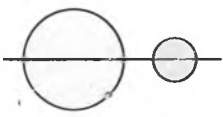


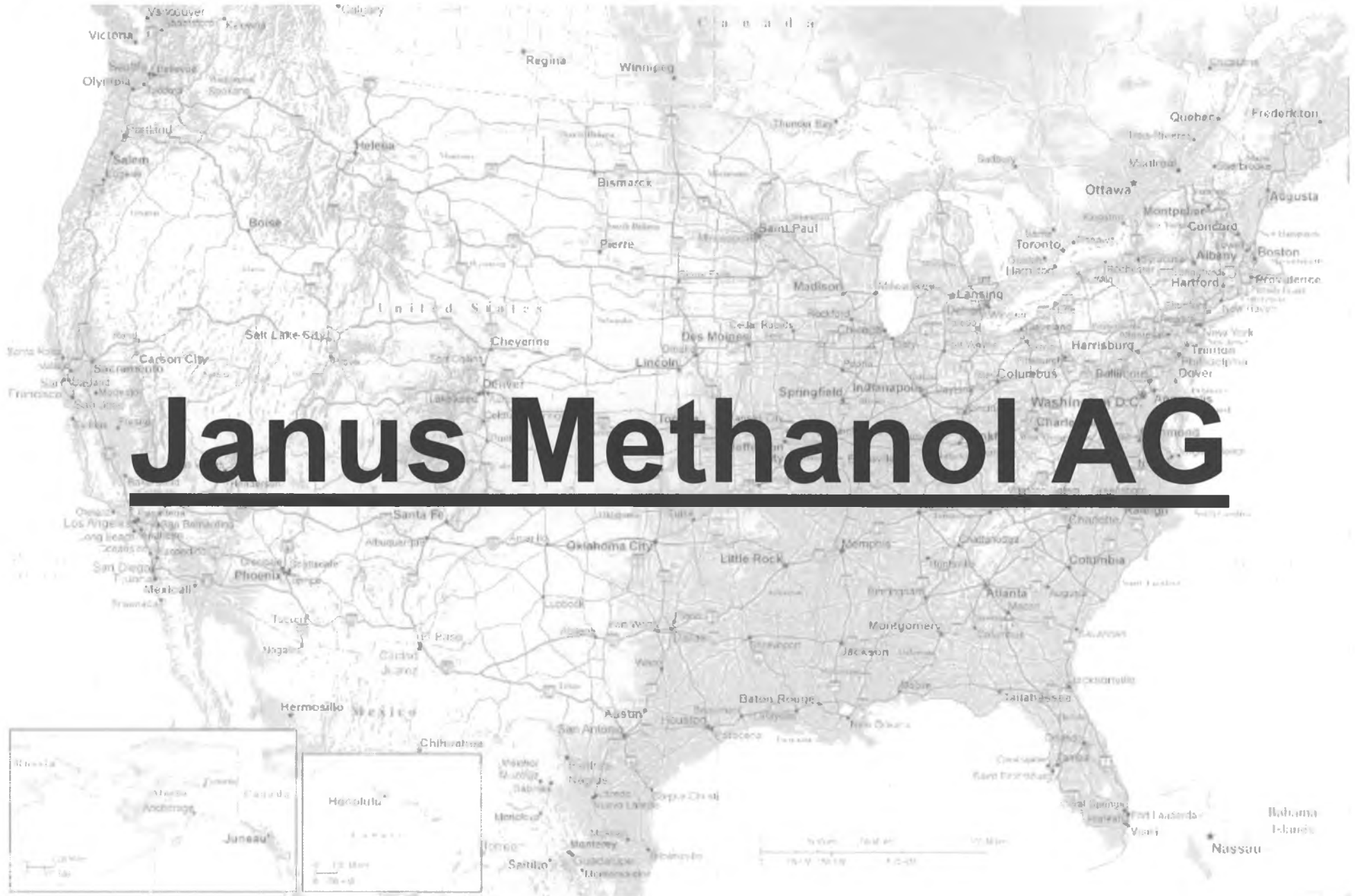
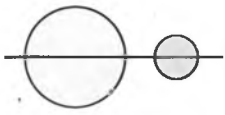
**4/15/11
PRESENTA-
TION:
GIGAMETHANOL
AND GAS TO
GASOLINE**

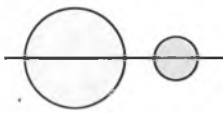
<TARGET><BILL></BILL><SUBJECT>4-15-11 PRESENTATION
GIGAMETHANOL AND GAS TO
GASOLINE</SUBJECT><COMM>HRES27</COMM></TARGET>



GigaMethanol and Gas to Gasoline

National Petroleum Refining Assoc
assoc
NPRA, San Antonio
March, 2011



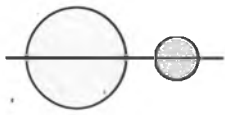


Janus Methanol AG

- Registered In Switzerland – a methanol and chemical development and operating Company

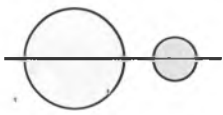


- Janus team consists of very experienced methanol players that have developed, financed, built, operated and marketed numerous plants
- Chairman – Mr. Deo van Wijk



Janus Methanol AG

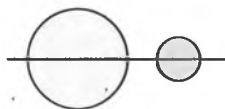
- **Mr. van Wijk formed Saturn in 1994 – built Titan and Atlas in Trinidad together with BP utilising Lurgi Technology**
- **Janus formed in 2007 – comprising approximately 30 people**
- **Top 10 people have 30+ years' experience each**
- **Worldwide experience comes from BP, Lurgi, Ferrostaal and MG**
- **Strong history of large scale projects in conjunction with Lurgi**

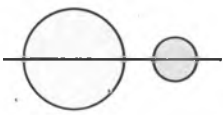


Our Experience in Trinidad & Tobago

2009







Definitions

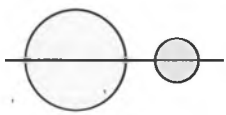
MegaMethanol® Technology

- 5 000 ton methanol per day in a single train
- ATLAS, the 1st MegaMethanol® project, developed and implemented in conjunction with Mr. van Wijk, Dr. Balthasar and Dr. Wagner
- Successfully operated in Trinidad (ATLAS), Iran (Zagros I & II) and Malaysia (Petronas)
- Presently four plants are in operation and two plants in construction/ erection (two trains in China after coal gasification)

*- Joint Venture
VAN Wijk
+ B.P.*

- TITAN 2500 tons

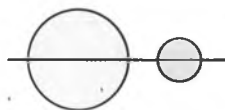
- 5,000 ton per day



Definitions

GigaMethanol Technology

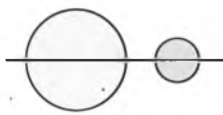
- 10 000 ton methanol per day in a single train configuration based on ATLAS
- Utilising Lurgi's sophisticated high-pressure ATR-technology and two stage methanol synthesis
- Economy of scale promises a significant reduction in specific investment cost compared to MegaMethanol technology



Definitions

GigaMethanol Project

- Consisting of two trains producing 20 000 ton methanol per day
- Second train is a 100 percent copy of the first, together with common utilities resulting in expected cost savings of 30 – 40 percent for the second train
- Resulting in a yearly production of 7 million ton methanol, representing 15 percent of today's world methanol production

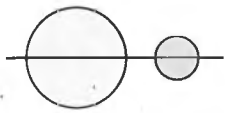


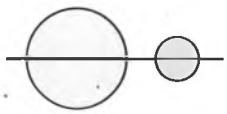
The ATLAS plant - the mother of MegaMethanol® and the foundation of GigaMethanol



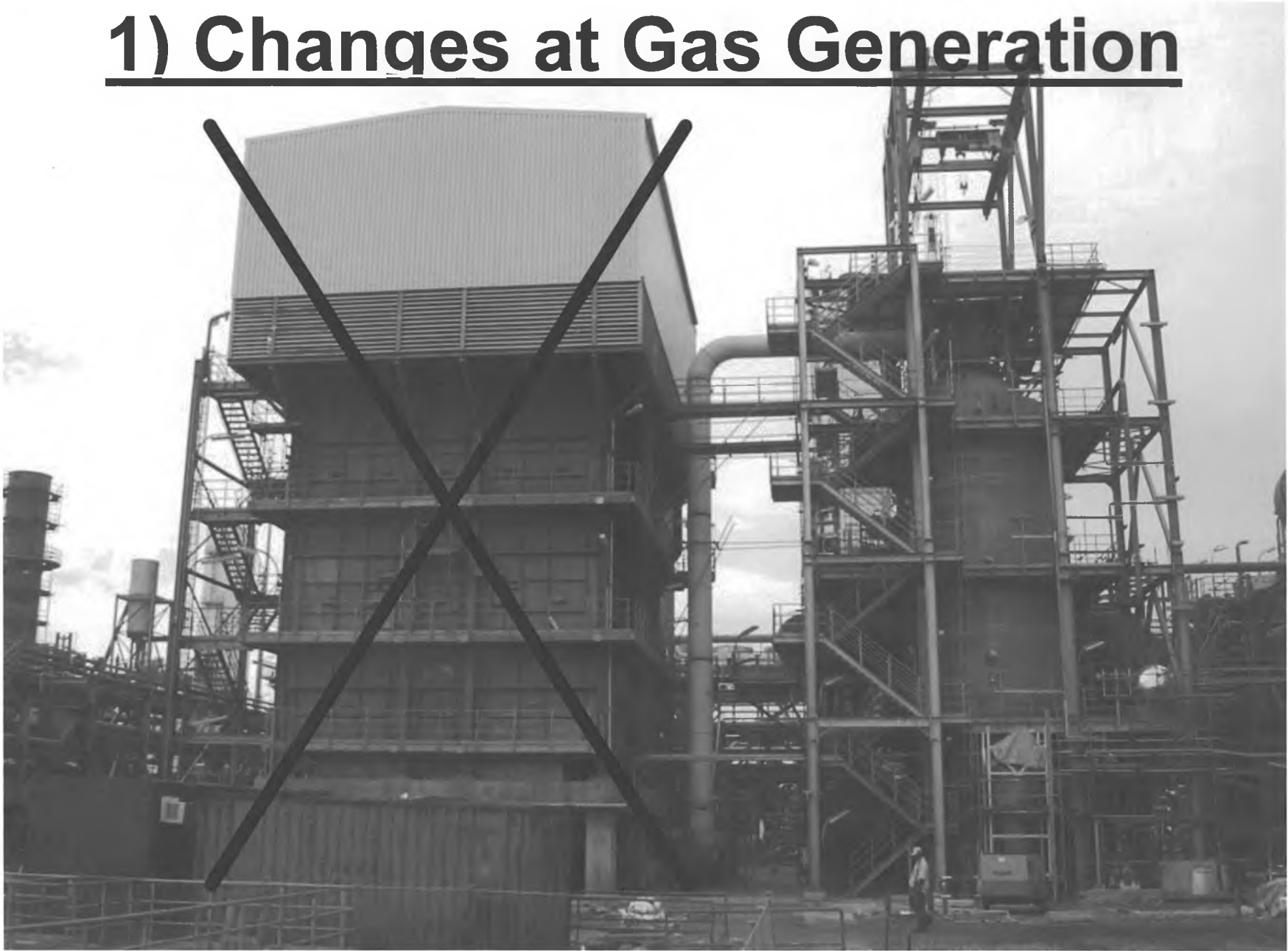
Plant located in Trinidad, one single train, design capacity: 5 000 tpd

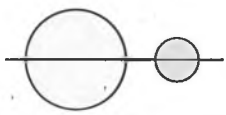
In 2008: 360 operational days at 108% of the design capacity





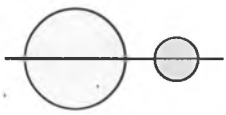
1) Changes at Gas Generation





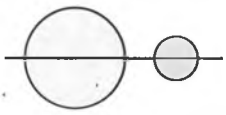
2) Changes at Methanol Synthesis





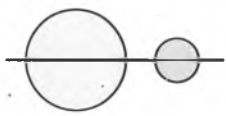
3) Changes at Distillation





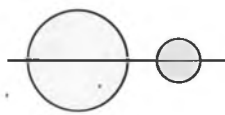
4) Changes at Syngas Compressor





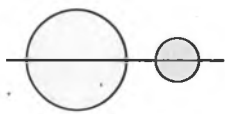
5) Changes at Fired Heater





6) Changes at Utilities/ Sea water Cooling



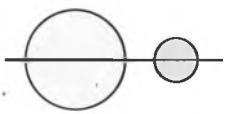


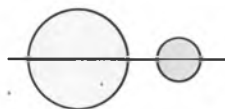
Summary GigaMethanol technology

In the sum:

With only *acceptable increased investment cost* the production can be increased from 5 000 tpd up to 10 000 tpd using equipment proven and utilised in the ATLAS plant!







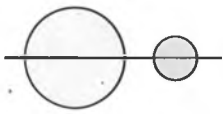
Conversion of Syngas into Petrochemicals

- Fischer-Tropsch

Known Methanol Conversion Technologies

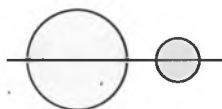
- Methanol to Gasoline (MTG)
- Methanol to Propylene (MTP)
- Methanol to Olefins (MTO)



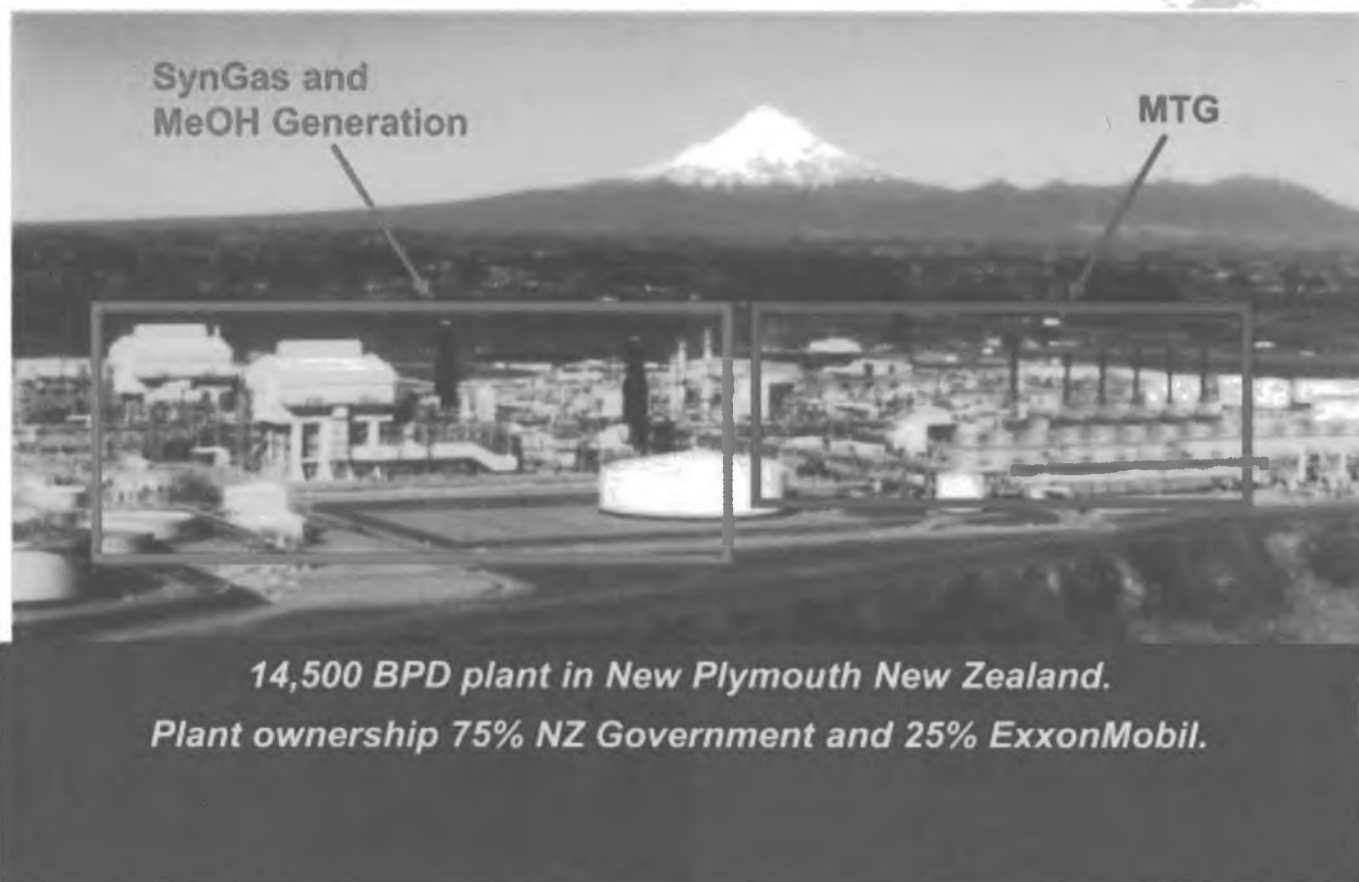


Methanol to Gasoline (MTG)

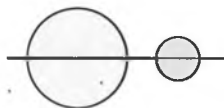
- Today the only proven methanol conversion technology
- Can be licensed from ExxonMobil
- Used in New Zealand in the past, improved significantly since that time
- In 2009 an optimised plant in Jincheng (China) started successfully and it is running well
- Chinese plant = reference for all MTG projects



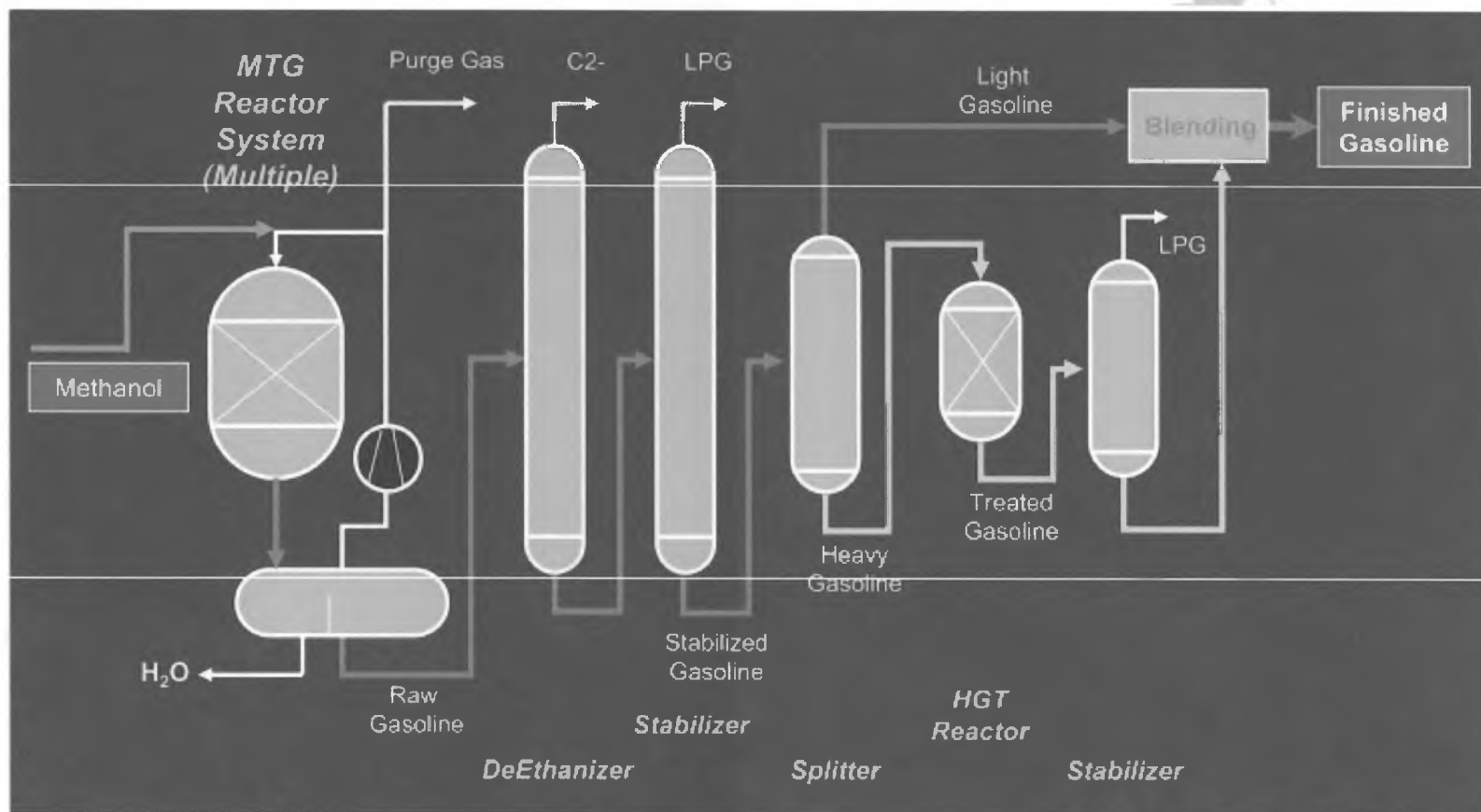
NEW ZEALAND MTG FACILITY: NEW PLYMOUTH NZ



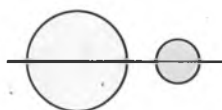
ExxonMobil
Research and Engineering



EMRE MTG PROCESS FLOW DIAGRAM



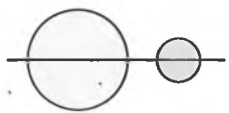
ExxonMobil
Research and Engineering



MTG REACTION PATH



ExxonMobil
Research and Engineering



2ND GENERATION MTG TECHNOLOGY

- Second Generation Design based on 10 years learning's from New Zealand operation
- Improved heat integration
- Improved process efficiency

Reduced capital cost

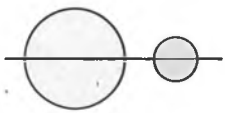
Reduced operating cost



ExxonMobil is the world leader in catalyst development and manufacture



ExxonMobil
Research and Engineering

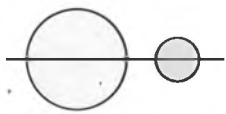


World's First Coal to Liquids Plant using MGT

- Jincheng Anthracite Mining Group (JAMG) plant in Shanxi Province China is the first 2nd generation MTG Plant

- The JAMG complex is demonstrating the coal to gasoline concept with Chinese gasification technologies

ExxonMobil
Research and Engineering

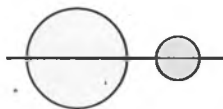


MTG YIELDS AND PROPERTIES/COMPOSITION

MTG GASOLINE YIELDS		
	Percent of Feed	Percent of Hydrocarbon Product
Gas	1%	2%
LPG	5%	11%
Gasoline	38%	87%
H ₂ O	56%	-

MTG GASOLINE PROPERTIES/COMPOSITION	
Octane, RON	92
Octane, MON	82
(R+M)/2	87
Paraffins, vol%	53
Olefins, vol%	12
Napthenes, vol%	9
Aromatics, vol%	26
Benzene, vol%	0.3
Sulfur	nil

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Research and Engineering



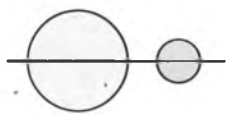
MTG GASOLINE VS. U.S. CONVENTIONAL GASOLINE

- MTG Gasoline is completely compatible with conventional gasoline
- MTG Gasoline contains essentially no sulfur and low benzene

	2005 Summer	2005 Winter	MTG Gasoline	US Regulation
API Gravity	58.4	61.9	61.8	
Aromatics (%Vol)	27.7	24.7	26.5	
Olefins (%Vol)	12	11.6	12.6	
RVP (psi)	8.3	12.12	9	
T50 (F)	211.1	199.9	201	
T90 (F)	330.7	324.1	320	
Sulfur (PPM)	106	97	0	30
Benzene (%Vol)	1.21	1.15	0.3	1 (0.62)

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Research and Engineering

11



F-T & MTG COMPONENT YIELDS

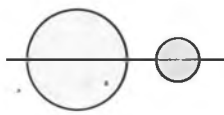
Components	Fischer-Tropsch Co Catalyst @ 220 C	Fischer-Tropsch Fe Catalyst @ 340 C	MTG
Fuel Gas	6	15	1.1
LPG	6	23	10.0
Naphtha	19	36	
GASOLINE			88.8
Distillate/Diesel	22	16	
Fuel Oil/Wax	46	5	
Oxygenates	1	5	

- F-T yields depend on catalyst, temperature and specific technology
- F-T processes produce a range of hydrocarbons and oxygenates that require refining processes to convert F-T liquids to conventional fuels
- MTG produces a conventional gasoline and an LPG stream

Data Sources: Sasol 2004 publication.

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23



20,000 ton/day methanol

\$2.6 b / 5.2b North Dakota

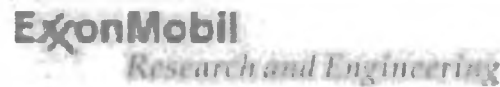
2009 NRC STUDY: LIQUID TRANSPORTATION FUELS FROM COAL / BIOMASS

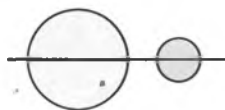
F-T & MTG ECONOMIC COMPARISON

		Fischer-Tropsch No CO ₂ Capture	Fischer-Tropsch With CO ₂ Capture	MTG No CO ₂ Capture	MTG With CO ₂ Capture
INPUT	Coal, tpd (as received)	26,700	26,700	22,900	23,200
OUTPUTS	Diesel, bpd	28,700	28,700		
	Gasoline, bpd	21,290	21,290	50,000	50,000
	Total Liquid Fuel, bpd	50,000	50,000	50,000	50,000
	Electricity, MW _e	427	317	145	111
THERMAL EFF. (LHV)		49.1%	47.6%	54.2%	52.9%
TOTAL PLANT COST (\$M)		4,880	4,950	3,940	4,020
TOTAL PLANT COST (\$K/bpd)		97.6	98.9	78.8	80.4
EST. BREAKEVEN CRUDE PRICE (\$/BBL)		56	68	47	51

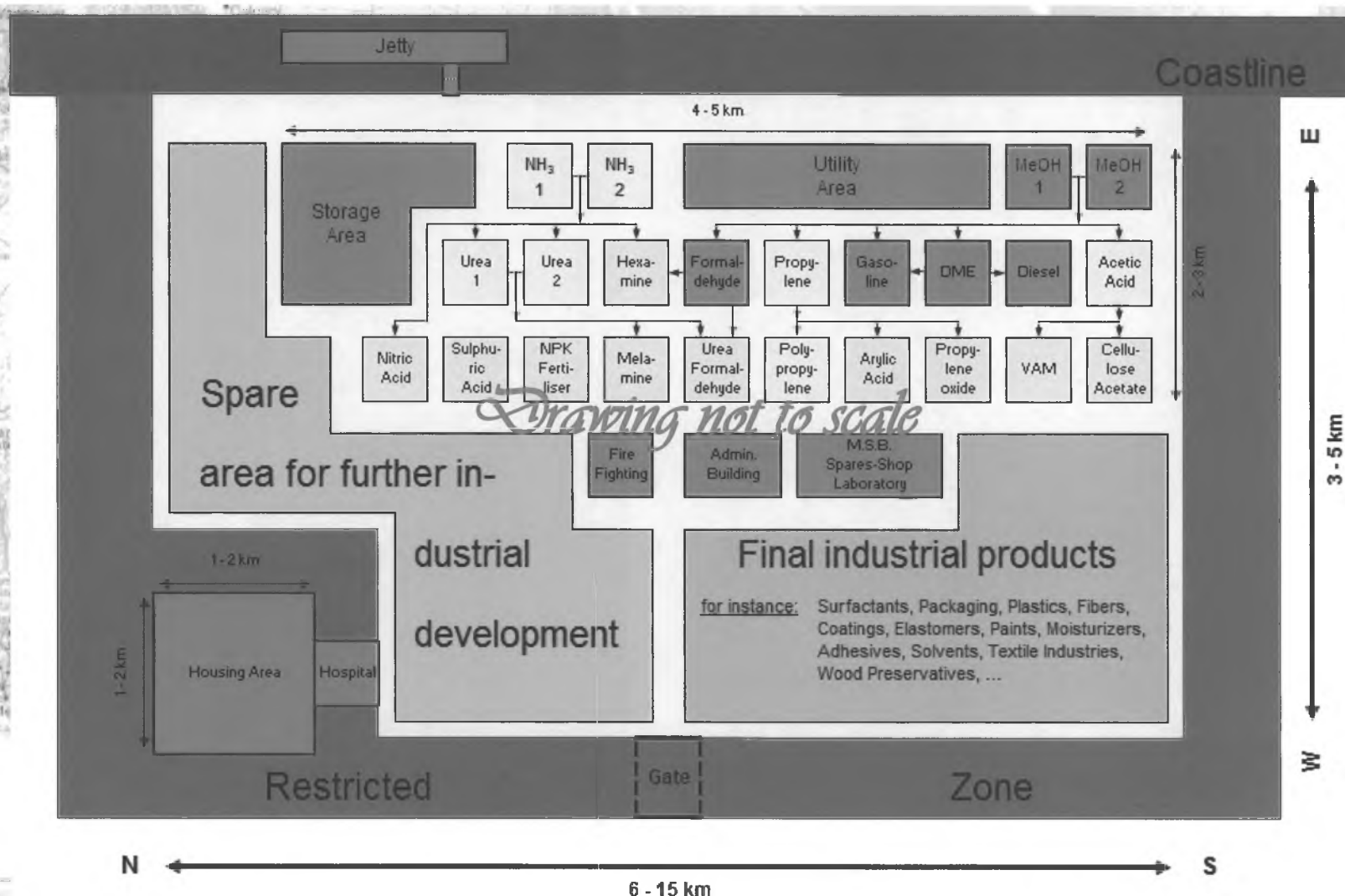
- The study indicated the MTG based plant had slightly higher overall efficiency and lower construction costs
- CO₂ Sequestration lowered efficiency by about 1.5% and raised costs 1.5-2%

Data Sources: Liquid Transportation Fuels from Coal and Biomass. © National Academy of Sciences, 2009. <http://www.nap.edu/catalog/12620.html>





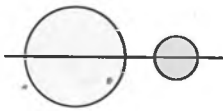
Natural Gas-Based Industrial Complex



MeOH = Methanol, 1+2 = 20,000 tpd
 NH₃ = Ammonia, 1+2 = 10,000 tpd
 Urea = Fertiliser, 1+2 = 6,000 to 8,000 tpd

DME = Dimethyl ether (fuel)
 VAM = Vinyl acetate monomer
 Utilities = Electrics, Water (drinking, raw, cooling, demin),
 O₂ and N₂, Instrument air

First Phase
 Second Phase
 Third Phase



North Slope 100% over Gulf Coast

Investment \$ 2.6 billion, producing 3.0 million ton of premium unleaded, depreciation over 15 years p/mt

\$ 58.00 116.0

R.O.I. 20% over 2.6 billion

- 173.00 347-

Tax at 35% (\$ 173.00 times 1.54 growth up times 35%)

\$ 533 {
- 93.00 186-

Oxygen at \$ 18.00 per ton of MeOH

- 42.00 84-

Personal ²²⁵ ~~400~~ people at \$ ^{150,} ~~200,~~000 p.p.

- 9.00 11.25

Other Operating expenses \$ 100 mio per annum

- 33.00 49.50

Catalyst (for MeOH and MTG)

p.A \$ 550. = mio

- 12.00 15.25

Total

\$ 420.00 p/mt \$ 810.

	P/mt	P/g	
Cost	\$ 277	\$ 0.752	
MARGIN	- 347	- 0.946	} \$ 1.453
TAX	- 186	- 0.507	
SP	\$ 810.	\$ 2.205	+ NG.

\$ 810 P/mt = \$ 2.21 + NG

Royalty 12% at \$ 2. = =>
3 TRAINS => \$ 87.5 mio
(350 stream days)

We have 367 gallons in 1 mt of gasoline or gallon

\$ 1.144 cts per

We need 80 MM/BTU per mt of gasoline

Price for natural gas \$ 2.00 MM/BTU or \$ 160.00 p/mt or \$ 0.436 p/g

"				-	1.580	2.64
	3.00	- 240.00	- 0.654	-	1.798	" 2.859
	4.00	- 320.00	- 0.872	-	2.016	" 3.077
	5.00	- 400.00	- 1.090	-	2.234	" 3.295
	6.00	- 480.00	- 1.308	-	2.452	" 3.513
	7.00	- 560.00	- 1.526	-	2.670	" 3.731
	8.00	- 640.00	- 1.744	-	2.888	" 3.949
	9.00	- 720.00	- 1.962	-	3.106	" 4.167
	10.00	- 800.00	- 2.180	-	3.324	" 4.385

533 \$1.45

Of course it should be noted that we have 20 % return after tax on the investment, which amounts to \$266.00 p/mt or \$0.725 cts p/g. Which I believe is a healthy buffer.

minimum 640 m/day

BP in Trinidad.

15 billion ^{cap} \$ in T_{max}

20,000 = 7 mil ton/yr.

Total world = 49 mil ton

Methanol & Gasoline 1982

Steam reformer 25% of cost
removal allows 65 bars

Sea water max 3° intake & discharge

Atlas 600\$/ton capacity
20000 \$300/ton/yr. \$26. US

7 mil ton Meth \Rightarrow 1200°

3 mil ton Gas 4 mt water Potable

incl.

35% of Gross Rev AK tax est.

1 mt \Rightarrow 367 gal metan

2.65/gal - 2.85 incl 145 margin
\$1.20

80% cost is methanol port

4.56 cf gas \Rightarrow 14 plants $\begin{matrix} 320,000 \\ 640,000 \end{matrix} \Rightarrow 140,000$
methanol \Rightarrow 1.2 mill bls/day
yield 43% 450,000 gasoline/day

30% methanol wont freeze
ship to valley \Rightarrow gasoline

~~36 months~~
36 months + 2 yrs profit

~~40 acres/train~~
40 acres/train