

# ANALYSIS OF SOUTH AFRICA'S PETROLEUM SECTOR - A PARTIAL INFORUM APPLICATION

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# PREFACE

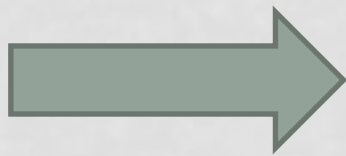
- The National Energy Regulator of South Africa (NERSA) is the regulatory authority established in terms of the National Energy Regulator Act, 2004.
- Plays a key role in the South African economy due to the fact that it regulates the energy sector.
- A priority of NERSA is the development and implementation of a suite of models for economic impact assessment of its regulatory decisions.

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- Price elasticity of the demand for petroleum products
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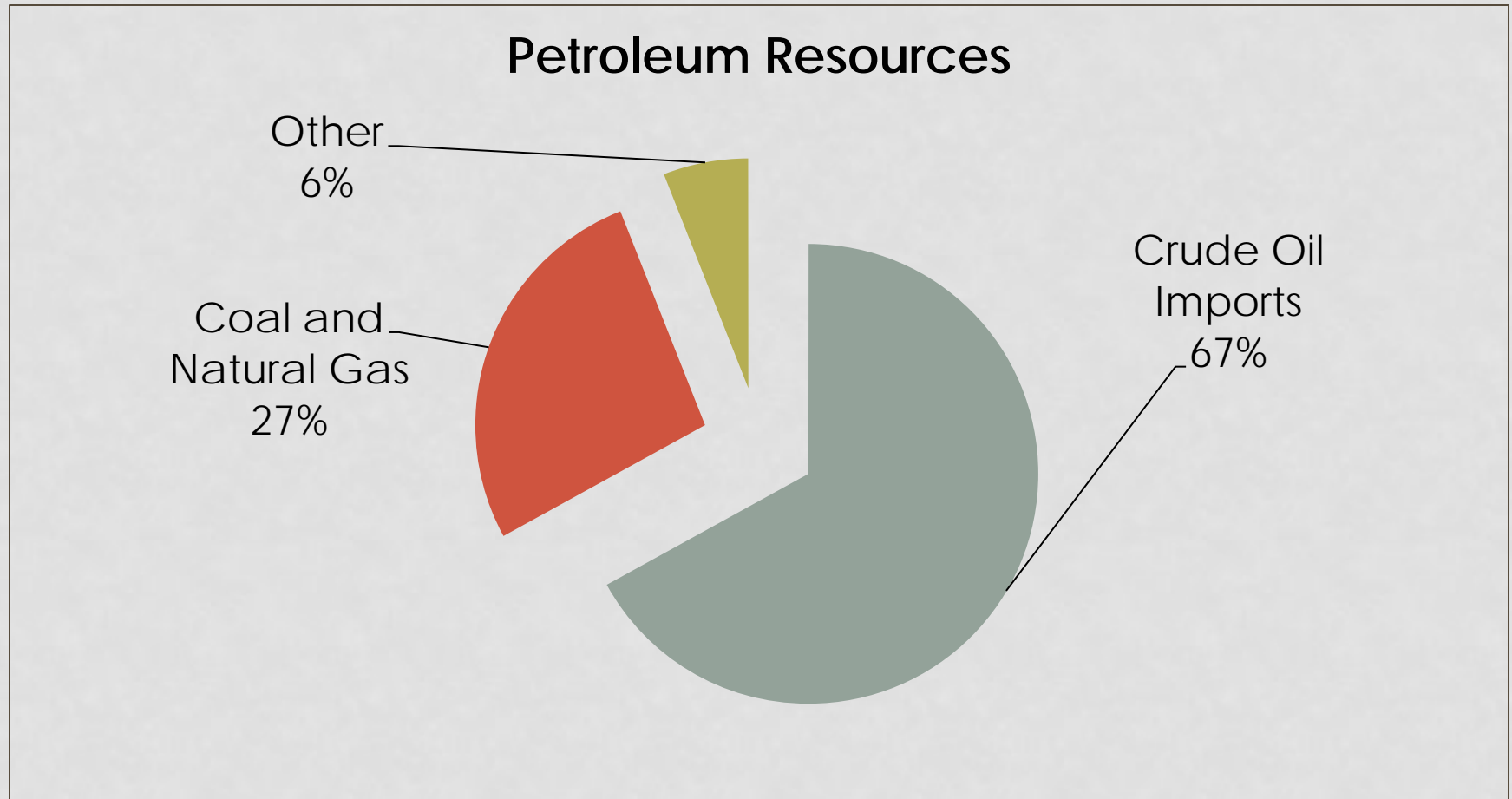
# BACKGROUND TO SOUTH AFRICAN PETROLEUM SECTOR

- Inputs of petroleum products plays an important part in transport and production activities of various other sectors of the economy.
- South Africa does not have its own economically extractable natural crude oil resources



domestic prices for petroleum products are dependant on world price for crude oil.

# RAW MATERIAL SOURCES FOR PETROLEUM PRODUCTS' MANUFACTURING



67% of all petroleum products are crude oil based, the bulk of the remainder is used for coal and natural gas.

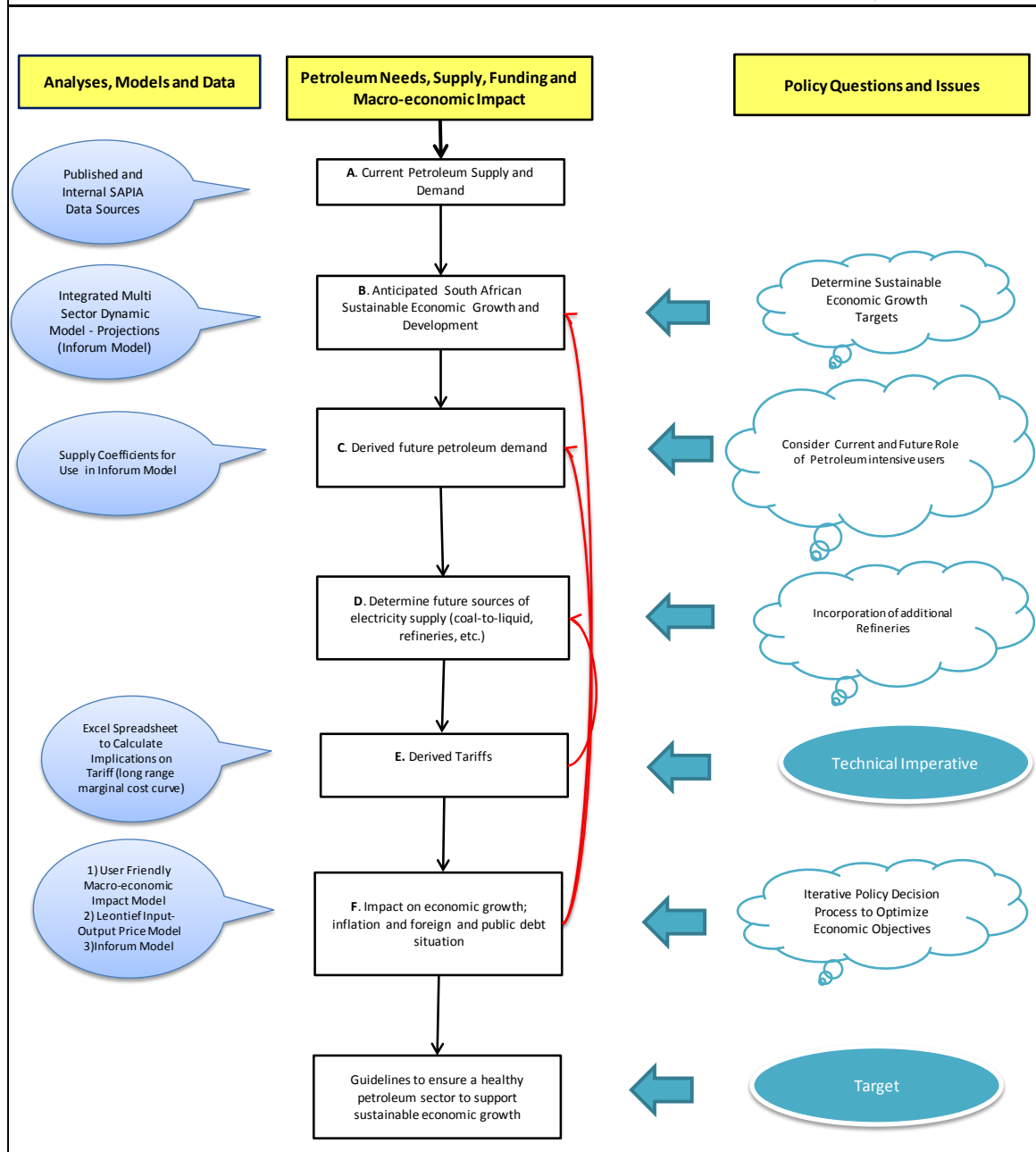
# MODELLING PETROLEUM DEMAND AND SUPPLY

OVERALL DEMAND FOR PETROLEUM PRODUCTS ARE  
LINKED TO GENERAL ECONOMIC GROWTH

# PETROLEUM GROWTH MODEL

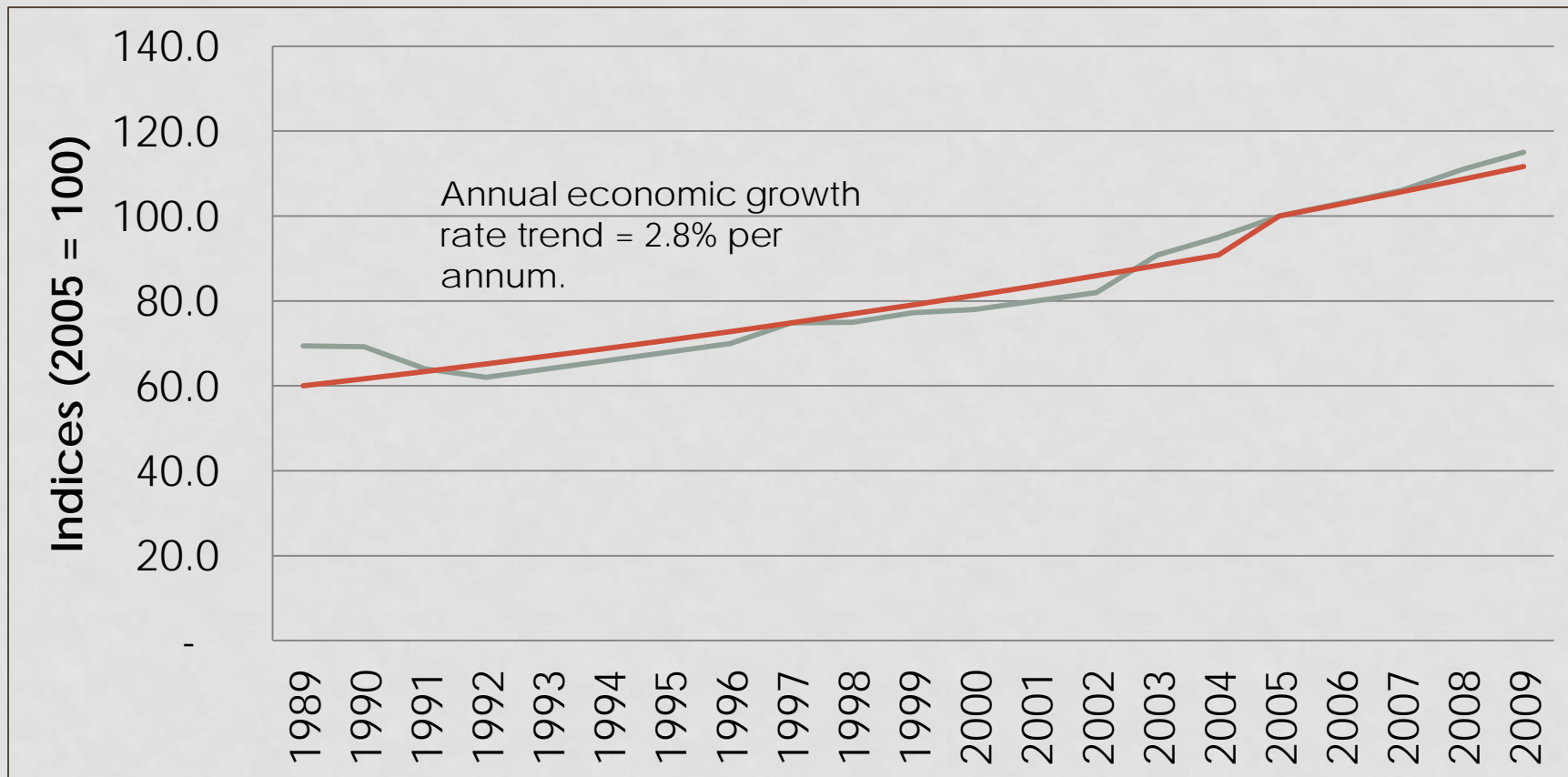
- Suite of models were developed to optimize the demand and supply of petroleum.
- The model entertains the following aspects:
  - Petroleum supply and demand;
  - Impact of price elasticity on demand;
  - Anticipated South African sustainable economic growth and development;
  - Determine future sources of petroleum;
  - Derived petroleum tariffs; and
  - Impact on economic growth and inflation.

# Development of the South African Petroleum Industry



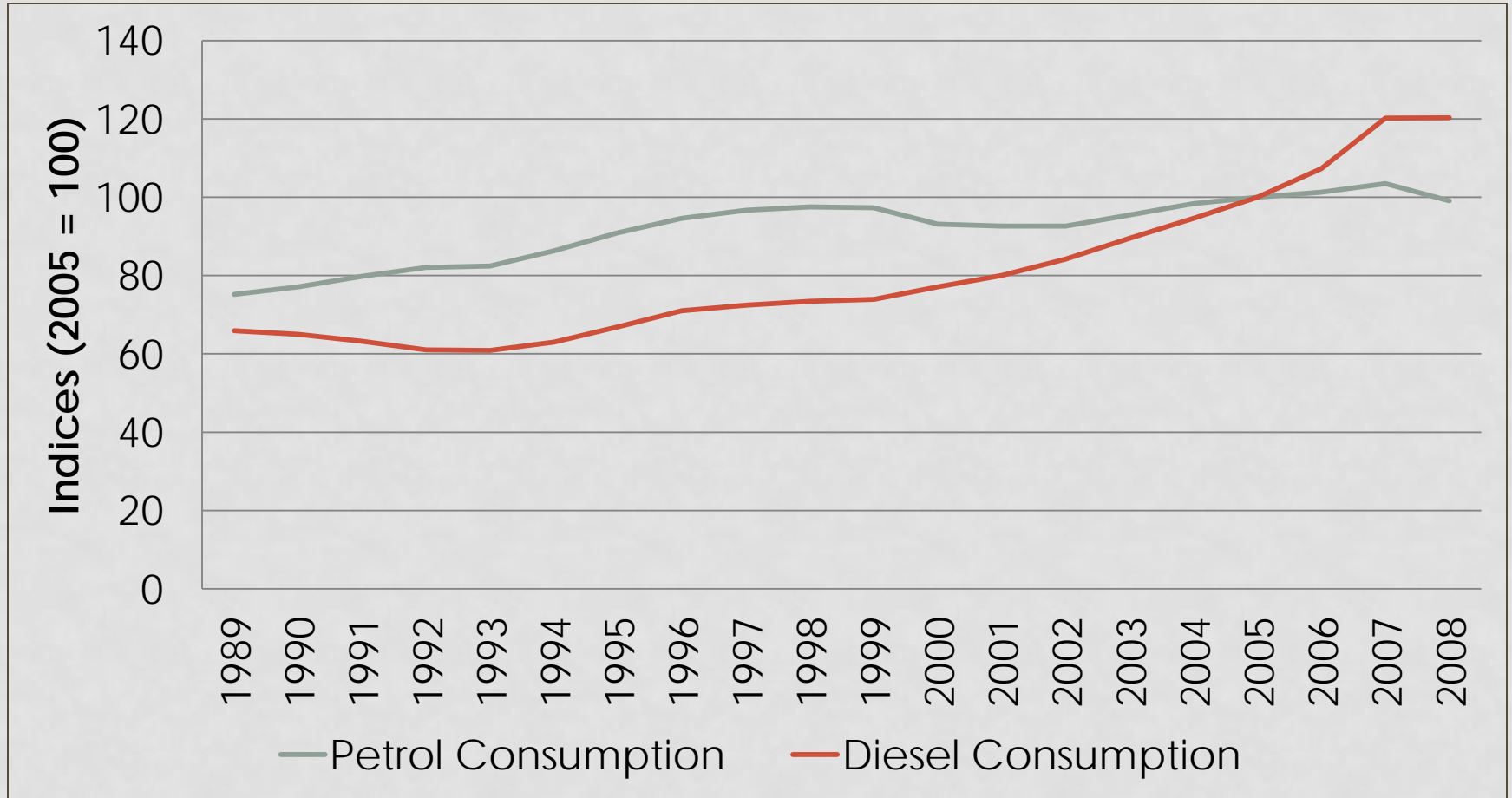


# ECONOMIC GROWTH AND PETROLEUM DEMAND



From 1989 to 2009 the demand for petroleum products increased by 2.3% on average per annum, while the economy registered annual growth of 2.8%.

# PETROL AND DIESEL CONSUMPTION



# PETROLEUM DEMAND TRENDS FROM 1988 TO 2009

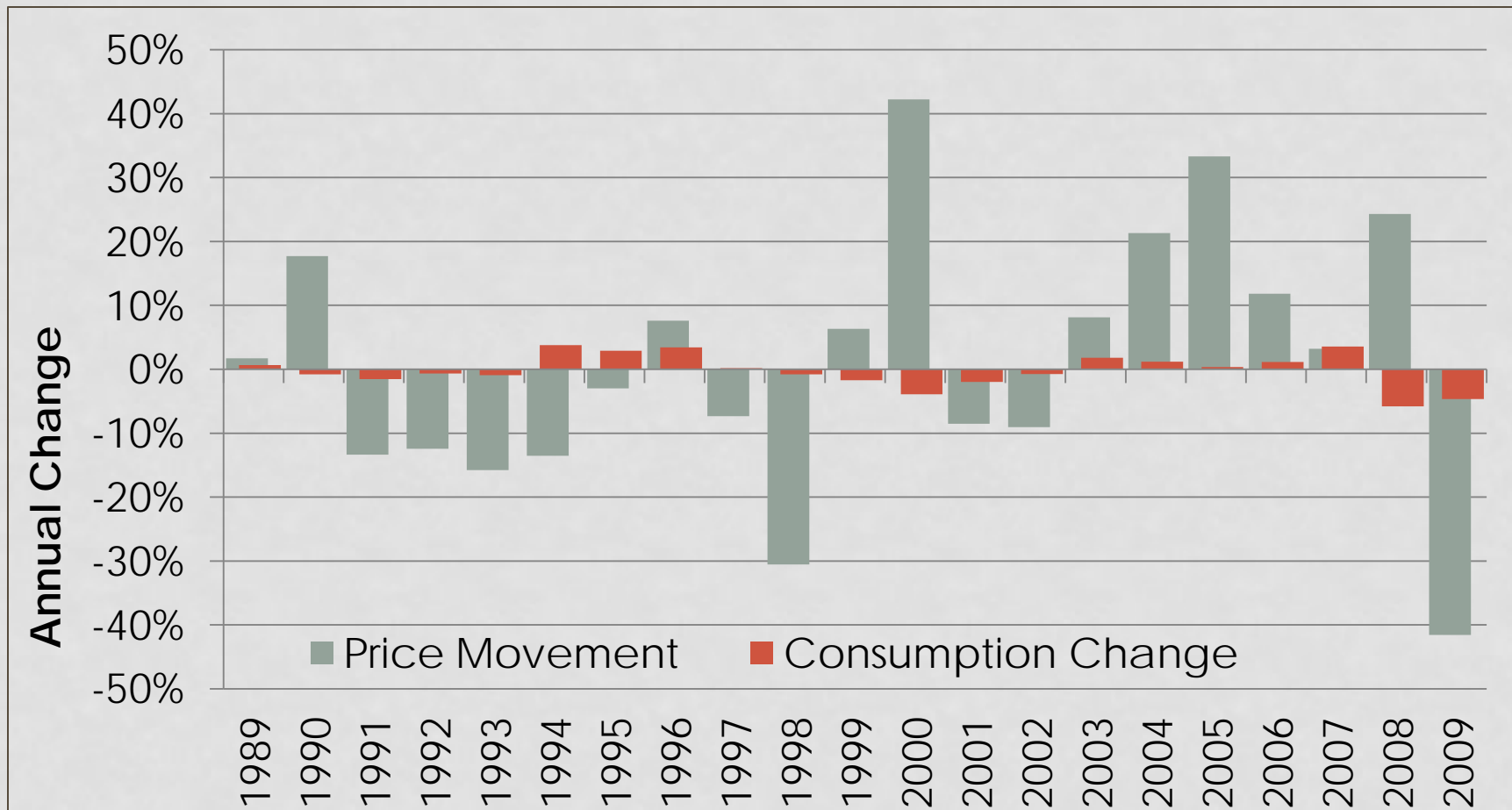
	<b>Average Annual Growth Percentage from 1988 to 1999 (1998 base year)</b>	<b>Average Annual Growth Percentage from 1999 to 2009 (1999 base year)</b>
Petrol	2.4	0.4
Diesel	0.9	4.3
Other Petroleum	2.7	1.4

- The demand for petrol grew much faster than that of diesel in the first period (1988 to 1999).
- Changed drastically in the period 1999 to 2009, where diesel grew at 4.3% per annum and petrol only at 0.4% per annum.

# PRICE ELASTICITY OF THE DEMAND FOR PETROLEUM PRODUCTS

PRICE PLAYS AN IMPORTANT ROLE IN THE DEMAND FOR  
ALL PETROLEUM PRODUCTS

# CRUDE OIL PRICE AND CONSUMPTION EFFECT OVER THE SHORT-TERM



Note: Excluding long term changes

# METHODOLOGY

THE STRUCTURE OF THE THREE DEMAND FUNCTIONS USED FOR FORECASTING THE VARIOUS PETROLEUM PRODUCTS' DEMANDS ARE SIMILAR

# DEMAND MOVEMENTS

- Three variables are used to explain the demand movements over time:
  1. The calculated demand vector was designed to present the historic domestic demand for the various petroleum products.
  2. Relative prices were used to calculate a variable to reflect price sensitivity (demand elasticity) in the regression analysis.
  3. Time was used in the regression analysis as a variable to explain the change in technology over time, which affects the usage of a specific petroleum product.



## PETROL

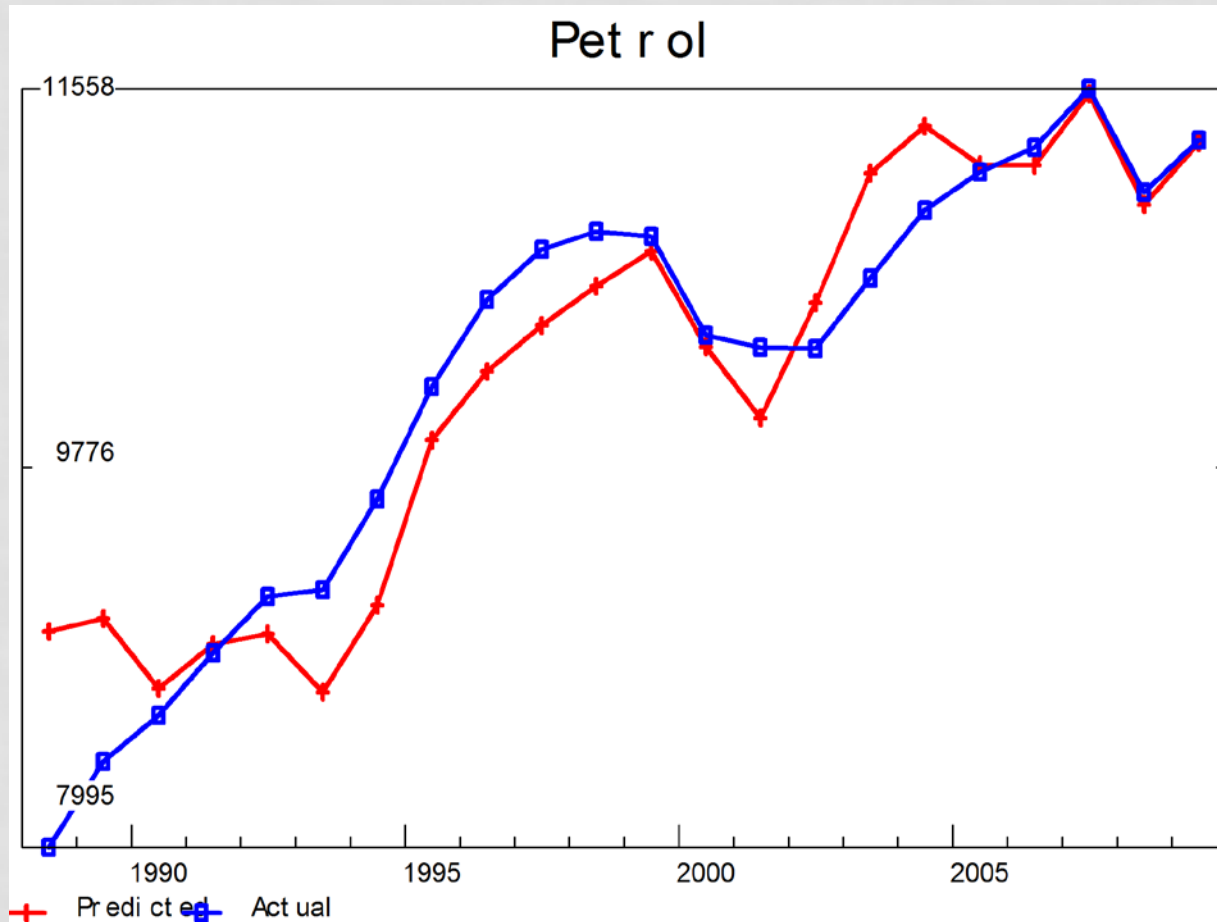
DEPENDANT VARIABLE IS THE ACTUAL VOLUME OF PETROL DEMAND WITH EXPLANATORY VARIABLES THE CALCULATED PETROL DEMAND INDICATOR, RELATIVE PRICES FOR PETROL AND RELATIVE PRICES FOR PETROL, LAGGED ONE PERIOD



# PETROL REGRESSION ANALYSIS

PETROL			
RBSQ	0.8503		
<u>Dependent variable: Actual domestic petrol demand</u>			
	Reg-Coef	Elas	t-value
Intercept	8 440.93	0.83	17.83
Calculated Petrol Demand Indicator	1.05	0.82	8.29
Petrol Relative Prices	-5 030.76	-0.24	-2.52
Petrol Relative Prices [1]	-3 024.76	-0.41	-3.71

# COMPARISON OF ACTUAL AND ESTIMATED DEMAND FOR PETROL



# PETROL SCENARIO COMPARISON

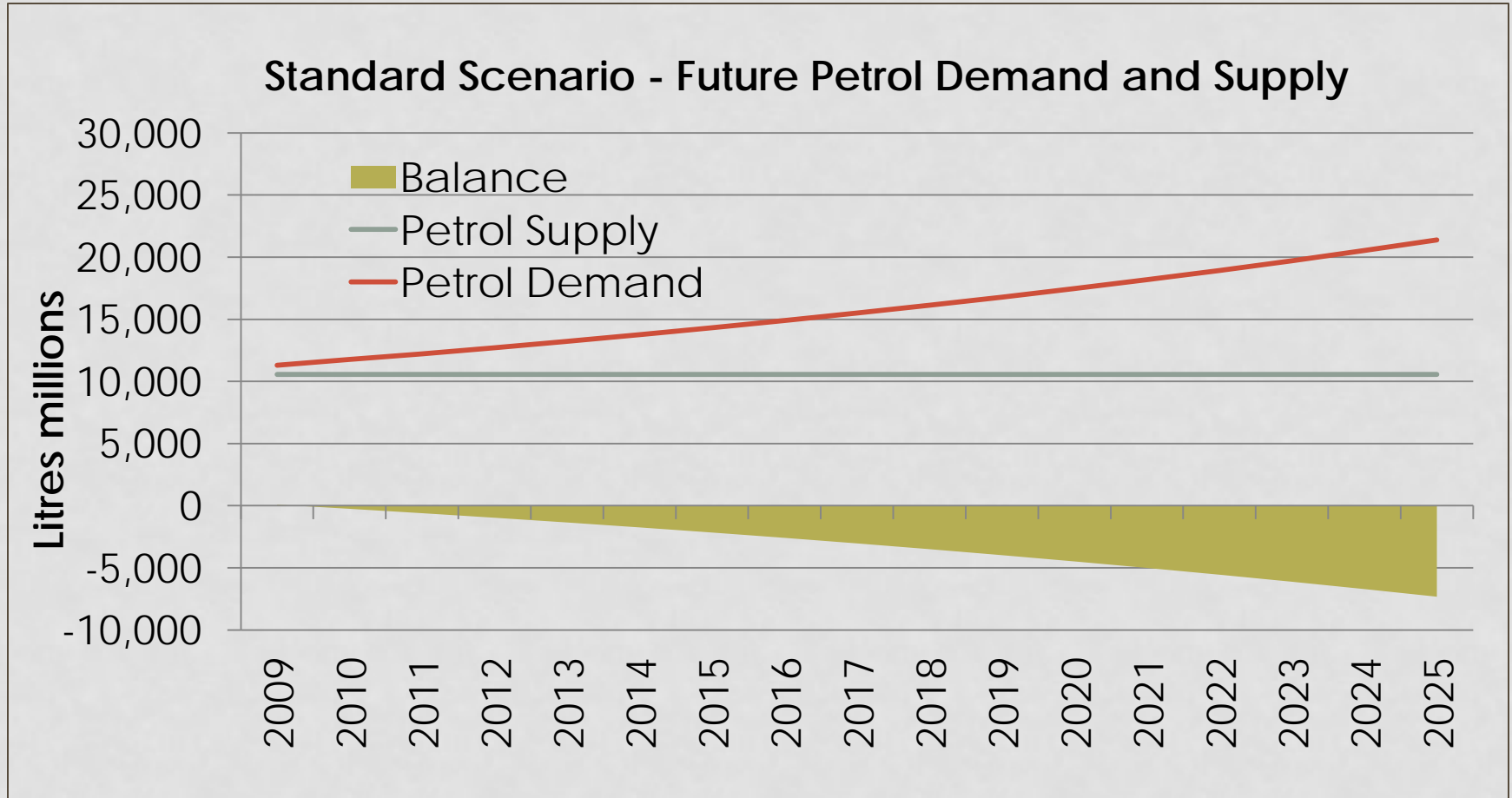
## Standard Scenario

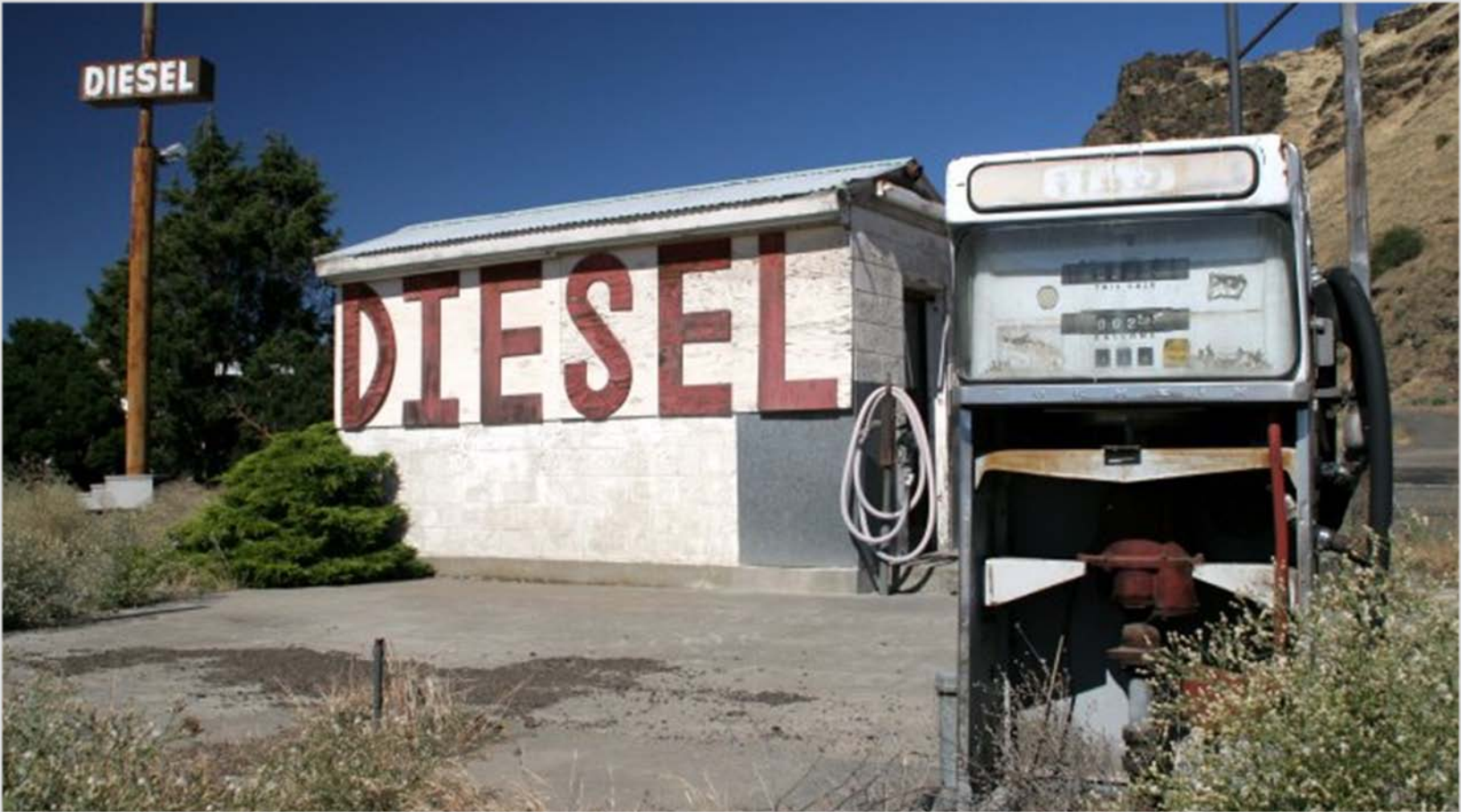
- Estimated growth rate of domestic demand for petrol is around 3.8% p.a. (double the historic rate of 1.5% p.a.).
- Increased demand in petrol
  - ➔ As a result of more and more people buying cars as wealth increases.
  - ➔ If the price of petrol does not increase rapidly, petrol demand will follow the same trend.
- Low historic growth rate in petrol demand is the result of a relative high increase in petrol prices over the period.

## High Petrol Price Scenario

- Lower growth rate in petrol demand due to the price effect
  - ➔ Forecast for petrol drops from 3.8% p.a. to 2.5% p.a. if the petrol price changes drastically (from 8% to 10% p.a.)

# PETROL CONSUMPTION AND REFINING CAPACITY REQUIRED





## DIESEL

THE REGRESSION EQUATIONS FOR FORECASTING DIESEL SALES ARE EXACTLY THE SAME AS WITH PETROL

# DIESEL REGRESSION ANALYSIS

## DIESEL

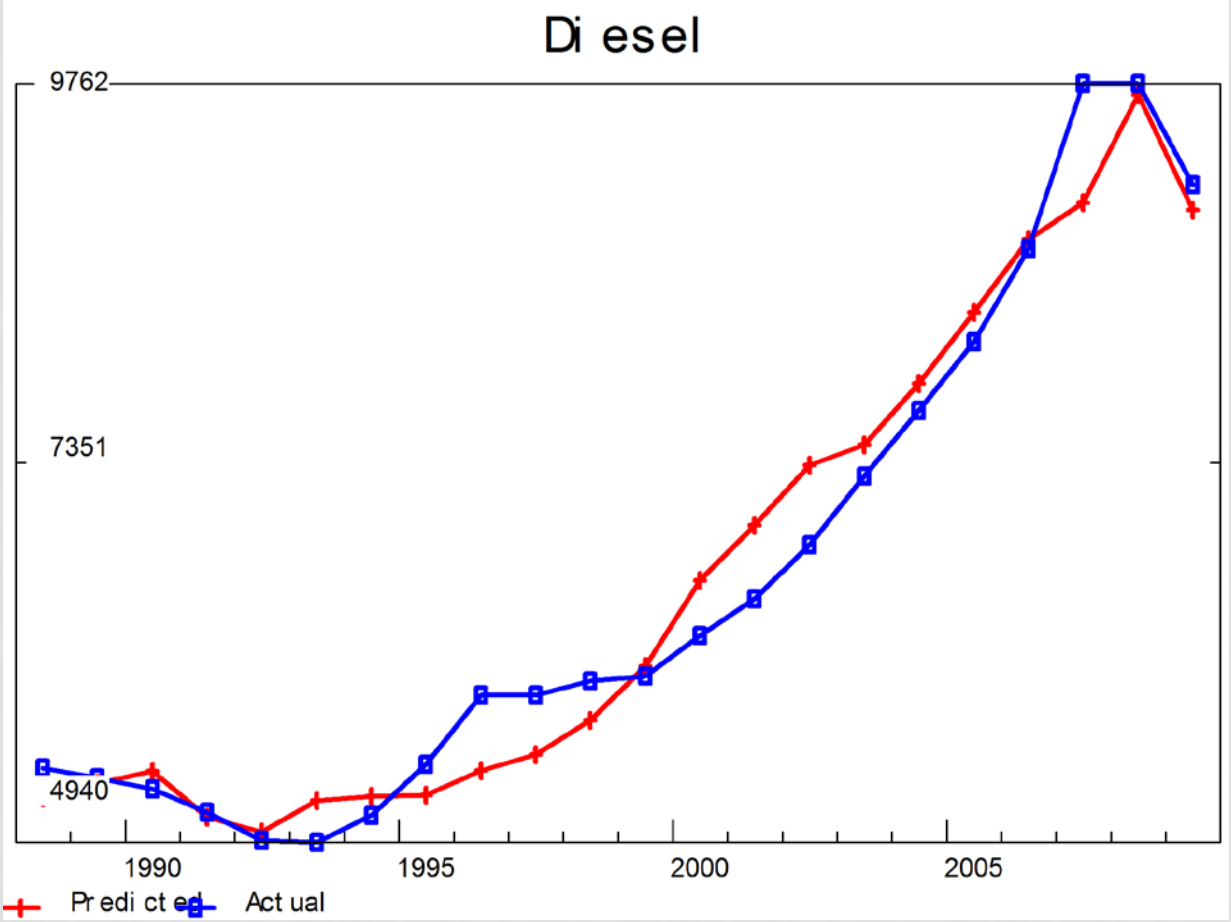
RBSQ

0.9575

Dependent variable: Actual domestic diesel demand

	<b>Reg-Coeff</b>	<b>Elas</b>	<b>t-value</b>
Intercept	1 294.62	0.20	3.00
Calculated Diesel Demand Indicator	0.98	0.94	3.85
Time	-72.85	-0.33	-1.38
Diesel Relative Prices	-16 30.55	-0.19	-2.03

# COMPARISON OF ACTUAL AND ESTIMATED DEMAND FOR DIESEL



# DIESEL SCENARIO COMPARISON

## Standard Scenario

- Historic growth rate for diesel sales was 3.3% p.a.
- Projected growth rate is 3.7% p.a.
- Future growth in diesel demand will resemble the growth in the transport sector, which is forecasted at 2.9% p.a.

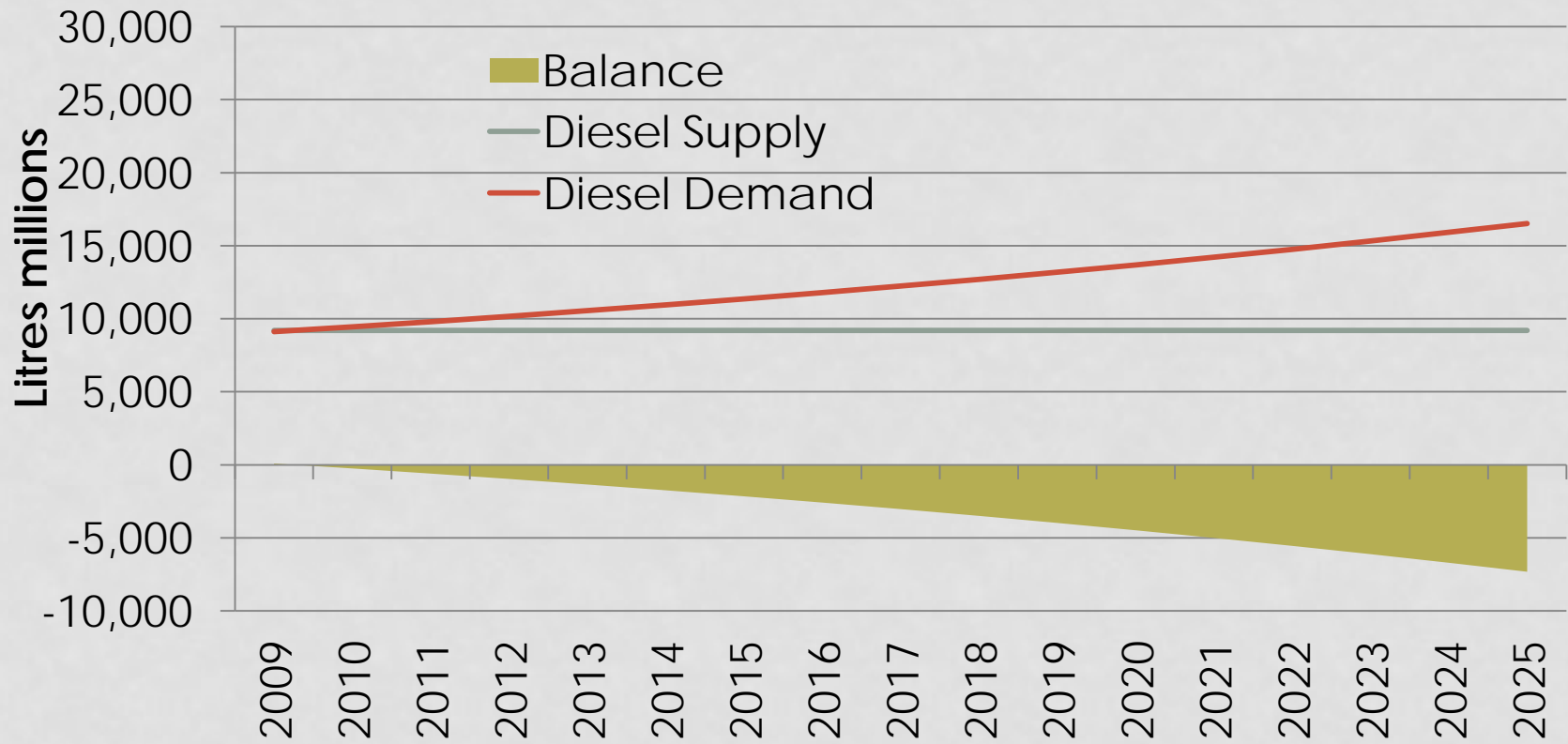
## High Diesel Price Scenario

- Lower growth rate in diesel demand due to the price effect
- ➔ Forecast for diesel drops from 3.7% p.a. to 3.1% p.a. if the diesel price changes drastically (from 8% to 10% p.a.)



# DIESEL CONSUMPTION AND REFINING CAPACITY REQUIRED

Standard Scenario - Future Diesel Demand and Supply



The End