



# ***LNG Outlook***

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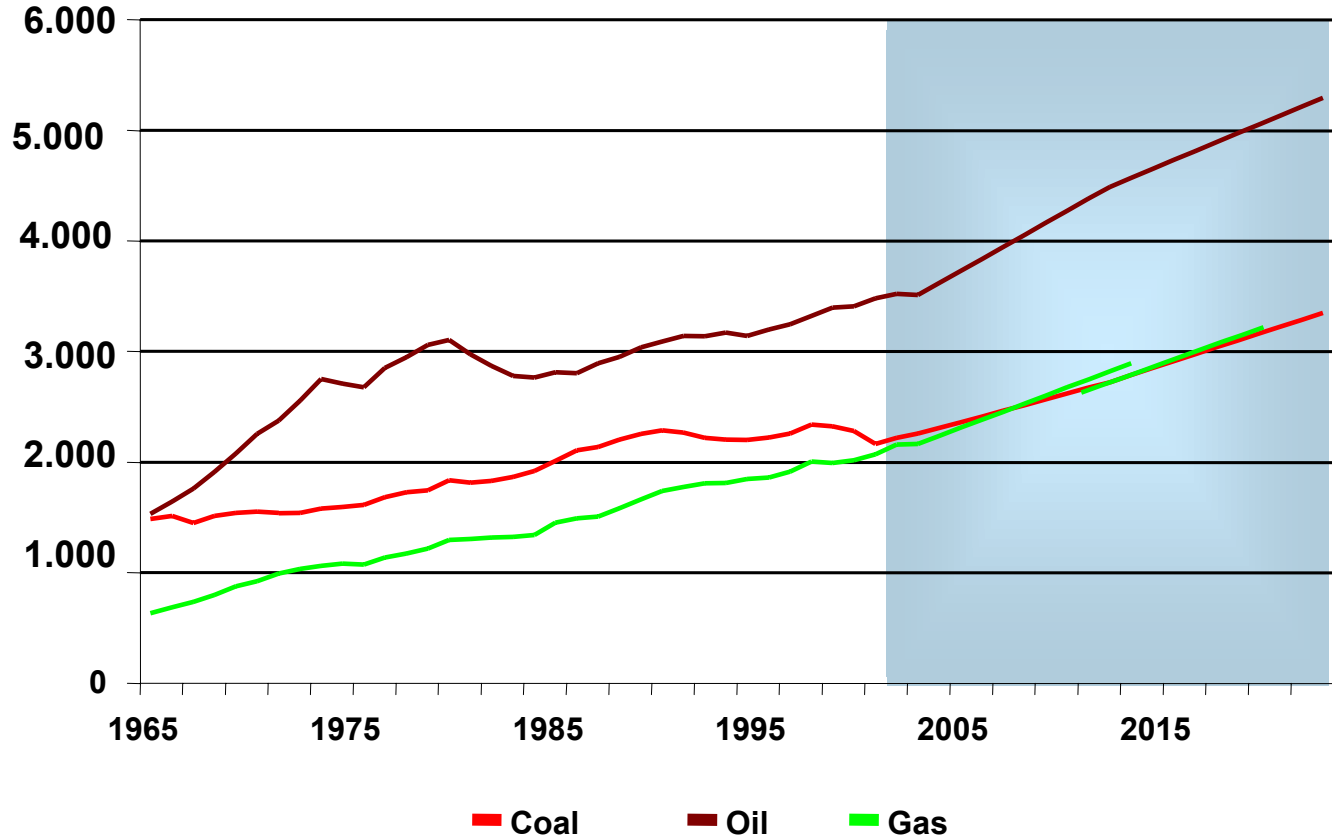
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# Natural gas market is growing



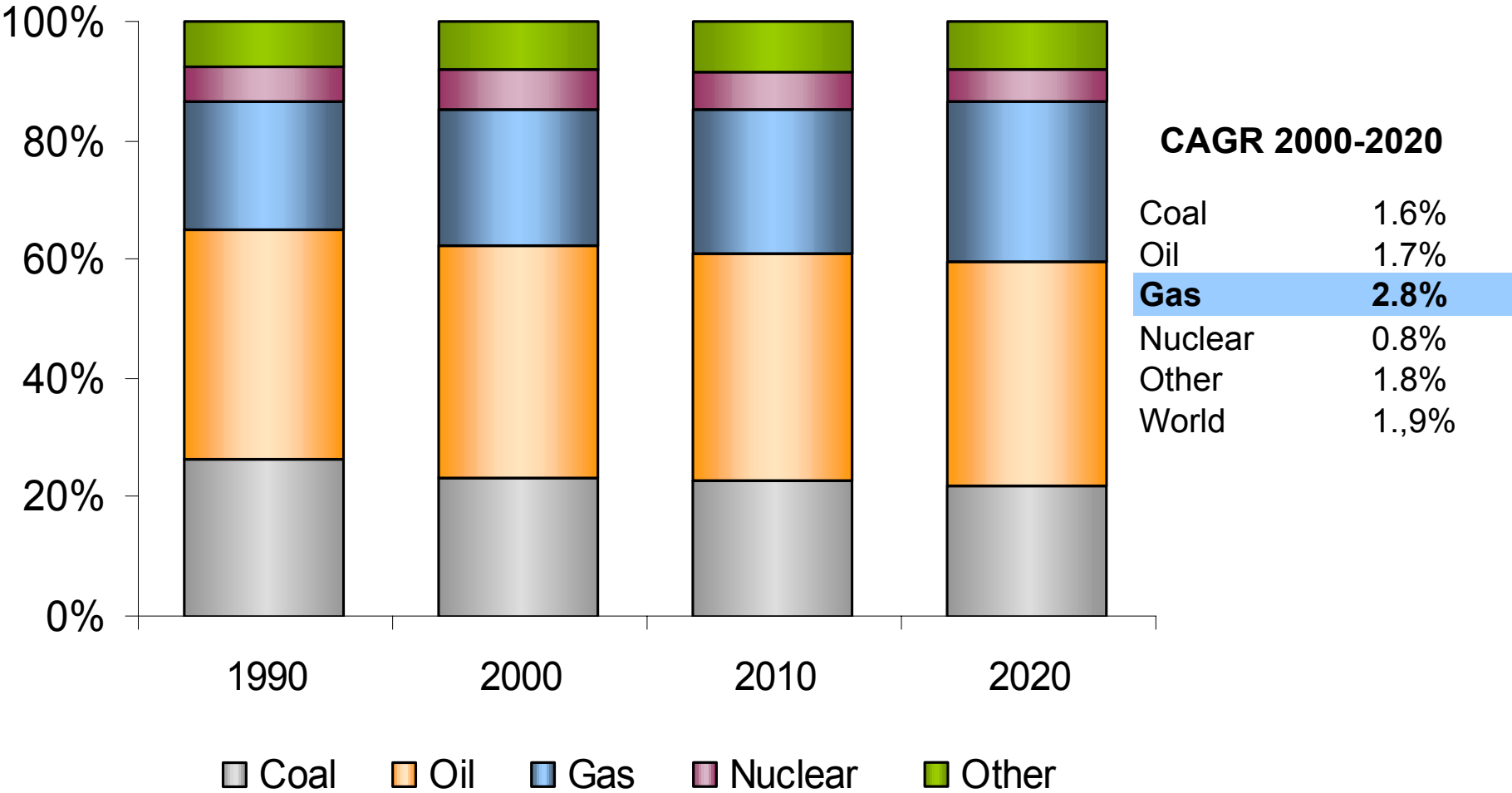
- Natural gas offers further growth potential. Natural gas will become the second fuel even without considering new technical developments

World energy consumption (Mtoe)



Source: EIA

# World energy mix evolution

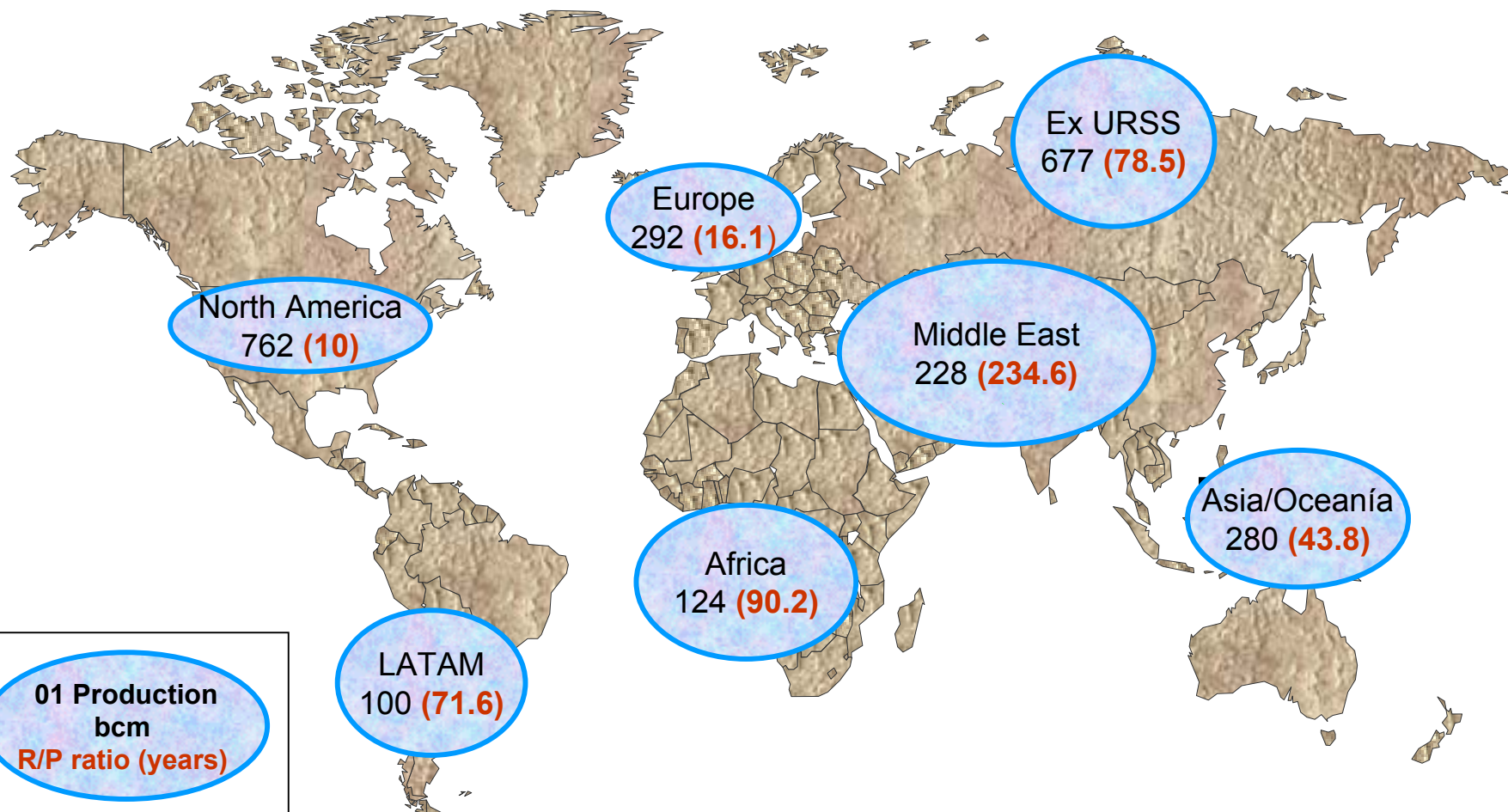


Source: IEA

# USA and Europe will be more dependent on gas imports



- R/P ratio in main consumption areas show the need for increasing gas imports in the future

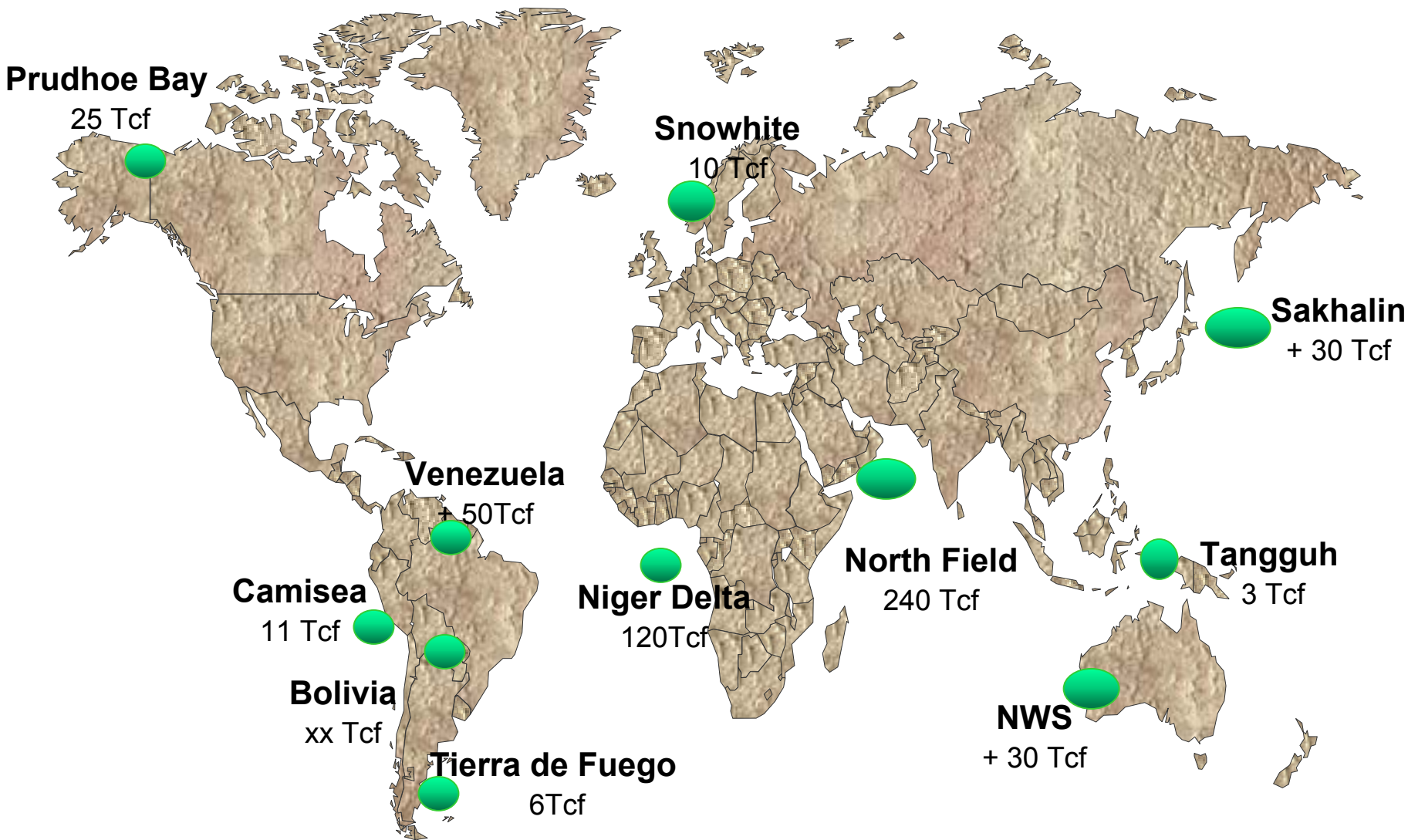


01 Production  
bcm  
R/P ratio (years)

# Cost structure limits the development of gas reserves



- High costs along the chain have traditionally delayed the development of stranded gas reserves for LNG projects.

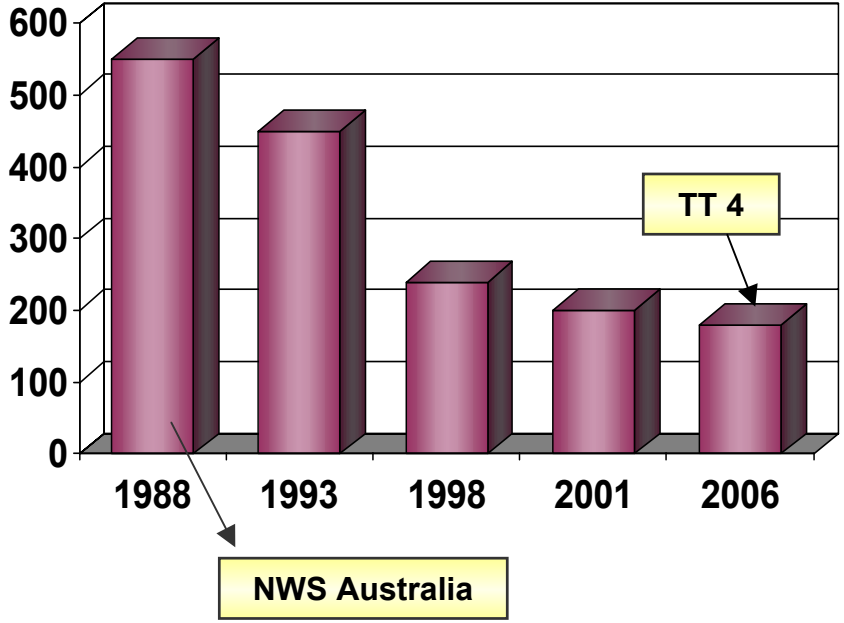


# But costs have been decreasing ...

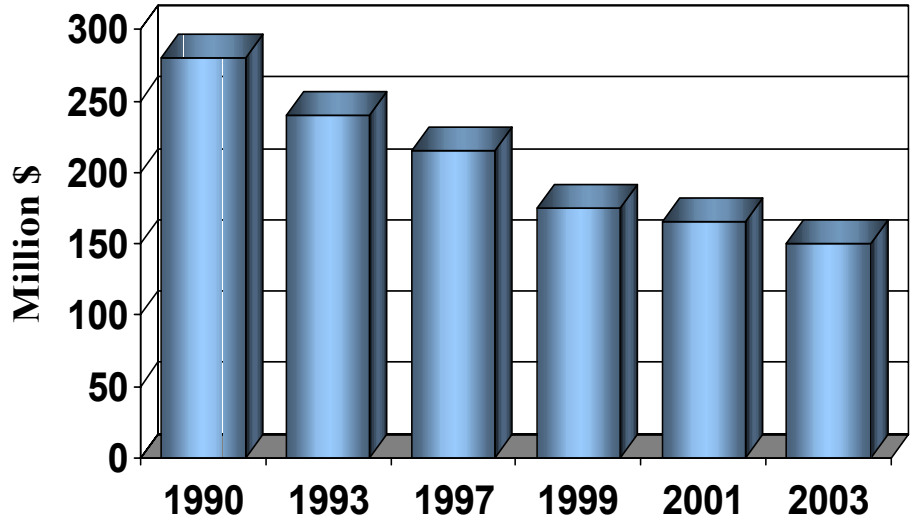


- Liquefaction cost has decreased more than 60%
- Cost of new vessels is 40% lower as a result of increased capacity in Far East, competition between shipyards and technologies. Strong demand pressure has prevented an even sharper reduction

\$/Ton Liquefaction capacity



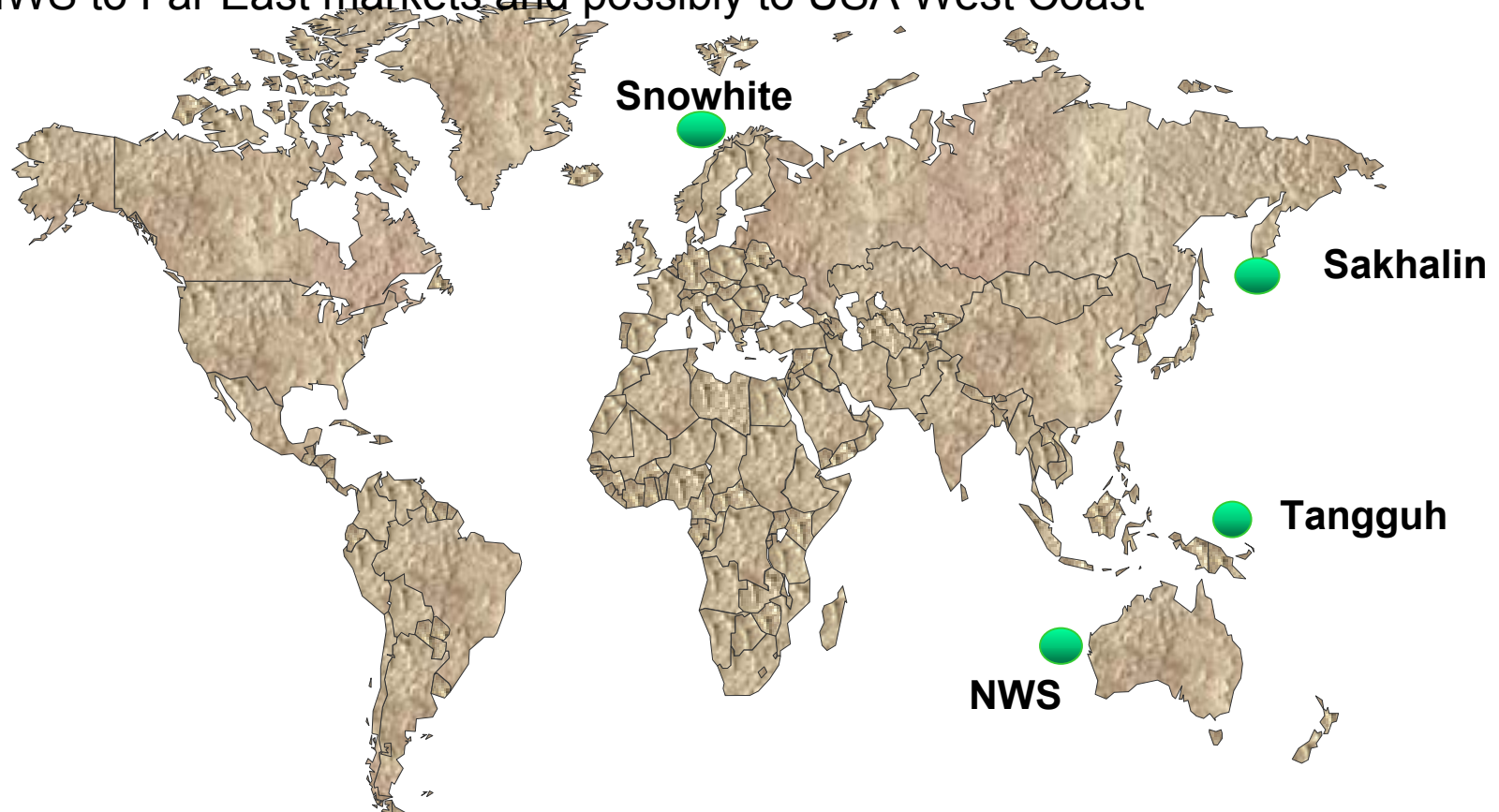
Capex vessel 135.000 m3



# ... and new projects have been launched



- Developments in LNG will allow commercial exploitation of those reserves:
  - Snowwhite (Norway) directed to USA (Cove Point) and European (Spain) markets
  - Sakhalin to Japan and possibly to USA West Coast
  - Indonesia (Tangguh) to South Korea
  - NWS to Far East markets and possibly to USA West Coast







## Gas monetisation

- Facilitates and ensures the development of equity gas

## Chain control Optionalities

- Cross-market arbitrage opportunities
- Additional margins from inefficiencies and restrictions in the chain ( i.e. shipping)
- Improves negotiating position with suppliers

## Cost reduction

- Transportation costs optimization
- Flexibility

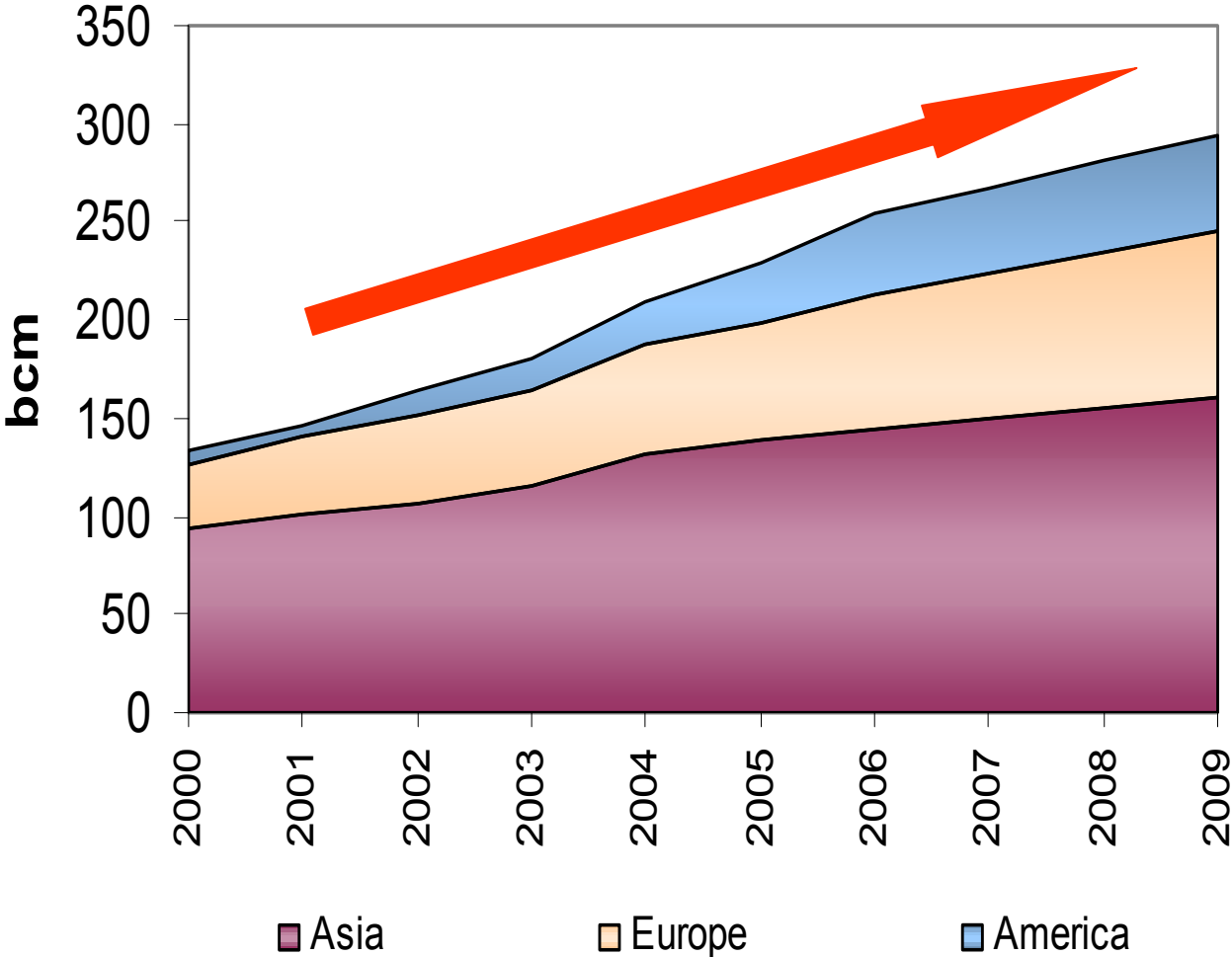
## Access to high value markets

- Access to high value market
- Integration gas/power
- Spot opportunities
- Facilitates hedging

# Global LNG demand & supply



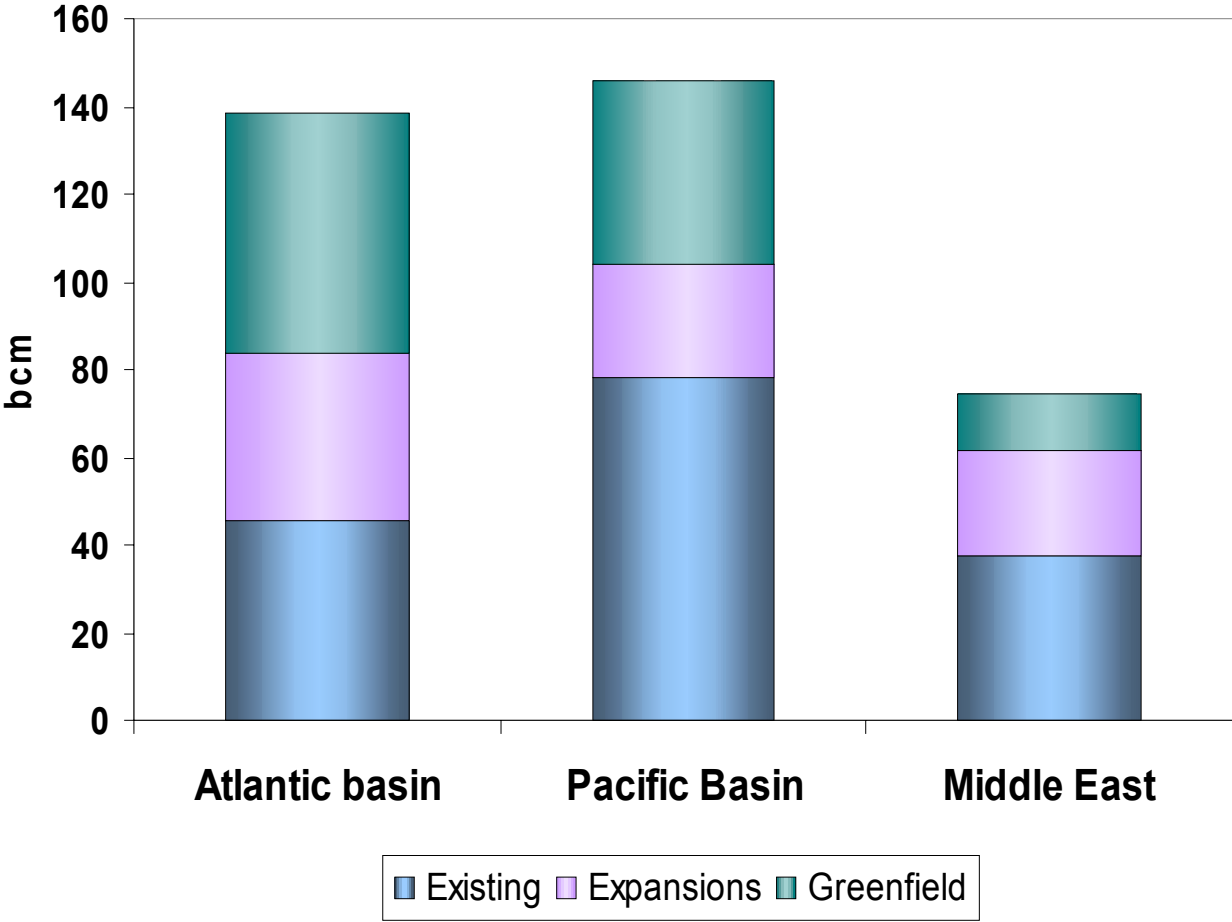
## LNG Demand



- **Expected CAGR 12% for next years**
- **Strong demand in existing markets (Japan, Korea, Mediterranean, USA) and new markets (India, China, Caribbean)**

Source: EIA, WoodMcKenzie

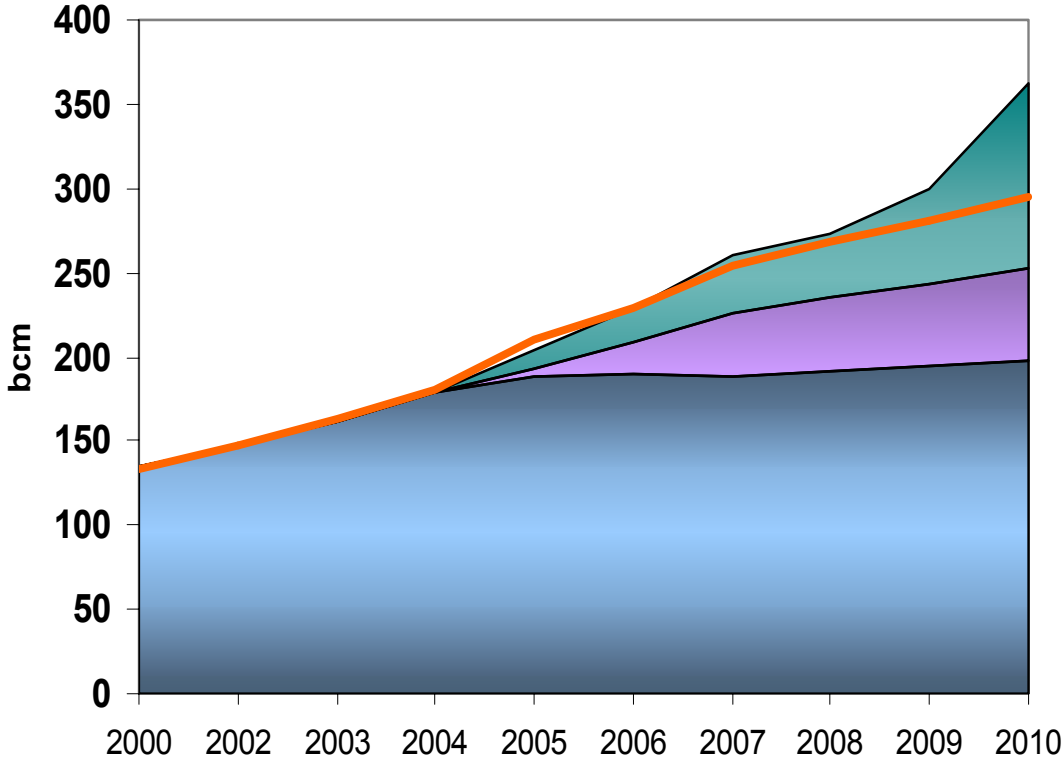
## LNG Supply Projects Capacity



- **Expected liquefaction capacity to more than double by 2010**
- Recent projects launched with uncommitted volumes
- New projects target more distant destinations

Source: EIA, WoodMcKenzie

# LNG Supply & Demand

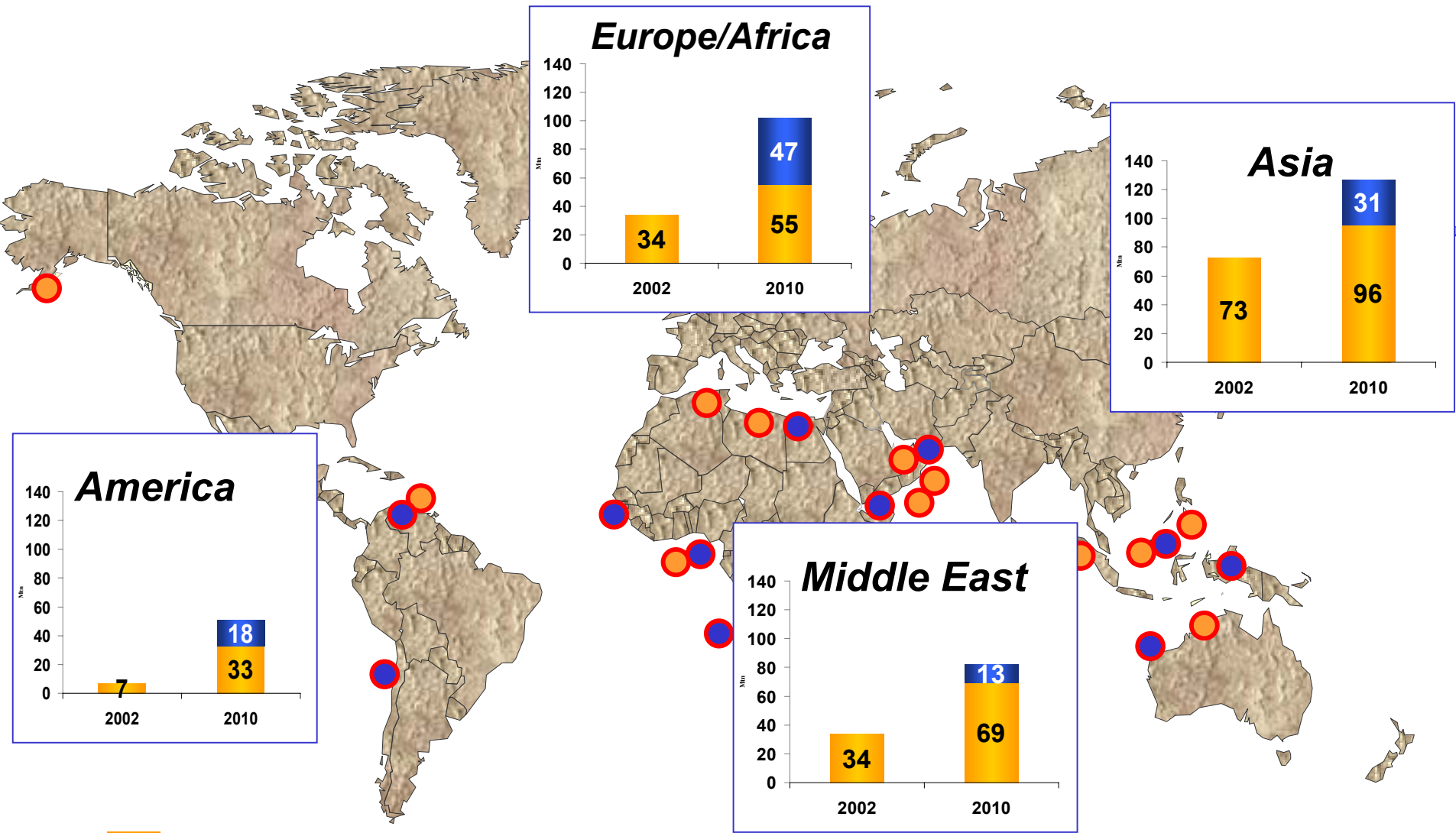


- **Expected CAGR 12% for next years**
- Strong demand in existing markets (Japan, Korea, Mediterranean, USA) and new markets (India, China, Caribbean)
- No excess liquefaction capacity

Existing Expansions Greenfield Demand

Source: EIA, WoodMcKenzie

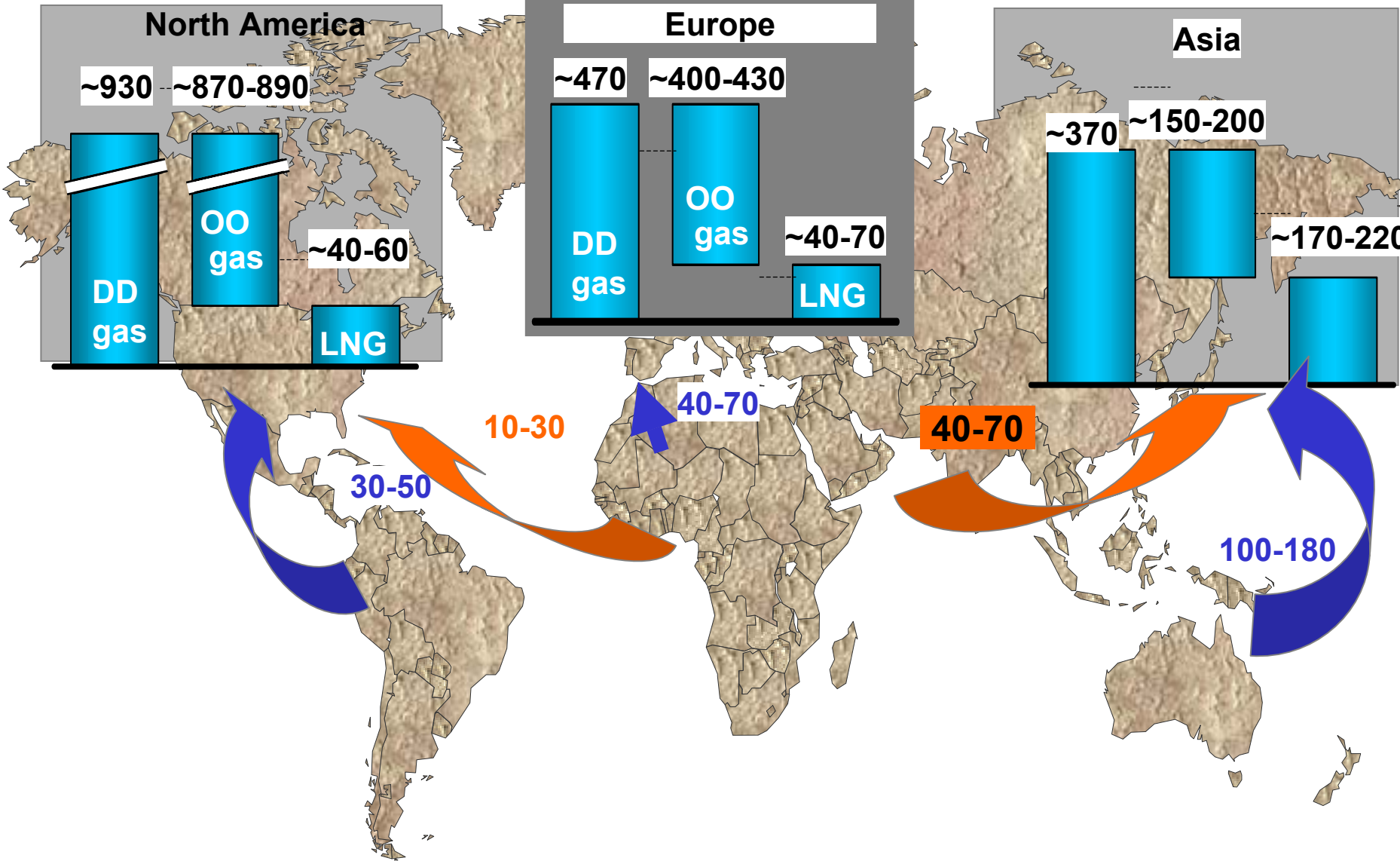
# Liquefaction Capacity (bcm)



Existing + expansions (Brownfield)  
 Greenfield

# LNG Demand and flows 2010 (bcm)

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YPF



# LNG business would follow oil business evolution

REPSOL  
YPF



1950-72

1973-79

Early 1980s

1986-89

From 1990s-today

Regulated markets

Increase of Spot volumes

Spot prices become price reference

Growth of derivative

Derivatives market matures, changes in industry

Oil

- Spot market insignificant– Predominance of term contracts
- Price regulated by governments and companies
- 19 producers (13 OPEP)
- Production, supplies and refining dominated by the “7 sisters”
- Industry with strong vertical integration

- Spot Sales 5% of total; many traders enter the market
- Increase in prices
- Prices linked to spot market benchmark
- Nationalization of upstream business breaks vertical integration

- From sellers market to buyers market
- Increase in non-OPEP production
- Spot sales: 30% of total
- 1983 – futures WTI futures in NYMEX

- Increase in volatility.
- Price collapse in 1986
- Netback pricing
- Forward and futures more liquid
- Major oil companies implement cost reduction programs

- Increase in liquidity and competition in derivatives market
- Major oil companies restructure their refining and marketing business

- Looking at the oil market evolution, the same could occur with LNG
- As the LNG market becomes fully arbitrated, efficient spot markets in LNG and shipping likely to emerge
- Gas quality, almost standard compared to oil standards, would facilitate global reference pricing

LNG

• (1962-2002)

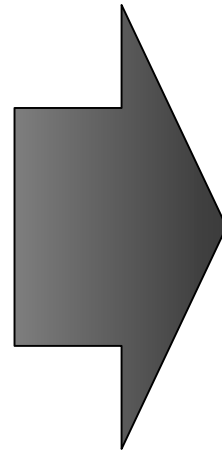
• (2002-?)

• (2002-?)



## “OLD SYSTEM”

- Gas resource constraint
- Projects launched with all volumes committed
- Long-term SPA
- High level Take or Pay
- Small volume flexibility
- Predetermined target markets (no free destination)
- Oil price linkage (Europe & Asia). Gas price competitive with alternative fuels in end user markets
- Protected markets downstream
- No competition between projects



## “NEW SYSTEM”

- Available new gas resources commercially viable
- Projects launched with uncommitted volumes
- Shorter contract terms and spot sales
- Lower Take or Pay level
- Higher volume flexibility
- Free destination
- Gas to gas competition
- Competition in downstream markets
- Competition between projects
- LNG buyers participation in project's equity



# Likely end-game in LNG



- Efficient/liquid spot markets for LNG sales and shipping capacity
- Disaggregated value chain
- Netback pricing widely used
- Prices, on average, equal to full capital recovery but often set at variable cash cost

	Upstream	Liquefaction	Shipping	Regas	Market
• Efficient/liquid spot markets for LNG sales and shipping capacity	✓	✓	✓	✓	
• Disaggregated value chain	✓	✓	✓	✓	
• Netback pricing widely used	✓				✓
• Prices, on average, equal to full capital recovery but often set at variable cash cost	✓	✓	✓	✓	

When this end-game of fully arbitrated LNG market materializes, value will accrue at the extremes of the value chain (E&P, downstream)

Long-term value





## Current LNG market - “*Fractured market*”:

- Early phase of development
- Bottlenecks along the chain (i.e. regassification capacity)
- Higher returns in the intermediate phases of the chain (liquefaction, shipping ,regassification,)
- First trading opportunities between markets Europe-USA- Far East

## Future LNG market - “*mature market*”:

- Margins concentrated in both extremes of the chain (upstream and downstream)
- Intermediate phases of the chain pure commodity (tolling, utilities)
- Sharp increase in market liquidity
- Development and expansion of trading activity



## Value

- Value accrued at the ends of the value chain (E&P, market provided) as long as efficient and liquid spot markets exist for LNG sales and shipping capacity

## Pricing

- Prices in markets will be set by transportation differentials provided there are bottlenecks in the value chain
- Common reference market(s) will exist to help players assess opportunity cost; e.g.
  - Henry Hub (U.S.)
  - National Balancing Point (UK)

## LNG Flows

- LNG flows determined by minimization of opportunity costs
- Middle East becomes swing, marginal supplier to most reference markets
- LNG will be diverted constantly to minimize opportunity cost provided that efficient and liquid markets exist for LNG sales and shipping capacity



- LNG pricing fundamentals vary considerably between regions thereby offering arbitrage opportunities.
- **USA**
  - Prices varies according to supply demand balance and are predominantly linked to Henry Hub.
  - Price differentials depending on LNG terminal location (e.g Lake Charles (LA) Price = Henry Hub: Cove Point (MA) Price = HH + 0,15-0,35)
- **Europe**
  - LNG prices fundamentally subject to formulas linked to oil products and crude oils that represent alternative fuel to natural gas in each market.
  - UK price, which varies according to supply demand balance, is an exception.
- **Japan**
  - LNG price linked to a basket of imported crude oils in Japan.

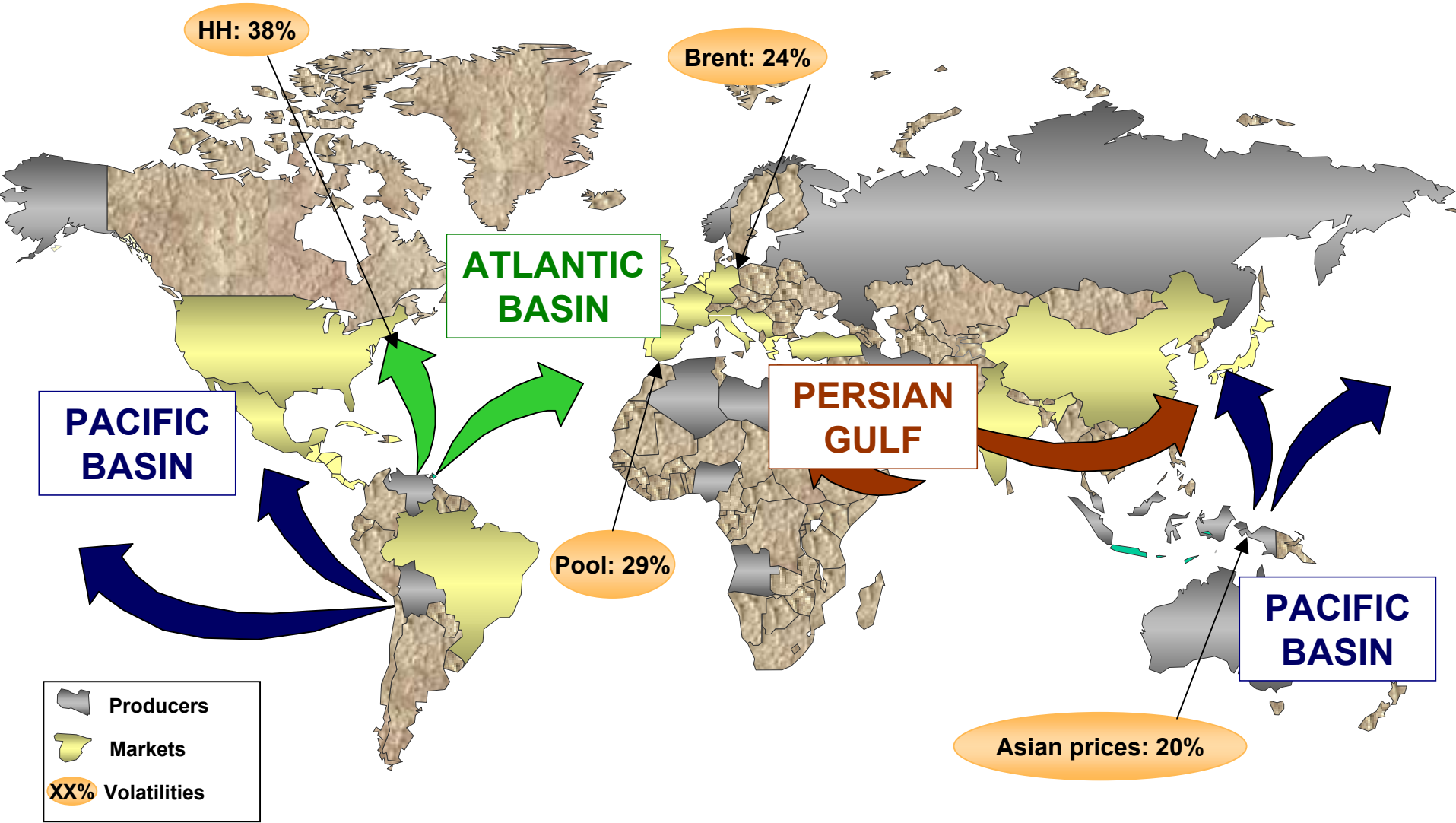


- Europe traditionally characterized by long-term contracts with large buyers linked to large upstream and liquefaction facilities. LNG price linked to oil or oil products in rigid arrangements.
- Recent liberalization in end user markets and competition between players is putting pressure on producers to increase flexibility (destination, reduced ToP) and to decouple price from oil-to-market fundamentals (UK)
- Although US LNG is growing rapidly, it is still very small compared with the natural gas market. Price determined basically by market fundamentals. Recent price peaks and reduced LNG costs is pushing LNG up in the energy mix.
- The emergence of US as growing importer of LNG is affecting the dynamics of the Atlantic Basin market,
  - Different price fundamentals will increase trading with European volumes.
  - Distant LNG projects (Middle East) would become marginal suppliers.



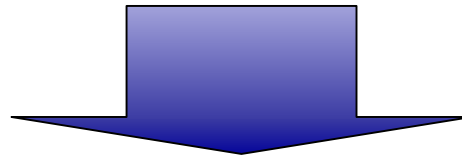
- Market characterized by long-term contracts with large buyers (traditionally Japanese and Korean utilities) linked to large upstream and liquefaction facilities in Asia Pacific and Middle East.
- Regulated markets with small competition among players imply rigid, long-term agreements. High initial capital costs require a closed chain from producer to buyer, concerned with security of supply.
- Recent changes in the area include:
  - Increasing interest to develop projects with uncommitted capacity have increased competition between projects to supply new and existing markets (China, India, Taiwan), that contract LNG through open tenders.
  - This competition combined with cost improvements in LNG operations is pushing prices down and increasing flexibility terms (destination, reduced ToP, etc)
  - Emergence of spot and short-term markets with lower prices decoupled from oil.

# Arbitrage opportunities





- Year 2002: LNG becomes global:
  - Scenario: Strong demand resulting from cold weather worldwide combined with shutdown of nuclear power plants in Japan and a drop in US gas production
  - All LNG available in Persian Gulf is diverted to Asian markets (Japan and Korea).
  - Strong demand in Europe limits the possibility of diverting cargoes to US East Coast. Trinidadian LNG is the only LNG available to serve US.



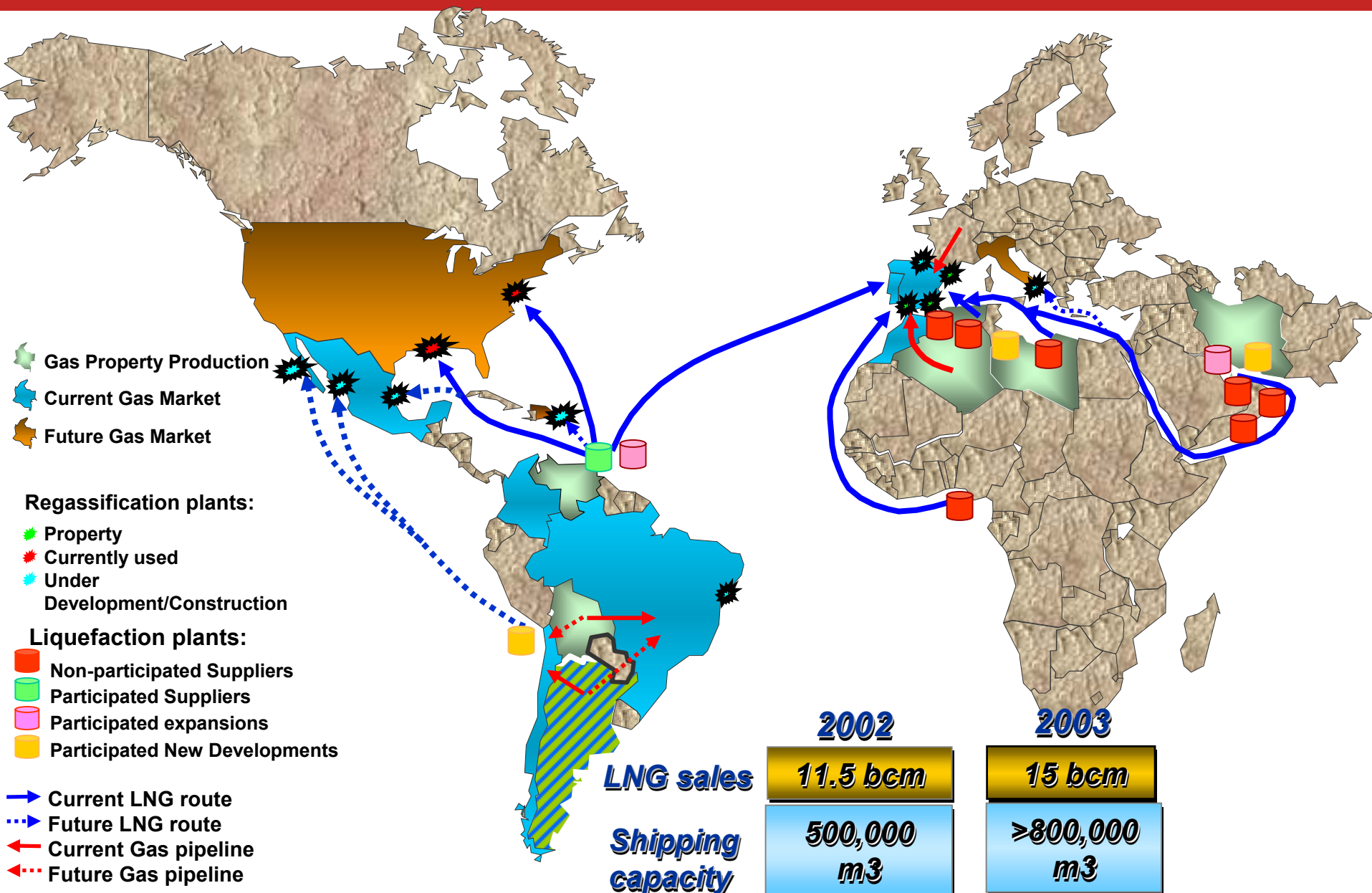
**Nuclear crisis in Japan had in 2002 a direct impact in US natural gas prices**





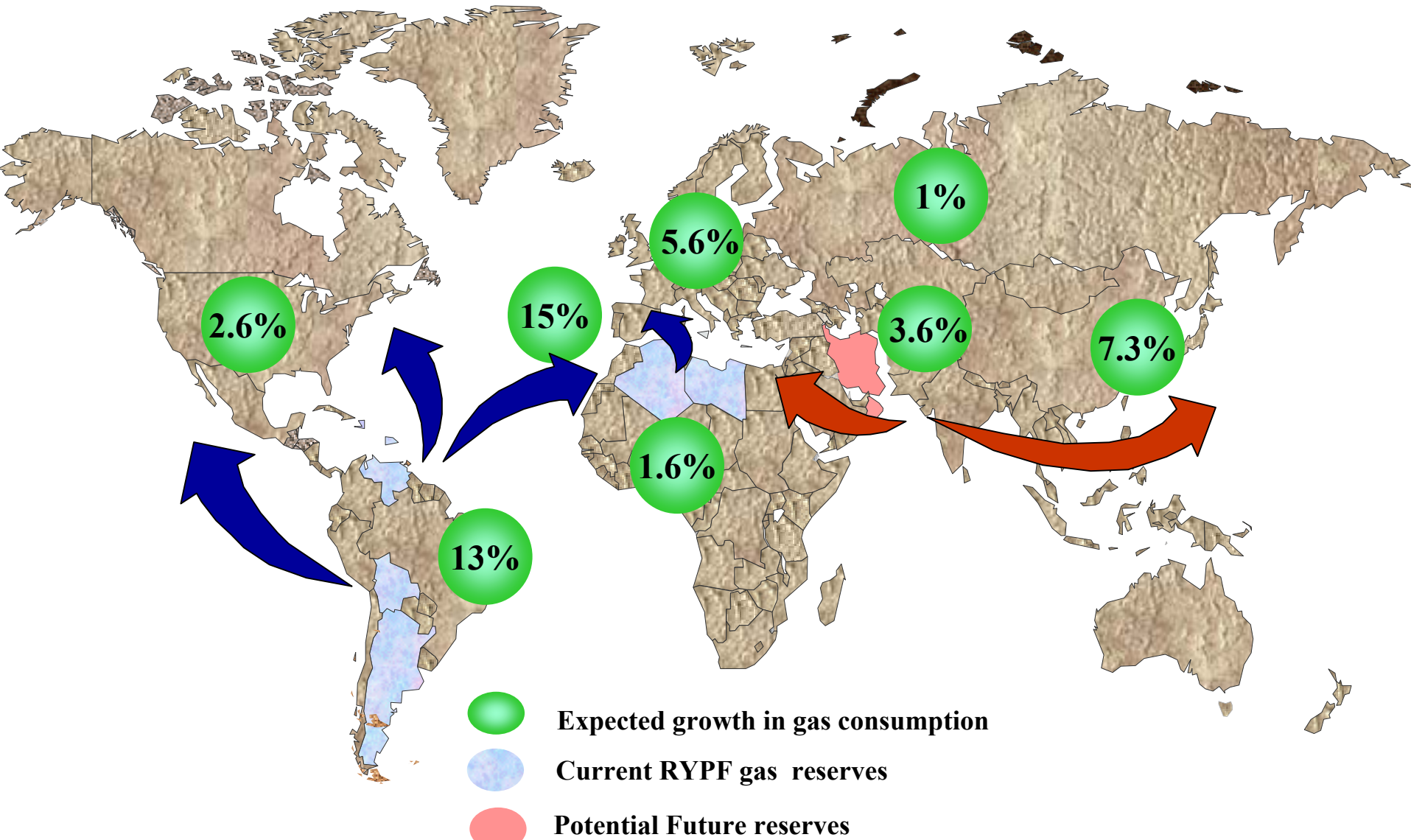
- 30% BPTT in Trinidad Tobago
- T&T: 20% Train 1 (3.5 Mton/yr)
- T&T: 25% Trains 2&3 (3.5 Mton/yr)
- 3 x 138.500 cm vessels
- 1 x 125.000 cm vessel
- 3 medium size vessels (70,000-85,000 cm)
- 4 small size vessels (< 50,000 cm)
- From integrated projects (T&T): 4.2 bcm
- From other suppliers: 11 bcm
- 25% BBG (Spain): 7 bcm/yr capacity
- 50% Ecoelectrica (Puerto Rico): 2 bcm/yr capacity
- Spanish regassification plants: Barcelona, Cartagena, Huelva (35% stake through GN sdg)
- Spain: 11 bcm
- USA (Lake Charles, Cove Point, Elba Island) and Dominican Republic: 4.5 bcm

# Repsol YPF: LNG & natural gas chains



# RYPF positioning for arbitrage and access to growing markets

REPSOL  
YPF



- RYPF has a privileged position in the natural gas business with gas reserves available to supply high value markets
  - **UPSTREAM**
    - Gas reserves in Argentina, Bolivia, Venezuela, Trinidad & Tobago and North Africa, for markets in USA, Mexico, Southern Cone and Spain.
  - **UPSTREAM/MIDSTREAM**
    - Integrated projects: Trinidad & Tobago for Spanish and USA markets.
    - LNG fleet
  - **DOWNSTREAM**
    - Strong presence in markets with high growth potential: USA, Spain, Southern Cone.

# Trinidad&Tobago: Atlantic LNG

REPSOL  
YPF



	Train 1	Trains 2&3	Train 4
<b>Start-up</b>	1999	2002/03	2006
<b>Capacity (Mton/yr)</b>	3	7	5,4
<b>Storage (m3 GNL)</b>	2 x 102,000	1 x 160,000	1x 160,000
<b>Investment (MUSD)</b>	850	1,200	1,200

Aerial View of the Atlantic LNG Facility - April 2003

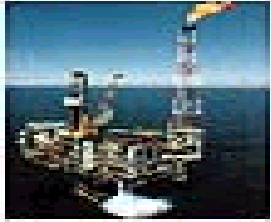
# Trinidad&Tobago: Atlantic LNG (II)

REPSOL  
YPF



- 3 trains in operation
- Phillips Optimized Cascade technology
- Multiple Suppliers (BP, RYPF, BG..)
- Multiple Buyers: BP, RYPF, BG, Tractebel, Gas Natural sdg, Gas de Euskadi
- High value markets:
  - USA
  - Spain/Europe
  - Caribbean
- FOB LNG Sales
- Arbitrage opportunities
- Reserves available for further expansion





## UPSTREAM

- Acquisition of BP's Trinidad&Tobago gas reserves (30%).



## LIQUEFACTION

- Atlantic LNG (Train 1, 20% Repsol YPF, 4 bcm/year)
- Atlantic LNG 2/3 (Trains 2&3, 25% Repsol YPF , 8 bcm/year)
- Atlantic LNG 4 (Train 4, 22.2% Repsol YPF, 7 bcm/year)



## SHIPPING

- To Spain, USA and other Caribbean/Central-American markets
- Options for swaps and logistic optimization



## LNG TERMINALS

- Development of LNG regassification terminal in Bilbao (7 bcm/year)



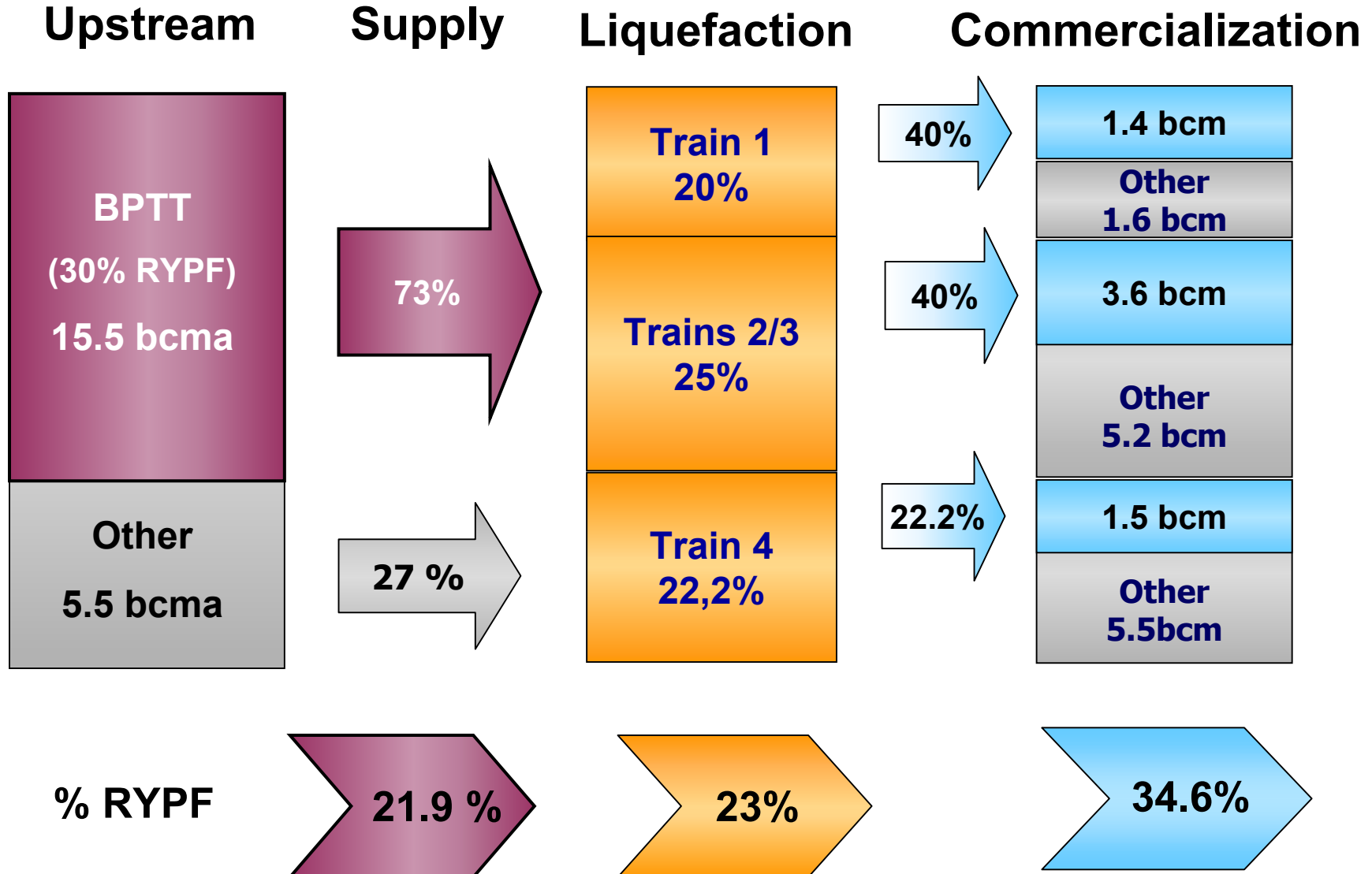
## RYPF LNG VOLUME

- 1.4 bcm Train 1
- 3.6 bcm Trains 2&3
- 1.5 bcm Train 4

## MARKETS

Spain, USA, Caribbean

# RYPF in Atlantic LNG: Summary (1)



(1) Including train 4



# Spanish gas Infrastructure

REPSOL  
YPF



	Capacity (m3/hr)	RYPF stake
Barcelona	1.350	10% (1)
Cartagena	750	10% (1)
Huelva	450	10% (1)
BBG	450	25%

(1) through Gas natural sdg

Fuente Enagas

YACIMIENTO HASSI A MEL



- **Capacity: Currently 400,000 cm/hr with an ongoing expansion to 800,000 cm/h (2005), equivalent to a peak of 7 bcm/yr.**
- **2 LNG tanks with a capacity of 150,000 cm e/o.**
- **Jetty to allow discharge of LNG tankers with a capacity up to 140,000 cm. 3 unloading arms with a total capacity of 12,000 cm/h.**



- 2003 capacity:  
>800,000 m3 GNL
- 11 LNG vessels, not  
associated to specific  
LNG projects
- Various sizes  
enabling flexibility  
and cost optimization





## Monetise Reserves

- Development of integrated projects
- Capitalizing on optionalities
- Capitalizing on potential margins across the value chain

## Access to high value markets

- Expansion in existing markets and development of new markets to leverage Integrated projects
- Develop shipping and regassification capacity

## Synergies

- Integration to final client
- Cost reduction
- Economies of scale