Proposal for Building Upon the Growing LNG & Gas to Liquids Offshore Markets & “Anti Flaring” Solutions

“Market Opportunities & Positive Environmental Recognition”
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Introduction

Snap shot overview of present Asian Gas to Liquids market

• Asian Market has many emerging “previously thought as marginal” oil & gas fields

• Handling the gas represents a real problem, can ruin reservoir economics!

• Asian Market is growing in Gas to Liquids, mostly LNG at this time

• Operators looking for better way to utilise the associated gas;
  - Stop flaring
  - Expensive gas re-injection (negative $)
  - Profitable conversion of the gas
Gas to Liquids – Asian Market Opportunities

Gas handling / Gas to Liquids (GTL) Options Evaluated Included:

- **Gas Re-injection**
  - Typical $40m USD cost for gas re-injection facilities “negative money”
    - Some benefits to oil production can be gained

- **Pure Liquefied Methane (PLM)**
  - Market niche opportunity, good ROCE, allows OPEX relief on reservoir
    - Requires LNG style handling facilities & distribution network
    - Best return on gas “pro rata”
    - Lowest price processing facilities compared to other GTL’s
    - Encourages use of clean burning diesel (dual fuel)

What’s the Best Way to Go at this Time?
Gas to Liquids – Asian Market Opportunities

Gas to Liquids (GTL) Options Evaluated Included (cont’d):

• Compressed Natural Gas (CNG)
  - Viable small $ return allowing some OPEX relief

• Methanol
  - Viable but hasn’t caught on as other GTL’s. Moderate ROCE possible
    - Market dominated by a few main players
    - Haldor Topsoe offshore design!

• Liquefied Natural Gas (LNG)
  - Growing market, offers best outlet for the gas & very good ROCE
    - Established market applications
    - Established supporting infrastructure
    - Growing world demand including Asian market

LNG, Still the Best Way to Go at this Time
Gas to Liquids – Asian Market Opportunities

The Challenge:

• Find an alternative solution to flaring
  - No to typical $40m re-injection cost, turn negative $ to positive $ return

• Maximise revenue potential for Operators
  - Look at what's best for Asian market & the environment

• Attract new business to Asian operators
  - Pinpoint & exploit technology transfer potential

• Benefit local infrastructure & support local employment
  - Build upon the Asian market’s current LNG relationship

Opportunities Exist for Building Upon & Improving Current LNG Production Techniques
Gas to Liquids – Asian Market Opportunities

The Solution - Big Picture:

- Asian & Global Market Opportunities
- Liquefied Natural Gas
- Asian & Global Market Opportunities

Fishing Industry
Support Vessels
Supply Vessels
Carriers
Motor Industry

Work Boats
Ferries
Yes & Air Travel!
(Future Development)
Public Transport

Growing Asian Market!
Gas to Liquids – Asian Market Opportunities

The Solution (LNG):

1. Define “Mini LNG” process design for offshore use
   Utilise Irvine’s expertise/R&D facilities to produce an efficient mini LNG offshore design

2. Establish pilot plant on fixed or floating structure
   Optimise process

3. Exploit market for “Mini LNG” production support
   Aim design at marginal developments that require gas handling,
   sell design on it’s merit’s;
   1. A solution to flaring
   2. Maximised reservoir recovery and improved overall economics
   3. $ return on the gas
   4. Environmentally friendly recognised solution

Irvine Know How, 1st Class R&D Facilities, Rapid Development!
The Solution (continued):

Strategy - Step 1:
1. Define pilot design for offshore use, 4.5 - 5.0MMscf/d
2. Lease known reliable platform for operations (SERF)
3. Establish offshore LNG ISO transportation containers & handling
4. Establish onshore distribution

Economic & Environmentally Driven Product
The Solution (continued):

Strategy - Step 2:

1. Finalise Mini pilot design for offshore applications
2. Market design for fixed & floating gas handling solutions
3. Sell design as stand alone or combined with an existing oil process facility
4. Distributors supply growing Asian market
5. Project duration is 2 years
Main Benefits of LNG:

1. Operators gain improved reservoir revenues
2. Ready & established market
3. Established technology (subject to Irvine Mini design technology)
4. R&D opportunities exist with Irvine for continuous LNG development, by:
   - Improved process efficiency
   - Develop lower cost facilities
   - Speed up the process
5. Greatly reducing flaring
6. Enhance job creation for Asia offshore & onshore Oil & Gas market
7. Asia has opportunity for continued positive environmental recognition
Gas to Liquids – Asian Market Opportunities

Likely Cost of System & ROCE ($USD):

Mini LNG 4.5 MMscf/d processing system
Inclusive of:
1. Gas receiving facilities, pumps and valves
2. LNG distillation equipment
3. LNG handling & storage system
4. 3 MW power generation

Total Cost of system  $14m
Way Forward

• Irvine have the design capability for producing an offshore mini LNG design.

• Irvine have the industry contacts for minimal cost fabrication, construction and assembly work.

• Irvine have the industry contacts for sourcing candidate barge vessels required as the process facility platform.

• Irvine have the main personnel to man a design and build project.

• Irvine are looking to partner with a company capable of financing the project.

Opportunity to invest in a LNG Market Niche
Irvine Engineering & Partner?

“Not Just Supplying Flaring Solutions”

But also

“Opportunities for New Investment Returns & Positive Environmental Recognition”
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