Example of a Novel Gas to Liquids Offshore Recovery Solution for a New Market

“Market Opportunities & Positive Environmental Recognition”
Example Displaying Novel Gas to Liquids Offshore Recovery for a New Market!

- Client seeking New Novel Environmentally sound Market Niche for Gas to Liquids offshore recovery
- Irvine investigate market for new end users
- Pure Liquefied Methane (PLM) used is duel fuel for Diesel engines marine and motor vehicle
- PLM similar properties to LNG including handling etc
- Duel fuel PLM 80% Diesel 20% substantially cutting diesel emissions, PLM greatly reduced price
- Use of PLM will also extend Diesel fuel shelf life well into the future

Floating / Mobile Concept Currently Under Review by Client
What is Pure Liquefied Methane (PLM)?

**Simply put:**

PLM is natural gas cooled down to a temperature where it becomes a liquid, it is a very close sister to LNG. At ambient pressure the temperature is approximately –161°C (–258°F). PLM is primarily methane with low concentrations of other hydrocarbon and non-hydrocarbon components.
Example Gas Recovery Solution - West Patricia Reservoir, Malaysia

<table>
<thead>
<tr>
<th>Original Options Evaluated Included:</th>
<th>The Challenge:</th>
<th>Our Vision for West Patricia &amp; Malaysia Involves:</th>
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</thead>
<tbody>
<tr>
<td>1. Continued flaring</td>
<td>1. Get an alternative solution to flaring</td>
<td>1. The best solution for WP and for reducing flaring on future developments!</td>
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<tr>
<td>Not an option</td>
<td>2. Not to spend $28.6m in &quot;dead re-injection money&quot;</td>
<td>2. Not spending $28.6m in &quot;dead re-injection money&quot;</td>
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<td>2. Gas Re-injection</td>
<td>3. Maximise revenue potential</td>
<td>3. Finding a viable marketable solution that maximises revenues with follow up benefits</td>
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<td>3. Micro Liquefied Natural Gas (LNG)</td>
<td>5. Attract new business to Malaysia</td>
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<tr>
<td>Viable small $ return allowing some OPEX relief</td>
<td>6. Pinpoint technology transfer potential</td>
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<td>4. Compressed Natural Gas (CNG)</td>
<td>7. Benefit local infrastructure &amp; supports local employment</td>
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<tr>
<td>Viable small $ return allowing some OPEX relief</td>
<td>8. Advance Malaysia’s current LNG relationship</td>
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<td>5. Gas to Liquids (GTL)</td>
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<th>The Solution - Big Picture:</th>
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<td>&quot;PLM&quot; Asian Market Leaders</td>
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<tr>
<td>Pure Liquefied Methane</td>
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What is Pure Liquefied Methane?
PLM is a Gas Derivative (Gas to Liquid), basically a Bi Fuel. "The simultaneous combustion of 2 fuels", e.g. PLM combines with Diesel (a fuel enhancive additive) to make clean Diesel

The Solution for West Patricia:

**Strategy- Phase 1:**
1. Define pilot design for offshore use, 3.5 to 5MMscf/d
2. Lease known reliable platform for operations (SERF)
3. Adapt support vessels & FSO engines to DDF (diesel & gas)
4. Establish offshore ISO container distribution
5. Establish onshore distribution excess PLM

**Strategy- Phase 2:**
1. Adapt pilot design for floating production applications
2. Lease or purchase barge from known reliable source (T.B.A.)
3. Produce & Implement planned PLM offtake & shuttle to shore
4. Implement planned PLM distribution network
5. Distributors supply growing Asian market
6. Project duration is 2 years

Mani Benefits:
1. WP OPEX greatly reduced, higher reservoir revenues
2. PLM process established offshore, greatly reducing flaring
3. Existing LNG transportation facilities adapted for PLM
4. Job creation for Malaysia offshore & onshore
5. Malaysia has opportunity for positive environmental recognition

Petronas Malaysia Opportunities for New Investment Returns & Positive Environmental Recognition
Concept Status

• Studies conducted include:
  – Identification of floater, i.e sizing / mobile platform identification (covers floating & fixed platform options)
  – Identification of PLM process equipment P&ID’s
  – Identification of low cost Sour Gas treatment facility
  – Identification of project planning
  – Identification of project deliverables
  – Identification of suppliers

• Project awaiting developers interest

Example of Early Consultancy & Project Business Development!
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Thank You

“Market Opportunities & Positive Environmental Recognition”
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