Enhancing Vehicles Energy Efficiency in Saudi Arabia

G20 Transport Task Group workshop
Buenos Aires, Argentina / September, 2018

المركز السعودي لكفاءة الطاقة
Saudi Energy Efficiency Center

AGENDA

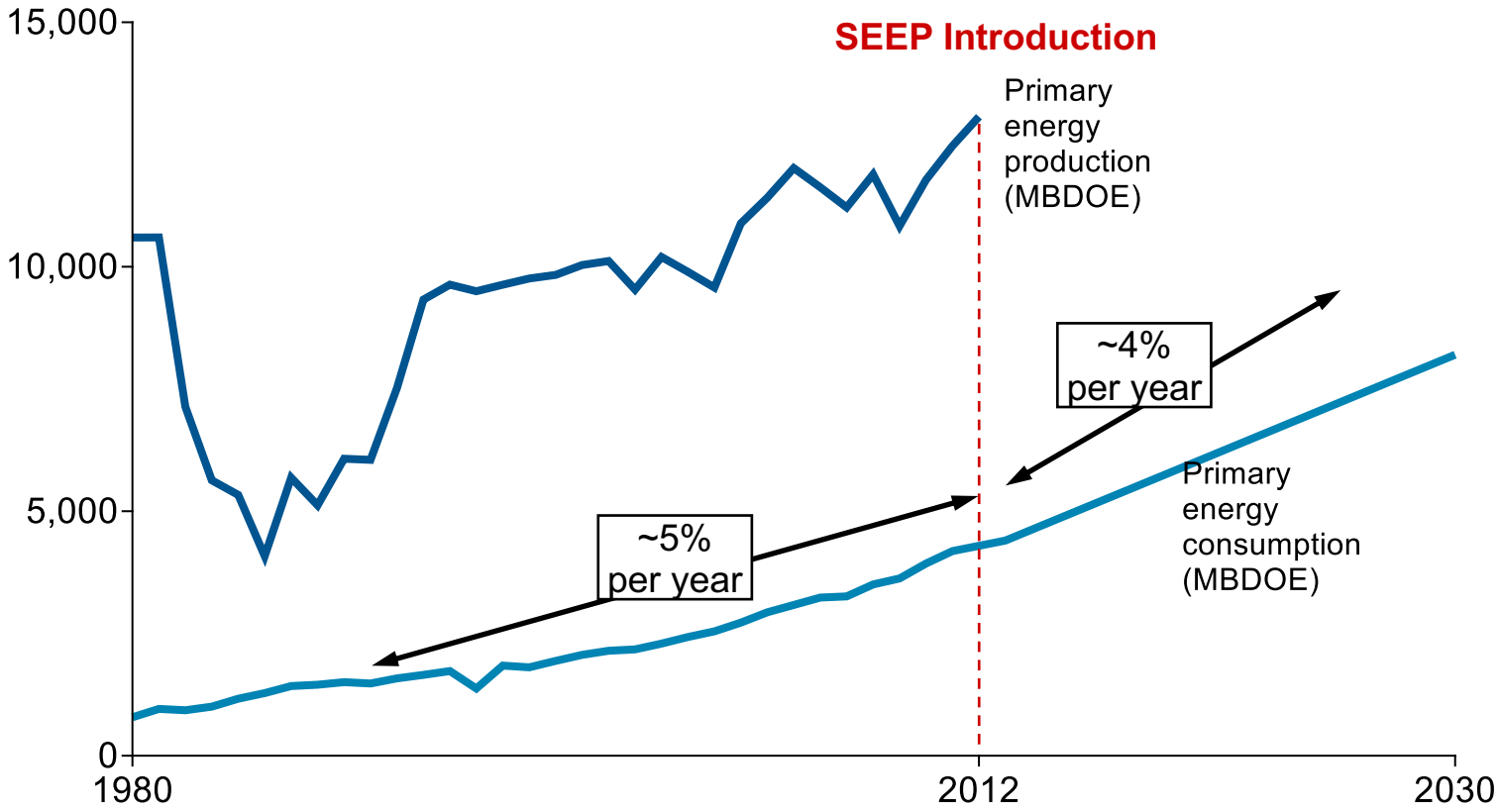
SEEP overview

Transportation sector

SEEP got introduced in 2012 to help lower the growth of primary energy consumption in Saudi Arabia from 5% to 4%

Saudi Arabia's Energy Consumption and Production

Kingdom's primary energy consumption and production
(Thousand Barrel of Oil Equivalent per day)



Note: (1) million barrel of oil equivalent
Source: SEEP, Team Analysis

Explanation

- The Kingdom has experienced an **unprecedented energy consumption growth** due to:
  - Economic development
  - Population growth
  - Industrialization
- At current pace / business-as-usual, the energy consumption could reach **up to 8 MMBDoE[1] in 2030**
- Active **demand-side management** is key for the Kingdom's **sustainable future**

The Saudi Energy Efficiency Program has been on a journey since 2012

2010

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Established through Council of Ministers

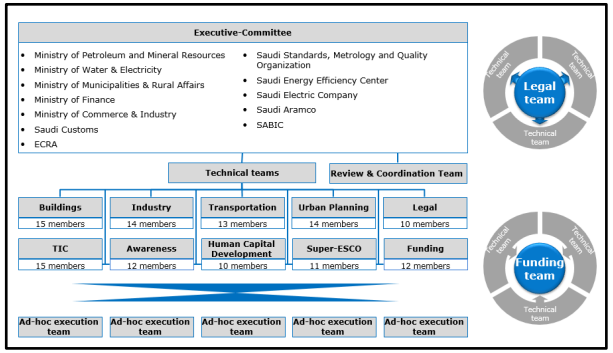
2012

SEEP

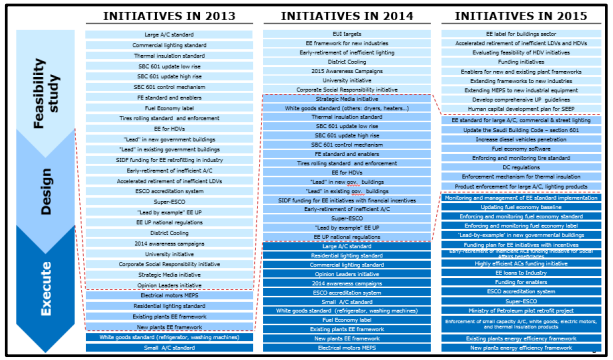
Inter-agency effort to launch the **Saudi Energy Efficiency Program (SEEP)**, with guiding principles, a clear strategy and strong governance

2013 – 2018

- Full-fledged program with **12 teams**



- **~80 initiatives** at different stages (feasibility, design, execution)



Now

- **New mandate** for SEEP has been approved in 2018

- **Scope of work expands** to cover:
  - **Power generation including T&D**
  - **Water desalination**
  - **Feedstock in industry**

SEEP mobilized 150+ professionals from 30+ governmental entities and state owned enterprises

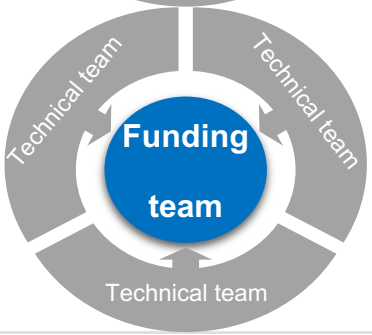
Executive-Committee

- Ministry of Energy, Industry and Minerals
- Ministry of Environment, Water and Agriculture
- Ministry of Municipalities & Rural Affairs
- Ministry of Finance
- Ministry of Commerce & Investment
- Saudi Customs
- Saudi Aramco
- Electricity Generation and Co-Generation Regulatory Authority (ECRA)
- Saudi Standards, Metrology and Quality Organization
- Saudi Energy Efficiency Center
- Saudi Electric Company
- SABIC

Technical teams

Review & Coordination Team

Buildings	**Industry**	**Transportation**	**Urban Planning**	**Legal**
TIC	**Awareness**	**Human Capital Development**	**Funding and ESCO**	**Utilities**
Ad-hoc execution team	**Ad-hoc execution team**	**Ad-hoc execution team**	**Ad-hoc execution team**	**Ad-hoc execution team**



SEEP has so far focused on three sectors, representing 90+% of the energy consumption in the Kingdom

INDUSTRY

- ~44% of total energy consumed in KSA
- ~2.1 million barrels of oil equivalent per day

BUILDINGS

- ~29% of total energy consumed in KSA
- ~1.4 million barrels of oil equivalent per day

TRANSPORTATION

- ~21% of total energy consumed in KSA
- ~1 million barrels of oil equivalent per day

AGENDA

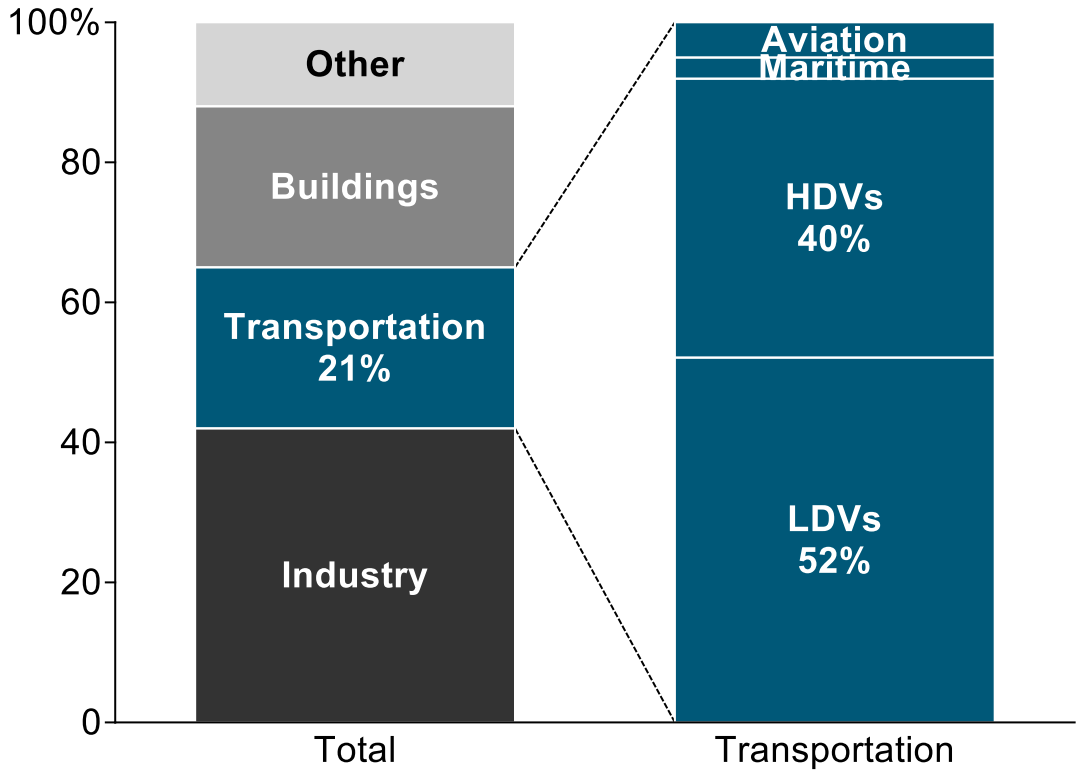
SEEP overview

Transportation sector

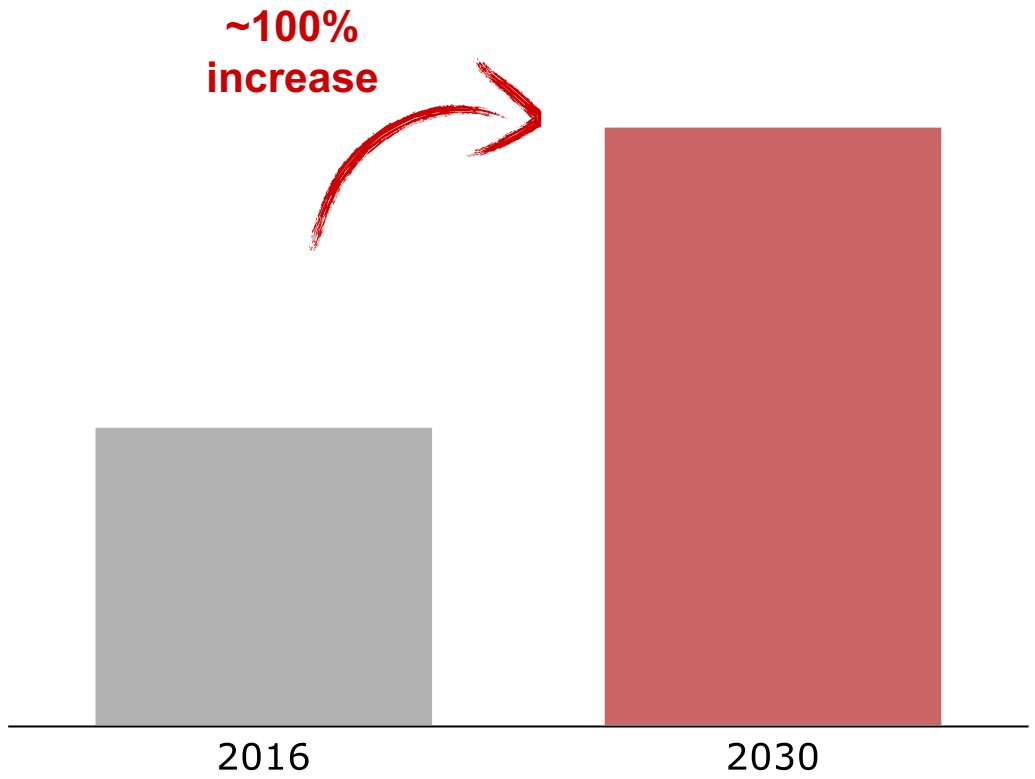
Transportation represents **~21%** of energy consumed and the demand is expected to keep increasing in the future

Transportation accounts for almost a quarter of KSA energy consumption

Primary energy consumption, 2016 breakdown

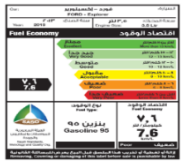
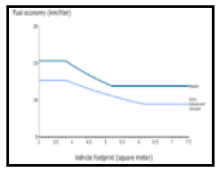


Transportation energy consumption is expected to increase by ~100% until 2030



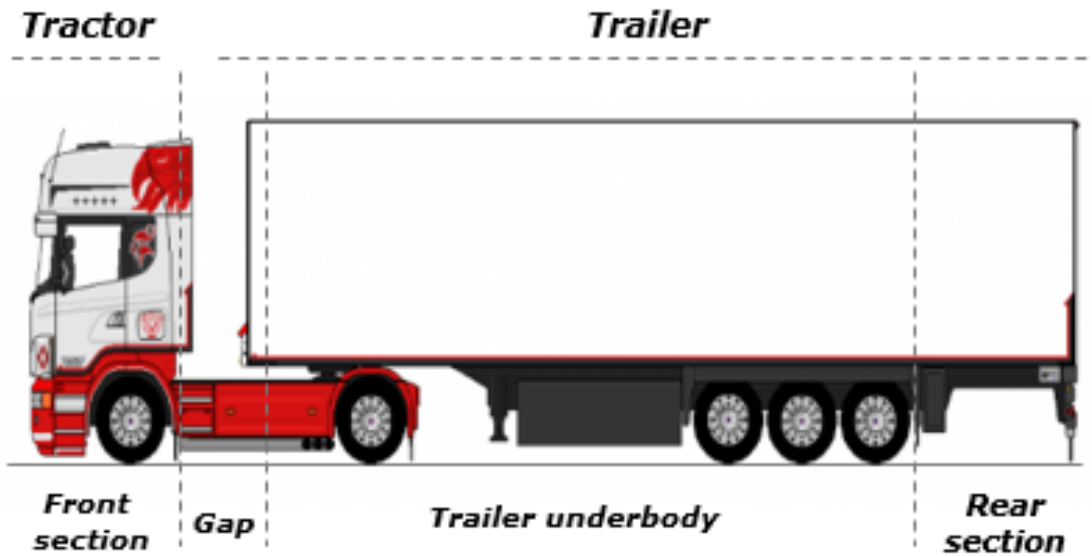
Note: LDV = Light-Duty Vehicles and include sedan cars, SUV, mini-vans, and any other road vehicles that weigh less than 3,500 KGS.
HDV = Heavy-Duty Vehicles and are also called commercial vehicles i.e. trucks, buses, and other road vehicles that weigh more than 3,500 KGS.
Source: Team Analysis

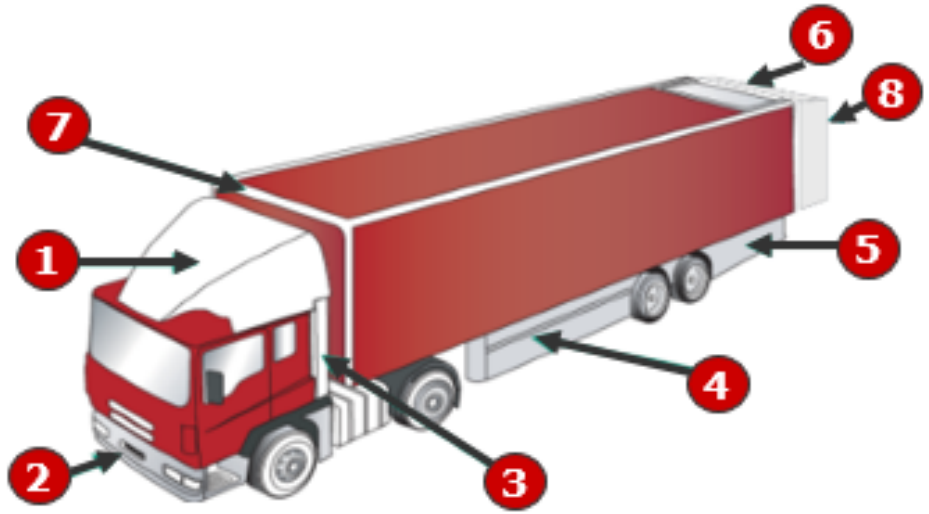
Multiple initiatives were developed to improve the energy efficiency of LDVs and HDVs in the Kingdom

Initiative		Objective	Progress
HDVs FE improvements		• Improving fuel economy of all HDVs through enforcing anti-idling and aerodynamics regulations	• Under assessment
Tires Rolling Resistance & Wet Grip		• Improving Energy Efficiency of LDVs and HDVs	• Issued in April 2014 • Enforced as of Nov 2015
FE Label		• Raising consumer awareness about fuel economy	• Issued in Dec 2013 • Enforced as of Aug 2014
LDVs FE Standard		• Improving fuel economy of all incoming LDVs Focus of next slides	• Issued in Nov 2014 • Enforced as of Jan 2016
Accelerated Retirement of vehicles		• Removing inefficient LDVs/HDVs	• Under assessment

Aerodynamic devices initiative for heavy duty vehicles

HDVS





- There are **4 main aerodynamic drag areas** that cause the most air resistance around the vehicle.
- The aerodynamic drag is split almost equally **(25% tractor side and 75% trailer side)** between these four regions.
- Saudi Arabia can achieve **5-9%** in fuel savings through aerodynamic improvements
- The aerodynamic regulation expected to be **issued in 2019 and implemented in 2021**

Tire rolling resistance is an important contributor to energy consumption in vehicles

TRR & WG

Requirements of Rolling Resistance and Wet Grip

- Saudi Arabia has issued targets that conform with international benchmarks
- The Tire Rolling Resistance standard is expected to **reduce fuel consumption by 2-4% for LDVs and 6-8% for HDVs**

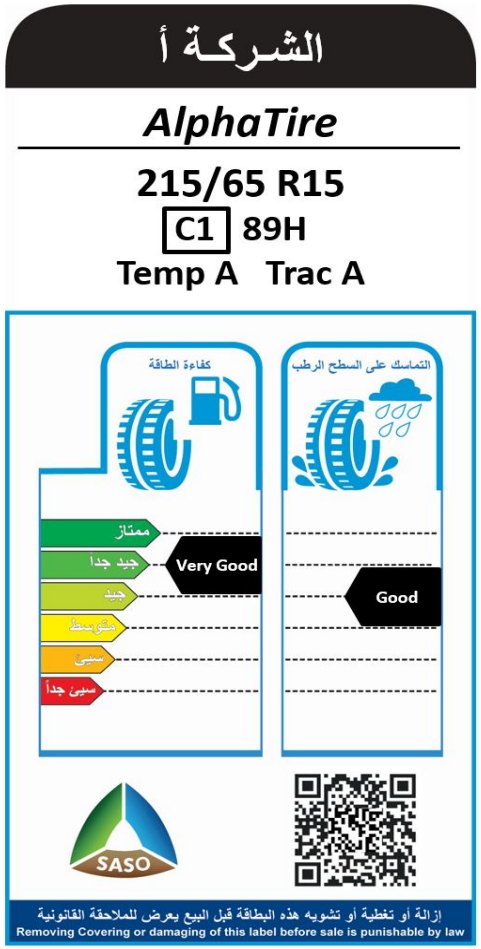
Maximum Rolling Resistance (N/Kn)

Implement ation date	Phase I (2014-2018)	Phase II (2018-2022)
C1	12.0	10.5
C2	10.5	9.0
C3	8.0	6.5

Minimum Wet Grip (G Value)

Implementation date	(2014-2022)
C1	1.10
C2	0.95
C3	0.8

Example of TRR and WG label

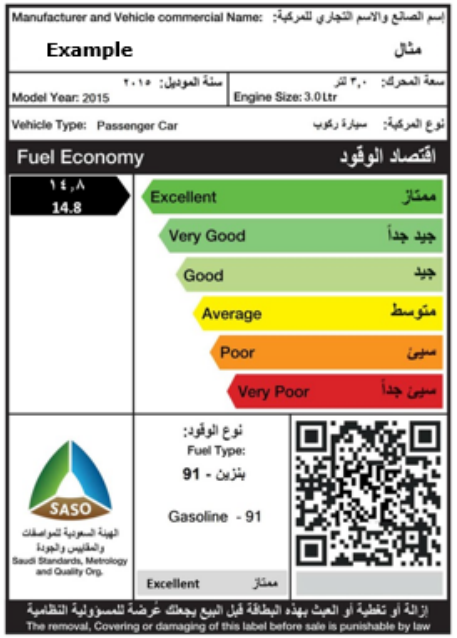


Note:
Source: SASO 2857

The Fuel Economy label is frequently updated to reflect growing market needs

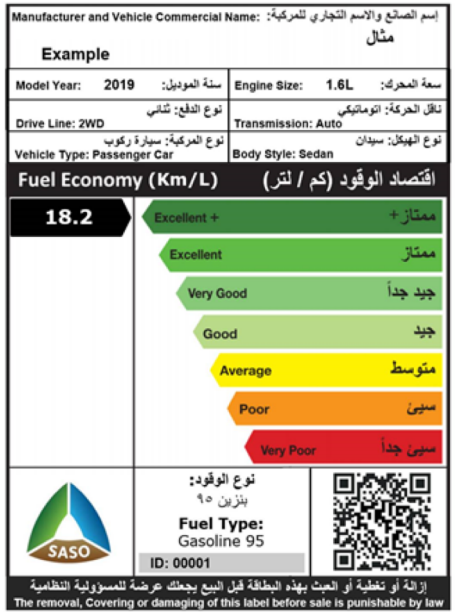
FE LABEL

2014



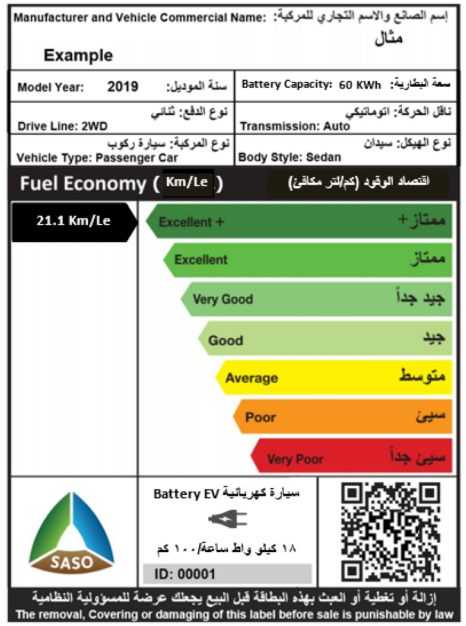
- The **first Fuel Economy label** was introduced in 2014 and has helped consumers to **visually identify the efficiency of their vehicles** relative to peers.

2017



- The fuel Economy label was updated to include an **“Excellent +” category** of vehicles
- This came as a result of a dramatic increase in models registered under the “Excellent” bracket over time

2018



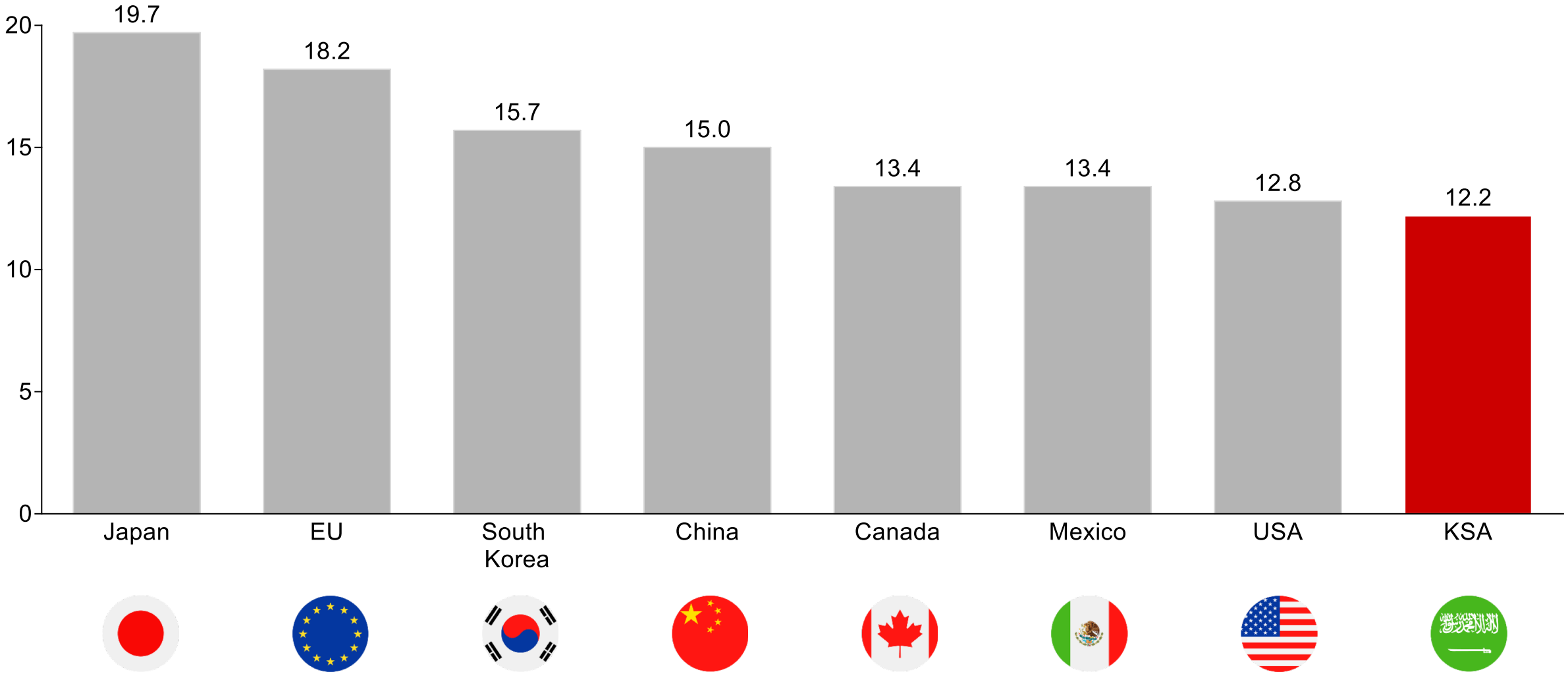
- The fuel Economy is updated to include **Battery Electric Vehicles and Plug-in Hybrid Electric Vehicles**
- This will help the introduction of Evs in the country

Note:
Source: SASO 2487

Average fuel economy of incoming LDVs fleet registered in the Kingdom in **2012** was **~12.2 km/liter**, significantly lower than international benchmarks

FE STANDARD

New incoming LDVs fuel economy, 2012 (Km /liter)

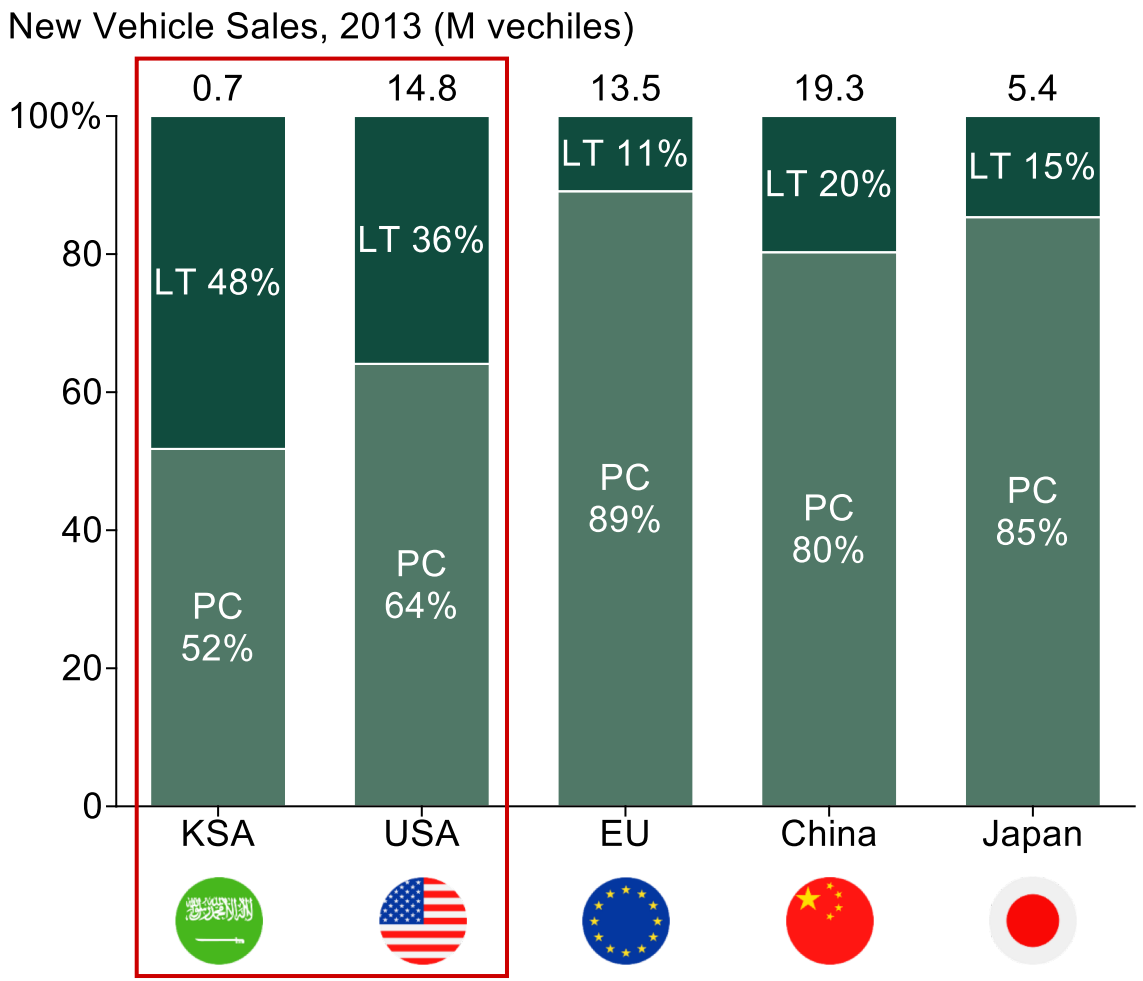


Source: The International Council for Clean Transportation (ICCT)

80+ global manufacturers have signed the agreement for this standard and are committed to starting the implementation in January 2016

FE STANDARD

LDVs new sales split in select geographies



CAFÉ adoption

- **After a series of market comparisons** around the world, **USA's CAFE** was the most suitable for KSA's needs
- In August **2012**, SEEP started to **develop fuel economy standard**
- **Agreements** were signed on November **2014** between the **KSA** and 80+ global **automotive** manufacturers, **representing more than 99%** of the KSA market
- **Fuel economy performance requirements were** set for all incoming LDVs starting **January 2016**
- **Fuel economy standard** was updated on **July 2018 to include electrical vehicle calculation**

The fuel economy standard for incoming LDVs covers both new vehicles and used imports

FE STANDARD

Incoming light-duty vehicles

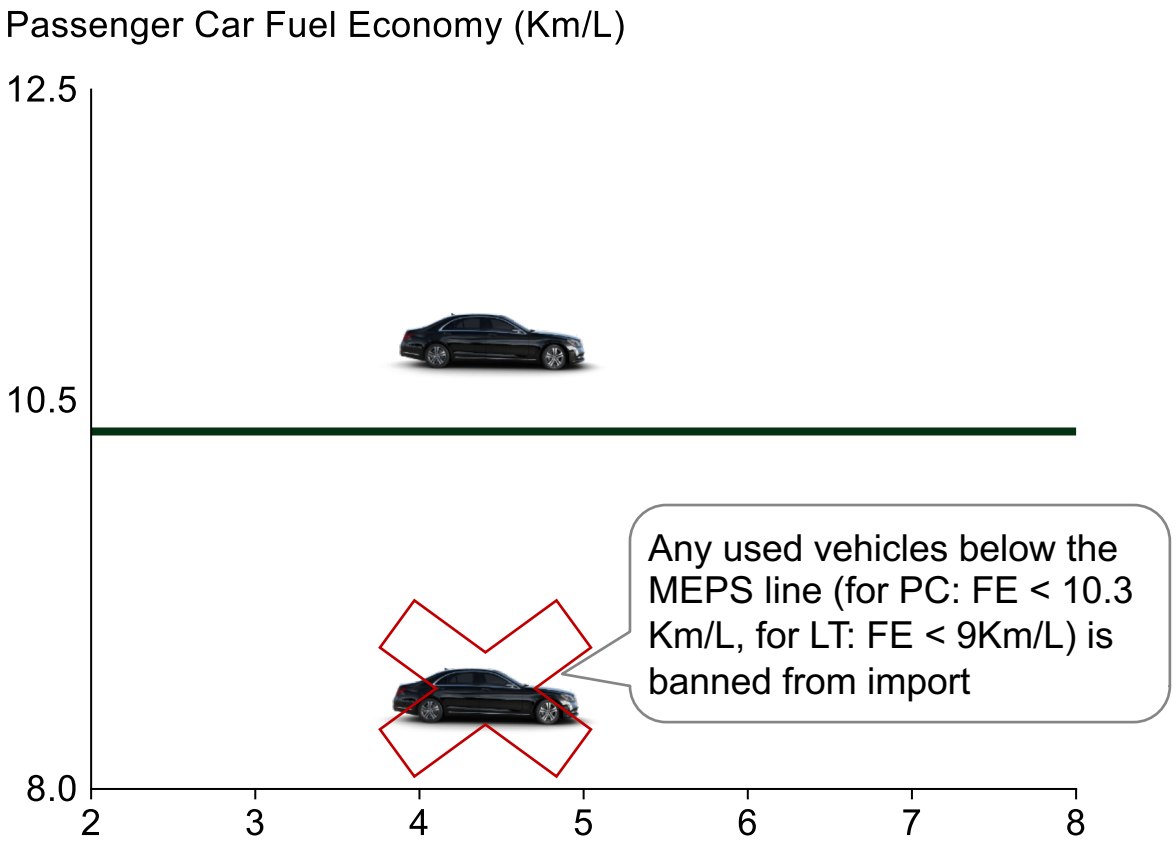
Timeline	**Phase I:** Jan 1st 2016 - Dec 31st 2020	
LDVs involved	**New imports**	**Used imports**
Fuel Efficiency Standard	Corporate Average Fuel Economy (CAFE)	Minimum Energy Performance Standards (MEPS)
Attribute	Based on **footprint** (separately for PC and LT)	**Independent** of any attribute (separately for PC and LT)
Fuel Efficiency Standard Enforcement	Automotive Manufacturer	Importer
Importing Channels Concerned	Professional traders; Individual imports; Dealers/ Distributors	Individual imports; Traders

Similarly, the standard will also be applied on used imports where other fuel economy targets have to be met

FE STANDARD | USED IMPORTS

/ILLUSTRATIVE

MEPS[1] illustration



Explanation

- The fuel economy standard for incoming used import is based on the minimum energy performance concept
  - A minimum allowed fuel economy is defined in advance
  - If the actual fuel economy of the vehicle is strictly less than the minimum allowed fuel economy, the vehicle will be banned from entering the Kingdom of Saudi Arabia

Model	E. size (liter)	Footprint (sqm)	Actual FE (km/liter)	Target FE (km/liter)	Decision
Sedan A	4.0	4.3	8.5	10.3	**Ban**
Sedan B	1.8	4.3	11.0	10.3	**Allow**

Note: MEPS:
Source:

Each manufacturer will have to achieve a target corporate average for its incoming new vehicles based on its fleet footprint

FE STANDARD | NEW IMPORTS

/ILLUSTRATIVE

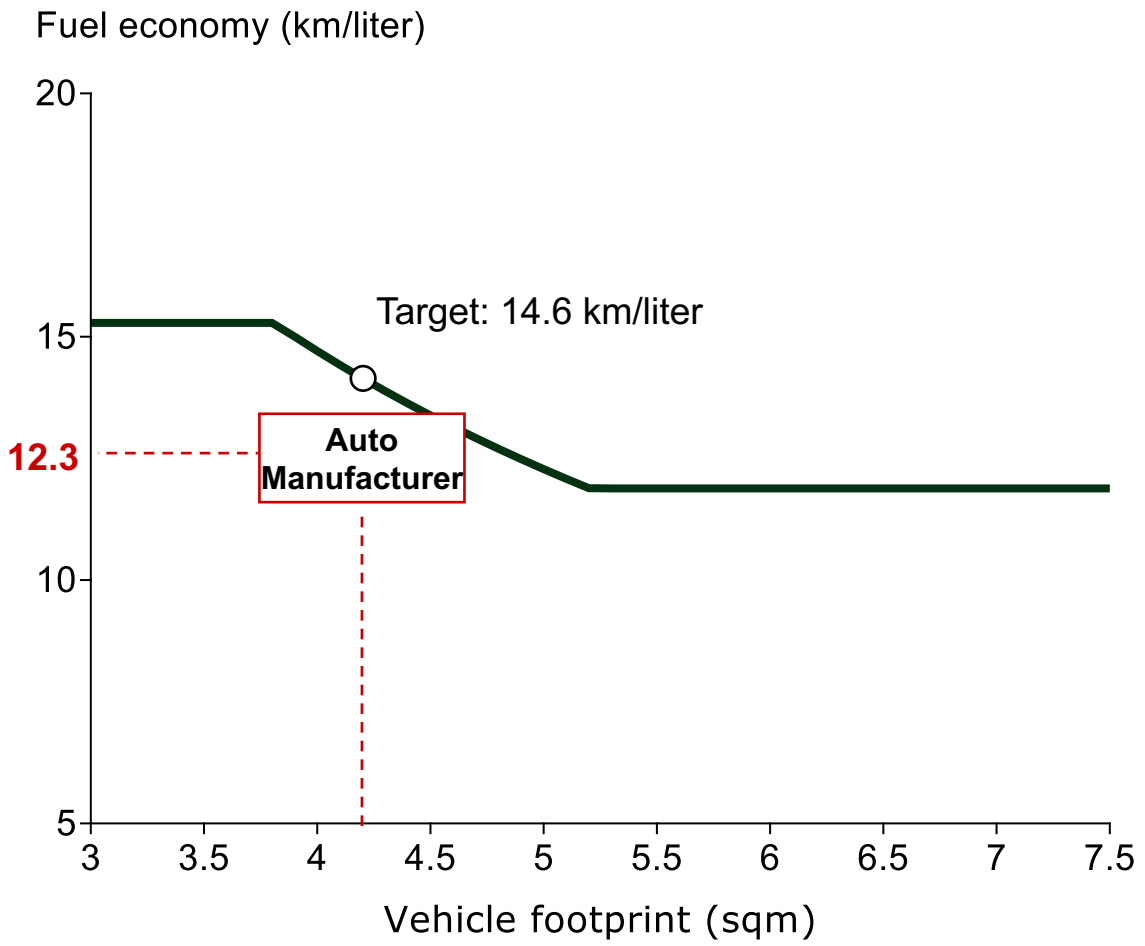
CAFÉ example

Model	E. size (liter)	Footprint (sqm)	Actual FE (km/liter)	Target FE (km/liter)	Sales
Sedan A	1.8	3.2	12	15.3	20,000
Sedan B	1.6	3.2	15	15.3	10,000
Sedan C	2.7	4.2	11	14	20,000
Sedan D	2.0	4.2	14	14	10,000

SALES weighted Metrics

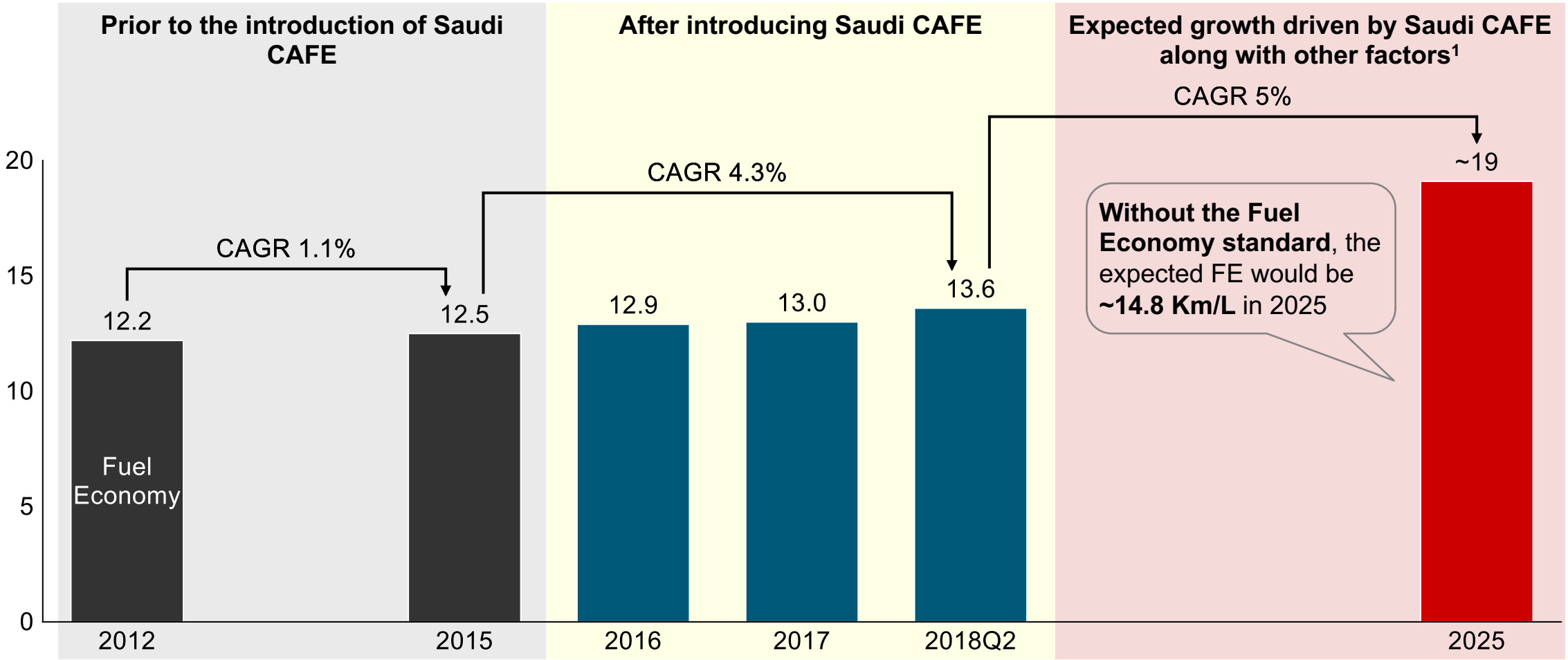
Sales-weighted target FE (km/liter)	14.6
Sales-weighted actual FE (km/liter)	12.3

Visualization



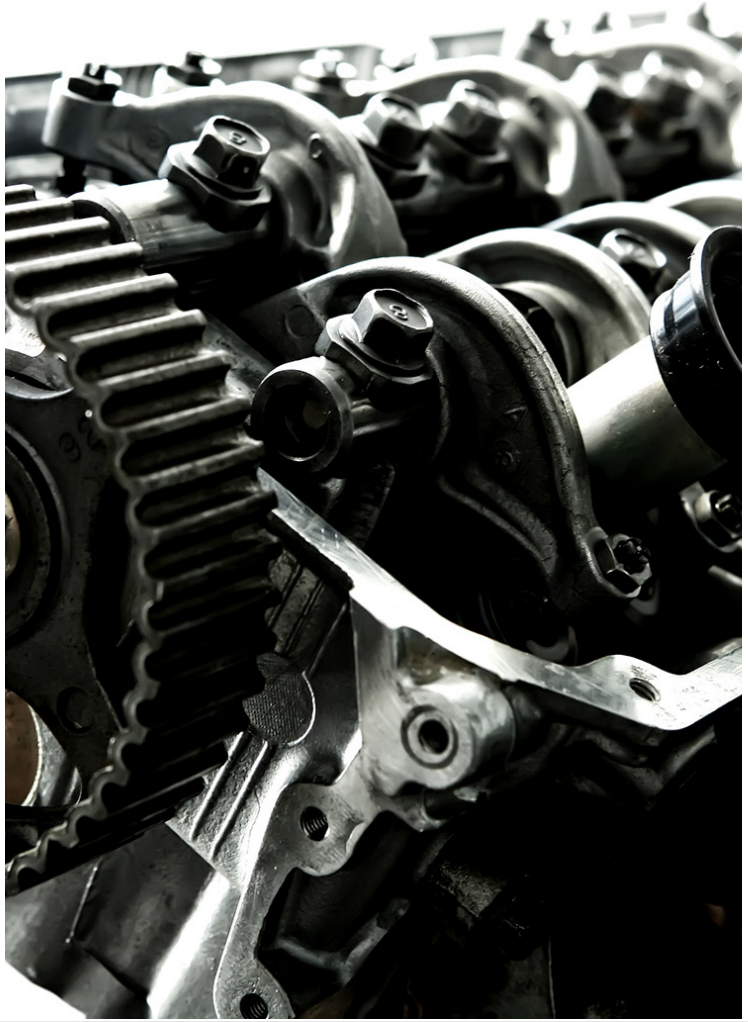
The standard is expected to yield significant improvements in terms of fuel economy

FE STANDARD | NEW IMPORTS



Note: (1) Other factors include the expected introduction of dieselization in 2021, the introduction of women driving in 2018, fuel price reform until 2021
Source: SEEP internal data

Summary



- Saudi Arabia's **energy consumption** was growing at a high rate **~5% a year**
- SEEP aims to **lower the growth rate to ~4% a year**
- Saudi Arabia can achieve **5-9% in fuel savings** through aerodynamic improvements
- The Tire Rolling Resistance standard is expected to **reduce fuel consumption by 2-4% for LDVs and 6-8% for HDVs**
- Actual fuel economy of **new Light Duty Vehicle imports has improved by 4.3% until 2018Q2**
- The standard is expected to yield significant **improvements in fuel economy 5% by 2025**
- **Without the Fuel Economy standard**, the expected FE would be **~14.8 Km/L in 2025**

كفاءة

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