DECISIONS BETWEEN RISK AND UNCERTAINTY – EXPERIENCES FROM MAJOR LNG PROJECTS

32nd IAEE International Conference

June 21-24, 2009
San Francisco, Ca.

John Holding, OKLNG FZE (London, UK)
Dieter Beike, Independent Consultant (Houston)

Presentation Topics:

- Background ⇨ Why look at LNG projects?
- LNG Value Chain and Business Structure
- Risks & Uncertainties
  - Oil & Gas industry and LNG Projects
  - LDC's and Nigeria experiences
- Lessons Learned
- Conclusions

Background ⇨ Why look at LNG projects?

OIL & GAS INDUSTRY

- GLOBAL REACH
- CAPITAL INTENSIVE
- INTERNATIONAL COMPANIES + GOVERNMENT ENTERPRISES
- CRUDE OIL INTERNATIONALLY TRADED
- UPSTREAM, MIDSTREAM, DOWNSTREAM ENTITIES

LNG

- ATLANTIC, PACIFIC BASIN FOCUSED
- HUGE INVESTMENTS
- LIMITED # PARTICIPANTS
- IMPORTANCE OF VALUE CHAIN
- DEPENDENT ON LONG TERM SALE & PURCHASE CONTRACTS
- UNIQUE SET & SCALE OF RISKS & UNCERTAINTIES

LNG Value Chain and Business Structure - 1

UPSTREAM	LIQUEFACTION	SHIPPING	RECEIVING & REGASIFICATION	PIPELINING & GAS MARKETING
Gas Development	***Processing***	***Transportation***	***Terminal***	***Sales***
Exploration Development Production	Gas Trains Utilities Offsites	Tankers	Gas Vaporization	Monetization of Gas
Responsible for specified gas quality & gas volume	Enabler for whole value chain:1. Most significant investment, 2. limiting capacity	Dedicated fleet, Purpose-built for the project concerned	Terminals have varying ranges of gas specs that they can receive	Limited gain in market share by product differentiation; no price differentiation (i.e. commodity price)

>> Not acceptable for one part of value chain to subsidize another

Opportunity: Multitude of contractual arrangements - - -
Double – digit US$ Billions CAPEX - - -
Uncertain future market conditions - - -

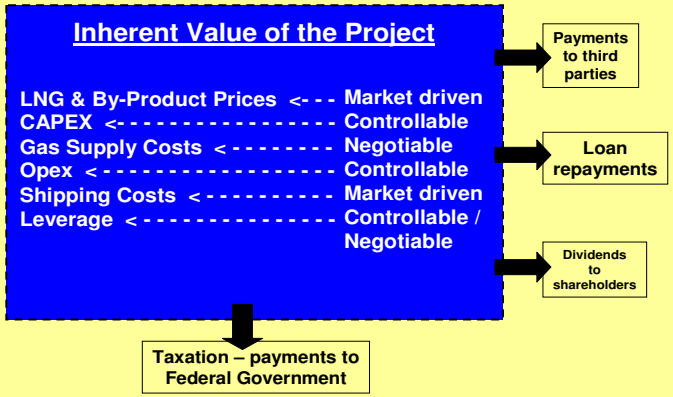
LNG Value Chain and Business Structure - 2

Alignment of Purpose throughout whole Value Chain needed

Alignment Issues:

- different perceptions of risk
- different perception of value
- different view where to generate value
- different view on commercialization criteria
- different view on risk tolerances

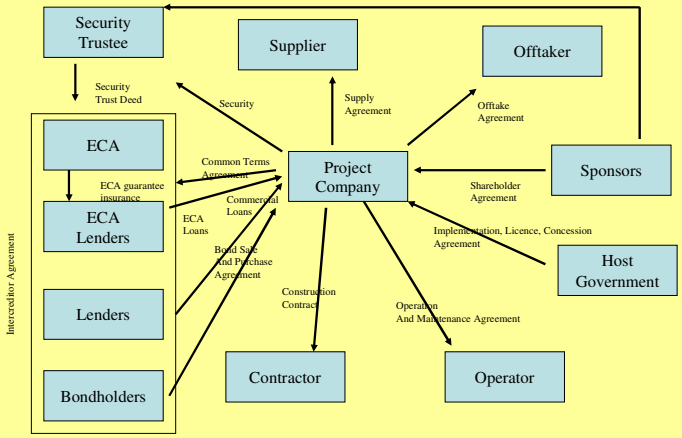
HOW IS VALUE GENERATED AND HOW IS IT SHARED?



Competitiveness

- Long-term plant reliability
- Quality of construction
- Lowest Cost of production
- Customer service: destination flexibility
- Flexibility w/feedgas suppliers

LNG Project Contractual Arrangements



Limitations

- Long-term commitments
- Long time till payout

(Full-scale view of diagrams in Back-ups)

Risks & Uncertainties - Oil & Gas industry and LNG Projects

OIL & GAS INDUSTRY

- Long time horizons
- Large CAPEX
- JV / partnership arrangements
- Management team capability
- Host government's culture
- Contracting & procurement
- Identification of stakeholders
- Corporate investment vehicle
- HSE issues

LNG PROJECTS – in addition…

- Gas Supply Availability
- Construction issues
- Capital costs
- Conflict between NOC's / Gov. and IOC's
- Gas prices and volatility
- New / extended technology
- Financing
- Stakeholders / communities
- Others

See Back-up Slides for definitions of Risk and Uncertainty

Risks & Uncertainties - LDC's and Nigeria experiences

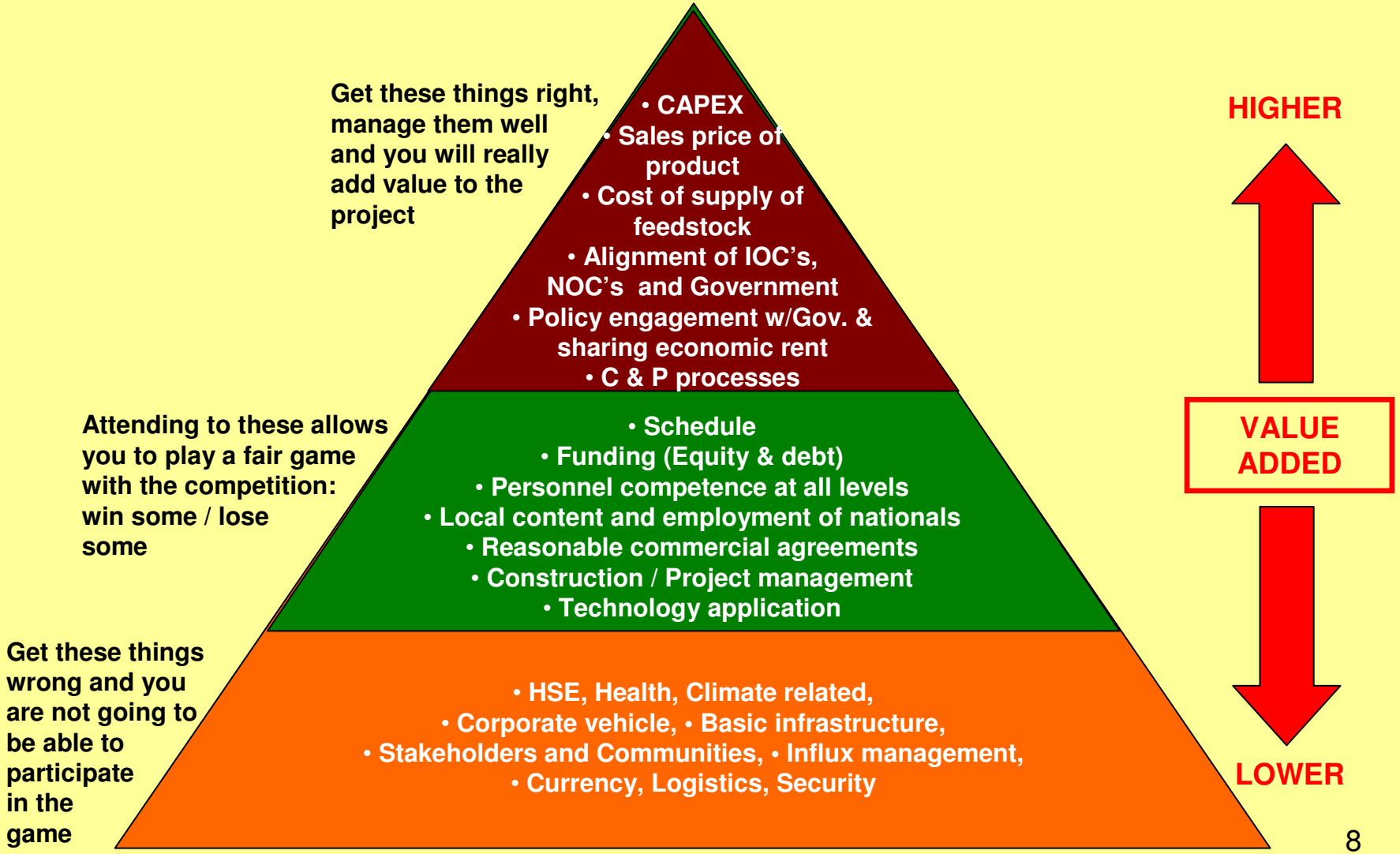
LDC's

- National / State (IOC's) as imposed Partners
- Sharing of economic rent
- Contracting Processes not always efficient
- Local Manpower skills / availability
- Influx management
- Basic infrastructure
- Aggressive domestic gas policies

NIGERIA

- Shifting Gas Policy
- Government funding
- Political stability / industry and stakeholder relationships
- Nigerian Content obligations
- Health issues
- Climatic conditions

Lessons Learned
Hierarchy of Economic Value Added



Conclusions

- LNG has undergone a roller-coaster history but today is regarded as an internationally traded commodity with a widening supply and consumption base
- LNG projects can be classified as megaprojects in that they have scale, uniqueness and complexity

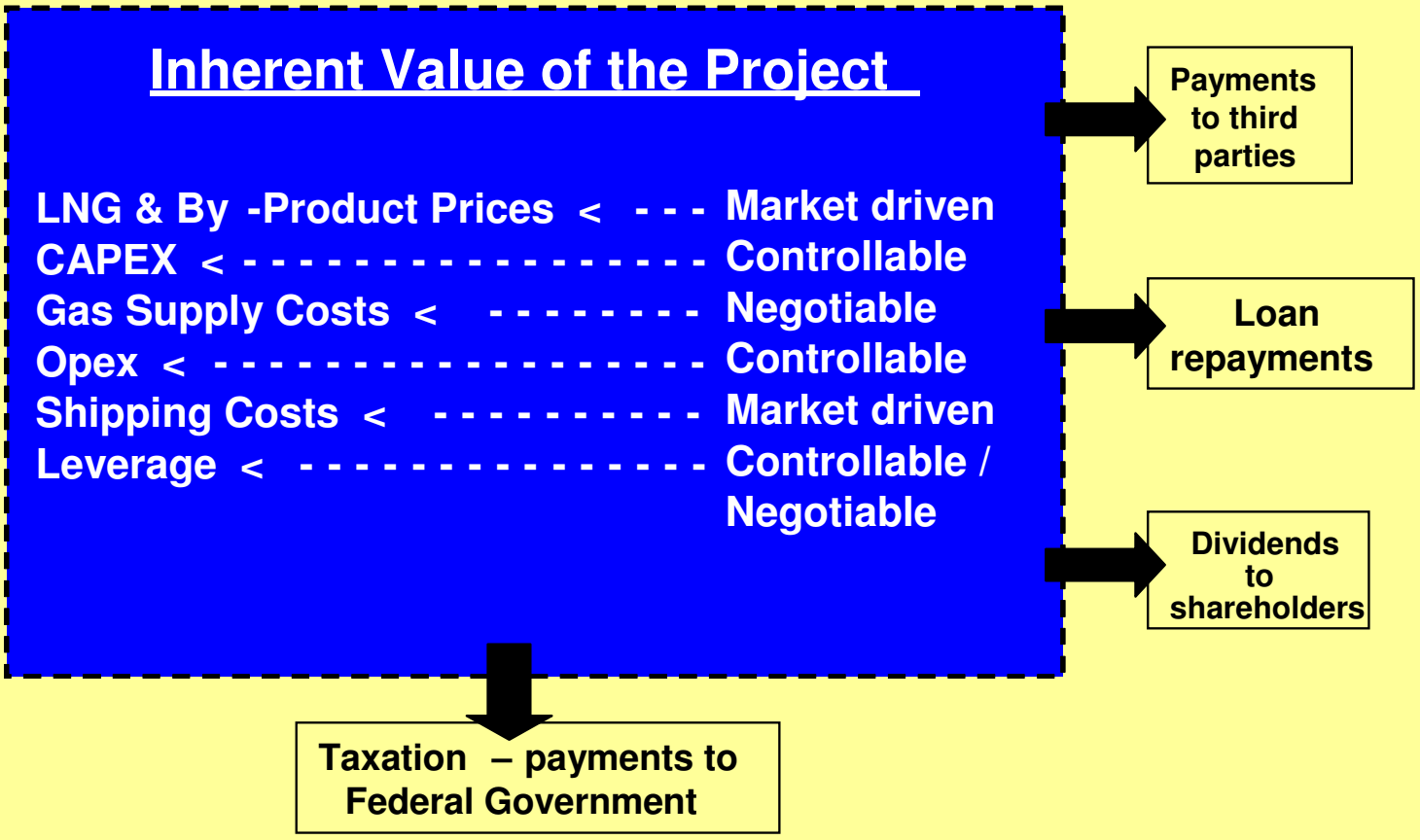
From an energy economists' point of view the ranking of impact on the fundamental project value proposition is:

Most sensitive
> Revenue stream (i.e. Product price and sales volumes)
> CAPEX
> Purchase price of feedstock (Raw material value at entrance to facility)
> Delayed start-up
> Operating and maintenance expenses
Least sensitive

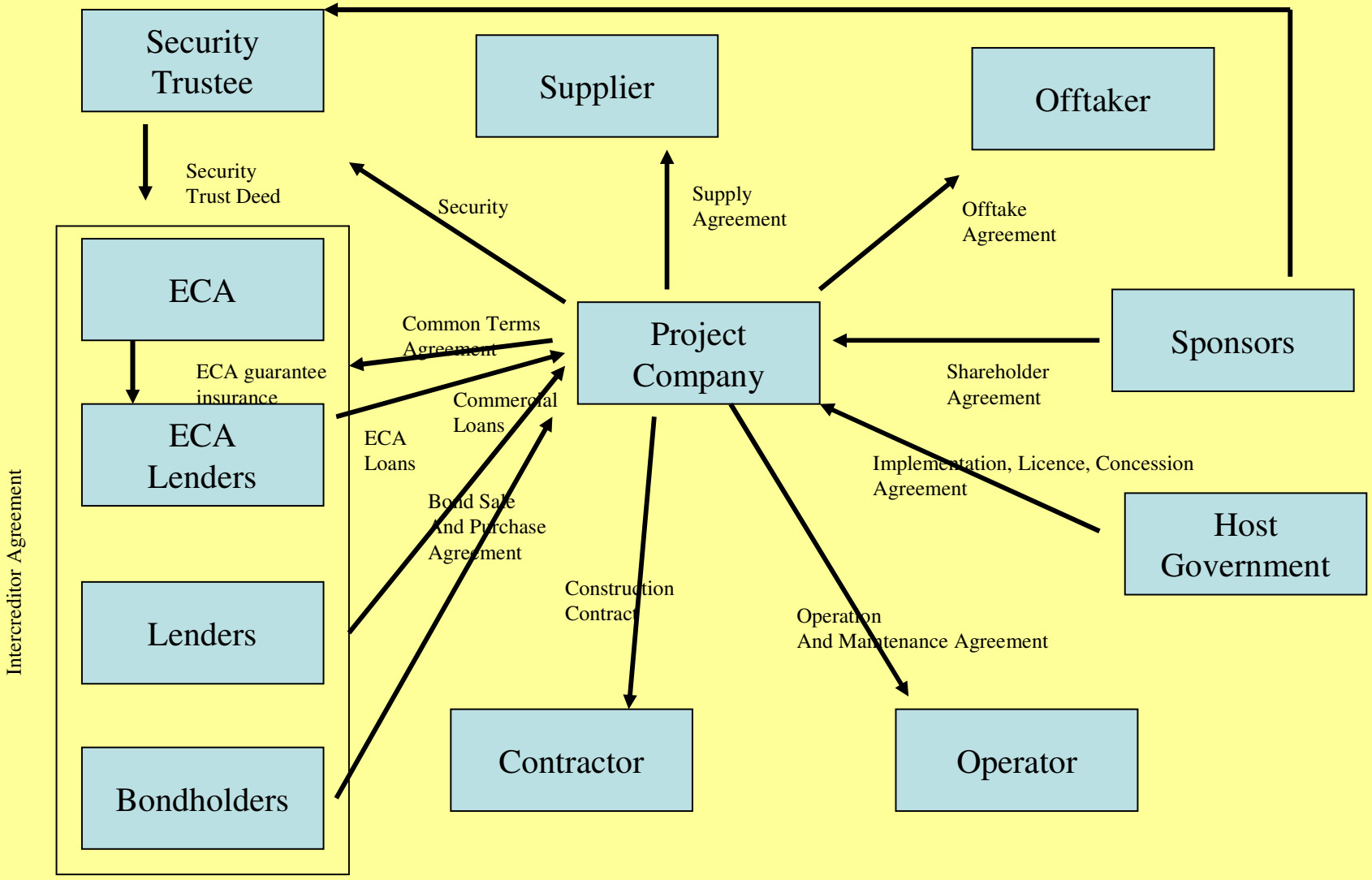
> To ensure quality decisions we note the importance for comprehensive risk and uncertainty data to be provided to decision makers and their analysts, shareholders and other constituencies in a timely manner.

Back-up Slides

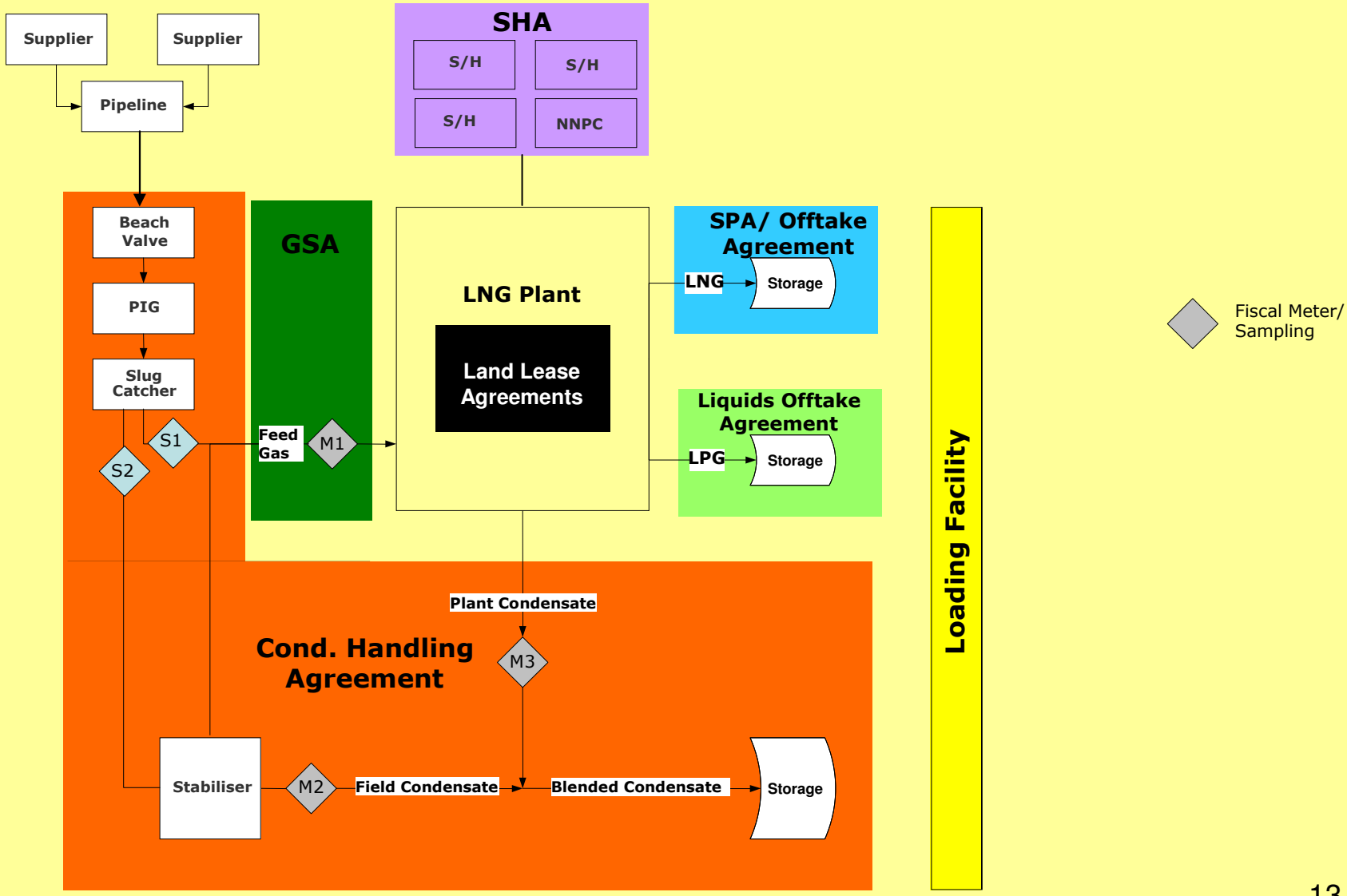
HOW IS VALUE GENERATED AND HOW IS IT SHARED?



LNG Project Contractual Arrangements



Commercial Agreements



Some details on definitions / our use of terminology: (1)

RISKS: Future events, having adverse / undesirable impacts, measurable / definable / can be quantified within a range of probable outcomes. If we have a risk we have uncertainties to contend with. In risk we are much more concerned with the variability of an event, e.g. the price of oil - not whether the price is high or low but with the problem of predictability of the price. The industry will adjust to one price level or another in the long run, but it is uncomfortable with choosing which way the trend will go at what time. This is even more dramatic when you look VERY long into the time horizon.

UNCERTAINTIES: Future events, having more than one outcome which is ill-defined / impossible to define, cannot be quantified but estimates can be given in terms of a chance or likelihood of occurrence. Uncertainty is concerned with the variables THEMSELVES that are changing, e.g. government policies / new or revised legislation – which we cannot predict. We can have uncertainty about the outcome of something but if we don't have a stake in it we don't have any risk: just because you have an uncertainty does NOT mean that you have risk.
Then, if you know that you are faced with 100% loss, then you do NOT face a risk but a CERTAINTY!

SYSTEMIC RISK: Applies to a whole system or business sector not to an individual entity or component. Systemic risk does not apply to market or price risk since these are unique to the commodity or product being traded and not to the entity that is dealing in the commodity or product. Systemic risks cannot readily be managed.

UNIQUE or SPECIFIC RISK: Applies to your own business in its environment. These risks can be identified and quantified in terms of frequency of occurrence and magnitude and plans put together to manage them.

QUOTATION from US Defense Secretary Donald Rumsfeld:

"There are known knowns. These are things that we know that we know.

There are known unknowns. That is to say, things that we know we don't know.

But there are also unknown unknowns. These are things we don't know we don't know."

- The above illustrates degrees of UNCERTAINTY

RISKS can be identified from the known knowns and the known unknowns
The first category can be defined very well but the second category less well because there are UNCERTAINTIES due to our lack of knowledge

With regards to unknown unknowns, we are not even aware of these - they represent risks and uncertainties beyond our sphere of comprehension - but at least we can keep out eyes and ears open for them…….