
Taking Biofuels into Petrol and Diesel

– A refiner's perspective

IA Baxter

Engen Petroleum Limited



Engen...

- Owned by Mobil until 1993
- Has the largest market share
- Operates South Africa's first crude oil refinery
- Is South Africa's largest crude oil refiner
- Is world's largest retailer of CTL fuels
- Is Sasol's largest fuel customer



Today's topics

- **Role of biofuels**
- **Petrol**
 - **Composition**
 - **Specifications and challenges**
 - **Splash blending**
 - **Uptake as ethers**
 - **Effect on imports**
- **Diesel**
 - **Blending, and other options**
- **Cost and value**

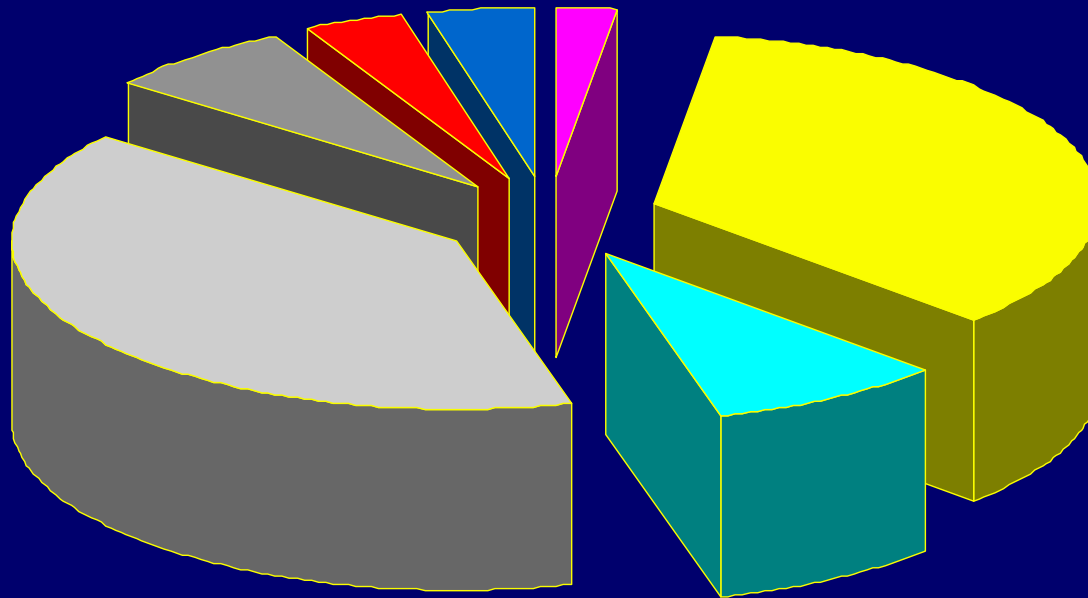


Role of biofuels (worldwide)

- **Predominantly driven as part of an agricultural support programme**
 - Legitimate goal in its own right
- **Increases renewable fuels in the pool**
 - Reduces CO₂ emissions; support Kyoto
- **Increases some emissions, reduces others**
- **Can offset imports, and reduce demand for forex, if managed properly.**



Blending petrol



Petrol is a multicomponent mixture of several refinery streams, blended to meet a specification.

■ Isomerate	■ FCC Naphtha	■ Alkylate	■ Reformate
■ Pentane	■ Low RON	■ HOBS	



Blending challenges

Refinery Blend Stream	Reid Vapour Pressure (RVP)	Octane
Butane, pentane	High	High
Light naphtha	High	Low
FCC Naphtha	Med.	Med.
Reformate	Low	High
Alkylate	High	High
Isomerate	High	High
Ethanol	High	High
Ethers	Low	High



Using ethanol for splash blending

- Creates a RVP problem
 - Displaces butanes and pentanes, which have no alternate markets
 - Lower value than present, so reduces value of ethanol
 - >R100million investment needed at Engen's refinery; others may vary.
- Needs Blendstock for Oxygenate Blending (BOB) from refineries, synfuels
 - Not readily importable at short notice
 - Potential for supply disruption
- Has to be blended at each depot as it is needed
 - Investment at each depot – ethanol tanks, in-line ratio blending, water management, firefighting, ethanol incoming QA; costs depot-specific
 - Needs additional, dedicated nationwide road / rail supply system to get ethanol to every depot
 - Not possible to distribute and stock non-ethanol petrol as well
- Displaced components reduce petrol availability
 - Increases imports
- Already permitted in SANS specification but not cost-effective to use

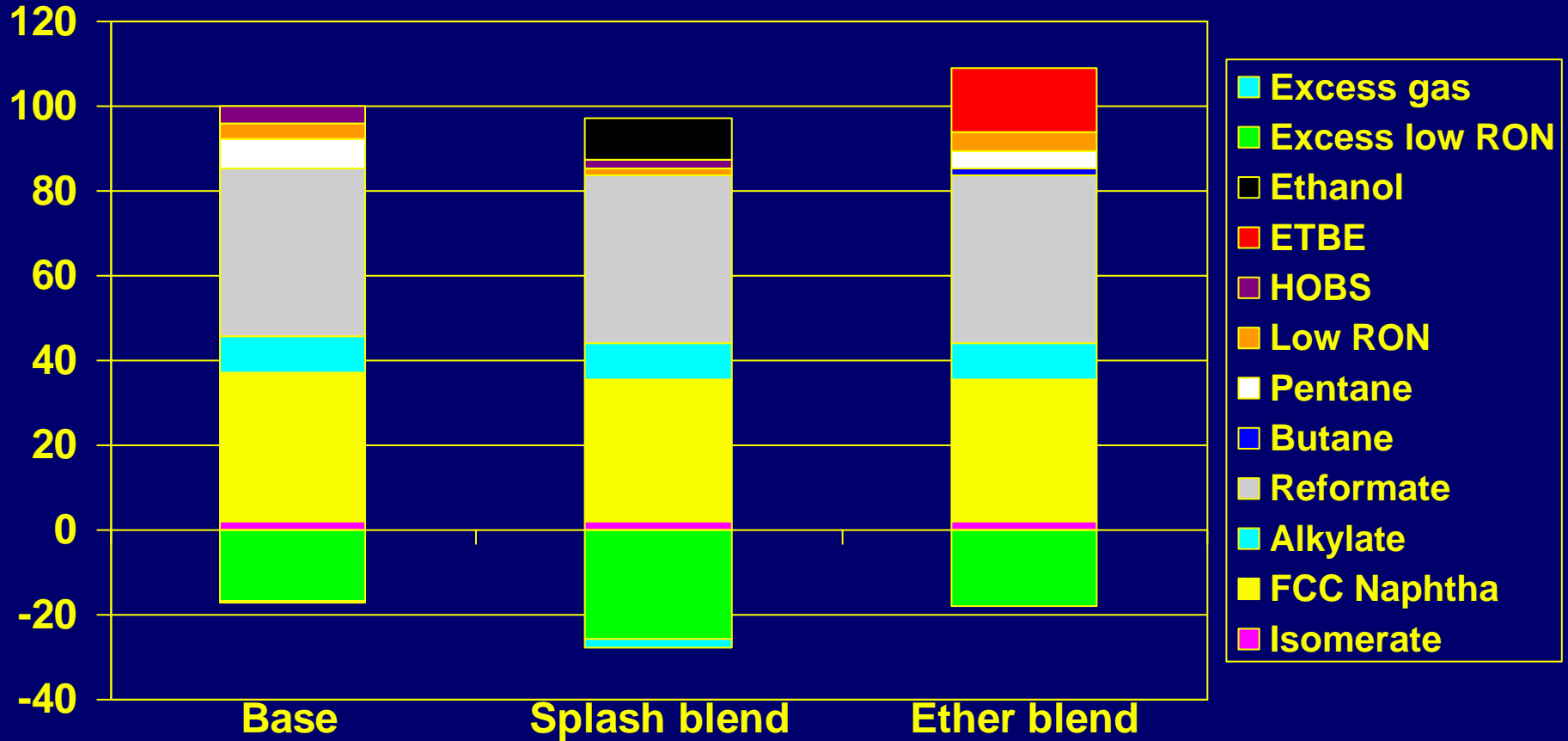


Using ethanol to manufacture ethers

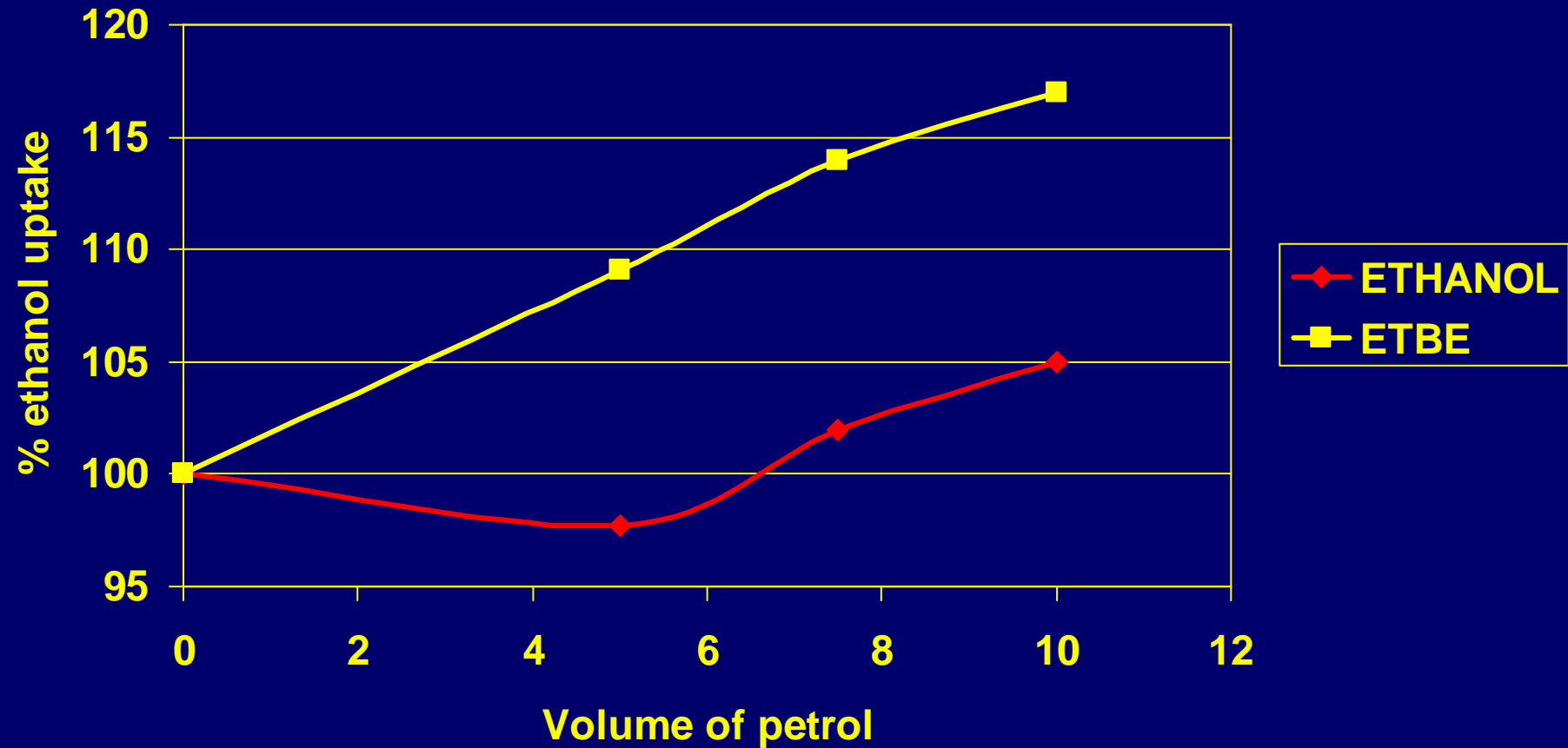
- **Made with olefins at refineries, synfuels plants**
 - Fewer delivery points, all on rail, and road.
 - Easier QA
 - New plants at refinery; R250 million; limited feedstock
 - Methyl ether already used in inland petrol; import an option
- **Finished petrol fully fungible with “normal” petrol**
 - Easy to replace with imports, even at short notice
 - No changes needed at depots or transportation systems
- **Petrol volumes increase**
 - High octane high RVP components not displaced
 - Low octane high RVP components can be kept onshore and not exported
 - Reduces imports



Volume comparison (1)



Volume comparison (2)



Biodiesel

- **Esters of plant oils and animal fats (1st generation)**
 - RSA net importer of oils
 - More expensive than diesel even at today's crude oil prices
- **Already permitted at <5%, but none available**
- **SANS 1935 spec must be met**
 - 26 named qualities; QA expensive for small producers
- **Relatively easy to blend regionally**
 - No need to make BOB equivalent
- **The oils and fats themselves can be processed in new hydroprocessing units to meet diesel specs. (2nd gen.)**
 - No need to buy methanol or ethanol
 - No glycerol disposal problem – surplus supply
 - Resulting diesel is better and more stable; fewer problems



Impact on prices

- Retail price of petrol and wholesale price of diesel is set by government and not the oil companies.
- Biofuel components are already permitted in petrol and diesel
 - not cost-effective blend components at the free-market price needed by any seller
 - Much debate about the blending value of these components to any fuel formulator
 - “alternate value” for components displaced
 - “purchase price” for components that can be bought freely
 - Marginal operating costs of the storage and blending operation
 - Return on any additional investment needed
- Many international examples of financial interventions to close this gap



Thank you

