METHANE TO MARKETS PARTNERSHIP

CHALLENGES AND OPPORTUNITIES

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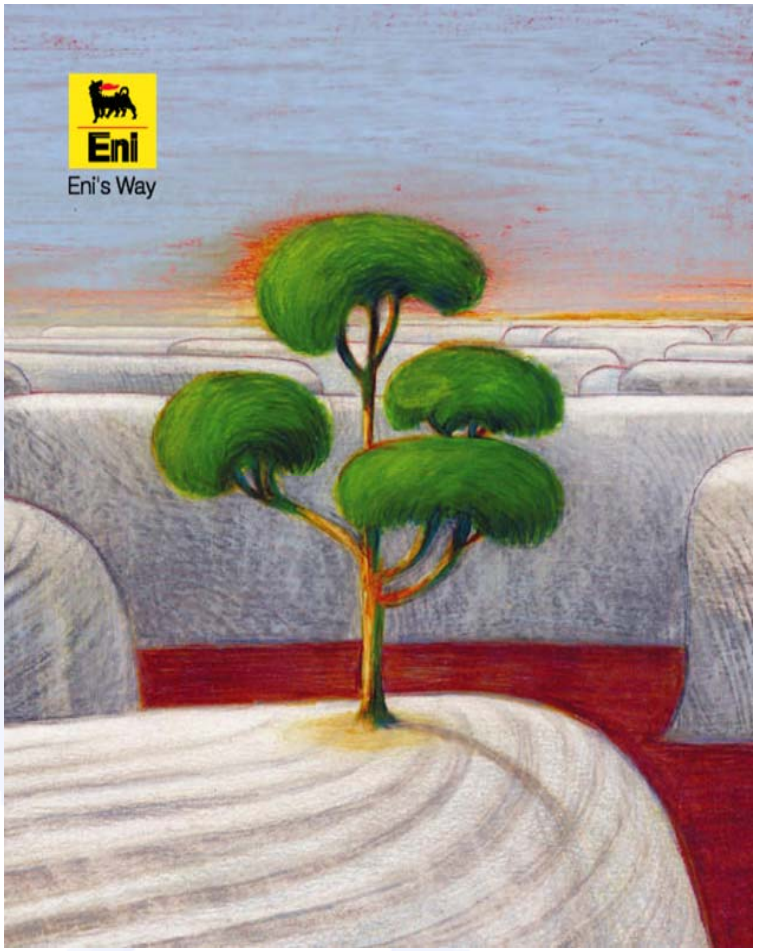
ITALY



TOMSK - September 13-14, 2005

NATURAL GAS

STRENGTHS

- Abundant reserves
- Mild environmental footprint
- Lowest carbon intensity among fossil sources
- High end use efficiency
- Clean and very efficient Power Generation
- Preferred source of hydrogen

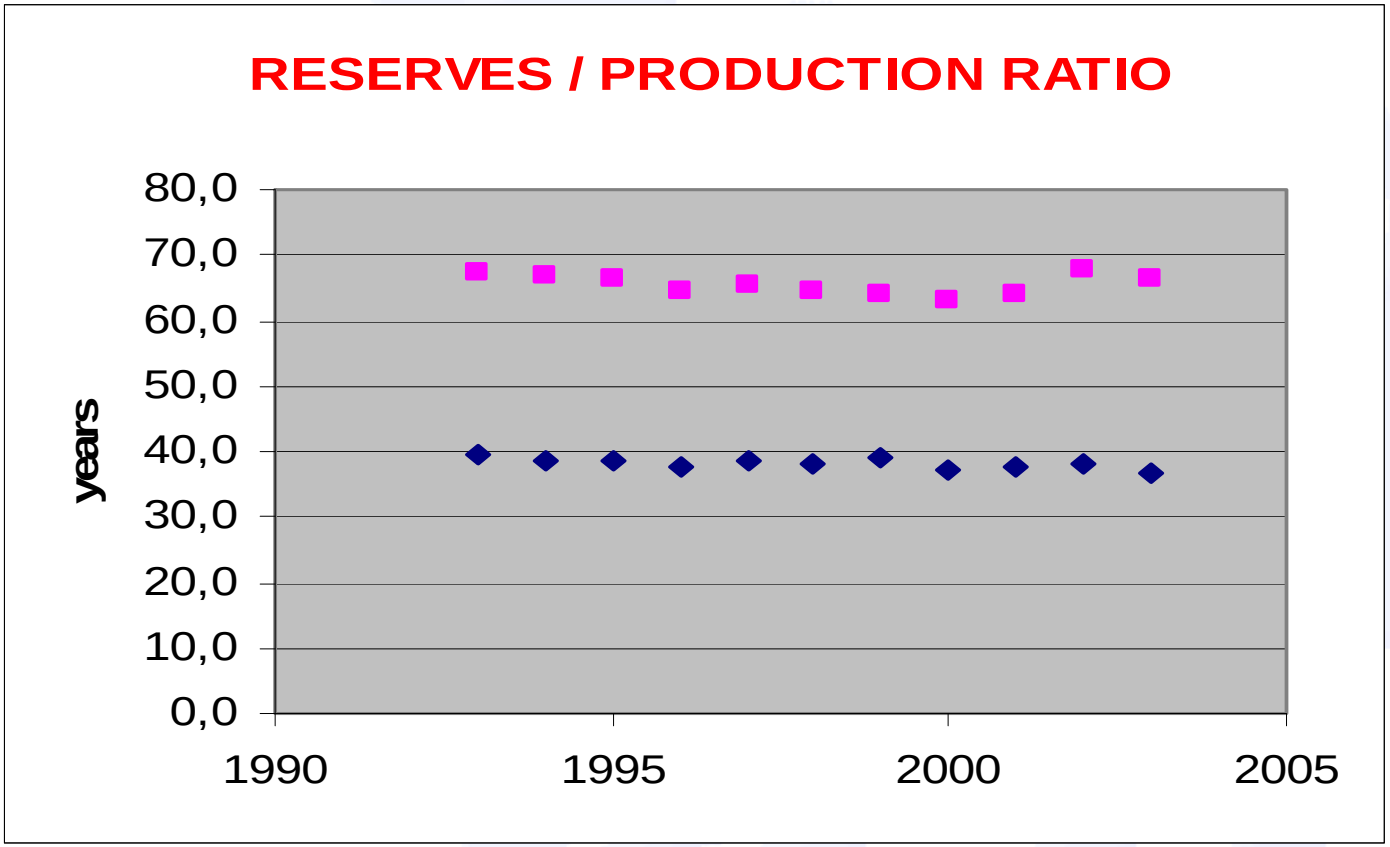
WEAKNESSES

- Complex and capital-intensive infrastructures
- Market rigidity: fixed link to the final market
- Lengthy negotiation between the parties involved
- Substantial volumes of stranded gas
- Under-explored energy source
- Flaring of remote associated gas

the NG reserve / production ratio

is higher than crude oil

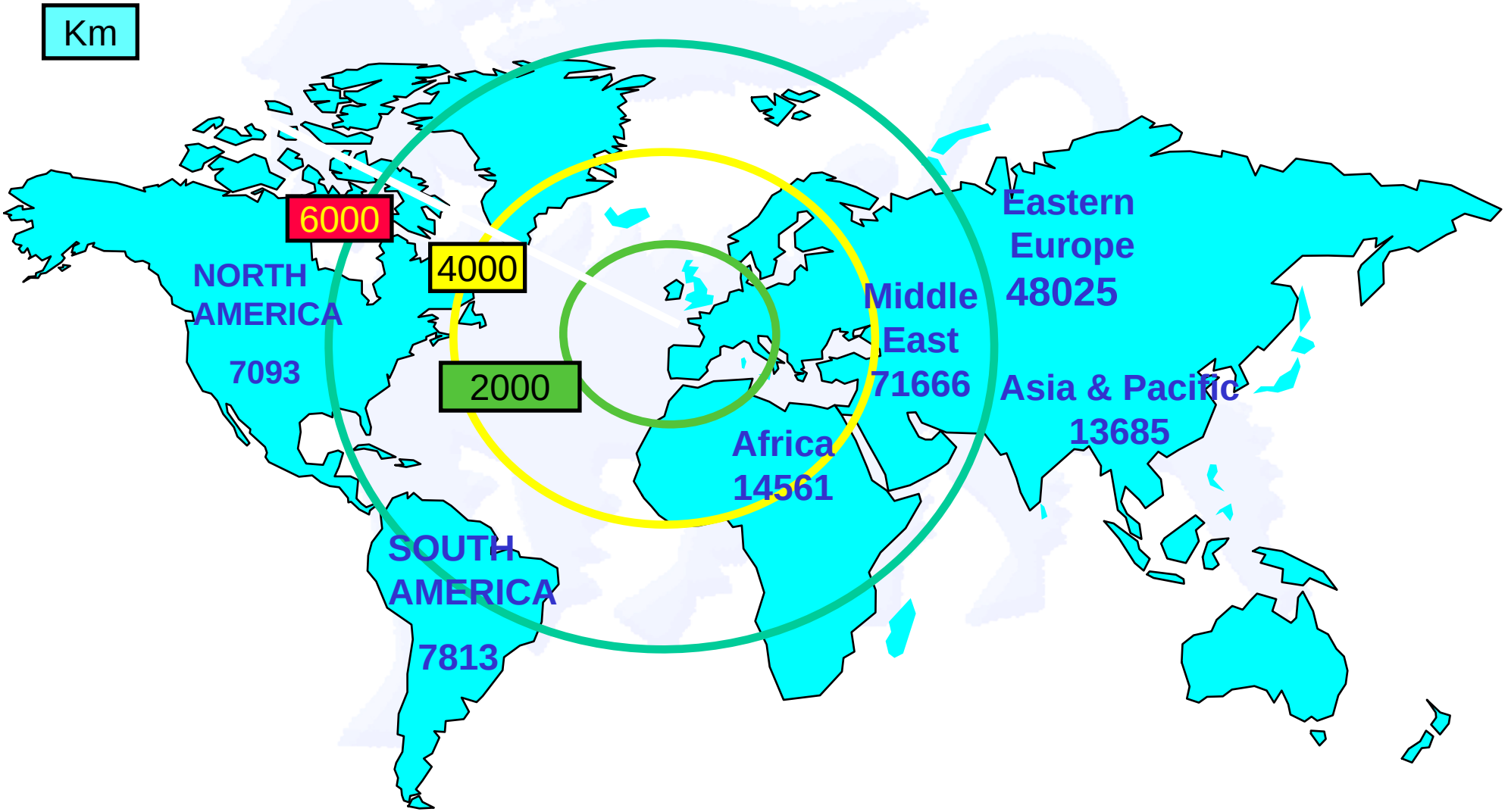
THE RATE OF NG RESERVES UTILIZATION IS LOWER THAN OIL



NG's R/P ratio is almost twice the oil ratio

Reducing this ratio contributes to stabilize hydrocarbon supply

2005 WORLD GAS RESERVES (Gm^3)



CO_2 EMISSION FACTORS

	Heat	PG
	tCO_2/toe	tCO_2/MWh
Natural gas	2,35	0,36
Oil	3,15	0,65
Coal	3,96	1,00

The internalisation of the environmental cost of CO_2 may substantially increase the total cost of the primary energy and change the competition among fuels, conversion technologies and final uses.

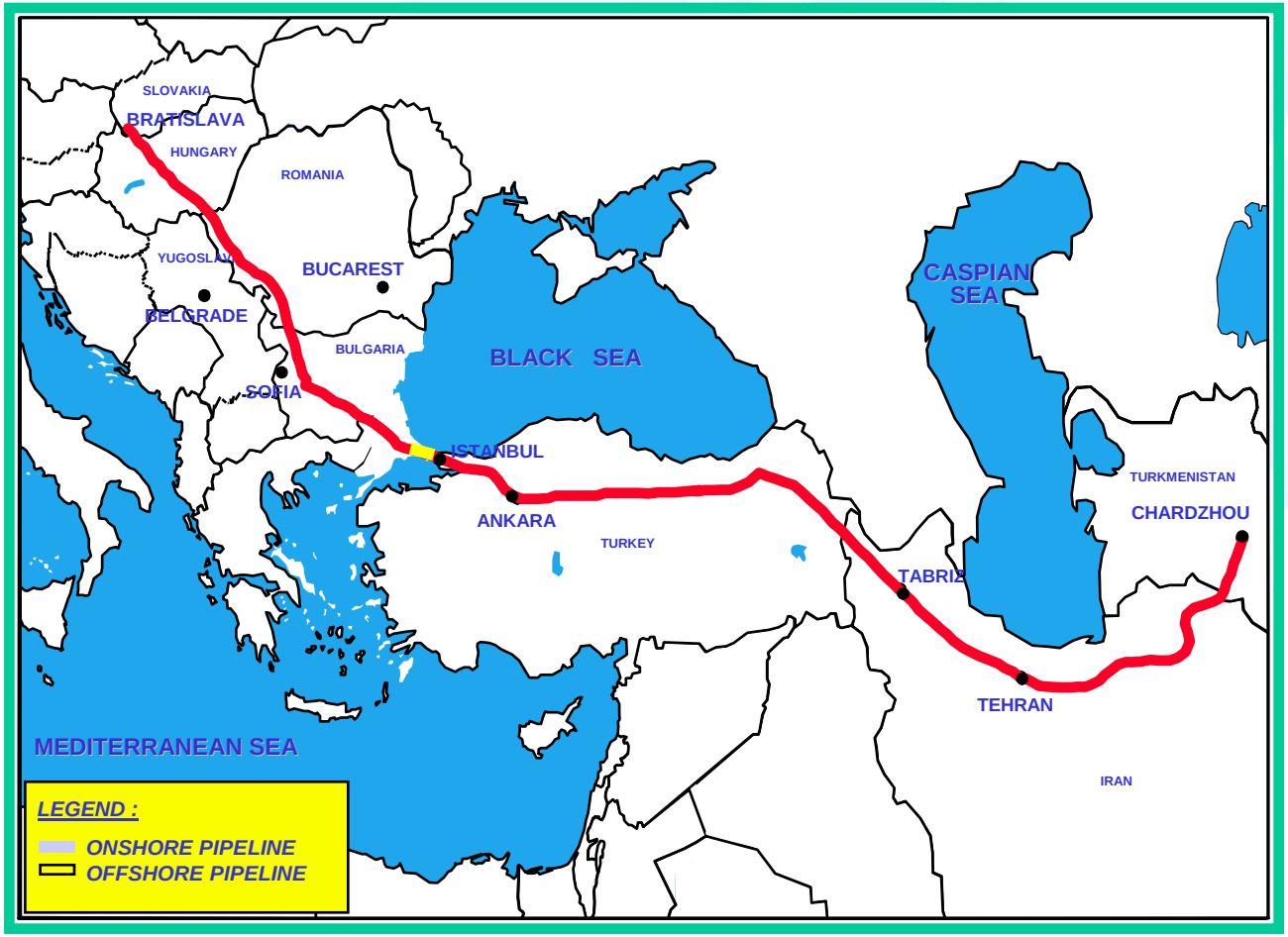
The internalisation of the CO_2 emissions depends on the CO_2 emission factors.

Natural gas, being less carbon intensive, is favoured.

ROADMAP TOWARDS A MORE DECARBONISED ENERGY SYSTEM

New infrastructures for existing and new markets	Long distance, high pressure pipelines LNG chain
Mobilize stranded gas	LNG Gas to Liquids
Expand NG use for power generation	High efficiency combined cycle
"Zero" Gas Flaring	Power generation for local uses; GtL
Reduce GHG emissions from NG infrastructures	High efficiency turbo-compressors; leak detection
CO_2 geological Sequestration	Sequestrate CO_2 available in gas centers, from decarbonisation units

ROUTE MAP OF THE GAS PIPELINE
TURKMENISTAN - EUROPE
Feasibility study of HP pipeline

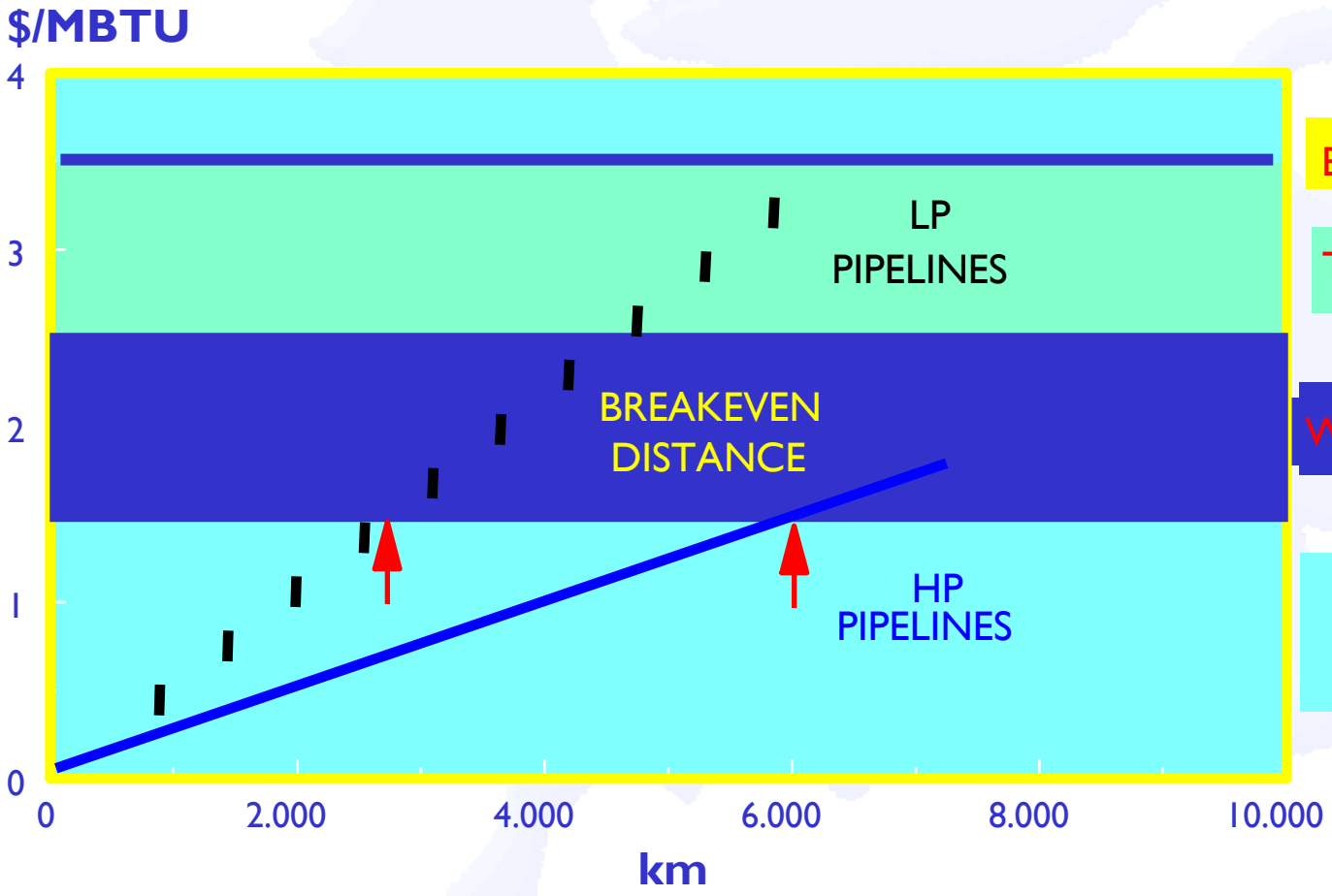


- Long distance (5000 km)
- Diverse environments (deserts, mountains, seismic zones, cultivated areas)
- Presence of an offshore section
- Large transport capacity (options for 15 and 30 Gm^3/y)

COMPARISON BETWEEN HP AND LP FOR 15 - 30 GSM³/Y NET TRANSPORT CAPACITY

	15 Gm³/y		30 Gm³/y	
	HP	LP	HP	LP
Suction Pressure, MPa	10	4.5	10	4.5
Discharge Pressure, MPa	14	7.5	14	7.5
Pipe Steel (API 5L Spec.)	X-80	X-70	X- 80	X-70
Nominal Diameter, inch	42	56	56	56 72
Max. Wall Thickness, mm	24	19	32	19 25
Pipe Weight, kg/m	530	582	941	582 961
Stations Distance, km	406	650	447	166 598
Adsorbed Power per Station,MW	20	34	40	68 68
Fuel, GSm³ /y/1000 km	0.10	0.11	0.18	0.83 0.23

ECONOMIC COMPARISON BETWEEN HP AND LP PIPELINES



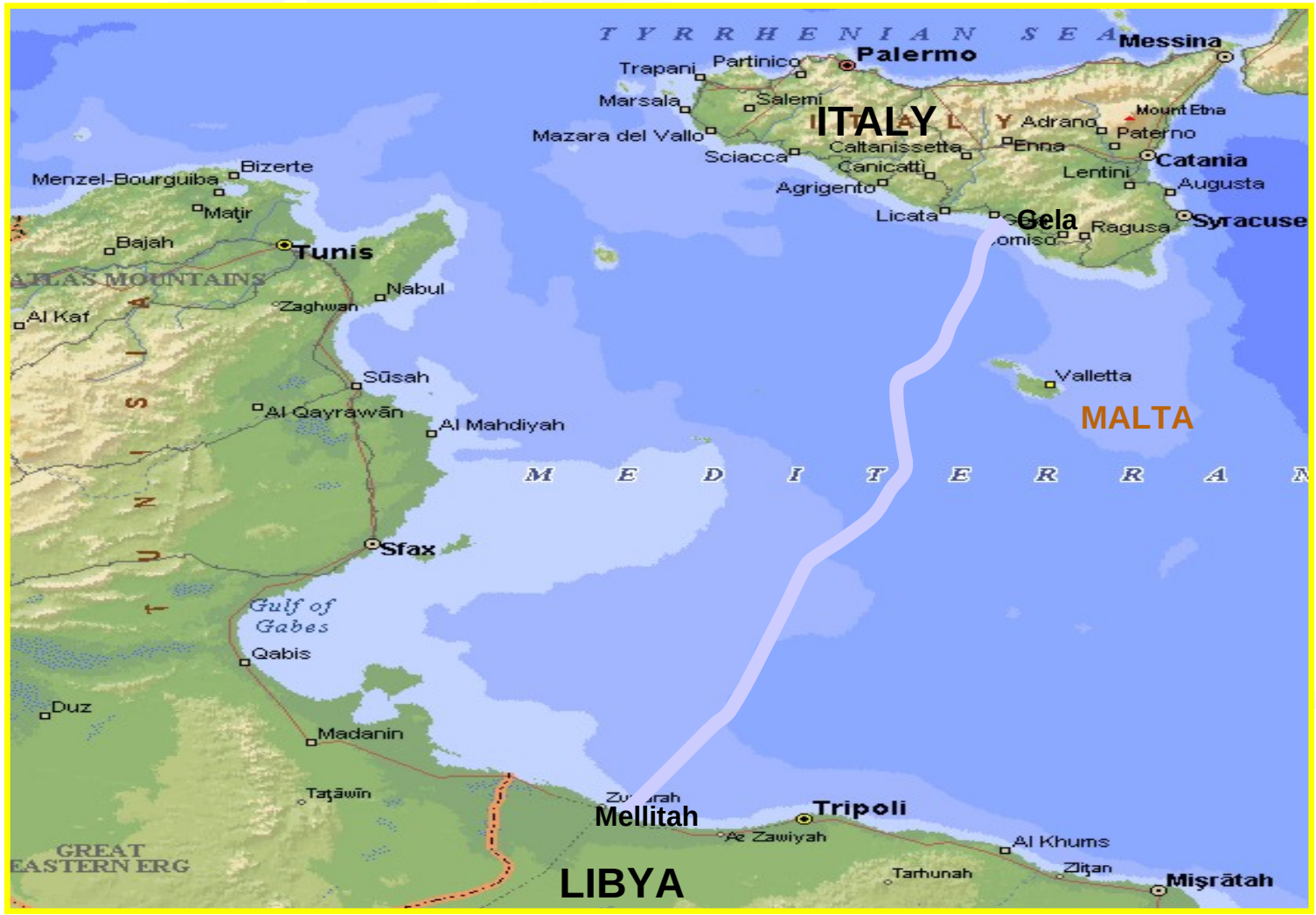
BORDER COST 3,5 $/MBTU

TRANSIT FEES 1 $/MBTU

WELL-HEAD COST 1 $/MTBU

ALLOWED TRANSPORTATION COST 1,5 $/MBTU

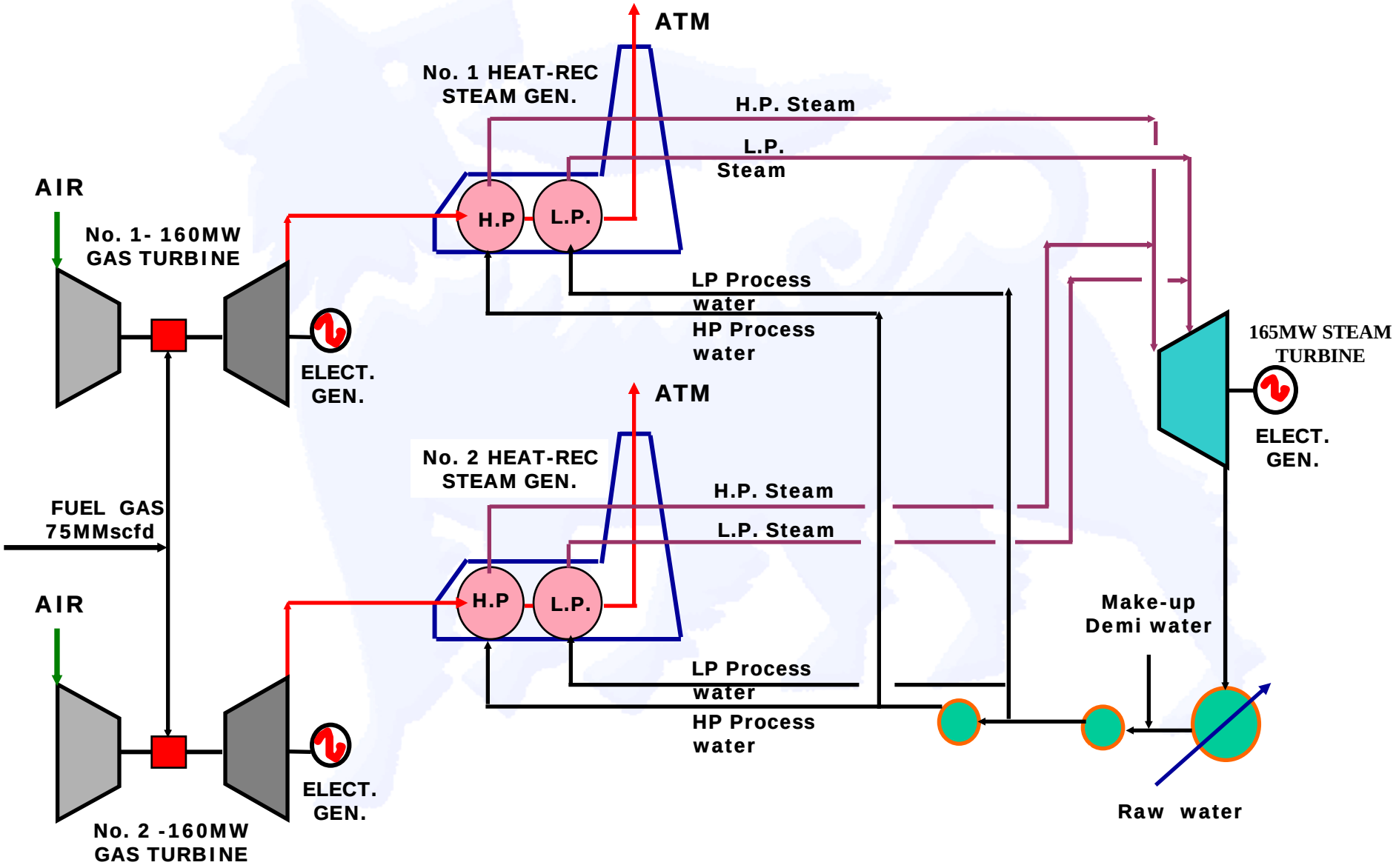
LIBYA - ITALY PIPELINE



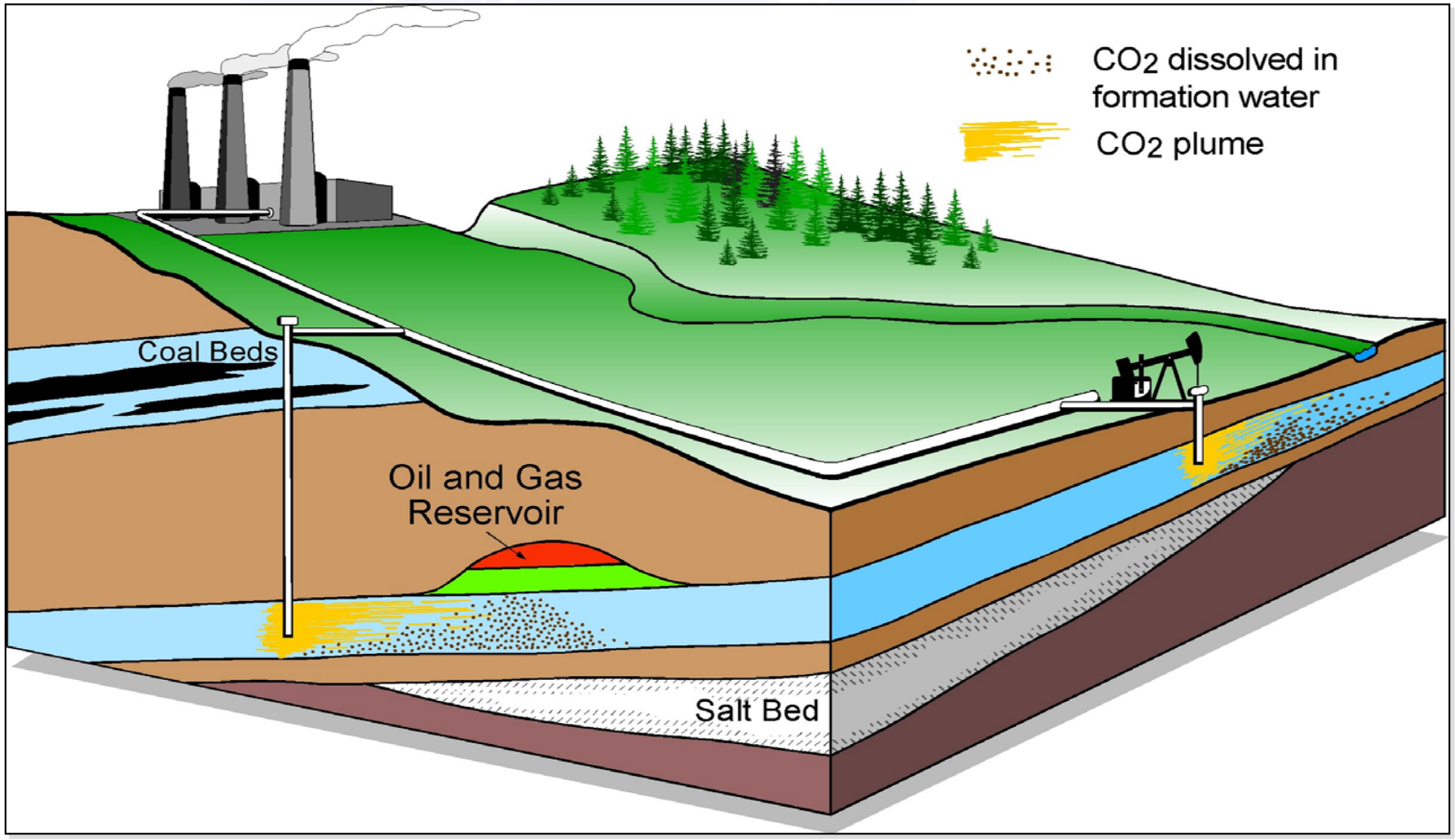
TOWARDS ZERO GAS FLARING

KWALE (NIGERIA) ENERGY PROJECT

NIGERIA – POWER GENERATION



CO_2 GEOLOGICAL SEQUESTRATION



THE OUTLOOK FOR CO_2 GEOLOGICAL SEQUESTRATION
(Acceptable CO_2 avoided cost = 40 $/$tCO_2$)

Quite a different meaning for different PG units

	$kgCO_2/kwh$	
NG Combined Cycle	0.4	1.6 cent/kWh (40,0 $/$tCO_2$)
Oil fired PG	0.6	2.4 cent/kWh (26.6 $/$tCO_2$)
Pulverized Coal	1.0	4.0 cent/kWh (16.0 $/$tCO_2$)

Similar results for heat or H_2 production

The cost goal of the tCO_2 avoided is much higher for NG and therefore it is necessary to aim for CCS in NG units.

CO_2 from deacidification of NG in gas centers provide early opportunities for CCS.

Reduction of energy consumption and GHG emissions

- To curb energy consumption and GHG emissions, targeted energy saving programmes are possible using the best available technology, with the installation of high-efficiency turbines including aeroderivative turbines with an energy efficiency of 37%.

- Natural gas consumption at the compressor stations can be controlled and optimised by the Dispatching Centre with specific software programs. These programs make it possible to determine the best efficiency point for each station and the best operating conditions for the transport lines.

ROLE OF NATURAL GAS

Natural Gas is the bridge towards a more decarbonised energy system.

1. **Switching to low-carbon fuels**
2. **Power generation with CO_2 sequestration**
3. **Source of H_2 as an energy carrier**

The Italian contribution in fulfilling an expanded role of NG

In Italy NG plays a major role in the energy supply.

The Italian industry has pioneered and continues to develop advanced technologies in all segments of the NG chain

- onshore and offshore pipelines (Transmed, Bluestream, Greenstream,..)
- LNG and regasification
- geological gas storage
- Gas to Liquids (Methanol, DME, Fischer-Tropsch synthesis)
- Advanced combined cycle Power Generation

This gas technology portfolio can contribute to bring new international gas initiatives to fruition.