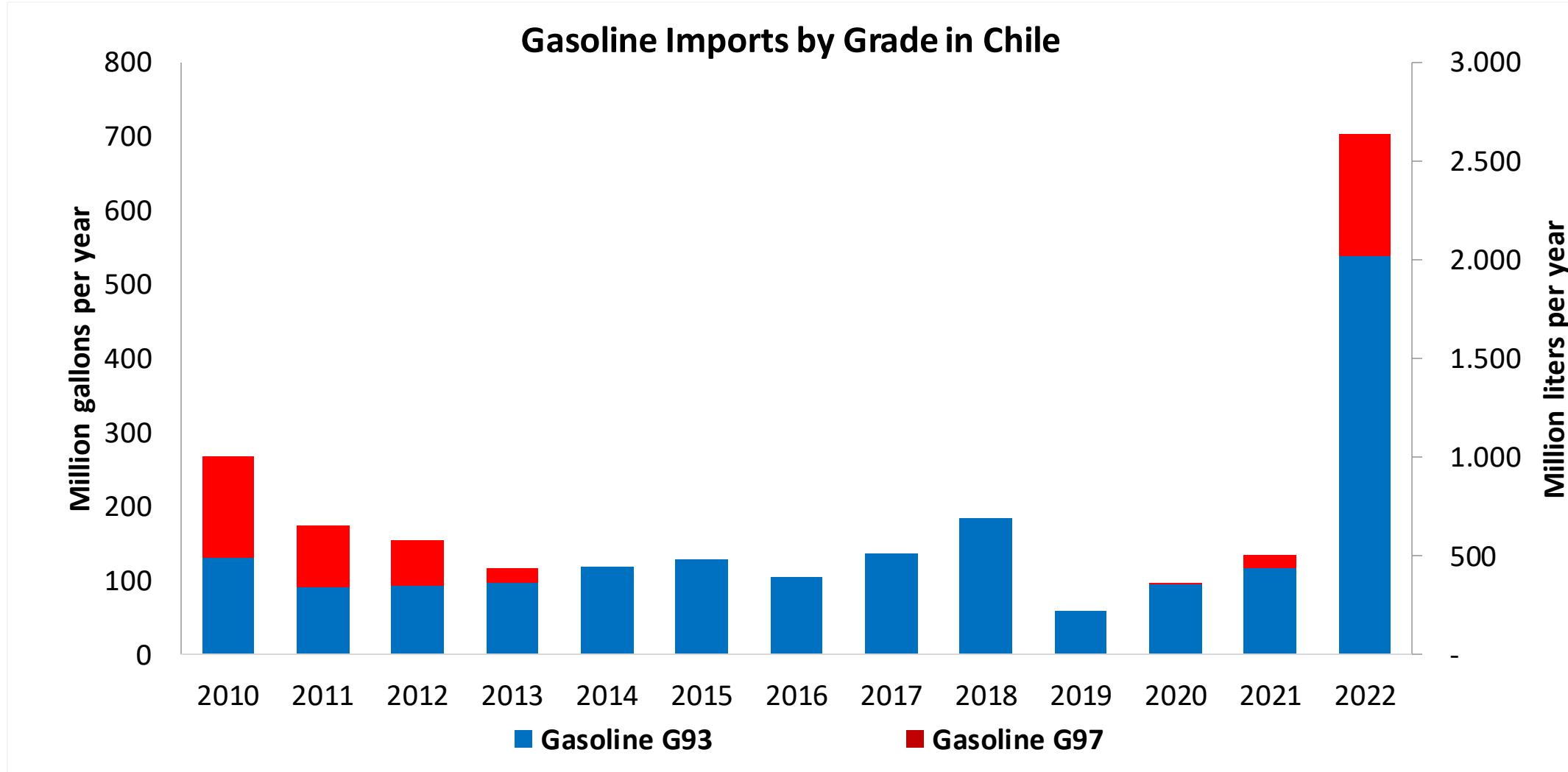
Gasoline Production in Chile

Gasoline Production by Grade in Chile



Source: ENAP, 2022

Gasoline Imports in Chile

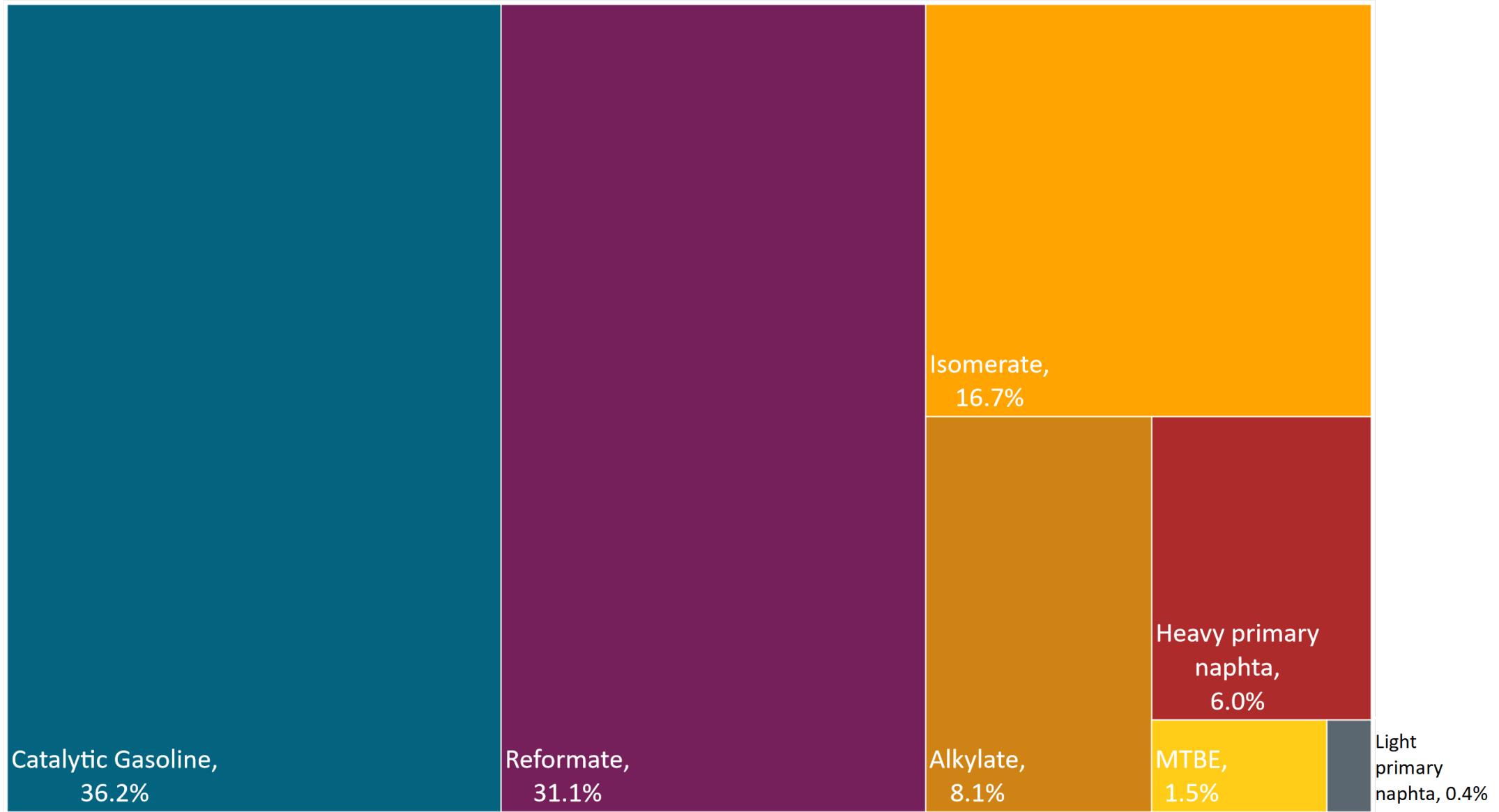


Fuente: SEC, 2023

Gasoline Quality in Chile

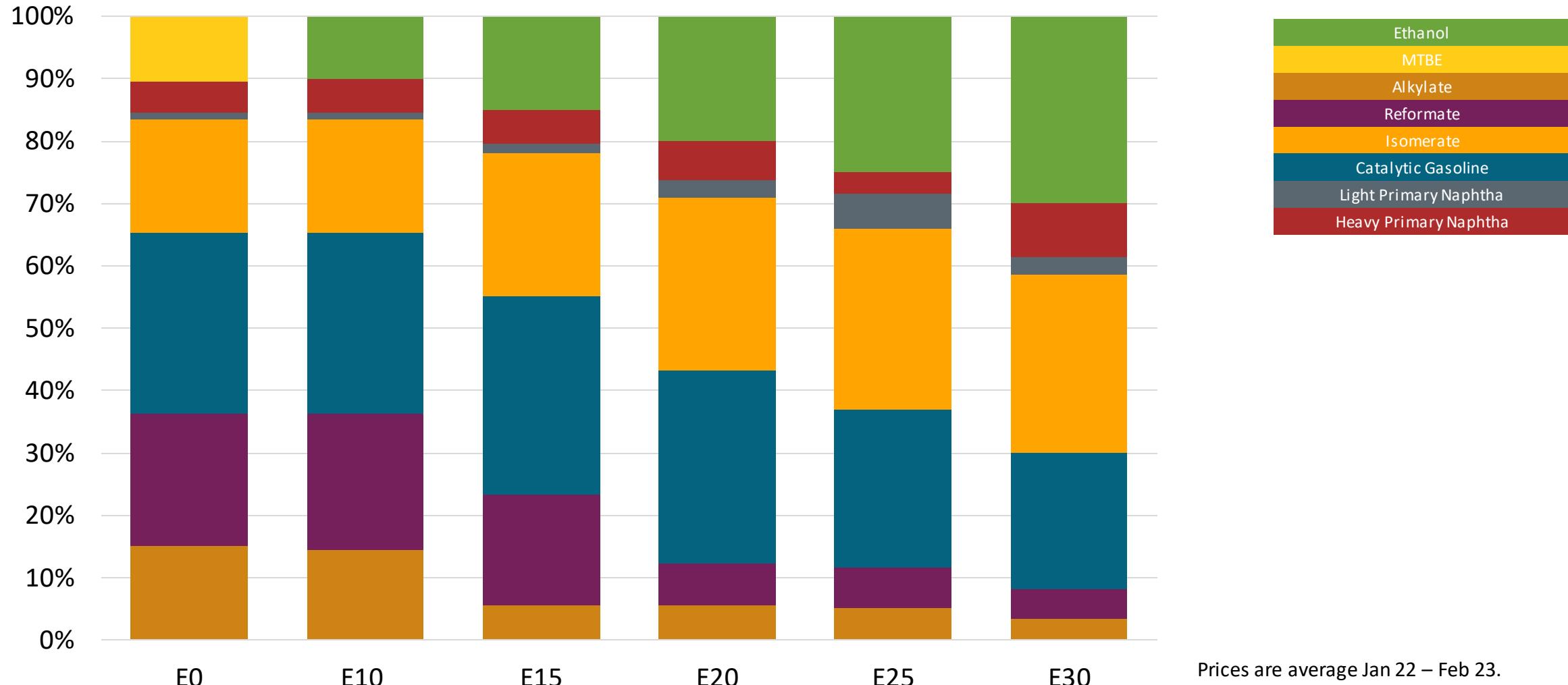
Name	PPDA DS31	PPDA DS31	DS 60	DS 60	EN 228:2012 + A1:2017 (Euro 6 enabling)			
Implementation Date	2017	2017	2012	2012	2017			
Applicability	Metropolitan Region	Metropolitan Region	Rest of the country	Rest of the country	All countries			
Selected Grade	G93	G97	G93	G97	RON 95 E5	RON 95 E10	RON 98 E5	RON 98 E10
Benzene Content	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v
Aromatics	< 38 %v/v	< 38 %v/v	< 38 %v/v	< 38 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v
Olefins	12 %v/v	12 %v/v	20 %v/v	20 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v
Lead Content	< 0,013 g/l	< 0,013 g/l	< 0,013 g/l	< 0,013 g/l	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l
Manganese	Reportar	Reportar	Reportar	Reportar	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l
RON	93	97	93	97	> 95	> 95	> 98	> 98
MON	Reportar	Reportar	Reportar	Reportar	> 85	> 88	> 85	> 88
AKI								
Sulfur Content	< 15 mg/kg	< 15 mg/kg	< 15 mg/kg	< 15 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg
Oxygen Content	< 2 %m/m	< 2 %m/m	< 2 %m/m	< 2 %m/m	< 2,7 % m/m	< 3,7 % m/m	< 2,7 % m/m	< 3,7 % m/m
Ethanol (EtOH)	<5 %v/v	<5 %v/v	<5 %v/v	<5 %v/v	<5 %v/v	<10 %v/v	<5 %v/v	<10 %v/v
RVP 37.8°C (Summer)	<> 55 kPa	<> 55 kPa	<> 69 kPa, <> 83 kPa (Magallanes y región Antártica)	<> 69 kPa, <> 83 kPa (Magallanes y región Antártica)	<> 60 - 70 kPa *Depends on the country, RVP is regulated in the EU Fuel Quality Directive			
RVP 37.8 °C(Winter)	<> 69 kPa	<> 69 kPa	<> 45 - 80 kPa	<> 45 - 80 kPa				
RVP 37.8°C (Transition)								
MTBE					-	-	-	-
Ethers 5 or more C Atoms	-	-	-	-	Based on oxygen content	<22 %v/v	Based on oxygen content	<22 %v/v

Available Blending Components



Source: ENAP, 2022

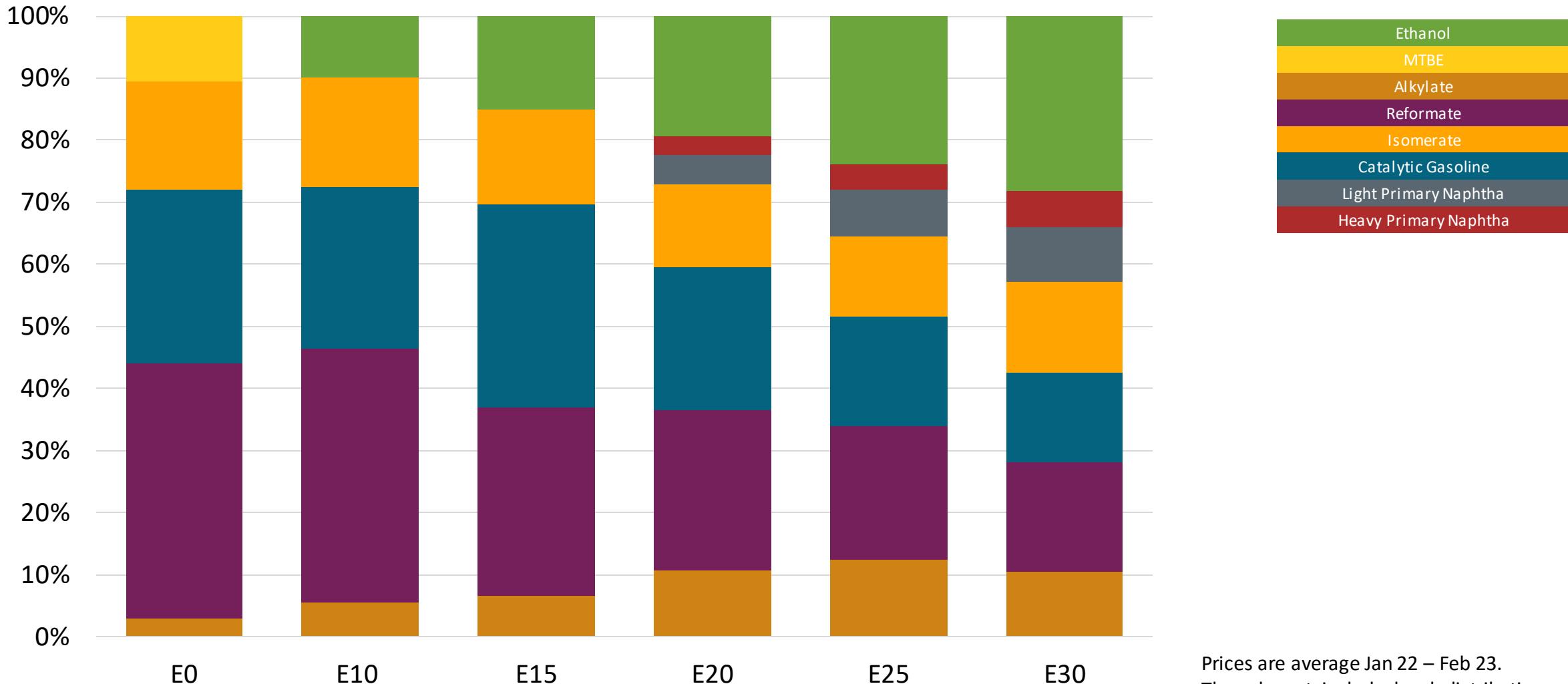
Chile – G93 RP Aconcagua – Constant Octane



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90, 2023

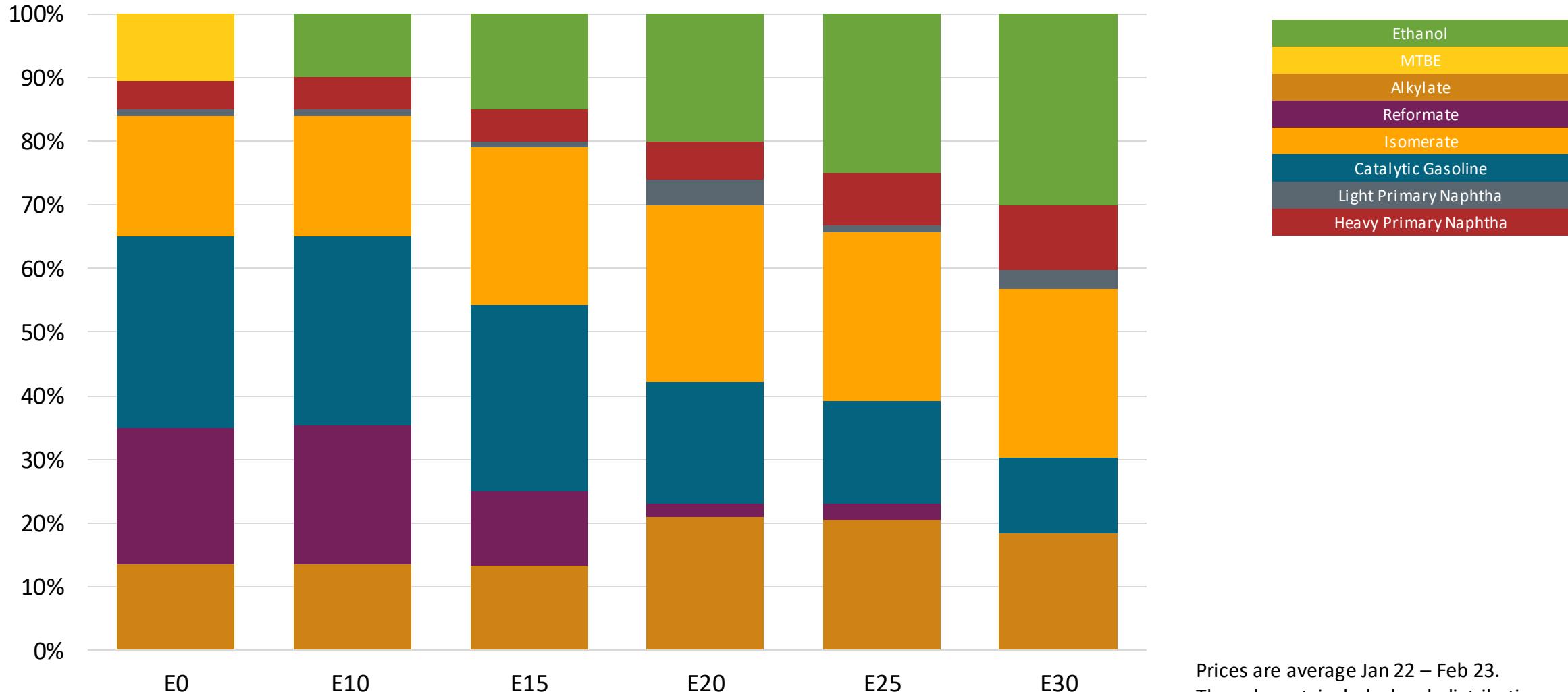
Chile – G97 RP Aconcagua – Constant Octane



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90, 2023

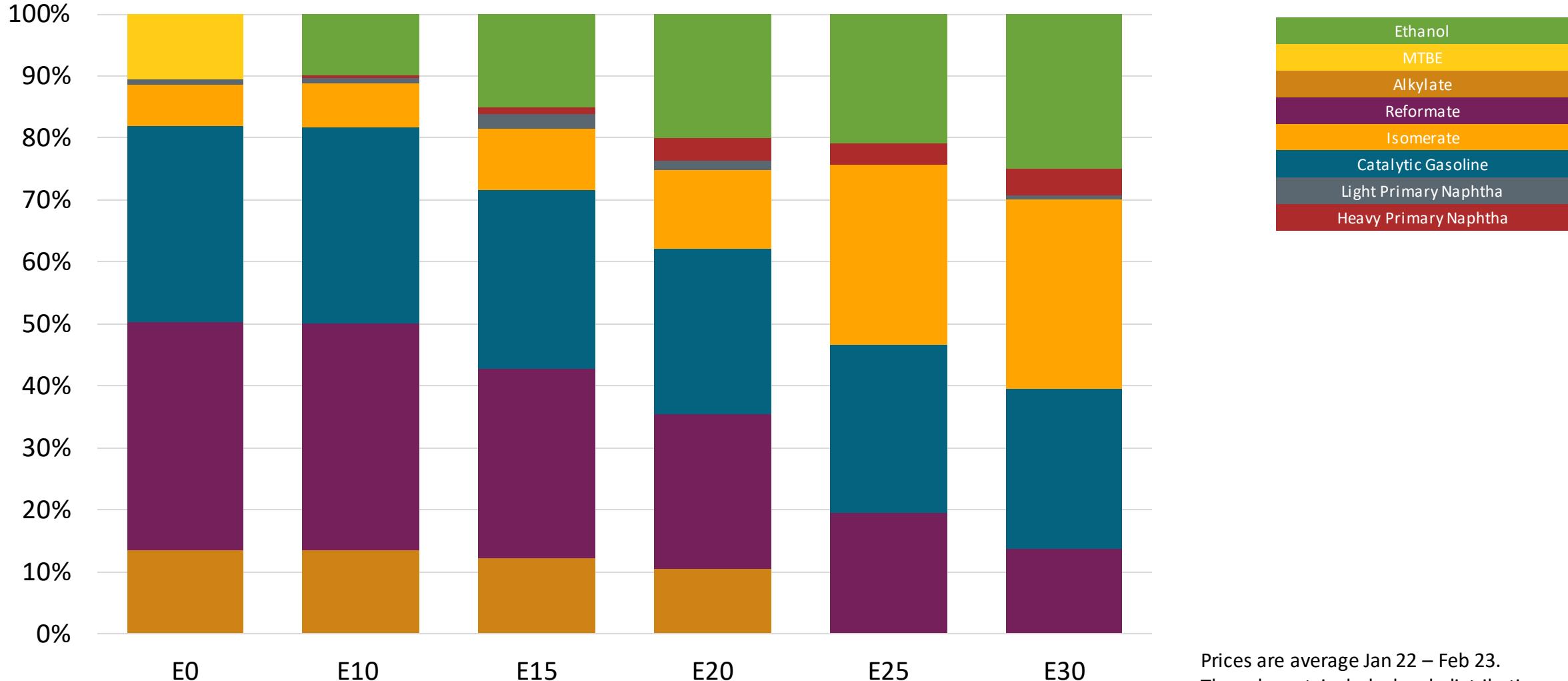
Chile – G93 RM Aconcagua – Constant Octane



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90, 2023

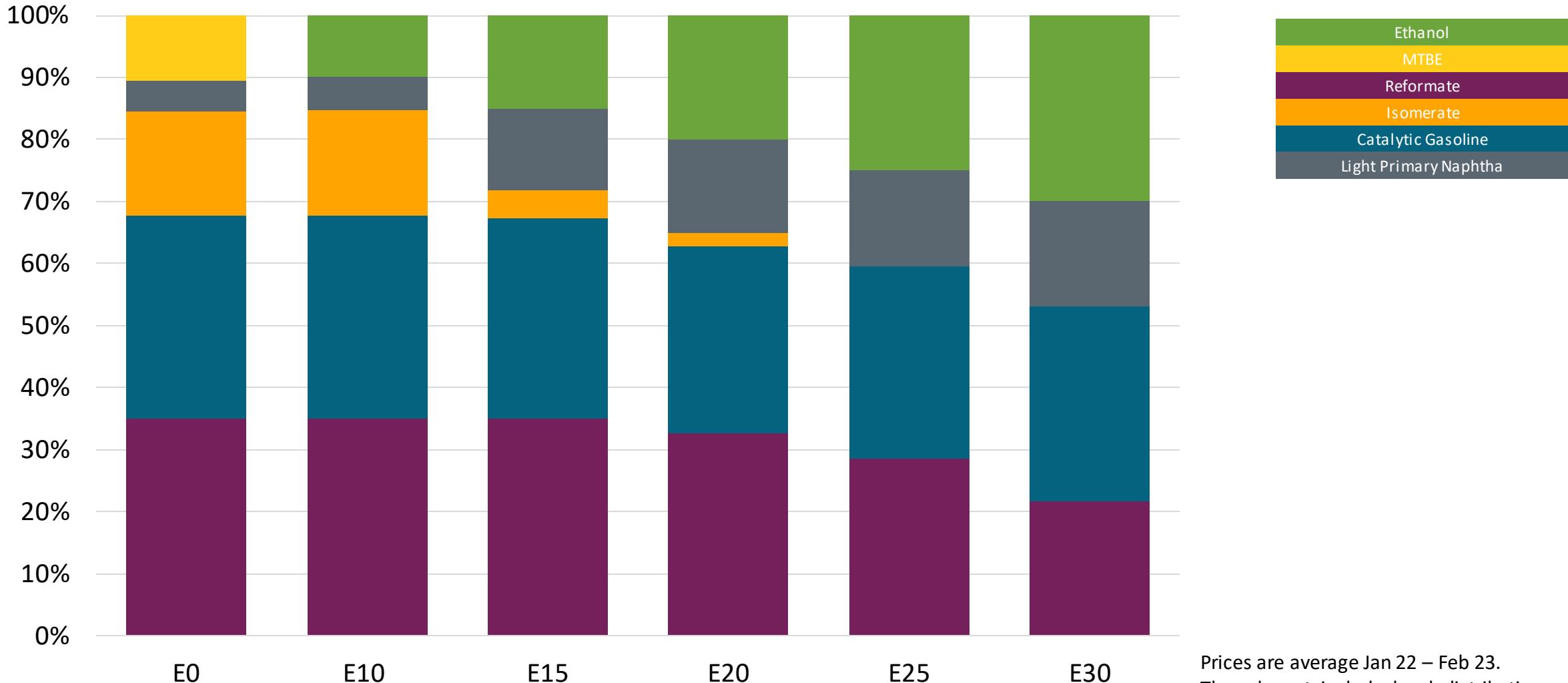
Chile – G97 RM Aconcagua – Constant Octane



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90, 2023

Chile – G93 RP Biobío – Constant Octane

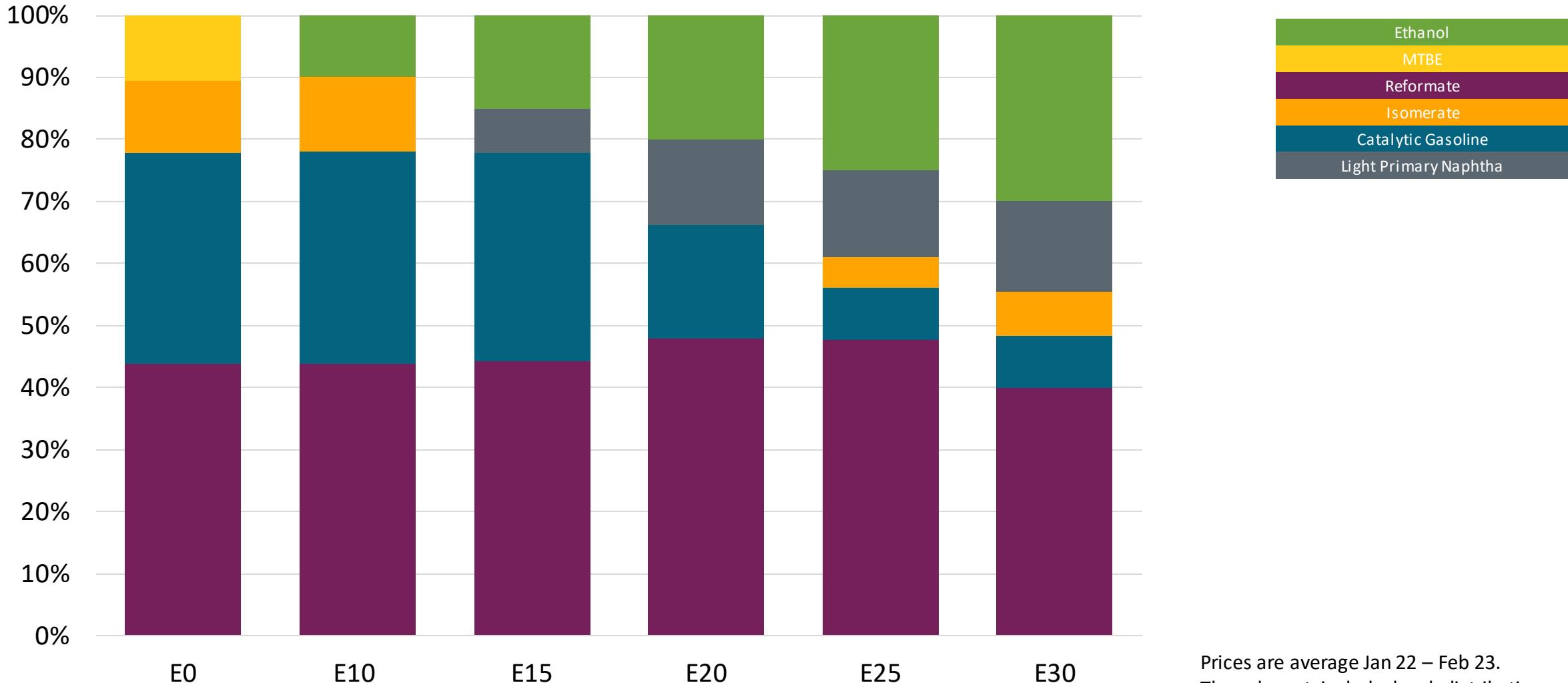


Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90, 2023

Octane (RON)	93.0	93.0	93.0	93.0	93.0	93.0
Price (USD/gal)	\$ 2.513	\$ 2.4485	\$ 2.416	\$ 2.384	\$ 2.368	\$ 2.320

Chile – G97 RP Biobío – Constant Octane

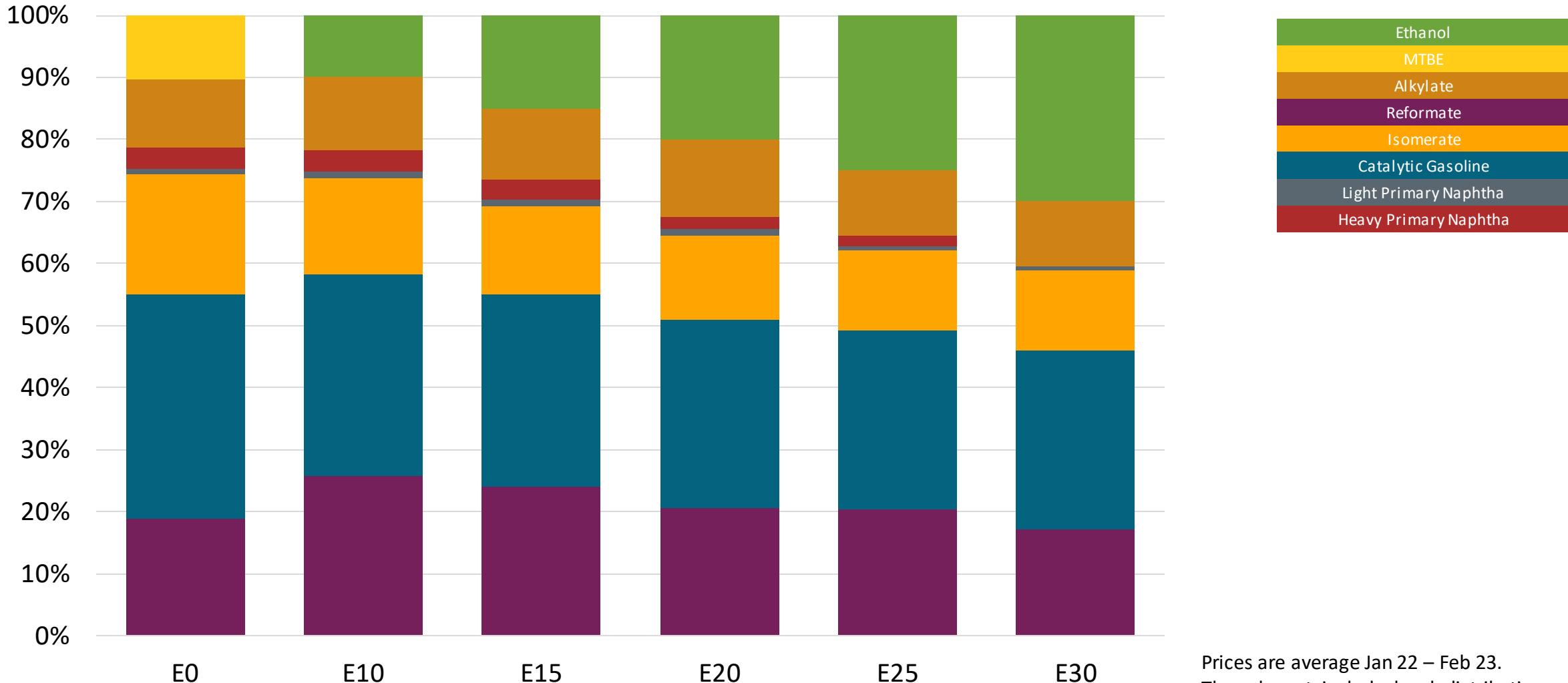


Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90, 2023

Octane (RON)	96.6	96.7	97.0	97.0	97.0	97.0
Price (USD/gal)	\$ 2.588	\$ 2.5235	\$ 2.491	\$ 2.459	\$ 2.441	\$ 2.394

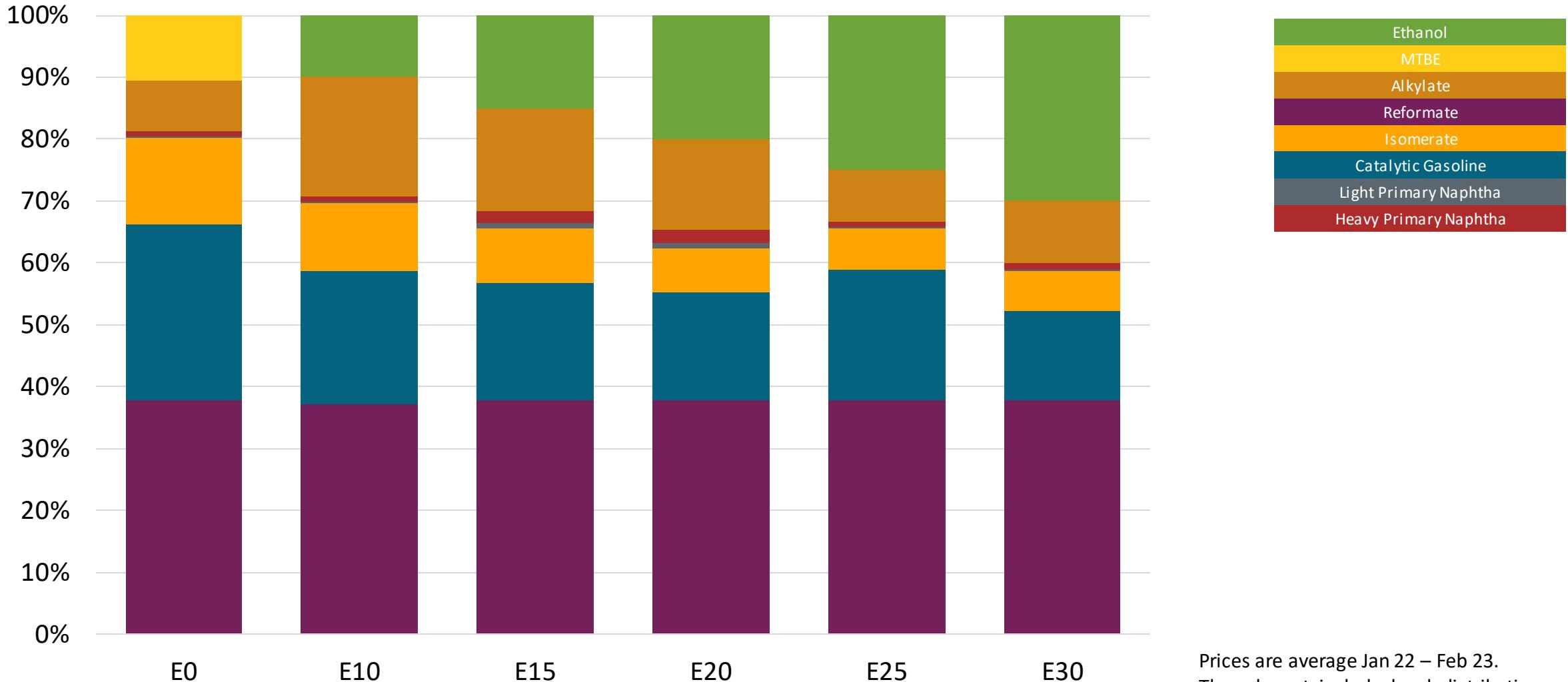
Chile – G93 RP Aconcagua – Octane Increment



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90, 2023

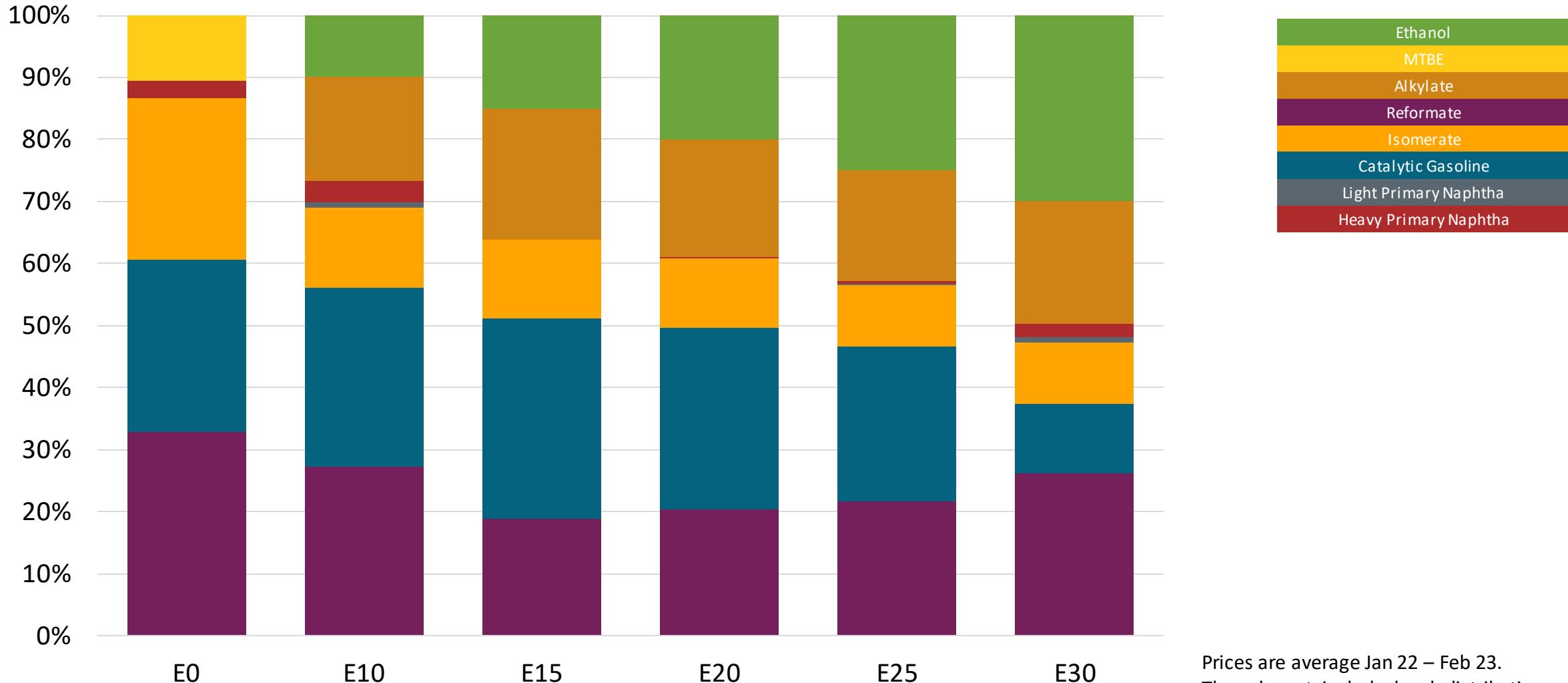
Chile – G97 RP Aconcagua – Octane Increment



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90, 2023

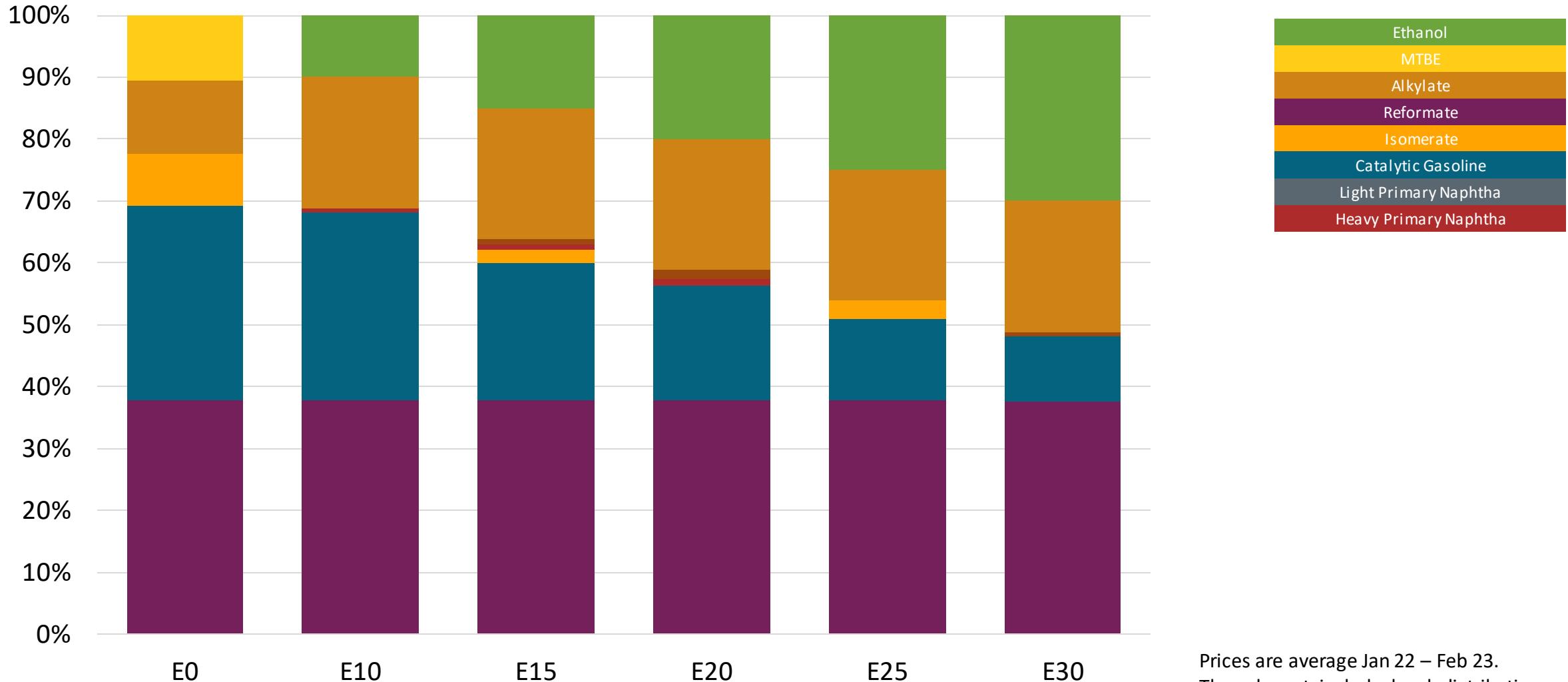
Chile – G93 RM Aconcagua – Octane Increment



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90, 2023

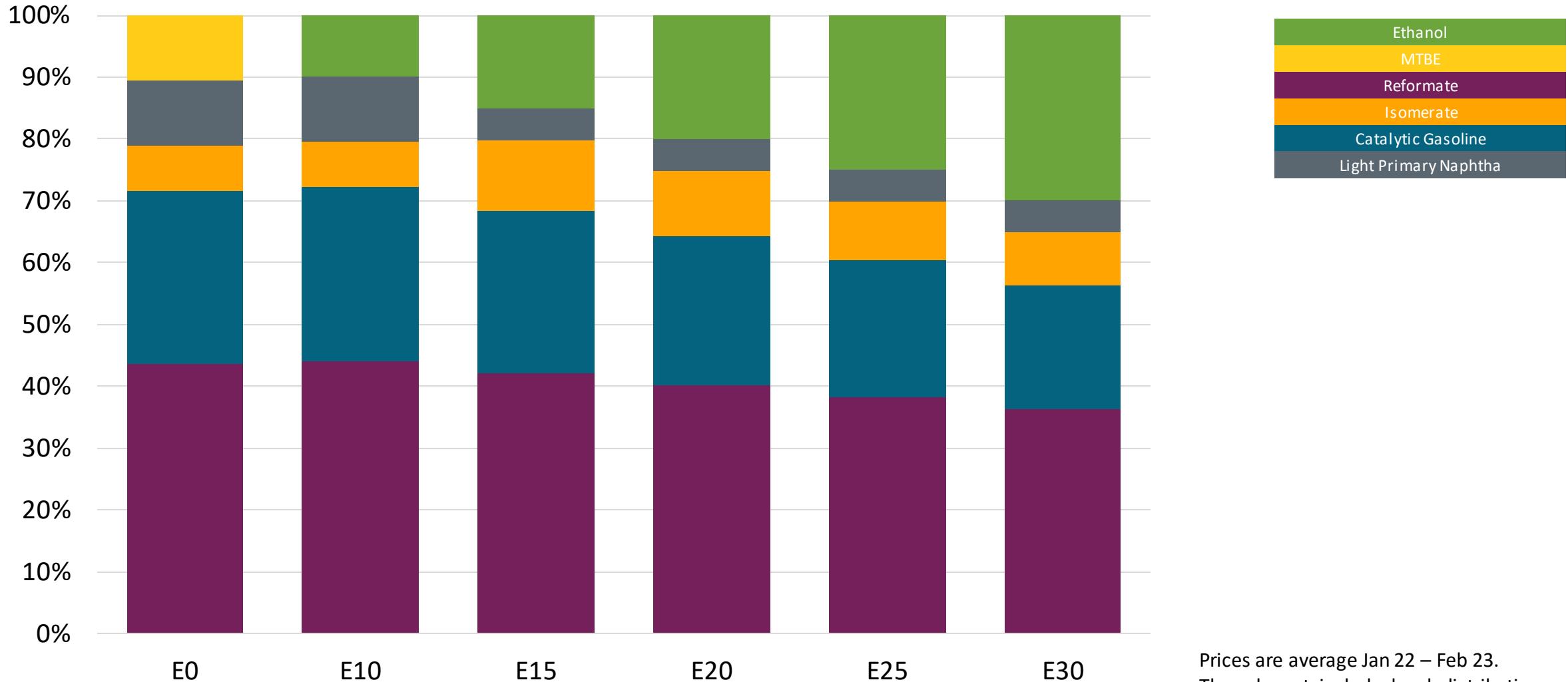
Chile – G97 RM Aconcagua – Octano Aumento



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Elaboración: Faro90, 2023

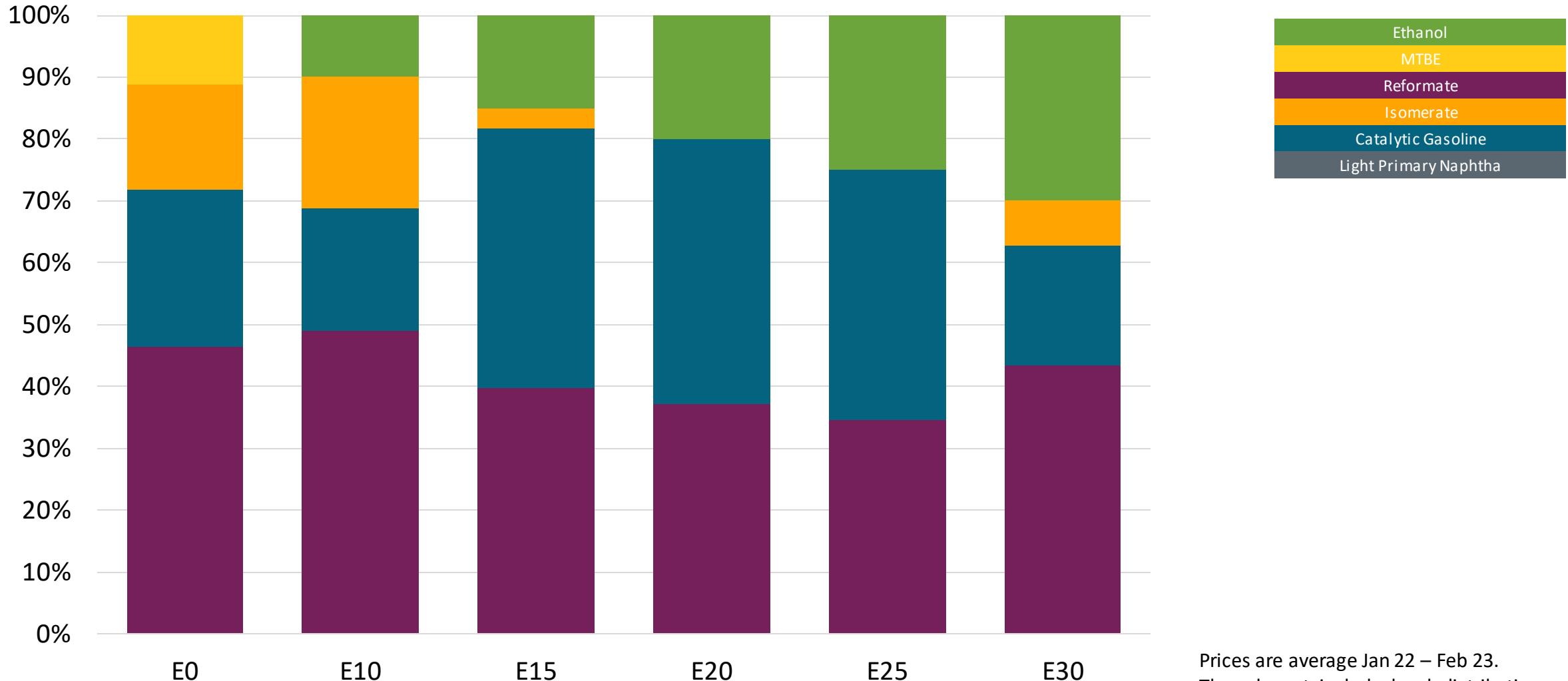
Chile – G93 RP Biobio – Octane Increment



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90, 2023

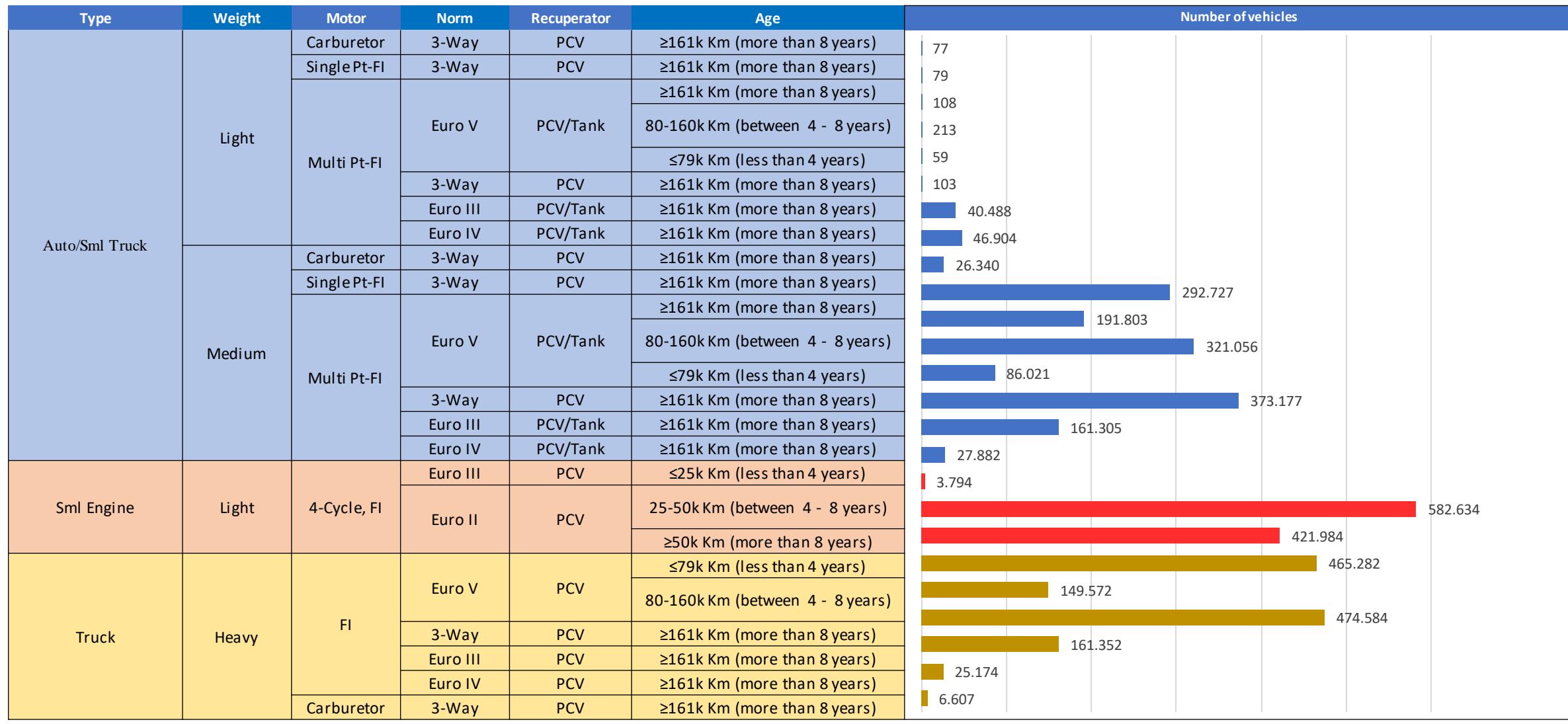
Chile – G97 RP Biobío – Octane Increment



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90, 2023

Chile – Gasoline Vehicle Fleet



Vehicular Fleet: 3,859,325

Average Age: 12.8 years

Main Technology: Motor Multi-Fuel-Injection, Euro V, PCV Tank

Source: INE, 3CV, Ministerio de Transporte, 2022

Chile – Gasoline Vehicle Emissions

Emissions	E0 g/km	E10 g/km	E15 g/km	E20 g/km	E25 g/km	E30 g/km	E10 - E0	E20 - E0	E30 - E0	Euro 6	TIER USA
CO	3.42	3.27	3.15	3.05	2.98	2.87	-5%	-11%	-16%	1	3.5
VOC	0.25	0.25	0.25	0.25	0.25	0.25	-2%	-2%	-2%	95	255
VOC_{evap}	0.29	0.29	0.29	0.30	0.31	0.31	0%	4%	7%	0.1	0.273
NOx	0.21	0.20	0.19	0.18	0.17	0.15	-6%	-17%	-28%	0.06	0.203
SOx	0.00	0.00	0.00	0.00	0.00	0.00	-8%	-21%	-36%		
NH3	0.07	0.07	0.07	0.07	0.07	0.07	-1%	1%	2%		
Butadiene	0.00	0.00	0.00	0.00	0.00	0.00	-1%	-1%	0%		
Acetaldehyde	0.01	0.01	0.02	0.02	0.03	0.04	68%	249%	440%		
Formaldehyde	0.02	0.02	0.03	0.03	0.03	0.03	13%	39%	78%		
Benzene	0.01	0.01	0.01	0.01	0.01	0.01	-5%	-7%	-14%		
CO2	218.53	196.67	199.86	198.12	196.13	195.35	-10%	-9%	-11%		
N2O	0.00	0.00	0.00	0.00	0.00	0.00	0%	2%	4%		
CH4	0.06	0.06	0.06	0.06	0.06	0.07	0%	4%	7%		
PM 2.5	0.01	0.01	0.01	0.01	0.01	0.00	-12%	-35%	-60%		
PM10	0.01	0.01	0.00	0.00	0.00	0.00	-12%	-35%	-60%	0.005	0.007
THC	0.10	0.10	0.12	0.12	0.14	0.15	7%	27%	50%		

Ethanol Blending in Ethanol - Colombia



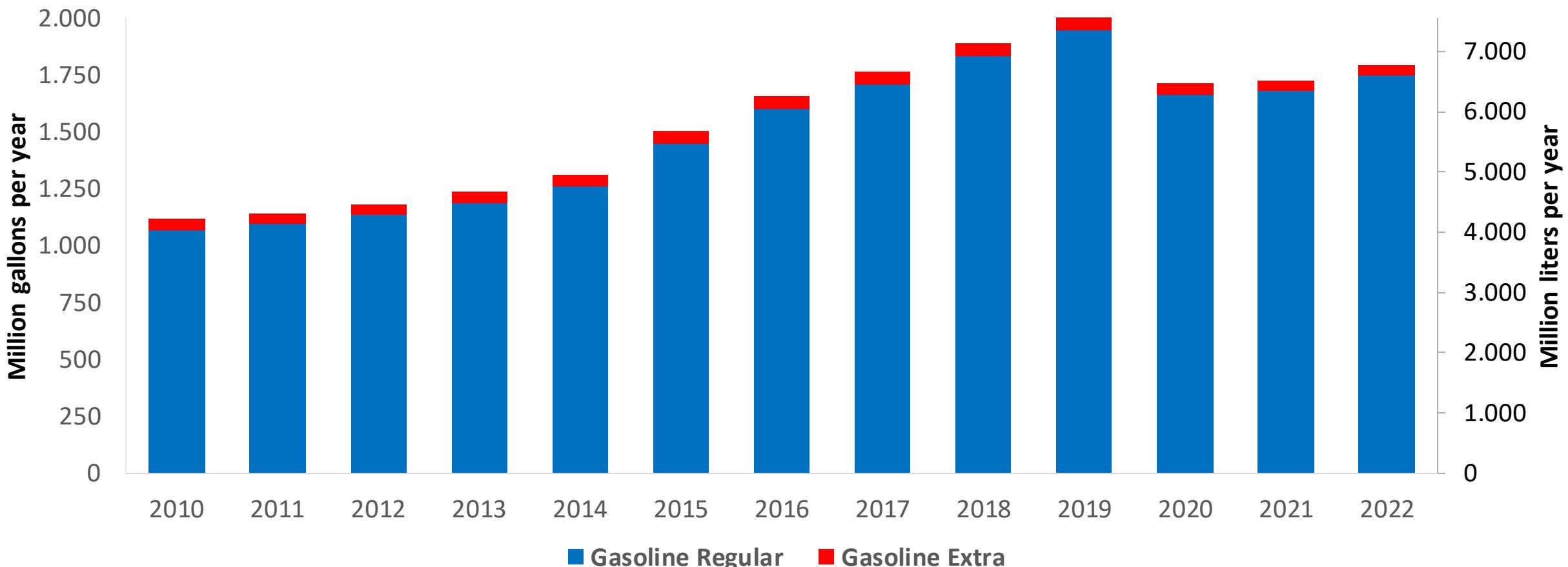
In 2022, gasoline consumption in Colombia was 1,800 million gallons (6,800 million liters). Market share was 3% for Extra gasoline E10 (RON 97 – AKI 94) and 97% for Corriente gasoline (regular) E10 (RON 89 – AKI 84). Local production supplies 65% of total demand. United States is the mainly source of gasoline imports.

Resolution 40391 of 2023 authorizes the blending of up to 7% ethanol in the country, but allows up to 10% in accordance with Decree 675 of 2015. E10 is the predominant grade in the country except on the border with Venezuela. The ethanol supply comes from imports from the United States and from local production.

Source: ACP, 2023

Gasoline Demand in Colombia

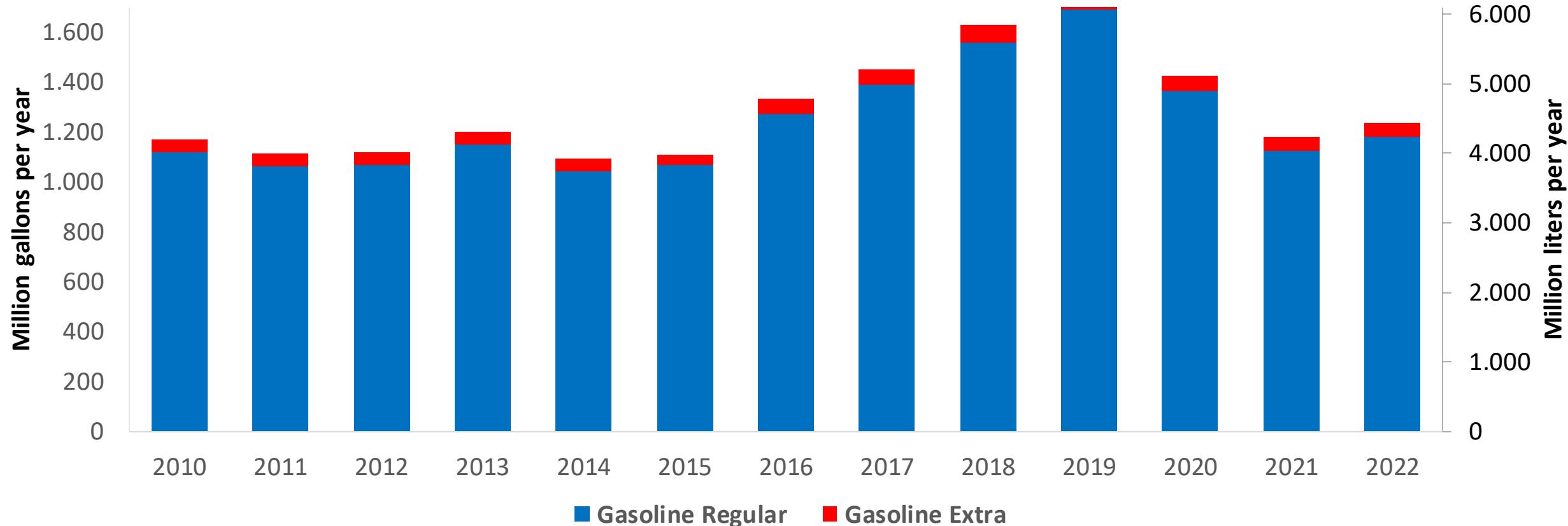
Gasoline Demand by Grade in Colombia



Source: ACP, 2023

Gasoline Production in Colombia

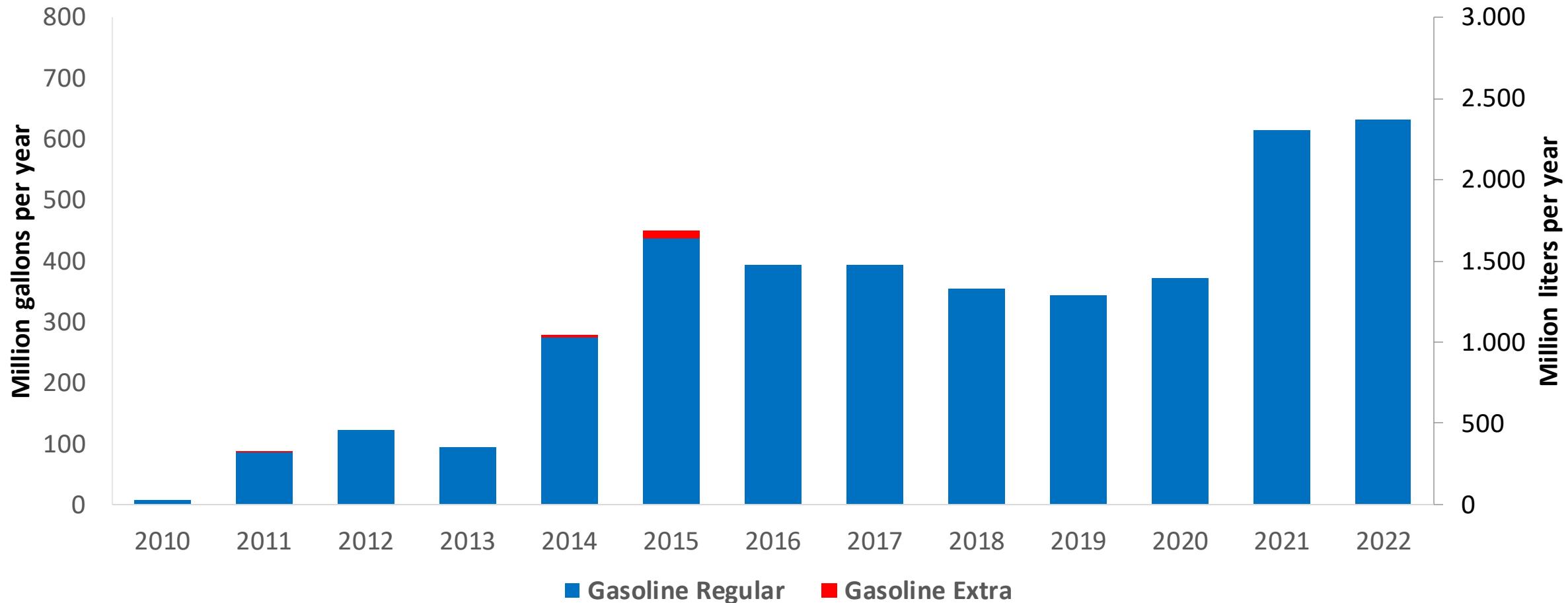
Gasoline Production by Grade in Colombia



Fuente: ACP, 2023

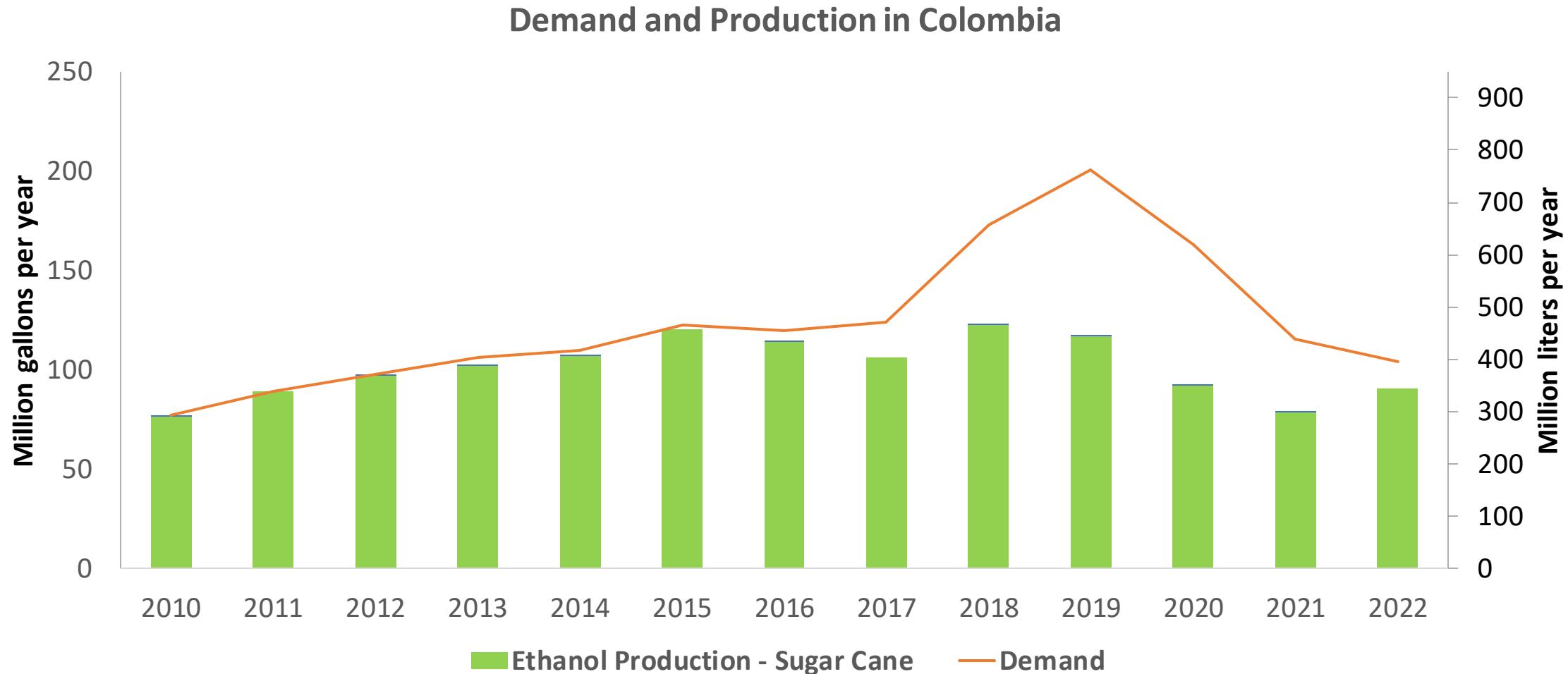
Gasoline Imports in Colombia

Gasoline Imports by Grade in Colombia



Fuente: ACP, 2023

Ethanol Balance in Colombia

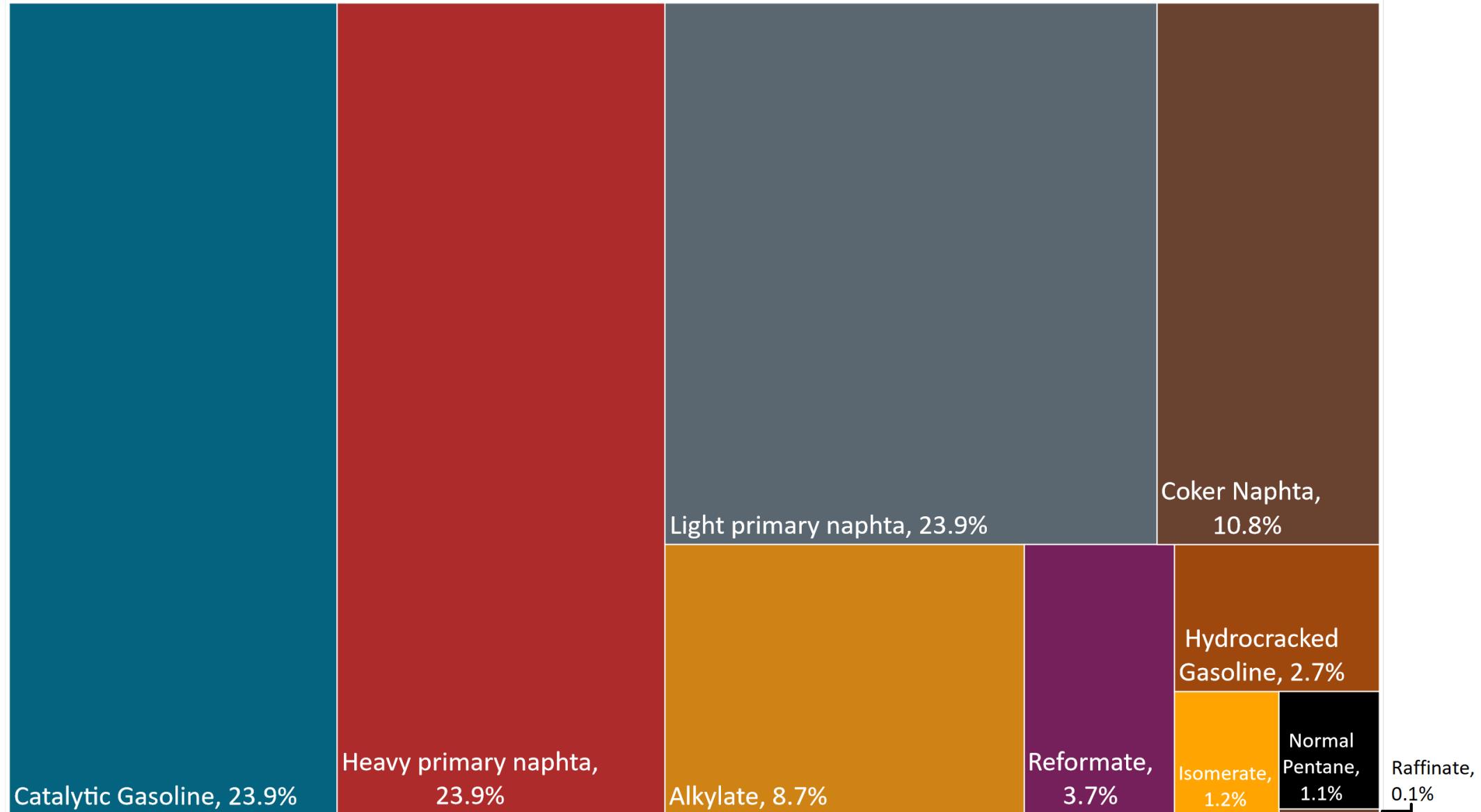


Source: Asocaña - Balance Azucarero Colombiano, 2020; EIA, 2023

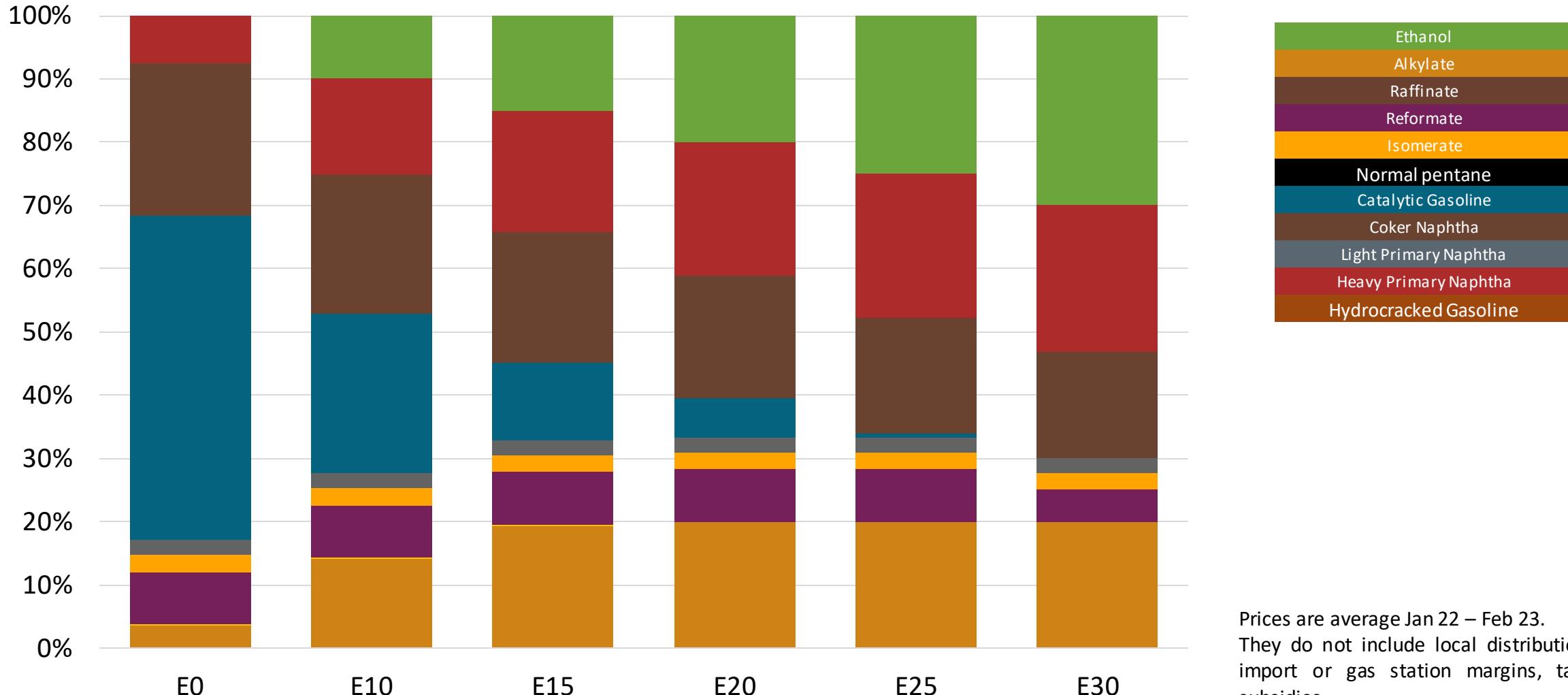
Gasoline Quality in Colombia

Name	Resolution 40103 de 2021				EN 228:2012 + A1:2017 (Euro 6 enabling)			
Implementation Date	2021				2017			
Applicability	Whole country	Whole country	Whole country	Whole country	All countries			
Selected Grade	Gasoline Regular	Gasoline Extra	Gasoline Regular E10	Gasoline Extra E10	RON 95 E5	RON 95 E10	RON 98 E5	RON 98 E10
Benzene Content	< 1,0 %v/v	< 2,0 %v/v	< 0,9 %v/v	< 1,8 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v
Aromatics	< 28 %v/v	< 35 %v/v	< 25 %v/v	< 31,5 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v
Olefins	-	-	-	-	< 18 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v
Lead Content	< 0,013 g/l	< 0,013 g/l	< 0,013 g/l	< 0,013 g/l	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l
Manganese	-	-	-	-	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l
RON	> 84	> 93	> 89	> 97	> 95	> 95	> 98	> 98
MON	-	-	-	-	> 85	> 88	> 85	> 88
AKI	> 81	> 91	> 84	> 94				
Sulfur Content	< 50 mg/kg	< 50 mg/kg	< 50 mg/kg	< 50 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg
Oxygen Content			< 3,7 %m/m	< 3,7 %m/m	<2,7 % m/m	<3,7 % m/m	<2,7 % m/m	<3,7 % m/m
Ethanol (EtOH)	<> 9,5 - 10,5 %v/v	<> 9,5 - 10,5 %v/v	<> 9,5 - 10,5 %v/v	<> 9,5 - 10,5 %v/v	<5 %v/v	<10 %v/v	<5 %v/v	<10 %v/v
RVP 37.8°C (Summer)	<> 65 kPa	<> 65 kPa	<> 65 kPa	<> 65 kPa	<> 60 - 70 kPa *Depends on the country, RVP is regulated in the EU Fuel Quality Directive			
RVP 37.8 °C(Winter)								
RVP 37.8°C (Transition)								
MTBE					-	-	-	-
Ethers 5 or more C Atoms	-	-	-	-	Based on oxygen content	<22 %v/v	Based on oxygen content	<22 %v/v

Available Blending Components



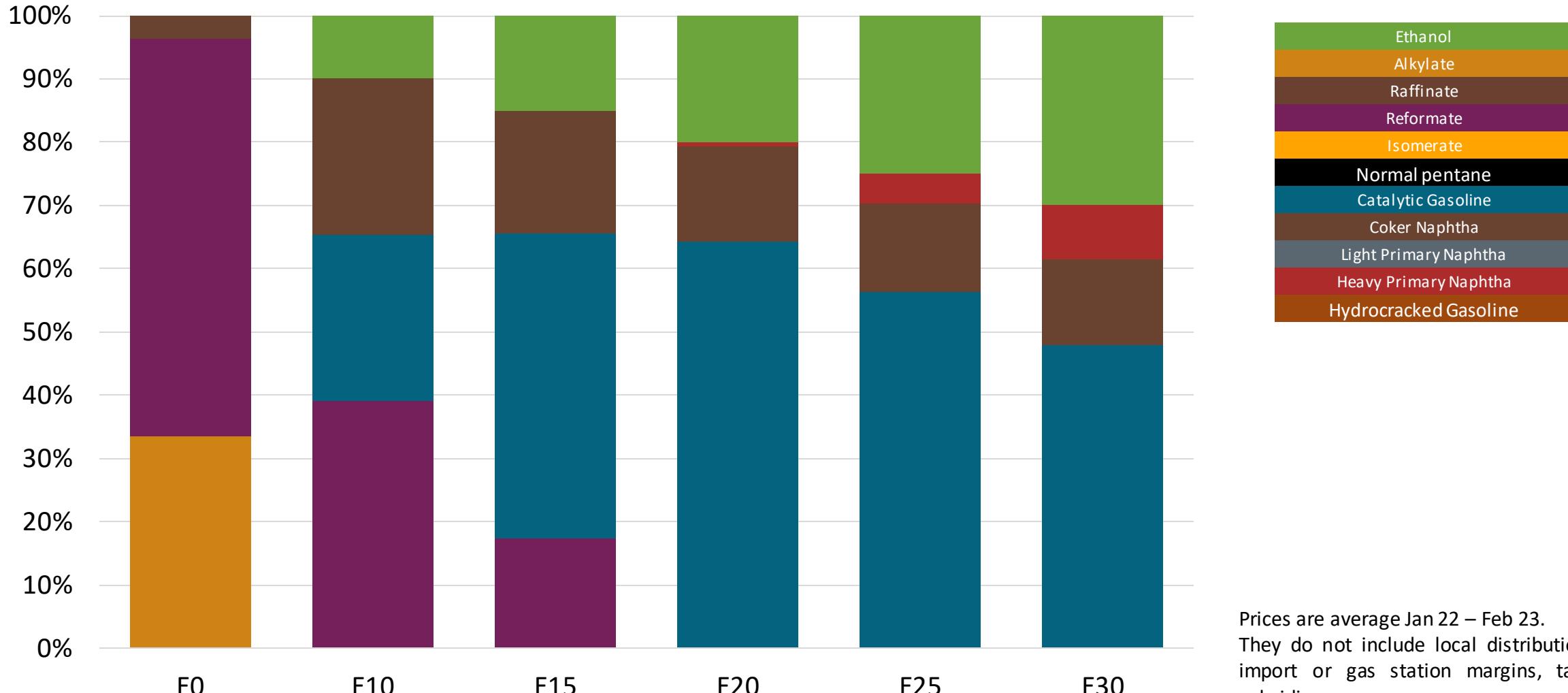
Colombia – G. Regular – Constant Octane



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90

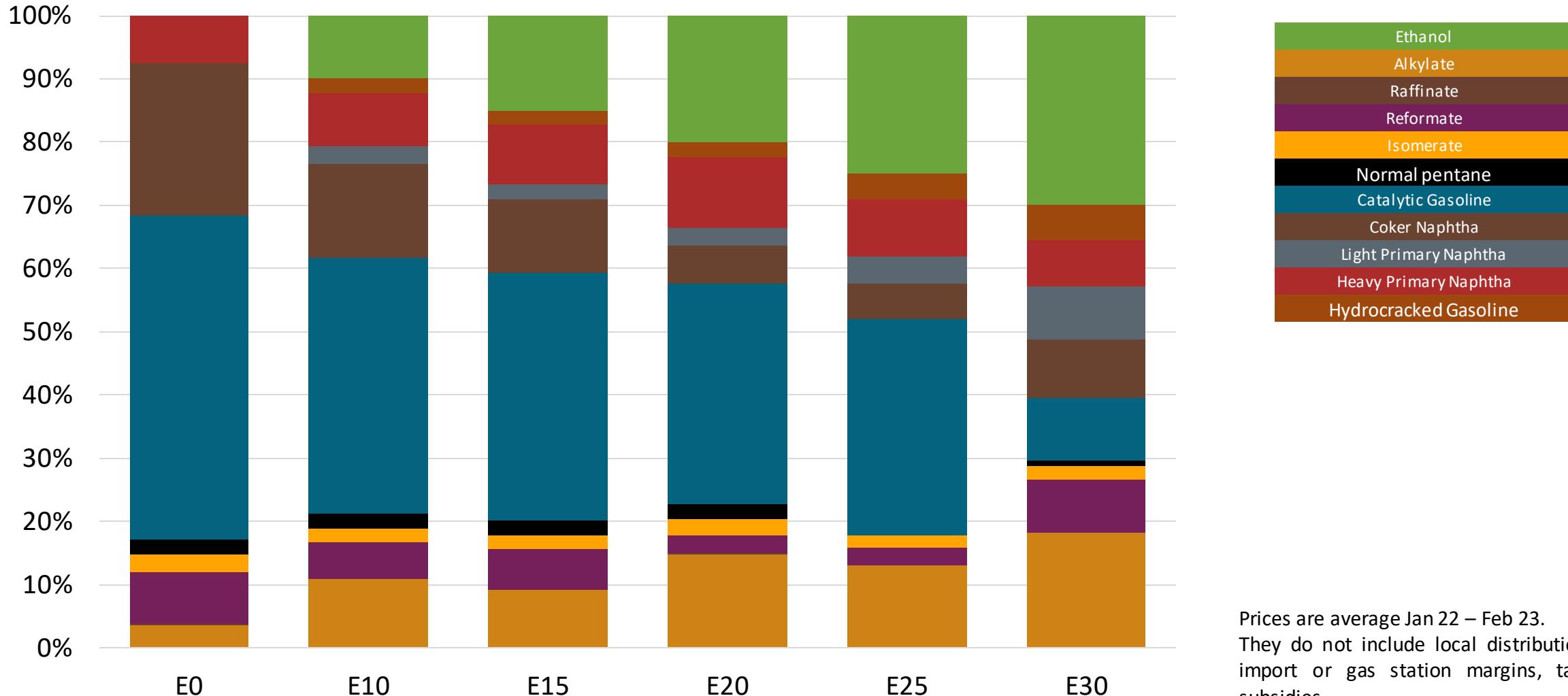
Colombia – G. Extra – Constant Octane



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90

Colombia – G. Regular – Octane Increment

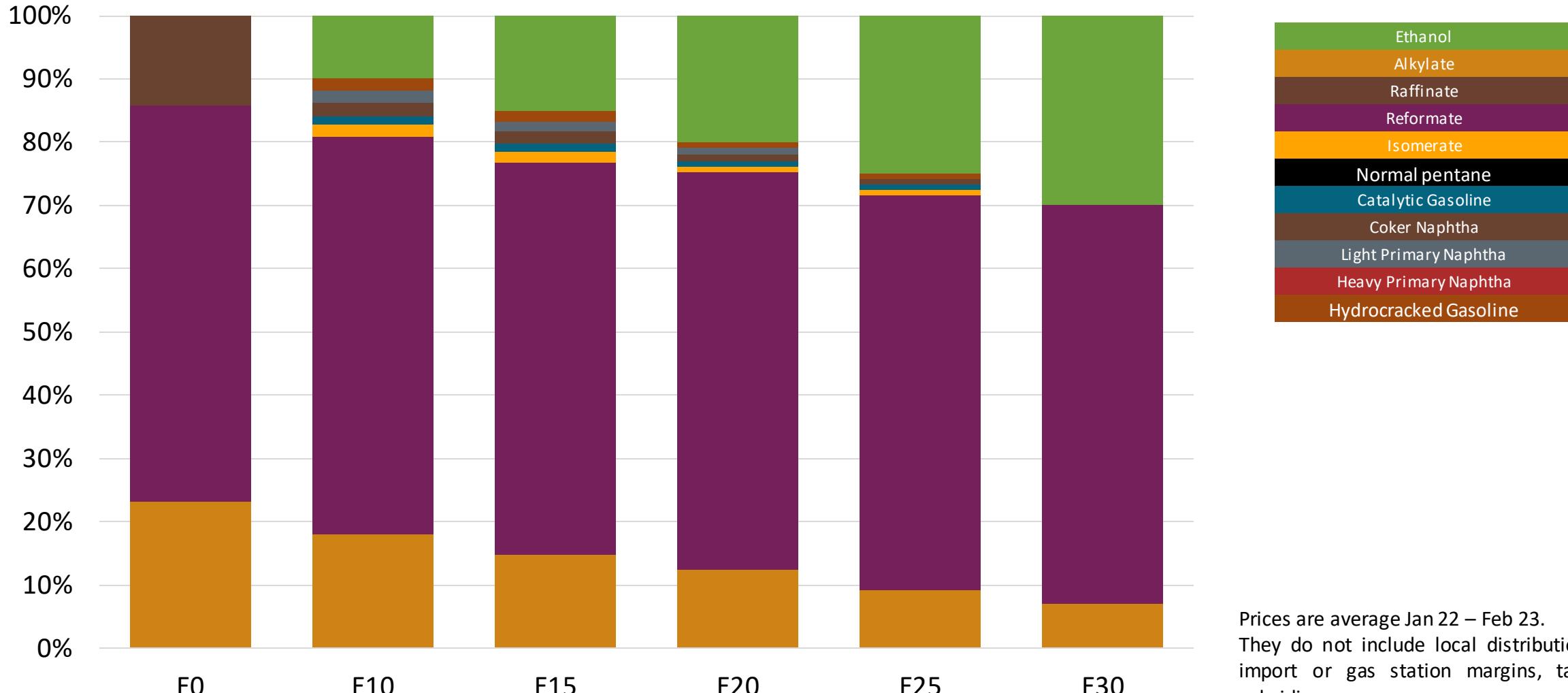


Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90

Octane (RON)	89.0	90.5	91.7	92.3	94.4	95.1
Price (USD/gal)	\$ 2.217	\$ 2.217	\$ 2.217	\$ 2.217	\$ 2.217	\$ 2.217

Colombia – G. Extra – Octane Increment

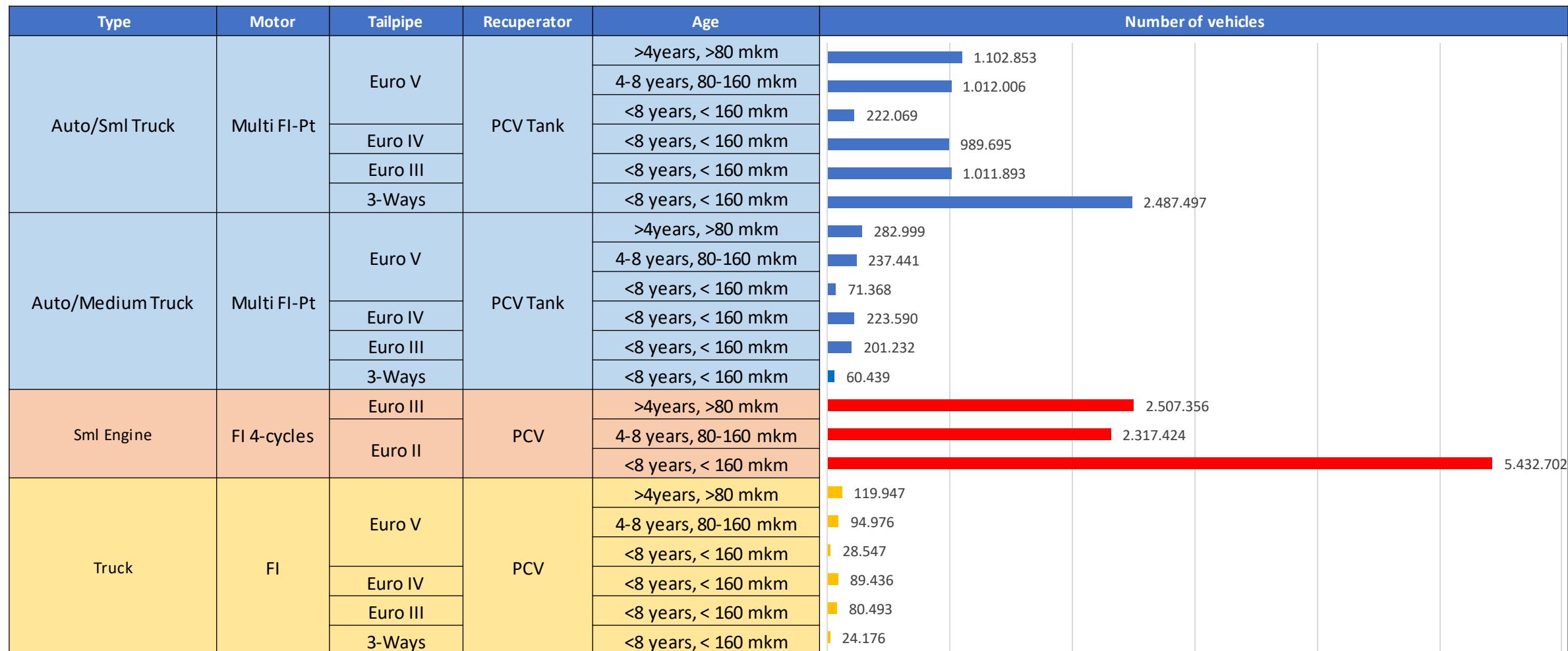


Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90

Octane (RON)	96.8	98.4	100.2	101.7	103.4	104.9
Price (USD/gal)	\$ 2.509	\$ 2.509	\$ 2.509	\$ 2.509	\$ 2.509	\$ 2.509

Gasoline Vehicle Fleet - Colombia



Vehicular Fleet: **14,259,624**

Average Age: **12.8 years**

Motorcycles Fleet: **72%**

Colombia – Vehicular Emissions

Emissions	E0 g/km	E10 g/km	E15 g/km	E20 g/km	E25 g/km	E30 g/km	E10 - E0	E20 - E0	E30 - E0	Euro 6	TIER USA
CO	22.65	20.77	20.16	19.62	19.23	18.69	-8%	-13%	-17%	1	3.5
VOC	2.09	1.94	1.90	1.86	1.83	1.79	-7%	-11%	-15%	95	255
VOCeVap	0.62	0.62	0.63	0.64	0.66	0.67	0%	4%	7%	0.1	0.273
NOx	0.97	0.68	0.64	0.60	0.56	0.52	-30%	-38%	-46%	0.06	0.203
SOx	0.01	0.01	0.01	0.01	0.01	0.01	-15%	-28%	-41%		
NH3	0.06	0.06	0.06	0.06	0.06	0.06	-2%	0%	1%		
Butadiene	0.01	0.01	0.01	0.01	0.01	0.01	-8%	-12%	-16%		
Acetaldehyde	0.02	0.04	0.06	0.08	0.09	0.11	68%	249%	372%		
Formaldehyde	0.09	0.11	0.12	0.13	0.14	0.16	13%	39%	68%		
Benzene	0.10	0.10	0.09	0.09	0.09	0.09	-9%	-11%	-18%		
CO2	348.07	330.67	324.02	320.73	317.66	311.80	-5%	-8%	-10%		
N2O	0.02	0.02	0.02	0.02	0.02	0.02	-1%	2%	4%		
CH4	0.46	0.46	0.47	0.48	0.49	0.50	0%	4%	7%		
PM 2.5	0.03	0.02	0.02	0.02	0.01	0.01	-22%	-43%	-65%		
PM10	0.05	0.04	0.04	0.03	0.03	0.02	-22%	-43%	-65%	0.005	0.007
THC	0.70	0.71	0.76	0.79	0.82	0.86	3%	14%	23%		

Ethanol Blending in Gasoline - Costa Rica



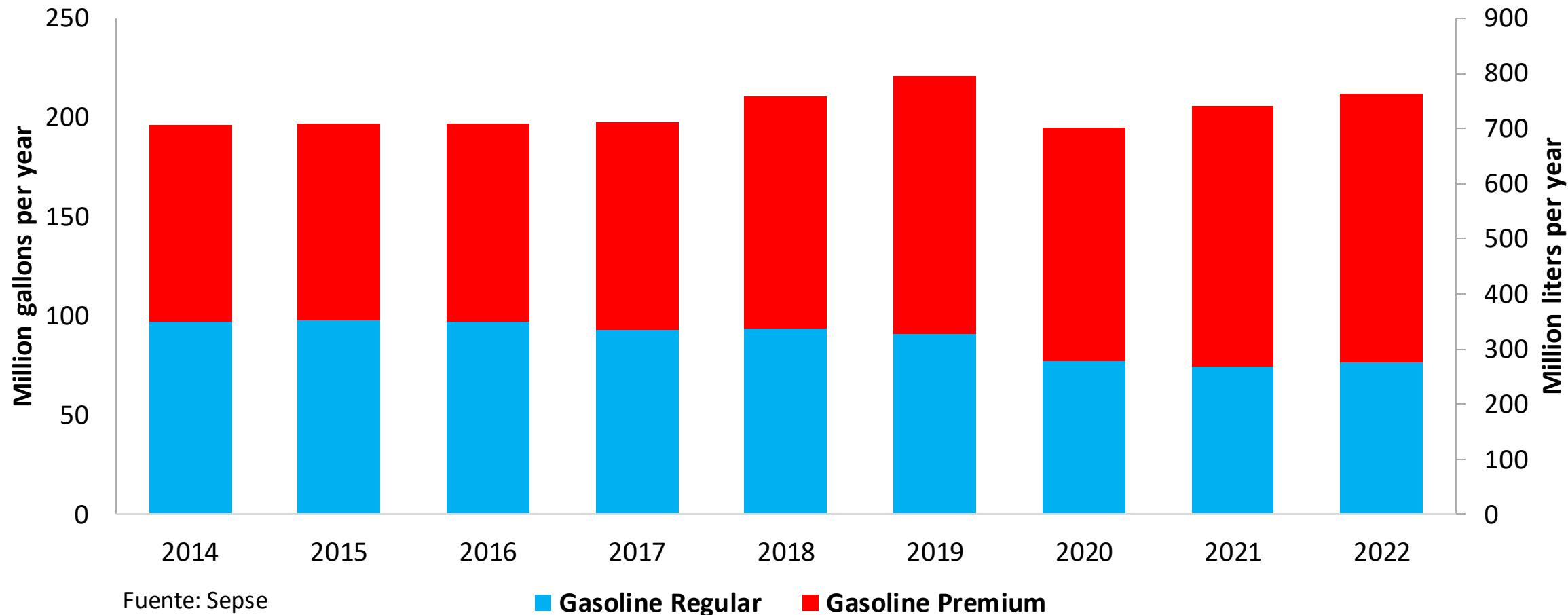
Costa Rica has two gasoline RON 95 and RON 91, with a market share of 51% for RON 91 and 49% for RON 95 in 2022. As it does not have refining capacity, gasoline blends are made only with components imported mainly from the United States and to a lesser extent from Europe.

Since 2010, it is allowed gasoline blends with up to 10% v/v of ethanol. However, this mandate is not yet reflected on the gasoline market. Current ethanol consumption is less than 0.2%. In 2022, ethanol production was 4.7 million liters and ethanol exports mainly to Europe was 4.1 million liters. Introduction of E8 is expected in 2024.

Source: Sepse

Gasoline Demand in Costa Rica

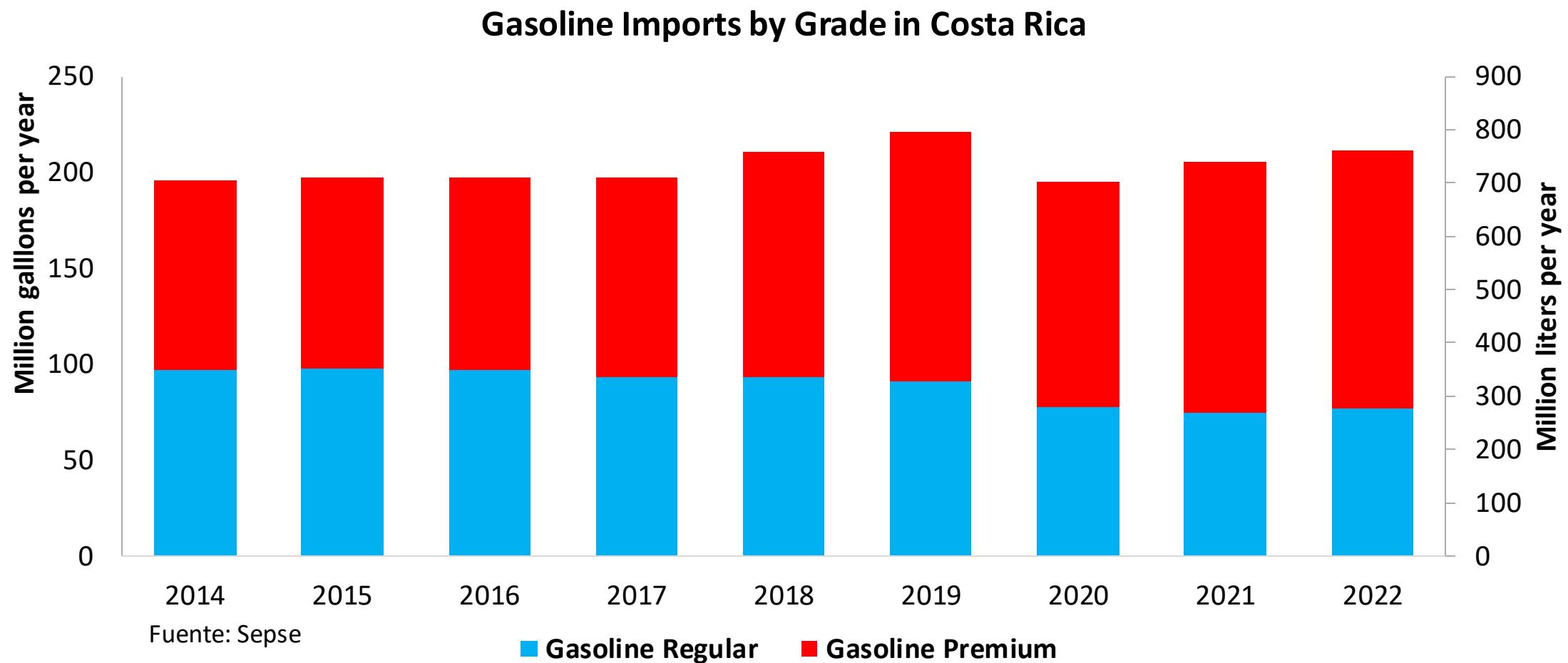
Gasoline Demand by Grade in Costa Rica



Fuente: Sepse

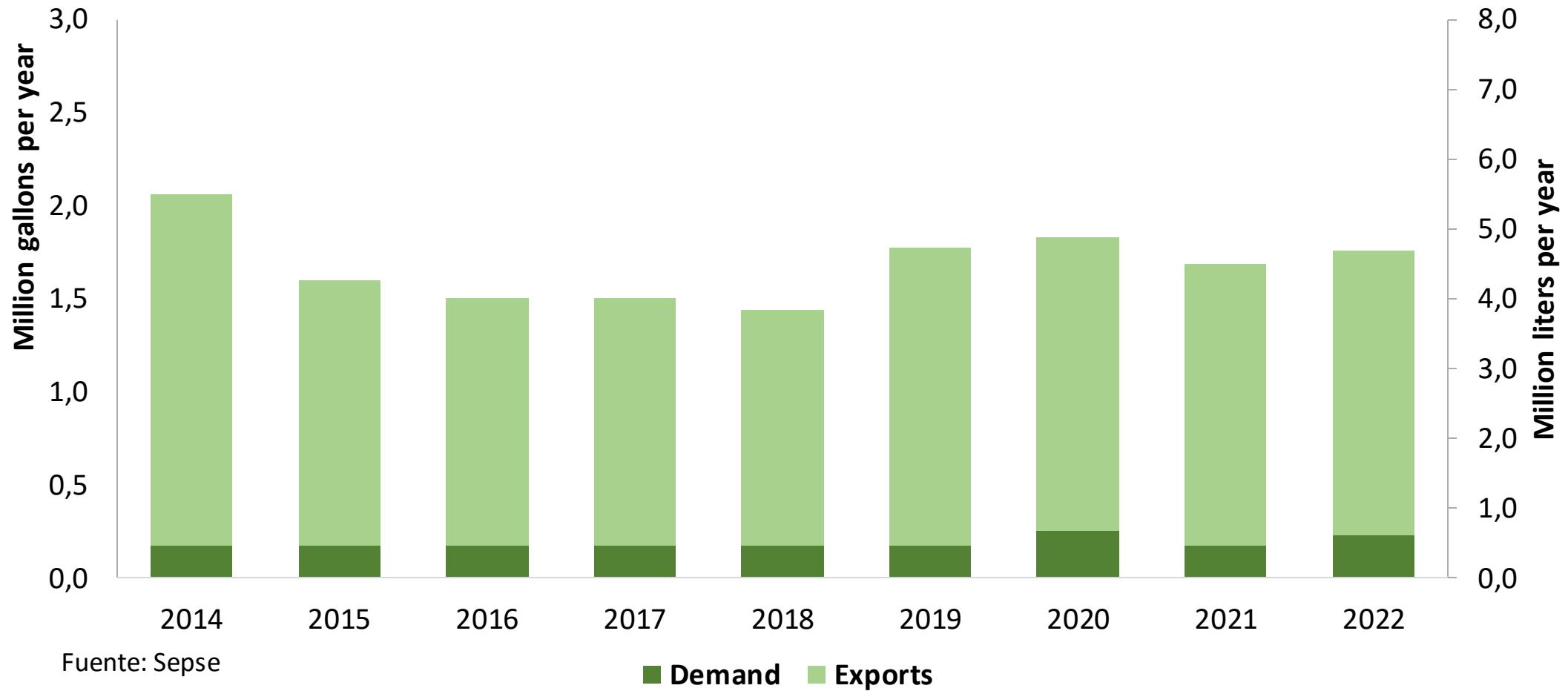
■ Gasoline Regular ■ Gasoline Premium

Gasoline Imports in Costa Rica



Ethanol Demand in Costa Rica

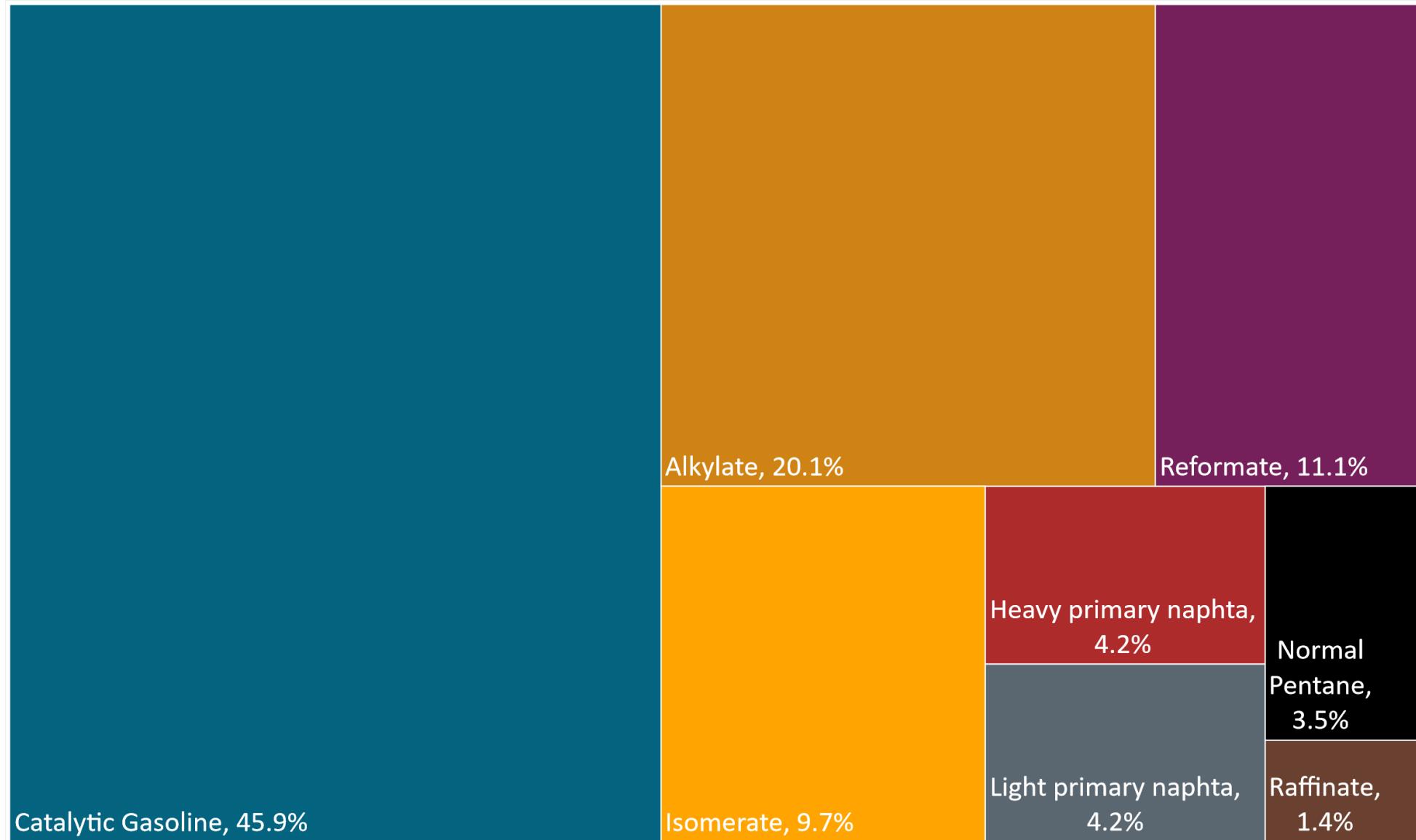
Ethanol Balance in Costa Rica



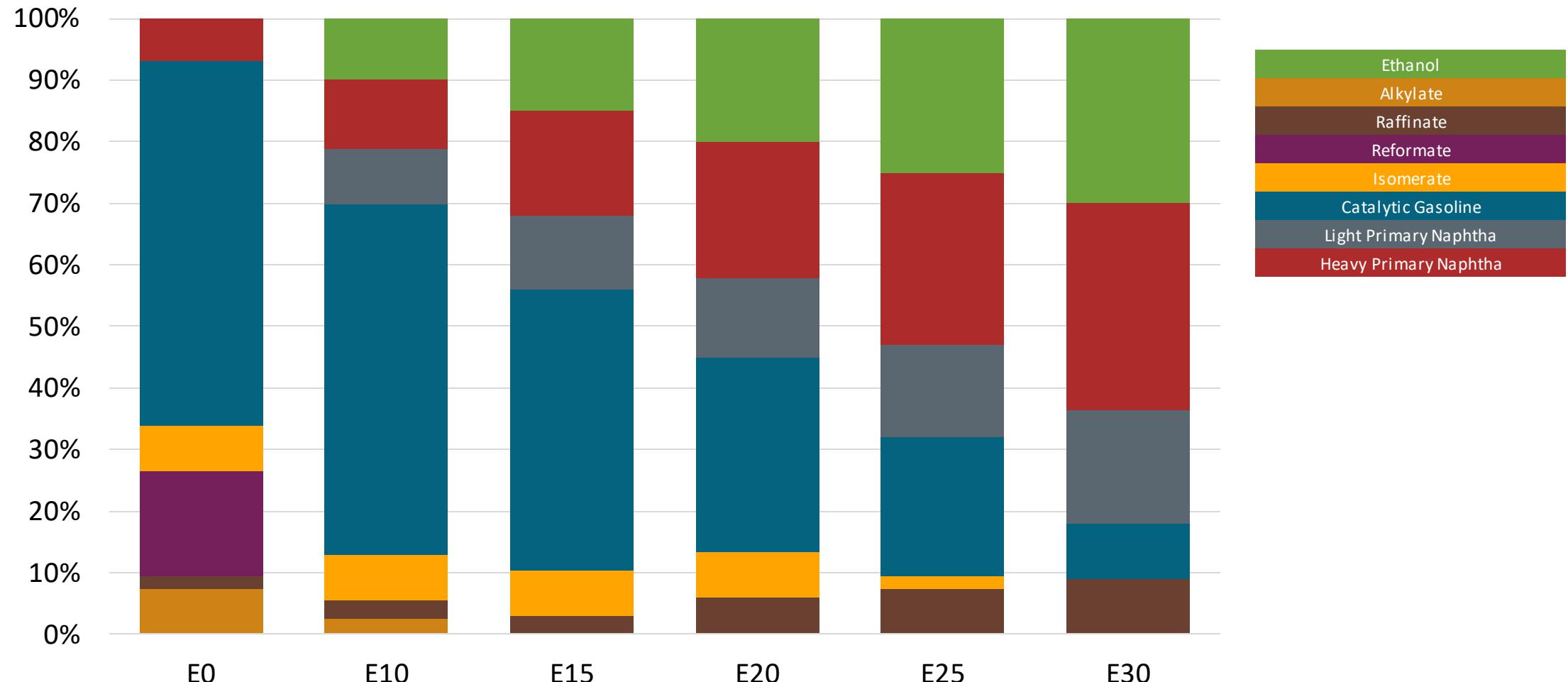
Gasoline Quality in Costa Rica

Name	INTE E1:2019		EN 228:2012 + A1:2017 (Euro 6 enabling)			
Implementation Date	2019		2017			
Applicability	Whole country	Whole country	All countries			
Selected Grade	RON 91	RON 95	RON 95 E5	RON 95 E10	RON 98 E5	RON 98 E10
Benzene Content	< 1,5% v/v	< 1,5% v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v
Aromatics	< 35% v/v	< 35% v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v
Olefins	< 18% v/v	< 18% v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v
Lead Content	< 0,013 g/l	< 0,013 g/l	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l
Manganese	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l
RON	> 91	> 95	> 95	> 95	> 98	> 98
MON	> 79	> 83	> 85	> 88	> 85	> 88
AKI						
Sulfur Content	< 50 mg/kg	< 50 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg
Oxygen Content	2,7% m/m (3,7% m/m if ethanol is added)	2,7% m/m (3,7% m/m if ethanol is added)	<2,7 % m/m	<3,7 % m/m	<2,7 % m/m	<3,7 % m/m
Ethanol (EtOH)	< 10% v/v	< 10% v/v	<5 %v/v	<10 %v/v	<5 %v/v	<10 %v/v
RVP 37.8°C (Summer)	< 69 kPa (< 76 kPa if ethanol is added)	< 69 kPa (< 76 kPa if ethanol is added)	<> 60 - 70 kPa *Depends on the country, RVP is regulated in the EU Fuel Quality Directive			
RVP 37.8 °C(Winter)						
RVP 37.8°C (Transition)						
MTBE	-		-	-	-	-
Ethers 5 or more C Atoms	-		Based on oxygen content	<22 %v/v	Based on oxygen content	<22 %v/v

Available Blending Components



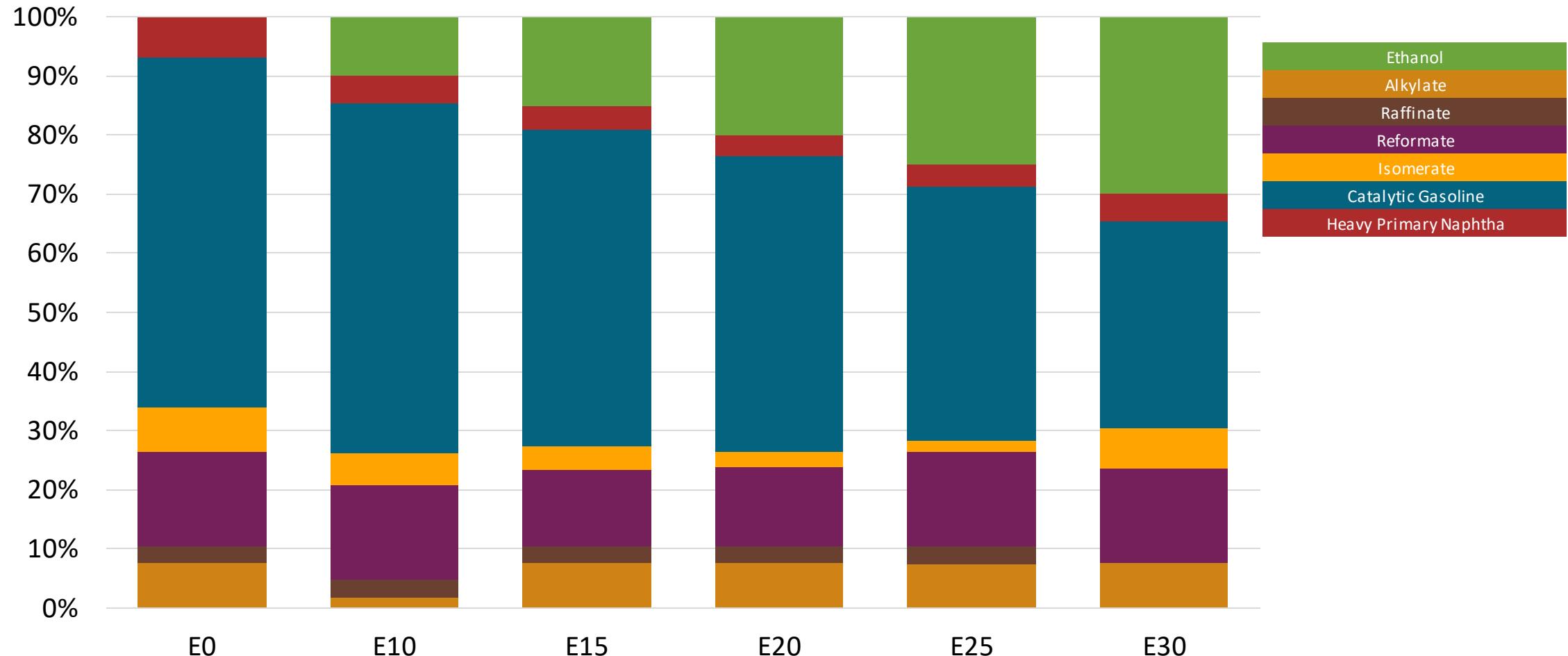
Ethanol Blending – Gasoline RON 91 – Constant Octane



Octane (RON)	91.0	91.0	91.0	91.0	91.2	91.3
Price (USD/gal)	\$2.36	\$2.19	\$2.13	\$2.07	\$2.01	\$1.95

Prices are average Jan 22 – Feb 23.
 They do not include local distribution costs,
 import or gas station margins, taxes and
 subsidies.

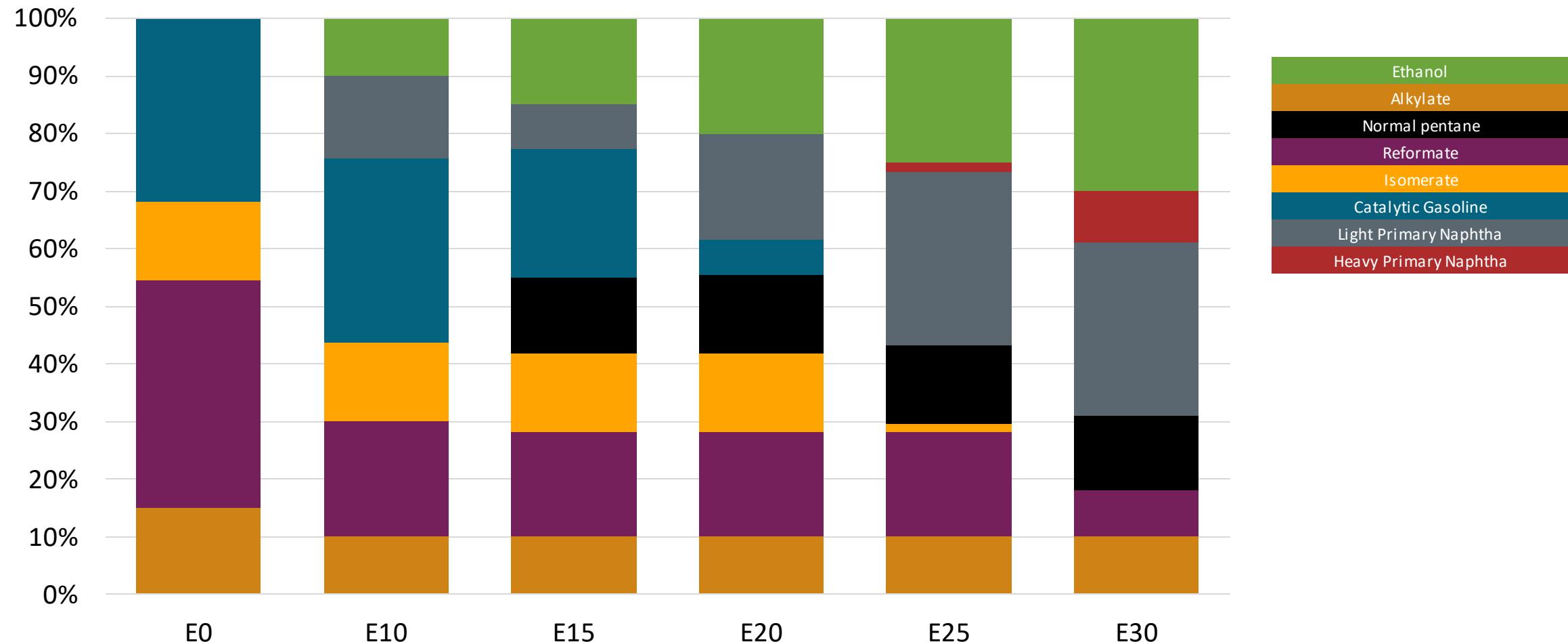
Ethanol Blending – Gasoline RON 91 – Octane Increment



Octane (RON)	90.9	94.0	95.2	96.7	98.1	99.7
Price (USD/gal)	\$2.35	\$2.35	\$2.35	\$2.35	\$2.35	\$2.35

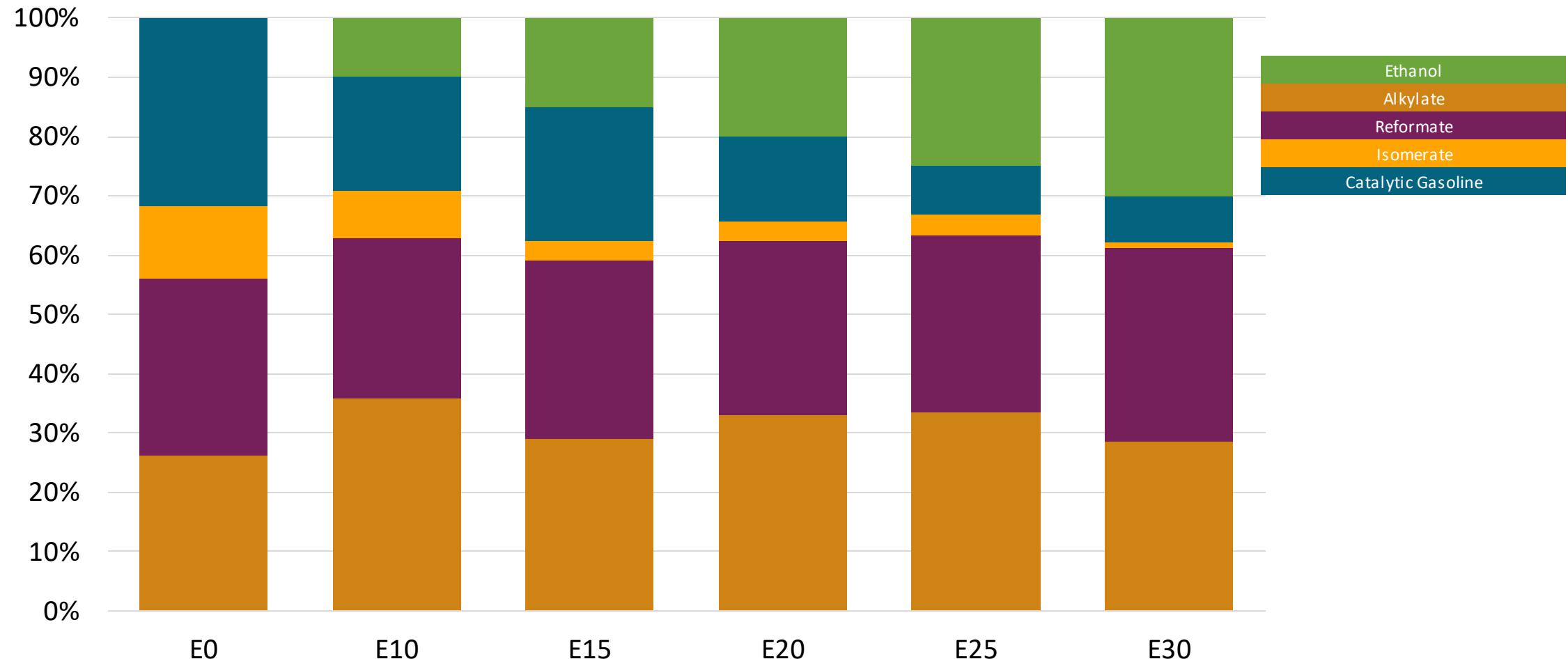
Prices are average Jan 22 – Feb 23.
 They do not include local distribution costs,
 import or gas station margins, taxes and
 subsidies.

Ethanol Blending – Gasoline RON 95 – Constant Octane



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Ethanol Blending – Gasoline RON 95 – Octane Increment



Octane (RON)	95.0	99.1	101.5	103.2	105.0	106.8
Price (USD/gal)	\$2.48	\$2.48	\$2.48	\$2.48	\$2.48	\$2.48

Prices are average Jan 22 – Feb 23.

They do not include local distribution costs, import or gas station margins, taxes and subsidies.

Gasoline Vehicle Fleet - Costa Rica



Vehicle Fleet: **1,575,585**

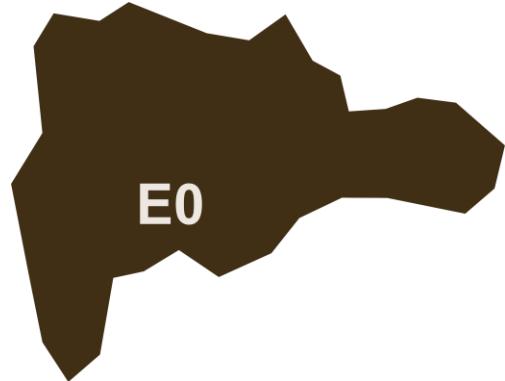
Average Age: **11 años**

Motorcycle: **19.6%**

Costa Rica – Gasoline Vehicle Emissions

Emissions	E0 g/km	E10 g/km	E15 g/km	E20 g/km	E25 g/km	E30 g/km	E10 - E0	E20 - E0	E30 - E0	Euro 6	TIER USA
CO	13.48	12.34	11.97	11.63	11.39	11.06	-8%	-14%	-18%	1	3.5
VOC	1.24	1.15	1.12	1.10	1.08	1.06	-7%	-11%	-15%	95	255
VOCeVap	0.49	0.49	0.50	0.51	0.52	0.53	0%	4%	7%	0.1	0.273
NOx	0.63	0.44	0.41	0.39	0.36	0.34	-30%	-38%	-46%	0.06	0.203
SOx	0.01	0.01	0.01	0.00	0.00	0.00	-15%	-28%	-41%		
NH3	0.07	0.07	0.07	0.07	0.07	0.07	-2%	0%	1%		
Butadiene	0.01	0.01	0.01	0.01	0.01	0.01	-7%	-11%	-14%		
Acetaldehyde	0.02	0.03	0.04	0.06	0.06	0.08	68%	249%	372%		
Formaldehyde	0.06	0.07	0.08	0.09	0.09	0.10	13%	39%	68%		
Benzene	0.06	0.06	0.06	0.05	0.05	0.05	-9%	-11%	-18%		
CO2	278.82	264.88	259.56	256.92	254.37	249.68	-5%	-8%	-10%		
N2O	0.01	0.01	0.01	0.01	0.01	0.01	-1%	2%	4%		
CH4	0.27	0.27	0.28	0.28	0.29	0.29	0%	4%	7%		
PM 2.5	0.02	0.02	0.02	0.01	0.01	0.01	-22%	-43%	-65%		
PM10	0.03	0.03	0.02	0.02	0.02	0.01	-22%	-43%	-65%	0.005	0.007
THC	0.42	0.43	0.46	0.49	0.51	0.53	3%	16%	26%		

Ethanol Blending in Gasoline – Dominican Republic

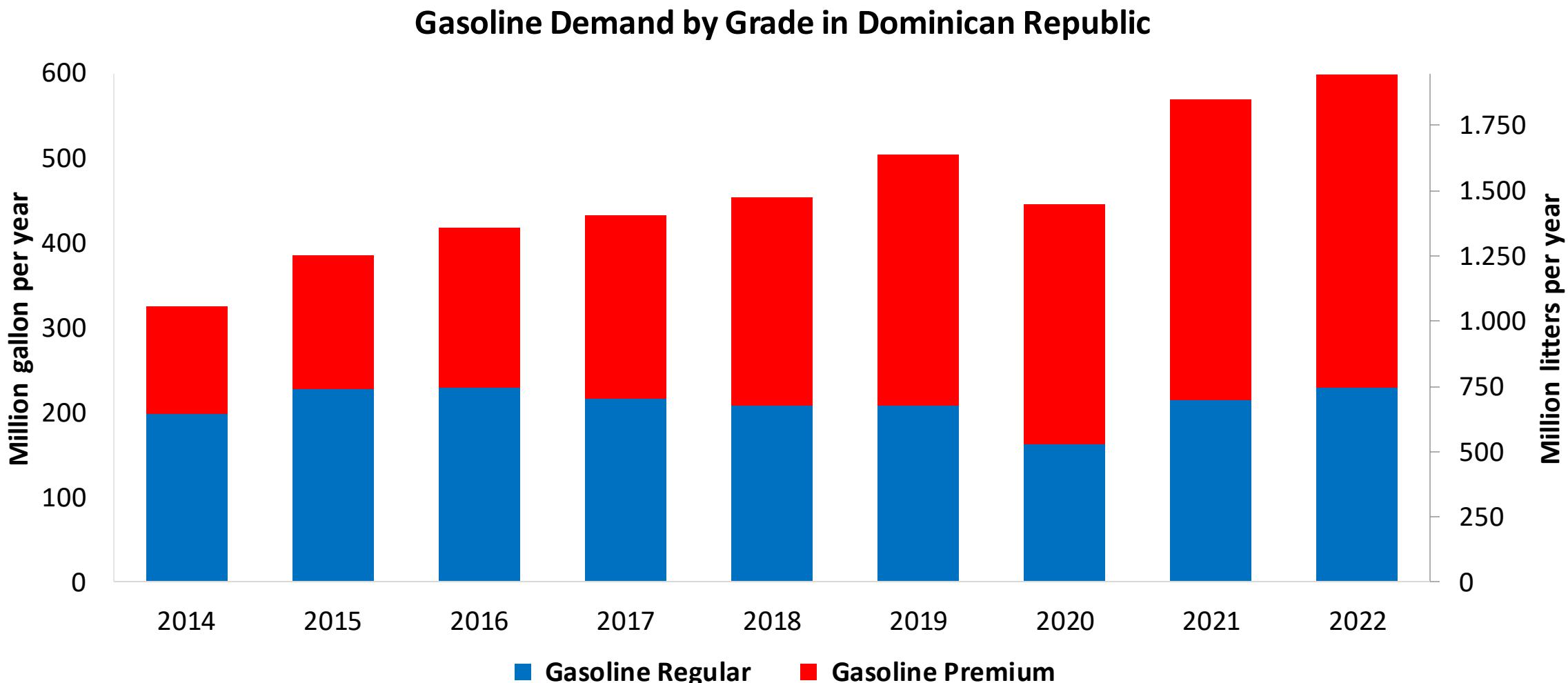


National demand is covered up by local production representing 20%, and imports from United States, Trinidad and Tobago, Caribbean, among other countries. In 2022, regular gasoline consumption was 38.3% of total demand and premium 61.7%.el de premium de 61.7%.

Dominican Republic does not currently have an ethanol mandate.

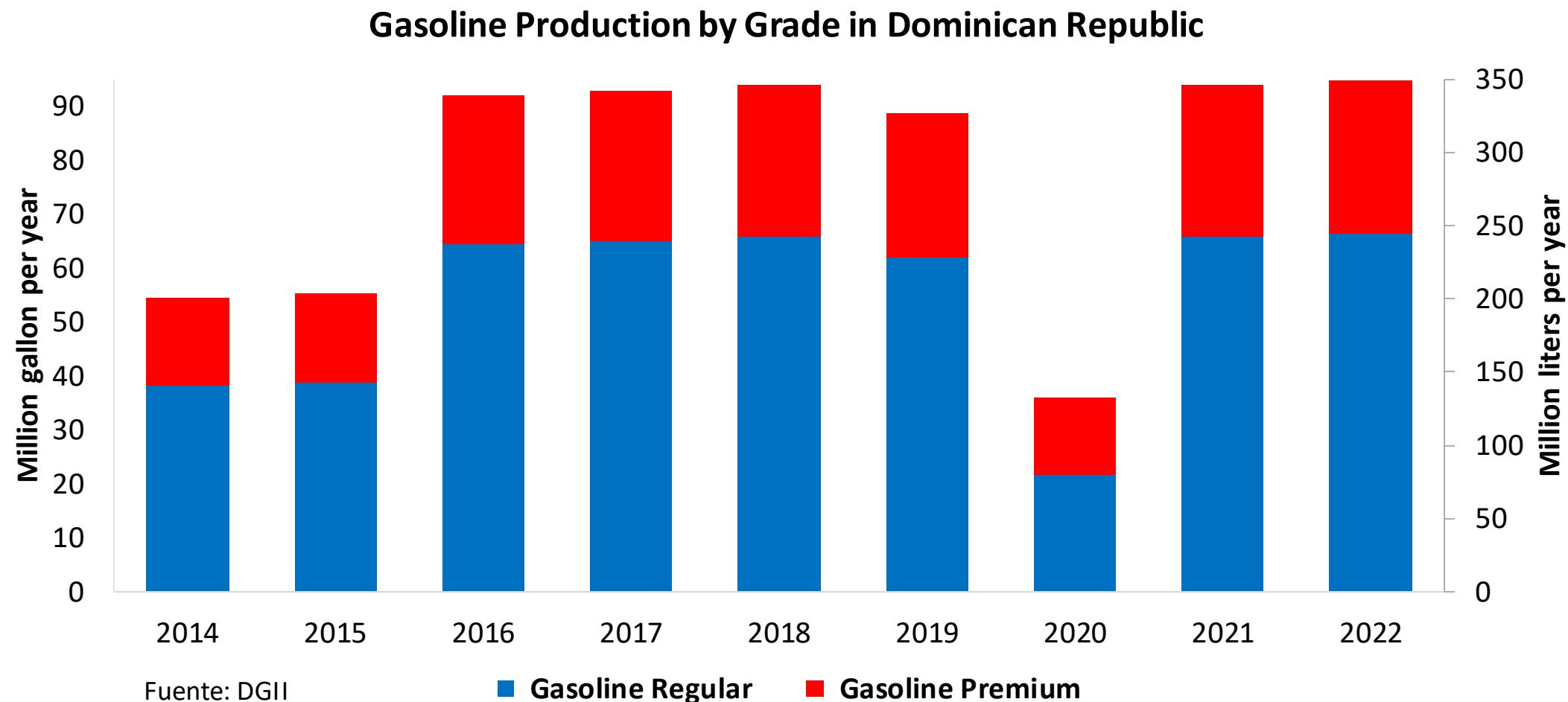
Source: DGII

Gasoline Demand in Dominican Republic

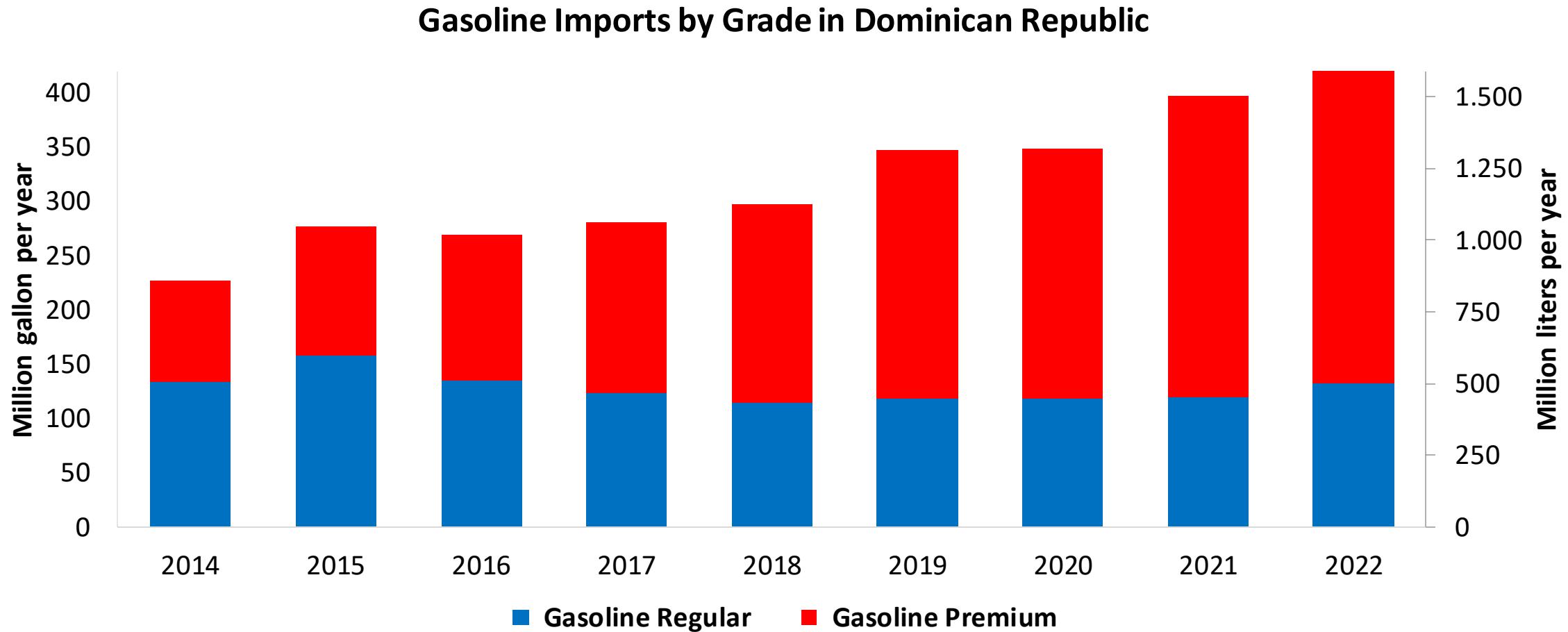


Fuente: DGII

Gasoline Production in Dominican Republic



Gasoline Imports in Dominican Republic

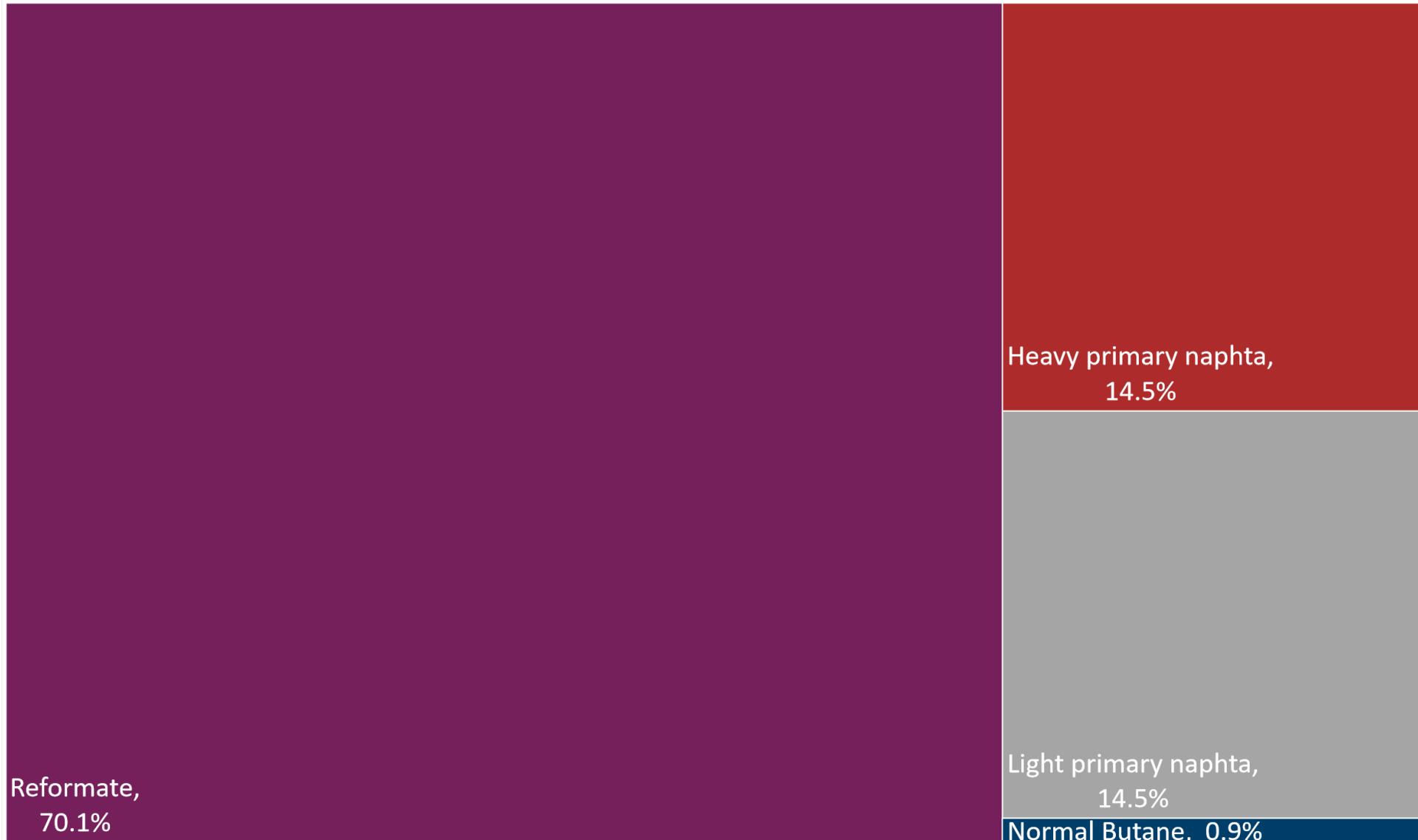


Fuente: DGII

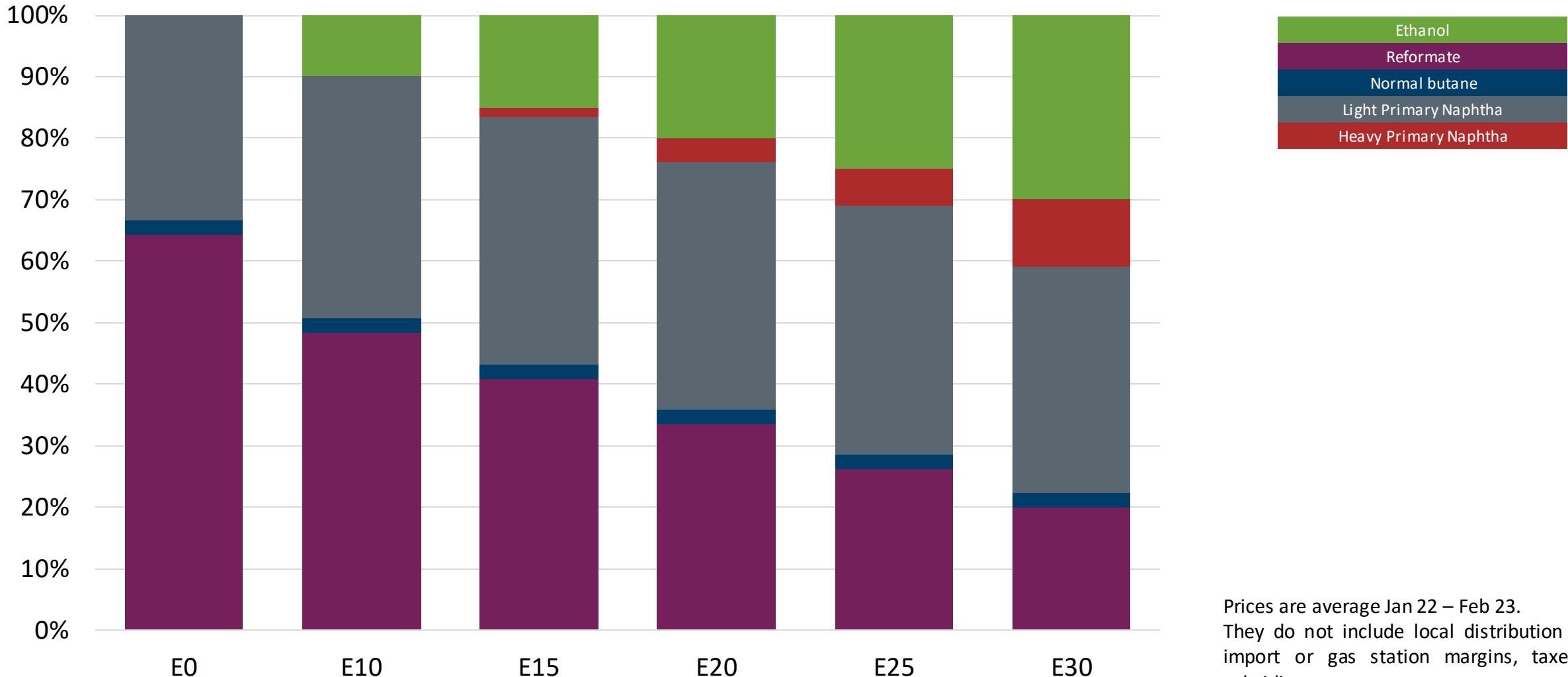
Gasoline Quality in Dominican Republic

Name	NORDOM 476 3rd Revision				EN 228:2012 + A1:2017 (Euro 6 enabling)			
Implementation Date	2015				2017			
Applicability	Whole country	Whole country	Whole country	Whole country	All countries			
Selected Grade	Regular Gasoline	Premium Gasoline	Oxygenated Regular Gasoline	Oxygenated Premium Gasoline	RON 95 E5	RON 95 E10	RON 98 E5	RON 98 E10
Benzene Content	-	-	-	-	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v
Aromatics	-	-	-	-	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v
Olefins	-	-	-	-	< 18 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v
Lead Content	< 0,013 g/l	< 0,013 g/l	< 0,013 g/l	< 0,013 g/l	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l
Manganese	< 8,3 mg/l	< 8,3 mg/l	< 8,3 mg/l	< 8,3 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l
RON	> 89	> 95	> 90	> 96	> 95	> 95	> 98	> 98
MON	> 76	> 82	> 77	> 83	> 85	> 88	> 85	> 88
AKI								
Sulfur Content	< 1.500 mg/kg	< 1.500 mg/kg	< 1.500 mg/kg	< 1.500 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg
Oxygen Content			< 3.5 %m/m	< 3.5 %m/m	<2,7 % m/m	<3,7 % m/m	<2,7 % m/m	<3,7 % m/m
Ethanol (EtOH)			< 10 %v/v	< 10 %v/v	<5 %v/v	<10 %v/v	<5 %v/v	<10 %v/v
RVP 37.8°C (Summer)	< 61 kPa	< 61 kPa	< 69 kPa	< 69 kPa	<> 60 - 70 kPa *Depends on the country, RVP is regulated in the EU Fuel Quality Directive			
RVP 37.8 °C(Winter)								
RVP 37.8°C (Transition)								
MTBE					-	-	-	-
Ethers 5 or more C Atoms	-	-	-	-	Based on oxygen content	<22 %v/v	Based on oxygen content	<22 %v/v

Available Blending Components



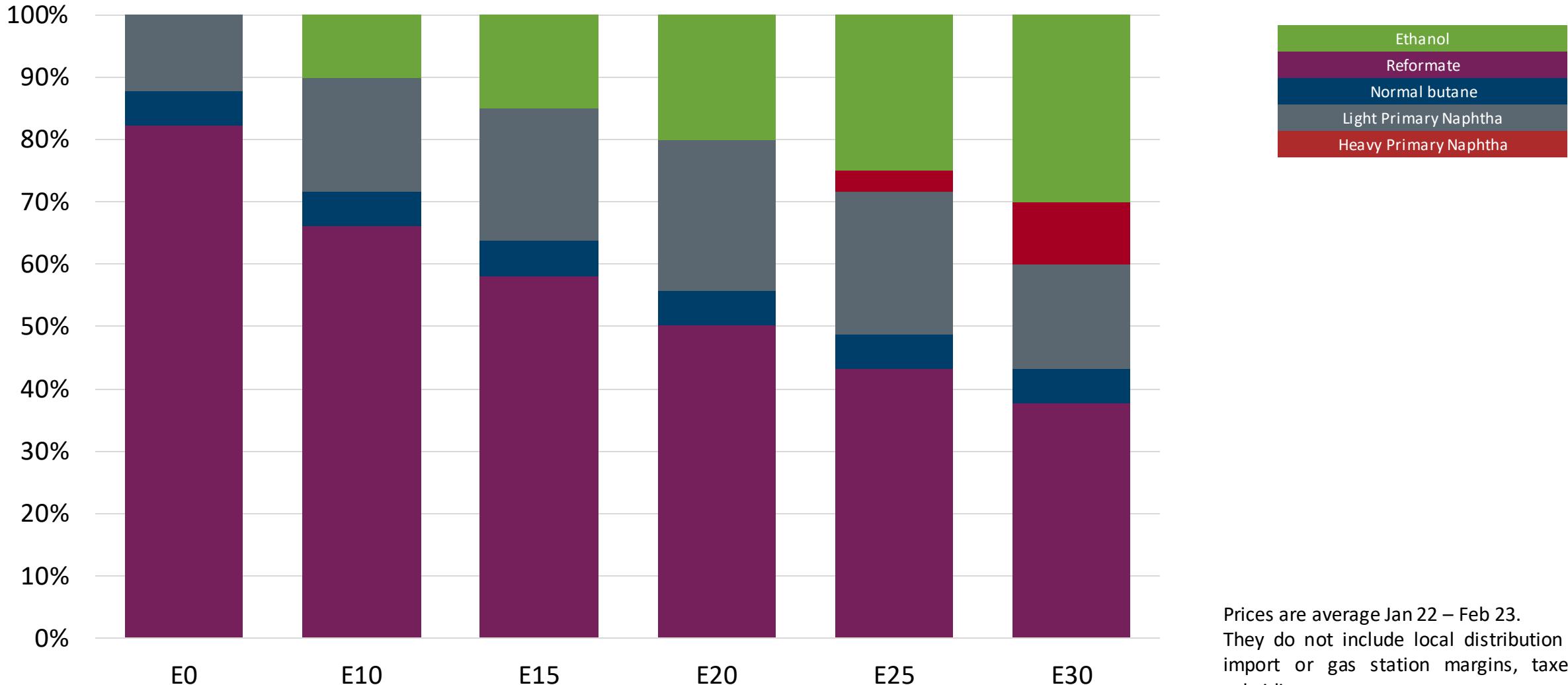
Rep. Dominicana – Regular – Constant Octane



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90

Rep. Dominicana – Premium – Constant Octane



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90

Octane (RON)	96.0	96.0	96.0	96.0	96.0	96.0
Price (USD/gal)	\$ 2.438	\$ 2.351	\$ 2.308	\$ 2.264	\$ 2.224	\$ 2.189

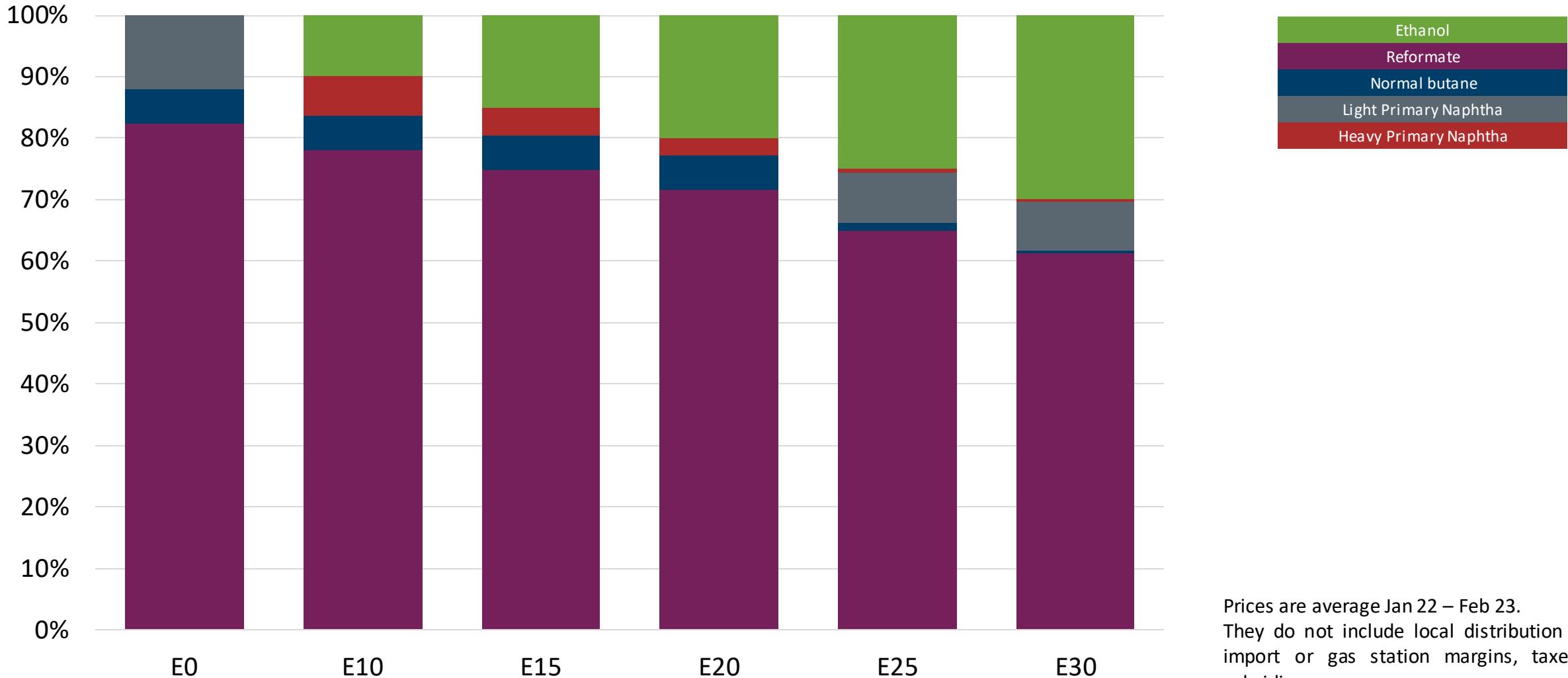
Rep. Dominicana – Regular – Octane Increment



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90

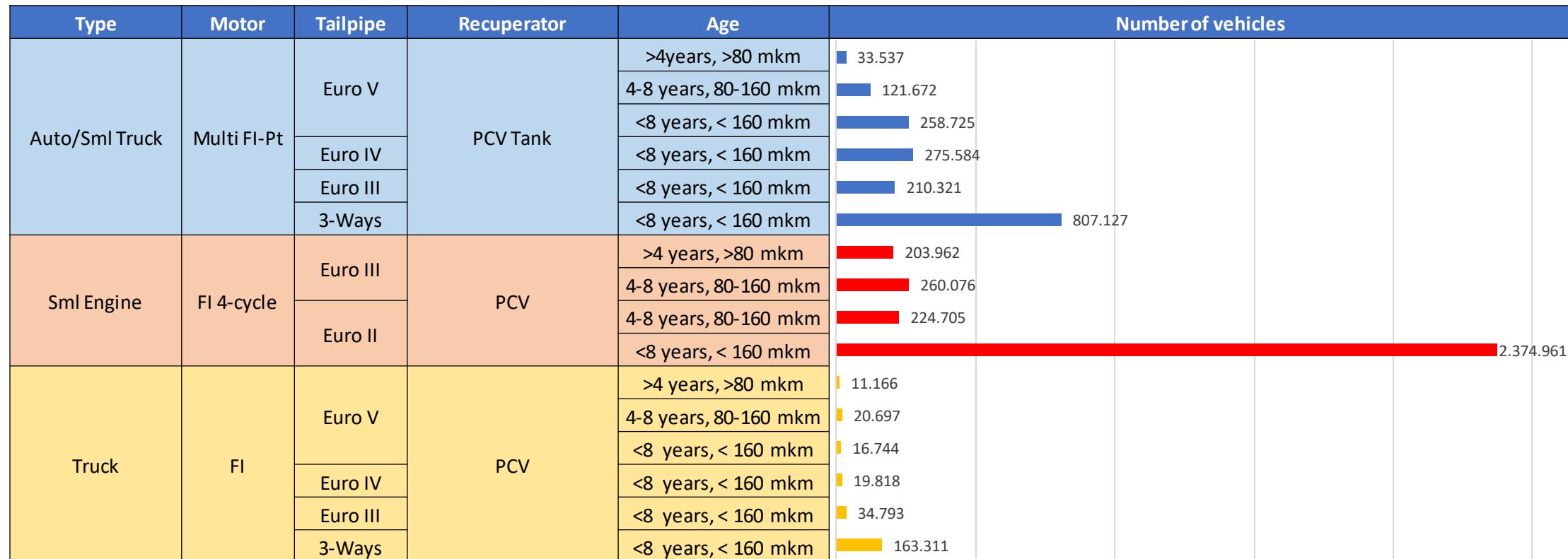
Rep. Dominicana – Premium – Octane Increment



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90

Gasoline Vehicle Fleet – Dominican Republic



Vehicular Fleet: **5,037,199**

Average age : **13 years**

Motorcycle: **61%**

Gasoline Vehicle Emissions – Dominican Republic

Emissions	E0 g/km	E10 g/km	E15 g/km	E20 g/km	E25 g/km	E30 g/km	E10 - E0	E20 - E0	E30 - E0	Euro 6	TIER USA
CO	12.81	10.29	9.20	8.09	7.22	6.31	-20%	-37%	-51%	1	3.5
VOC	1.98	1.66	1.52	1.39	1.28	1.14	-16%	-30%	-42%	95	255
VOCevak	0.69	0.69	0.70	0.72	0.73	0.74	0%	4%	7%	0.1	0.273
NOx	0.64	0.45	0.42	0.40	0.37	0.34	-30%	-38%	-46%	0.06	0.203
SOx	0.00	0.00	0.00	0.00	0.00	0.00	-15%	-28%	-41%		
NH3	0.08	0.08	0.08	0.08	0.08	0.08	-2%	0%	1%		
Butadiene	0.02	0.01	0.01	0.01	0.01	0.01	-13%	-24%	-33%		
Acetaldehyde	0.04	0.07	0.11	0.15	0.17	0.20	68%	249%	372%		
Formaldehyde	0.17	0.20	0.23	0.24	0.27	0.29	13%	39%	68%		
Benzene	0.07	0.06	0.06	0.06	0.06	0.06	-9%	-11%	-18%		
CO2	201.92	191.82	187.96	186.06	184.31	180.91	-5%	-8%	-10%		
N2O	0.01	0.01	0.01	0.01	0.01	0.01	-1%	2%	4%		
CH4	0.44	0.44	0.44	0.45	0.46	0.47	0%	4%	7%		
PM 2.5	0.02	0.01	0.01	0.01	0.01	0.01	-22%	-43%	-65%		
PM10	0.10	0.08	0.07	0.06	0.05	0.03	-22%	-43%	-65%	0.005	0.007
THC	0.74	0.78	0.86	0.91	0.96	1.02	6%	24%	39%		

Ethanol Blending in Gasoline - Ecuador



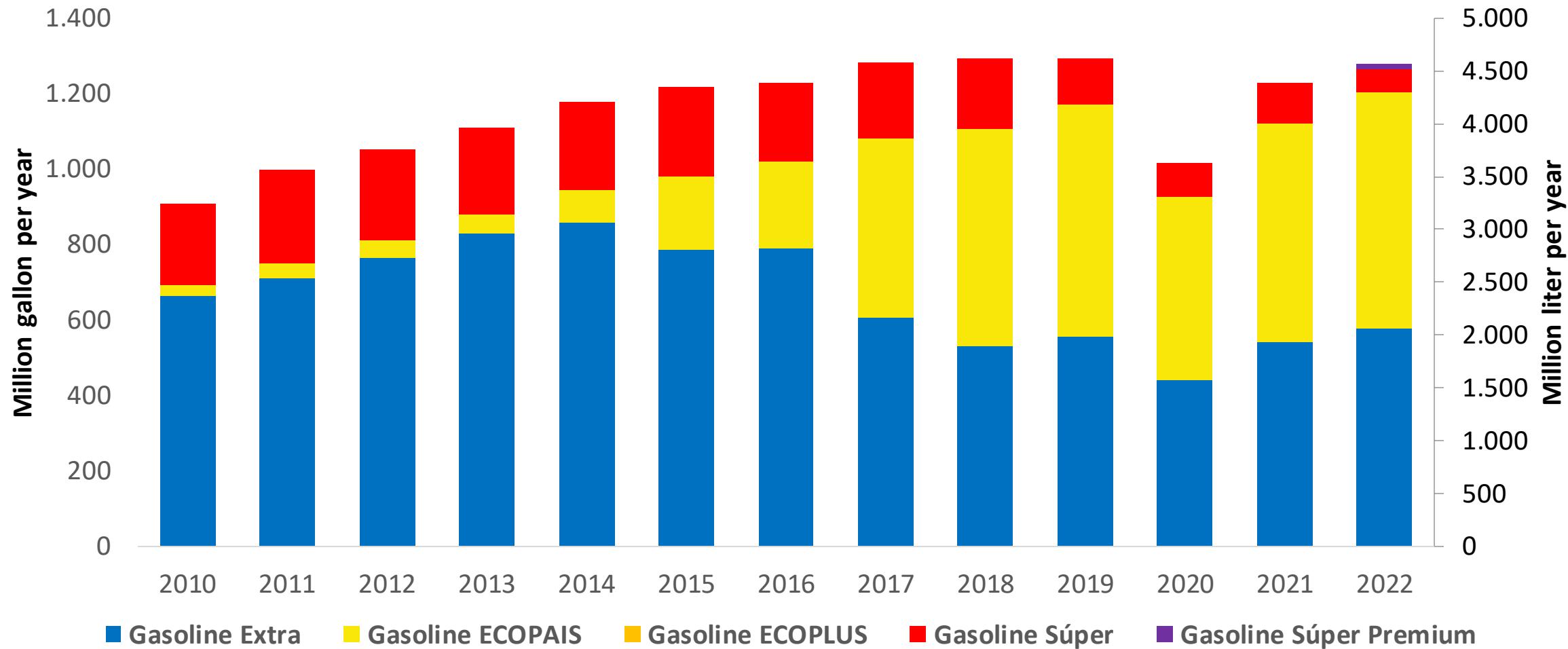
In 2022, gasoline consumption in Ecuador reached 1,200 million gallons (4,500 million liters). A new decree was established to implement new grades of gasoline: four grades with 5 different types: Gasoline Extra (RON 85), Gasoline Ecopais E10 (RON 85), Gasoline Ecoplus (RON 89), Gasoline Súper (RON 92) and Gasoline Súper Premium (RON 95). Gasoline Supere Premium (RON 95) will gradually substitute gasoline Super (RON 92). Gasoline Ecoplus (RON 89) was recently introduced in the market. Ecuador has local production and imports naphtas (unfinished gasolines) to supply national demand.

There is no specific mandate for ethanol blending, however there is a permit to blend it with gasoline. Therefore, E5 ECOPAIS and E8 ECOPLUS are observed in the market since 2009. Ethanol is produced ,consumed and exported to neighbouring countries for fuel and industrial use.

Source: EP PETROECUADOR, 2023

Gasoline Demand in Ecuador

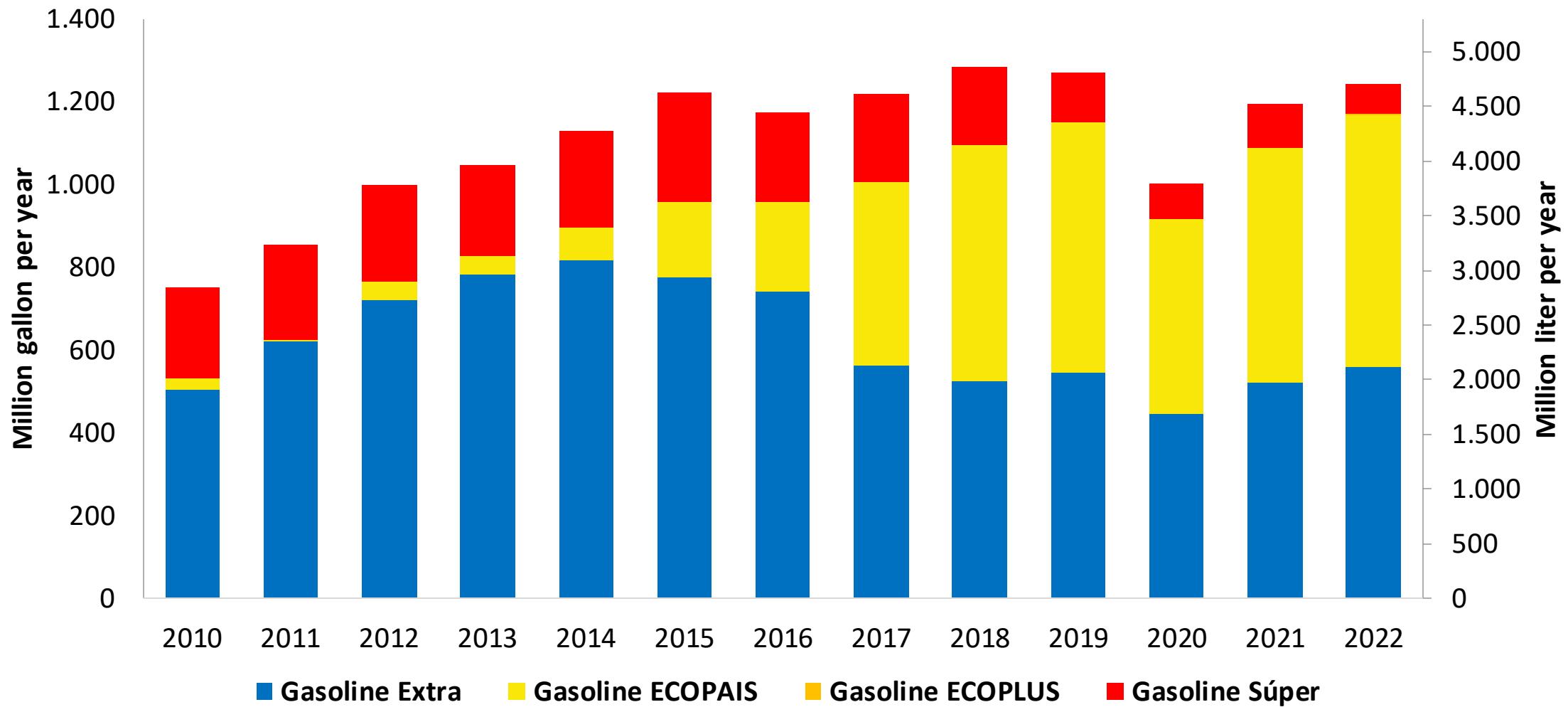
Gasoline Demand in Ecuador



Source: EP PETROECUADOR, 2023

Gasoline Production in Ecuador

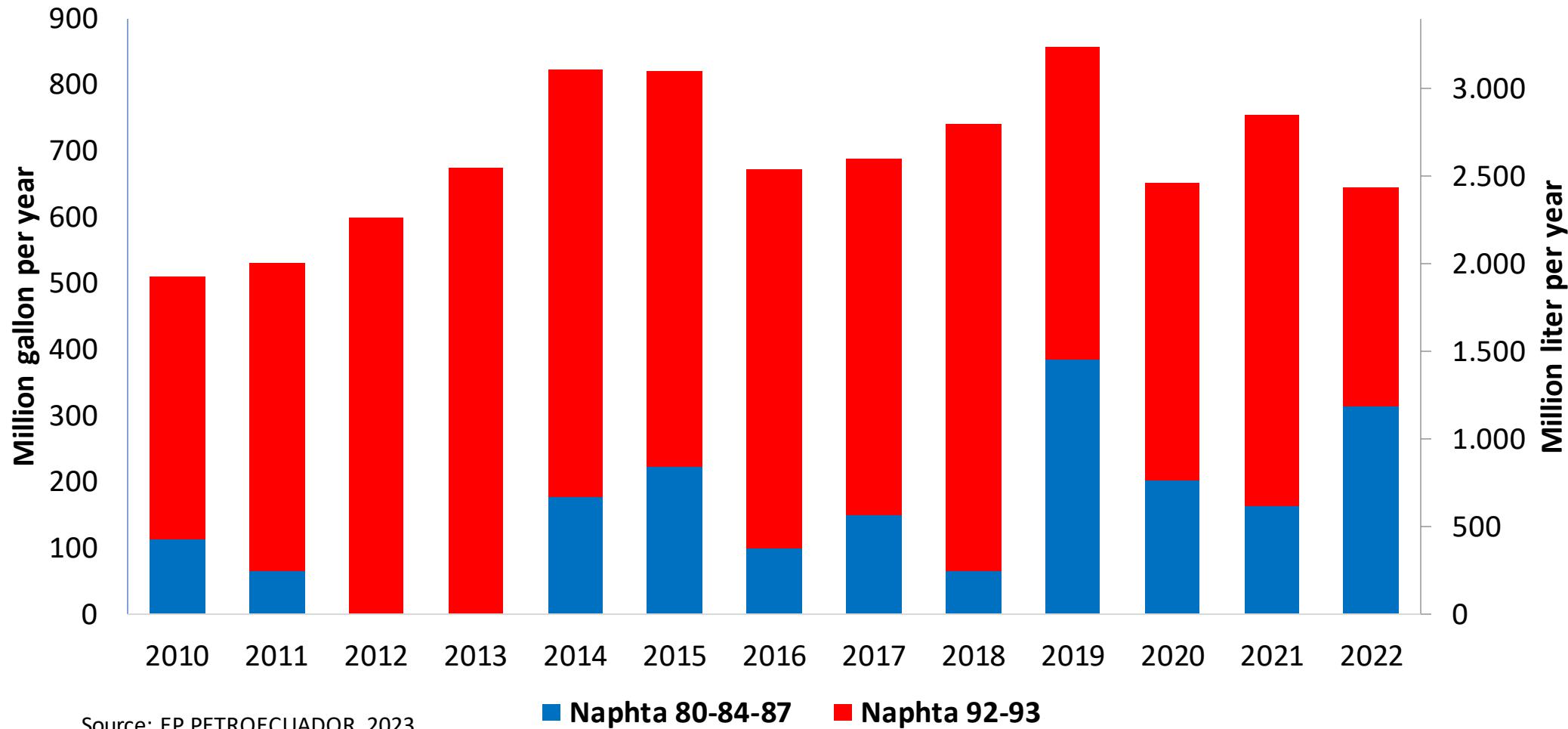
Gasoline Production in Ecuador



Source: EP PETROECUADOR, 2023

Gasoline Imports in Ecuador

Naphta imports in Ecuador

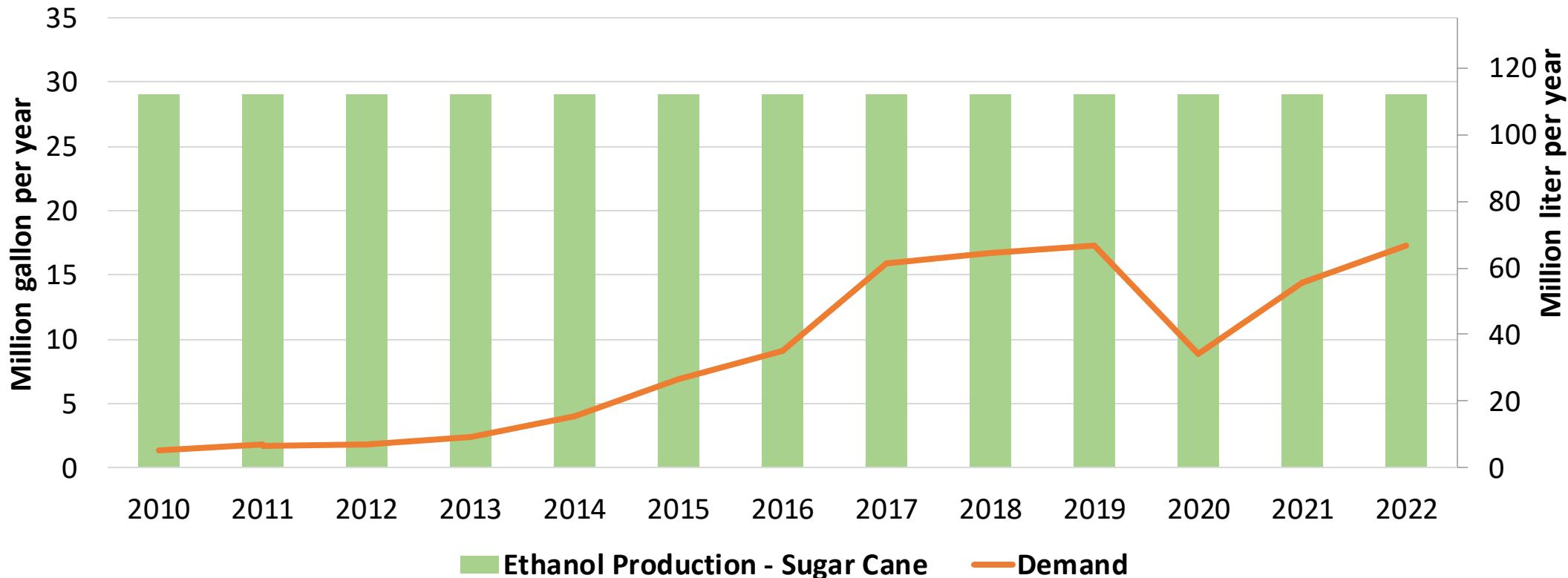


Source: EP PETROECUADOR, 2023

■ Naphta 80-84-87 ■ Naphta 92-93

Ethanol Balance in Ecuador

Ethanol Production and Demand in Ecuador

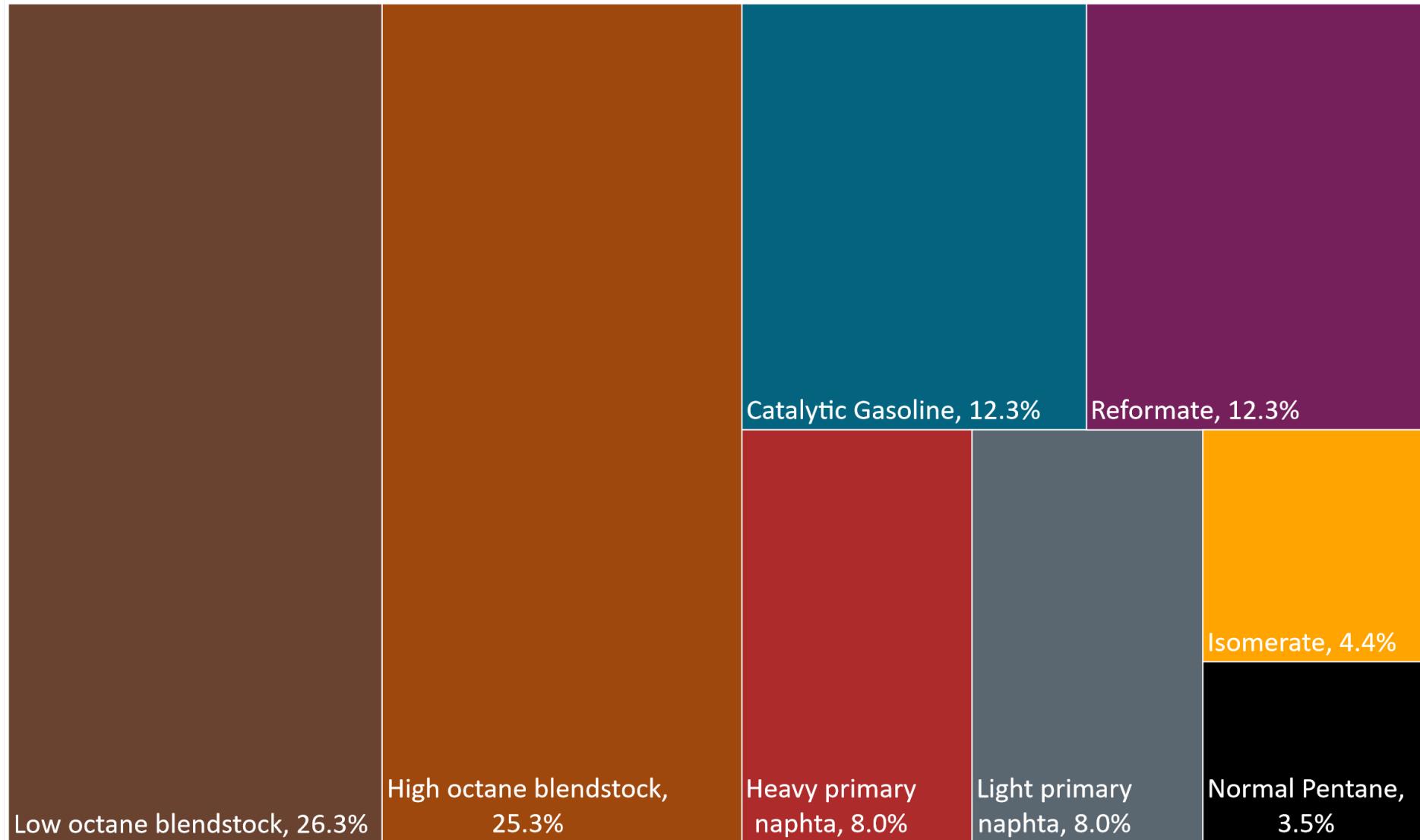


Source: EP PETROECUADOR, 2023; CEDRSSA, 2020

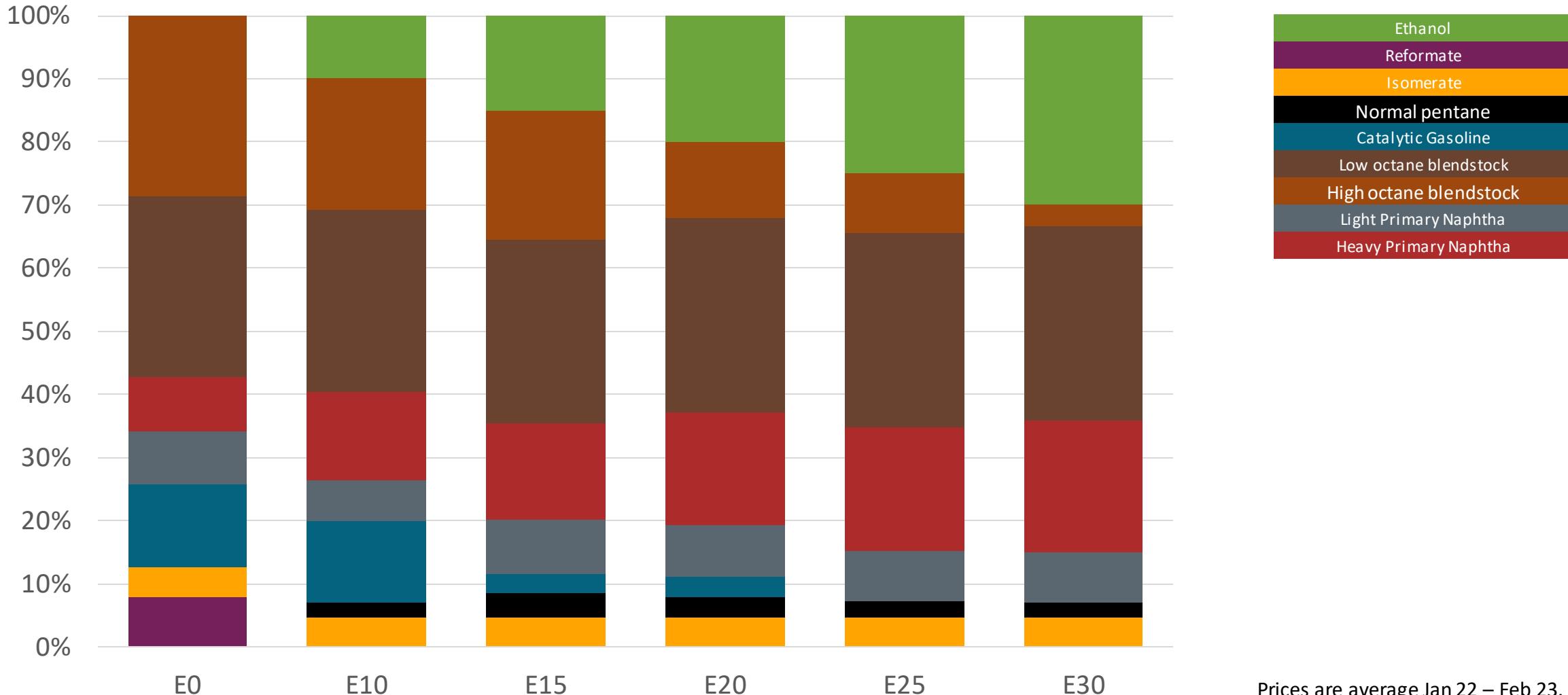
Gasoline Quality in Ecuador

Name	NTE INEN 935:2021				EN 228:2012 + A1:2017 (Euro 6 enabling)			
Implementation Date	2021				2017			
Applicability	Whole country	Whole country	Whole country	Whole country	All countries			
Selected Grade	RON 85	RON 89	RON 92	RON 93	RON 95 E5	RON 95 E10	RON 98 E5	RON 98 E10
Benzene Content	< 1 %v/v	< 2 %v/v	<2 %v/v	<1,3 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v
Aromatics	< 30 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v
Olefins	< 18 %v/v	< 25 %v/v	< 25 %v/v	< 25 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v
Lead Content	< 0 mg/l	< 0 mg/l	< 0 mg/l	< 0 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l
Manganese	0 mg/l	0 mg/l	0 mg/l	0 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l
RON	85	89	92	95	> 95	> 95	> 98	> 98
MON					> 85	> 88	> 85	> 88
AKI								
Sulfur Content	650 mg/kg	650 mg/kg	450 mg/kg	<300 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg
Oxygen Content	< 2,7 %m/m	< 2,7 %m/m	< 2,7 %m/m	< 2,7 %m/m	<2,7 % m/m	<3,7 % m/m	<2,7 % m/m	<3,7 % m/m
Ethanol (EtOH)					<5 %v/v	<10 %v/v	<5 %v/v	<10 %v/v
RVP 37.8°C (Summer)	<60 kPa	<60 kPa	<60 kPa	<62 kPa	<> 60 - 70 kPa *Depends on the country, RVP is regulated in the EU Fuel Quality Directive			
RVP 37.8 °C(Winter)								
RVP 37.8°C (Transition)								
MTBE					-	-	-	-
Ethers 5 or more C Atoms	-	-	-	-	Based on oxygen content	<22 %v/v	Based on oxygen content	<22 %v/v

Available Blending Components



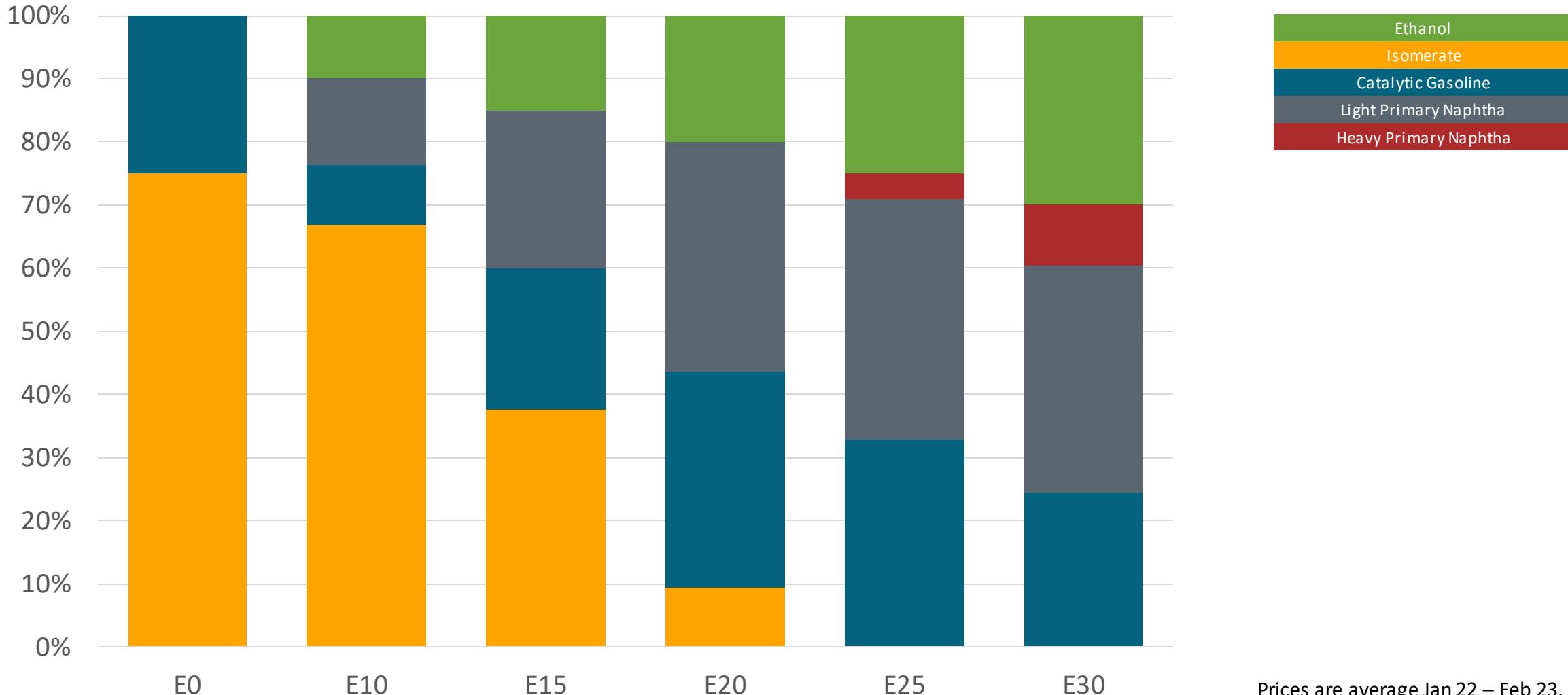
Ecuador – Gasoline RON 85 – Constant Octane



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Octane (RON)	85.0	85.0	85.0	85.6	86.5	87.5
Price (USD/gal)	\$ 2.246	\$ 2.157	\$ 2.112	\$ 2.094	\$ 2.083	\$ 2.071

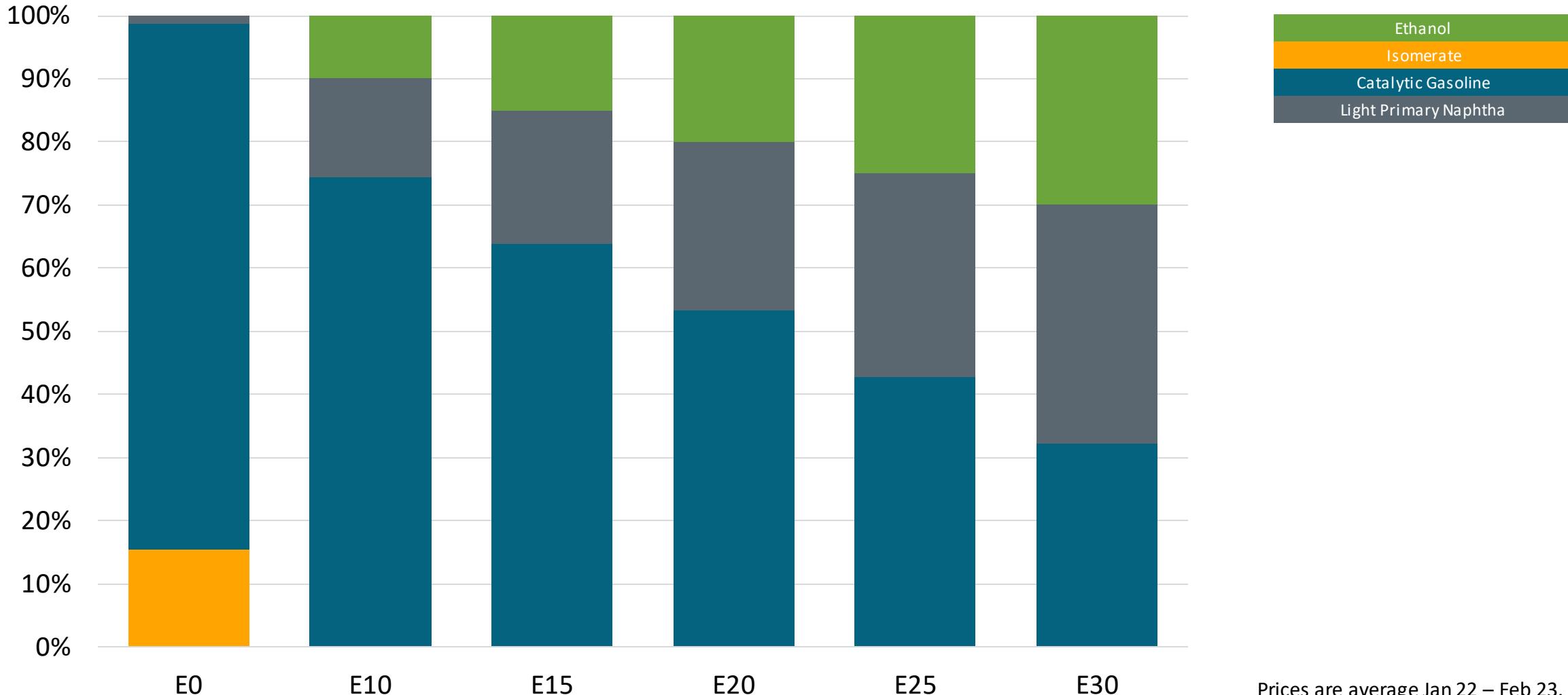
Ecuador – Gasoline RON 89 – Constant Octane



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Octane (RON)	89.0	89.0	89.0	89.0	89.0	89.0
Price (USD/gal)	\$ 2.295	\$ 2.213	\$ 2.172	\$ 2.132	\$ 2.095	\$ 2.059

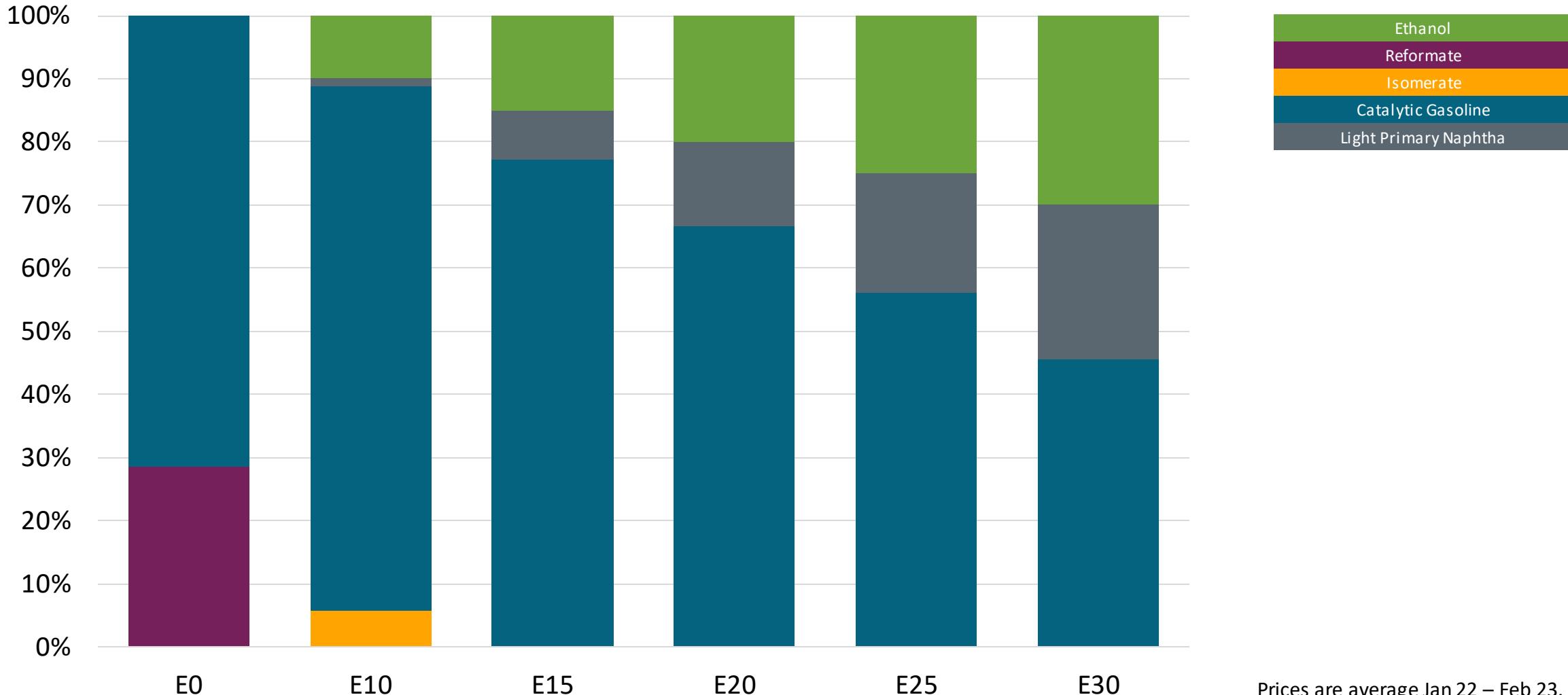
Ecuador – Gasoline RON 92 – Constant Octane



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Octane (RON)	92.0	92.0	92.0	92.0	92.0	92.0
Price (USD/gal)	\$ 2.354	\$ 2.277	\$ 2.238	\$ 2.199	\$ 2.161	\$ 2.122

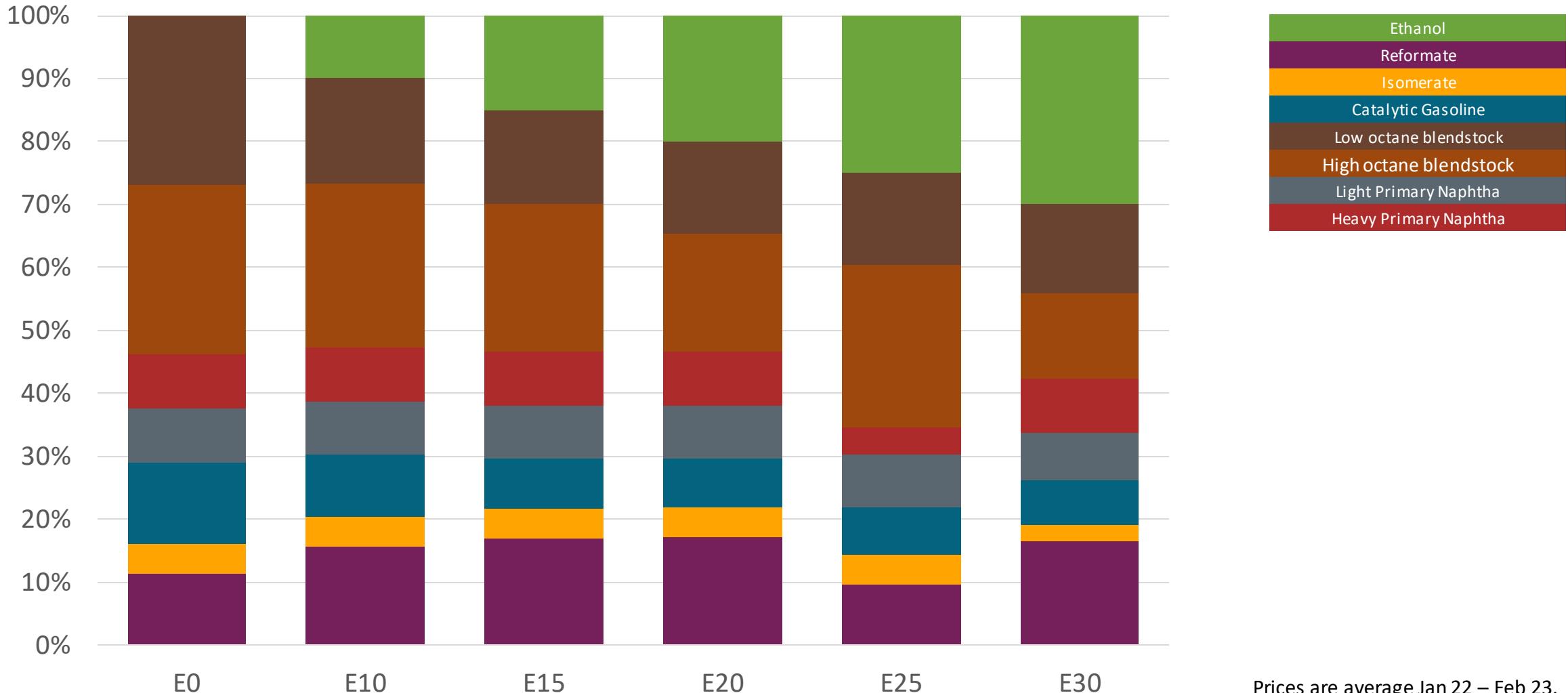
Ecuador – Gasoline RON 95 – Constant Octane



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Octane (RON)	95.0	95.0	95.0	95.0	95.0	95.0
Price (USD/gal)	\$ 2.450	\$ 2.355	\$ 2.316	\$ 2.278	\$ 2.239	\$ 2.201

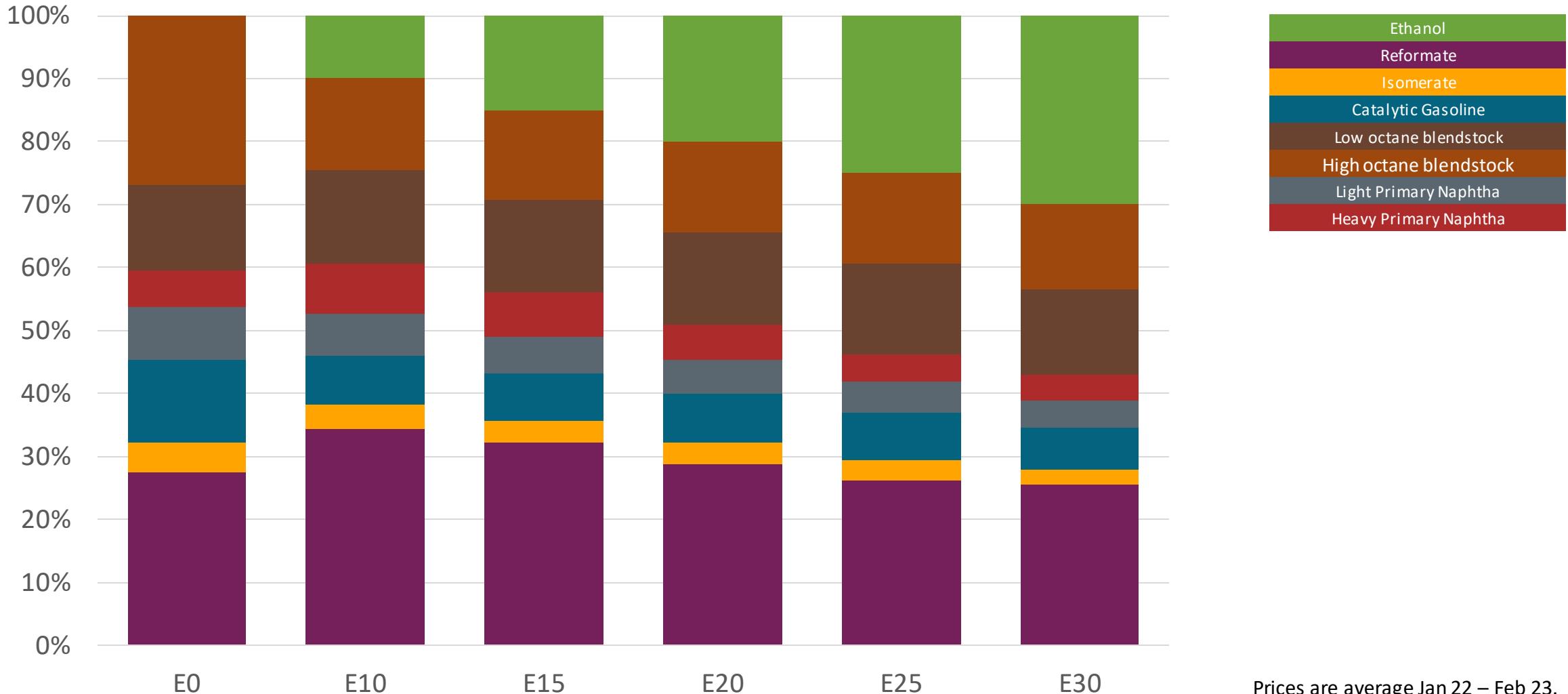
Ecuador – Gasoline RON 85 – Octane Increment



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Octane (RON)	85.5	88.5	90.1	91.9	93.3	95.3
Price (USD/gal)	\$ 2.256	\$ 2.256	\$ 2.256	\$ 2.256	\$ 2.256	\$ 2.256

Ecuador – Gasoline RON 89 – Octane Increment



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Octane (RON)	89.0	91.8	93.3	94.9	96.6	98.1
Price (USD/gal)	\$ 2.331	\$ 2.331	\$ 2.331	\$ 2.331	\$ 2.331	\$ 2.331

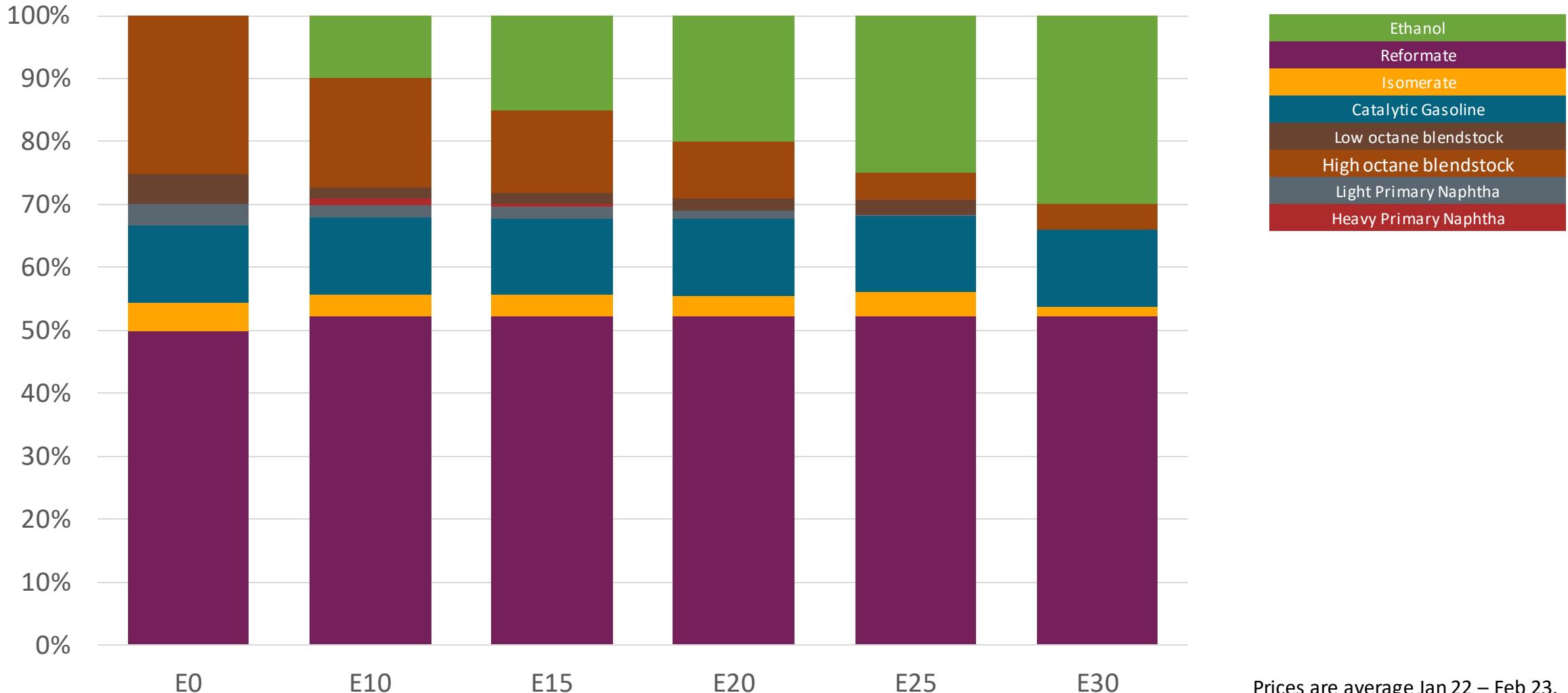
Ecuador – Gasoline RON 92 – Octane Increment



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Octane (RON)	92.1	95.3	96.9	98.6	100.3	101.8
Price (USD/gal)	\$ 2.418	\$ 2.418	\$ 2.418	\$ 2.418	\$ 2.418	\$ 2.418

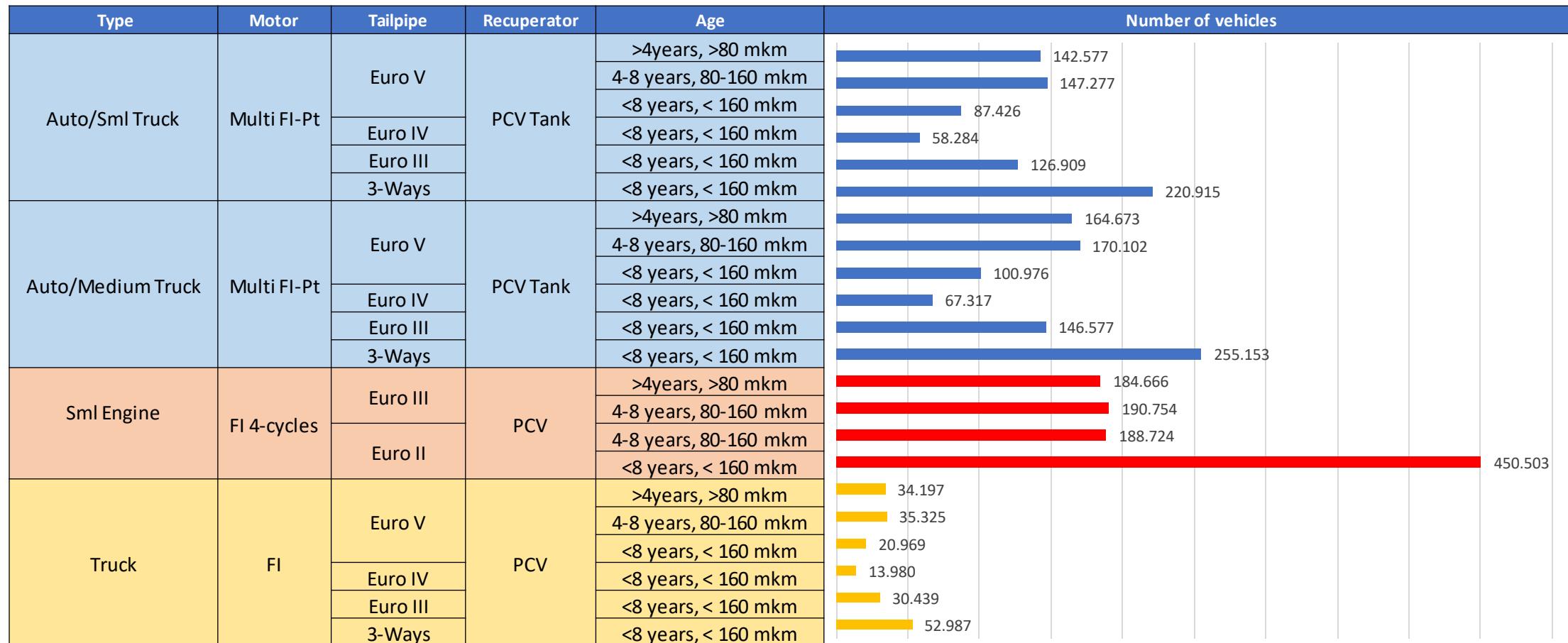
Ecuador – Gasoline RON 95 – Octane Increment



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Octane (RON)	95.0	97.7	99.2	100.8	102.3	103.9
Price (USD/gal)	\$ 2.471	\$ 2.471	\$ 2.471	\$ 2.471	\$ 2.471	\$ 2.471

Gasoline Vehicle Fleet - Ecuador



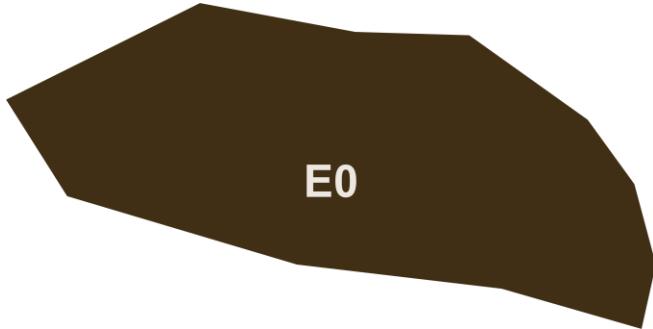
Vehicle Fleet: **2,890,730**

Average Age: **13 years**

Ecuador – Gasoline Vehicle Emissions

Emissions	E0 g/km	E10 g/km	E15 g/km	E20 g/km	E25 g/km	E30 g/km	E10 - E0	E20 - E0	E30 - E0	Euro 6	TIER USA
CO	10.71	9.55	9.12	8.71	8.40	8.02	-11%	-19%	-25%	1	3.5
VOC	1.16	1.05	1.01	0.97	0.94	0.90	-10%	-16%	-22%	95	255
VOCeVap	0.44	0.44	0.45	0.46	0.47	0.48	0%	4%	7%	0.1	0.273
NOx	0.55	0.39	0.36	0.34	0.32	0.30	-30%	-38%	-46%	0.06	0.203
SOx	0.01	0.00	0.00	0.00	0.00	0.00	-15%	-28%	-41%		
NH3	0.07	0.07	0.07	0.07	0.07	0.07	-2%	0%	1%		
Butadiene	0.01	0.01	0.01	0.01	0.01	0.01	-8%	-14%	-18%		
Acetaldehyde	0.02	0.03	0.05	0.07	0.08	0.09	68%	249%	372%		
Formaldehyde	0.08	0.09	0.10	0.11	0.12	0.13	13%	39%	68%		
Benzene	0.05	0.05	0.05	0.05	0.04	0.04	-9%	-11%	-18%		
CO2	241.01	228.96	224.36	222.08	219.89	215.84	-5%	-8%	-10%		
N2O	0.01	0.01	0.01	0.01	0.01	0.01	-1%	2%	4%		
CH4	0.26	0.26	0.26	0.27	0.27	0.28	0%	4%	7%		
PM 2.5	0.02	0.01	0.01	0.01	0.01	0.01	-22%	-43%	-65%		
PM10	0.04	0.03	0.03	0.02	0.02	0.01	-22%	-43%	-65%	0.005	0.007
THC	0.42	0.44	0.47	0.50	0.52	0.55	4%	20%	32%		

Ethanol Blending in Gasoline - El Salvador



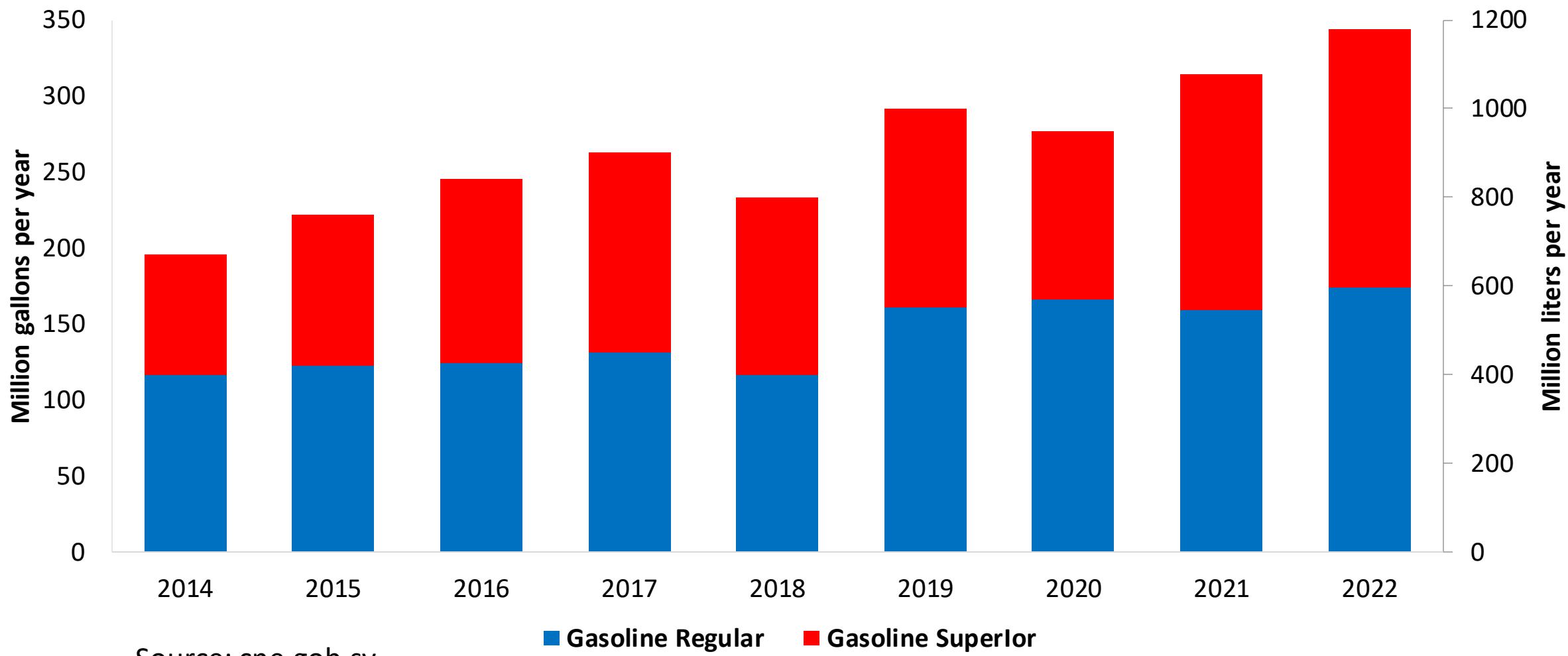
In 2022, gasoline demand was 315 million gallons (1,180 million liters). Regular gasoline RON 91 represented 50.6% of the volume consumed while Superior gasoline RON 95 reached 49.4%. Gasoline is supplied only by imports, distributed mainly by Chevron, Puma and Uno companies and imported mainly from the United States.

El Salvador has no national specifications for ethanol. It has the potential to produce ethanol from maize and sugar cane.

Sources: cne.gob.sv

Gasoline Demand in El Salvador

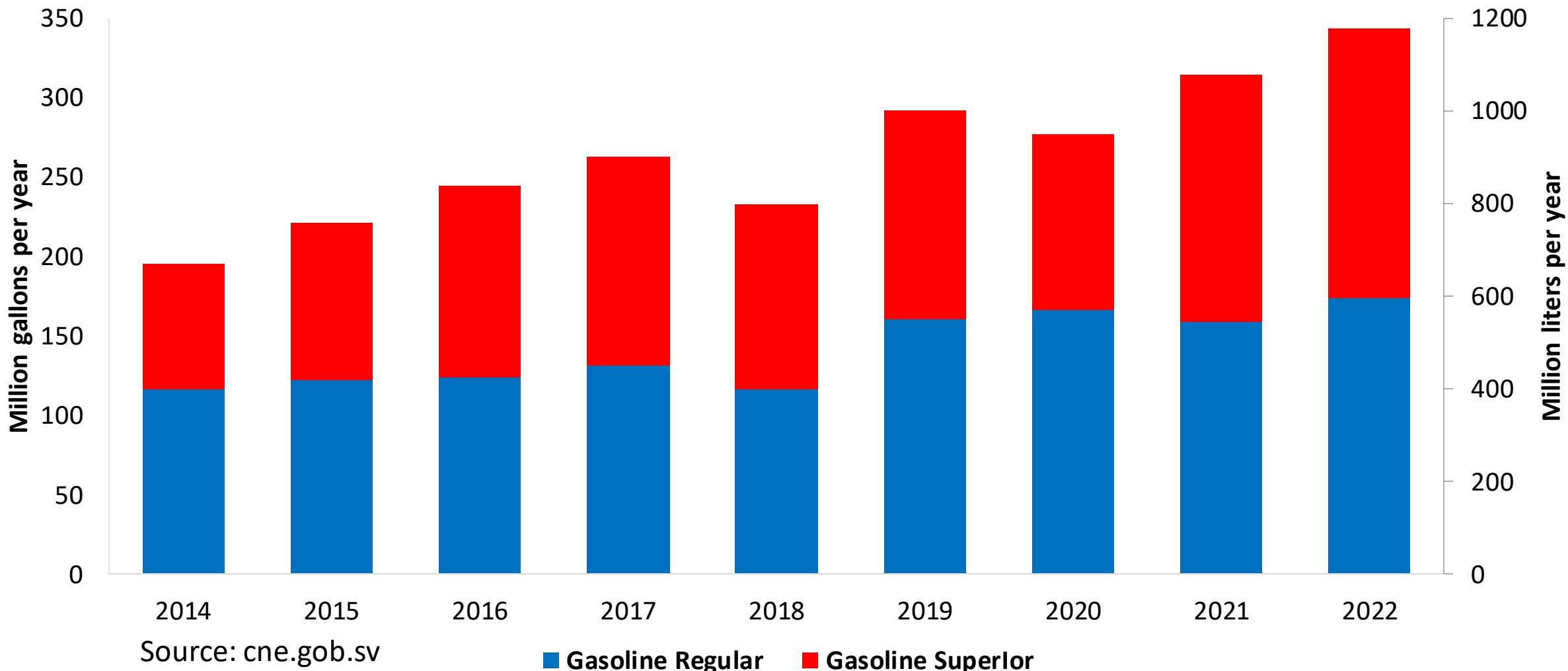
Gasoline Demand by Grade in El Salvador



Source: cne.gob.sv

Gasoline Imports in El Salvador

Gasoline Imports by Grande in El Salvador



Source: cne.gob.sv

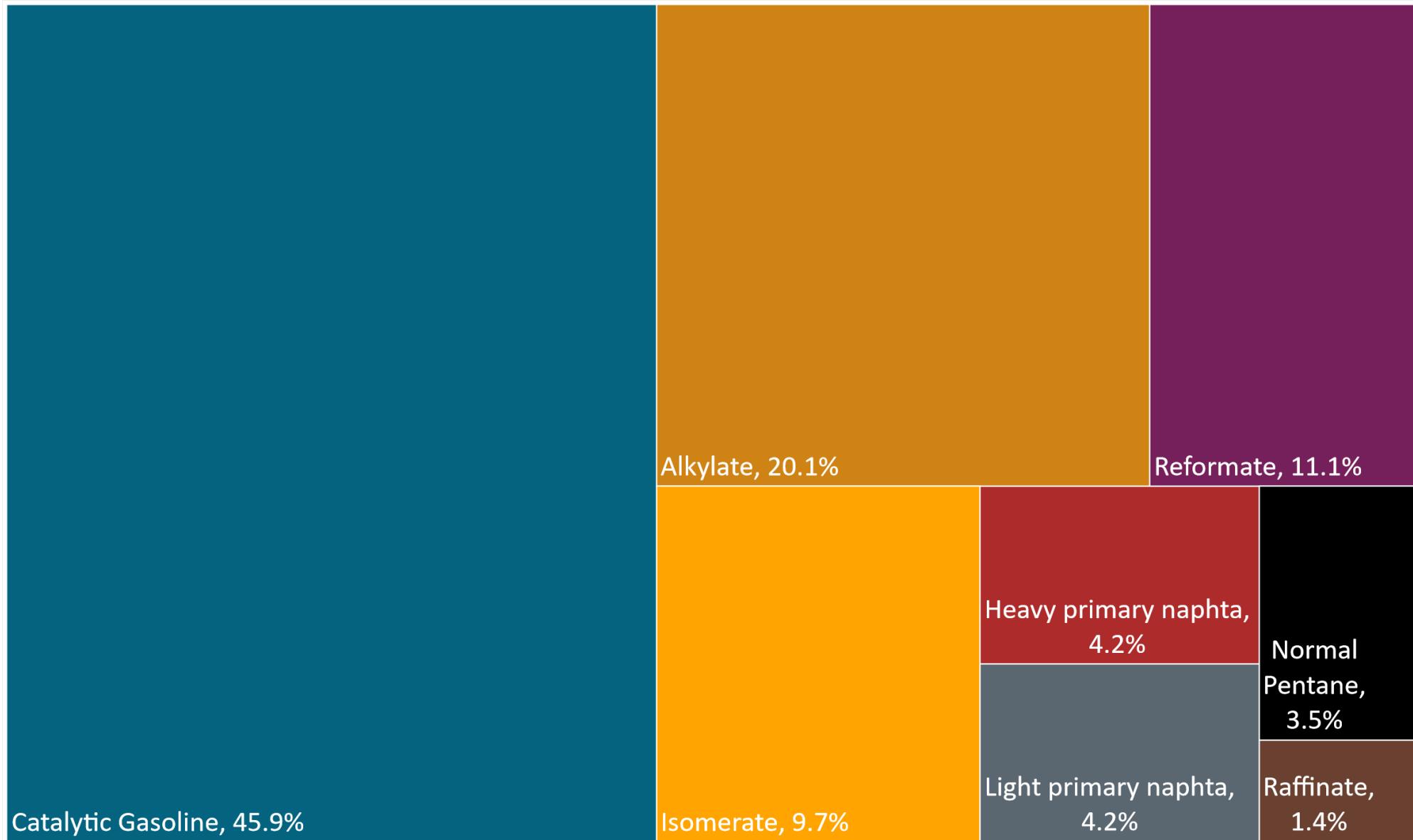
■ Gasoline Regular ■ Gasoline Superior

Gasoline Quality in El Salvador

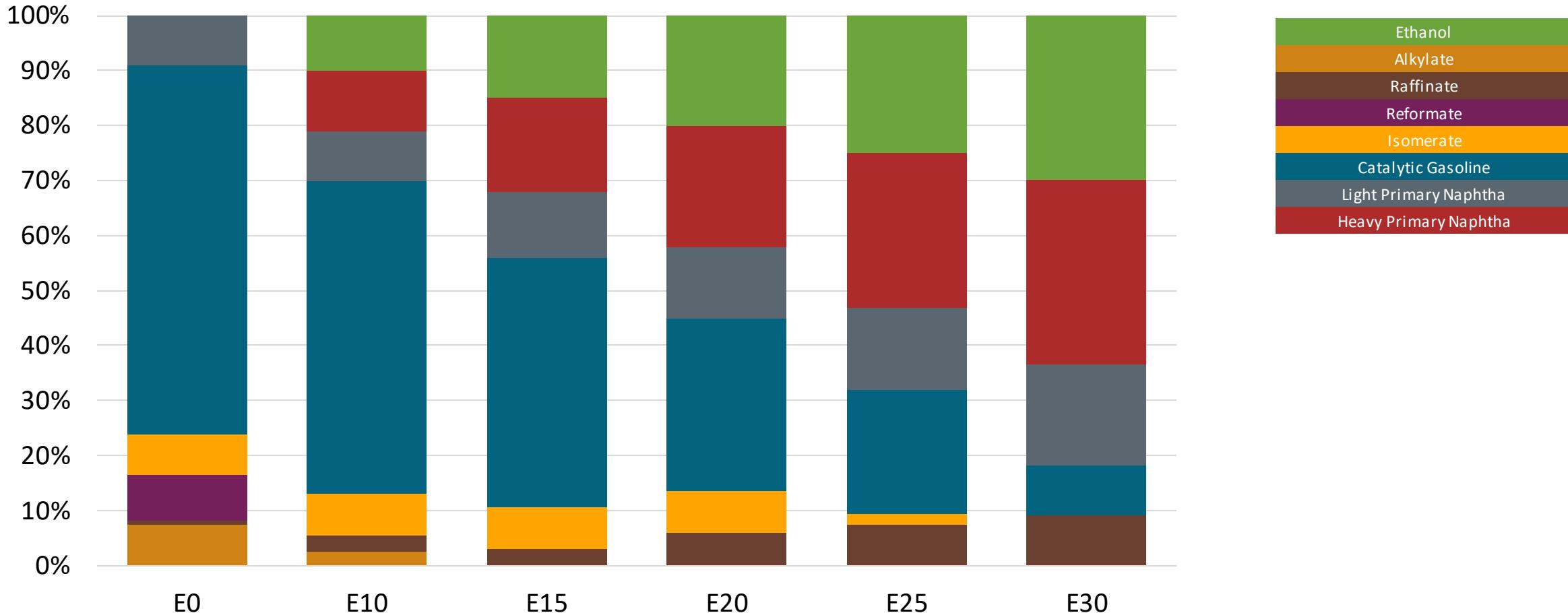
Name	RTCA 75.01.19:19	RTCA 75.01.20:19	EN 228:2012 + A1:2017 (Euro 6 enabling)			
Implementation Date	2021	2021	2017			
Applicability	Whole country	Whole country	All countries			
Selected Grade	Gasoline Regular	Gasoline Premium	RON 95 E5	RON 95 E10	RON 98 E5	RON 98 E10
Benzene Content	5% v/v	5% v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v
Aromatics	50% v/v	50% v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v
Olefins	30% v/v	30% v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v
Lead Content	< 0,013 g/l	< 0,013 g/l	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l
Manganese	2,0% v/v	2,0% v/v	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l
RON	> 91	> 95	> 95	> 95	> 98	> 98
MON	-	-	> 85	> 88	> 85	> 88
AKI						
Sulfur Content	< 500 mg/kg	< 500 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg
Oxygen Content	0,7% v/v	0,7% v/v	<2,7 % m/m	<3,7 % m/m	<2,7 % m/m	<3,7 % m/m
Ethanol (EtOH)	-	-	<5 %v/v	<10 %v/v	<5 %v/v	<10 %v/v
RVP 37.8°C (Summer)	< 69 kPa	< 69 kPa	<> 60 - 70 kPa *Depends on the country, RVP is regulated in the EU Fuel Quality Directive			
RVP 37.8 °C(Winter)						
RVP 37.8°C (Transition)						
MTBE	-	-	-	-	-	-
Ethers 5 or more C Atoms	-	-	Based on oxygen content	<22 %v/v	Based on oxygen content	<22 %v/v

Source: RTCA

Blending Components- El Salvador



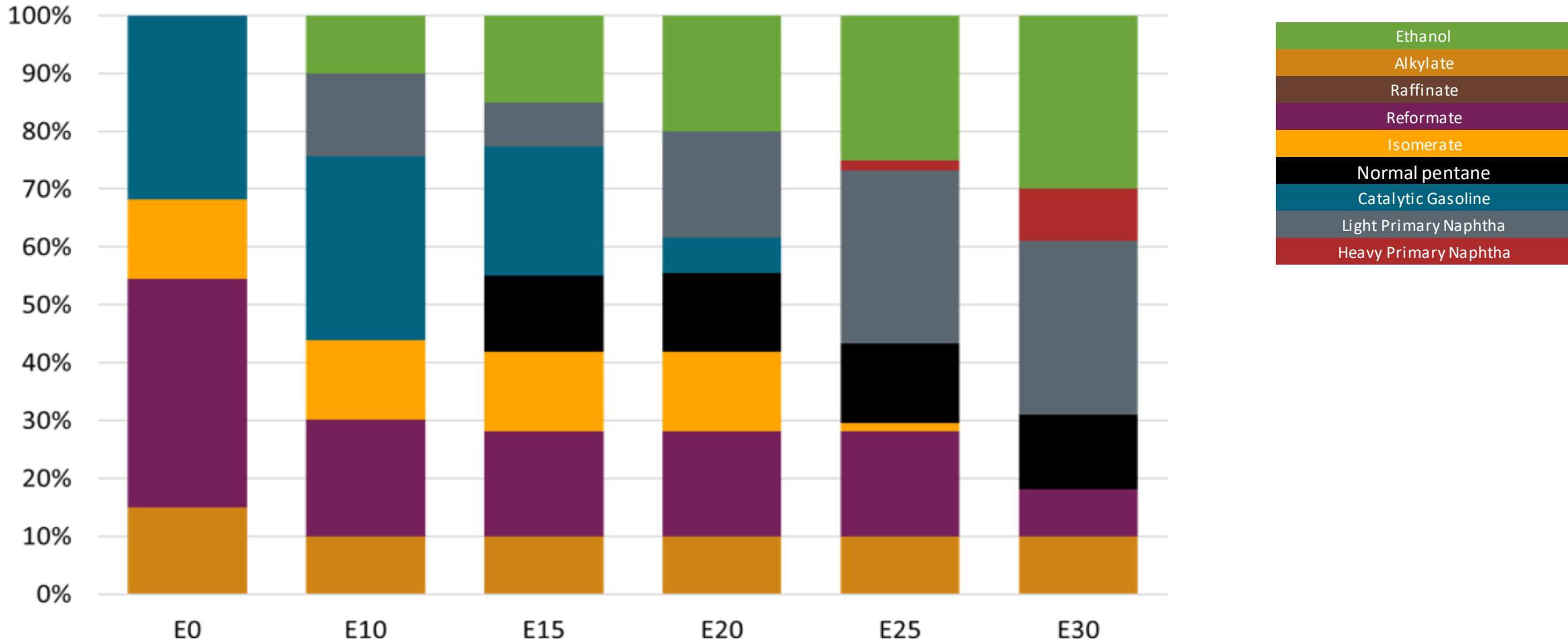
El Salvador – Regular – Constant Octane



Octane (RON)	91.0	91.0	91.0	91.0	91.2	91.3
Price (USD/gal)	\$ 2.331	\$ 2.189	\$ 2.127	\$ 2.067	\$ 2.009	\$ 1.945

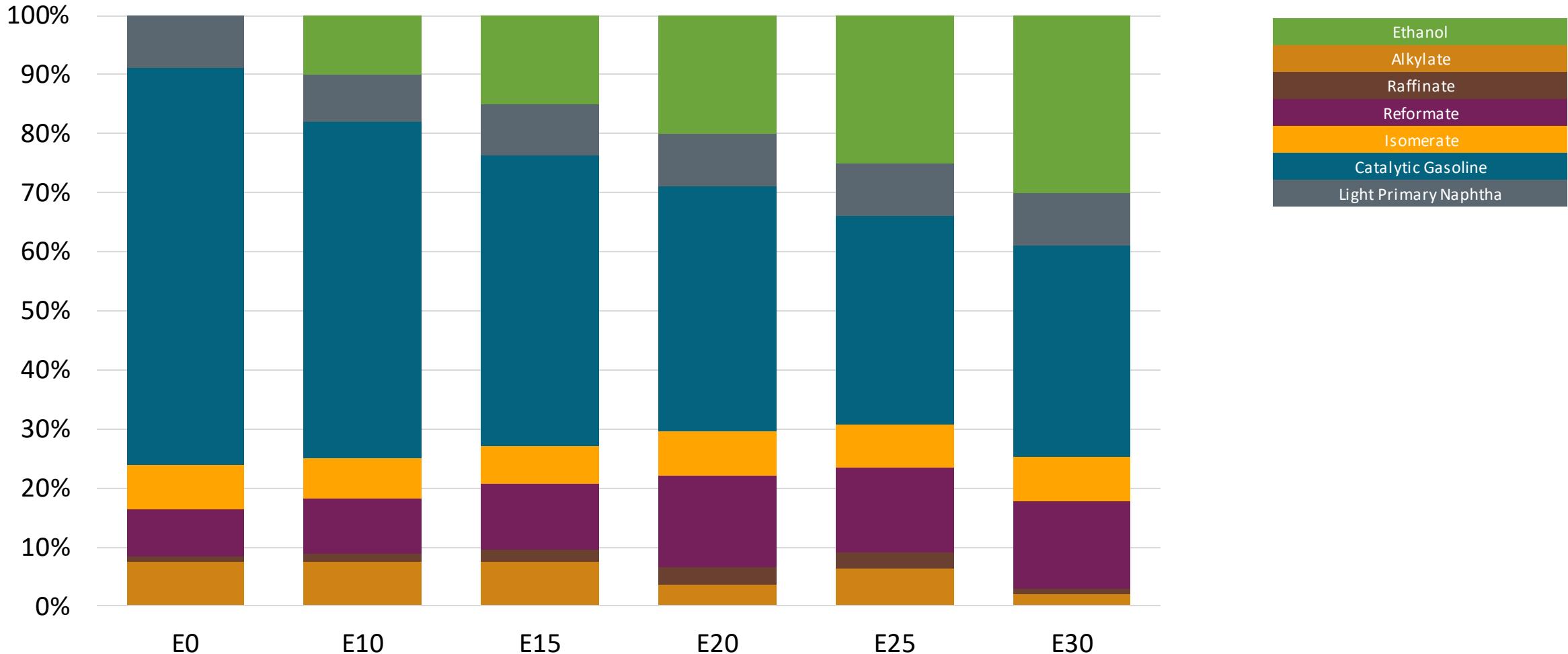
Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

El Salvador – Premium – Constant Octane



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

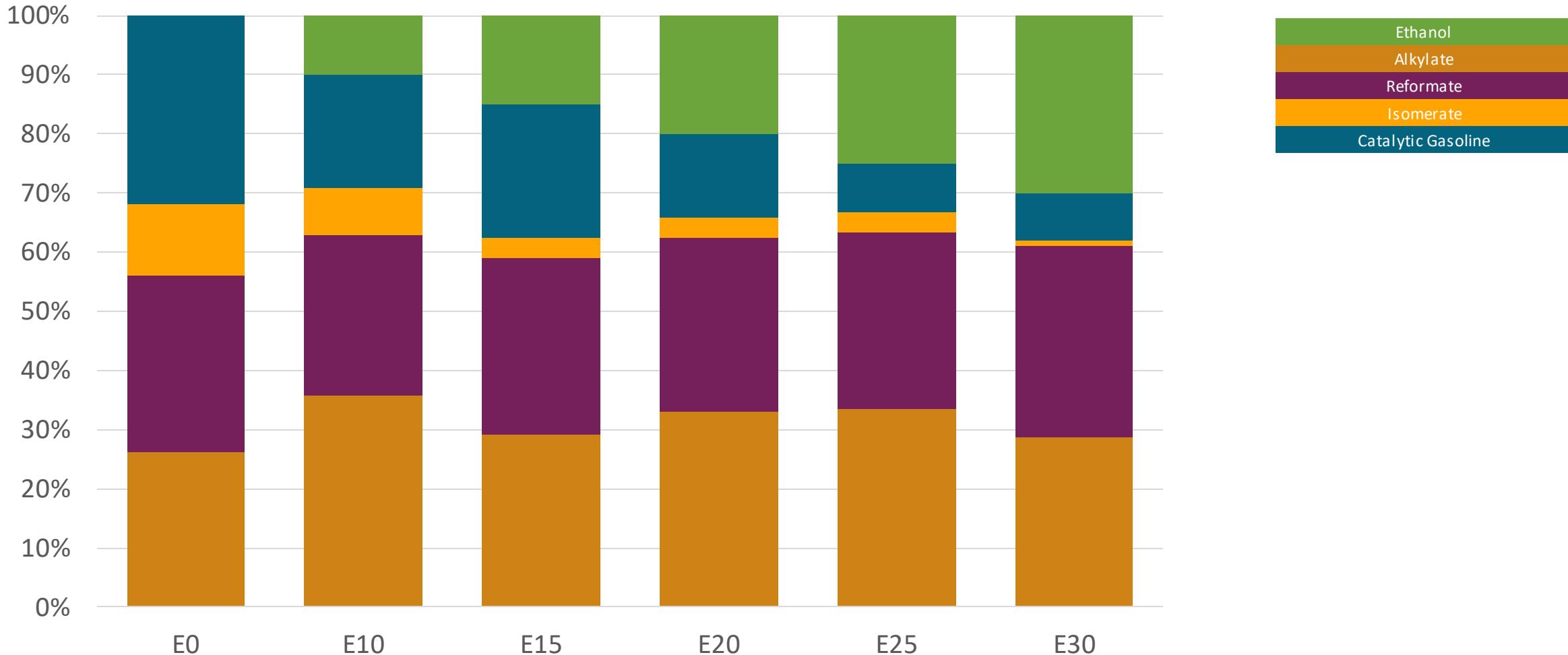
El Salvador – Regular – Octane Increment



Octane (RON)	91.0	95.7	97.8	99.7	101.6	103.8
Price (USD/gal)	\$ 2.326	\$ 2.326	\$ 2.326	\$ 2.326	\$ 2.326	\$ 2.326

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

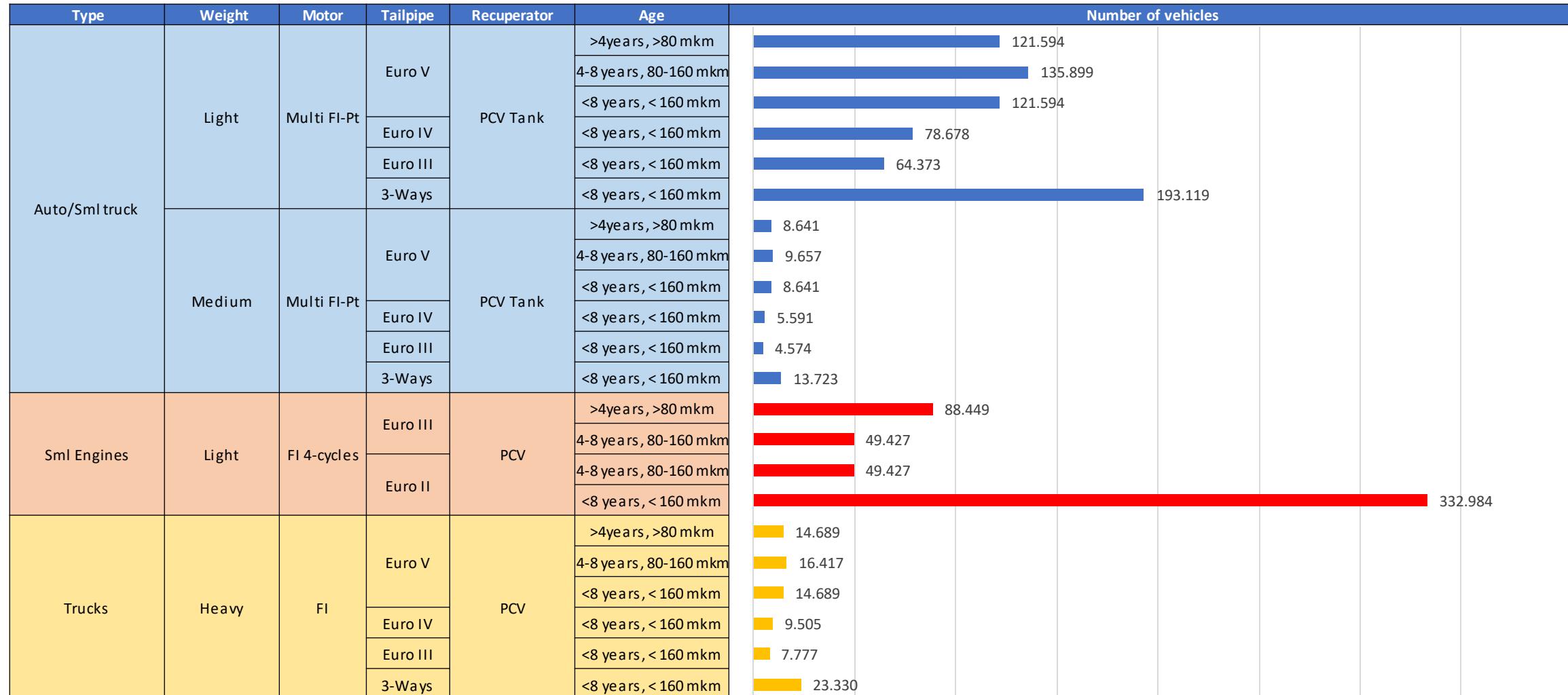
El Salvador – Premium – Octane Increment



Octane (RON)	95.0	99.1	101.5	103.2	105.0	106.8
Price (USD/gal)	\$ 2.484	\$ 2.484	\$ 2.484	\$ 2.484	\$ 2.484	\$ 2.484

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Gasoline Vehicle Fleet - El Salvador



Vehicle Fleet: 1,372,776

Average Age: 11 years

Motorcycles: 31.1%

El Salvador – Gasoline Vehicle Emissions

Emissions	E0 g/km	E10 g/km	E15 g/km	E20 g/km	E25 g/km	E30 g/km	E10 - E0	E20 - E0	E30 - E0	Euro 6	TIER USA
CO	10.12	8.77	8.24	7.71	7.31	6.86	-13%	-24%	-32%	1	3.5
VOC	1.23	1.08	1.02	0.97	0.92	0.86	-12%	-22%	-30%	95	255
VOCeVap	0.47	0.47	0.48	0.49	0.50	0.51	0%	4%	7%	0.1	0.273
NOx	0.51	0.36	0.34	0.32	0.30	0.27	-30%	-38%	-46%	0.06	0.203
SOx	0.01	0.00	0.00	0.00	0.00	0.00	-15%	-28%	-41%		
NH3	0.07	0.07	0.07	0.07	0.07	0.07	-2%	0%	1%		
Butadiene	0.01	0.01	0.01	0.01	0.01	0.01	-11%	-19%	-25%		
Acetaldehyde	0.02	0.04	0.06	0.08	0.09	0.10	68%	249%	372%		
Formaldehyde	0.09	0.10	0.11	0.12	0.13	0.14	13%	39%	68%		
Benzene	0.05	0.05	0.05	0.04	0.04	0.04	-9%	-11%	-18%		
CO2	223.98	212.78	208.50	206.39	204.35	200.59	-5%	-8%	-10%		
N2O	0.01	0.01	0.01	0.01	0.01	0.01	-1%	2%	4%		
CH4	0.27	0.27	0.28	0.28	0.29	0.29	0%	4%	7%		
PM 2.5	0.02	0.01	0.01	0.01	0.01	0.01	-22%	-43%	-65%		
PM10	0.05	0.04	0.03	0.03	0.02	0.02	-22%	-43%	-65%	0.005	0.007
THC	0.44	0.46	0.50	0.53	0.56	0.59	5%	21%	34%		

Ethanol Blending in Gasoline - Guatemala

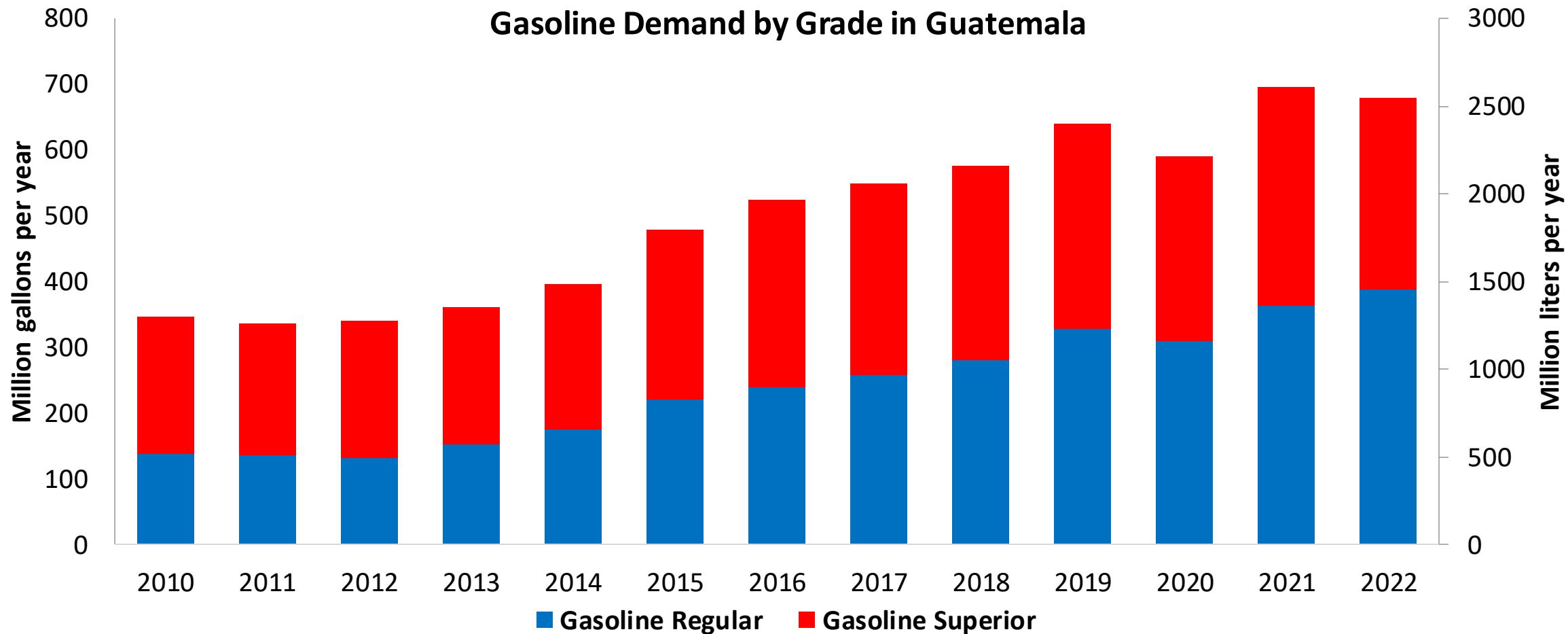


In 2022, gasoline consumption was 670 million gallons (2,550 million liters). Gasoline is supplied only by imports, mainly from United States. There are two grades of gasoline: (RON 91 - AKI 85) and Superior (RON 95 - AKI 89). 60% of gasoline is gasoline Regular.

Guatemala allows for blends up to 10% v/v but no ethanol is blended in the country. It has local ethanol advanced ethanol production that is exported to Europe. Guatemala is the main ethanol producer in Central America. A E10 mandate for 2024 is currently under approval.

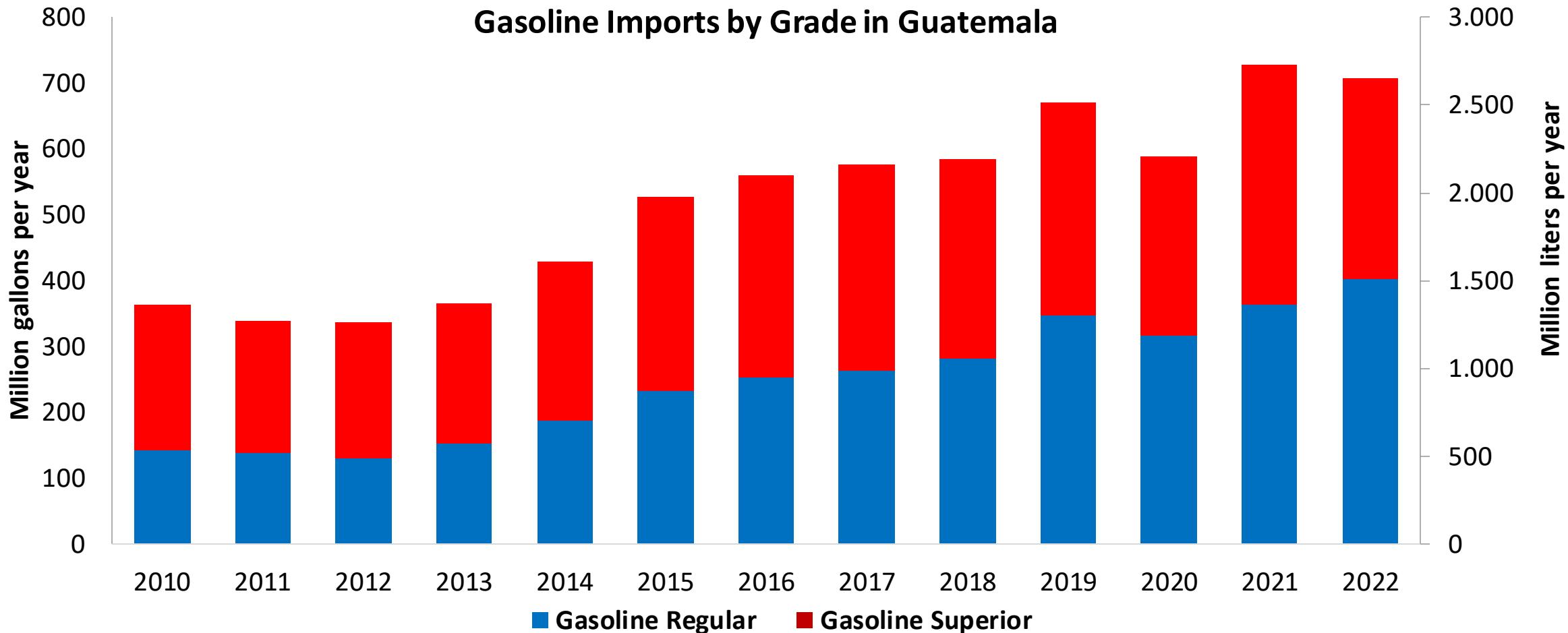
Source: MEM, 2023

Gasoline Demand in Guatemala



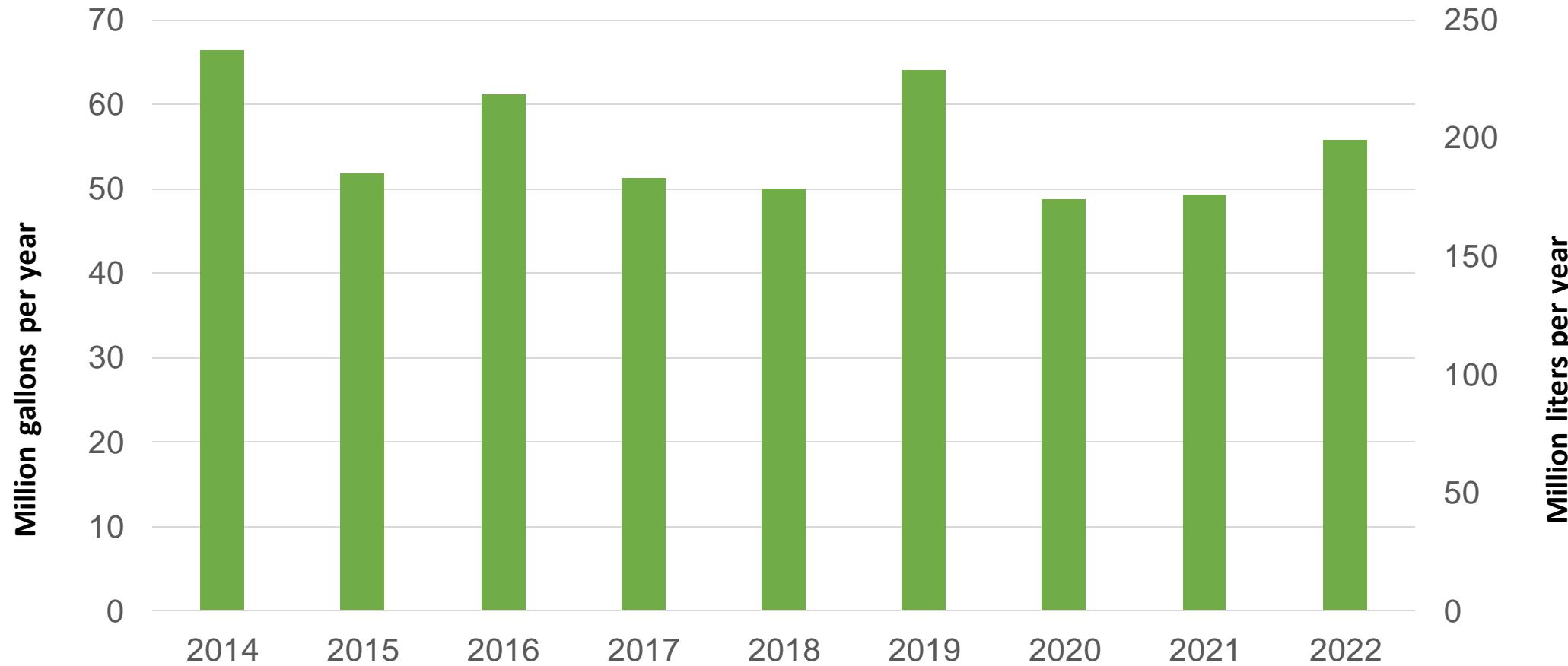
Source: MEM, 2023

Gasoline Imports in Guatemala



Source: MEM, 2023

Ethanol Exports from Guatemala



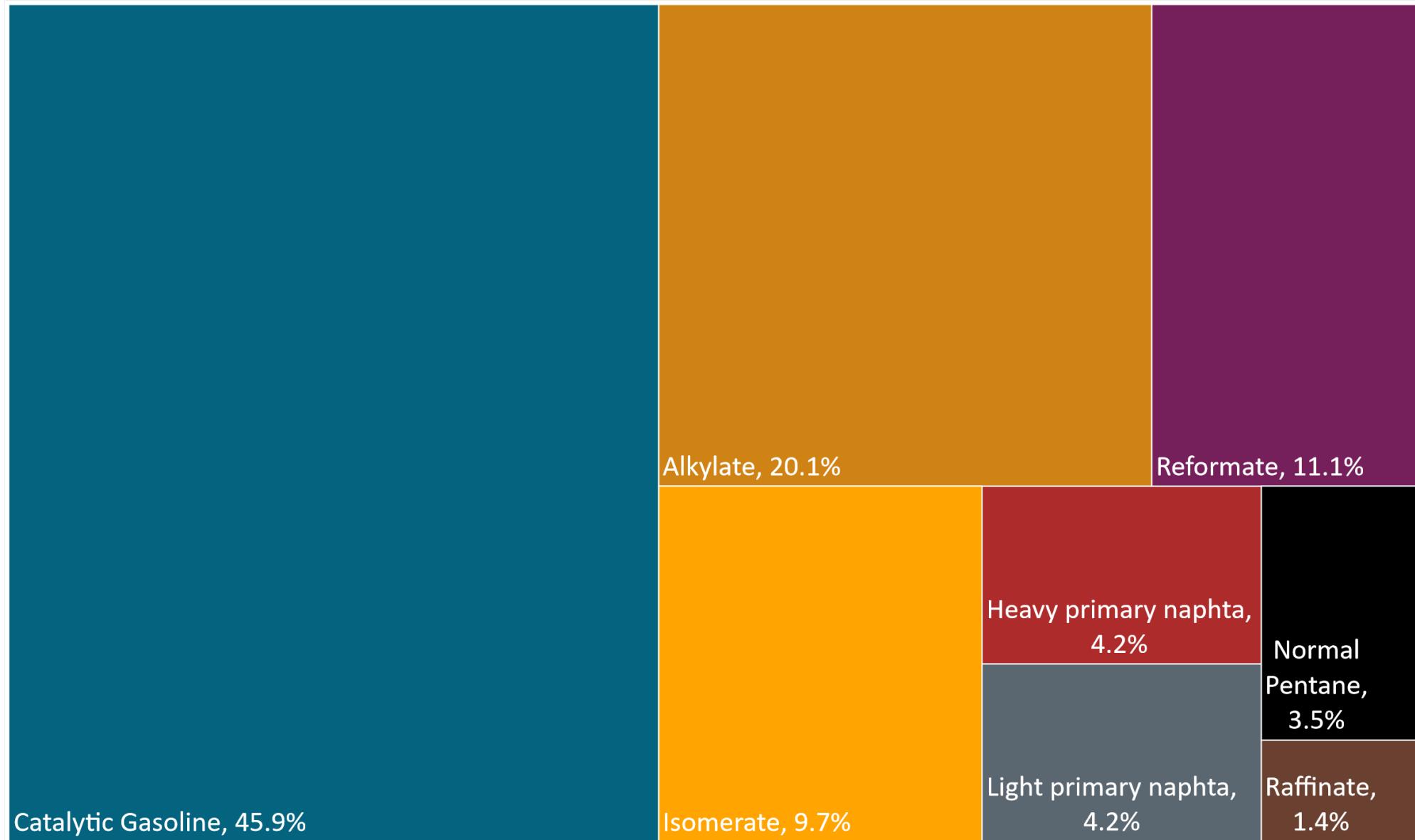
Source: Asociación de productores de etanol de Guatemala

Gasoline Quality in Guatemala

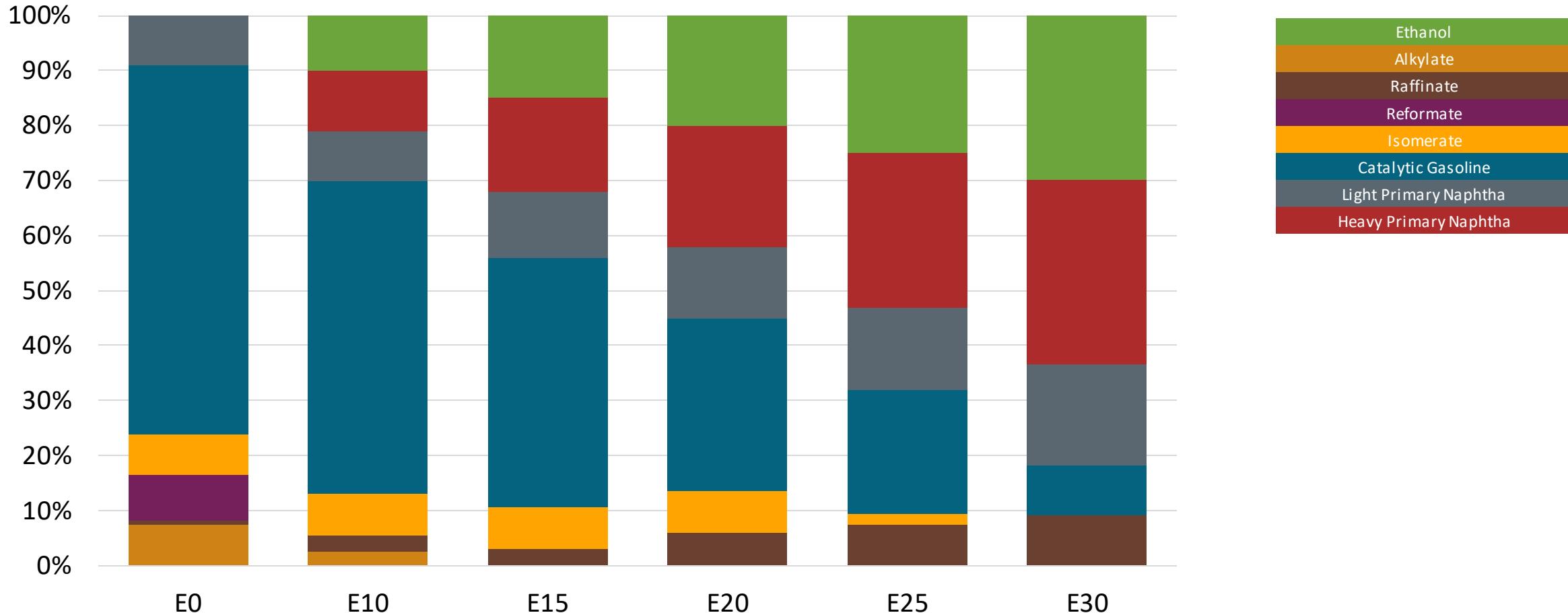
Name	Ministerial Accord Number 320-2022		EN 228:2012 + A1:2017 (Euro 6 enabling)			
Implementation Date	2022		2017			
Applicability	Whole country	Whole country	All countries			
Selected Grade	Gasoline Regular	Gasoline Superior	RON 95 E5	RON 95 E10	RON 98 E5	RON 98 E10
Benzene Content	< 2,5% v/v	< 2,5% v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v
Aromatics	- / < 50% v/v	- / < 50% v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v
Olefins	- / < 30% v/v	- / < 30% v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v
Lead Content	< 0,013 g/l	< 0,013 g/l	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l
Manganese	< 2,5 mg/l	< 2,5 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l
RON	> 91	> 95	> 95	> 95	> 98	> 98
MON	-	-	> 85	> 88	> 85	> 88
AKI						
Sulfur Content	< 500 mg/kg	< 500 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg
Oxygen Content	-	-	<2,7 % m/m	<3,7 % m/m	<2,7 % m/m	<3,7 % m/m
Ethanol (EtOH)	< 10 %v/v	< 10 %v/v	<5 %v/v	<10 %v/v	<5 %v/v	<10 %v/v
RVP 37.8°C (Summer)	< 69 kPa	< 69 kPa	<> 60 - 70 kPa *Depends on the country, RVP is regulated in the EU Fuel Quality Directive			
RVP 37.8 °C(Winter)						
RVP 37.8°C (Transition)						
MTBE	10% v/v	10% v/v	-	-	-	-
Ethers 5 or more C Atoms	-	-	Based on oxygen content	<22 %v/v	Based on oxygen content	<22 %v/v

Source: MEM, 2022

Blending Components- Guatemala



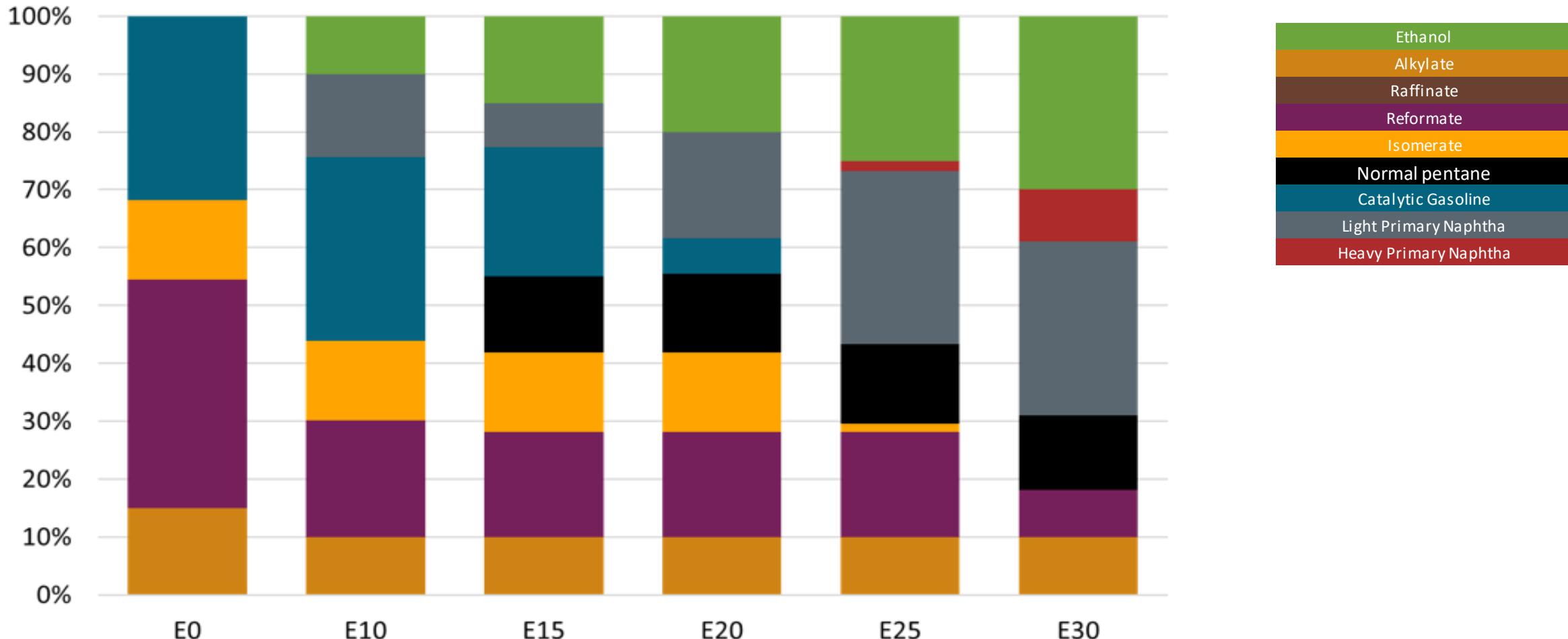
Guatemala – Regular – Constant Octane



Octane (RON)	91.0	91.0	91.0	91.0	91.2	91.3
Price (USD/gal)	\$ 2.331	\$ 2.189	\$ 2.127	\$ 2.067	\$ 2.009	\$ 1.945

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

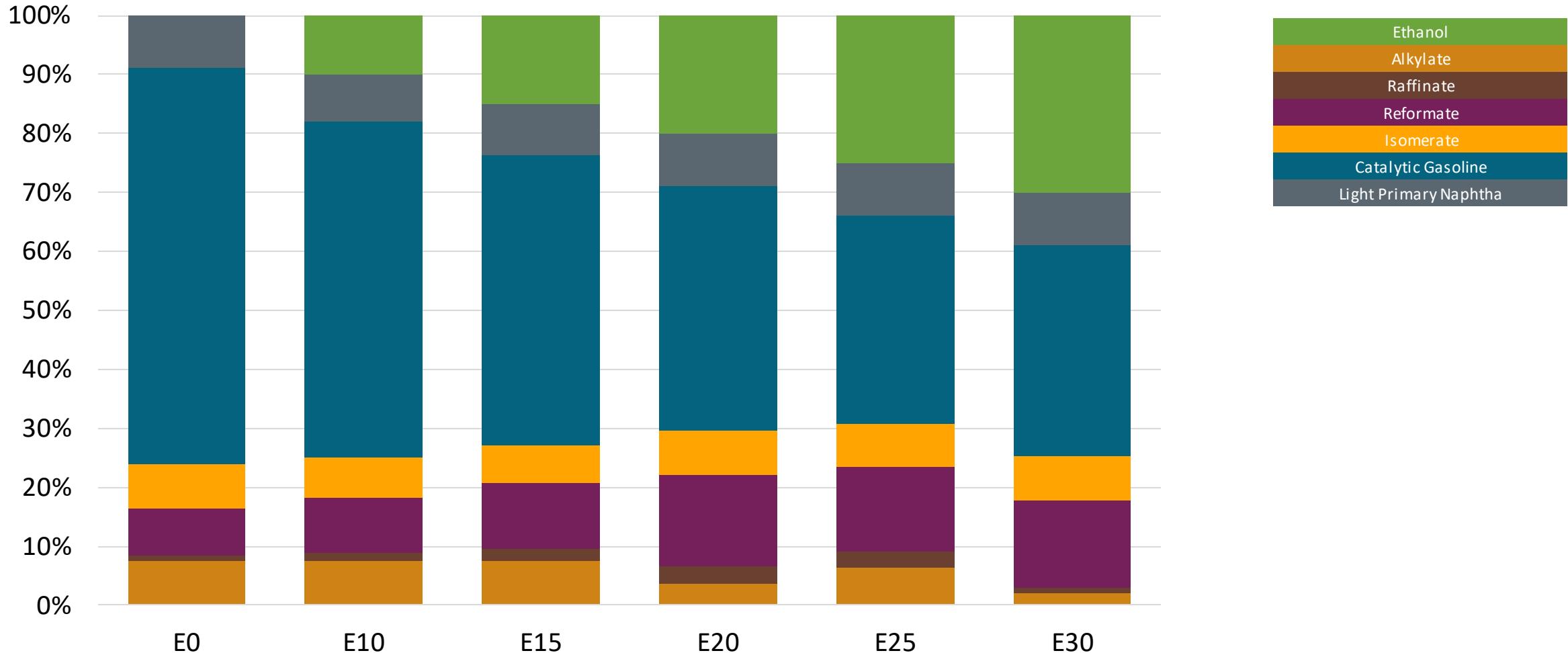
Guatemala – Premium – Constant Octane



Octane (RON)	95.0	95.0	95.0	95.0	95.0	95.0
Price (USD/gal)	\$ 2.497	\$ 2.364	\$ 2.273	\$ 2.198	\$ 2.116	\$ 2.032

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

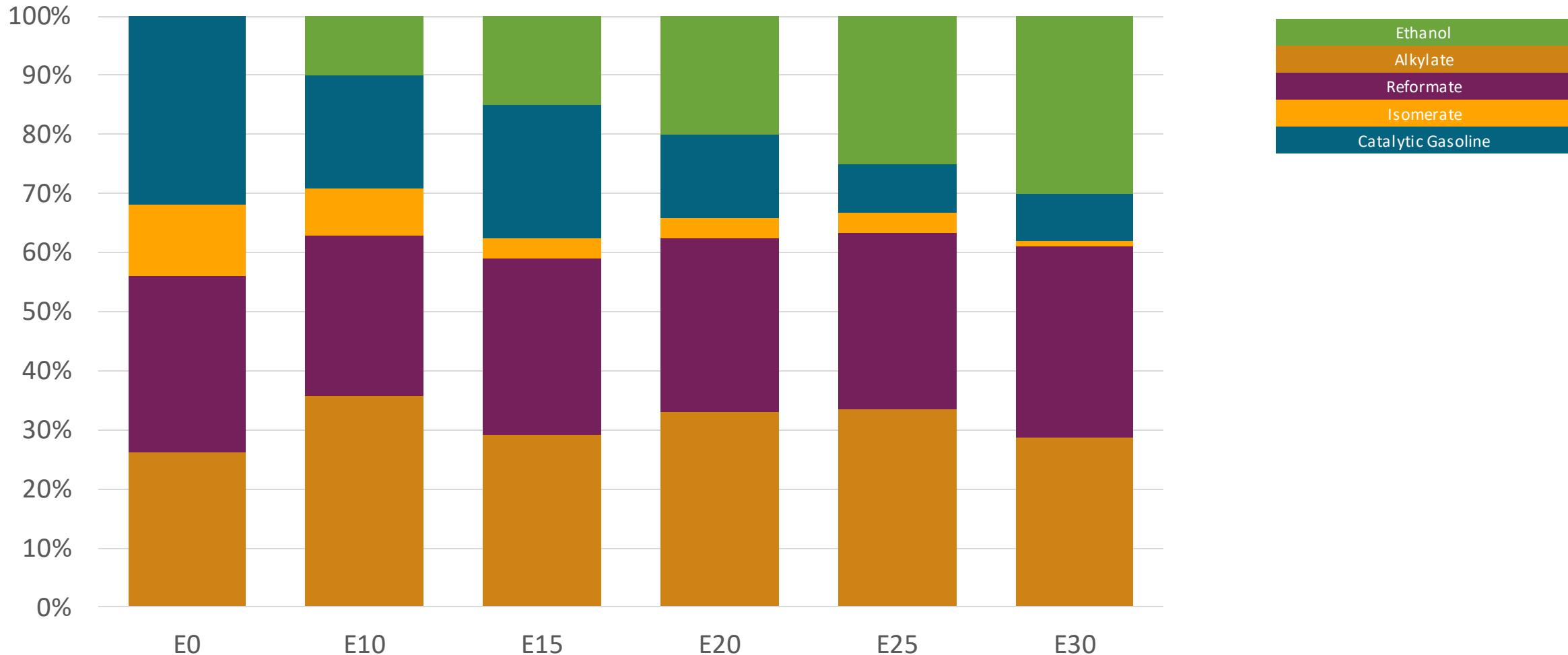
Guatemala – Regular – Octane Increment



Octane (RON)	91.0	95.7	97.8	99.7	101.6	103.8
Price (USD/gal)	\$ 2.326	\$ 2.326	\$ 2.326	\$ 2.326	\$ 2.326	\$ 2.326

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

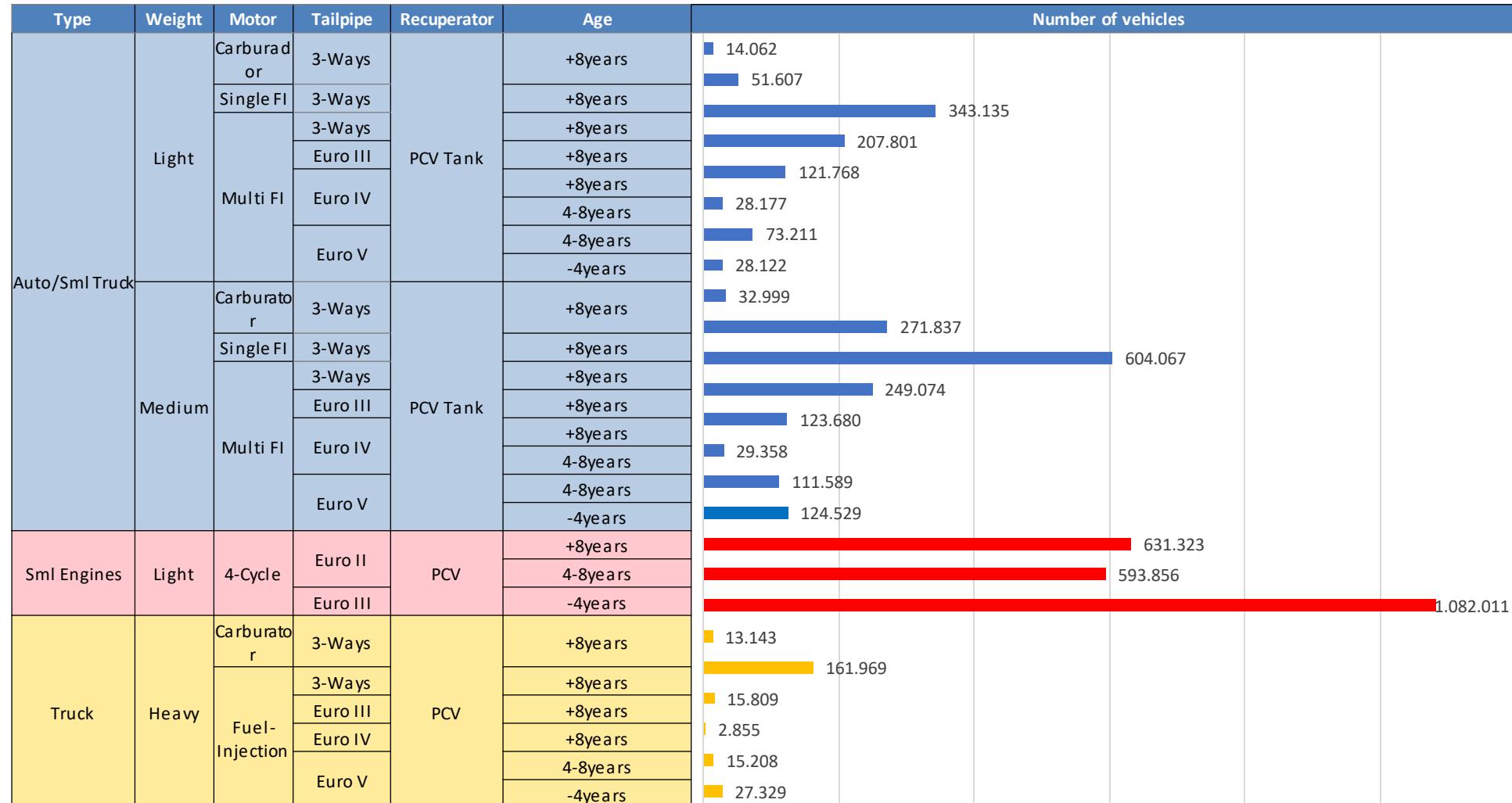
Guatemala – Premium – Octane Increment



Octane (RON)	95.0	99.1	101.5	103.2	105.0	106.8
Price (USD/gal)	\$ 2.484	\$ 2.484	\$ 2.484	\$ 2.484	\$ 2.484	\$ 2.484

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Gasoline VGuatemala



Vehicle Fleet: **4,958,519**

Average Age: **12 years**

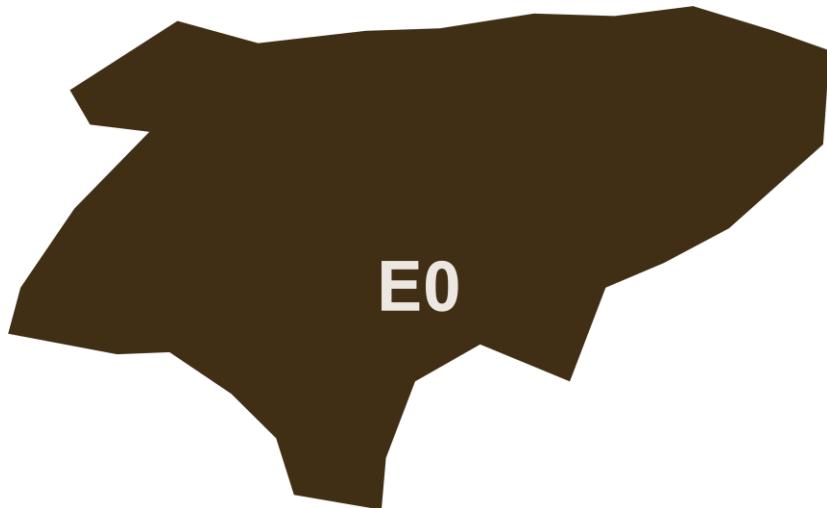
Source: SAT

132

Guatemala – Gasoline Vehicle Emissions

Emissions	E0 g/km	E10 g/km	E15 g/km	E20 g/km	E25 g/km	E30 g/km	E10 - E0	E20 - E0	E30 - E0	Euro 6	TIER USA
CO	10.53	9.28	8.80	8.34	7.99	7.53	-12%	-21%	-29%	1	3.5
VOC	0.95	0.88	0.86	0.84	0.83	0.81	-7%	-11%	-15%	95	255
VOCEvap	0.57	0.57	0.58	0.60	0.61	0.62	0%	4%	7%	0.1	0.273
NOx	0.61	0.43	0.40	0.38	0.36	0.33	-30%	-38%	-46%	0.06	0.203
SOx	0.01	0.00	0.00	0.00	0.00	0.00	-15%	-28%	-41%		
NH3	0.06	0.05	0.05	0.06	0.06	0.06	-2%	0%	1%		
Butadiene	0.01	0.01	0.01	0.01	0.01	0.01	-6%	-9%	-11%		
Acetaldehyde	0.02	0.03	0.04	0.06	0.07	0.08	68%	249%	372%		
Formaldehyde	0.06	0.06	0.07	0.08	0.09	0.09	13%	39%	68%		
Benzene	0.04	0.04	0.04	0.04	0.04	0.03	-9%	-11%	-18%		
CO2	241.54	229.47	224.85	222.57	220.40	216.33	-5%	-8%	-10%		
N2O	0.01	0.01	0.01	0.01	0.01	0.01	-1%	2%	4%		
CH4	0.22	0.22	0.22	0.23	0.23	0.23	0%	4%	7%		
PM 2.5	0.02	0.01	0.01	0.01	0.01	0.01	-22%	-43%	-65%		
PM10	0.03	0.02	0.02	0.01	0.01	0.01	-22%	-43%	-65%	0.005	0.007
THC	0.34	0.36	0.38	0.41	0.43	0.45	4%	19%	31%		

Ethanol Blending in Gasoline - Honduras

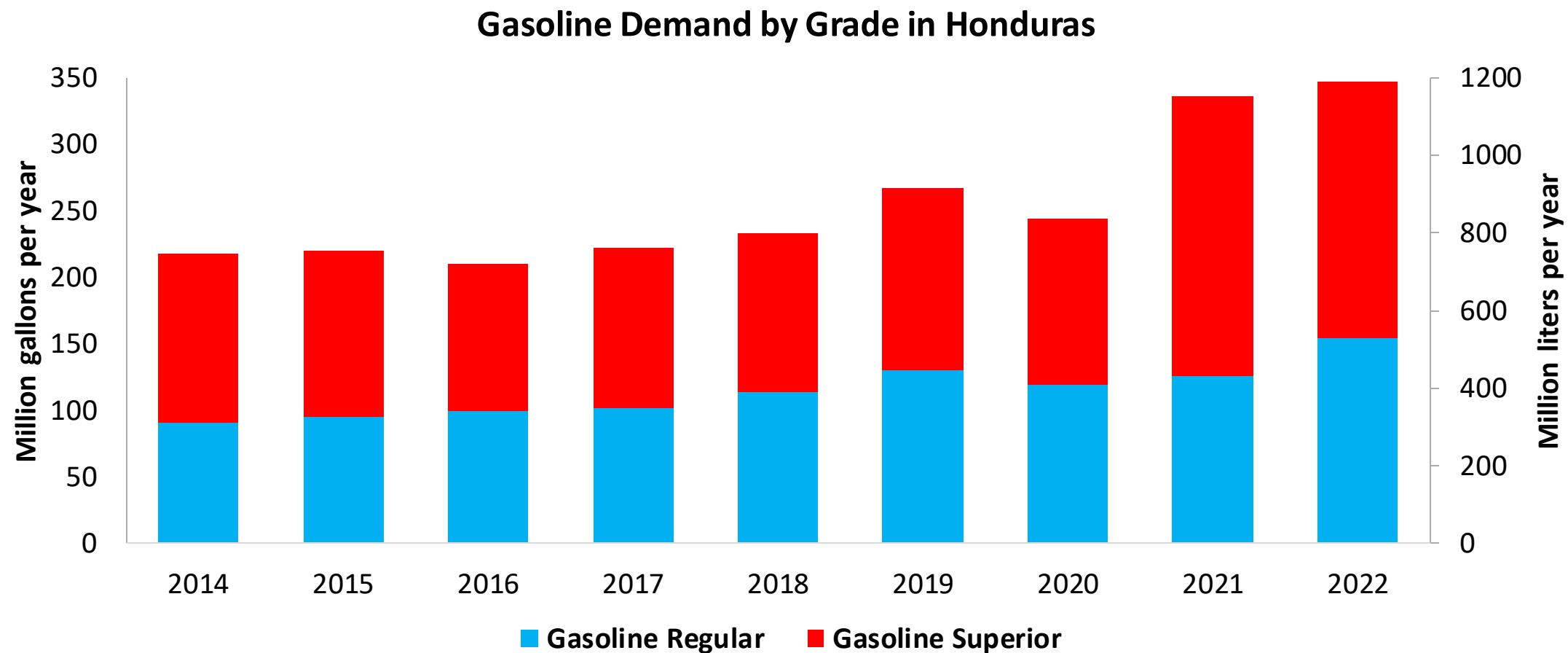


In 2022, gasoline demand was 314 million gallons (1,190 million liters). Regular gasoline RON 91 represented 44.6% while Superior gasoline RON 95 reached 55.6% of national demand. Honduras does not have gasoline production capacity, importing components for gasoline blending mainly from United States and to a lesser extent, from Ecuador.

Honduras has no national mandate for ethanol blends.

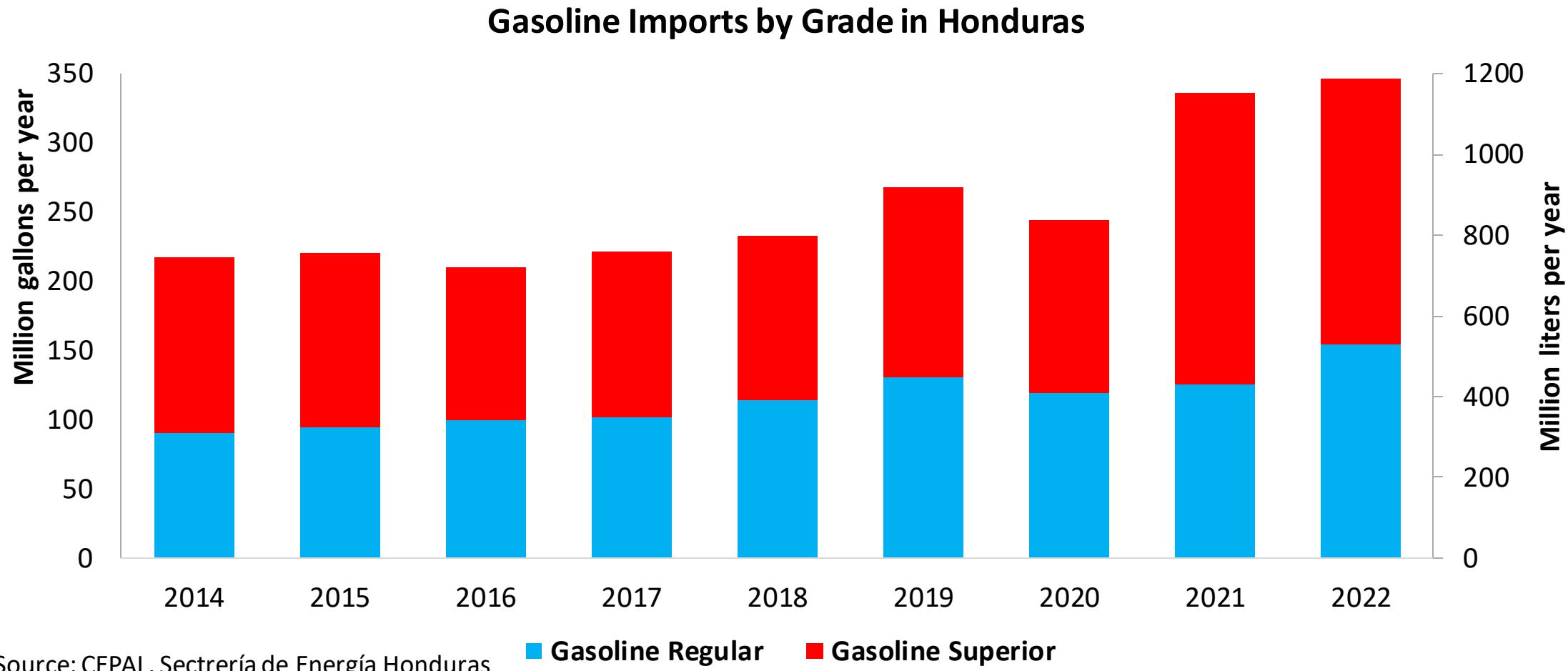
Source: CEPAL, Secretaría de Energía Honduras

Gasoline Demand in Honduras



Source: CEPAL, Secretaría de Energía Honduras

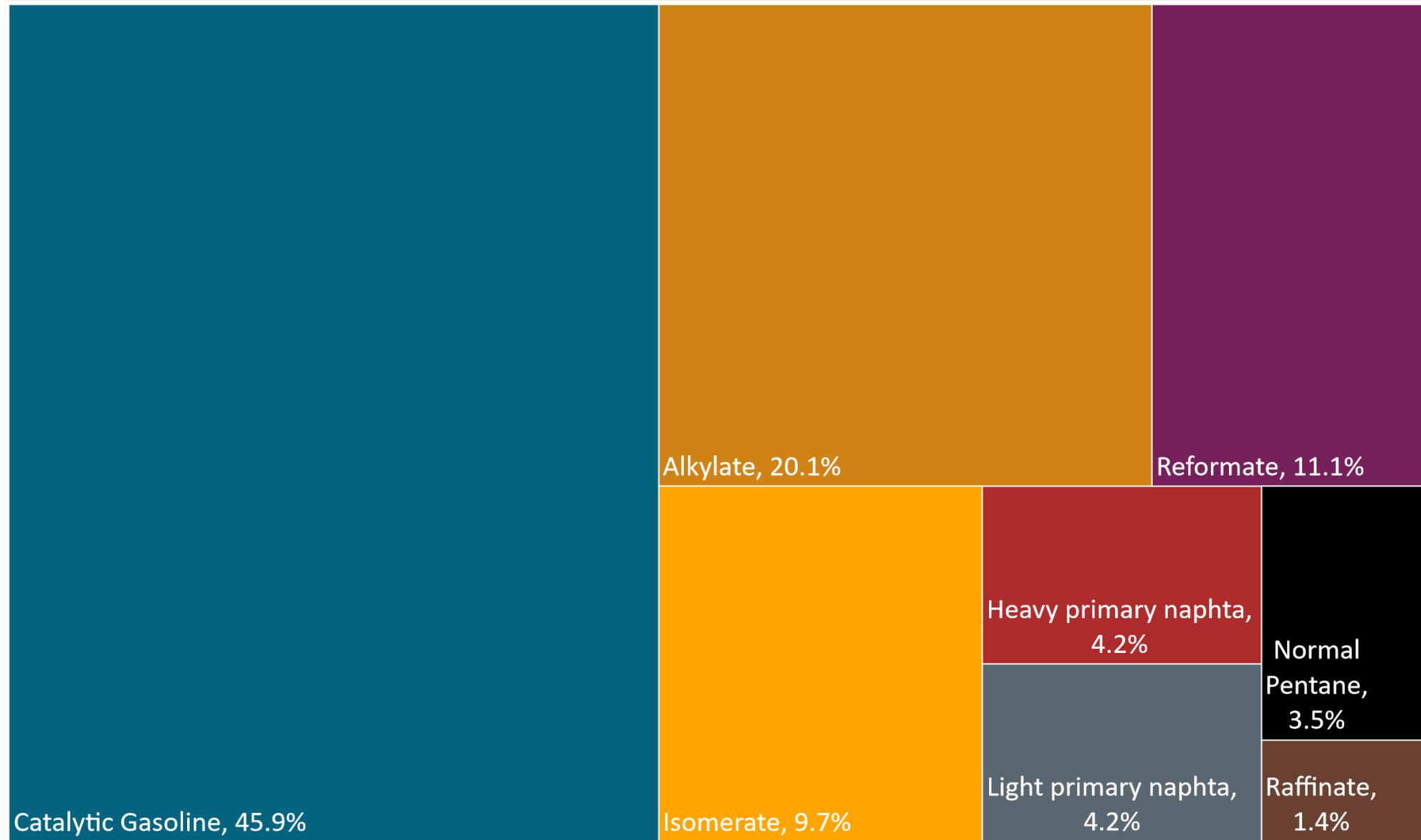
Gasoline Imports in Honduras



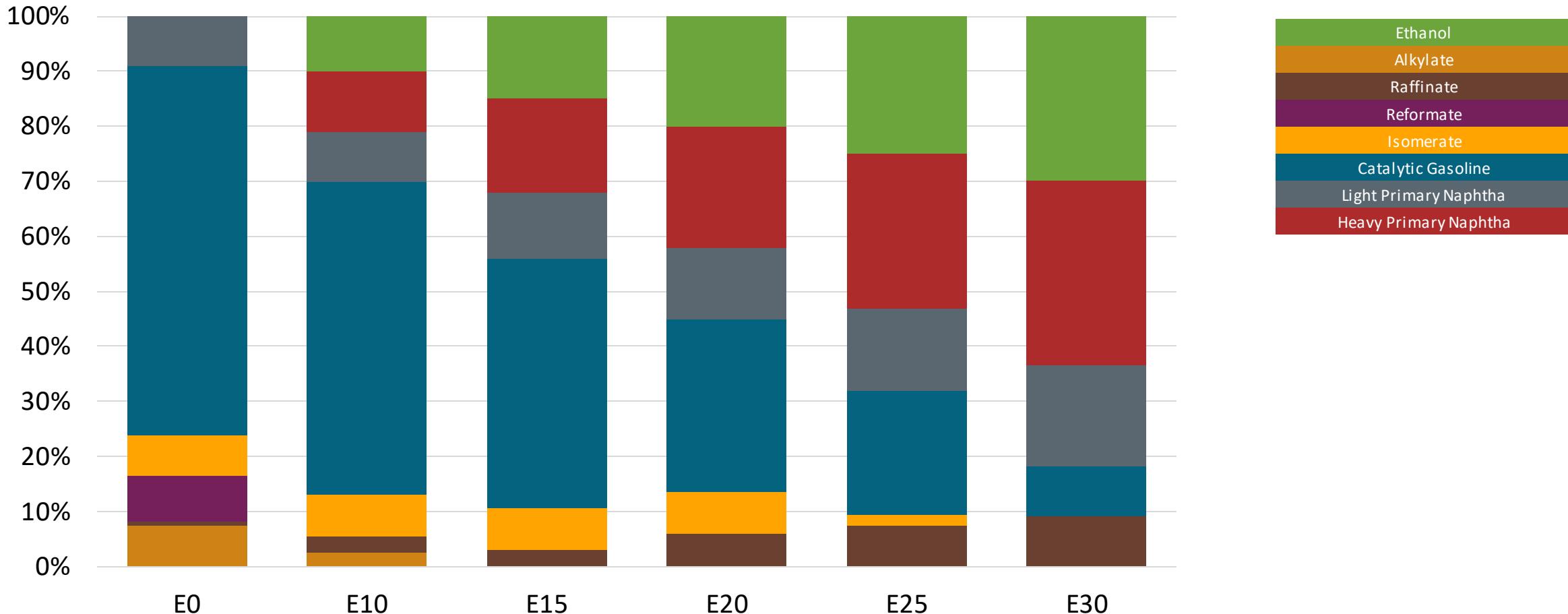
Gasoline Quality in Honduras

Name	RTCA 75.01.08:19 p.m.	RTCA 75.01.19:19	EN 228:2012 + A1:2017 (Euro 6 enabling)			
Implementation Date	2021	2021	2017			
Applicability	Whole country	Whole country	All countries			
Selected Grade	Gasoline Premium	Gasoline Regular	RON 95 E5	RON 95 E10	RON 98 E5	RON 98 E10
Benzene Content	2,5% v/v	2,5% v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v
Aromatics	50% v/v	50% v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v
Olefins	30% v/v	30% v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v
Lead Content	< 0,013 g/l	< 0,013 g/l	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l
Manganese	0,25% v/v	0,25% v/v	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l
RON	> 95	> 91	> 95	> 95	> 98	> 98
MON	-	-	> 85	> 88	> 85	> 88
AKI						
Sulfur Content	< 500 mg/kg	< 500 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg
Oxygen Content	2,7% v/v	2,7% v/v	<2,7 % m/m	<3,7 % m/m	<2,7 % m/m	<3,7 % m/m
Ethanol (EtOH)	-	-	<5 %v/v	<10 %v/v	<5 %v/v	<10 %v/v
RVP 37.8°C (Summer)	< 69 kPa	< 69 kPa	<> 60 - 70 kPa *Depends on the country, RVP is regulated in the EU Fuel Quality Directive			
RVP 37.8 °C(Winter)						
RVP 37.8°C (Transition)						
MTBE	-	-	-	-	-	-
Ethers 5 or more C Atoms	-	-	Based on oxygen content	<22 %v/v	Based on oxygen content	<22 %v/v

Blending Components- Honduras



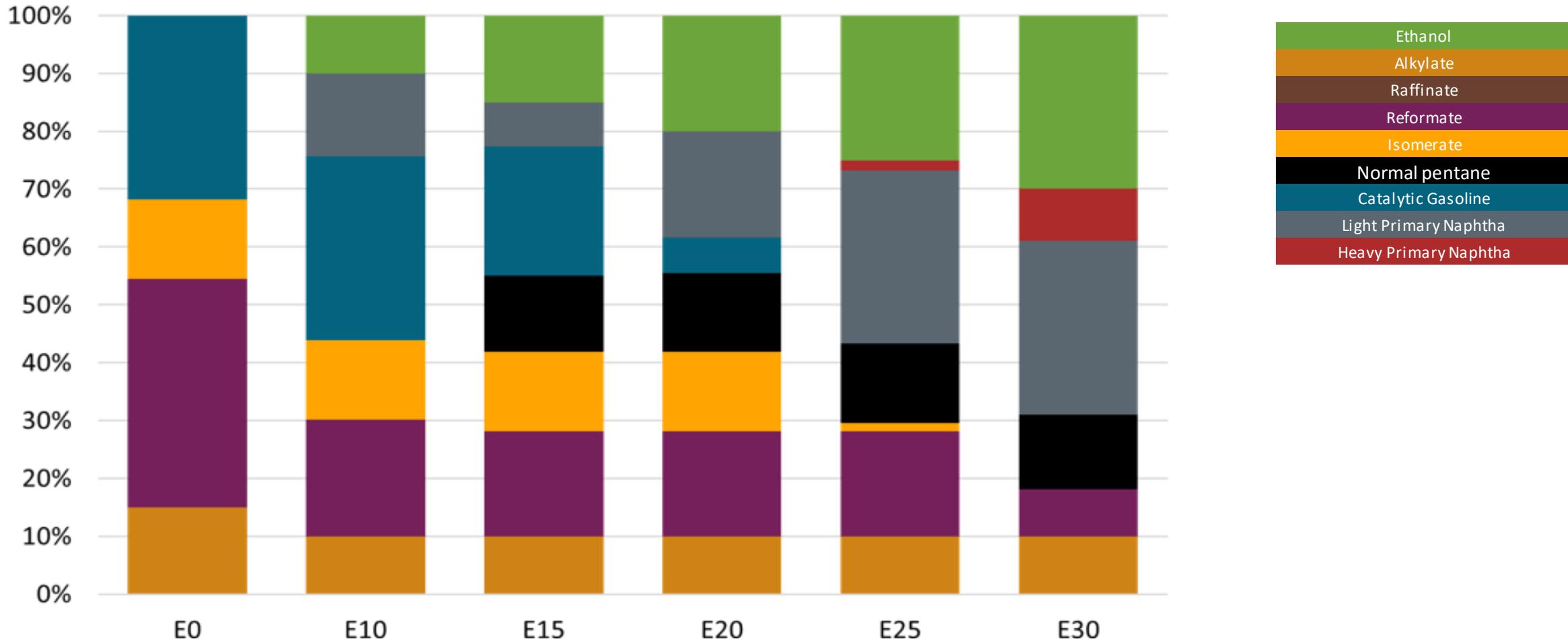
Honduras – Regular – Constant Octane



Octane (RON)	91.0	91.0	91.0	91.0	91.2	91.3
Price (USD/gal)	\$ 2.331	\$ 2.189	\$ 2.127	\$ 2.067	\$ 2.009	\$ 1.945

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

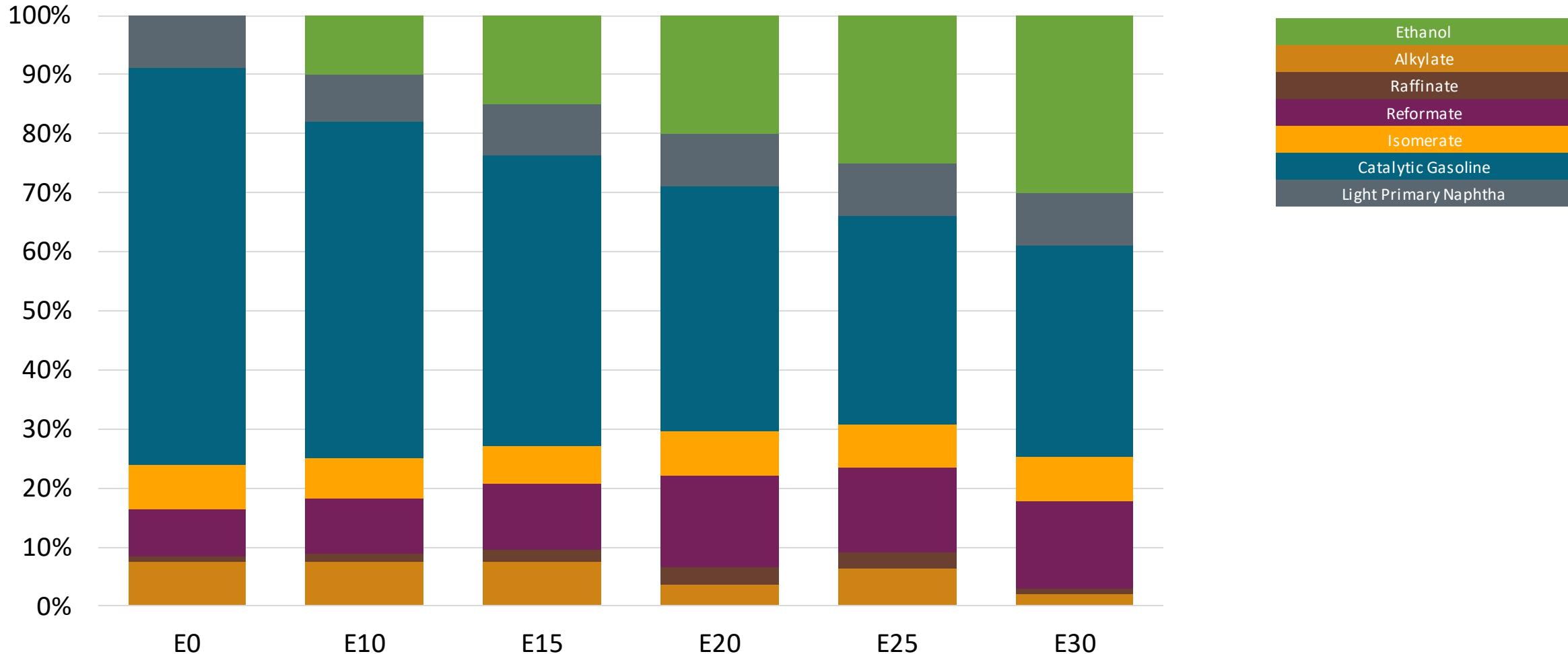
Honduras – Premium – Constant Octane



Octane (RON)	95.0	95.0	95.0	95.0	95.0	95.0
Price (USD/gal)	\$ 2.497	\$ 2.364	\$ 2.273	\$ 2.198	\$ 2.116	\$ 2.032

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

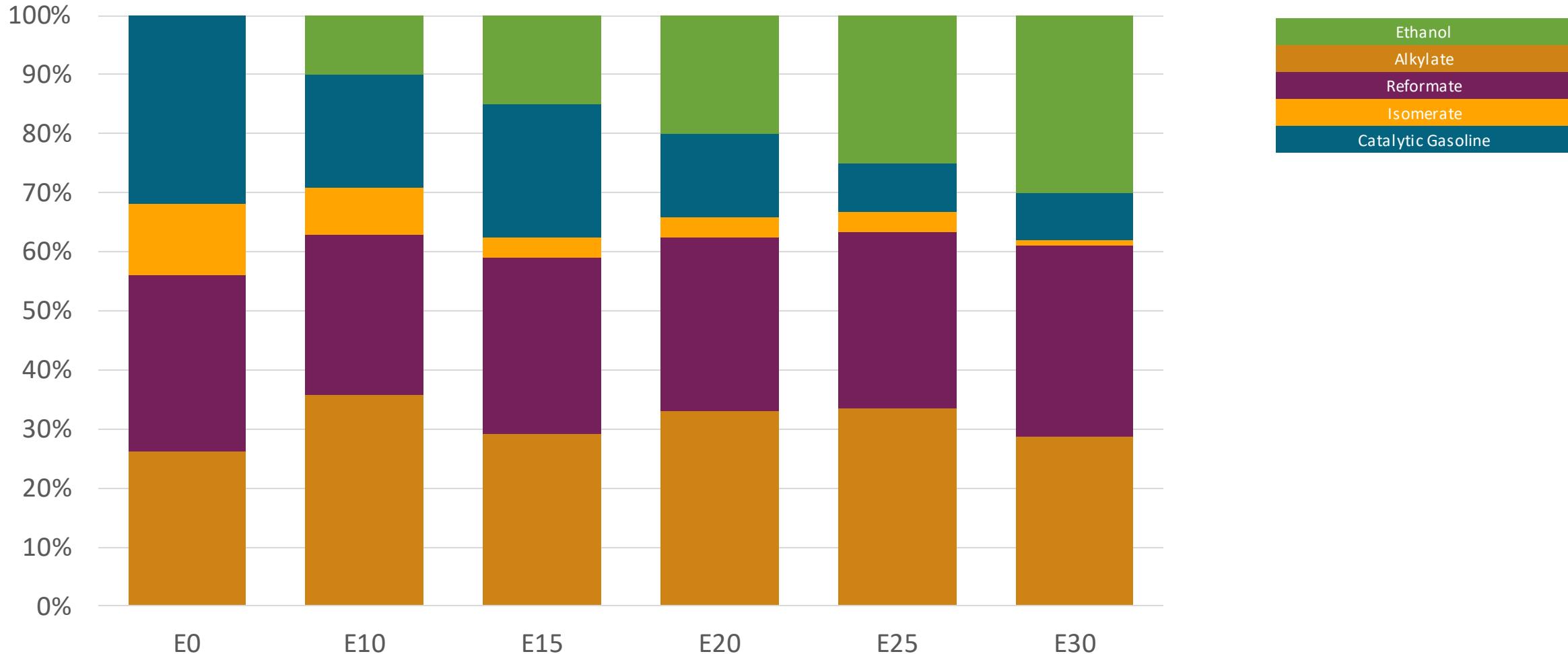
Honduras – Regular – Octane Increment



Octane (RON)	91.0	95.7	97.8	99.7	101.6	103.8
Price (USD/gal)	\$ 2.326	\$ 2.326	\$ 2.326	\$ 2.326	\$ 2.326	\$ 2.326

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

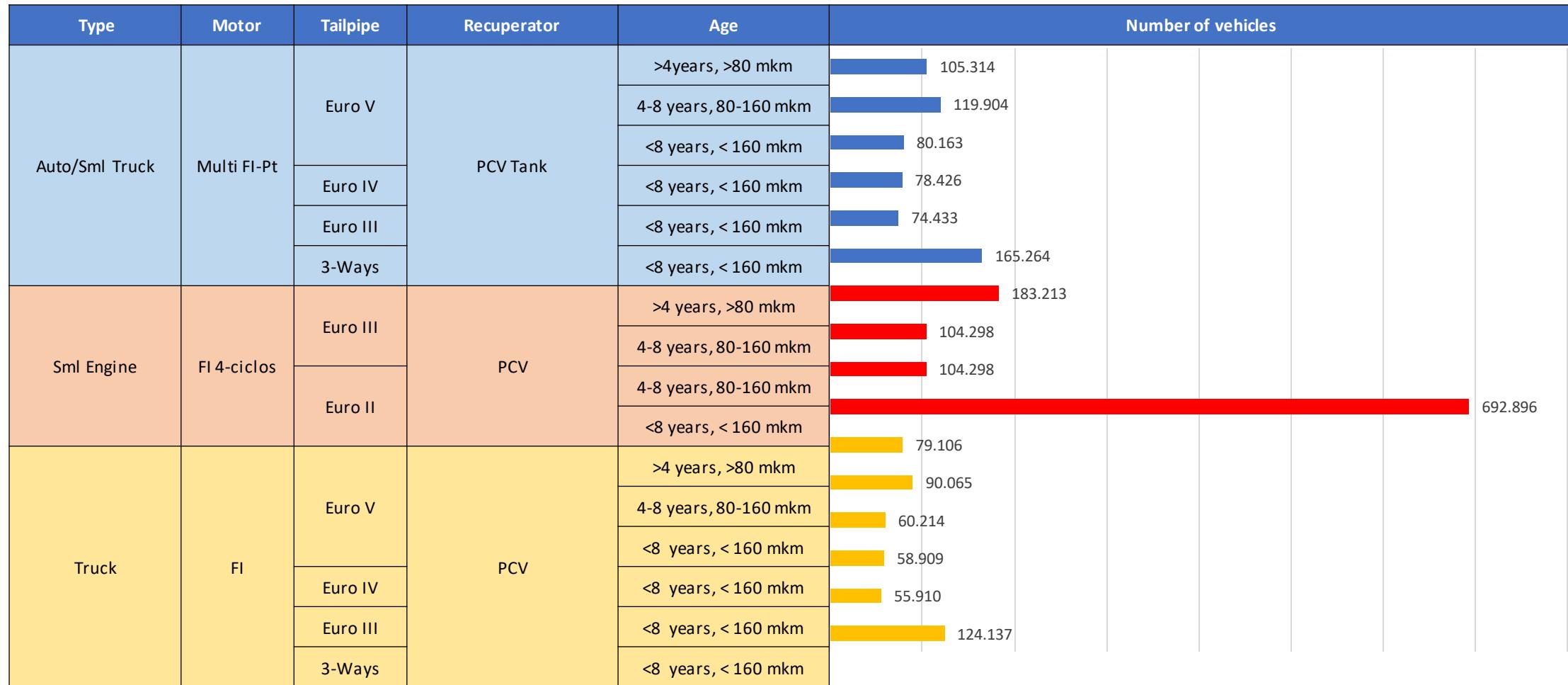
Honduras – Premium – Octane Increment



Octane (RON)	95.0	99.1	101.5	103.2	105.0	106.8
Price (USD/gal)	\$ 2.484	\$ 2.484	\$ 2.484	\$ 2.484	\$ 2.484	\$ 2.484

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Gasoline Vehicle Fleet - Honduras



Vehicle Fleet: **2,176,552**

Average Age: **11 years**

Motorcycles: **38%**

Honduras – Gasoline Vehicle Emissions

Emissions	E0 g/km	E10 g/km	E15 g/km	E20 g/km	E25 g/km	E30 g/km	E10 - E0	E20 - E0	E30 - E0	Euro 6	TIER USA
CO	23.15	20.81	19.97	19.18	18.59	17.88	-10%	-17%	-23%	1	3.5
VOC	2.41	2.18	2.10	2.03	1.98	1.89	-10%	-16%	-22%	95	255
VOCevap	0.65	0.65	0.66	0.68	0.69	0.70	0%	4%	7%	0.1	0.273
NOx	0.99	0.69	0.65	0.62	0.58	0.53	-30%	-38%	-46%	0.06	0.203
SOx	0.01	0.01	0.01	0.01	0.01	0.00	-15%	-28%	-41%		
NH3	0.06	0.06	0.06	0.06	0.06	0.06	-2%	0%	1%		
Butadiene	0.01	0.01	0.01	0.01	0.01	0.01	-10%	-17%	-23%		
Acetaldehyde	0.03	0.05	0.08	0.11	0.12	0.15	68%	249%	372%		
Formaldehyde	0.13	0.14	0.17	0.18	0.20	0.21	13%	39%	68%		
Benzene	0.11	0.10	0.10	0.10	0.09	0.09	-9%	-11%	-18%		
CO2	322.66	306.53	300.37	297.32	294.53	289.10	-5%	-8%	-10%		
N2O	0.02	0.02	0.02	0.02	0.02	0.02	-1%	2%	4%		
CH4	0.53	0.53	0.54	0.55	0.56	0.57	0%	4%	7%		
PM 2.5	0.03	0.02	0.02	0.02	0.01	0.01	-22%	-43%	-65%		
PM10	0.08	0.06	0.05	0.04	0.04	0.03	-22%	-43%	-65%	0.005	0.007
THC	0.82	0.84	0.90	0.95	0.99	1.03	3%	16%	27%		

Ethanol Blending in Gasoline - Jamaica

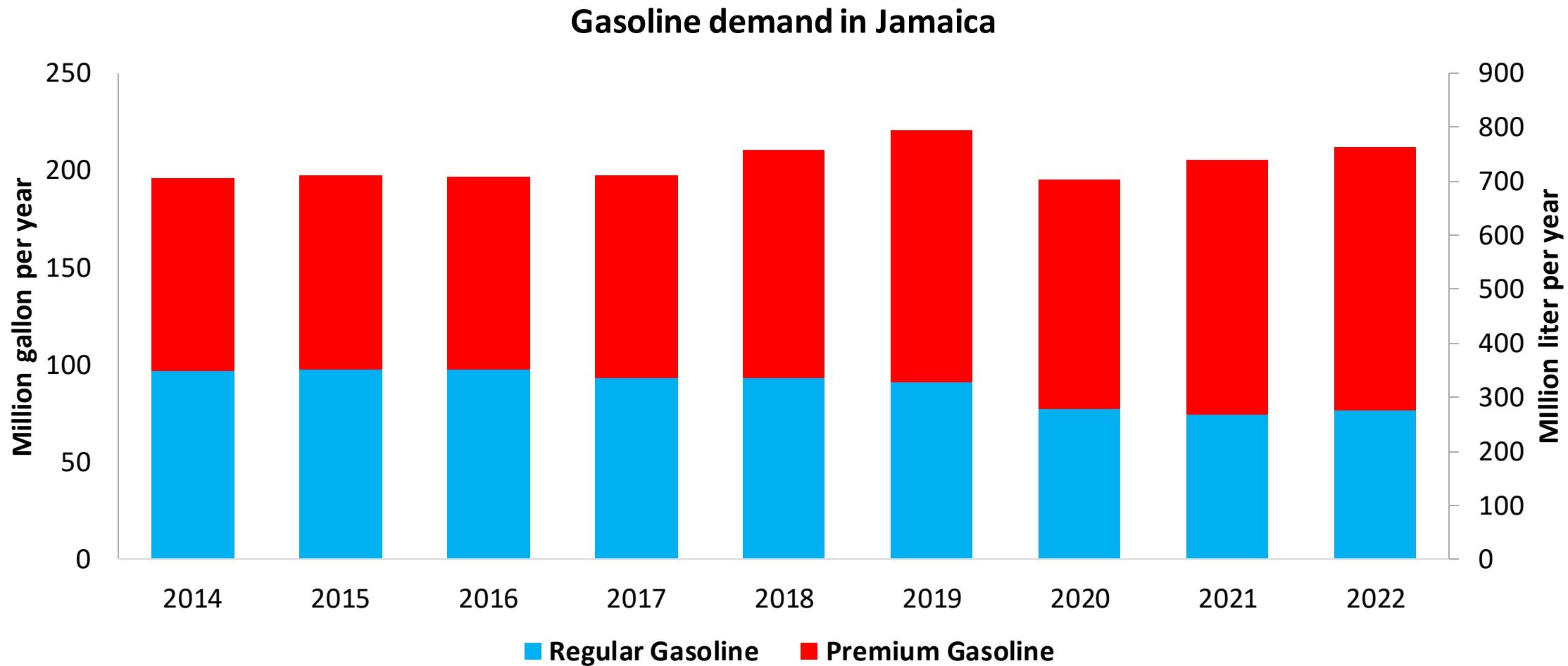


In 2022, gasoline production was 476 million liters and gasoline imports 190 million liters, mainly from United States. Regular grade (AKI 87) had a market share of 36% and Premium grade (AKI 90) 64%. Since 2010, only E10 has been consumed in Jamaica.

E10 is mandate in Jamaica since 2010. Previously, ethanol was supplied with local production Petrojam, however, in recent years ethanol is mainly imported from the United States.

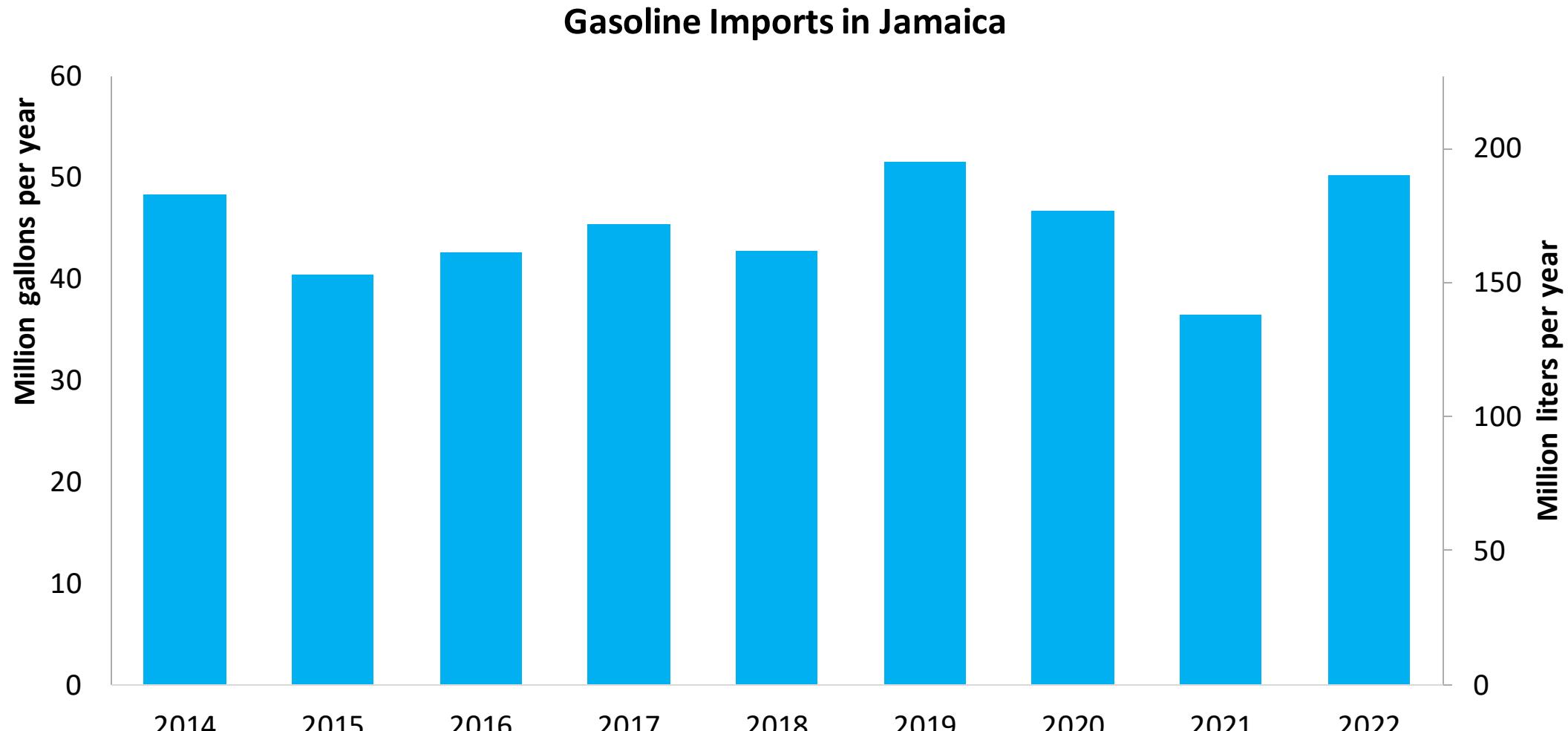
Source: Petrojam, MSET

Gasoline Demand in Jamaica



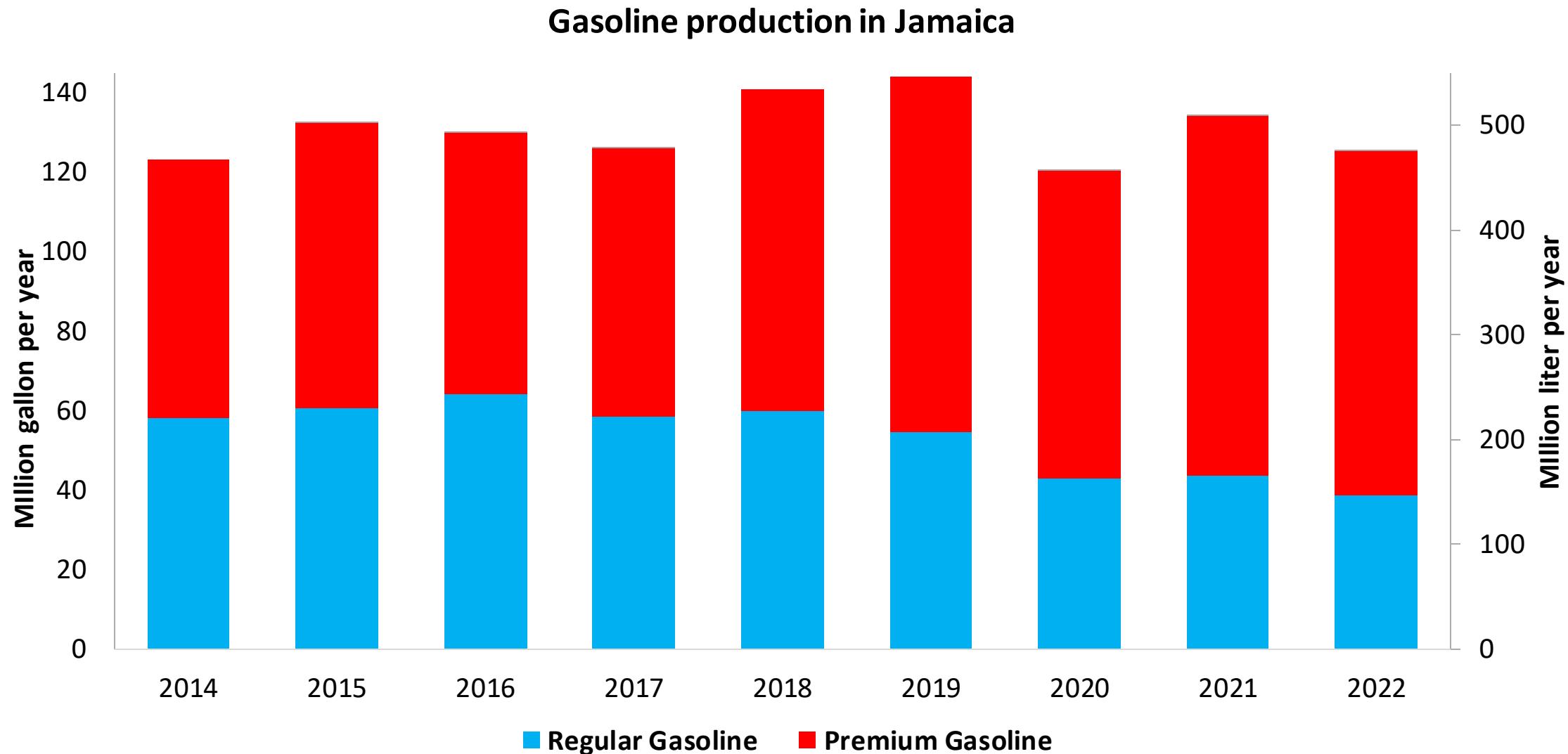
Source: Petrojam, MSET

Gasoline Imports in Jamaica



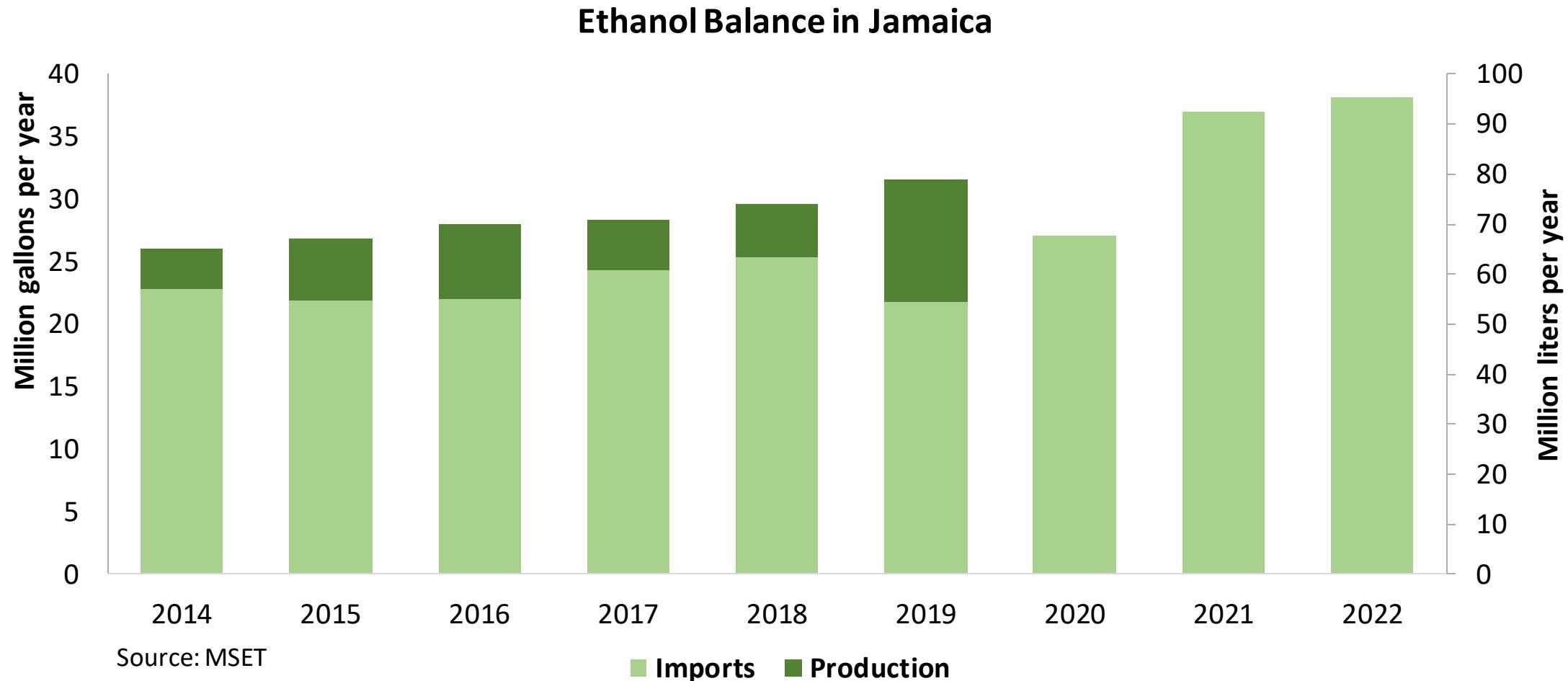
Source: Petrojam, MSET

Gasoline Production in Jamaica



Source: Petrojam, MSET

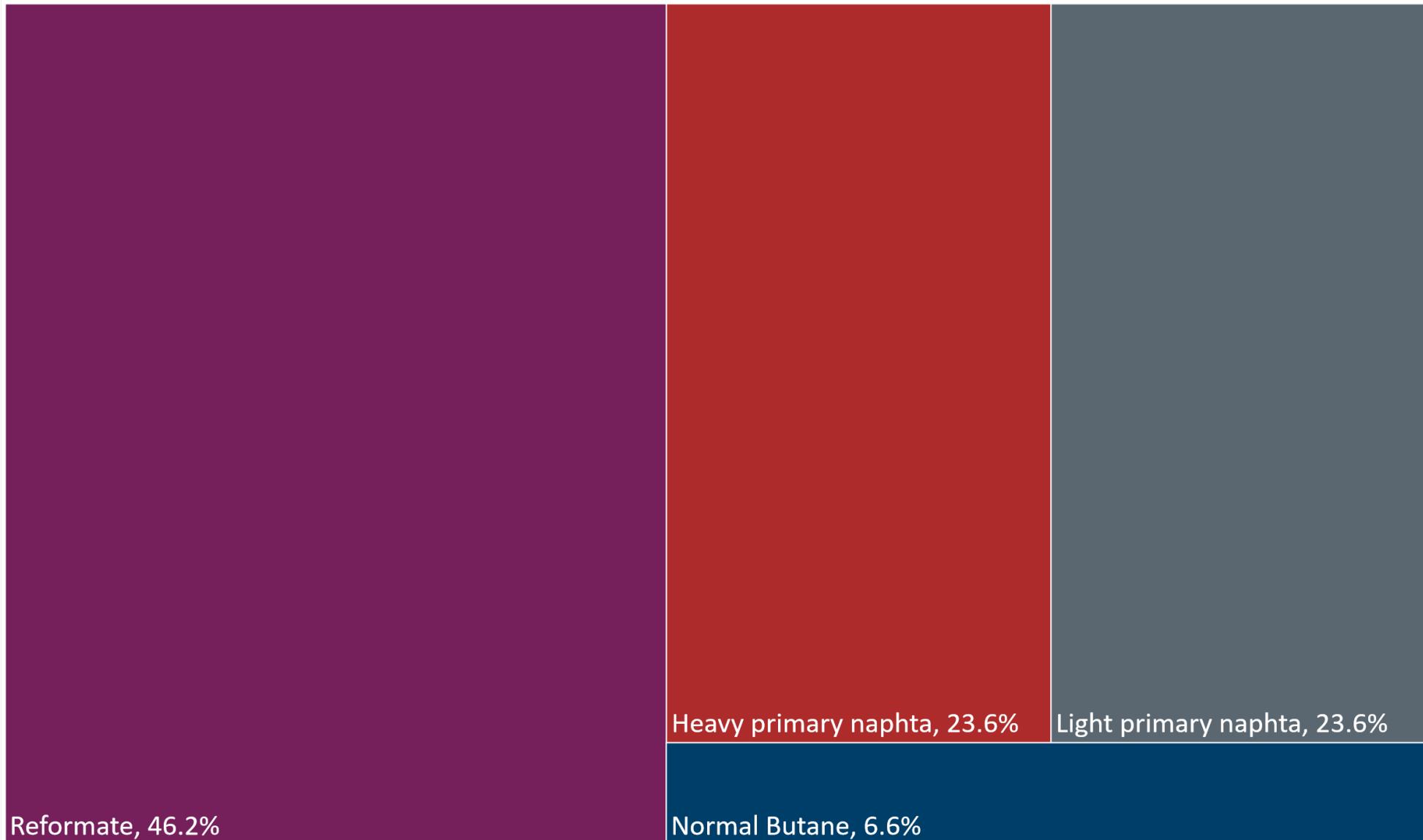
Ethanol Balance in Jamaica



Gasoline Quality in Jamaica

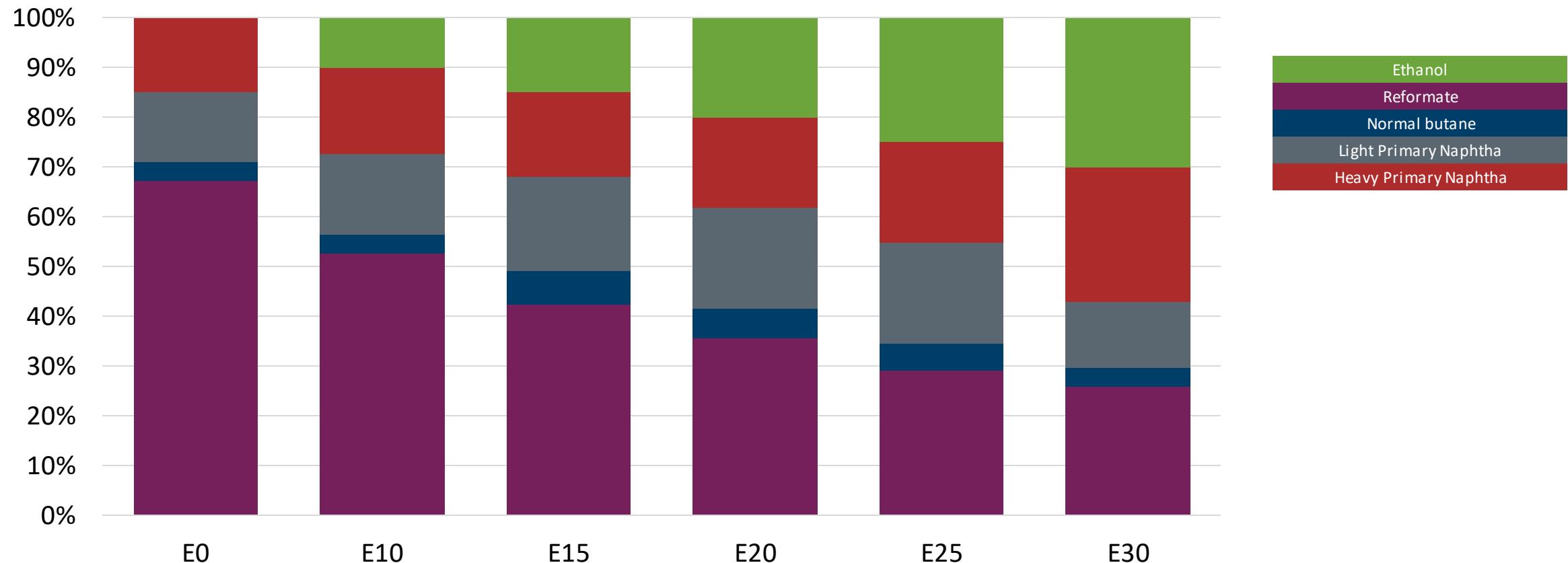
Name	JS 341:2017		EN 228:2012 + A1:2017 (Euro 6 enabling)				
Implementation Date	2017		2017				
Applicability	Whole country	Whole country	All countries				
Selected Grade	Unleaded Petrol AKI 87 E10		Unleaded Petrol AKI 90 E10		RON 95 E5	RON 95 E10	
Benzene Content	< 5 %v/v		< 5 %v/v		< 1 %v/v	< 1 %v/v	
Aromatics	< 45 %v/v		< 45 %v/v		< 35 %v/v	< 35 %v/v	
Olefins	-		-		< 18 %v/v	< 18 %v/v	
Lead Content	< 0,013 g/l		< 0,013 g/l		< 5 mg/l	< 5 mg/l	
Manganese	< 18 mg/l		< 18 mg/l		< 2,0 mg/l	< 2,0 mg/l	
RON					> 95	> 95	
MON					> 85	> 88	
AKI	90		87				
Sulfur Content	< 1.500 mg/kg		< 1.500 mg/kg		< 10 mg/kg	< 10 mg/kg	
Oxygen Content	< 4 %m/m (Gasoline with no ethanol)		< 4 %m/m (Gasoline with no ethanol)		<2,7 % m/m	<3,7 % m/m	
Ethanol (EtOH)	< 10 %v/v		< 10 %v/v		<5 %v/v	<10 %v/v	
RVP 37.8°C (Summer)	< 61 kPa		< 69 kPa	<> 60 - 70 kPa *Depends on the country, RVP is regulated in the EU Fuel Quality Directive			
RVP 37.8 °C(Winter)							
RVP 37.8°C (Transition)							
MTBE	< 15% v/v for Gasoline with no ethanol		< 15% v/v for Gasoline with no ethanol	-	-	-	-
Ethers 5 or more C Atoms	15% v/v (other oxygenates)		15% v/v (other oxygenates)	Based on oxygen content	<22 %v/v	Based on oxygen content	<22 %v/v

Available Blending Components



Source: Faro90

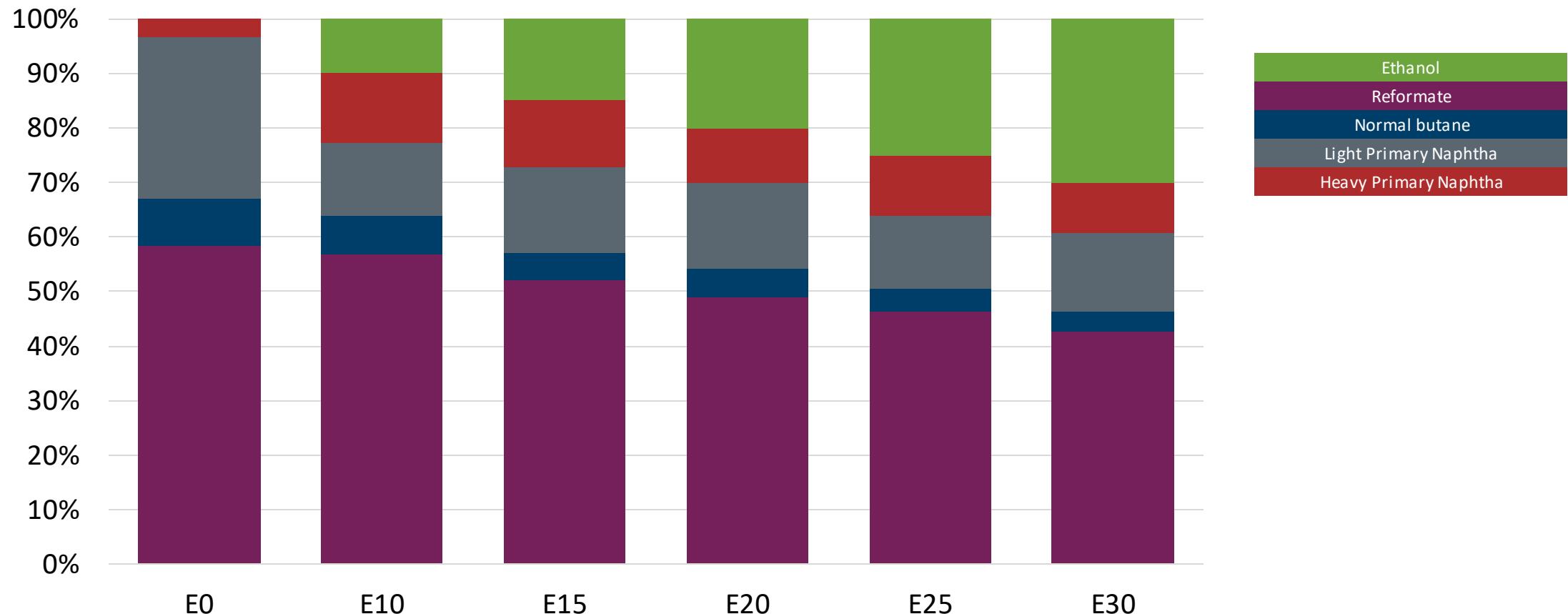
Ethanol Blending - Gasoline Regular – Constant Octane



Octane (AKI)	87.0	87.0	87.0	87.0	87.0	87.1
Price (USD/gal)	\$2.37	\$2.28	\$2.20	\$2.16	\$2.13	\$2.11

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

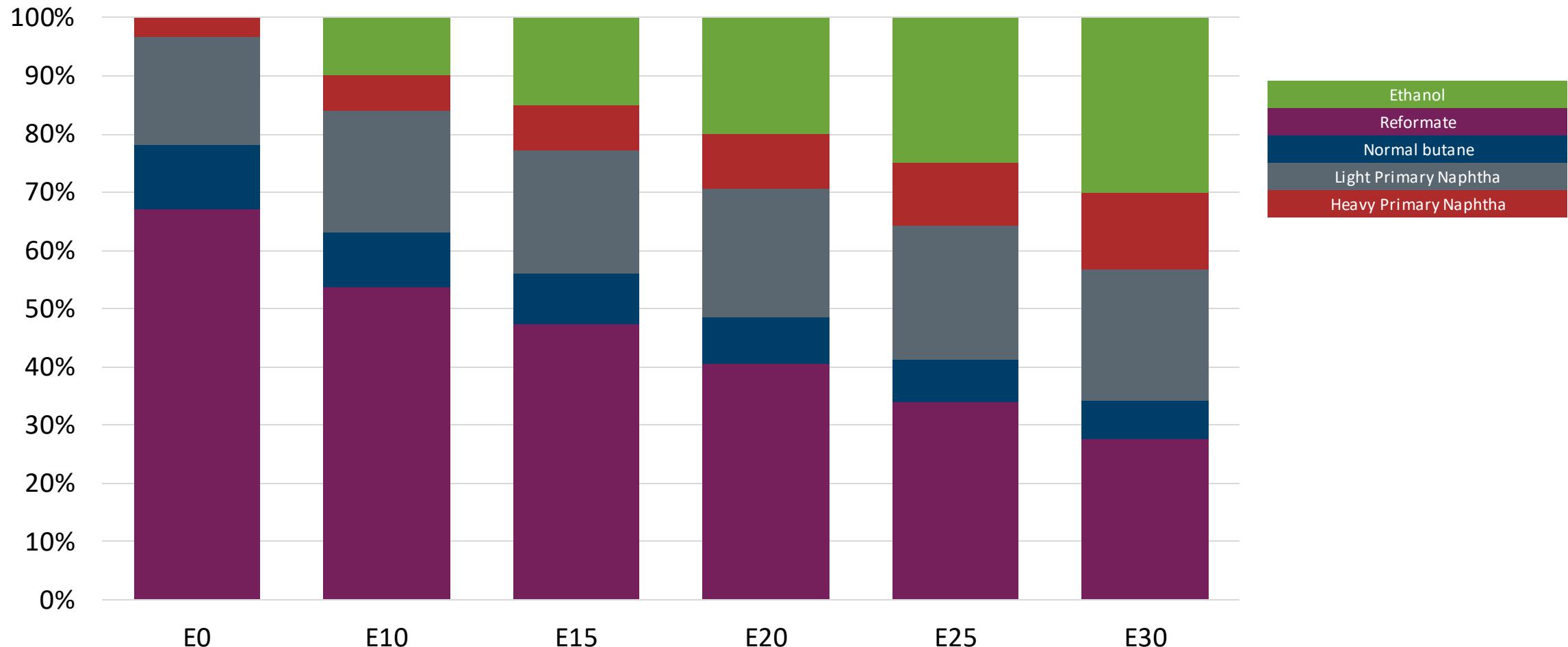
Ethanol Blending - Gasoline Regular – Octane Increment



Octane (AKI)	87.0	89.5	90.0	91.7	92.9	94.2
Price (USD/gal)	\$2.30	\$2.30	\$2.30	\$2.30	\$2.30	\$2.30

Prices are average Jan 22 – Feb 23.
 They do not include local distribution costs,
 import or gas station margins, taxes and
 subsidies.

Ethanol Blending - Gasoline Premium – Constant Octane

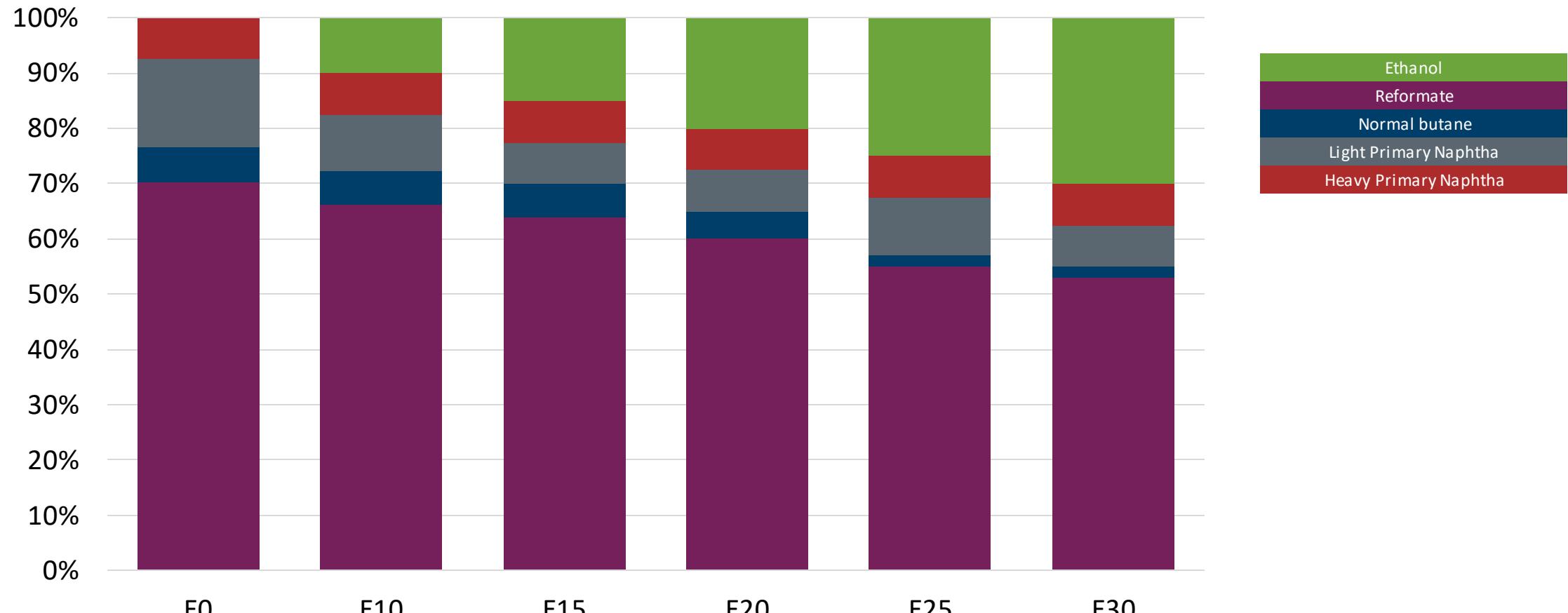


Octane (AKI)	90.0	90.0	90.0	90.0	90.0	90.0
Price (USD/gal)	\$2.34	\$2.28	\$2.25	\$2.21	\$2.18	\$2.14

Prices are average Jan 22 – Feb 23.

They do not include local distribution costs, import or gas station margins, taxes and subsidies.

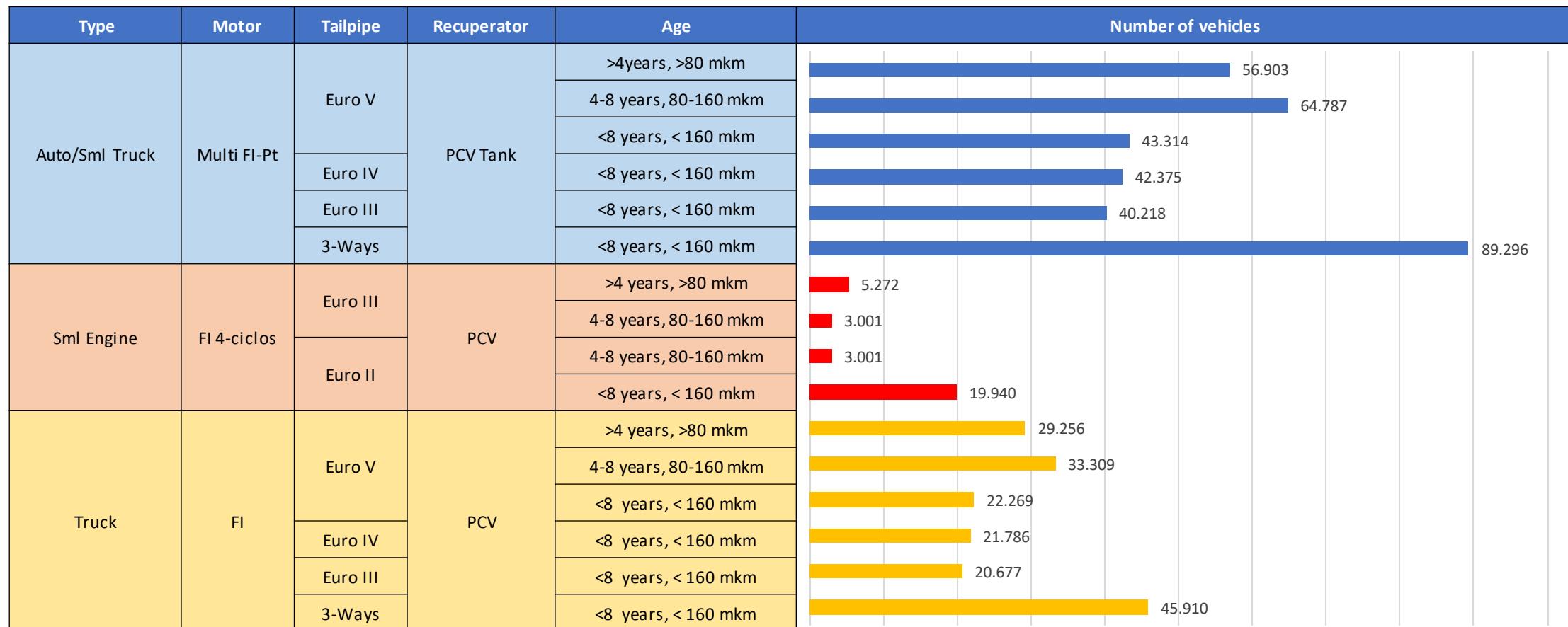
Ethanol Blending – Gasoline Premium – Octane Increment



	E0	E10	E15	E20	E25	E30
Octane (AKI)	89.7	92.7	94.2	95.2	95.4	97.0
Price (USD/gal)	\$2.39	\$2.39	\$2.39	\$2.39	\$2.39	\$2.39

Prices are average Jan 22 – Feb 23.
 They do not include local distribution costs,
 import or gas station margins, taxes and
 subsidies.

Gasoline Vehicle Fleet - Jamaica



Vehicle Fleet: 541,316

Average Age: 11 years

Motorcycle: 6%

Jamaica – Gasoline Vehicle Fleet Emissions

Emissions	E0 g/km	E10 g/km	E15 g/km	E20 g/km	E25 g/km	E30 g/km	E10 - E0	E20 - E0	E30 - E0	Euro 6	TIER USA
CO	22.05	20.66	20.28	19.99	19.8	19.45	-6%	-9%	-12%	1	3.5
VOC	1.76	1.69	1.68	1.68	1.68	1.67	-4%	-5%	-5%	95	255
VOCEvap	0.59	0.59	0.6	0.61	0.62	0.63	0%	3%	7%	0.1	0.273
NOx	0.94	0.66	0.62	0.59	0.55	0.51	-30%	-37%	-46%	0.06	0.203
SOx	0.01	0.01	0.01	0.01	0.01	0.01	0%	0%	0%		
NH3	0.06	0.06	0.06	0.06	0.06	0.06	0%	0%	0%		
Butadiene	0.01	0.01	0.01	0.01	0.01	0.01	0%	0%	0%		
Acetaldehyde	0.02	0.03	0.04	0.05	0.06	0.07	50%	150%	250%		
Formaldehyde	0.06	0.07	0.08	0.08	0.09	0.1	17%	33%	67%		
Benzene	0.1	0.09	0.08	0.07	0.05	0.04	-10%	-30%	-60%		
CO2	373.36	354.69	347.56	344.03	340.67	334.39	-5%	-8%	-10%		
N2O	0.02	0.02	0.02	0.02	0.02	0.02	0%	0%	0%		
CH4	0.39	0.39	0.39	0.4	0.41	0.42	0%	3%	8%		
PM 2.5	0.07	0.06	0.05	0.04	0.03	0.02	-14%	-43%	-71%		
PM10	0.03	0.03	0.02	0.02	0.02	0.01	0%	-33%	-67%	0.005	0.007
THC	0.57	0.58	0.6	0.61	0.62	0.64	2%	7%	12%		

Ethanol Blending in Gasoline - México

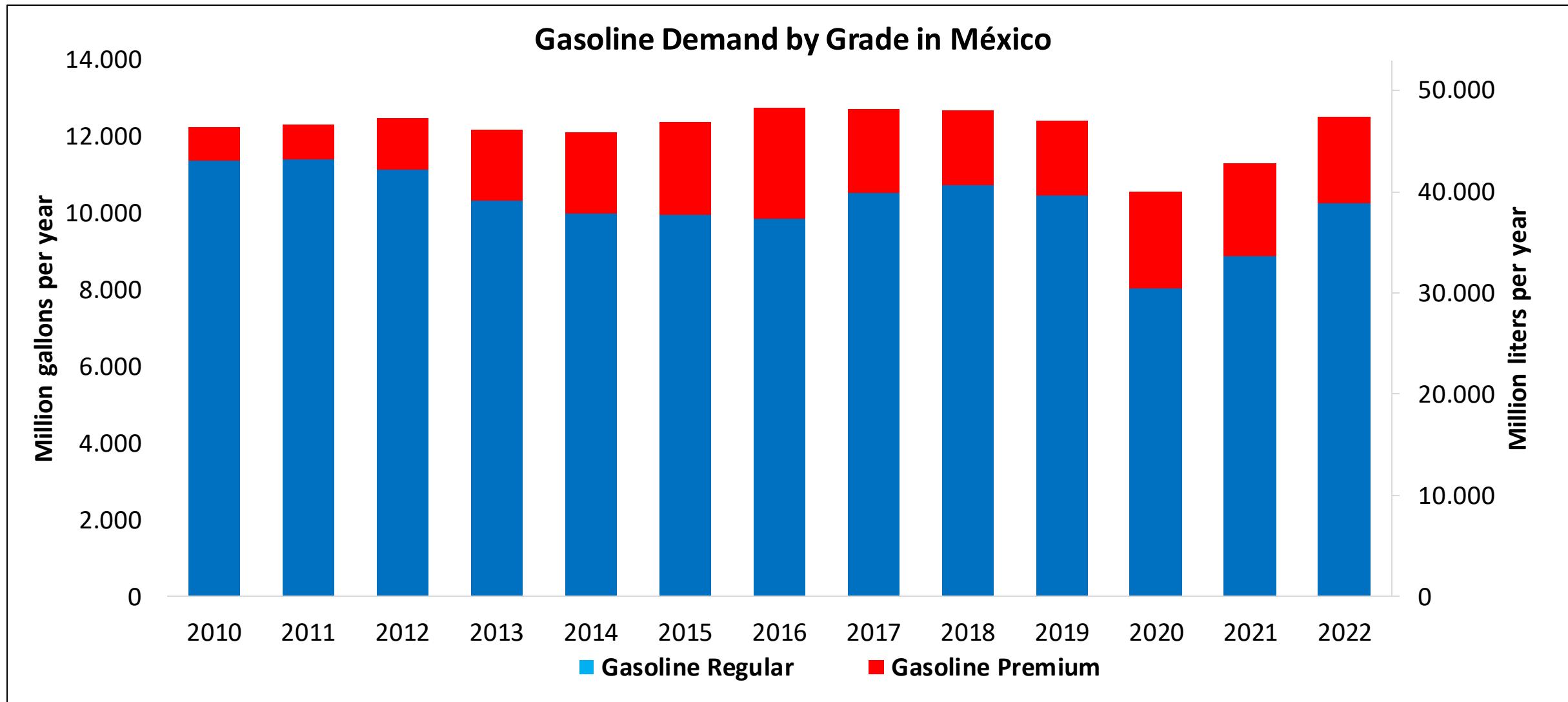


In 2022, gasoline consumption was 12,500 million gallons (20,000 million liters). There are two grades of gasoline, Regular (AKI 87) and Premium (AKI 91). Regular gasoline is the main grade in the market, representing 90%. There are stringent gasoline specifications for major metropolitan areas in Mexico City, Guadalajara and Monterrey. Demand is much higher than production, making necessary to import 40% of gasoline mainly from the United States.

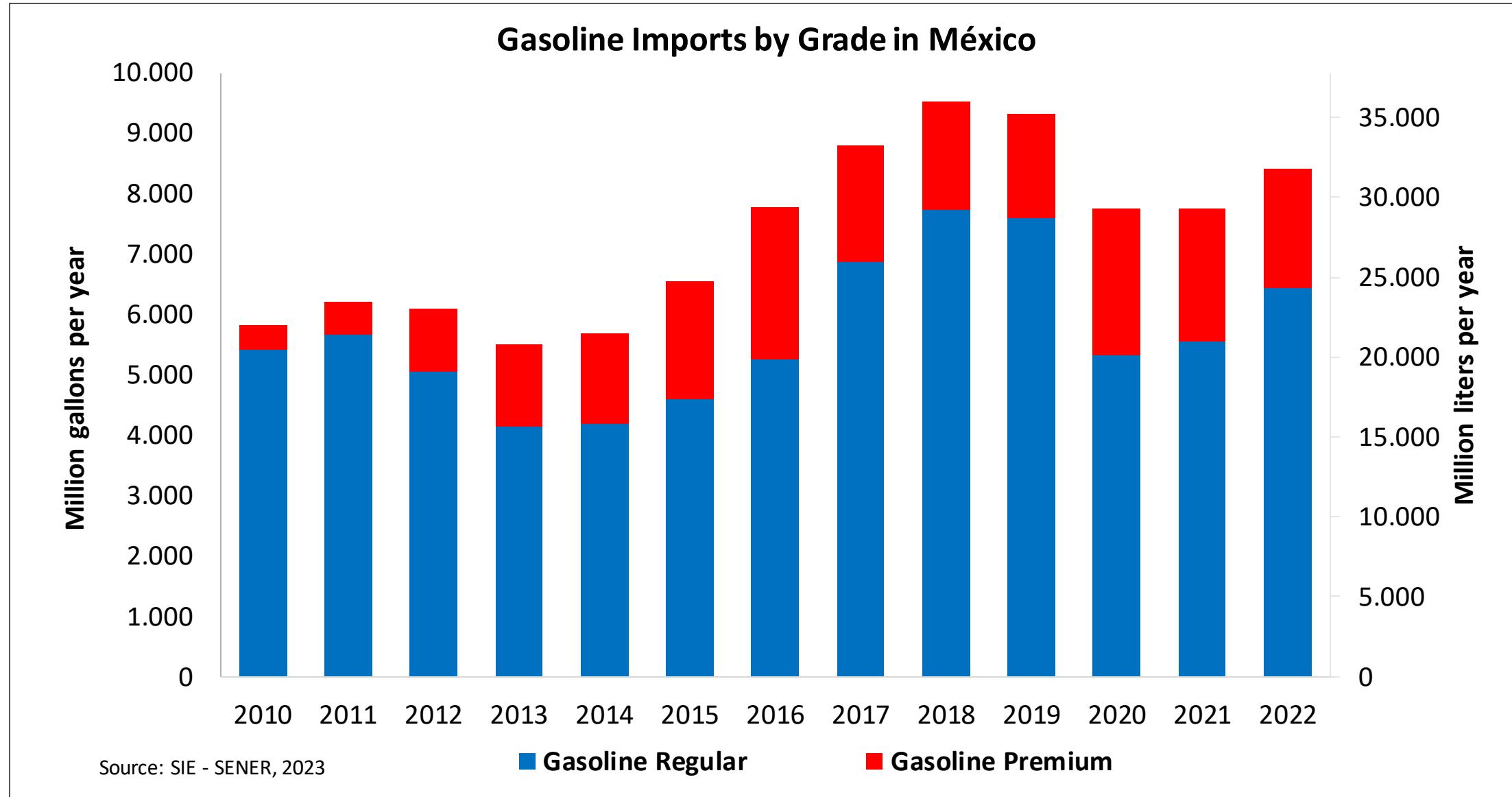
Blends with a maximum of 5.8% v/v of ethanol are allowed with the exception of metropolitan regions of Valle de Mexico, Guadalajara and Monterrey. Current ethanol use is equivalent to an average of 1.06% in the Rest of the Country grade gasoline.

Source: SIE - SENER, 2023

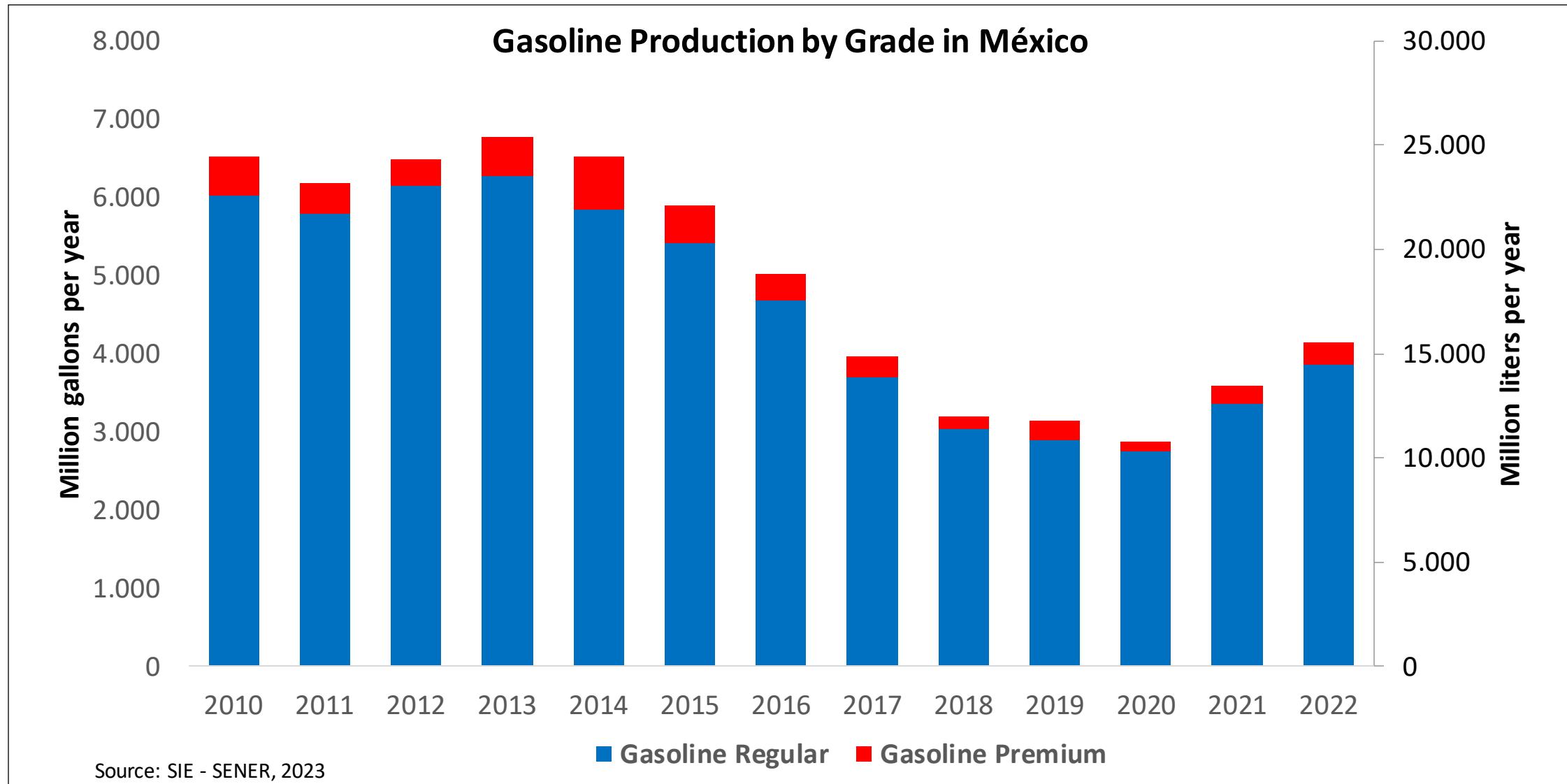
Gasoline Demand in México



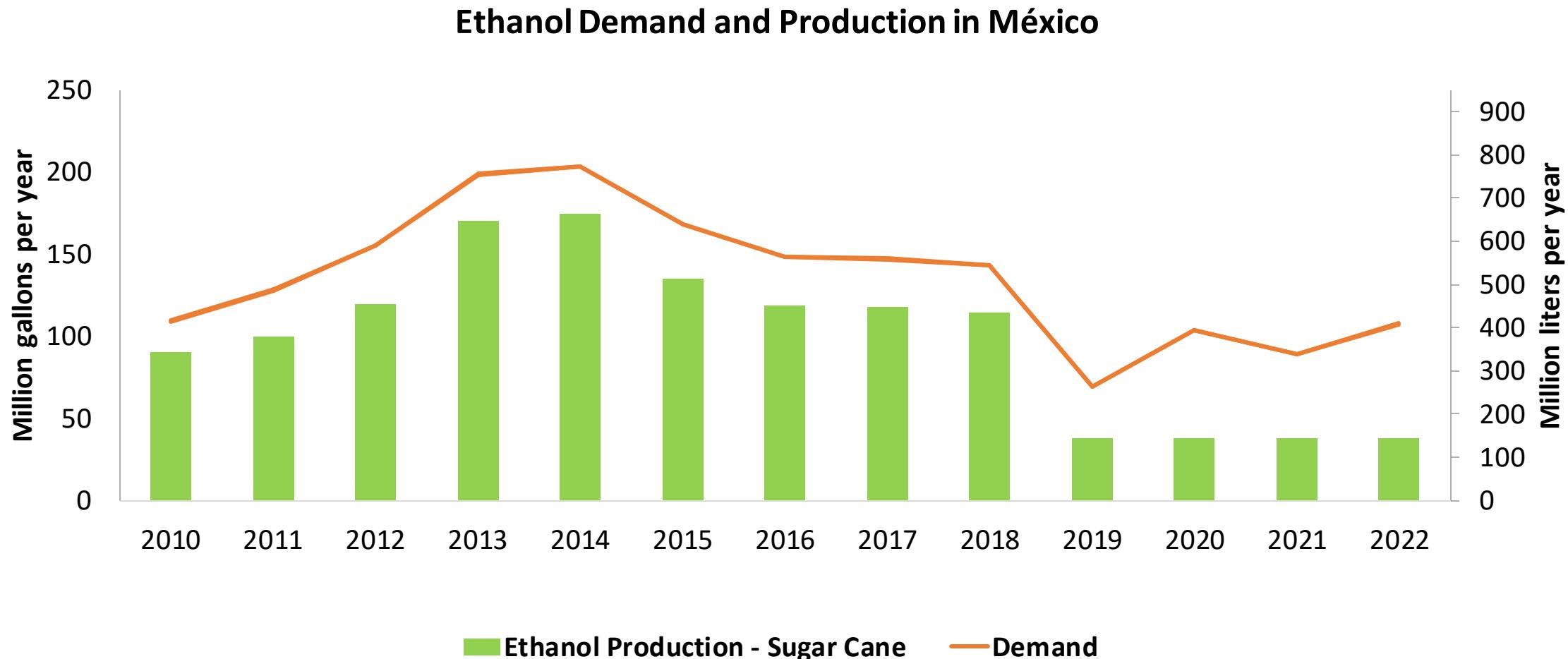
Gasoline Production in México



Gasoline Imports in México



Ethanol Balance in Mexico

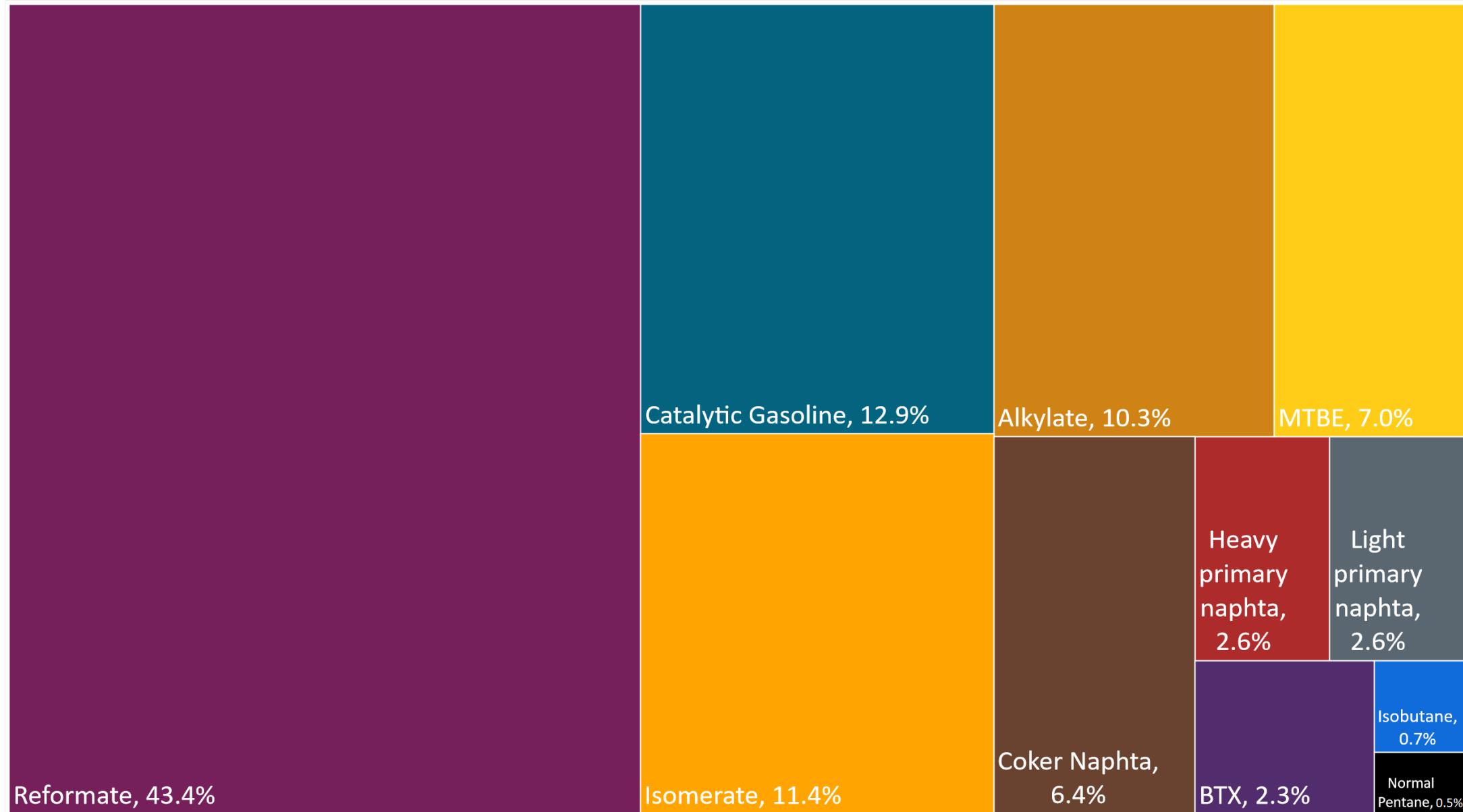


Source: CEDRSSA, 2020; EIA, 2023; Sanchez, 2014.

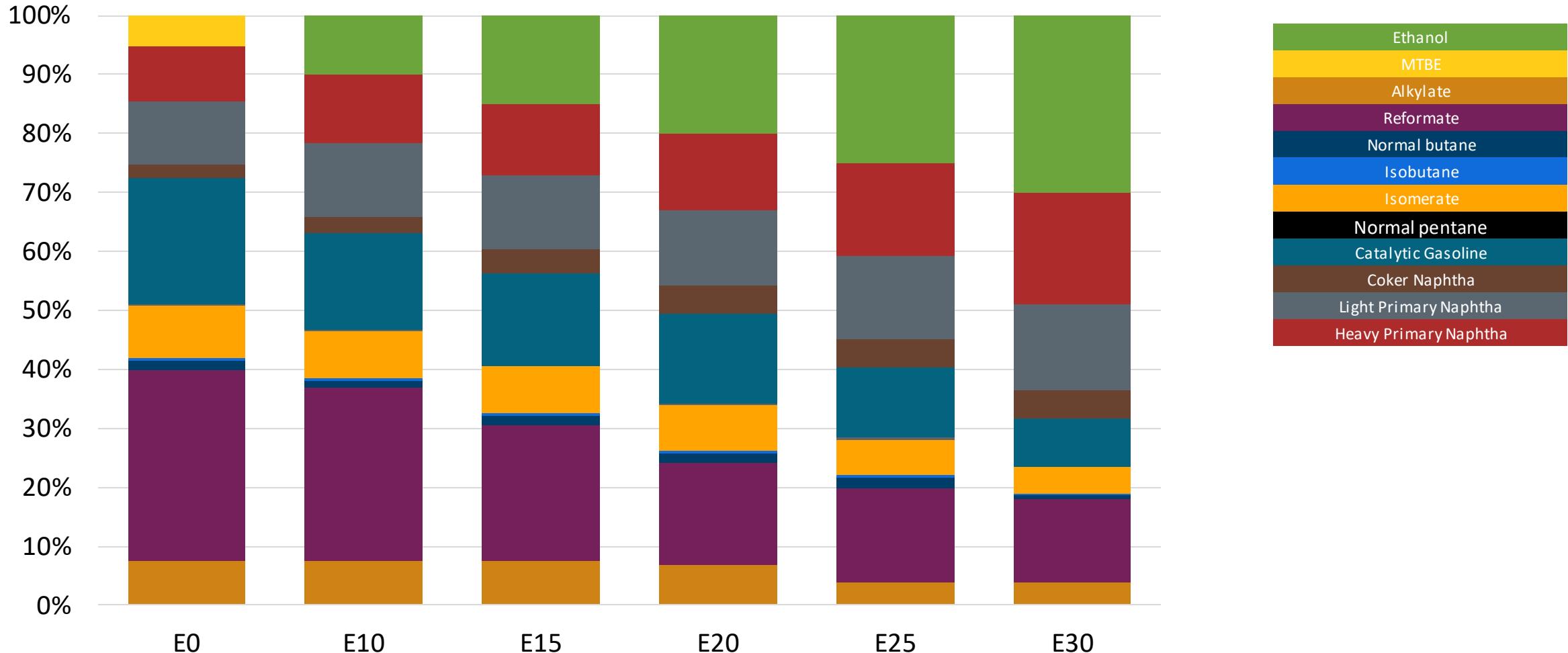
Gasoline Quality in México

Name	NOM-016-CRE-2016						EN 228:2012 + A1:2017 (Euro 6 enabling)			
Implementation Date	2016						2017			
Applicability	Mexico City	Mexico City	Guadalajara and Monterrey	Guadalajara and Monterrey	Rest of the country	Rest of the country	All countries			
Selected Grade	Gasoline Regular	Gasoline Premium	Gasoline Regular	Gasoline Premium	Gasoline Regular	Gasoline Premium	RON 95 E5	RON 95 E10	RON 98 E5	RON 98 E10
Benzene Content	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 2 %v/v	< 2 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v
Aromatics	< 25 %v/v	< 25 %v/v	< 32 %v/v	22,6% v/v	Report	22,6% v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v
Olefins	< 10 %v/v	< 10 %v/v	< 11,9 %v/v	< 11,9 %v/v	Report	< 2,5 mg/l	< 18 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v
Lead Content	-	-	-	-	-	-	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l
Manganese	0 mg/l	0 mg/l	0 mg/l	0 mg/l	0 mg/l	0 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l
RON		94		94		94	> 95	> 95	> 98	> 98
MON	82		82		82		> 85	> 88	> 85	> 88
AKI										
Sulfur Content	< 80 mg/kg	< 80 mg/kg	< 80 mg/kg	< 80 mg/kg	< 80 mg/kg	< 80 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg
Oxygen Content	< 3,7 %m/m	< 2,7 %m/m	< 3,7 %m/m	< 2,7 %m/m	< 3,7 %m/m	< 2,7 %m/m	< 2,7 %m/m	< 3,7 %m/m	< 2,7 %m/m	< 3,7 %m/m
Ethanol (EtOH)	Not allowed	Not allowed	Not allowed	Not allowed	> 5,8 %v/v	> 5,8 %v/v	< 5 %v/v	< 10 %v/v	< 5 %v/v	< 10 %v/v
RVP 37.8°C (Summer)	< 62 kPa	< 62 kPa	< 62 kPa	< 62 kPa	< 69 kPa North, < 62 kPa Center, South, Pacific	< 69 kPa North, < 62 kPa Center, South, Pacific	>> 60 - 70 kPa *Depends on the country, RVP is regulated in the EU Fuel Quality Directive			
RVP 37.8 °C(Winter)	< 79 kPa	< 79 kPa	< 79 kPa	< 79 kPa	< 79 kPa	< 79 kPa				
RVP 37.8°C (Transition)	< 54 kPa	< 54 kPa	< 54 kPa Guadalajara	< 54 kPa Guadalajara						
MTBE							-	-	-	-
Ehters 5 or more C Atoms	-	-	-	-	-	-	Based on oxygen content	<22 %v/v	Based on oxygen content	<22 %v/v

Available Blending Components



Ethanol Blending - Gasoline Regular RP – Constant Octane

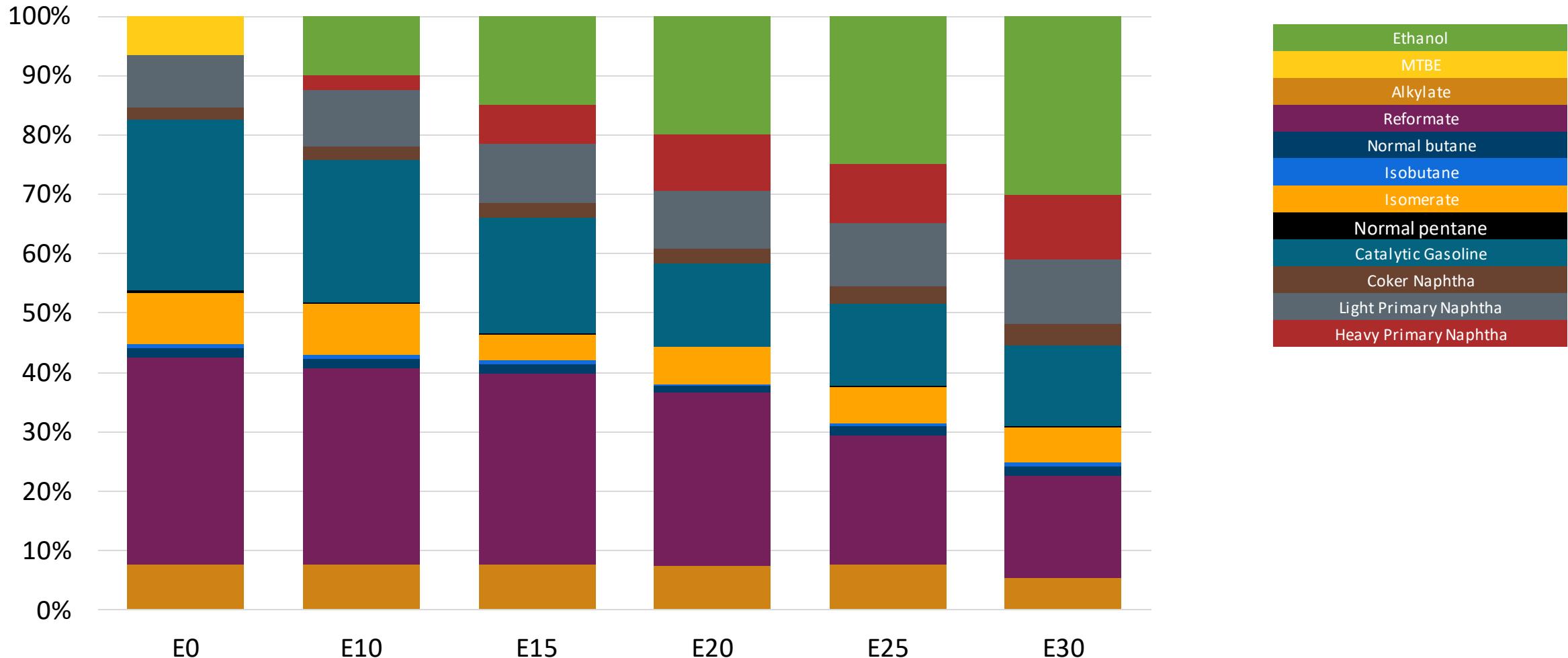


Ethanol
MTBE
Alkylate
Reformate
Normal butane
Isobutane
Isomerate
Normal pentane
Catalytic Gasoline
Coker Naphtha
Light Primary Naphtha
Heavy Primary Naphtha

Octane (AKI)	E0	E10	E15	E20	E25	E30
Price (USD/gal)	\$ 2.337	\$ 2.283	\$ 2.237	\$ 2.191	\$ 2.154	\$ 2.134

Prices are average Jan 22 – Feb 23.
 They do not include local distribution costs,
 import or gas station margins, taxes and
 subsidies.

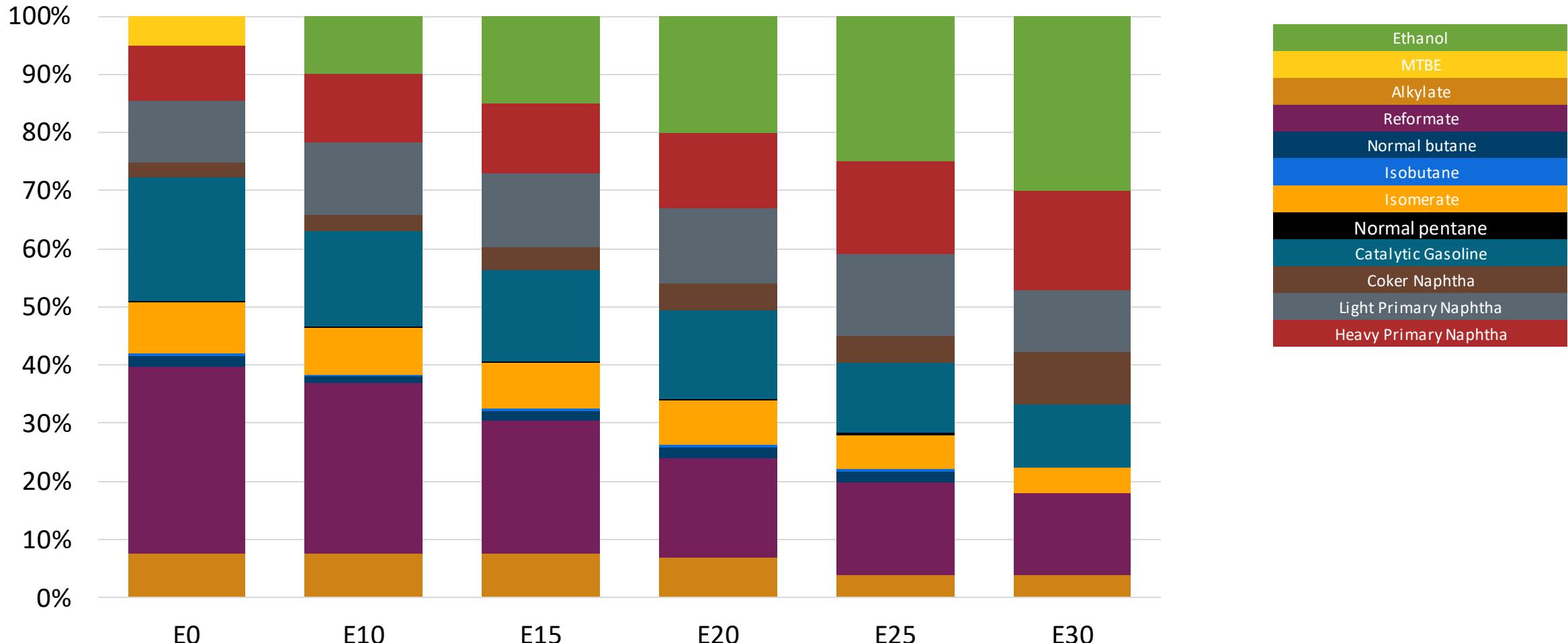
Ethanol Blending - Gasoline Premium RP – Constant Octane



Prices are average Jan 22 – Feb 23.
 They do not include local distribution costs,
 import or gas station margins, taxes and
 subsidies.

Octane (AKI)	91.0	91.0	91.0	91.0	91.0	91.0
Price (USD/gal)	\$ 2.429	\$ 2.371	\$ 2.336	\$ 2.309	\$ 2.257	\$ 2.212

Ethanol Blending - Gasoline Regular ZM – Constant Octane

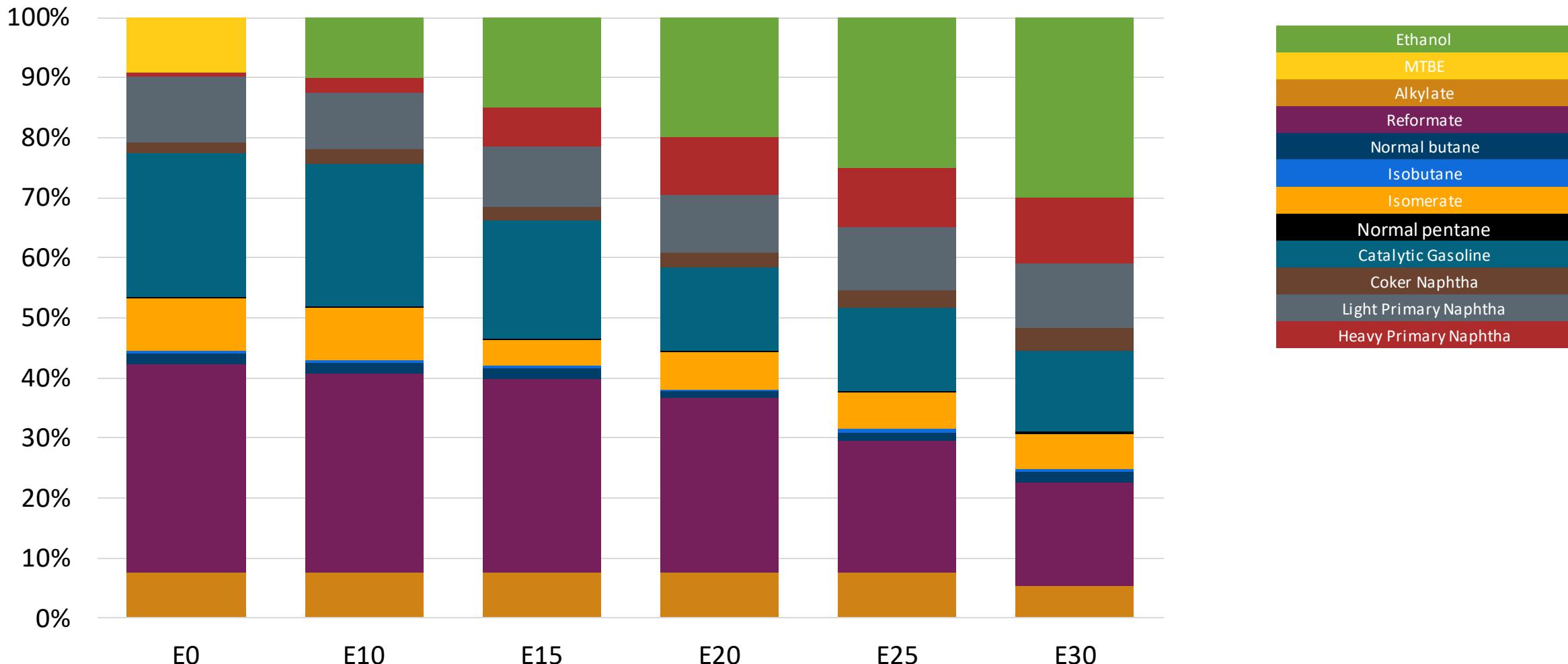


Ethanol
MTBE
Alkylate
Reformate
Normal butane
Isobutane
Isomerate
Normal pentane
Catalytic Gasoline
Coker Naphtha
Light Primary Naphtha
Heavy Primary Naphtha

Octane (AKI)	87.0	87.0	87.0	87.0	87.0	87.0
Price (USD/gal)	\$ 2.337	\$ 2.283	\$ 2.237	\$ 2.191	\$ 2.154	\$ 2.153

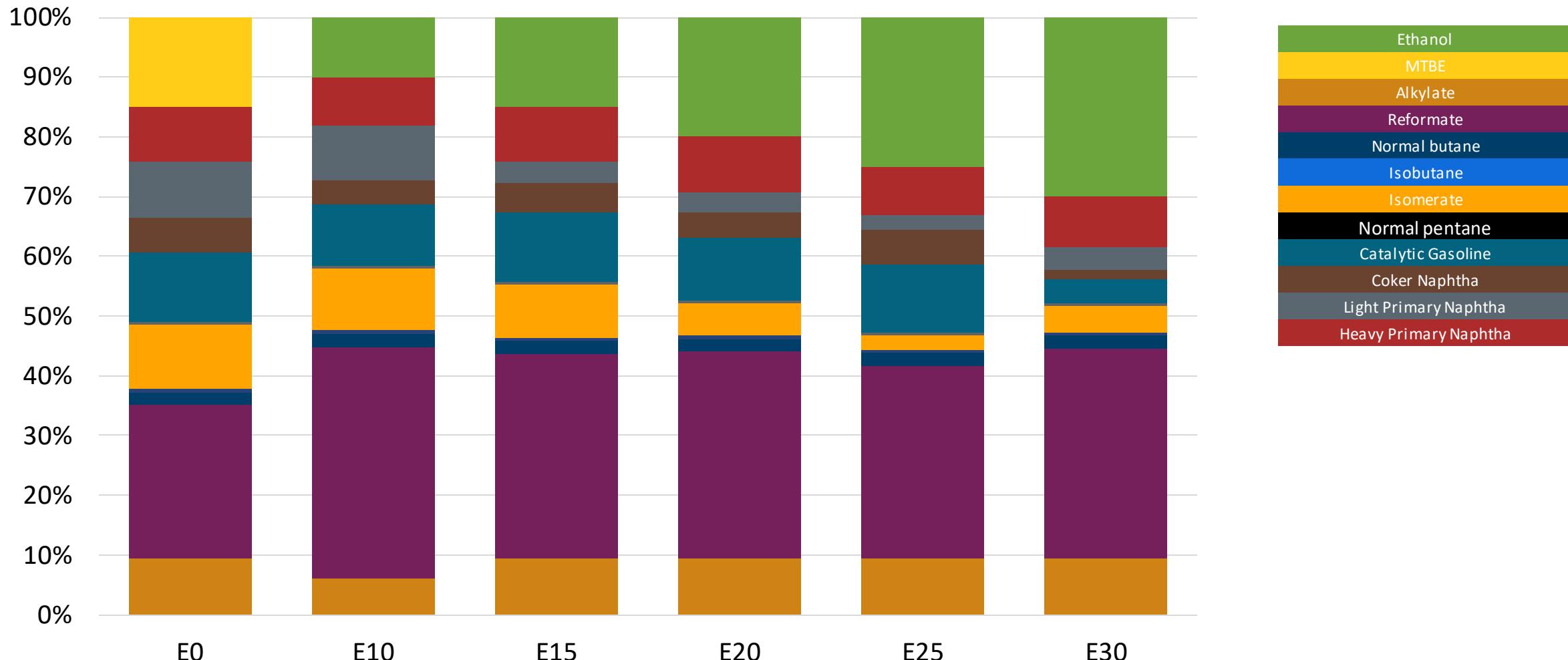
Prices are average Jan 22 – Feb 23.
 They do not include local distribution costs,
 import or gas station margins, taxes and
 subsidies.

Ethanol Blending - Gasoline Premium ZM – Constant Octane



Prices are average Jan 22 – Feb 23.
 They do not include local distribution costs,
 import or gas station margins, taxes and
 subsidies.

Ethanol Blending - Gasoline Regular RP – Octane Increment

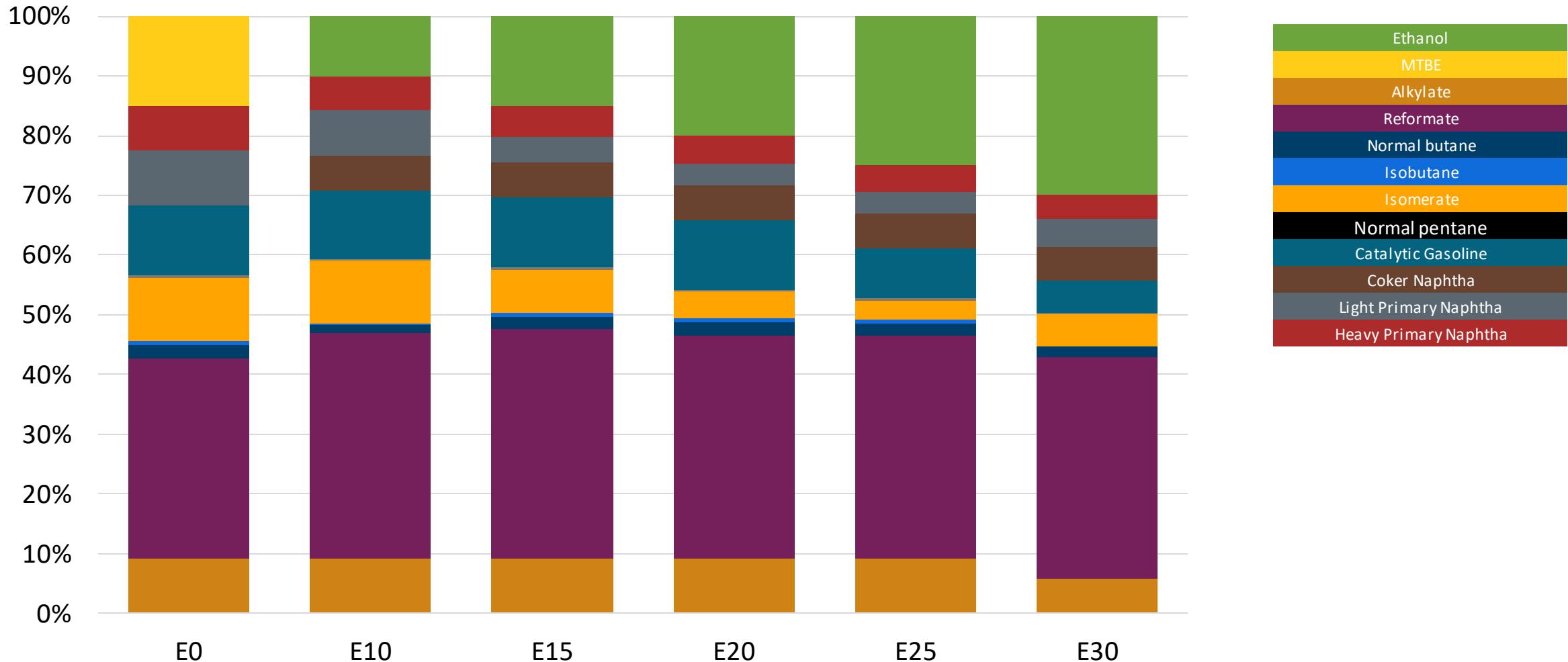


Ethanol
MTBE
Alkylate
Reformate
Normal butane
Isobutane
Isomerate
Normal pentane
Catalytic Gasoline
Coker Naphtha
Light Primary Naphtha
Heavy Primary Naphtha

Octane (AKI)	87.0	90.5	92.1	93.7	95.2	96.6
Price (USD/gal)	\$ 2.359	\$ 2.359	\$ 2.359	\$ 2.359	\$ 2.359	\$ 2.359

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

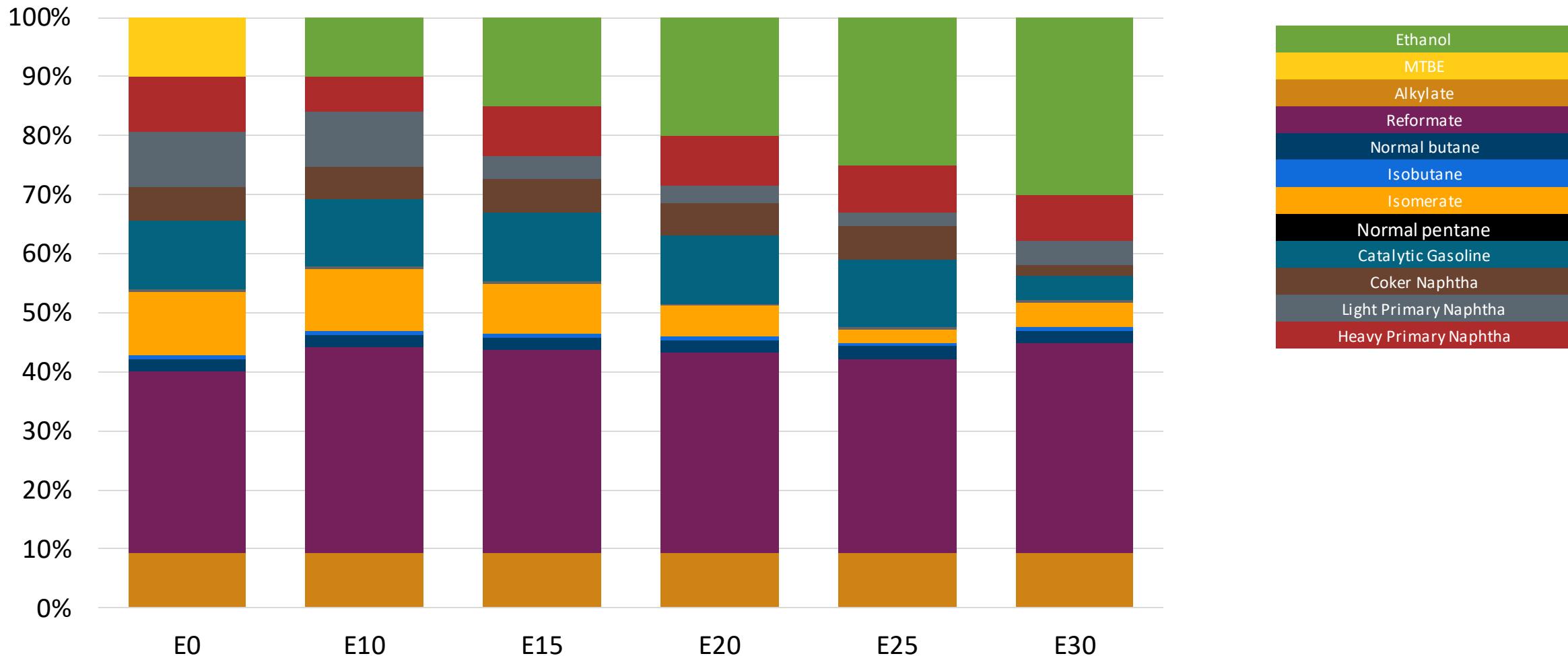
Ethanol Blending - Gasoline Premium RP – Octane Increment



Octane (AKI)	E0	E10	E15	E20	E25	E30
91.0	91.5	93.8	95.3	96.8	97.9	
Price (USD/gal)	\$ 2.403	\$ 2.403	\$ 2.403	\$ 2.403	\$ 2.403	\$ 2.403

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

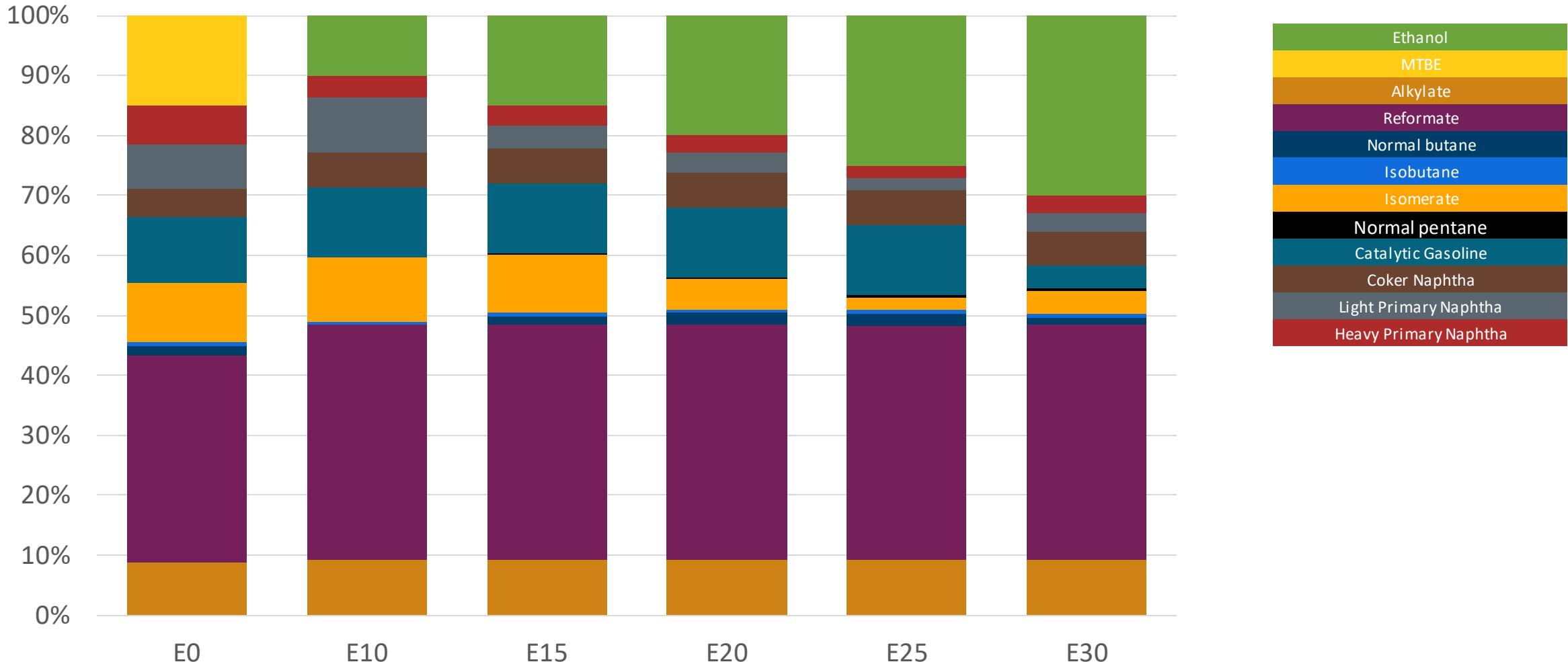
Ethanol Blending - Gasoline Regular ZM – Octane Increment



Octane (AKI)	88.8	90.8	92.3	93.8	95.4	96.8
Price (USD/gal)	\$ 2.364	\$ 2.364	\$ 2.364	\$ 2.364	\$ 2.364	\$ 2.364

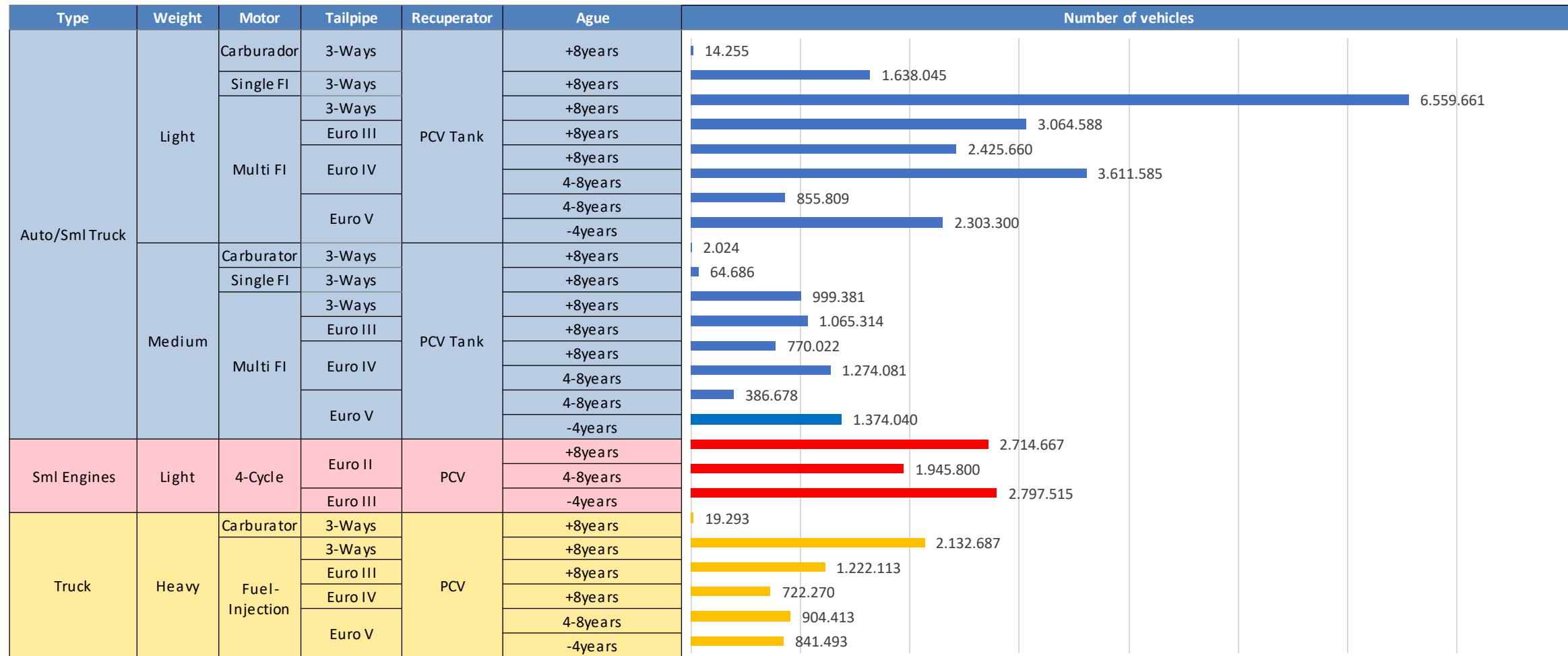
Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Ethanol Blending - Gasoline Premium ZM – Octane Increment



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Gasoline Vehicle Fleet - México



Vehicle fleet: **39,709,380**

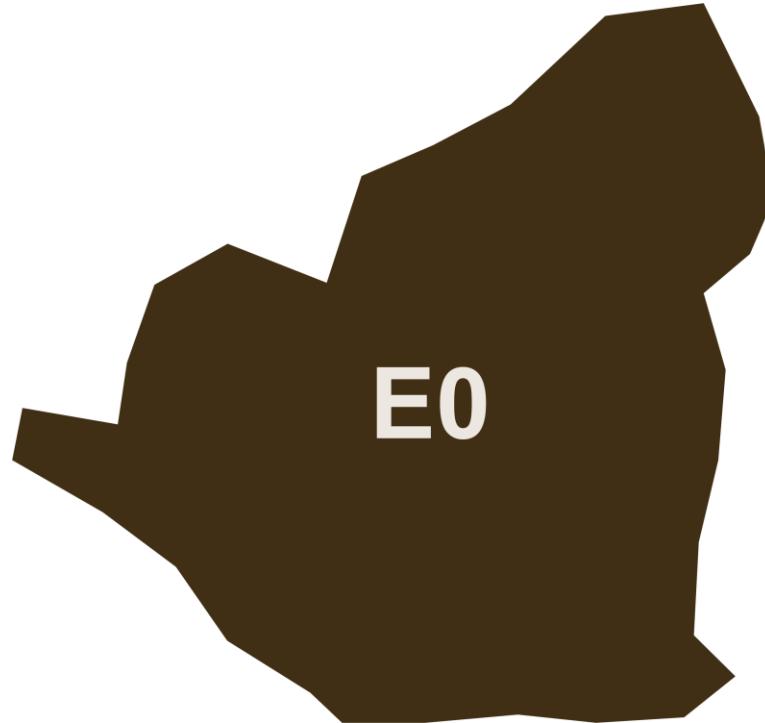
Average Age: **11 years**

Source: INEGI

Mexico – Gasoline Vehicle Emissions

Emissions	E0 g/km	E10 g/km	E15 g/km	E20 g/km	E25 g/km	E30 g/km	E10 - E0	E20 - E0	E30 - E0	Euro 6	TIER USA
CO	14.93	13.68	13.27	12.91	12.64	12.24	-8%	-14%	-18%	1	3.5
VOC	1.31	1.24	1.23	1.22	1.22	1.21	-5%	-6%	-8%	95	255
VOC_{evap}	0.53	0.53	0.54	0.55	0.56	0.57	0%	4%	7%	0.1	0.273
NOx	0.75	0.53	0.50	0.47	0.44	0.40	-30%	-38%	-46%	0.06	0.203
SOx	0.01	0.01	0.01	0.00	0.00	0.00	-15%	-28%	-41%		
NH3	0.06	0.06	0.06	0.06	0.06	0.06	-2%	0%	1%		
Butadiene	0.01	0.01	0.01	0.01	0.01	0.01	-4%	-5%	-6%		
Acetaldehyde	0.01	0.02	0.04	0.05	0.06	0.07	68%	249%	372%		
Formaldehyde	0.05	0.06	0.07	0.07	0.08	0.09	13%	39%	68%		
Benzene	0.07	0.07	0.06	0.06	0.06	0.06	-9%	-11%	-18%		
CO₂	286.17	271.86	266.39	263.69	261.07	256.25	-5%	-8%	-10%		
N₂O	0.01	0.01	0.01	0.01	0.01	0.01	-1%	2%	4%		
CH₄	0.29	0.29	0.29	0.30	0.30	0.31	0%	4%	7%		
PM 2.5	0.02	0.02	0.01	0.01	0.01	0.01	-22%	-43%	-65%		
PM10	0.03	0.02	0.02	0.01	0.01	0.01	-22%	-43%	-65%	0.005	0.007
THC	0.44	0.45	0.47	0.50	0.51	0.54	2%	14%	22%		

Ethanol Blending in Gasoline - Nicaragua

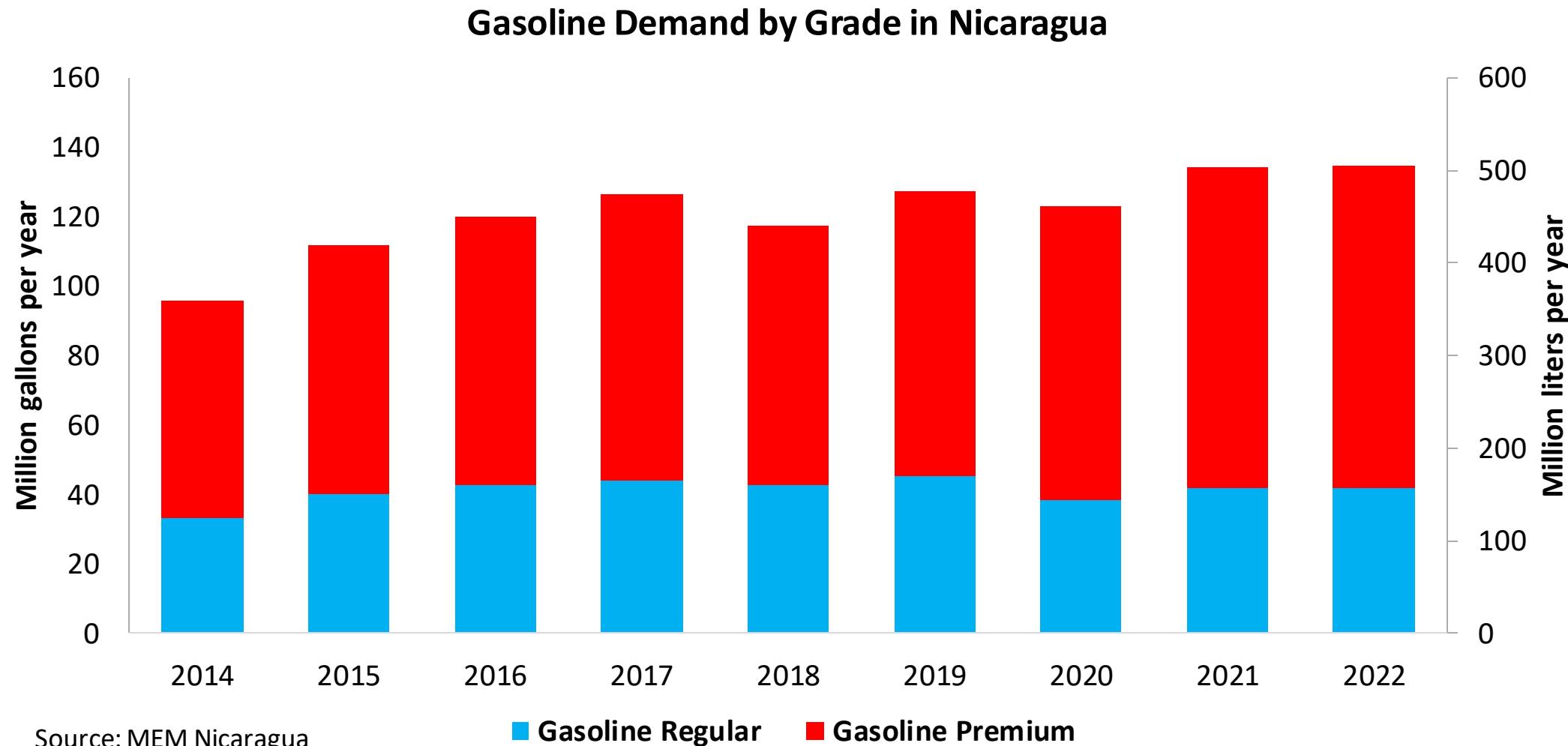


Nicaragua is the only country in Central America that has active refinery capacity, which produce 37.3% of gasoline national demand in 2022. The rest of demand is imported, previously from Venezuela and since 2016 mainly from United States. There are two gasoline grades in the country, regular with 31% and premium with 69% of market share.

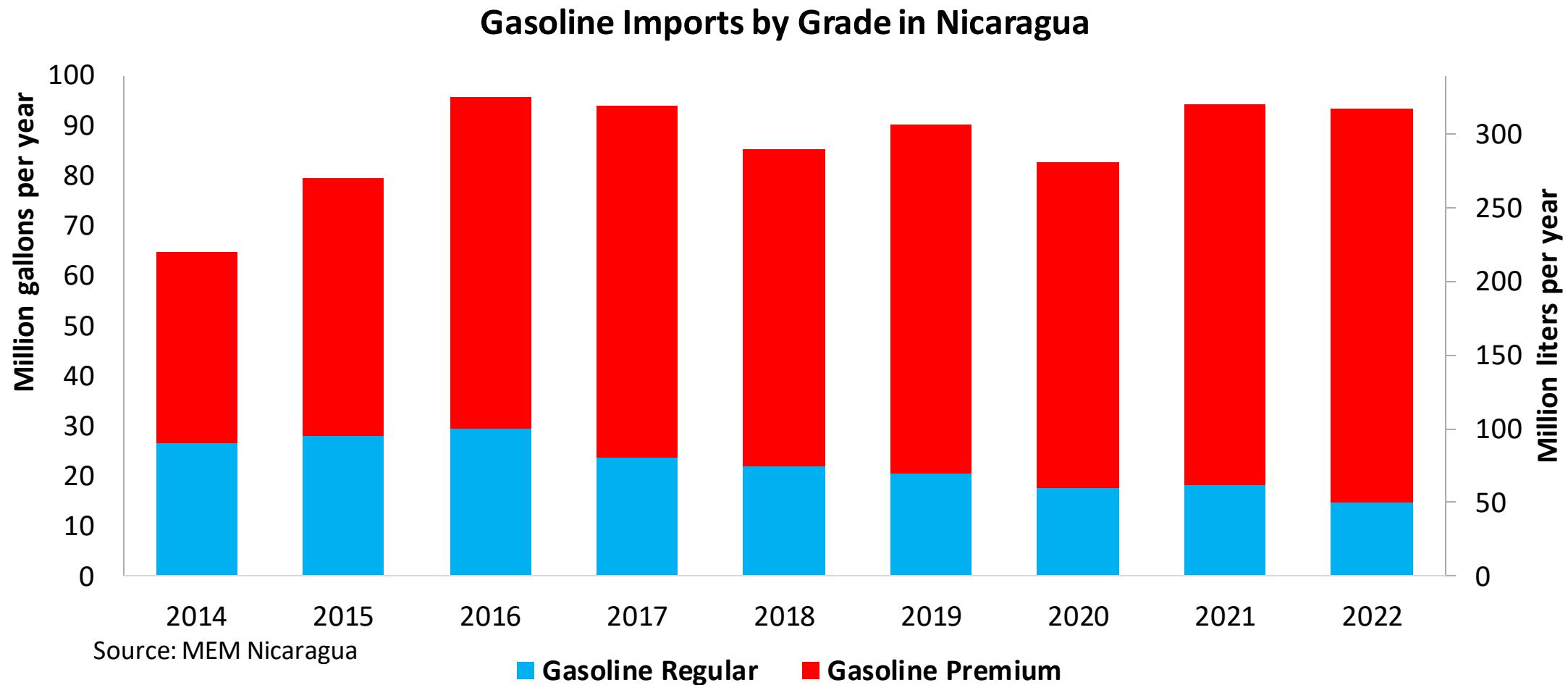
Nicaragua has no ethanol mandate.

Source: MEM Nicaragua

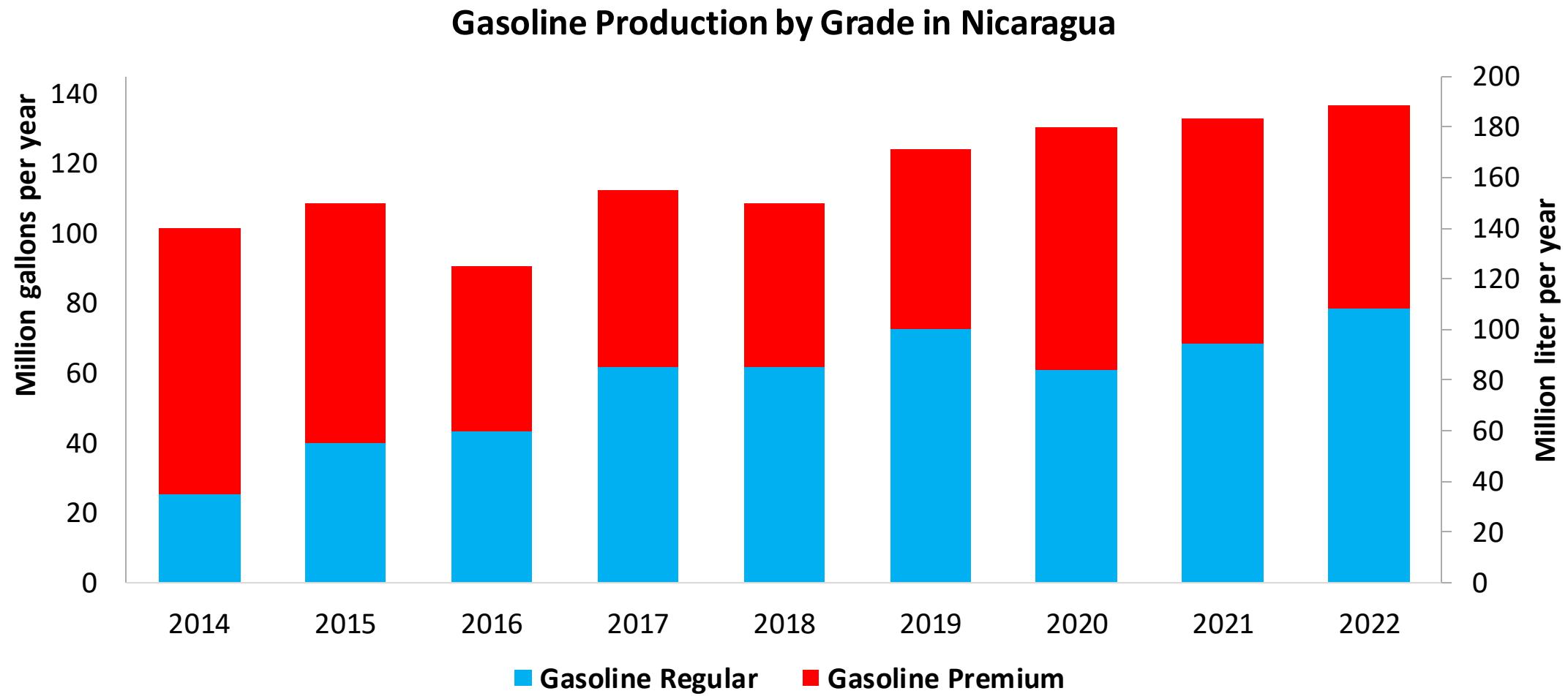
Gasoline Demand in Nicaragua



Gasoline Imports in Nicaragua



Gasoline Production in Nicaragua



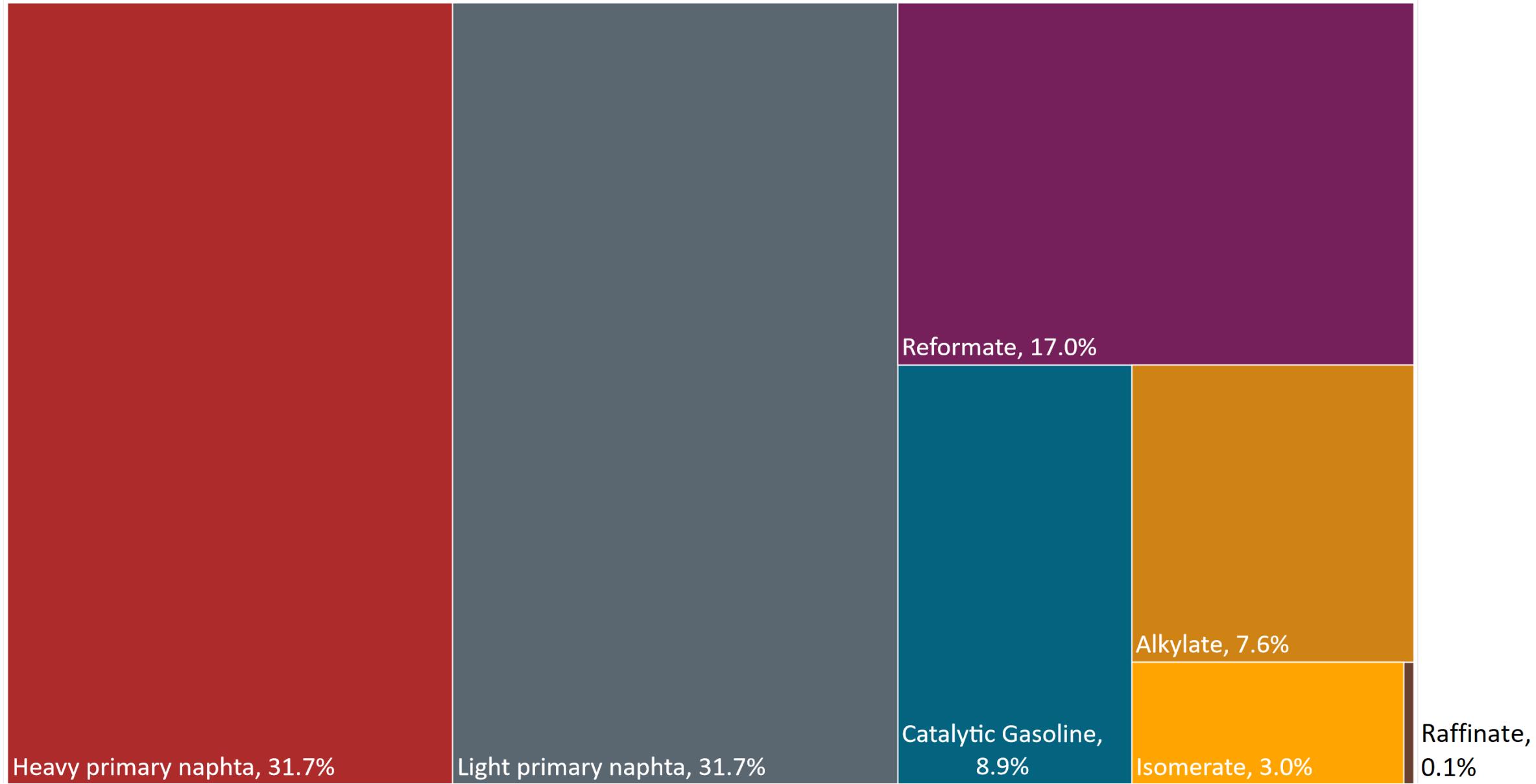
Source: MEM Nicaragua

Gasoline Quality in Nicaragua

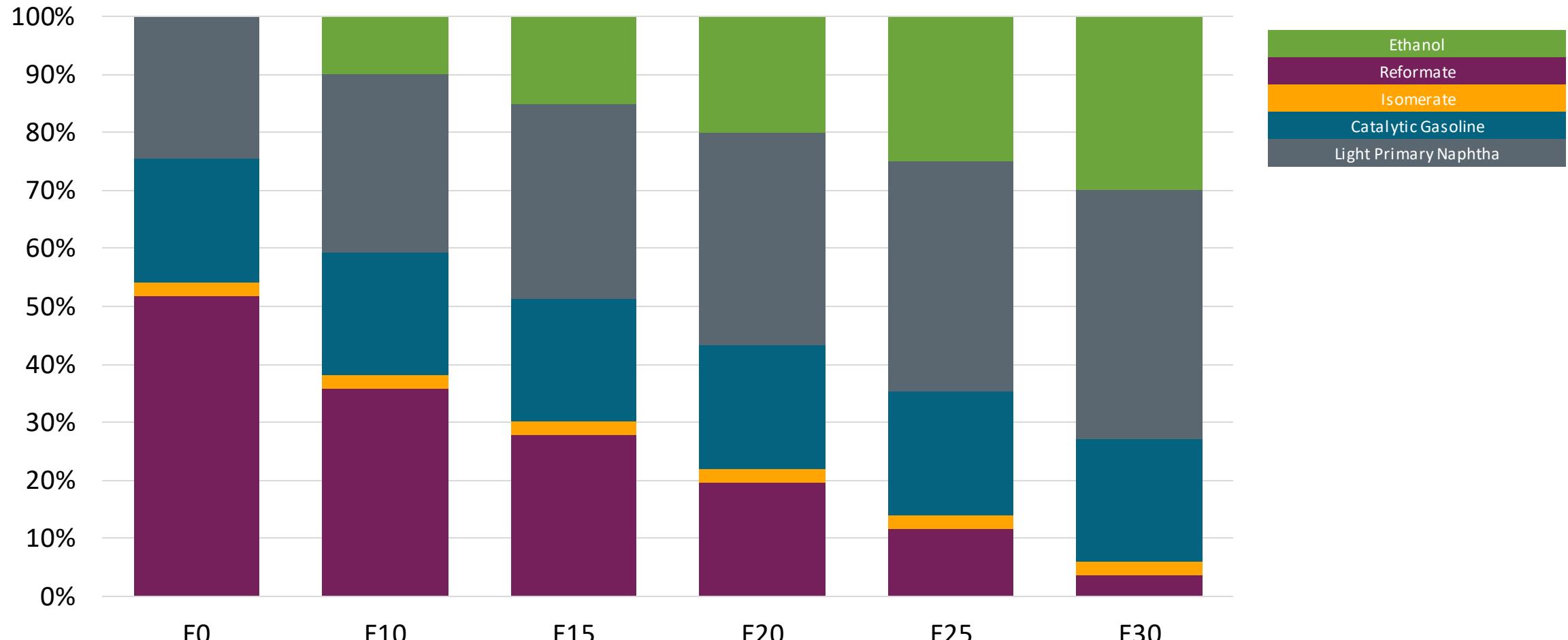
Name	RTCA 75.01.20:19	RTCA 75.01.19:19	EN 228:2012 + A1:2017 (Euro 6 enabling)			
Implementation Date	2021	2021	2017			
Applicability	Whole country	Whole country	All countries			
Selected Grade	Gasoline Premium	Gasoline Regular	RON 95 E5	RON 95 E10	RON 98 E5	RON 98 E10
Benzene Content	5% v/v	5% v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v
Aromatics	50% v/v	50% v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v
Olefins	30% v/v	30% v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v
Lead Content	< 0,013 g/l	< 0,013 g/l	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l
Manganese	Report	Report	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l
RON	> 95	> 91	> 95	> 95	> 98	> 98
MON	-	-	> 85	> 88	> 85	> 88
AKI						
Sulfur Content	< 500 mg/kg	< 500 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg
Oxygen Content	2,7% v/v	2,7% v/v	<2,7 % m/m	<3,7 % m/m	<2,7 % m/m	<3,7 % m/m
Ethanol (EtOH)	-	-	<5 %v/v	<10 %v/v	<5 %v/v	<10 %v/v
RVP 37.8°C (Summer)	< 69 kPa	< 69 kPa	<> 60 - 70 kPa *Depends on the country, RVP is regulated in the EU Fuel Quality Directive			
RVP 37.8 °C(Winter)						
RVP 37.8°C (Transition)						
MTBE	-	-	-	-	-	-
Ethers 5 or more C Atoms	-	-	Based on oxygen content	<22 %v/v	Based on oxygen content	<22 %v/v

Source: RTCA

Available Blending Components



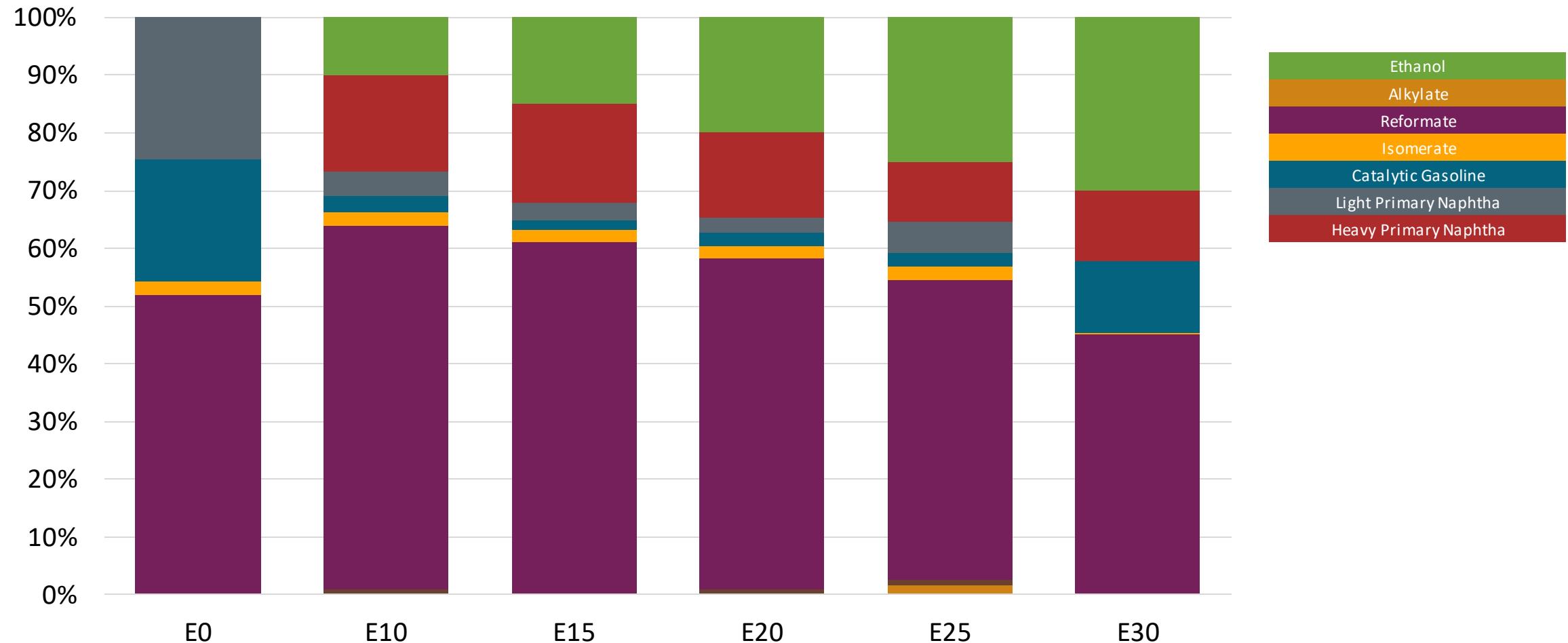
Ethanol Blending - Gasolina Regular – Constant Octane



Octane (RON)	91.0	91.0	91.0	91.0	91.0	91.0
Price (USD/gal)	\$2.36	\$2.27	\$2.23	\$2.19	\$2.14	\$2.10

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

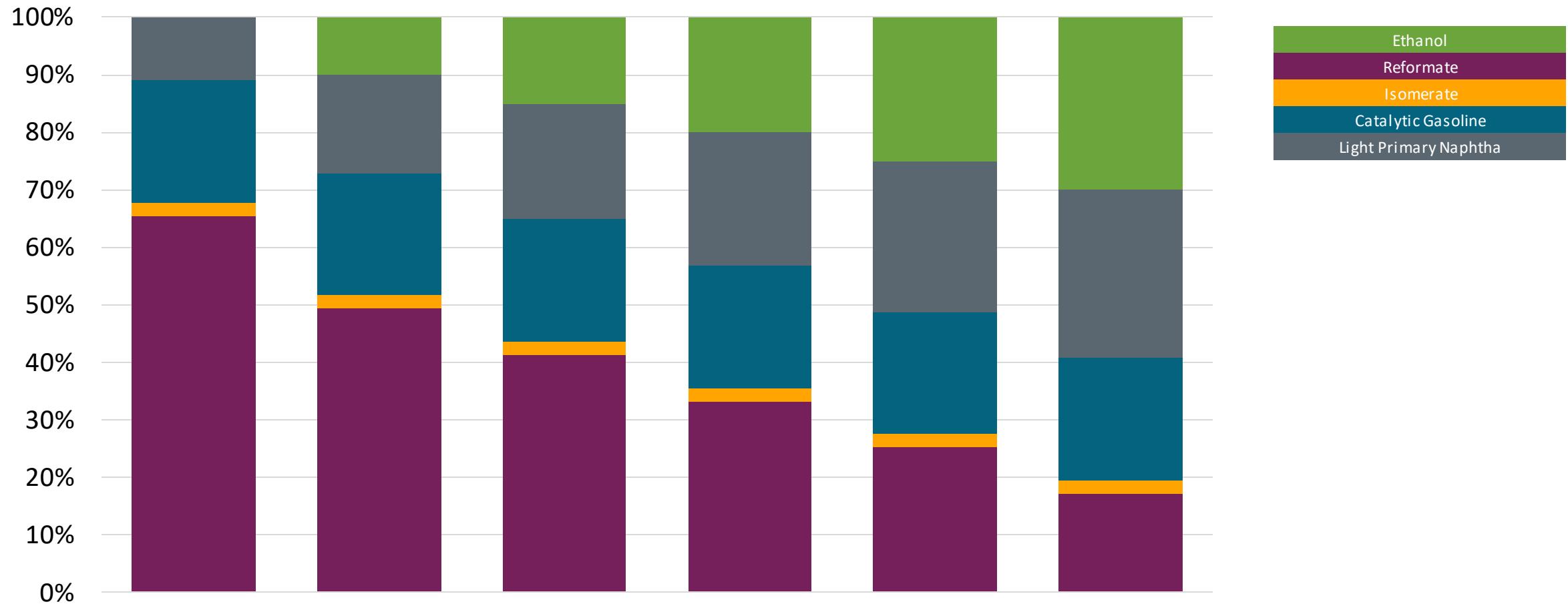
Ethanol Blending - Gasolina Regular – Octane Increment



Octane (RON)	91.0	93.0	94.6	96.2	97.9	99.6
Price (USD/gal)	\$2.36	\$2.36	\$2.36	\$2.36	\$2.36	\$2.36

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

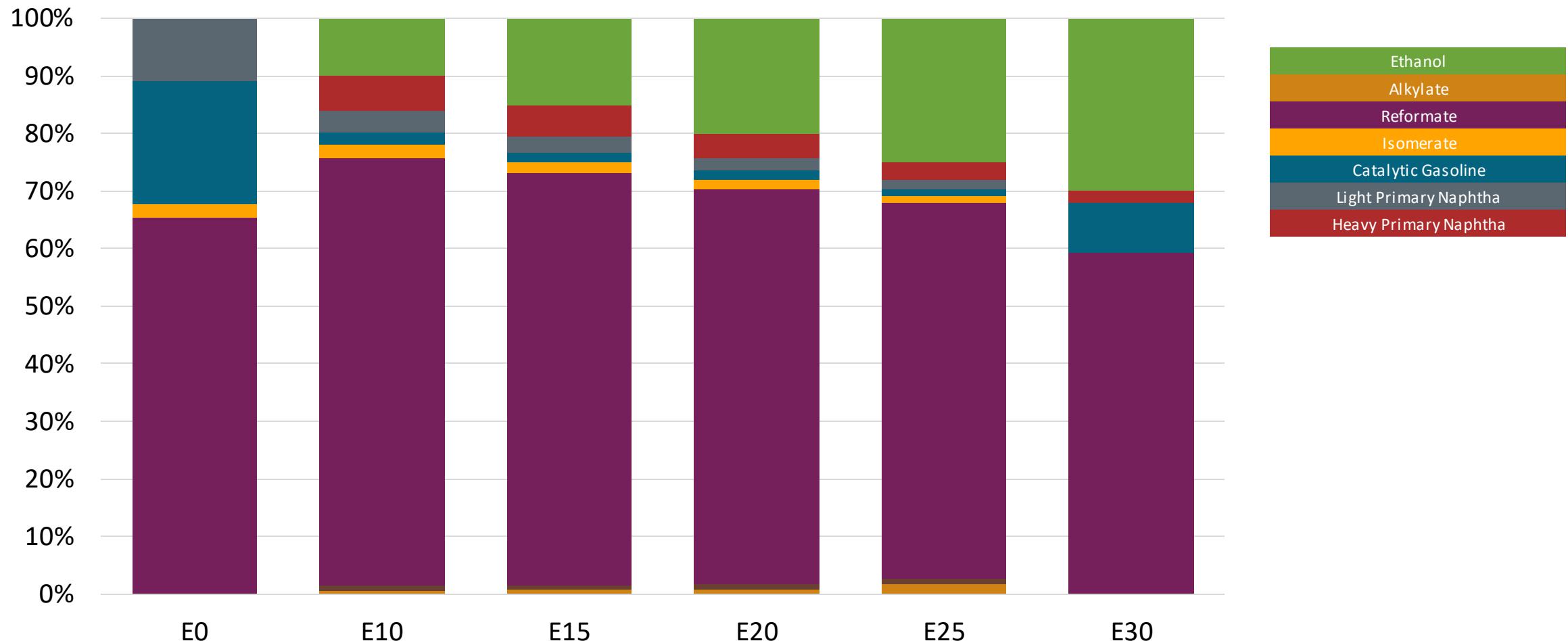
Ethanol Blending - Gasolina Superior – Constant Octane



	E0	E10	E15	E20	E25	E30
Octane (RON)	95.0	95.0	95.0	95.0	95.0	95.0
Price (USD/gal)	\$2.47	\$2.39	\$2.34	\$2.30	\$2.25	\$2.21

Prices are average Jan 22 – Feb 23.
 They do not include local distribution costs,
 import or gas station margins, taxes and
 subsidies.

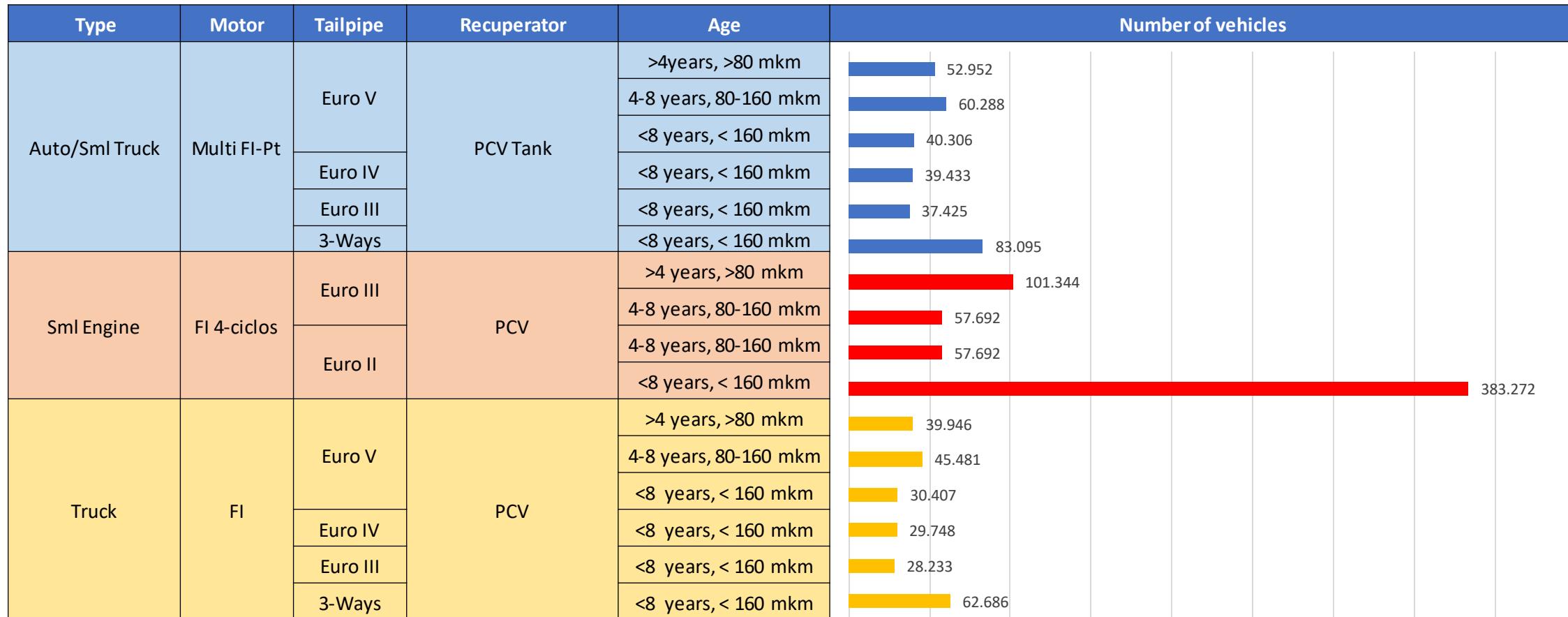
Ethanol Blending - Gasoline Superior – Octane Increment



Octane (RON)	95.0	97.4	99.0	100.6	102.1	103.9
Price (USD/gal)	\$2.47	\$2.47	\$2.47	\$2.47	\$2.47	\$2.47

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Gasoline Vehicle Fleet - Nicaragua



Vehicle Fleet: 1,150,000

Average Age: 11 years

Motorcycle: 52%

Nicaragua – Gasoline Vehicle Fleet Emissions

Emissions	E0 g/km	E10 g/km	E15 g/km	E20 g/km	E25 g/km	E30 g/km	E10 - E0	E20 - E0	E30 - E0	Euro 6	TIER USA
CO	28.90	26.92	26.35	25.89	25.56	25.05	-7%	-10%	-13%	1	3.5
VOC	2.56	2.43	2.40	2.38	2.37	2.35	-5%	-7%	-8%	95	255
VOCeVap	0.58	0.58	0.58	0.60	0.61	0.62	0%	4%	7%	0.1	0.273
NOx	1.20	0.84	0.79	0.75	0.70	0.65	-30%	-38%	-46%	0.06	0.203
SOx	0.01	0.01	0.01	0.01	0.01	0.01	-15%	-28%	-41%		
NH3	0.05	0.04	0.05	0.05	0.05	0.05	-2%	0%	1%		
Butadiene	0.01	0.01	0.01	0.01	0.01	0.01	-7%	-10%	-12%		
Acetaldehyde	0.02	0.03	0.05	0.07	0.08	0.10	68%	249%	372%		
Formaldehyde	0.08	0.09	0.11	0.12	0.13	0.14	13%	39%	68%		
Benzene	0.13	0.12	0.12	0.12	0.11	0.11	-9%	-11%	-18%		
CO2	350.45	332.93	326.24	322.93	319.92	314.02	-5%	-8%	-10%		
N2O	0.03	0.03	0.03	0.03	0.03	0.03	-1%	2%	4%		
CH4	0.57	0.57	0.58	0.59	0.60	0.61	0%	4%	7%		
PM 2.5	0.03	0.03	0.02	0.02	0.02	0.01	-22%	-43%	-65%		
PM10	0.05	0.04	0.03	0.03	0.02	0.02	-22%	-43%	-65%	0.005	0.007
THC	0.82	0.83	0.87	0.90	0.93	0.96	2%	11%	18%		

Ethanol Blending in Gasoline - Panamá

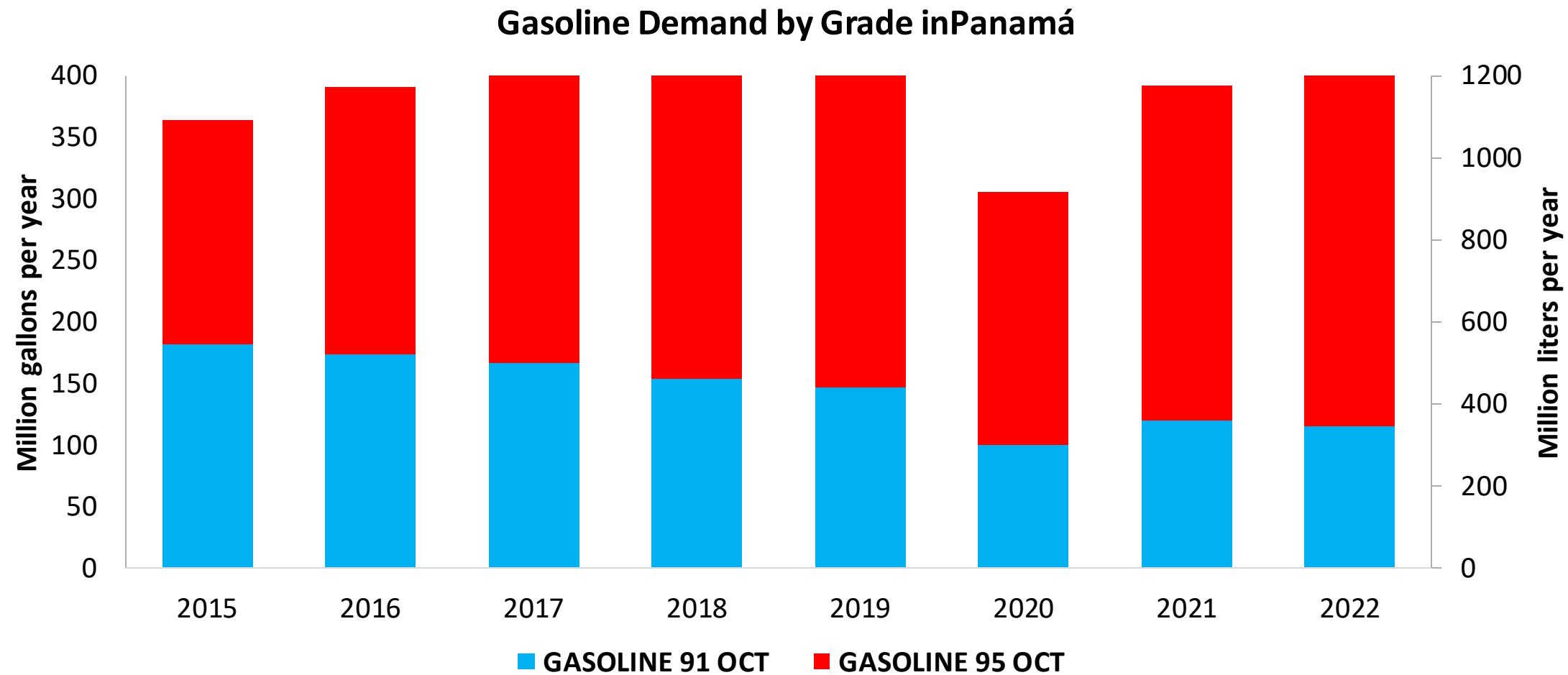


In 2022, regular gasoline (RON 91) represented 28.3% of the volume consumed while premium gasoline (RON 95) reached 71.7%. Gasoline is supplied only with imports, mainly from United States, the Netherlands and Germany.

In 2011, 2% v/v ethanol blends with gasoline were authorized, with a planned gradual increase until reaching 20% v/v by 2016. However, in 2013 it was limited to 5% v/v and by 2014 blending stopped because the only national producer announced its production cease due to political dispute. A new mandate implementation has been approved (starting with E5 in 2024 and reaching E10 in 2026).

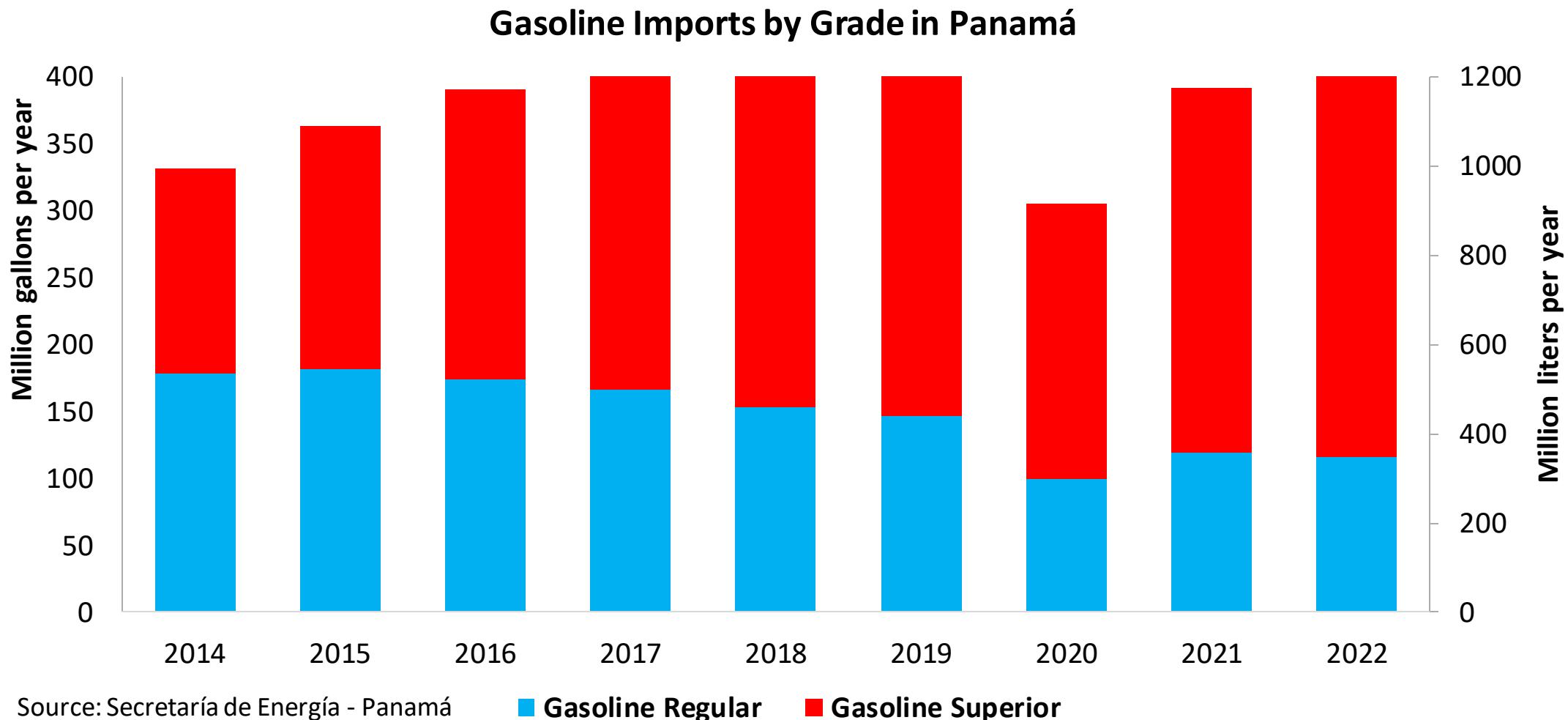
Source: Secretaría de Energía - Panamá

Gasoline Demand in Panamá



Source: Secretaría de Energía - Panamá

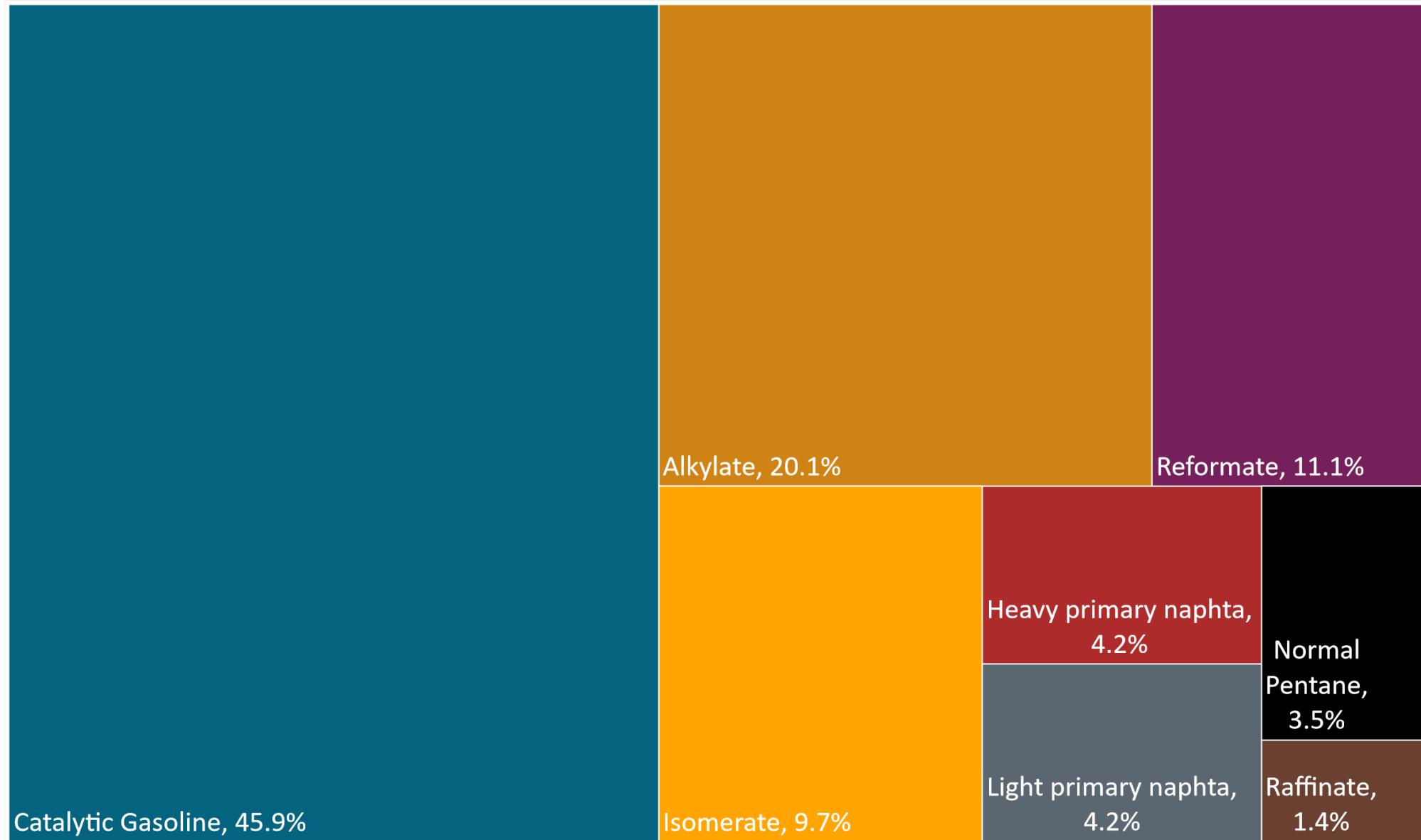
Gasoline Imports to Supply Demand in Panamá



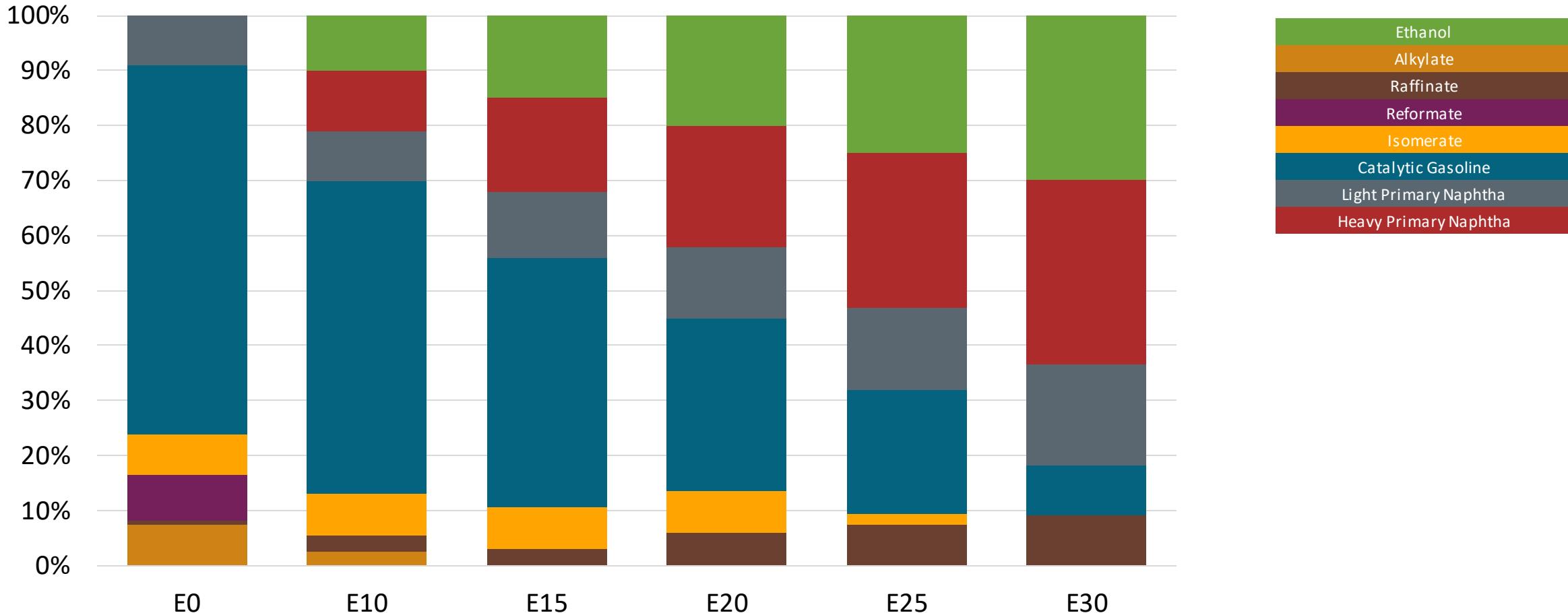
Gasoline Quality in Panamá

Name	DGNTI-COPANIT 83-2013/ Resolution 425/2020		EN 228:2012 + A1:2017 (Euro 6 enabling)			
Implementation Date	2014/2021		2017			
Applicability	Whole country	Whole country	All countries			
Selected Grade	RON 91	RON 95	RON 95 E5	RON 95 E10	RON 98 E5	RON 98 E10
Benzene Content	< 5% v/v / <1,5% v/v	< 5% v/v / <1,5% v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v
Aromatics	< 50% v/v	< 50% v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v
Olefins	< 30% v/v	< 30% v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v
Lead Content	< 0,013 g/l	< 0,013 g/l	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l
Manganese	-	-	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l
RON	> 91	> 95	> 95	> 95	> 98	> 98
MON	-	-	> 85	> 88	> 85	> 88
AKI						
Sulfur Content	< 500 mg/kg / < 150 mg/kg	< 500 mg/kg / < 150 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg
Oxygen Content	- / < 0,7% v/v	- / < 0,7% v/v	<2,7 % m/m	<3,7 % m/m	<2,7 % m/m	<3,7 % m/m
Ethanol (EtOH)	10% v/v	10% v/v	<5 %v/v	<10 %v/v	<5 %v/v	<10 %v/v
RVP 37.8°C (Summer)	< 69 kPa (< 76 kPa if ethanol is added)		< 69 kPa (< 76 kPa if ethanol is added)		<> 60 - 70 kPa *Depends on the country, RVP is regulated in the EU Fuel Quality Directive	
RVP 37.8 °C(Winter)						
RVP 37.8°C (Transition)						
MTBE	0% v/v if ethanol is added	0% v/v if ethanol is added	-	-	-	-
Ethers 5 or more C Atoms	-	-	Based on oxygen content	<22 %v/v	Based on oxygen content	<22 %v/v

Blending Components- Panama



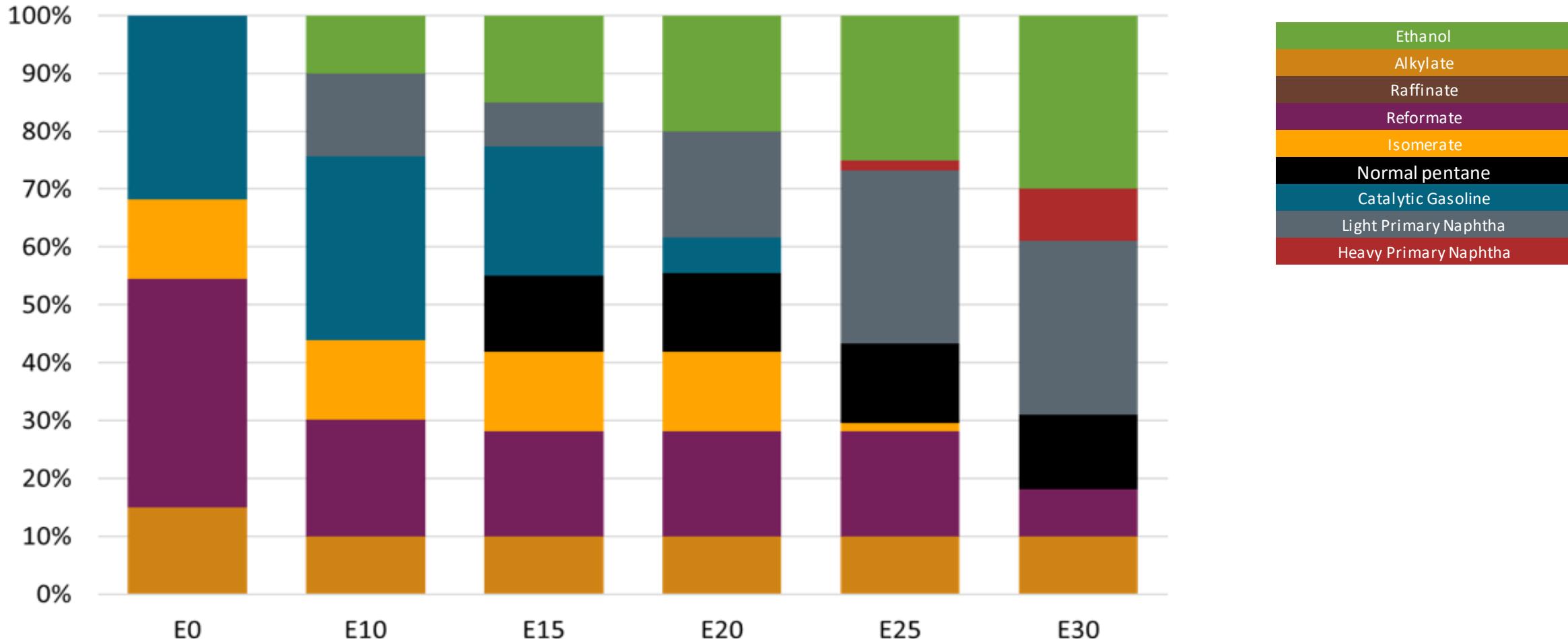
Panama – Regular – Constant Octane



Octane (RON)	91.0	91.0	91.0	91.0	91.2	91.3
Price (USD/gal)	\$ 2.331	\$ 2.189	\$ 2.127	\$ 2.067	\$ 2.009	\$ 1.945

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

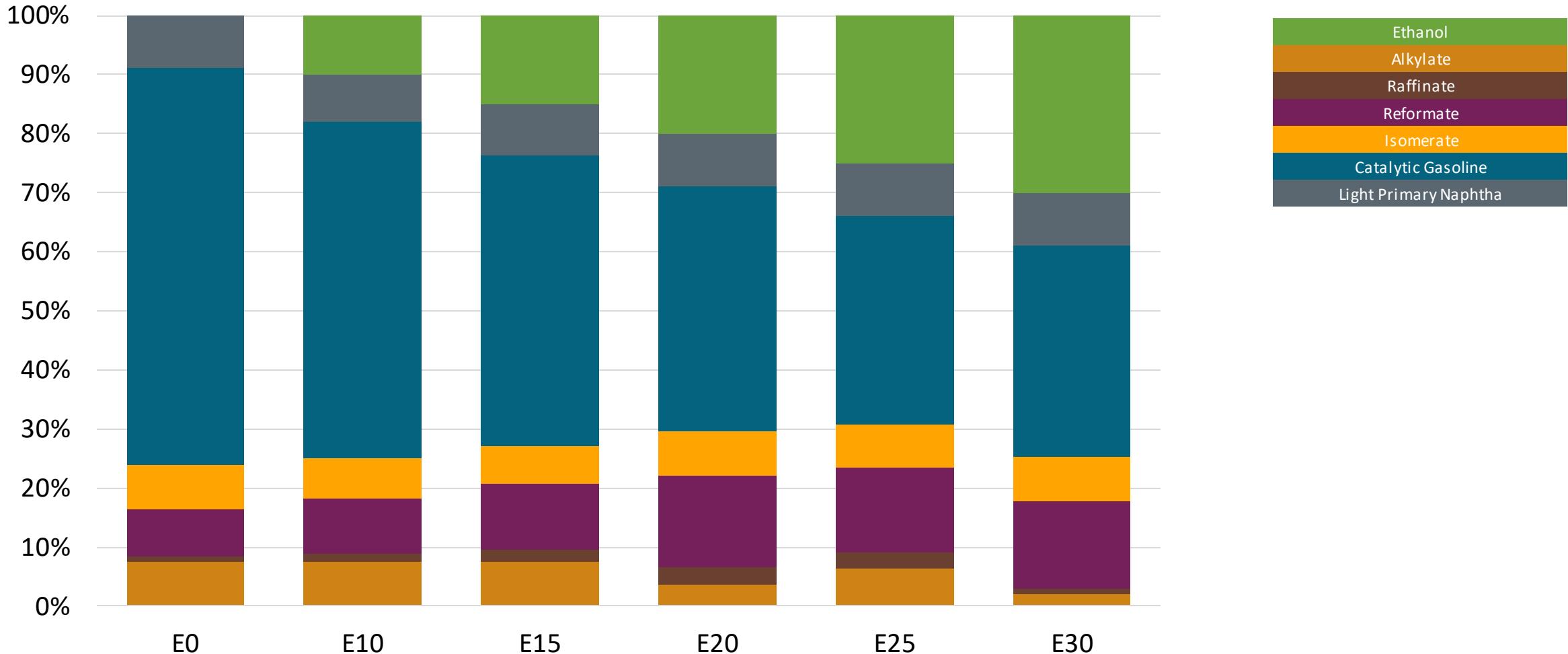
Panama – Premium – Constant Octane



Octane (RON)	95.0	95.0	95.0	95.0	95.0	95.0
Price (USD/gal)	\$ 2.497	\$ 2.364	\$ 2.273	\$ 2.198	\$ 2.116	\$ 2.032

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

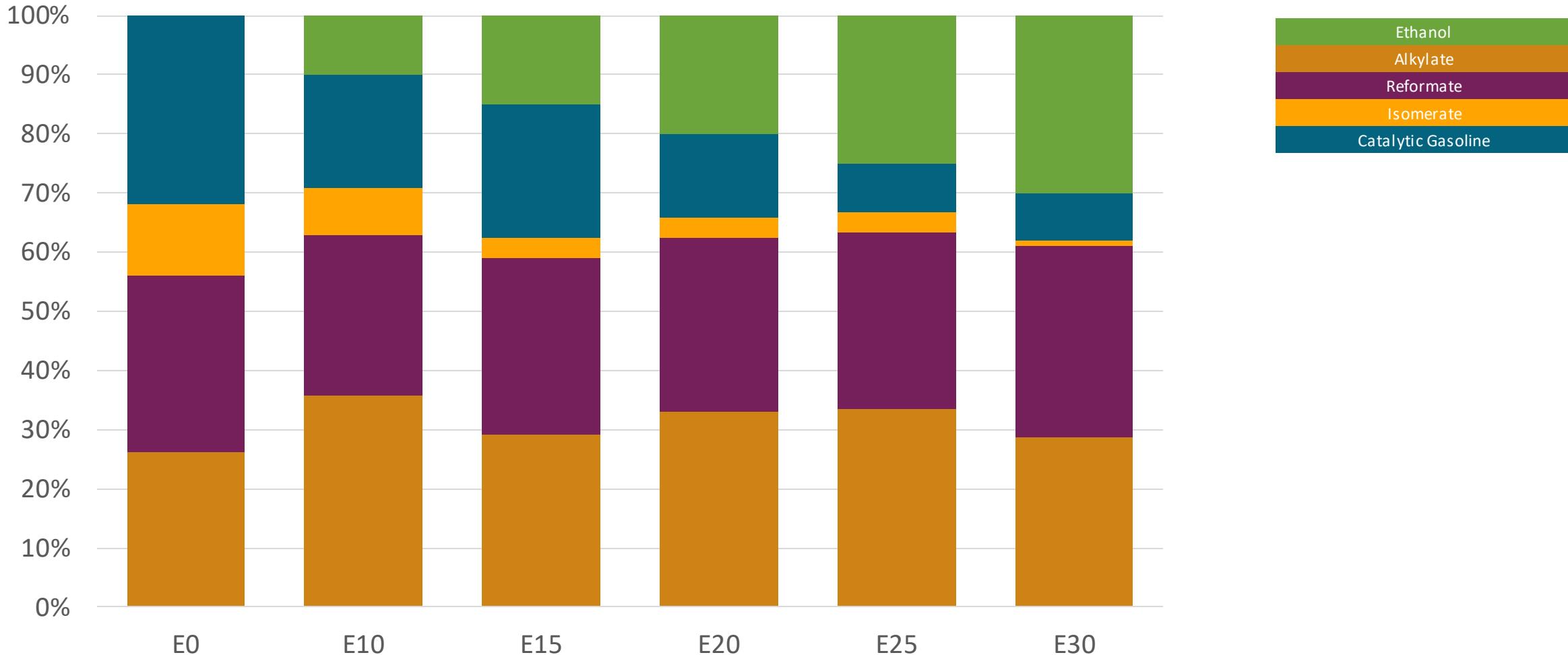
Panama – Regular – Octane Increment



Octane (RON)	91.0	95.7	97.8	99.7	101.6	103.8
Price (USD/gal)	\$ 2.326	\$ 2.326	\$ 2.326	\$ 2.326	\$ 2.326	\$ 2.326

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Panama – Premium – Octane Increment



Octane (RON)	95.0	99.1	101.5	103.2	105.0	106.8
Price (USD/gal)	\$ 2.484	\$ 2.484	\$ 2.484	\$ 2.484	\$ 2.484	\$ 2.484

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Gasoline Vehicle Fleet - Panamá

Type	Motor	Tailpipe	Recuperator	Age	Number of vehicles	
Auto/Sml Truck	Multi FI-Pt	Euro V	PCV Tank	>4years, >80 mkm	158.603	
				4-8 years, 80-160 mkm	180.576	
				<8 years, < 160 mkm	120.726	
		Euro IV		<8 years, < 160 mkm	118.110	
		Euro III		<8 years, < 160 mkm	112.096	
		3-Ways		<8 years, < 160 mkm	248.888	
Sml Engine	FI 4-ciclos	Euro III	PCV	>4 years, >80 mkm	5.544	
				4-8 years, 80-160 mkm	3.156	
		Euro II		4-8 years, 80-160 mkm	3.156	
				<8 years, < 160 mkm	20.966	
Truck	FI	Euro V	PCV	>4 years, >80 mkm	20.672	
				4-8 years, 80-160 mkm	23.536	
				<8 years, < 160 mkm	15.735	
		Euro IV		<8 years, < 160 mkm	15.394	
		Euro III		<8 years, < 160 mkm	14.610	
		3-Ways		<8 years, < 160 mkm	32.439	

Vehicle Fleet: 1,094,207

Average Age: 11.9 años

Motorcycles: 3%

Gasoline Vehicle Fleet - Emissions

Emissions	E0 g/km	E10 g/km	E15 g/km	E20 g/km	E25 g/km	E30 g/km	E10 - E0	E20 - E0	E30 - E0	Euro 6	TIER USA
CO	10.38	9.70	9.50	9.35	9.24	9.06	-7%	-10%	-13%	1	3.5
VOC	0.81	0.78	0.78	0.78	0.78	0.78	-4%	-4%	-5%	95	255
VOCeVap	0.43	0.43	0.44	0.45	0.46	0.47	0%	4%	7%	0.1	0.273
NOx	0.51	0.36	0.34	0.32	0.30	0.27	-30%	-38%	-46%	0.06	0.203
SOx	0.01	0.01	0.00	0.00	0.00	0.00	-15%	-28%	-41%		
NH3	0.07	0.07	0.07	0.07	0.07	0.07	-2%	0%	1%		
Butadiene	0.01	0.01	0.01	0.01	0.01	0.01	-4%	-4%	-4%		
Acetaldehyde	0.01	0.02	0.03	0.04	0.04	0.05	68%	249%	372%		
Formaldehyde	0.04	0.04	0.05	0.05	0.05	0.06	13%	39%	68%		
Benzene	0.05	0.04	0.04	0.04	0.04	0.04	-9%	-11%	-18%		
CO2	269.39	255.92	250.78	248.23	245.71	241.18	-5%	-8%	-10%		
N2O	0.01	0.01	0.01	0.01	0.01	0.01	-1%	2%	4%		
CH4	0.18	0.18	0.18	0.19	0.19	0.19	0%	4%	7%		
PM 2.5	0.02	0.02	0.01	0.01	0.01	0.01	-22%	-43%	-65%		
PM10	0.02	0.01	0.01	0.01	0.01	0.01	-22%	-43%	-65%	0.005	0.007
THC	0.28	0.29	0.30	0.32	0.33	0.35	3%	15%	24%		

Ethanol Blending in Gasoline - Perú



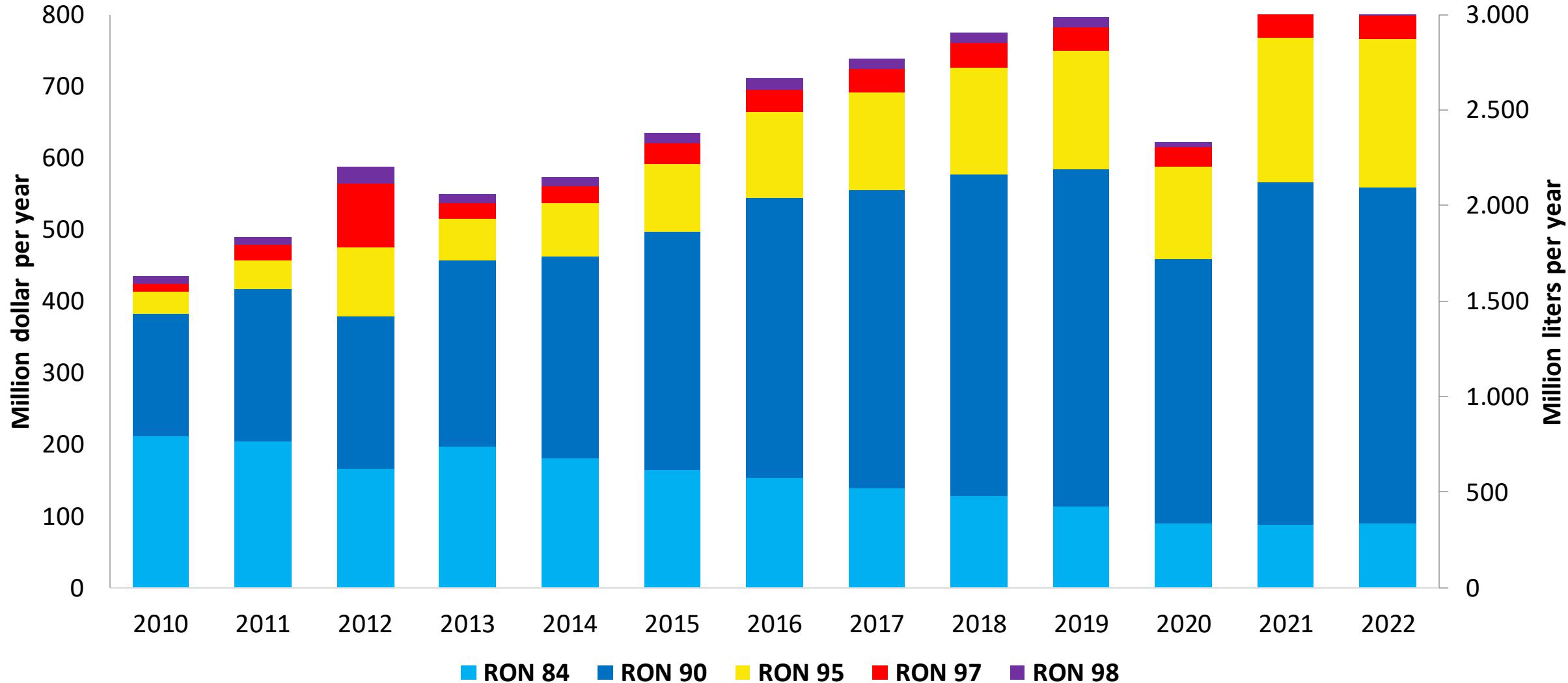
In 2022, Perú gasoline consumption surpassed 800 million gallons (3,000 millions liters). Starting in 2023, RON84 and RON 90 gasoline are commercialized as Regular gasoline (RON 91) with a 70% market participation. RON 95, RON 97 and RON 98 gasolines are now marketed as Premium gasoline (RON 96) with a 30% market share. La mayoría de sus gasolinas son producidas nacionalmente, llegando a importar entre el 10 y 15% de su demanda interna a países vecinos, Estados Unidos y Europa.

Blends with 7.8% v/v are allowed. Peru produces ethanol from sugarcane; however, its destination is mainly the EU market. Ethanol imports from the United States and to a lesser degree from Brazil are used for the national blend.

Source: MEM, 2023

Gasoline Demand in Perú

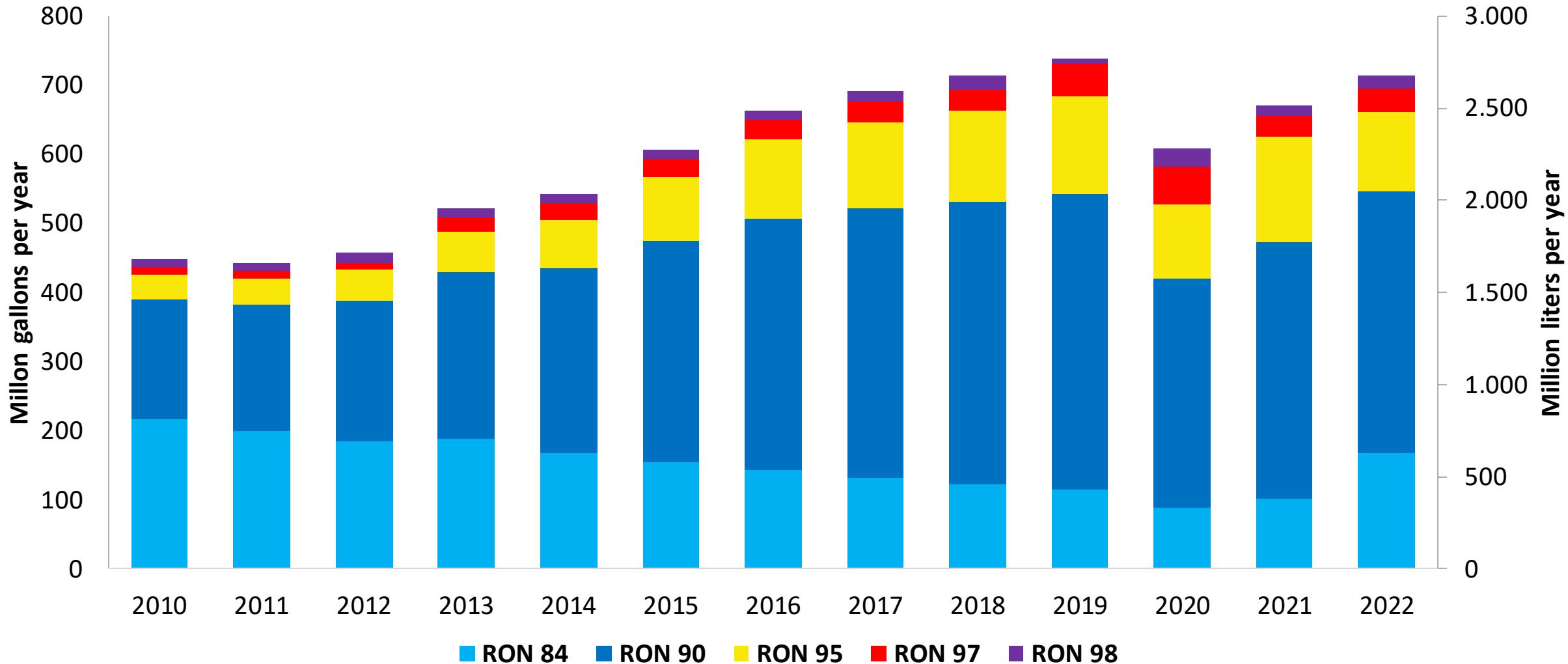
Gasoline Demand by Grade in Perú



Source: MINEM, 2023

Gasoline Production in Perú

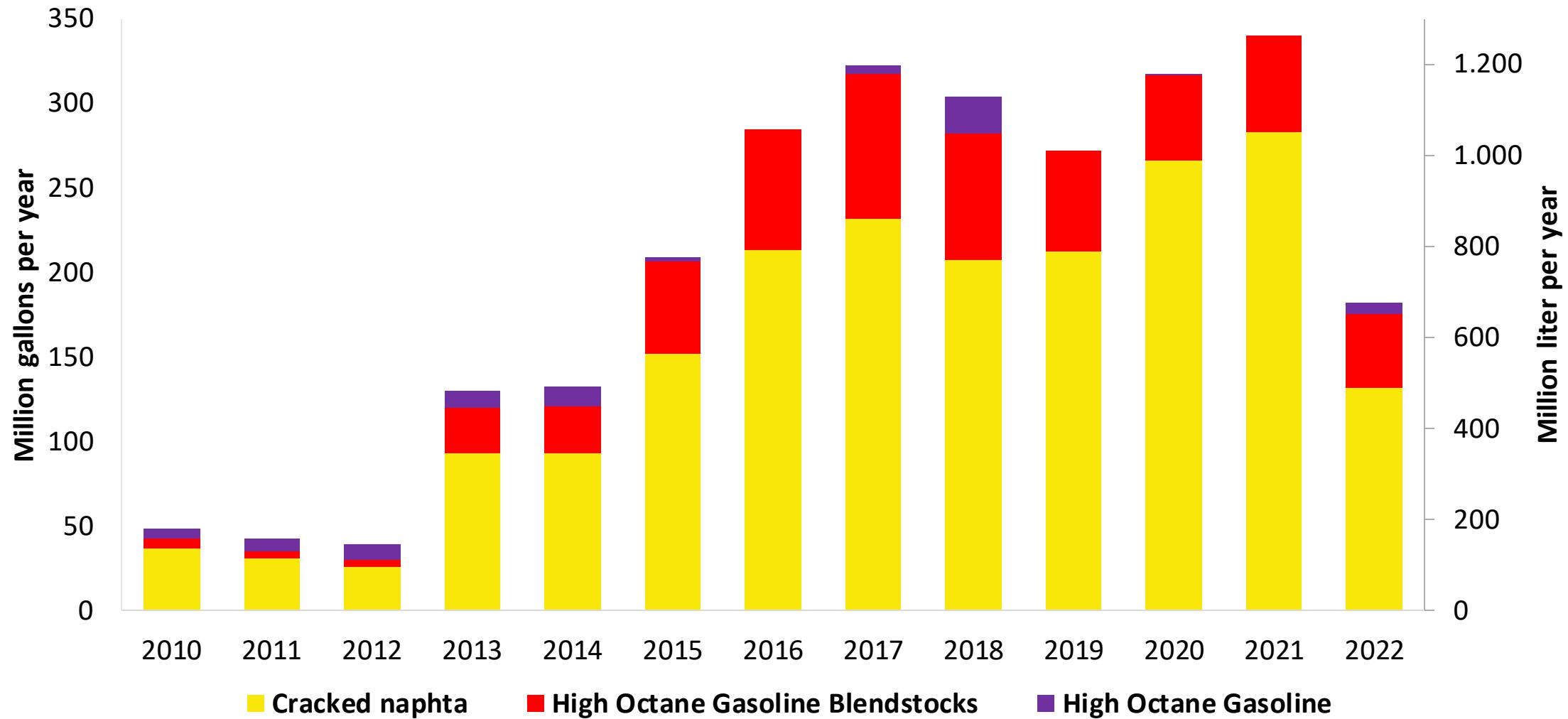
Gasoline Production by Grade in Perú



Source: MINEM, 2023

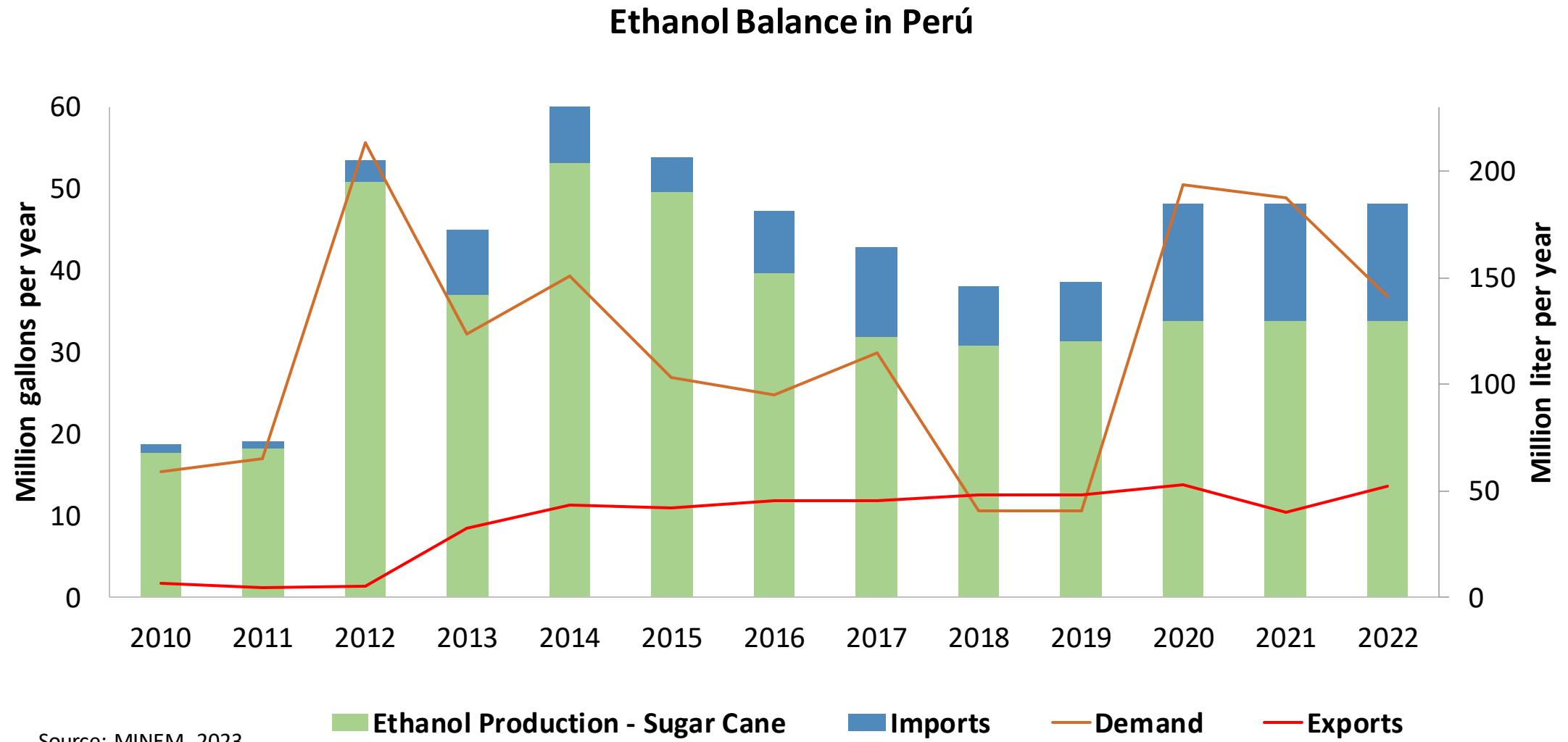
Gasoline Imports in Perú

Naphta and Gasoline Imports in Peru



Source: MINEM, 2023

Ethanol Balance in Perú

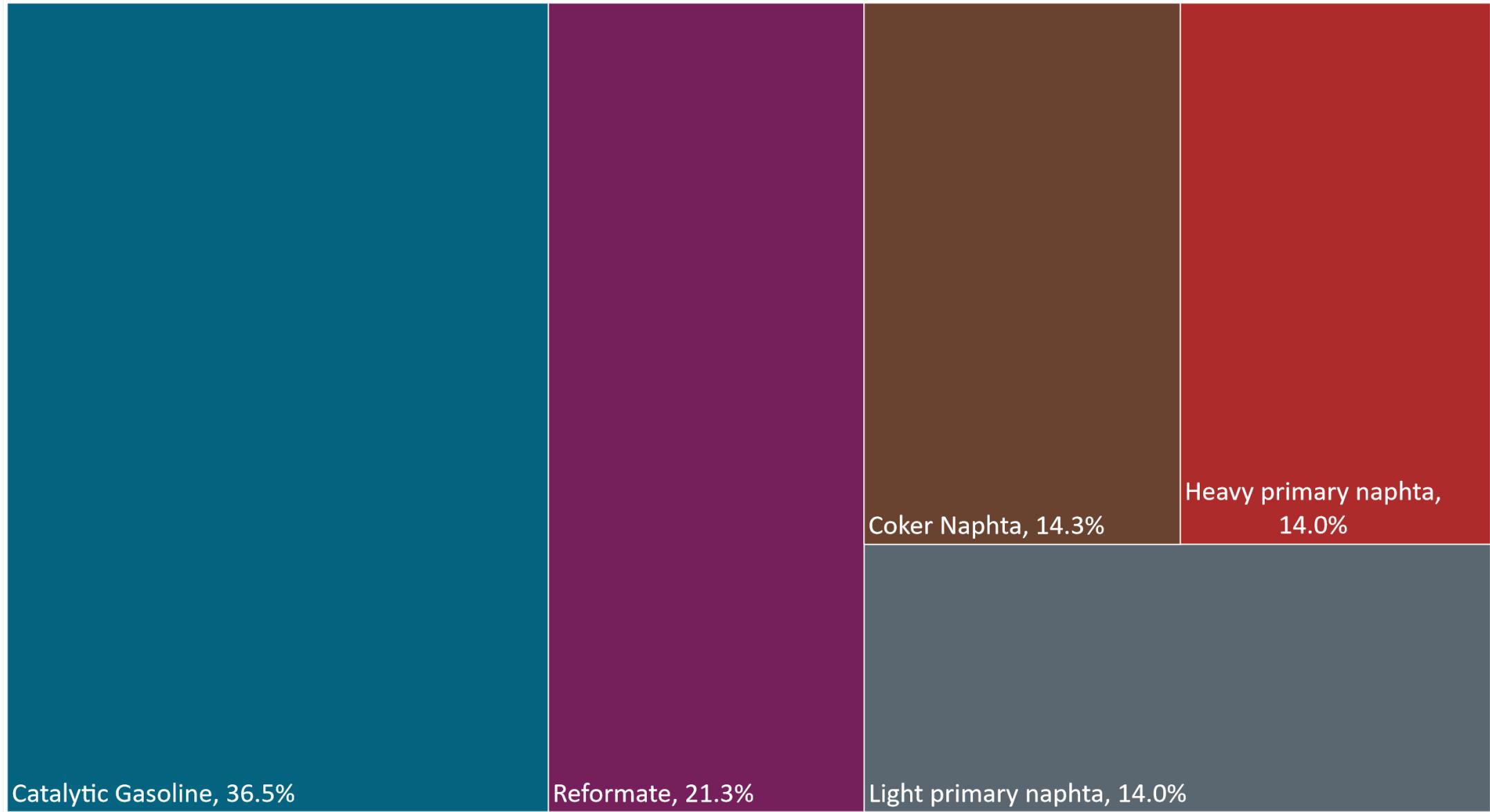


Gasoline Quality in Perú

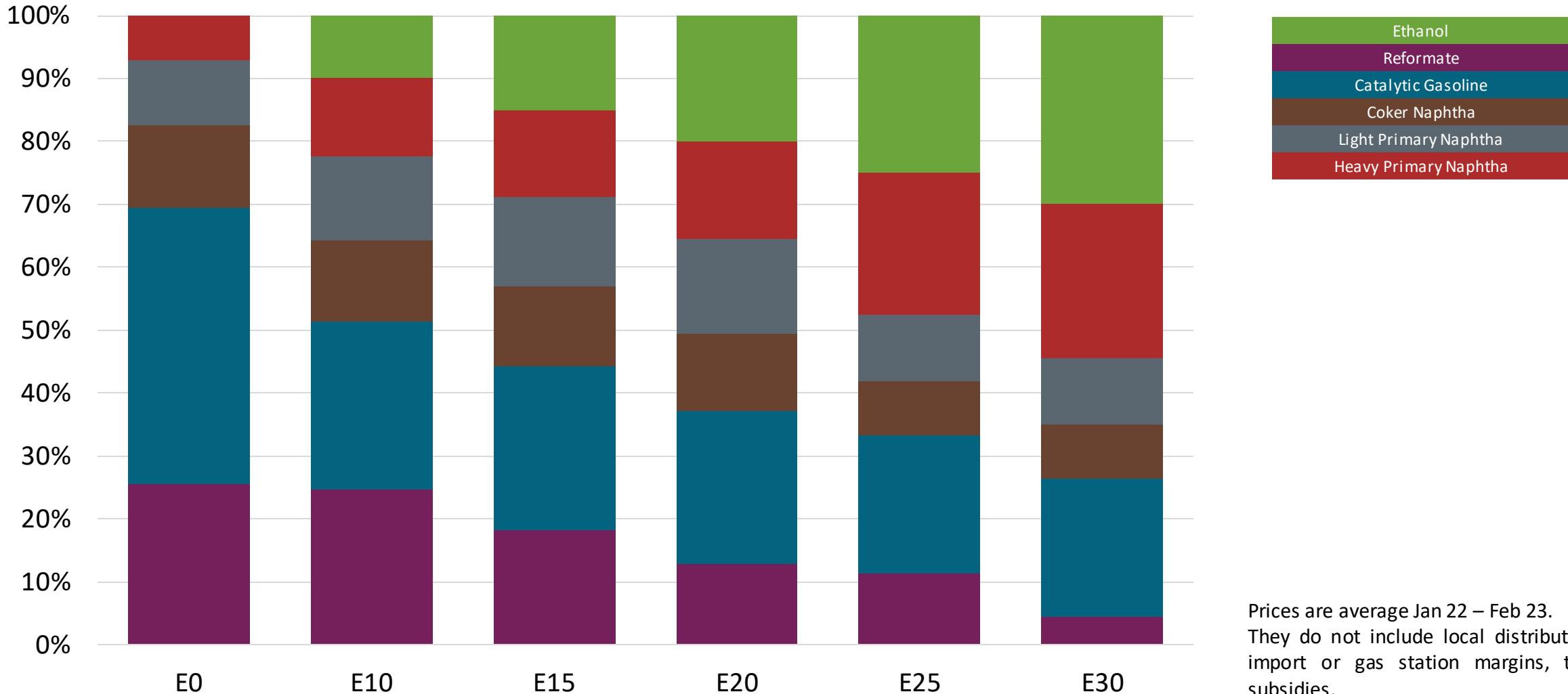
Name	Ministerial Resolution Nº 469-2021-MINEM/DM				EN 228:2012 + A1:2017 (Euro 6 enabling)			
Implementation Date	2021				2017			
Applicability	Whole country	Whole country	Whole country	Whole country	All countries			
Selected Grade	Gasolina Regular	Gasolina Premium	Gasohol Regular	Gasohol Premium	RON 95 E5	RON 95 E10	RON 98 E5	RON 98 E10
Benzene Content	< 2% v/v	< 2% v/v	< 2% v/v	< 2% v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v
Aromatics	< 45% v/v	< 45% v/v	< 45% v/v	< 45% v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v
Olefins	< 25% v/v	< 25% v/v	< 25% v/v	< 25% v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v
Lead Content	< 0,013 g/l	< 0,013 g/l	< 0,013 g/l	< 0,013 g/l	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l
Manganese	< 0,25 mg/l	< 0,25 mg/l	< 0,25 mg/l	< 0,25 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l
RON	> 90	> 95	> 91	> 96	> 95	> 95	> 98	> 98
MON	-	-	-	-	> 85	> 88	> 85	> 88
AKI								
Sulfur Content	< 50 mg/kg	< 50 mg/kg	< 50 mg/kg	< 50 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg
Oxygen Content	Reportar	Reportar	< 3,45 %m/m	< 3,45 %m/m	<2,7 % m/m	<3,7 % m/m	<2,7 % m/m	<3,7 % m/m
Ethanol (EtOH)			< 7,8 %v/v	< 7,8 %v/v	<5 %v/v	<10 %v/v	<5 %v/v	<10 %v/v
RVP 37.8°C (Summer)	< 76 kPa	< 76 kPa	< 76 kPa	< 76 kPa	<> 60 - 70 kPa *Depends on the country, RVP is regulated in the EU Fuel Quality Directive			
RVP 37.8 °C(Winter)								
RVP 37.8°C (Transition)								
MTBE					-	-	-	-
Ehters 5 or more C Atoms	-	-	-	-	Based on oxygen content	<22 %v/v	Based on oxygen content	<22 %v/v

Source: MINEM, 2023

Available Blending Components



Perú – Regular – Constant Octane

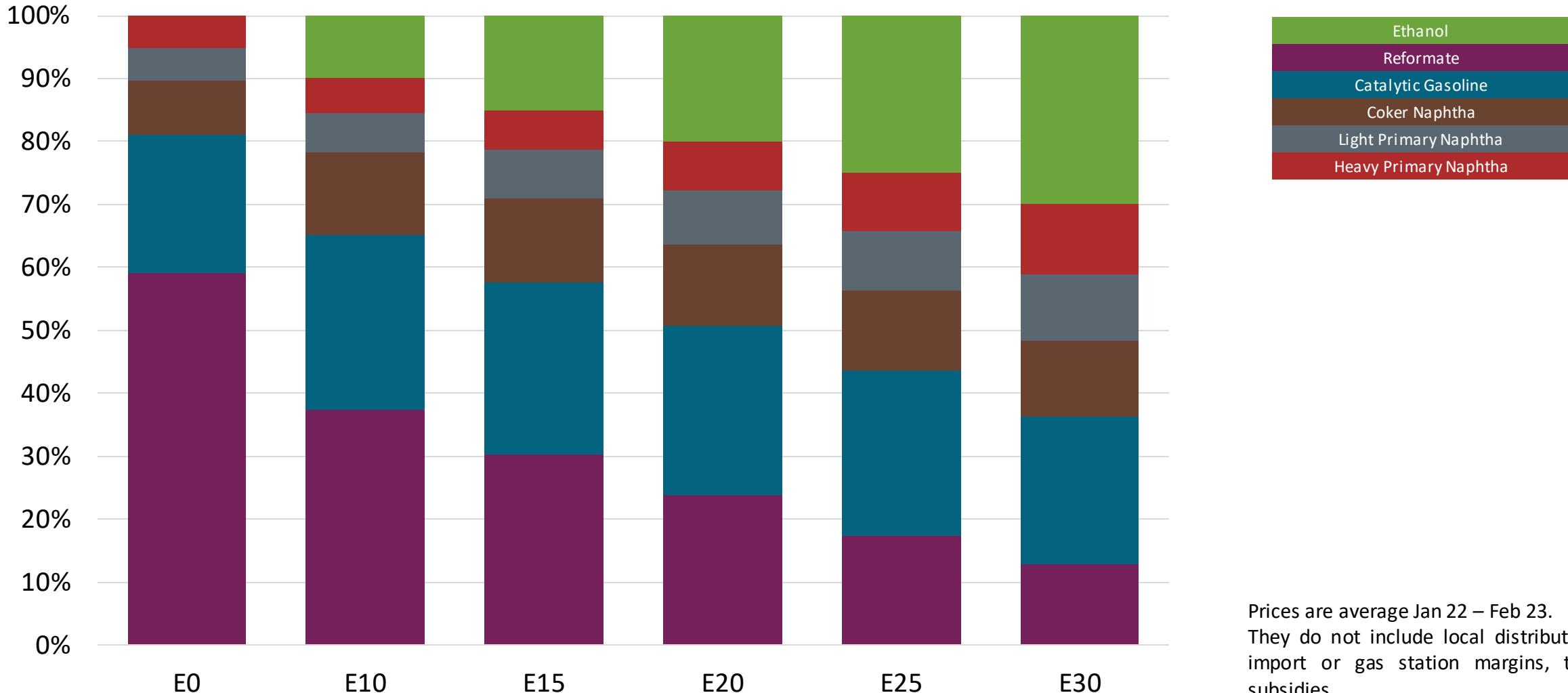


Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90

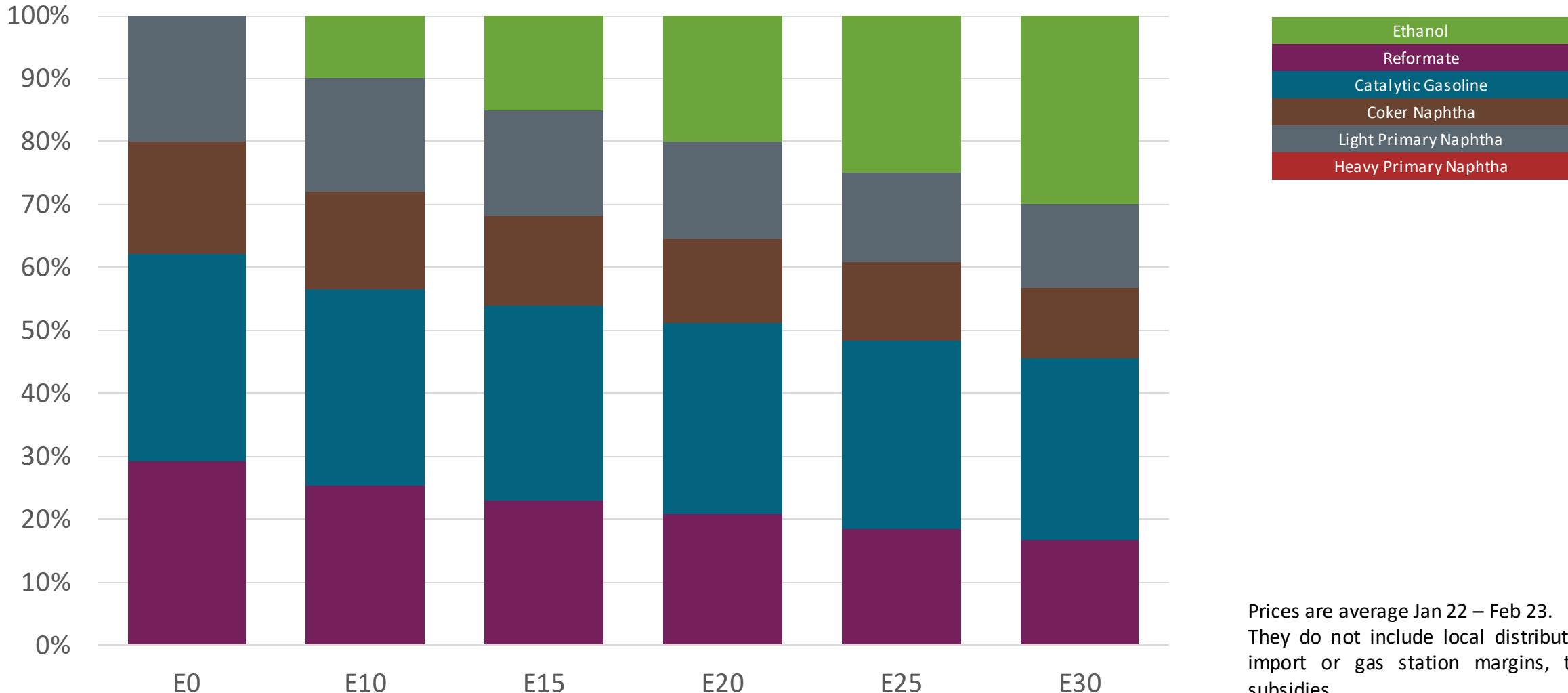
Octane (RON)	90.0	90.0	90.0	90.0	90.0	90.0
Price (USD/gal)	\$ 2.274	\$ 2.203	\$ 2.165	\$ 2.129	\$ 2.107	\$ 2.070

Perú – Premium – Constant Octane



Source: Faro90

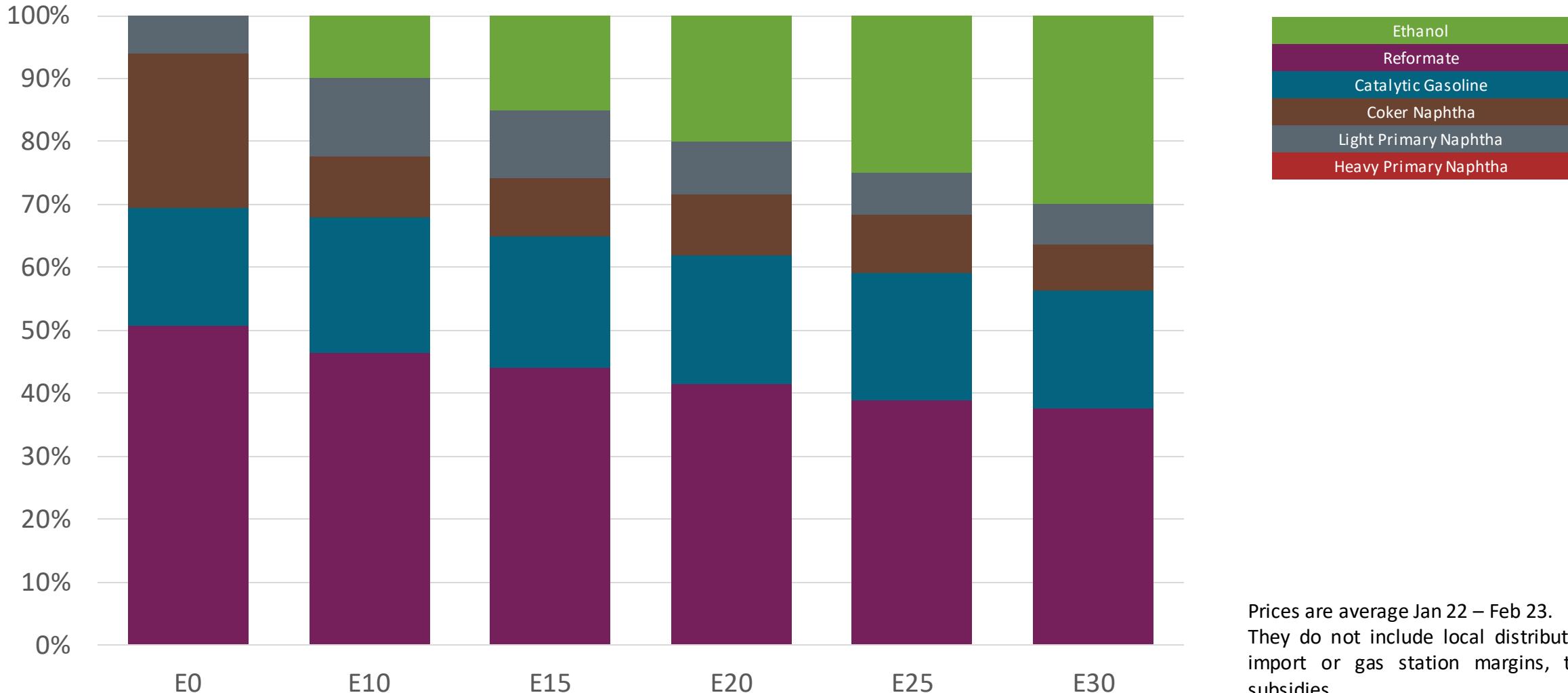
Perú – Regular – Octane Increment



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90

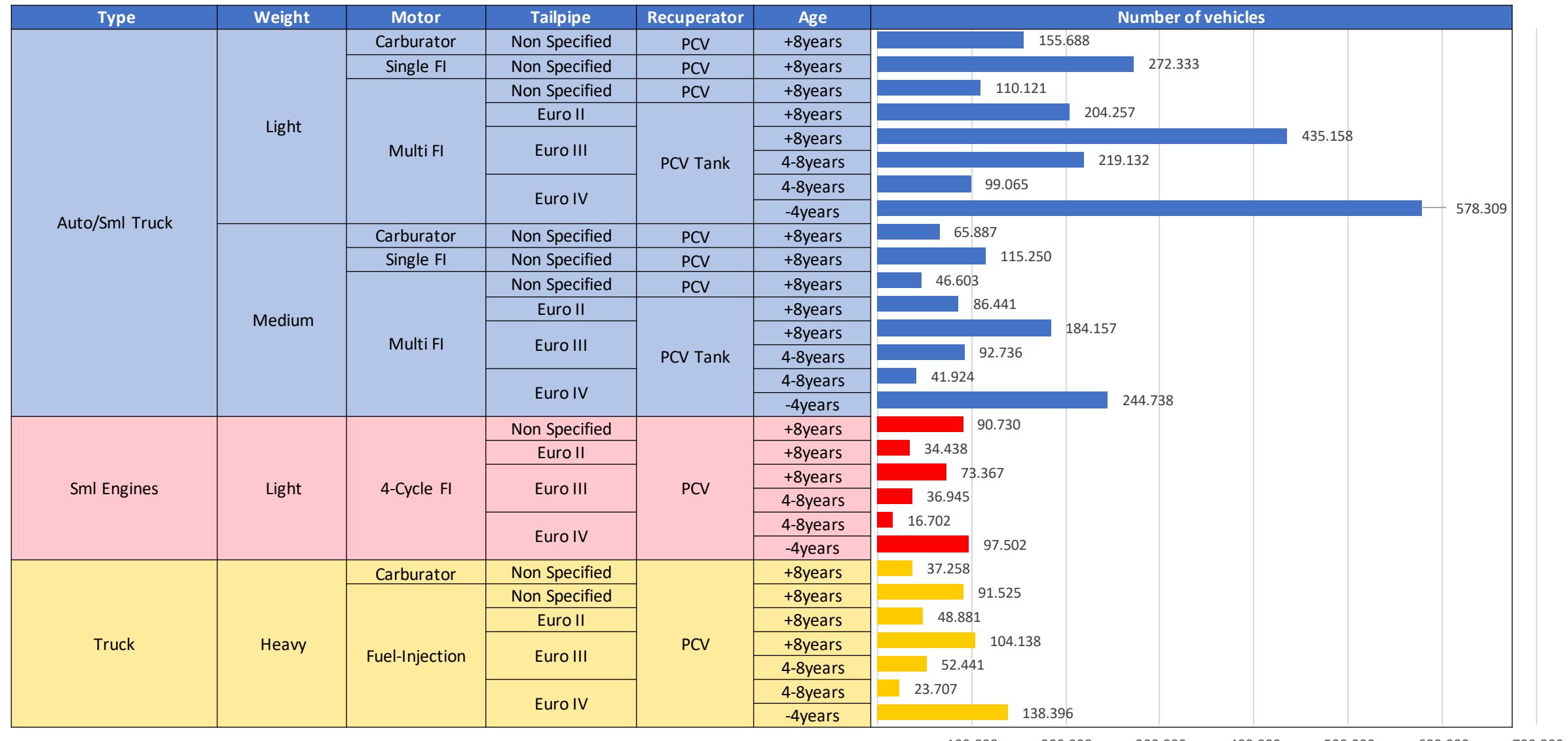
Perú – Premium – Octane Increment



Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Source: Faro90

Perú – Gasoline Vehicle Fleet



Vehicle Fleet: 3,797,829

Average Age: 14.9 years

Source: Ministerio de Transporte y Comunicaciones, 2023 209

Perú – Gasoline Vehicle Fleet Emissions

Emissions	E0 g/km	E10 g/km	E15 g/km	E20 g/km	E25 g/km	E30 g/km	E10 - E0	E20 - E0	E30 - E0	Euro 6	TIER USA
CO	31.80	25.76	23.17	20.52	18.46	16.03	-19%	-35%	-50%	1	3.5
VOC	3.20	2.82	2.67	2.53	2.43	2.28	-12%	-21%	-29%	95	255
VOCevap	0.45	0.45	0.46	0.47	0.48	0.48	0%	4%	7%	0.1	0.273
NOx	1.37	0.96	0.90	0.85	0.80	0.74	-30%	-38%	-46%	0.06	0.203
SOx	0.01	0.01	0.01	0.01	0.01	0.00	-15%	-28%	-41%		
NH3	0.06	0.06	0.06	0.06	0.06	0.07	-2%	0%	1%		
Butadiene	0.01	0.01	0.01	0.01	0.01	0.01	-12%	-20%	-28%		
Acetaldehyde	0.01	0.02	0.04	0.05	0.06	0.07	68%	249%	372%		
Formaldehyde	0.05	0.06	0.07	0.07	0.08	0.08	13%	39%	68%		
Benzene	0.18	0.16	0.16	0.16	0.15	0.15	-9%	-11%	-18%		
CO2	272.47	258.84	253.64	251.07	248.67	244.08	-5%	-8%	-10%		
N2O	0.01	0.01	0.01	0.01	0.01	0.01	-1%	2%	4%		
CH4	0.70	0.70	0.71	0.72	0.73	0.75	0%	4%	7%		
PM 2.5	0.02	0.02	0.01	0.01	0.01	0.01	-22%	-43%	-65%		
PM10	0.02	0.02	0.02	0.01	0.01	0.01	-22%	-43%	-65%	0.005	0.007
THC	0.95	0.95	0.98	1.01	1.03	1.05	0%	6%	11%		

Ethanol Blending in Gasoline - Uruguay

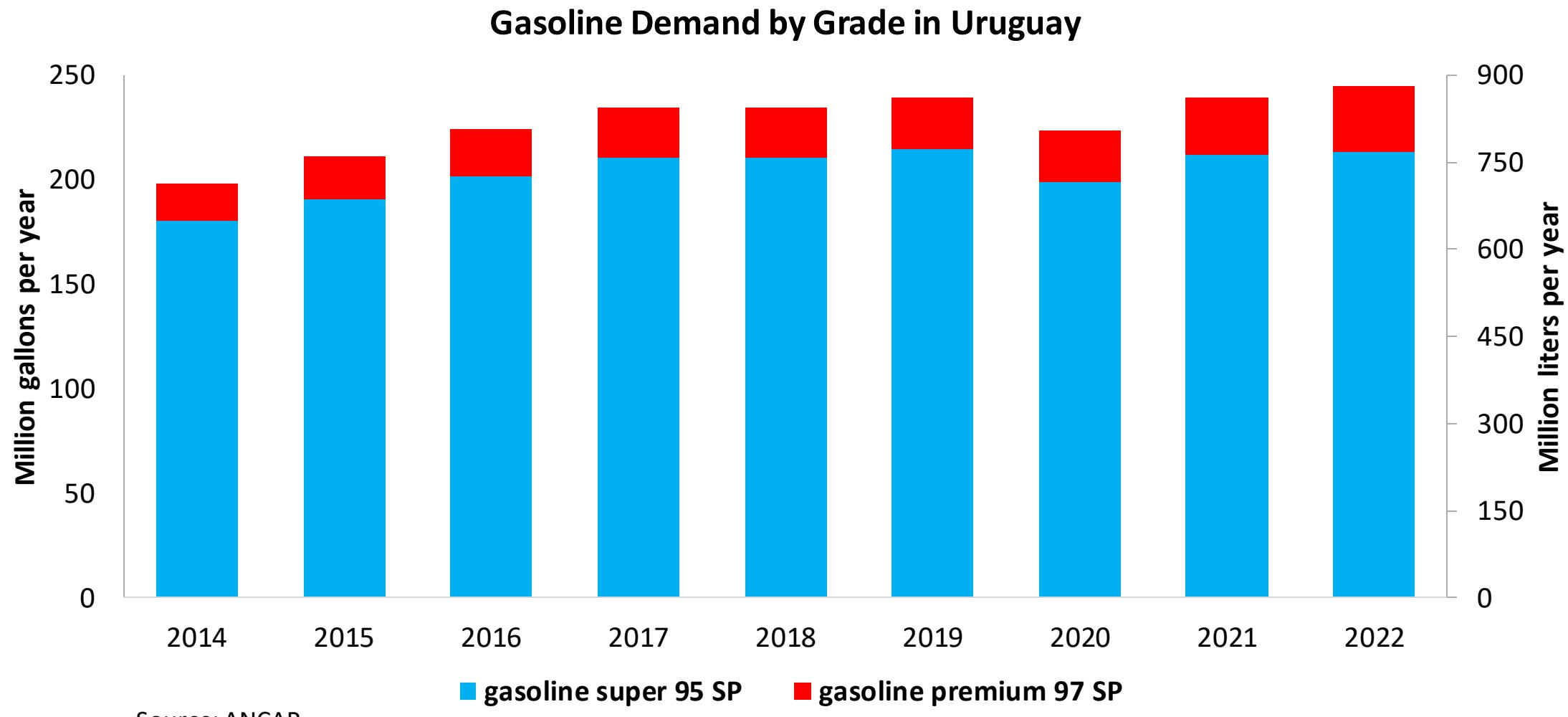


In 2022, gasoline demand was 233 million gallons (880 million liters). Super Gasoline with RON 95 represented 87% of total demand and Premium Gasoline with RON 97 the rest. Gasoline production was 810 million liters and covers almost 100% of local demand.

Since 2015, 5% v/v blends with a maximum limit of 10% v/v were allowed. In Uruguay there are two ethanol plants with an overall capacity of 100 million liters per year, raw material commonly used are sugar cane, sorghum, barley, corn, and wheat. In 2022, ethanol consumption was 22 million gallons (84 million liters).

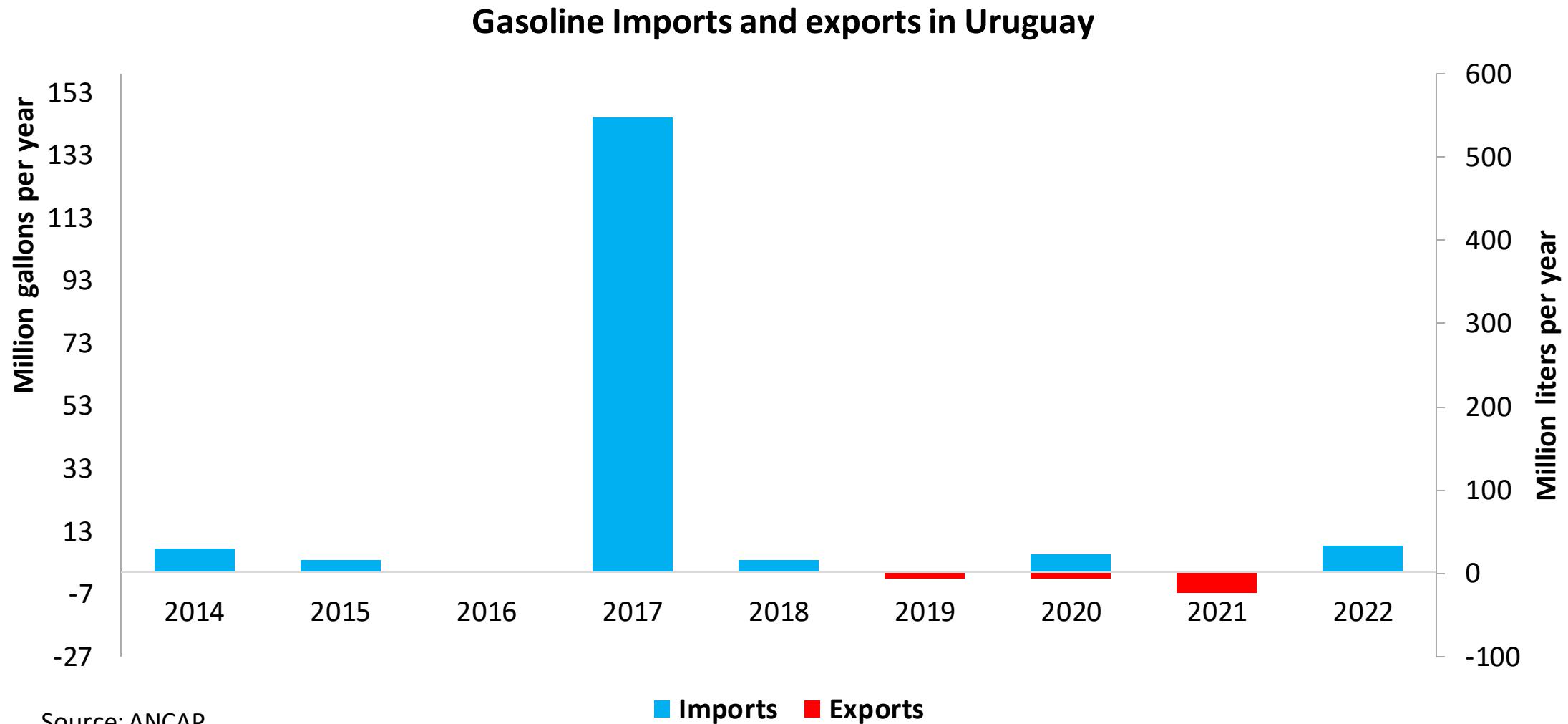
Source: ANCAP

Gasoline Demand in Uruguay



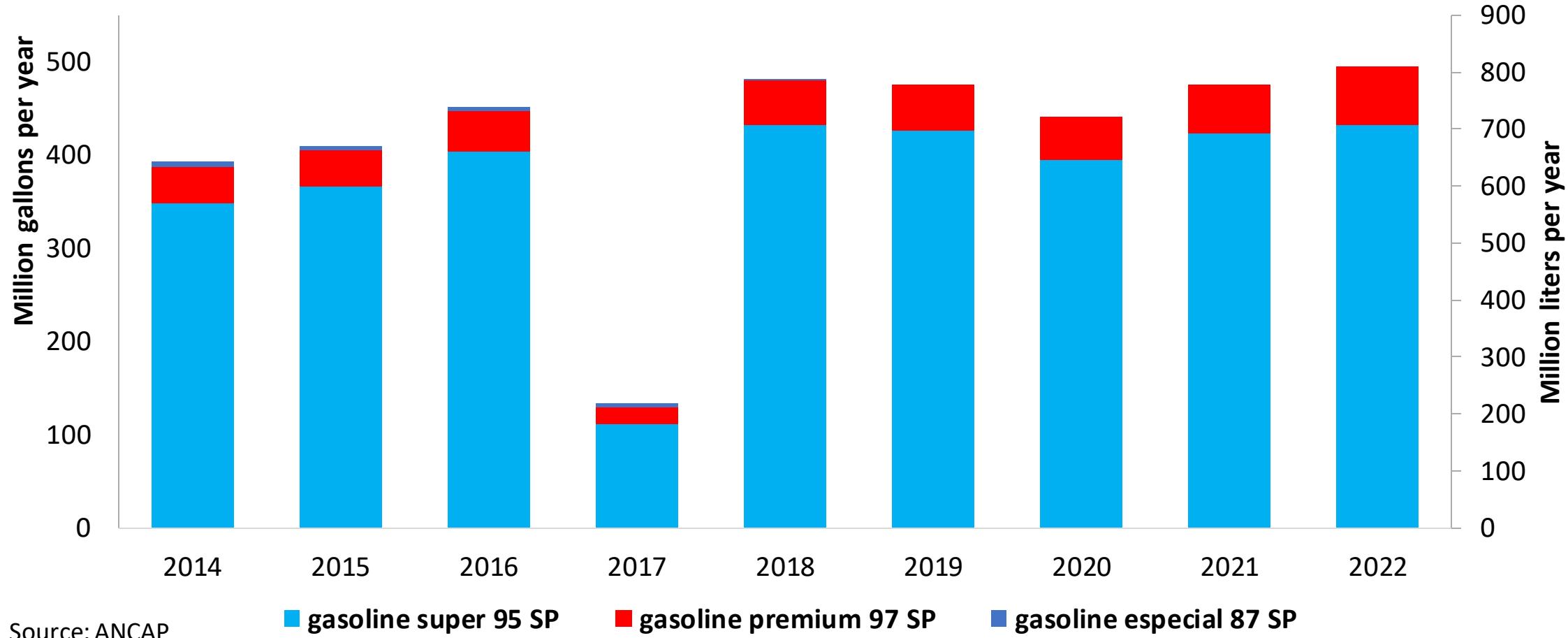
Source: ANCAP

Gasoline Imports in Uruguay



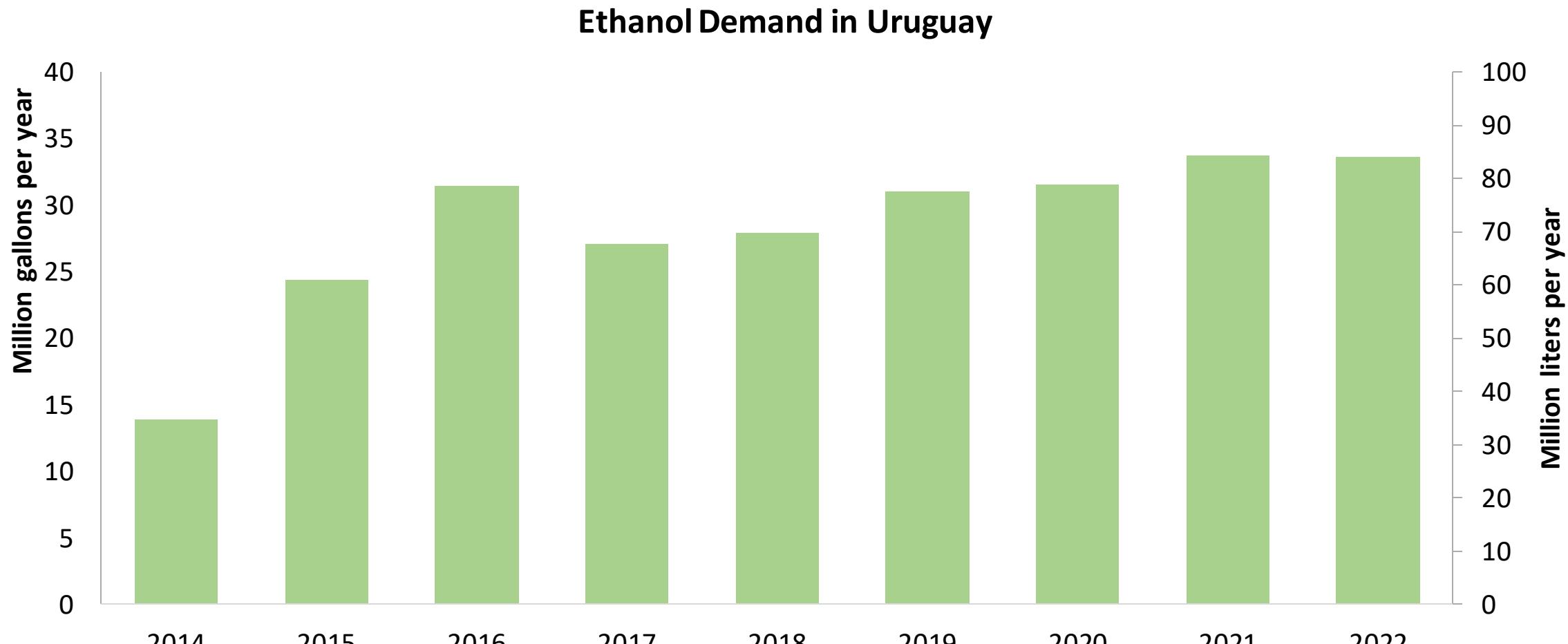
Gasoline Production in Uruguay

Gasoline Production by Grade in Uruguay



Source: ANCAP

Ethanol Demand in Uruguay



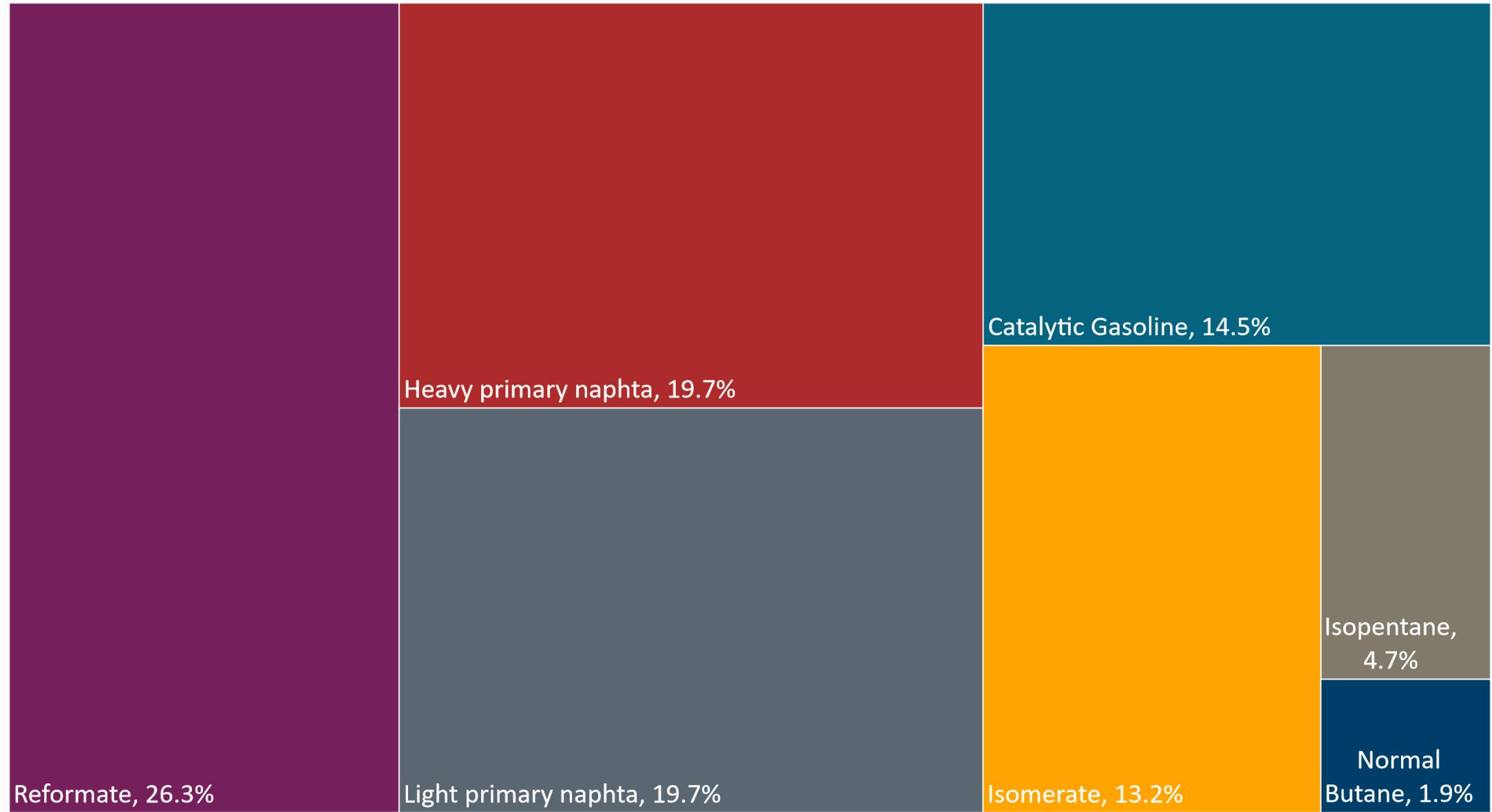
Source: ANCAP

Gasoline Quality in Uruguay

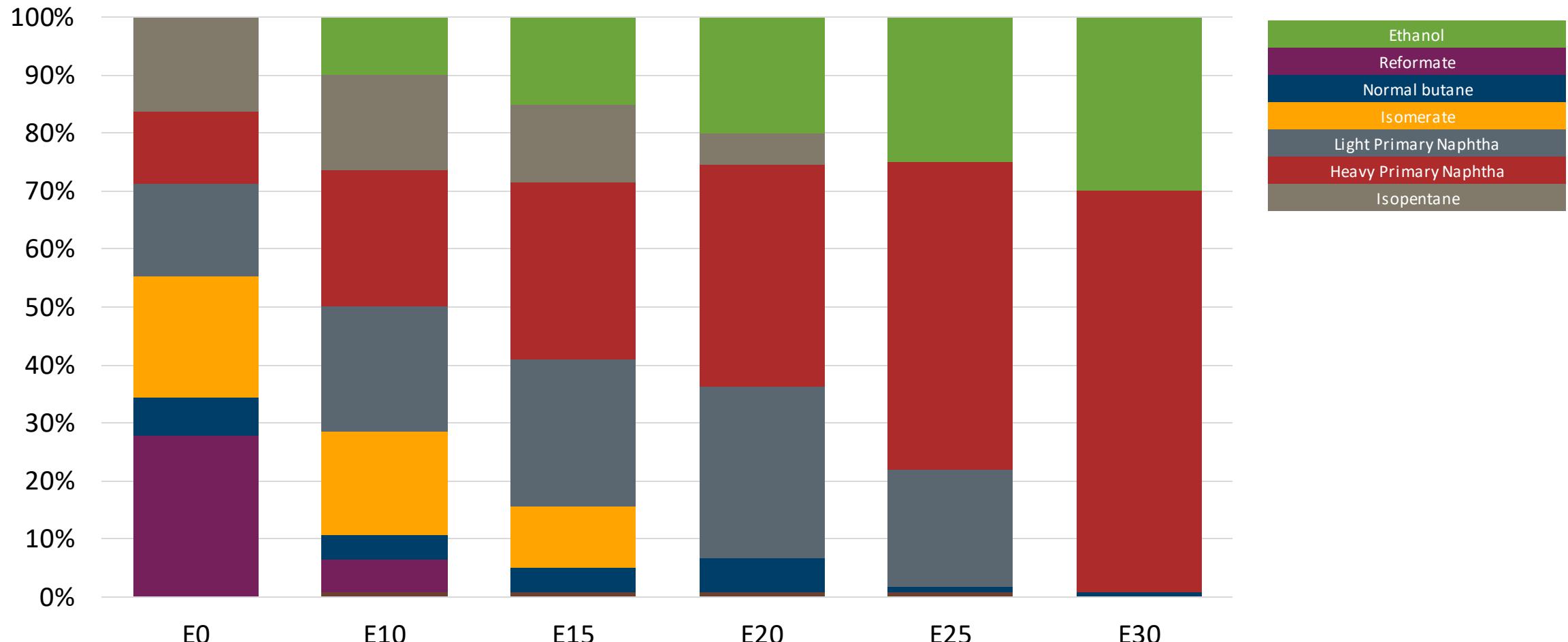
Name	Resolution 110/2014		ANCAP		EN 228:2012 + A1:2017 (Euro 6 enabling)			
Implementation Date	2019		2020		2017			
Applicability	Whole country	Whole country	Whole country	Whole country	All countries			
Selected Grade	Super 95 30-S	Premium 97 30-S	Super 95 30-S	Premium 97 30-S	RON 95 E5	RON 95 E10	RON 98 E5	RON 98 E10
Benzene Content	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v	< 1 %v/v
Aromatics	< 40 %v/v	< 40 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v	< 35 %v/v
Olefins	< 20 %v/v	< 20 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v	< 18 %v/v
Lead Content	< 0,005 g/l	< 0,005 g/l	< 0,005 g/l	< 0,005 g/l	< 5 mg/l	< 5 mg/l	< 5 mg/l	< 5 mg/l
Manganese	< 2,5 mg/l	< 2,5 mg/l	< 2,5 mg/l	< 2,5 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l	< 2,0 mg/l
RON	> 95	> 97	> 95	> 97	> 95	> 95	> 98	> 98
MON	> 82	> 84	> 85	> 85	> 85	> 88	> 85	> 88
AKI								
Sulfur Content	< 30 mg/kg	< 30 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg	< 10 mg/kg
Oxygen Content	< 2,7 %m/m	< 2,7 %m/m	< 2,7 %m/m	< 2,7 %m/m	< 2,7 % m/m	< 3,7 % m/m	< 2,7 % m/m	< 3,7 % m/m
Ethanol (EtOH)	< > 10 %v/v	< > 10 %v/v			< 5 %v/v	< 10 %v/v	< 5 %v/v	< 10 %v/v
RVP 37.8°C (Summer)	<> 72 kPa	<> 72 kPa	<> 50-80 kPa	<> 50-80 kPa	<> 60 - 70 kPa *Depends on the country, RVP is regulated in the EU Fuel Quality Directive			
RVP 37.8 °C(Winter)	<> 83 kPa	<> 83 kPa	<> 45-67 kPa	<> 45-67 kPa				
RVP 37.8°C (Transition)								
MTBE					-	-	-	-
Ethers 5 or more C Atoms	-	-	-	-	Based on oxygen content	<22 %v/v	Based on oxygen content	<22 %v/v

Source: ANCAP

Available Blending Components



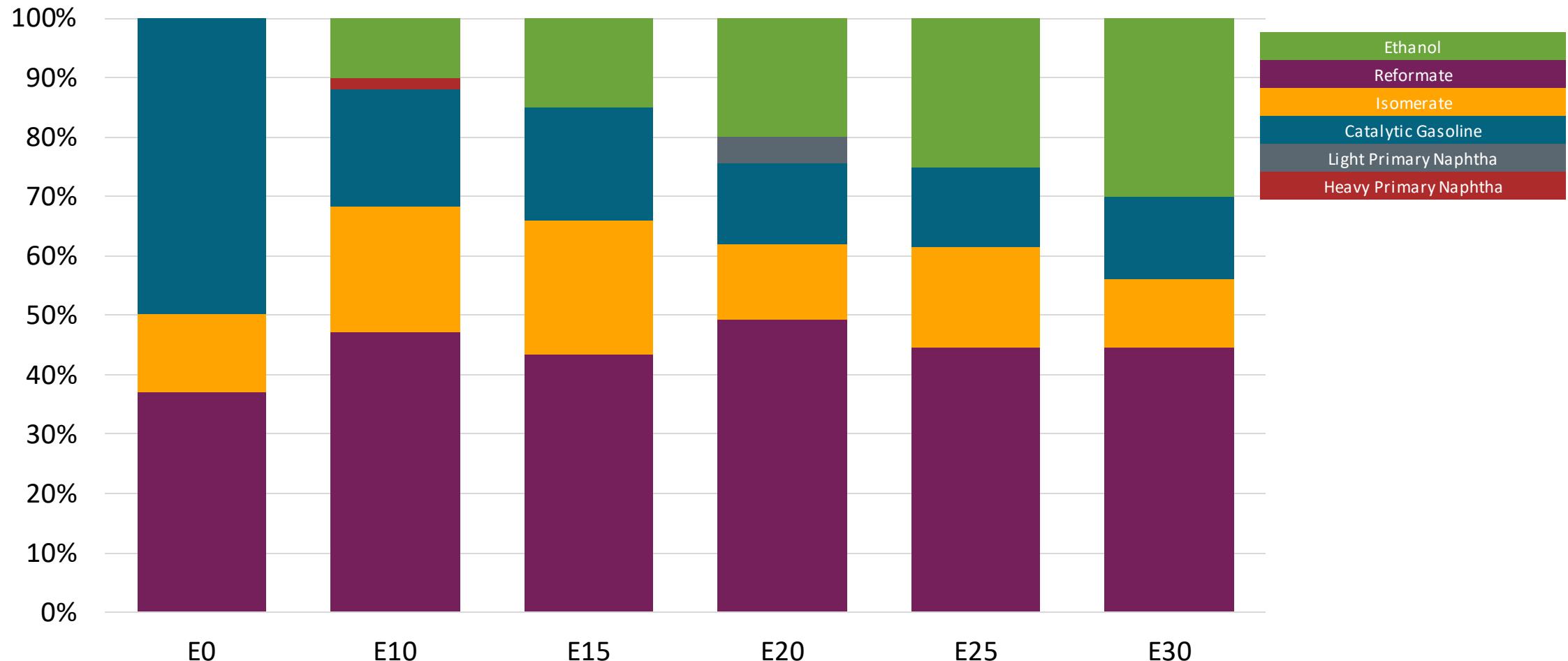
Ethanol Blending - Gasolina Super – Constant Octane



Octane (RON)	95.0	95.0	95.0	95.0	95.0	95.0
Price (USD/gal)	\$2.44	\$2.30	\$2.24	\$2.19	\$2.14	\$2.09

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Ethanol Blending - Gasolina Super – Octane Increment

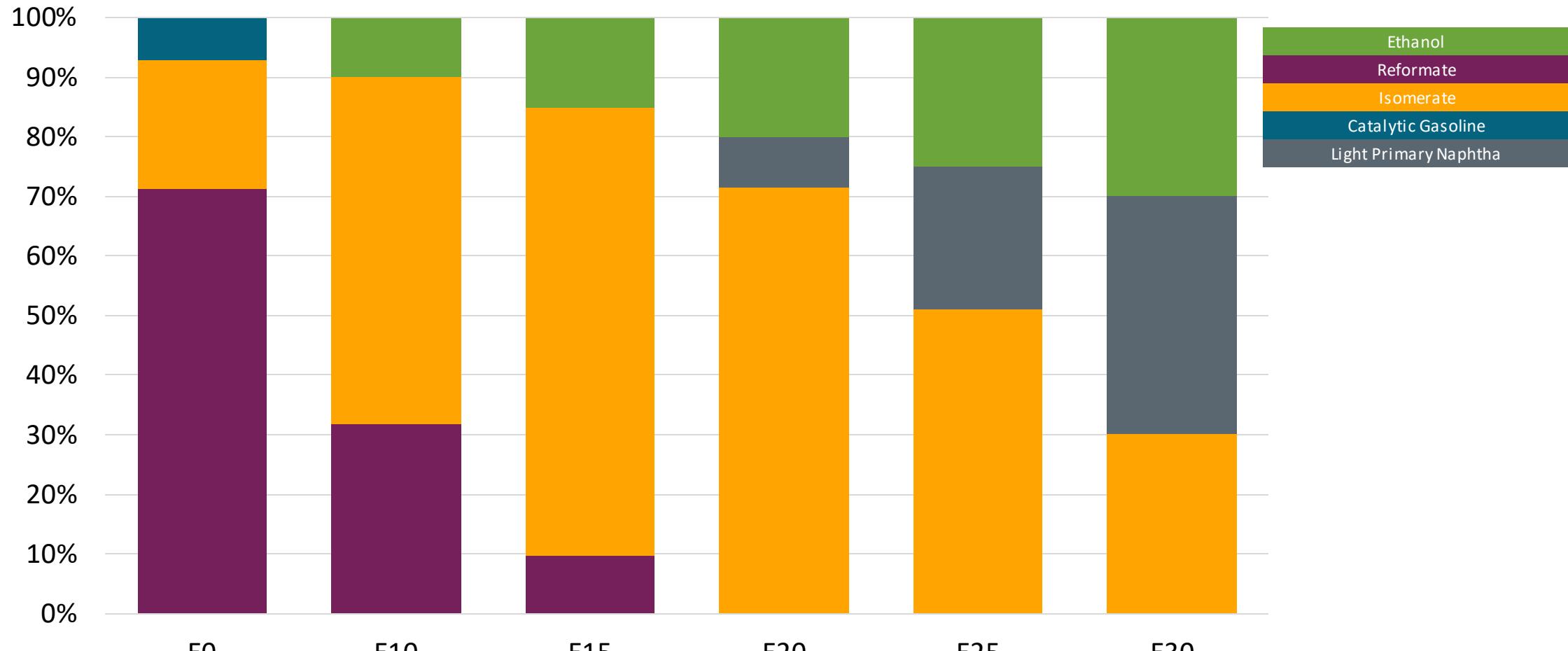


Octane (RON)	95.0	98.9	101.1	102.9	105.0	106.8
Price (USD/gal)	\$2.41	\$2.41	\$2.41	\$2.41	\$2.41	\$2.41

Prices are average Jan 22 – Feb 23.

They do not include local distribution costs, import or gas station margins, taxes and subsidies.

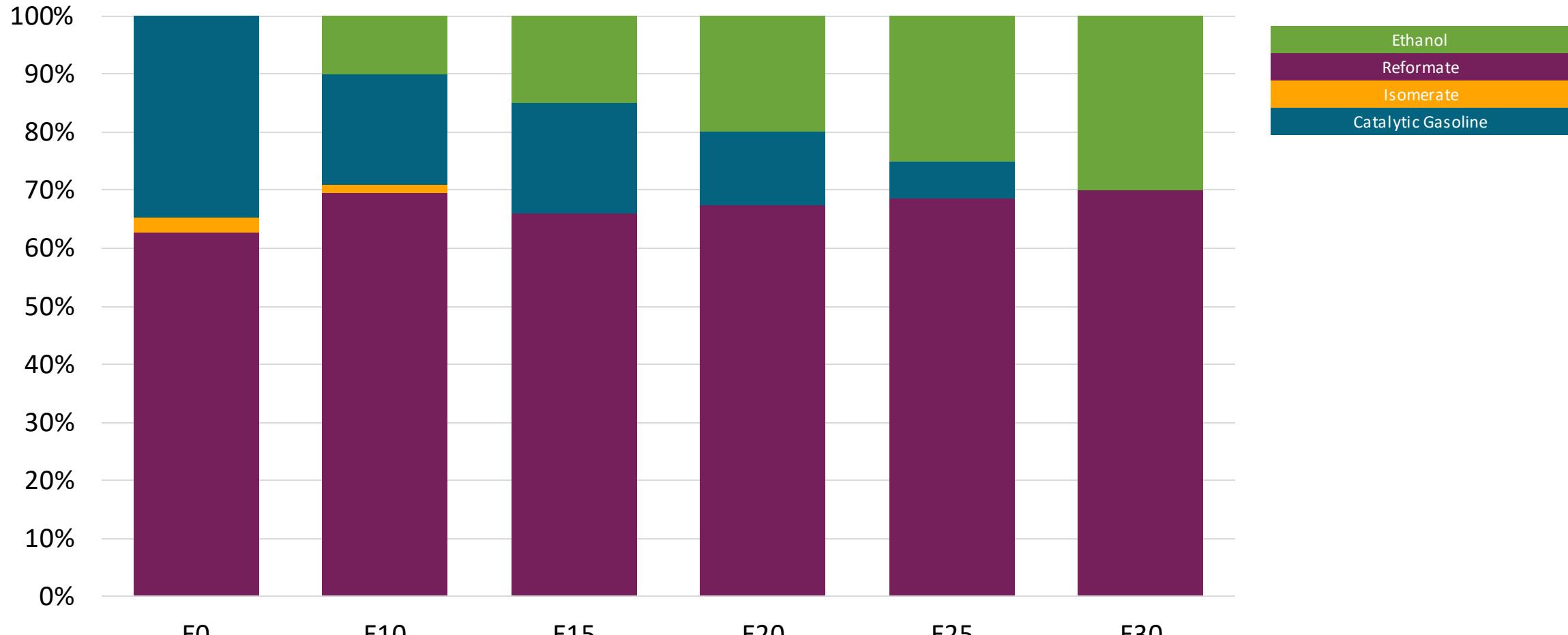
Ethanol Blending - Gasolina Premium – Constant Octane



Octane (RON)	97.0	97.0	97.0	97.0	97.0	97.0
Price (USD/gal)	\$2.49	\$2.37	\$2.30	\$2.24	\$2.19	\$2.13

Prices are average Jan 22 – Feb 23.
 They do not include local distribution costs,
 import or gas station margins, taxes and
 subsidies.

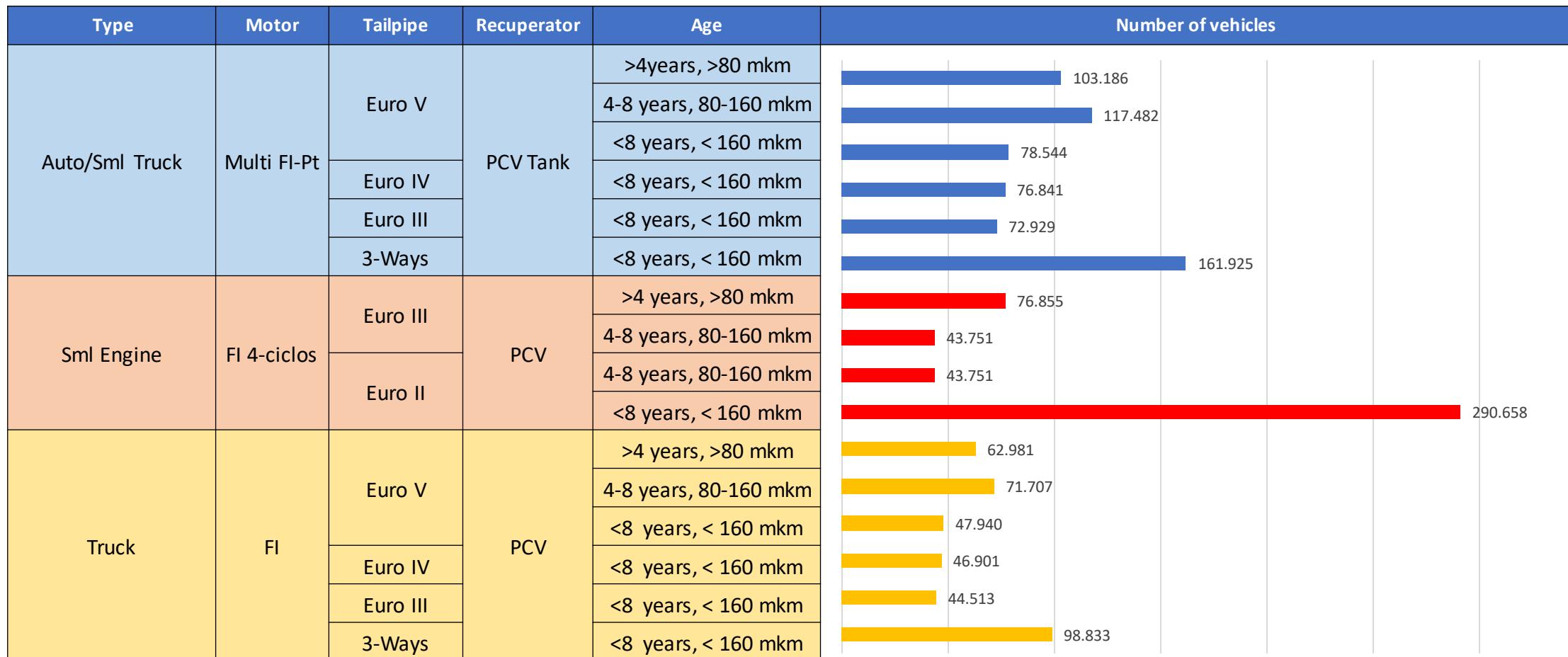
Ethanol Blending - Gasoline Premium – Octane Increment



Octane (RON)	97.3	101.8	103.4	105.2	106.9	108.5
Price (USD/gal)	\$2.48	\$2.49	\$2.48	\$2.48	\$2.48	\$2.48

Prices are average Jan 22 – Feb 23.
They do not include local distribution costs,
import or gas station margins, taxes and
subsidies.

Gasoline Vehicle Fleet - Uruguay



Vehicle Fleet: 1,438,798

Average Age: 9 years

Motorcycles: 31.6%

Gasoline Vehicle Fleet Emissions - Uruguay

Emissions	E0 g/km	E10 g/km	E15 g/km	E20 g/km	E25 g/km	E30 g/km	E10 - E0	E20 - E0	E30 - E0	Euro 6	TIER USA
CO	22.65	20.77	20.16	19.62	19.23	18.69	-8%	-13%	-17%	1	3.5
VOC	2.09	1.94	1.90	1.86	1.83	1.79	-7%	-11%	-15%	95	255
VOCevap	0.62	0.62	0.63	0.64	0.66	0.67	0%	4%	7%	0.1	0.273
NOx	0.97	0.68	0.64	0.60	0.56	0.52	-30%	-38%	-46%	0.06	0.203
SOx	0.01	0.01	0.01	0.01	0.01	0.01	-15%	-28%	-41%		
NH3	0.06	0.06	0.06	0.06	0.06	0.06	-2%	0%	1%		
Butadiene	0.01	0.01	0.01	0.01	0.01	0.01	-8%	-12%	-16%		
Acetaldehyde	0.02	0.04	0.06	0.08	0.09	0.11	68%	249%	372%		
Formaldehyde	0.09	0.11	0.12	0.13	0.14	0.16	13%	39%	68%		
Benzene	0.10	0.10	0.09	0.09	0.09	0.09	-9%	-11%	-18%		
CO2	348.07	330.67	324.02	320.73	317.66	311.80	-5%	-8%	-10%		
N2O	0.02	0.02	0.02	0.02	0.02	0.02	-1%	2%	4%		
CH4	0.46	0.46	0.47	0.48	0.49	0.50	0%	4%	7%		
PM 2.5	0.03	0.02	0.02	0.02	0.01	0.01	-22%	-43%	-65%		
PM10	0.05	0.04	0.04	0.03	0.03	0.02	-22%	-43%	-65%	0.005	0.007
THC	0.70	0.71	0.76	0.79	0.82	0.86	3%	14%	23%		