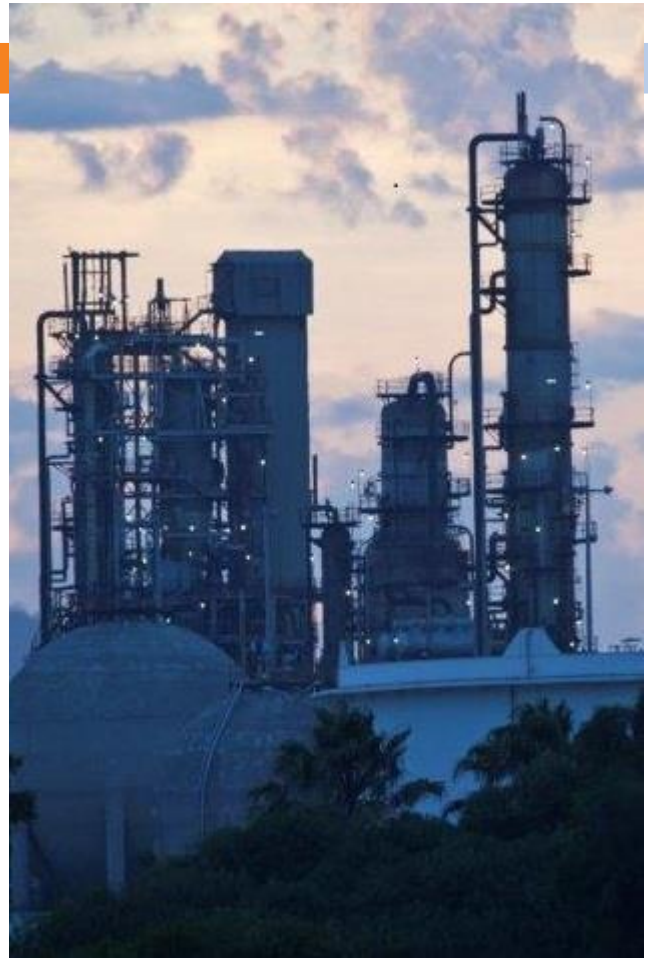


# The future of (liquid) fuel

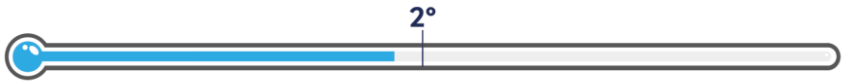
## June 2019

sapia | South African Petroleum Industry Association

# The Societal Challenge

| Current | | Future |
|---|---|---|
| 570 Exajoules | Energy Demand | 1000 Exajoules |
| 6.2 billion people (1.2 billion no access) | Population | 10 billion people (all with access) |
| 32 Gt $CO_{2e}$ | $CO_{2e}$ Emissions | Net Zero |

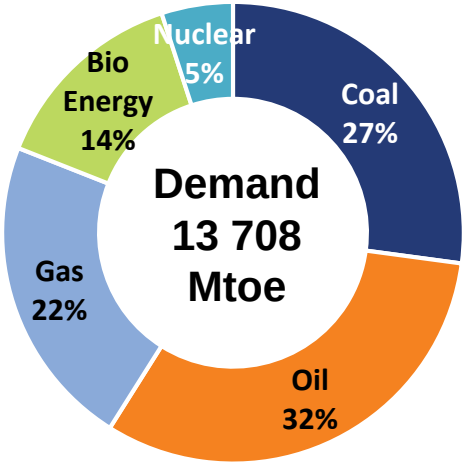
Increasing global temperatures

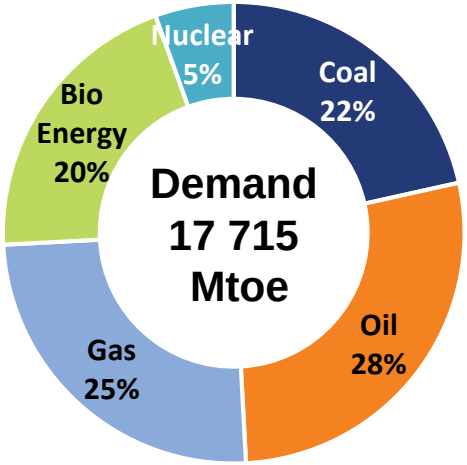



Keep temperature to well below 2 C pre-industrial levels

Source : IPIECA ; Shell Energy Transition Report

# A long term reliance on fossil fuels

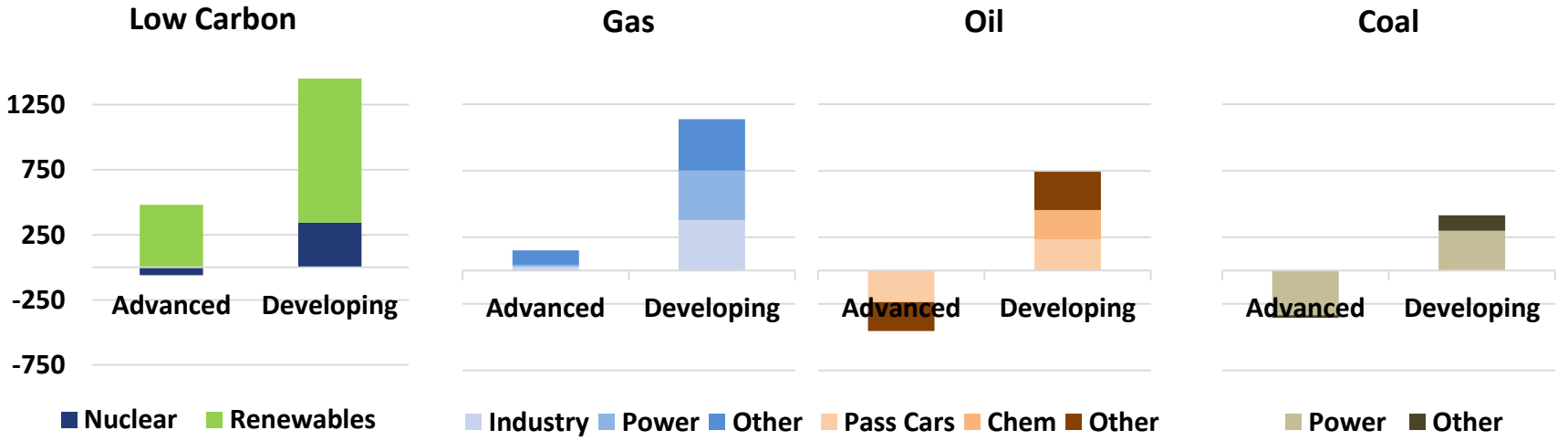



**South Africa (2040)**

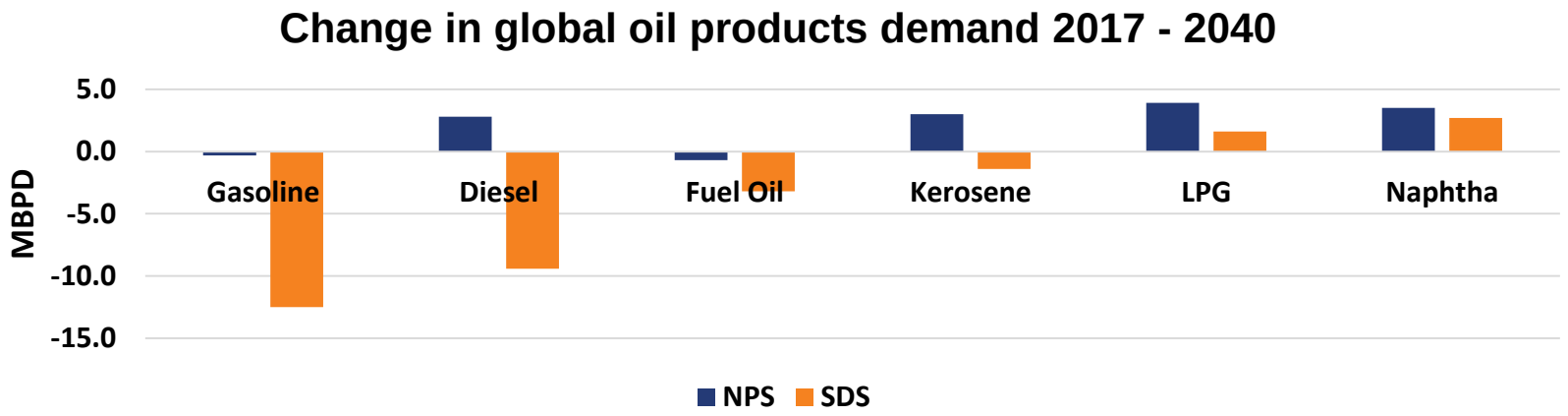
| | |
|---|---|
| Coal | 47% |
| Oil | 21% |
| Gas | 5% |
| Other | 27% |

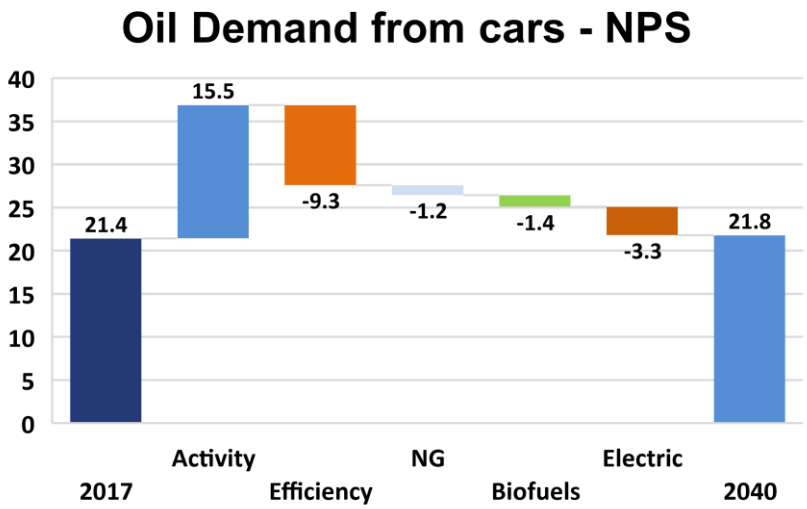
**Change in Primary Energy Demand – 2017 -2014 - NPS**




Source : IEA World Energy Outlook 2018

# But with a shift in type of demand



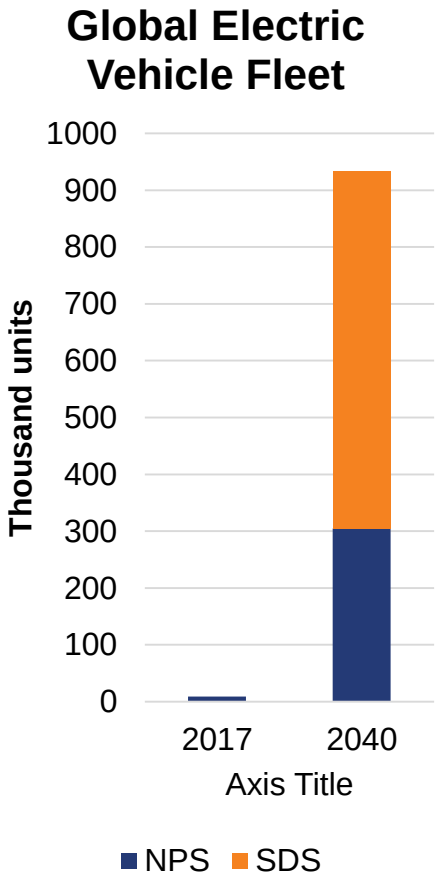




- Two scenarios (amongst others) in their 2018 scenarios for GHG emissions in 2040;
  - Current emissions (2017) - ~32.5 Gt
  - Current policies – ~42 Gt
  - New Policies – ~ 36 Gt
  - Sustainable Development – ~17.5 Gt
- New Policies oil demand for cars remains static
  - Large increases in use offset due to efficiencies
  - Impact of electric and biofuels is relatively small
- Sustainable development the impact is expected to be large – but this scenario relies on CCUS

Source : IEA World Energy Outlook 2018

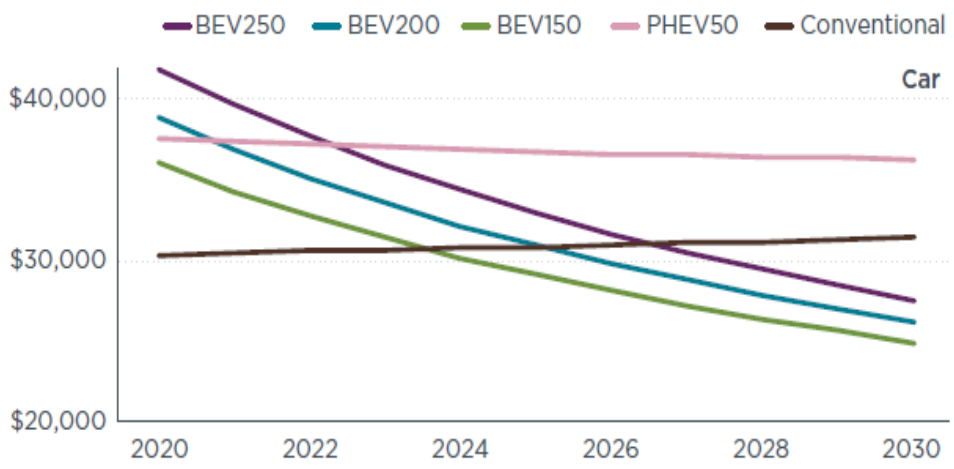
# EV role in these scenarios

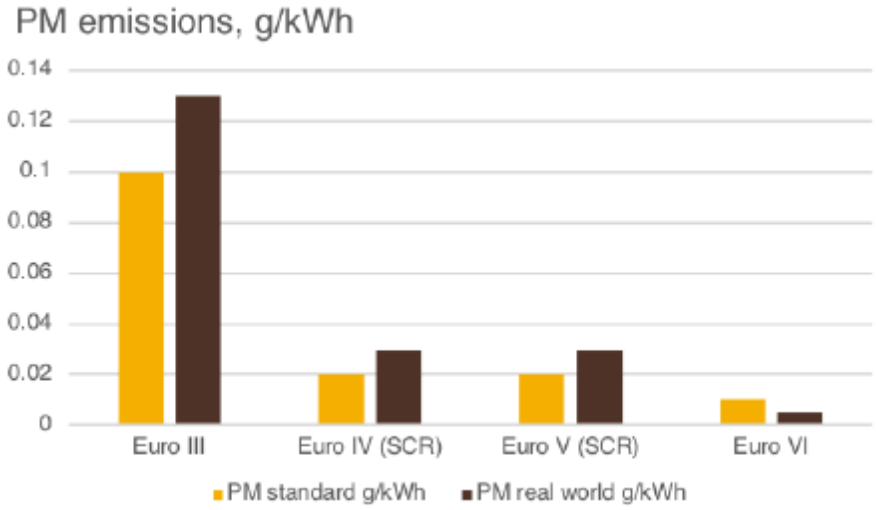
- Current total world car population estimated 1.2 billion units
  - South African vehicle population ~12 million (January 2017)
    - 95% are passenger cars or light commercial vehicles
    - Annual sales of passenger cars ~ 370 000, 99% of which are ICE
- Increasing concern about GHGs and local pollution suggests heightened interest in EVs
  - SDS scenario suggests world wide fleet a little under a billion vehicles EVs
  - South Africa expected uptake slow
- Worldwide 2017 new registrations (estimate): BEV – 1.9 million and PHEV – 1.2 million




Source : IEA World Energy Outlook 2018; SAPIA; NAAMSA

# An altruistic demand ?




- EV demand presently not driven by cost but primarily environmental concerns – local pollution and GHG emissions
- Euro 0 and Euro I vehicles the main contributors to vehicular PM and NOx emissions
  - In South Africa these vehicles comprise about 26% of the parc
- Older vehicles fitted with outdated and inefficient powertrain technologies has a negative impact on both emissions and consumption
- Fuel quality critical to achieve acceptable environmental performance of ICE

Source : ICCT; SAPIA;

# The Cleaner Fuels Program

- A long term program aimed at the manufacturing and supply of cleaner fuels suitable for modern technology ICE vehicles
  - Reduce the impact of noxious emissions and improve consumption
- Clean Fuels 2 is the provision of ultra low sulphur petrol and diesel to provide an enabling fuel meeting Euro V emission specifications
- SAPIA supports the implementation of a cleaner fuels regime
  - Reduction in noxious tail pipe emissions and improve quality of life through reduction of non-communicable chronic diseases
  - Implementation in the context of sustaining the industry - providing a reasonable fiscal framework and timeline for investments
- Supported by DEA - draft strategy on cleaner fuels focuses on key interventions; fuel quality, emission standards, expanding public transport system and the use of CNG in buses and taxis.
  - Estimated benefit ~ R200 bn

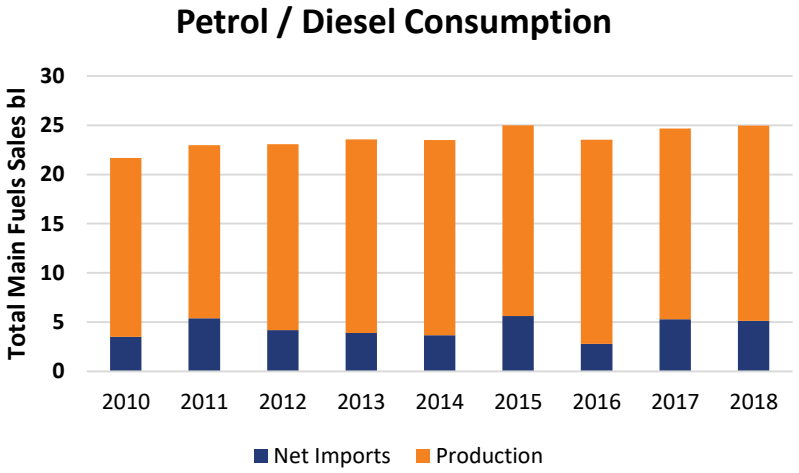
DEA Draft Integrated Strategy for the control of motor vehicle emissions 2013

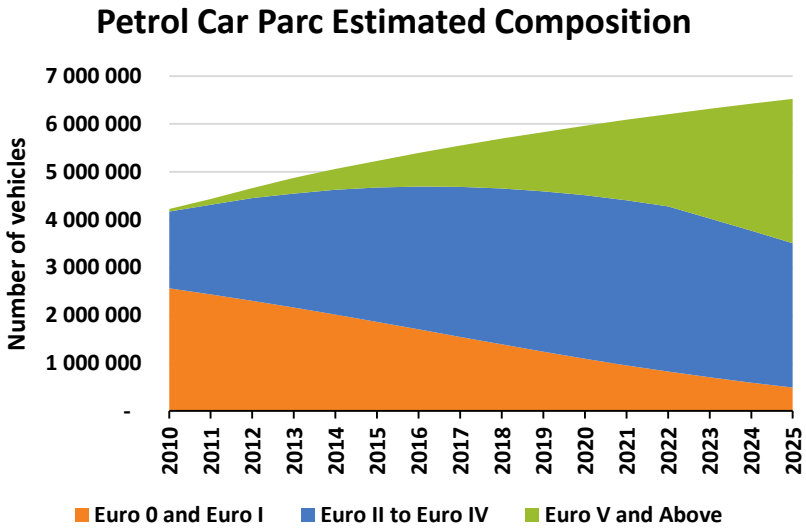
# Cleaner Fuels Program - hurdles

- Refining industry will find it difficult to respond to cleaner fuels challenge without assistance from government (estimated investment ~$3.9bn but non-return bearing)
- But the story is not only about cleaner fuels but also manufacturing, job sustainability, foreign exchange exposure, the provision of speciality products …..
  - The liquid fuels industry contributes 8.5% to GDP with the refining sector contributing 65% of this impact
  - Provides around 490 000 jobs - direct/indirect/induced
  - Is an anchor tenant for the specialised engineering & construction industry and supports further downstream manufacturing chemicals, plastics, bitumen

# Main Fuels demand - overview

- Mature market - flat to declining sales
- Net importer ~ 5 bn l/a
  - Actual imports ~ 8.3 bn l/a (140 kbpd)
- Product quality;
  - Diesel > 80% sales 50 ppm S
  - Petrol > 80 % 95 RON
- Local refineries competitive within its regional peer group (Africa & Europe) on EBITDA basis
- Market shifting to cleaner fuels driven by technology requirements
  - 2025 est ~50% of cars Euro V+ vehicles
- Significant investments required to upgrade refineries to meet Clean Fuels 2 specifications



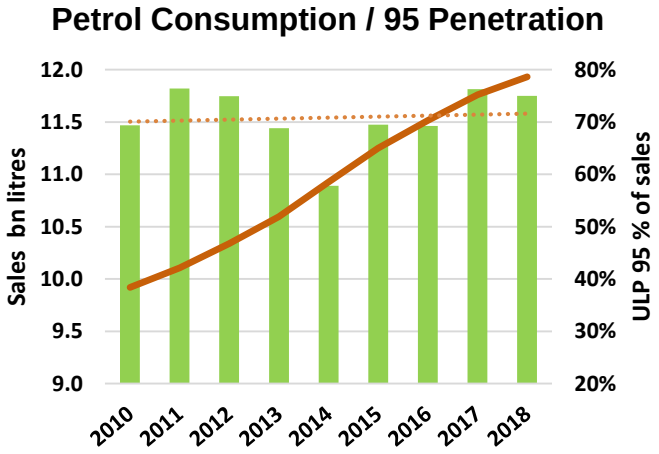




Sources: Department of Energy (sales and import data); SAPIA; Wood Mackenzie

# Where we sit now

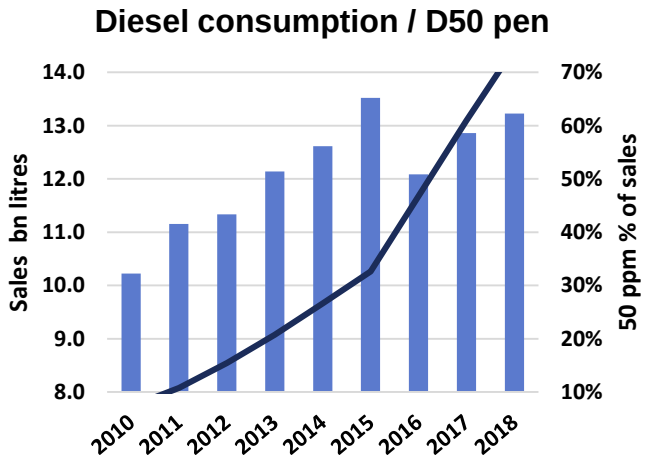
## Gasoline market

- Petrol consumption flat – net imports generally < 5% of market
- Traditionally a two tier market – low octane inland (93) / high octane (95) at the coast
- High octane (95) demand ~ risen from 35% of total gasoline market to now over ~ 75%
- LRP penetration now <3%

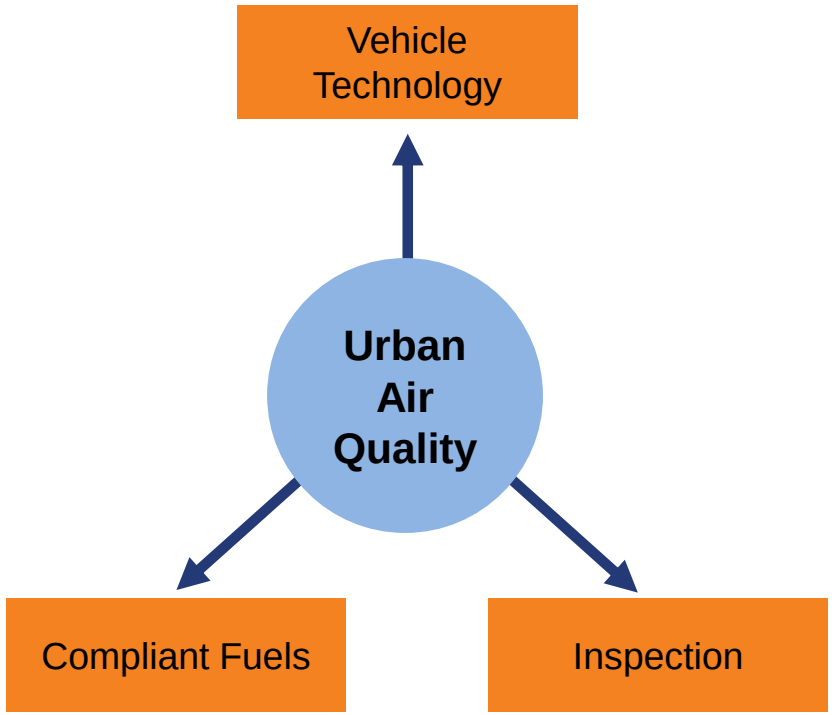



## Diesel market

- Diesel demand linked to GDP growth – growth continuing with imports ~40% of market demand
- 50 ppm diesel consumption - 2018 average ~ 70% CAGR ~35% since 2010
- Refiners responding to 50ppm market by switching to manufacture this product
- 10 ppm production may present a severe challenge (hydrogen, plant capacity)



# Compliance is important




Components of the three legged stool

- The objective of improved urban air quality and reduced GHG emissions from road transport is dependent on three aspects;
  - The correct cleaner fuels must be available
  - The appropriate technology must be used in vehicles
  - All vehicles need to be maintained in an as designed condition
- All are interrelated and the failure of one leg does not support the ultimate objective

# SA Green Transport Strategy

- The green transport strategy provides the following wrt liquid fuels;
  - Reduce their use
    - Promote biogas and use of CNG, LNG
      - Primarily for use in captive fleets
    - EVs using solar power
      - Penetration minimal but could grow if incentives provided
      - IEP 2016 ~10bl incremental liquid fuels needs ~ 5 GW electricity
  - Produce cleaner fossil fuels (Clean Fuels 2 program)
    - Paradoxically will produce more GHGs
    - Facilitates advanced vehicle technology – Euro VI, hybrids etc.

*Future transport energy will likely be a mix – petroleum based fuels, biofuels and electricity but given the reliance on petroleum, oil will likely be the dominant carrier and EVs probably less <20%*

World Energy Council – Scenarios of 2016 suggests a maximum of 32% EV penetration world wide in 2060
10 bl incremental liquid fuel required which equates to 72 PJ using 20% ICE efficiency and then 120 PJ at 60% for electricity

# Summary

- Demand for cleaner fuels growing in the country
  - Needs to be supported by investment program at manufacturing facilities to produce these fuels
  - Pre-requisite for the introduction of better vehicle technology
  - Industry requires support for investment
- In the future
  - Oil still forms the key energy carrier for transport
  - Will be a mix of other carriers – bioproducts and gas
  - EVs are not expected to make it big up to 2050 - dependent on government action

# End

Thank you
Dankie
Ngiyathokoza
Ke a leboha
Ke a leboga
Ke a leboga
Siyabonga
Inkomu
Ndo livhuwa
Enkosi
Ngiyabonga