Philippines Case Study
Sulu Sea and East Palawan Basins
Petroleum Policy & Management (PPM) Project
Coordinating Committee for Geoscience Programmes
in East and Southeast Asia (CCOP)

Dissemination Seminar

Redentor D. Pascual
Department of Energy
Petroleum Resources Development Division
12 May 2006
Manila, Philippines

OUTLINE

- PPM Project Team
- Sulu Sea Basin Case Study
- Project Activities
- Results of Resource Assessment
- Results of Economic Analysis
- Field Development Options
- Resource Management Strategies
- Licensing Strategies
- Recommendations
Philippine Case Study Team

PPM Project Duration: July 2002 to July 2006

- National Project Coordination Committee
  - Ramon Allan V. Oca
  - Ismael U. Ocampo

- National Coordinators
  - Guillermo H. Ansay
  - Redentor D. Pascual

- Technical Team
  - Arlene Y. A. Magbanua
  - Edmundo B. Guazon
  - Rolando Z. Morales
  - Jed B. Aragones
  - Neil O. Pesa
  - Andres O. Pangilinan
  - Demujin F. Antiporda
  - Isabel A. B. Nicolas

Sulu Sea Basin Case Study

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DOE-FRDD 12 May 2006
Sulu Sea Basin Case Study

East Palawan Basin
- Sub-basins: Balabac & Bancuan
- Area: 92,000 sq km
- Max. sediment fill: 3.5 km

Sulu Sea Basin
- Sub-basin: Sandakan
- Area: 115,000 sq km
- Max. sediment fill: 6 km

Project Activities
- Workshops
- Expert Visits
- Seminars
- Meetings
## WORKSHOPS

<table>
<thead>
<tr>
<th>Workshop / Date</th>
<th>TOPIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st WS / 13 – 18 Mar 2003</td>
<td>Introduction of the PPM Project, General Overview of the Case Study Basin, Upstream Petroleum Activities in the Philippines, and Resource Assessment Activities by the DOE</td>
</tr>
<tr>
<td>2nd WS / 22 – 27 Jan 2004</td>
<td>Petroleum Prospect &amp; Play Analysis</td>
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<tr>
<td>4th WS / 14 – 19 Mar 2005</td>
<td>Development and Production Solutions</td>
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<tr>
<td>5th WS / 14 – 18 Mar 2006</td>
<td>Exploration Strategies &amp; Attracting Investments for Exploration in the Frontier Basin</td>
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CCDI-PPM Project Dissemination Seminar
DOE-FRDO 12 May 2006
## Expert Visits

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Resource Person/s</th>
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<tbody>
<tr>
<td>22-23 May 2003</td>
<td>Petroleum Economics and Full-cycle Economic Evaluation</td>
<td>Dr. Alfred Kjemperud – The Bridge Group, Norway</td>
</tr>
<tr>
<td>17-21 Jan 2004</td>
<td>Sequence Stratigraphic Analysis</td>
<td>Mr. Robert Wong Hin Fatt &amp; Mr. Othman Ali Mahmud – PETRONAS, Malaysia</td>
</tr>
<tr>
<td>24 Nov 2005</td>
<td>Natural Gas Management – the role of the Government</td>
<td>Dr. Allen Beasly – ASCOPE Gas Center</td>
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<tr>
<td>7-10 Feb 2006</td>
<td>Petroleum Reservoir Management – the role of the Government</td>
<td>Mr. Jan Bygdevoll – Norwegian Petroleum Directorate</td>
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</table>

CCDP-PPM Project Dissemination Seminar
DOE-FR00 12 May 2006
Seminars

- **Kickoff Seminar**
  Bangkok, Thailand
  September 2002

- **2nd Seminar**
  Pattaya, Thailand
  September 2003

- **3rd Seminar**
  Changmai, Thailand
  September 2004

- **4th Seminar**
  Huahin, Thailand
  October 2005

Results of the PPM Project
Objectives:

- Address the geological uncertainties of the basins
- Evaluate the appropriate incentives to attract companies to explore
- Evaluation of the potential impacts to the Philippines

Expected Results

- Resource Assessment
- Possible Development Options
- Petroleum Policy Measures
### Resource Assessment

#### Sulu Sea

<table>
<thead>
<tr>
<th>Resource Class</th>
<th>Prospects/Leads</th>
<th>OIL (Mean) Million bbl</th>
<th>GAS (Mean) Billion cf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total resources</td>
<td></td>
<td>232</td>
<td>877</td>
</tr>
<tr>
<td>Discovered Resources</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Undiscovered Resources</td>
<td></td>
<td>232</td>
<td>877</td>
</tr>
<tr>
<td><em>Hypothetical (Mapped) Resources</em></td>
<td>25</td>
<td>169</td>
<td>700</td>
</tr>
<tr>
<td><em>Speculative (Unmapped) Resources</em></td>
<td></td>
<td>63</td>
<td>177</td>
</tr>
</tbody>
</table>

#### East Palawan

<table>
<thead>
<tr>
<th>Resource Class</th>
<th>Prospects/Leads</th>
<th>OIL (Mean) Million bbl</th>
<th>GAS (Mean) Billion cf</th>
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</thead>
<tbody>
<tr>
<td>Total resources</td>
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<td>310</td>
<td>836</td>
</tr>
<tr>
<td>Discovered Resources</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Undiscovered Resources</td>
<td></td>
<td>310</td>
<td>836</td>
</tr>
<tr>
<td><em>Hypothetical (Mapped) Resources</em></td>
<td>23</td>
<td>109</td>
<td>412</td>
</tr>
<tr>
<td><em>Speculative (Unmapped) Resources</em></td>
<td></td>
<td>201</td>
<td>424</td>
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</tbody>
</table>

#### Water Resources Depth (m)

<table>
<thead>
<tr>
<th>PROSPECT</th>
<th>Water Depth (m)</th>
<th>Resources (Mean Values)</th>
<th>% Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Oil (MMbbl)</td>
<td>Gas (Bcf)</td>
</tr>
<tr>
<td>SS1</td>
<td>1000</td>
<td>93</td>
<td>251</td>
</tr>
<tr>
<td>SS2</td>
<td>2200</td>
<td>259</td>
<td>1310</td>
</tr>
<tr>
<td>SS3</td>
<td>2200</td>
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<td>SS4</td>
<td>1800</td>
<td>81</td>
<td>498</td>
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<td>SS5</td>
<td>2500</td>
<td>63</td>
<td>388</td>
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<td>SS6</td>
<td>2100</td>
<td>308</td>
<td>1733</td>
</tr>
<tr>
<td>PE1</td>
<td>720</td>
<td>37</td>
<td>1719</td>
</tr>
<tr>
<td>PE2</td>
<td>800</td>
<td>7</td>
<td>402</td>
</tr>
<tr>
<td>PE3</td>
<td>1400</td>
<td>8</td>
<td>660</td>
</tr>
</tbody>
</table>
Economic Analysis

Elements:
- Production Profiles
- Cost Data
  - Capex, Opex, Sunk Cost
- Discount Rates
- Inflation Rates
- Oil Price / Natural Gas Prices

Economic Indicators:
- Net Present Value (NPV)
- Internal Rate of Return (IRR)
- Payback or Payout
- Expected Monetary Value (EMV) or Expected Value (EV)
## Economic Analysis

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Sulu Sea Basin</th>
<th>East Palawan Basin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SS6 Prospect</td>
<td>SS2 Prospect</td>
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<tr>
<td>Resources</td>
<td>1,733 BCF</td>
<td>1,310 BCF</td>
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<tr>
<td>Production Period</td>
<td>21 years</td>
<td>21 years</td>
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<tr>
<td>NPV @ 12%</td>
<td>$1,234 MM</td>
<td>$731 MM</td>
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<tr>
<td>IRR</td>
<td>26%</td>
<td>20%</td>
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<tr>
<td>Payback</td>
<td>5 years</td>
<td>7 years</td>
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<tr>
<td>TGT</td>
<td>$7,837 MM</td>
<td>$5,962 MM</td>
</tr>
</tbody>
</table>

## Field Development Options

### Development and Management Scheme

- **Drilling Operations**
  - Semi-submersible
  - Drillship

- **Well Completion Design**
  - Open-hole Completion
  - Screen & Liner Completion
  - Perforated Casing Completion
  - Perforated Liner Completion

- **Reservoir Development Plan**
  - **OIL**
    - solution-gas drive
    - gas or water injection
  - **GAS**
    - reinjection
    - compression
Field Development Options

Process & Field Facilities

- CGS
- WHP
- FSU
- OGP

Pipelines

Balabac Island

SULU SEA BASIN

Tawi-Tawi Islands

CELEBES SEA

Deepwater Oil Discovery

- Source: BHP Billiton (2004)

Deepwater Gas Discovery

Source: Minerals Management System

Oil and Gas Discovery & Production

FP50 with Subsea Wells

Source: Malampaya Oil Rim

Shallow Discoveries

Source: Minerals Management System
Field Development Options

- Onshore Gas Plant (OGP)
- Concrete Gravity Structure (CGS)
- Floating Production Storage & Off-loading (FPSO)
- Pipelines
- Onshore Gas Plant (OGP)

Marketing Options

- **Oil** - locally refined or exported
- **Gas** - for power generation or for transportation
- Trans ASEAN Gas Pipeline

Legend:
- Gas Reserves Tcf
- Existing or u/c Gas Pipeline
- Proposed ASEAN Gas Grid
Resource Management Strategies

- Resources (Oil and Gas)
- Oil Companies (what kind?)
- Promotion

Candidate Oil Companies

- Already present
- Buyers of Philippine Data
- Present in neighbouring countries
- Past association with the Philippines
- With interest in similar projects elsewhere
- Have a strategy & portfolio where a Philippine project would fit in
Promotion

Top 10 questions about entering the Sulu Sea-East Palawan Basins (asked by the Board Members)

1. The Sulu Sea-East Palawan Basin, are you @X%&# insane?
2. What will our shareholders think?
3. What’s the potential?
4. How much will it cost?
5. What are the lease terms?
6. Who’s going to work it?
7. Can you get the data, cheaply?
8. We are not going to operate are we?
9. You will get partner and sell down, right?
10. Is it easy to deal with the DOE?

Source: Norwegian Petroleum Directorate

Licensing Strategies / Contracting Rounds

- Campaign materials?
- Where to go?
- What to do?
**Recommendations**

- **Changes in the Fiscal System (?)**
  - decrease in minimum acreage
  - increase in % of FPIA

- **Exploration Risk**
  - comprehensive study of frontier basin
  - encourage acquisition of new data i.e. multi-client surveys due to low amount of existing data

- **Access to Data**
  - liberal access to data by exploration companies
  - decrease cost of data

- **Digital Data**
  - conversion of existing data into digital format
  - easy use and access by companies

- **Progressive Incentives**
  - modify signature bonus according to basin’s prospectivity
  - lower % of SC area relinquishment

- **Promotion**
  - prepare & disseminate promotional materials
Recommendations

- **Contracting Round**
  - foster healthy competition among companies
  - conducted at least every 2 years

- **PNOC-EC / PETRONAS Joint Study**
  - to fully evaluate potential of the basin
  - advantage: national oil companies in their respective countries
  - ongoing DANIDA Project in CCOP: made initial steps but with obvious constraints

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*Maraming Salamat Po!*
### Resource Assessment

<table>
<thead>
<tr>
<th>PROSPECT</th>
<th>MEAN GRV (km²-m)</th>
<th>Water Depth (m)</th>
<th>Reservoir Depth (m)</th>
<th>Resources (Mean Values)</th>
<th>% Risk</th>
</tr>
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<td>Oil (MMbbl)</td>
<td>Gas (Bcf)</td>
</tr>
<tr>
<td>SS1</td>
<td>1457</td>
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<td>PE3</td>
<td>1609</td>
<td>1400</td>
<td>2920</td>
<td>8</td>
<td>660</td>
</tr>
</tbody>
</table>

### Supply Demand Profile

**Mindanao, 2005 - 2014**

- **Req'd Cap Add.**
  - 2005: 150
  - 2006: 100
  - 2007: 100
  - 2008: 50
  - 2009: 50
  - 2010: 50
  - 2011: 100
  - 2012: 50
  - 2013: 150

- **Committed**
  - 2005: 75
  - 2006: 0
  - 2007: 210
  - 2008: 0
  - 2009: 0
  - 2010: 0
  - 2011: 0
  - 2012: 0
  - 2013: 0
  - 2014: 0

- **Existing**
  - 2005: 1515
  - 2006: 1566
  - 2007: 1681
  - 2008: 1681
  - 2009: 1681
  - 2010: 1681
  - 2011: 1681
  - 2012: 1681
  - 2013: 1681
  - 2014: 1681

- **Peak Demand**
  - 2005: 1,371
  - 2006: 1,458
  - 2007: 1,535
  - 2008: 1,615
  - 2009: 1,697
  - 2010: 1,784
  - 2011: 1,883
  - 2012: 2,001
  - 2013: 2,124
  - 2014: 2,256

**Graph Notes:**
- **Transfer of PB 101, 103 & 104**
- **Mindanao Coal 200**
- **Additional Capacity Needed**
Licensing, Contractual and Fiscal Conditions

- Contracting Rounds
- Marginal Fields

Oil Companies

- Super Majors: Large reserves & production; frequent mergers; access to latest technology & R&D
- Majors: Diversified group of companies; some have deepwater / HTHP experience; tail-end producers
- Mid Cap: Lesser amount of reserves & production compared with super majors
- Small Cap: Drill in previously drilled acreage; better for mature area exploration
- Microcap: Participants not operators; financial strength?; Would likely farm-out acreage before they drill a well or sell out prospects

McDonald Company

- ~ 70% ownership of petroleum activities in their home countries

Source: Norwegian Petroleum Directorate