

Annual Gas Statistics and the Gas Questionnaire

IEA Data TRAINING WORKSHOP in South Africa
Pretoria, South Africa, 11-13 October, 2010

Alex Blackburn
Energy Statistics Division

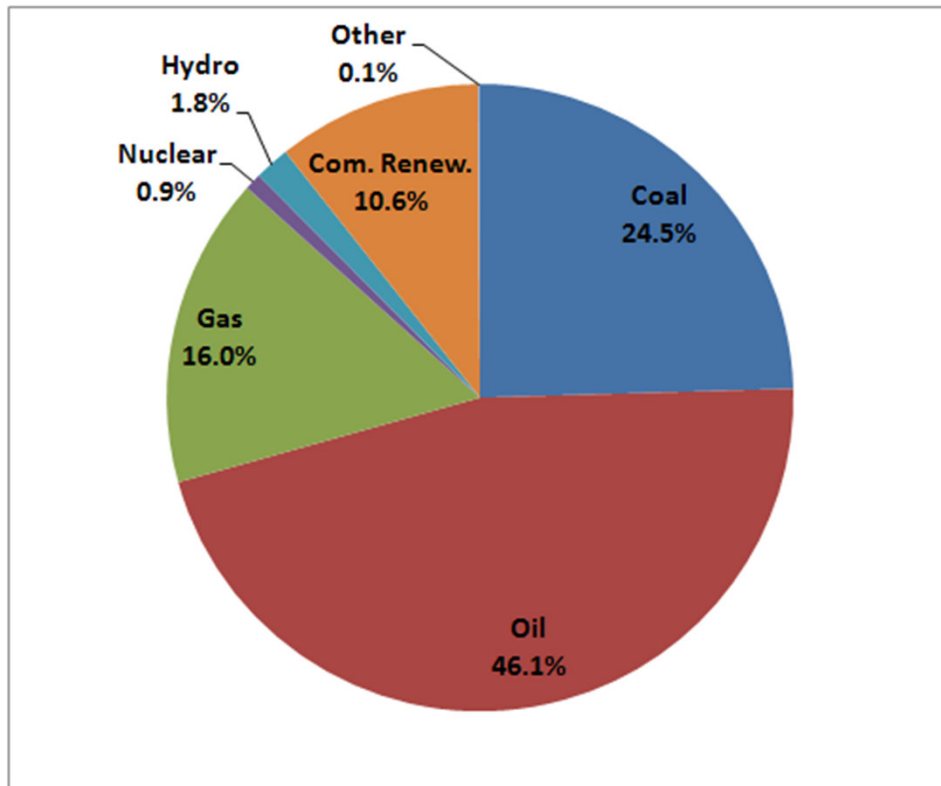


Outline of the talk

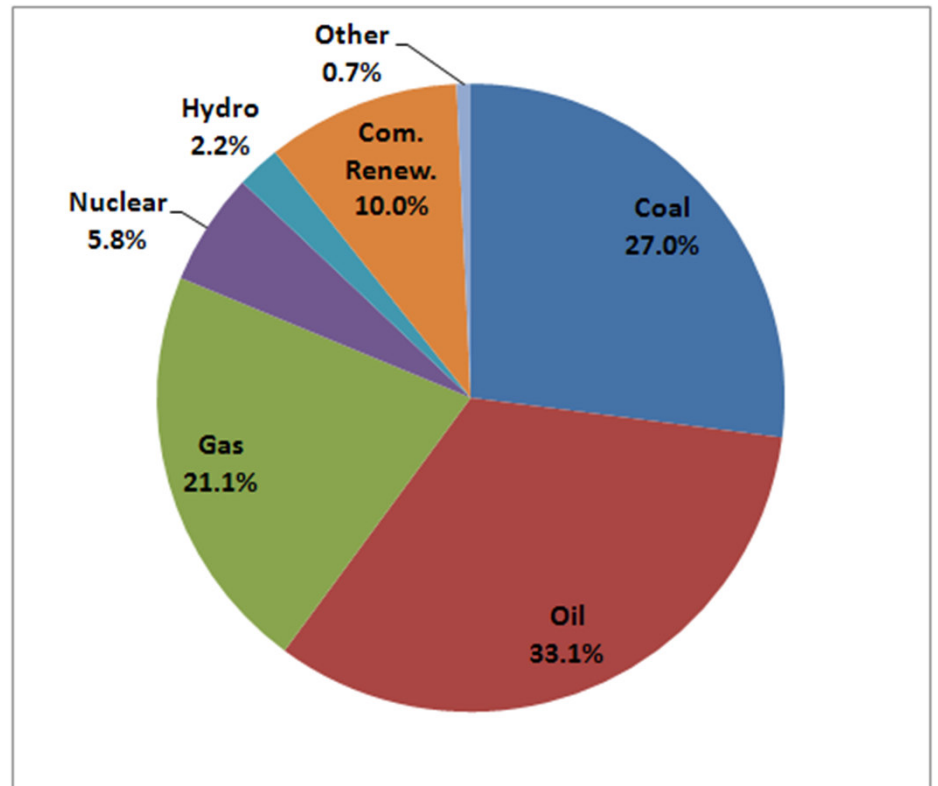
- Natural gas in the World and South Africa
- The natural gas chain & basic concepts
- Structure of the Annual Gas Questionnaire
- Ongoing statistical issues (general and specific)

WORLD ENERGY MIX

TPES, 1973



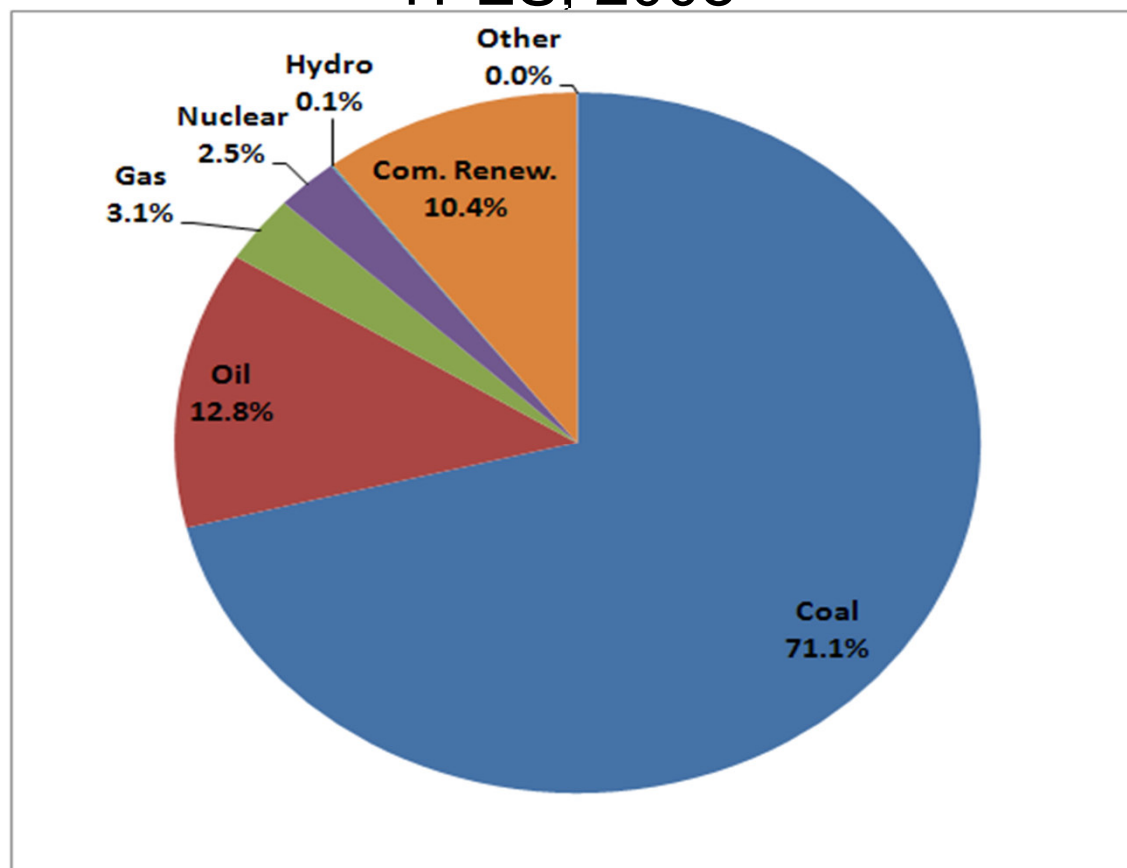
TPES, 2008



Natural gas playing an increasingly significant role

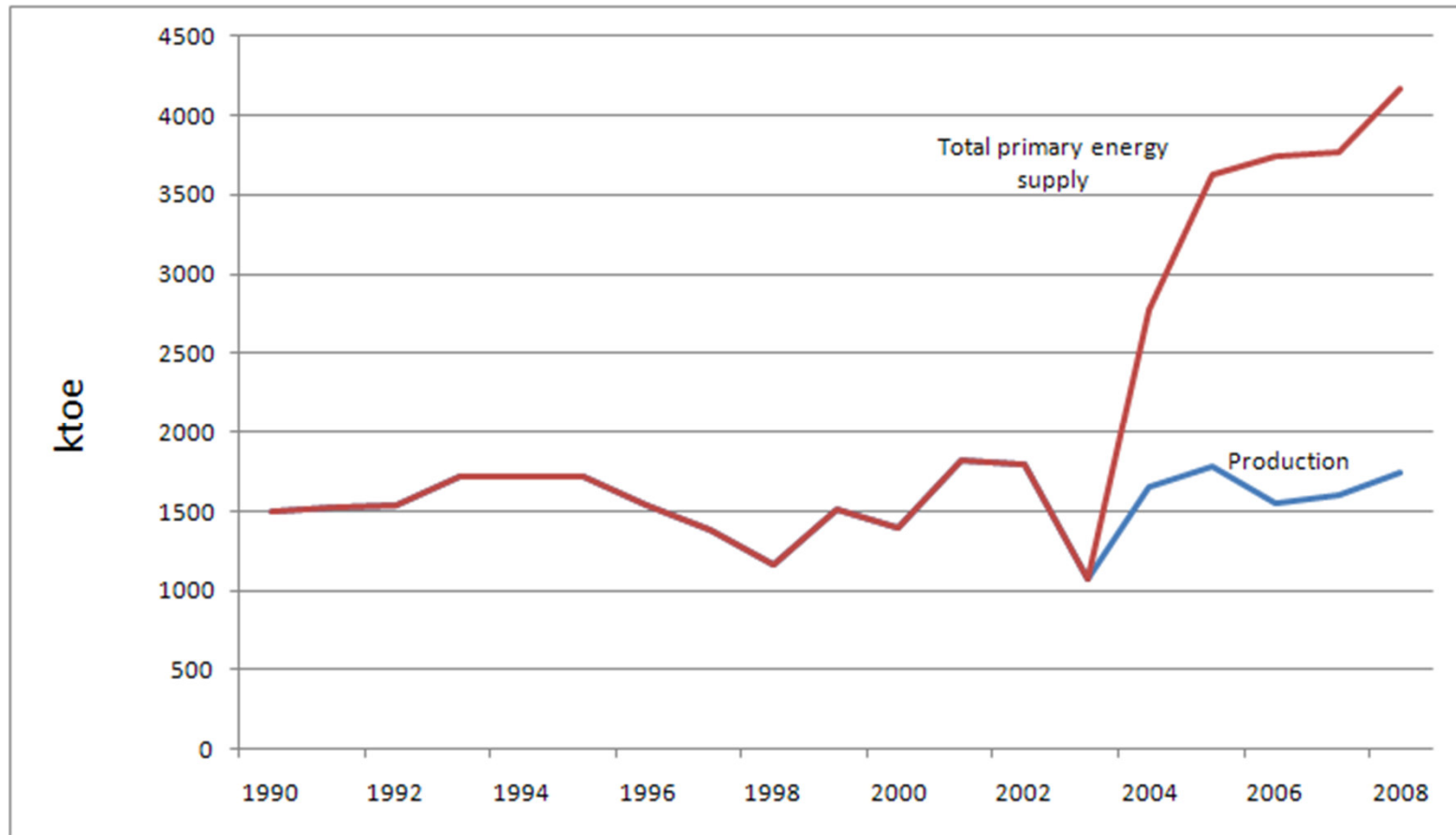
SOUTH AFRICA ENERGY MIX

TPES, 2008



Coal dominates South African supply, gas has currently only a minor role

SOUTH AFRICA GAS GROWTH



Since 2004 imports have made a big impact on supply

Basic concepts

- Natural gas comprises several gases, but consists mainly of methane
- As a gas expands or compresses according to temperature and pressure, it is important that when measuring natural gas the temperature and pressure are taken into account
- Gas is usually measured in :
 - energy unit : TJ - Gross Calorific Value
 - Volume : million m³
- Eurostat/IEA use Standard Conditions:
 - **Standard Conditions = 15 degrees C and 760 mm Hg**

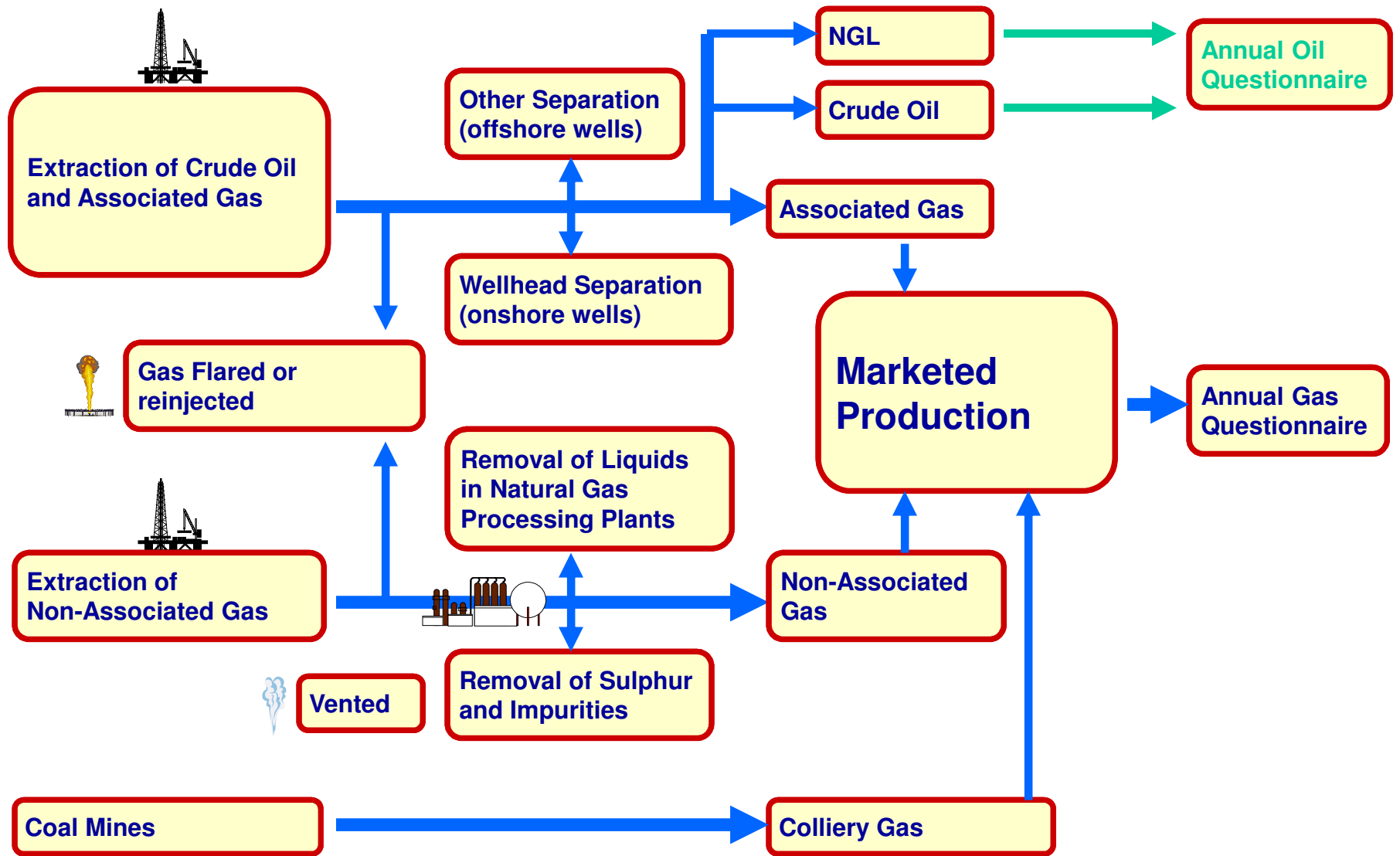
Basic concepts (2)

- For conversion we need to know how many kJ there are per m³
- When reporting data in a balance, specific kJ/m³ conversion factors need to be known for the various flows:
 - Indigenous Production
 - Imports
 - Exports
 - Stock changes
 - Inland Consumption (obs)

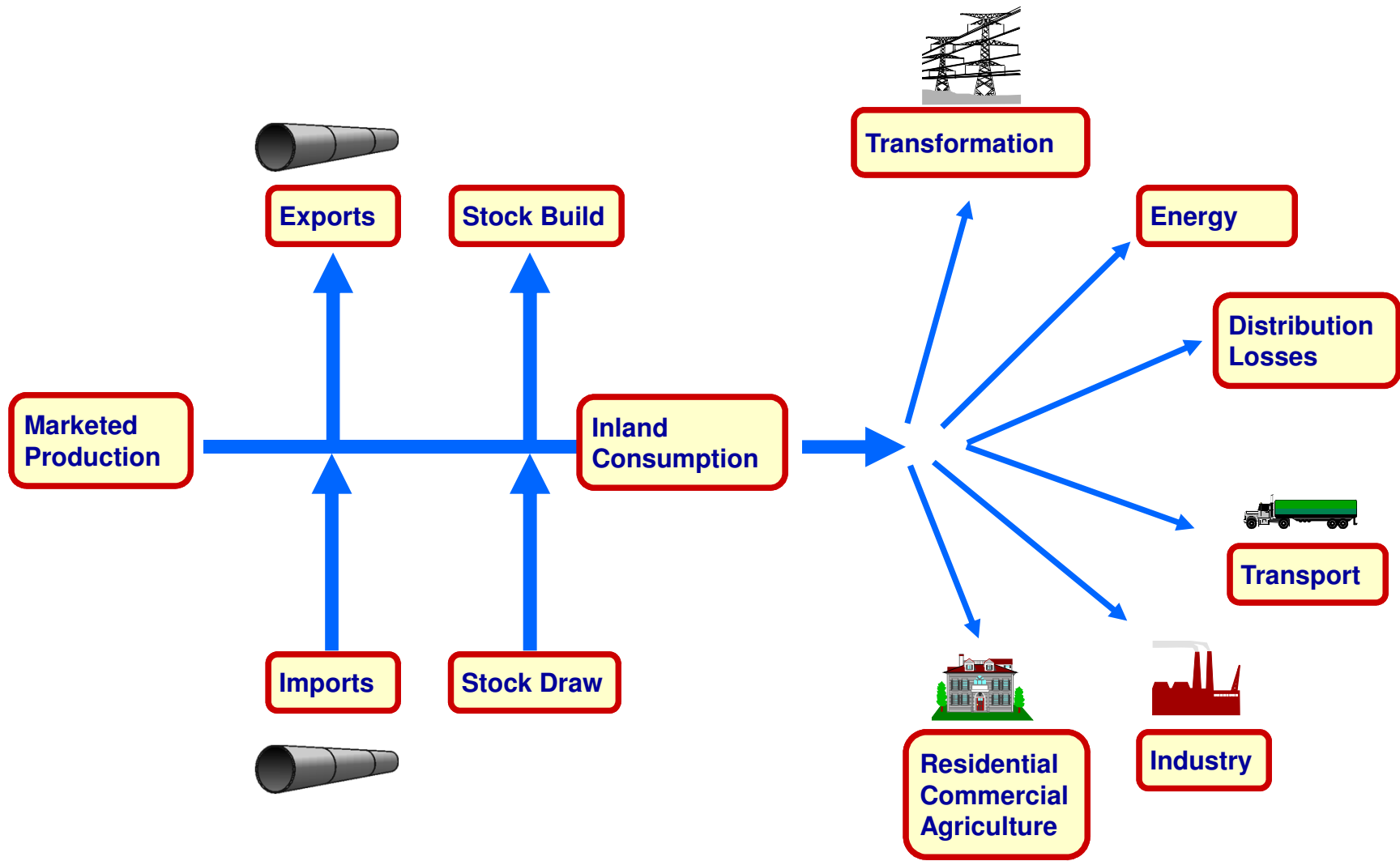
Basic concepts (3)

- What is the difference between the Gross and Net Calorific Value?
 - **Net Calorific value** =
Gross Calorific Value – latent heat of vaporisation of the water vapour produced during combustion of the gas.
- For gas the difference between Net and Gross is about **10%**

Natural gas production



Natural gas - supply and consumption



The natural gas questionnaire

-
- 2 units (million m³, TJ)
 - **5 tables**
 - Supply of Natural Gas
 - Consumption of Natural Gas
 - Net Inland Consumption by Sector
 - Total Final Consumption by Sector
 - Imports by Origin
 - Exports by Destination
 - Gas Storage Capacity

The natural gas questionnaire

Definitions

Supply – Table 1

- Indigenous Production
 - dry **marketable** production (after purification and extraction of NGL and sulphur)
- Imports and Exports
 - are considered imported or exported when having **crossed the physical boundary** of a country
- Stock changes and levels
 - stock levels of **recoverable** gas
 - change of stock is opening - closing stock level of recoverable gas

Supply of natural gas

		Million m3 (at 15°C, 760 mm Hg)	TJ (Gross Calor. Value) B	Average GCV (kJ/m3) C	Average NCV (kJ/m3) D
Indigenous Production	1	2,133	81,042	38,000	34,200
Associated Gas	2	0	0	0	0
Non-Associated Gas	3	0	0	0	0
Colliery Gas	4	0	0	0	0
From Other Sources	5	0	0	0	0
Total Imports (Balance)	6	2,965	112,671	38,000	34,200
Total Exports (Balance)	7	0	0	38,000	34,200
International Marine Bunkers	8	0	0	0	0
Stock Changes (National Territory)	9	0	0	38,000	34,200
Inland Consumption (Calculated)	10	5,098	193,713	37,998	34,198
Statistical Differences	11	0	0		
Inland Consumption (Observed)	12	5,098	193,713	38,000	34,200
Recoverable Gas					
Opening Stock Level (National Territory)	13	0	0		
Closing Stock Level (National Territory)	14	0	0		
Memo:					
Gas Vented	15	Zero, or N/A?			
Gas Flared	16				
Memo: Cushion Gas					
Cushion Gas Closing Stock Level	17	0	0		
Memo: From other sources					
From Other Sources - Oil	18	0	0	0	0
From Other Sources - Coal	19	0	0	0	0
From Other Sources - Renewables	20	0	0	0	0

The natural gas questionnaire

Definitions

Inland Consumption - Table 2a

- Transformation Sector
 - Natural Gas used for producing another type of energy (electricity, heat) which is after used for final consumption
 - Example: Gas-to-Liquids
- Energy Sector
 - Natural Gas consumed by Energy Industry
 - Example: Gas-to-liquid plants, Liquefaction plants
- Distribution Losses

Menu	Unit: TJ (GCV)	
	Consumption	
	A	
Inland Demand (Total Consumption)	1	193,713
Transformation Sector	2	193,713
Main Activity Producer Electricity Plants	3	0
Autoproducer Electricity Plants	4	0
Main Activity Producer CHP Plants	5	0
Autoproducer CHP Plants	6	0
Main Activity Producer Heat Plants	7	0
Autoproducer Heat Plants	8	0
Gas Works (Transformation)	9	0
Coke Ovens (Transformation)	10	0
Blast Furnaces (Transformation)	11	0
Gas-to-Liquids (GTL) Plants (Transformation)	12	193,713
Non-specified (Transformation)	13	0
Energy Sector	14	0
Coal Mines	15	0
Oil and Gas Extraction	16	0
Petroleum Refineries	17	0
Coke Ovens (Energy)	18	0
Blast Furnaces (Energy)	19	0
Gas Works (Energy)	20	0
Own Use in Electricity, CHP and Heat Plants	21	0
Liquefaction (LNG) / Regasification Plants	22	0
Gas-to-Liquids (GTL) Plants (Energy)	23	0
Non-specified (Energy)	24	0
Distribution Losses	25	0
Total Final Consumption	26	0

Zero, or NA?

Row 1: Equals the sum of rows 2, 14, 25, 26; should correspond to cell 12B on table 1.

Rows 3 to 8: Should correspond to quantities in table 6C in the Annual Electricity and Heat Questionnaire.

Rows 4, 6, 8: Should correspond to quantities in row 1 in table 5.

Row 26: Should correspond to the sum of cells 1A and 1B in table 2b.

The natural gas questionnaire

Definitions

Final Consumption - Table 2b

(= derived from final consumers)

- Different Use
 - Non-Energy Use

*Report Natural Gas used as a raw material for producing other products
(Chemical and Petrochemical Industry)*
 - Energy Use

Report Natural Gas used as fuel
- 3 Sectors
 - Industry Sector
 - Transport Sector
 - Other Sectors

2008

TOTAL FINAL CONSUMPTION BY SECTOR

South Africa

Menu		Unit: TJ (GCV)	
		Energy Use	Non-Energy Use
		A	B
Total Final Consumption	1	0	0
Transport Sector	2	0	0
Road	3	0	0
of which Biogas	4	0	0
Pipeline transport	5	0	0
	6	0	0
Industry Sector	7	0	0
Iron and Steel	8	0	0
Chemical (including Petrochemical)	9	0	0
Non-Ferrous Metals	10	0	0
Non-Metallic Minerals	11	0	0
Transport Equipment	12	0	0
Machinery	13	0	0
Mining and Quarrying	14	0	0
Food, Beverages and Tobacco	15	0	0
Paper, Pulp and Printing	16	0	0
Wood and Wood Products	17	0	0
Construction	18	0	0
Textiles and Leather	19	0	0
Non-specified (Industry)	20	0	0
Other Sectors	21	0	0
Commercial and Public Services	22	0	0
Residential	23	0	0
Agriculture/Forestry	24	0	0
Fishing	25	0	0
Non-specified (Other)	26	0	0

Row 1: Corresponds to the sum of rows 2, 7, 21.

Row 1: The sum of cells 1A and 1B should correspond to cell A26 in table 2a.

Row 9: Please report fuel use in column A.

The natural gas questionnaire

Definitions

Imports / Exports - Tables 3,4

- Requested Data
 - 2 Units: Million m3 et TJ
 - Natural Gas **by pipeline and LNG**
- Geographical Breakdown
 - 62 import origins
 - 48 export destinations
- Trade
 - Importance of the ultimate origin or destination
 - Transit trade and re-exports are not to be included

Questionnaire structure

Exports

COUNTRY OF DESTINATION		Million m3		TJ (GCV)	
		Total Exports	of which: LNG	Total Exports	of which: LNG
		A	B	C	D
Australia	1				
Austria	2				
Belarus	3				
....					

The natural gas questionnaire

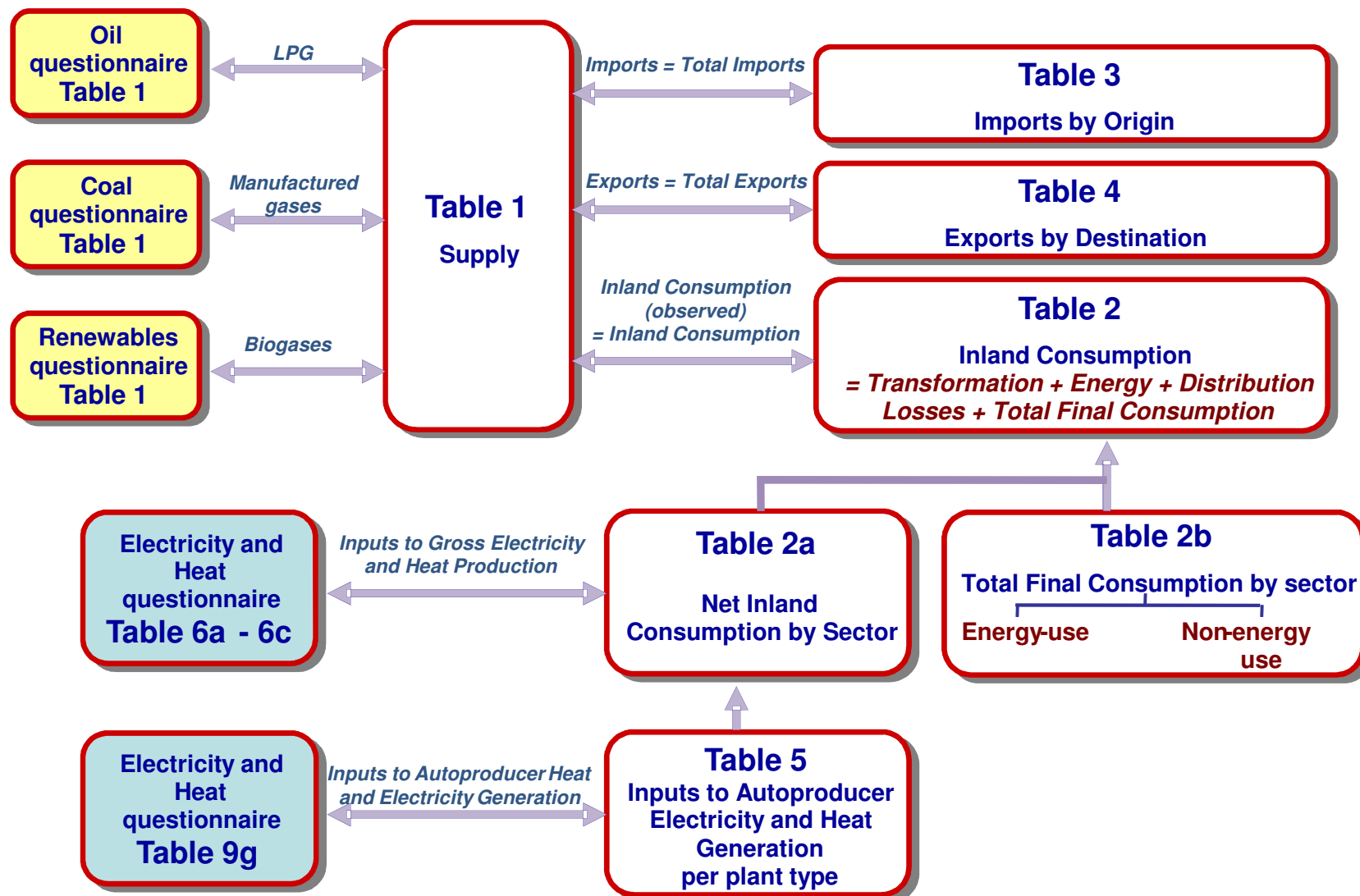
Definitions

Gas Storage Capacity – Table 5

- Location of the storage
- Type of storage
 - Depleted oil and gas fields
 - Aquifers
 - Salt Cavities
- Technical Characteristics
 - Working Capacity = total gas storage capacity minus cushion gas
 - Peak Output = maximum rate at which gas can be withdrawn from storage

The natural gas questionnaire

Relations within the questionnaire



The natural gas questionnaire

Common Issues

Trade

- Transit trade is often reported as import/export (mainly a European issue)
- Exchange contracts
- Origin not always known due to spot markets and hubs
- Increasing difficulties with liberalised market

Units

- Measurement in million cubic metres under Standard conditions - often reported under Normal conditions
- Data in TJ often reported as Net rather than Gross

The natural gas questionnaire

Data issues: Gas to liquids plants

- Currently all natural gas is reported as being transformed in Gas-to-liquids plants (Mossel Bay)
- But the South Africa energy balance has no separate outputs from this plant
- Outputs are synthetic liquid fuels, better data required from this plant for an accurate and complete balance

IEA Publications on annual natural gas

- Publication and CD-ROM
 - Natural Gas Information (hard copy, pdf)
 - CD-ROM
 - On-line Data Service
 - Pay-Per-View
 - Data download
 - Derived publications/analysis:
 - Natural Gas Market Review
 - Energy Statistics of OECD Countries
 - Energy Balances of OECD Countries
 - CO2 Emissions from Fuel Combustion
- Monthly data are also available for all OECD countries



Thank you

Questions welcome