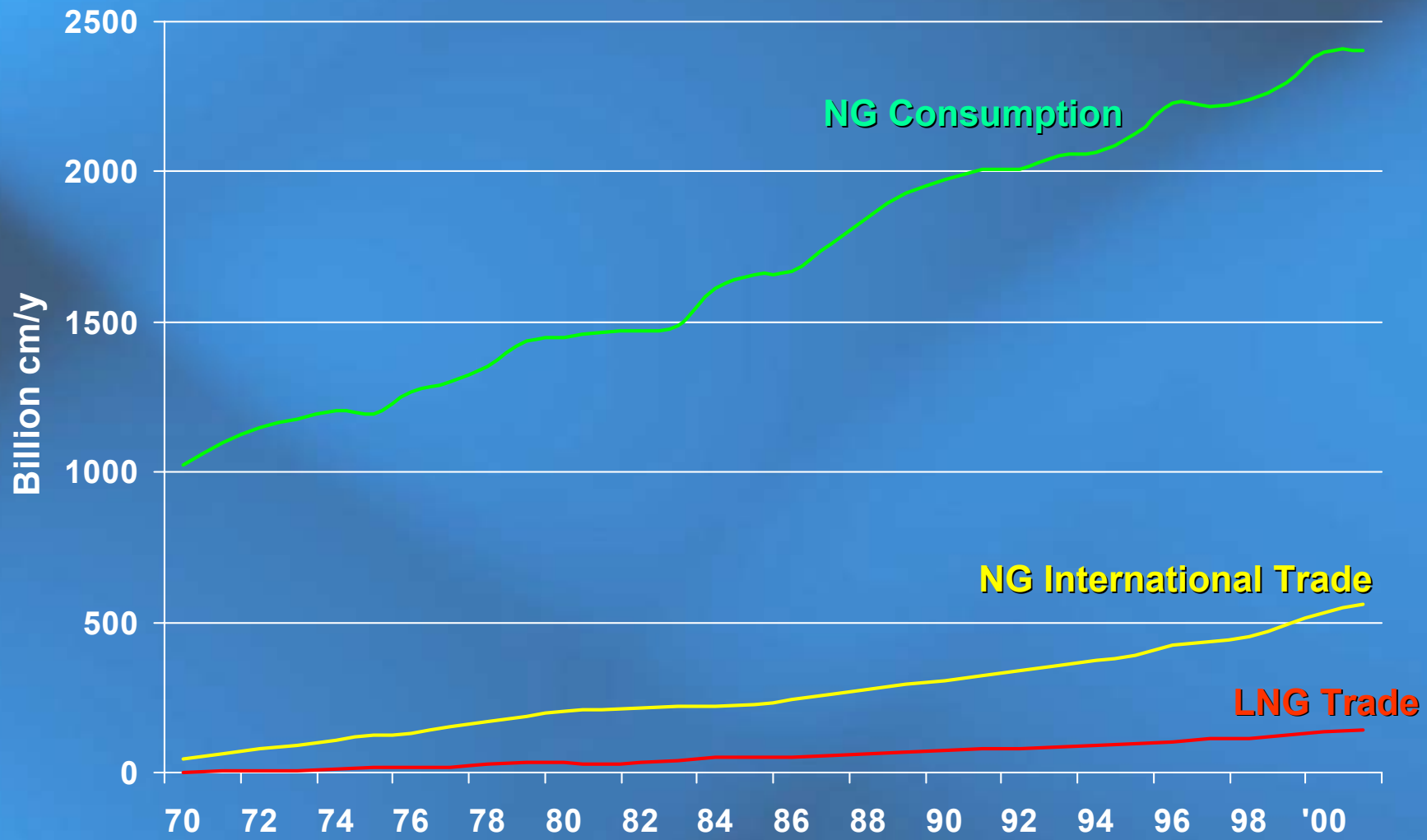
TECHNIP-COFLEXIP

LNG PLANT PRICING CONSIDERATION

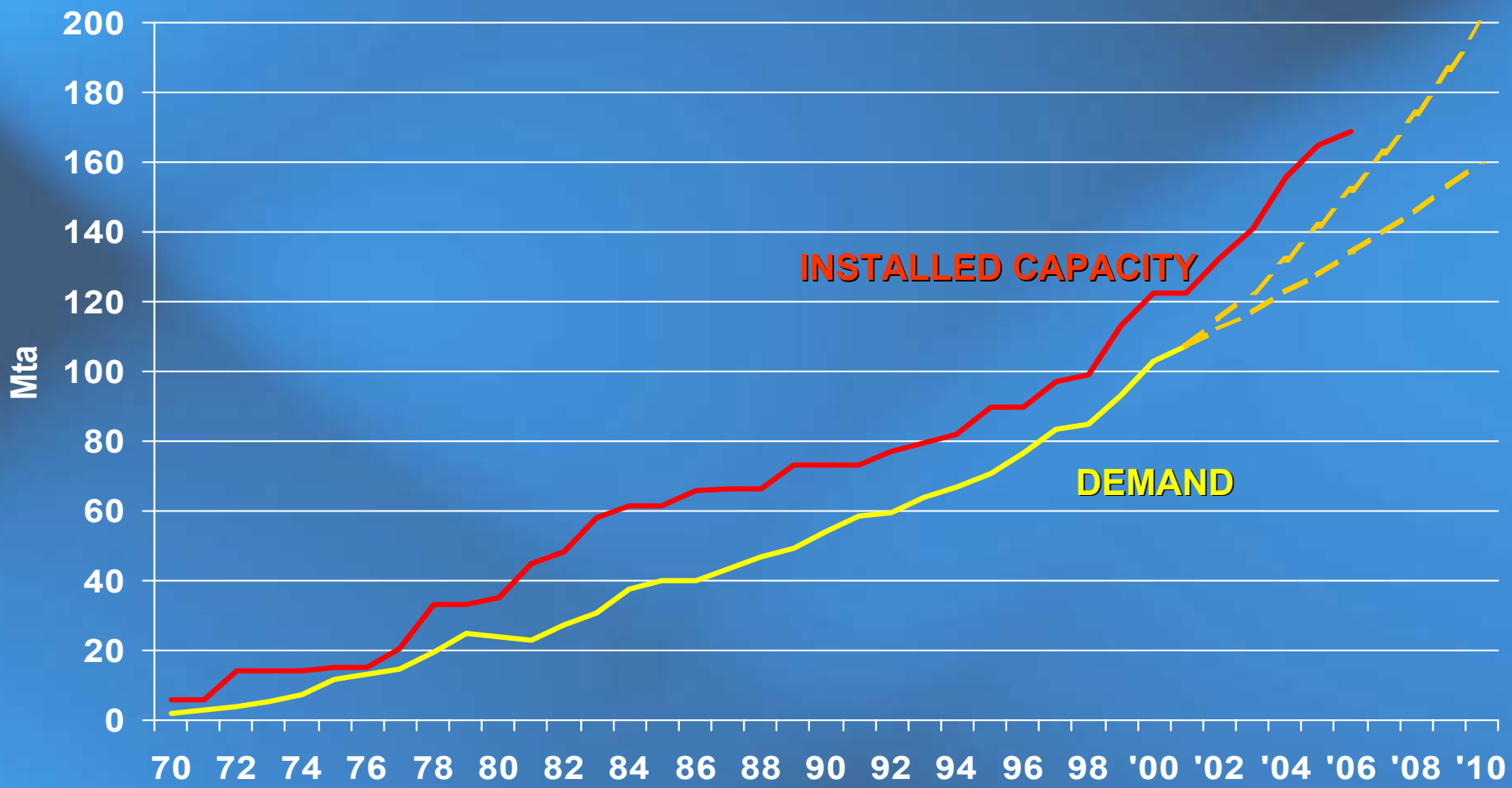
BRIEF HISTORY OF LNG

- ???? : first liquefaction of methane by ???
- 1917 : Liquefaction of gas to extract helium (Texas)
- 1920/30s : LNG produced to store natural gas in USA
- 1944 : major accident in Cleveland peak shaving
- 1950s : start of new era of development
- 1959/60 : trial runs of Methane Pioneer from USA to UK
- 1964 : Camel plant (Algeria) commissioned, first commercial deliveries to UK and France
- 2001 : annual LNG trade of 107 mt (+ 7.5% over last 20 years)

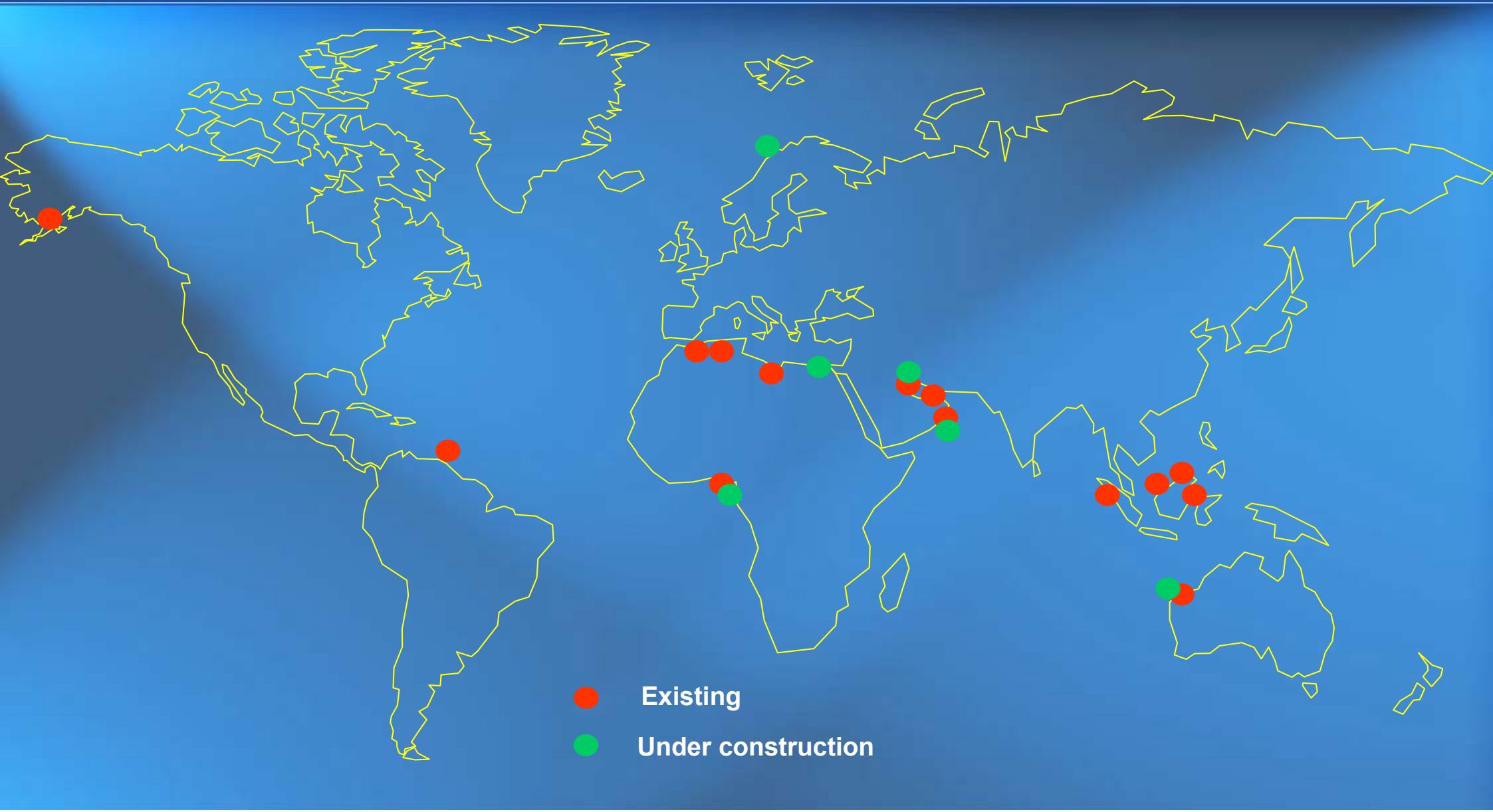
NATURAL GAS AND LNG TRADE



LNG DEMAND VERSUS INSTALLED CAPACITY

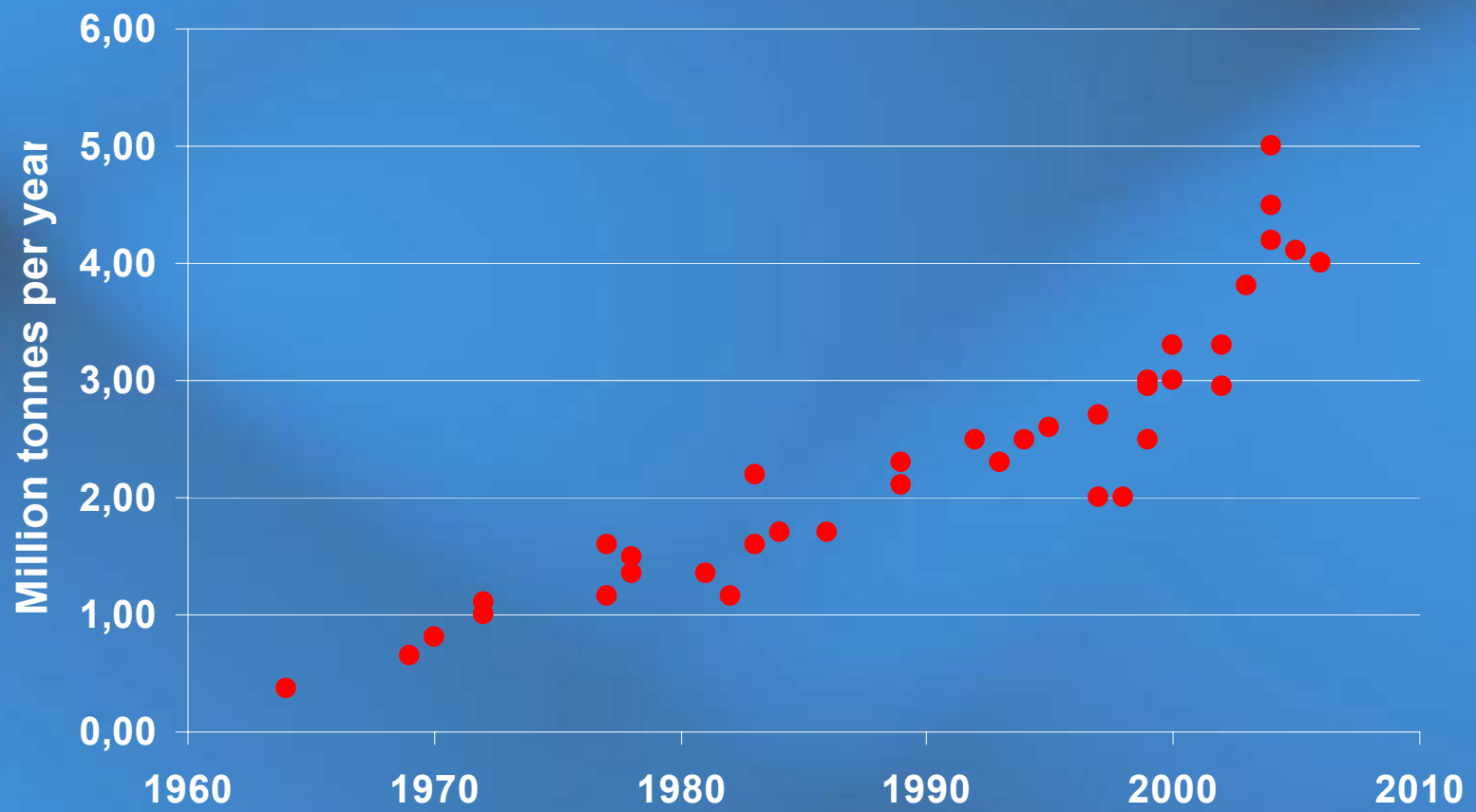


LOCATIONS OF LNG PLANTS

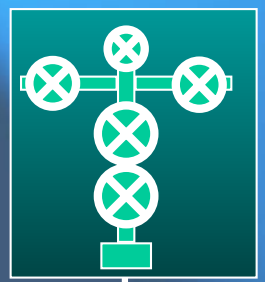


TECHNIP-COFLEXIP

EVOLUTION OF TRAIN CAPACITY



TYPICAL BLOCK DIAGRAM



C3 C4 Gasoline

FRACTIONATION

ACID GAS REMOVAL

DEHYDRATION AND MERCURY REMOVAL

LIQUEFACTION

NITROGEN REMOVAL

LNG STORAGE AND LOADING

SULPHUR RECOVERY

REFRIGERATION

MAIN LIQUEFACTION TECHNOLOGIES

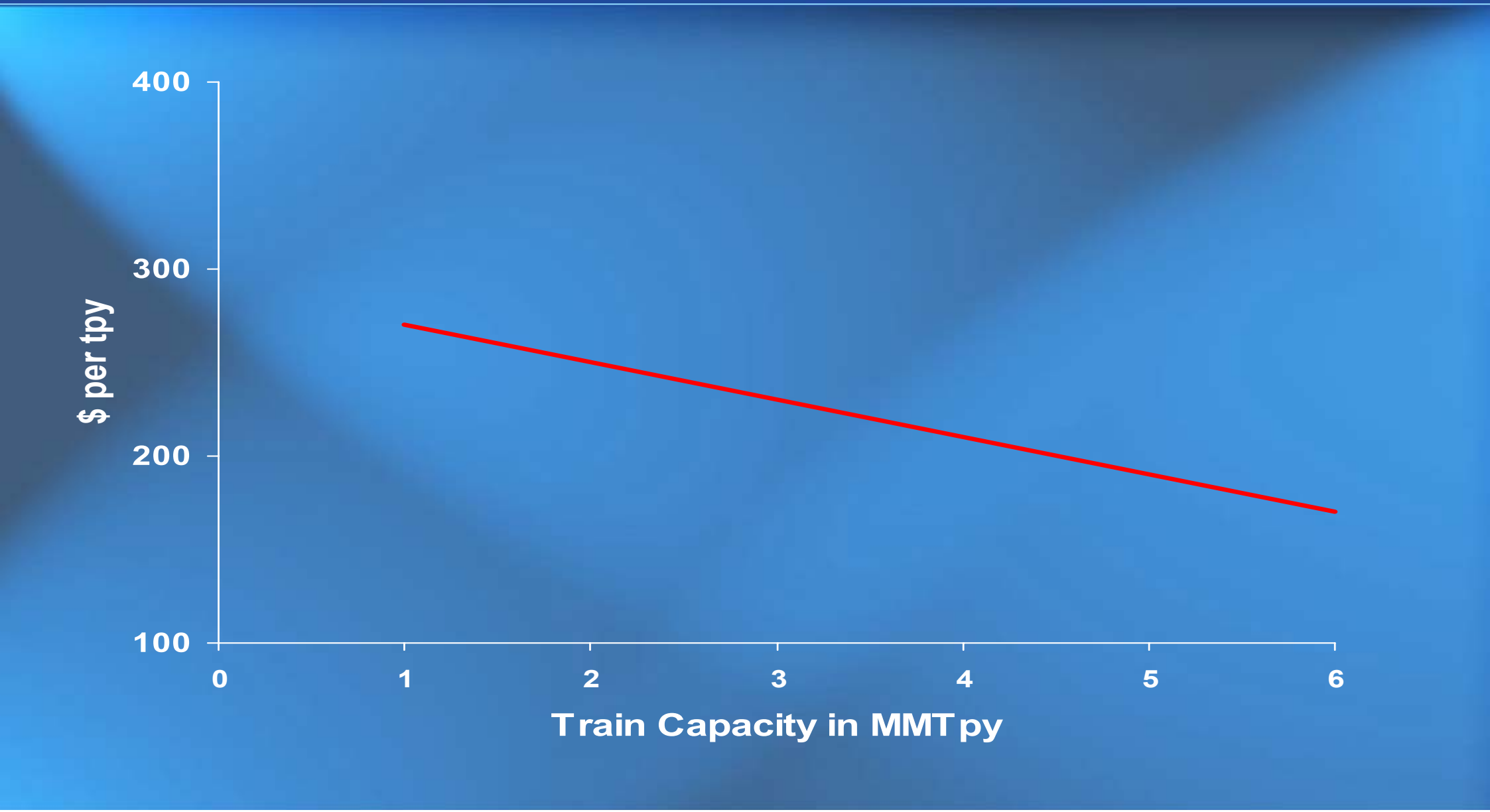
- A.P.C.I. - C3/MR : 57 trains in operation + 7 under construction
- PHILLIPS - Optimised Cascade : 3 trains in operation (Trinidad & Tobago) + 1 under construction (Idku – Egypt)
- STATOIL/LINDE - MFCP : 1 train under construction (Snohvit - Norway)
- AXENS - LIQUEFIN : No reference
- SHELL – DMR : 2 trains in project (Sakhalin)

TYPICAL PRICE BREAK –DOWN OF A TWO TRAIN LIQUEFACTION PLANT

- **LNG PRICES**
  - Plant cost $/tpy versus year of commissioning
  - Unit cost $/tpy versus year of commissioning
  - Plant Cost s/tpy versus train capacity
  - Price Break down of a two train liquefaction plant

PLANT COST $/TPY VERSUS YEAR OF COMMISSIONING

PLANT COST $/Tpy VERSUS TRAIN CAPACITY



TRAIN COST VERSUS YEAR OF COMMISSIONING

TYPICAL PRICE BREAK –DOWN OF A TWO TRAIN LIQUEFACTION PLANT

▪ 2 TRAINS	45 %	to	65 %
▪ UTILITIES	8 %	to	15 %
▪ OFF SITE	20 %	to	40 %
▪ COMMON	7 %	to	10 %
TOTAL LNG PLANT	100 %		
OTHERS	15	to	30 %
TOTAL LNG PROJECT	115 %		130 %

TYPICAL PRICE BREAK –DOWN OF A TWO TRAIN LIQUEFACTION PLANT

- 2 TRAINS

	Mini	Maxi	Criteria
Common/inlet facilities	1 %	10 %	Project Definition
Acid Gas removal	3 %	8 %	Gas composition
Dehydration	2 %	3 %	
Mercury removal	1 %	1 %	
Refrigeration/Liquefaction	25 %	40 %	Cooling system
			Compressors configuration
Fractionation		1 %	3 %
Sulphur recovery/prilling	0 %	3 %	
TOTAL	45 % to	65 %	

TYPICAL PRICE BREAK –DOWN OF A TWO TRAIN LIQUEFACTION PLANT

- **UTILITES**

	Mini	Maxi	Criteria
Power Generation :	3 %	7 %	Gas or steam turbine
Cooling water :	2 %	6 %	Cooling system (air – water – seawater)
Other Waters, Steam, Fuel, Air, Nitrogen :	3 %	6 %	Project definition,sparing philosophy
TOTAL	8 % to	15 %	

TYPICAL PRICE BREAK –DOWN OF A TWO TRAIN LIQUEFACTION PLANT

- **OFF SITE**

	Mini	Maxi	Criteria
LPG Storage & Loading	10 %	20 %	Storage capacity & tank specification
LPG Storage & Loading	0 %	13 %	Project definition
Condensate Storage & Loading	0 %	2 %	Project definition
Loading Jetty	4 %	8 %	Sea and Site conditions
Flare & Liquid blow-down	3 %	5 %	
Others Fire protection Drainage, Waste tr.	3 %	4 %	
TOTAL	25 %	to 40 %	

TYPICAL PRICE BREAK –DOWN OF A TWO TRAIN LIQUEFACTION PLANT

- **COMMON**

	Mini	Maxi
Site infrastructure, road & fences	2 %	4 %
Control room - Substations	2 %	2 %
DCS, ESD,FG & Telecom	2 %	3 %
Administration, maintenance buildings	2 %	3 %
TOTAL	7 % to	10 %

TYPICAL PRICE BREAK –DOWN OF A TWO TRAIN LIQUEFACTION PLANT

- **OTHERS**

	Mini	Maxi	Criteria
Gas pipeline	1MM$ per Km		On project definitions
Site Preparation	2 %	5 %	Site conditions
Material Off Loading – Airport	2 %	6 %	Remote area
Residential area	4 %	8 %	Client requirement
Spare parts	2 %	5 %	Client requirement
Movables	2 %	4 %	Client requirement
Training & Start-up	1 %	2 %	Take over definition
TOTAL	15 % to	30 %	

THE TRENDS

- **CONTINUOUS INCREASING OF THE UNIT CAPACITY :**

  8 Mty are now considered

  - New Process developments : APCI – APX, AXENS, Others
  - New Driving Machines
    - Frame 9 Gas Turbine (3,000 rpm)
    - Electric Motors
  - New 3,000 rpm compressors
  - New Unit lay out

- **TANKS CAPACITY UP TO 200,000 m3 ARE CONSIDERED**
- **ENVIRONMENTAL CONCERN**
  - Acid Gas Re-injection
- **LNG FLOATING PLANT ON BARGE (FLNG)**