¡MEXICO!
A New Opportunity

CIM Petroleum Society
Petroleum Economics Special Interest Group
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Outline

• Introduction
• Mexico’s Gas Supply Challenge
• Multiple Service Contracts
• Overview of PEMEX Offering
• Burgos Basin
• Summary
Forward Energy Group Inc.

- Consultancy based in Calgary
- Analysis and advice on strategic choices for the upstream petroleum sector
- Answer business questions at a strategic level through creative technical analysis at the basin level
- Multi-client study of gas production trends in WCSB
- Project with Canadian Hunter:
  - entry into upstream gas sector in Mexico
New Opportunity

• Enter the upstream gas business in Mexico through service contracts in non-associated natural gas basins.

• Create attractive return on investment by reactivating, extending, developing and operating tight gas sand fields.

• Enter other gas basins and oil sector in Mexico from an established position.
Mexico’s Gas Demand Forecast

Demand growth is estimated to reach 4.3 bcf/d, equivalent to an AAGR of 7.3%.

Source: SENER’s Prospectiva del mercado de gas natural 2002-2011

Mexico is anticipating significant growth in gas demand
Mexico’s Gas Supply Challenge

Even with MSCs, Mexico’s imports will climb

Source: SENER’s Prospectiva del mercado de gas natural 2002-2011 and PEP’s estimates
Why Mexico is Opening to International Oil Companies (IOCs)

- To increase substantially the national production of natural gas and to reduce the shortage that is predicted for the coming years
- To guarantee the availability of gas for electricity generation
- To obtain additional resources for investment in non-associated natural gas
- To stimulate the economic activity in Mexico

Mexico wants to import capital, not gas.
Service Contracts

- Mexico’s efforts follow on previous programs in Kuwait, Iran and Venezuela

- Service contracts generally suitable for lower risk operations, not applicable for Exploration

- Typically grant fees for services provided; fee levels not affected by commodity prices

- Often include performance incentives for higher production, higher reserves and lower cost structures

- Alignment of host country and IOC interests not always easy

- PEMEX as the “national patrimony”: constitutional, political and emotional constraints to opening

Mexico is building on experience of other countries
PEMEX Service Contracts

- Developed to comply with Constitution and existing legal framework,
- Lower risk operations: existing production, development upside, “extended development”, infrastructure and maintenance
- Pays fees for services provided; timing of payment affected by amortization schedule and payment cap
- To maximize return, Contractor has incentive to lower cost structures and ensure production and revenues exceed payment cap
- In Mexico, contract to be awarded, based on a single bid criteria:
  - bidding of a discount to the standard costs – The company that bids the greatest discount wins the contract!
Elements of MSCs

• International Oil Companies (IOCs) act as general contractors

• Contractor to act like an E&P company, with operational freedom within constraints of:
  – Pre-approved minimum work plan
  – Proper oil and gas conservation
  – Health, safety and environmental regulations
  – Drill or drop

• Contractor does not share in production, book reserves or own assets

• Fiscal system does not require cost verification

• Three phases: development, reactivation and maximum recovery, over the contract term of 10 to 20 years

MSCs profitable for highly efficient operators
Standard (Unit) Prices

- Catalogue of standard unit prices developed for gas field activities
  - Development, Infrastructure and Maintenance (which includes Operations)

- Each item includes five components
  - Direct
  - Indirect (G&A)
  - Financing
  - Profit Margin
  - Other

- Examples from Catalogue
  - Shoot >500 km new 2D seismic $ 8,600/ km
  - Drill and abandon 3000m vertical well $ 960,000/ well
  - Drill and case 3000m vertical well $ 1,650,000/ well
  - Install 101.6mm gathering line $ 112,000/ km
  - Install 25 mmcf/d dew point control unit $ 6,300,000/ ea
  - Maintain 3000m gas well $ 560/ day

Contractor upside in beating these costs
How Contractors Make Money

There are a number of processes that must be performed well to maximize the Contractor’s rate of return

• Fees Available
  – Profit margin on, and return of, recoverable capital spending
  – Profit margin on, and return of, recoverable maintenance spending
  – Spend less than the unit capital costs
  – Spend less than the unit maintenance costs
  – Carry out extra work beyond the minimum work program

• Supportive Processes
  – Create sufficient revenue stream to fund fees
  – Ensure downstream infrastructure is not a barrier;
  – Manage cost of bid (discount) to obtaining contract
  – Plan and execute incremental operations without a new bid
  – Optimally balance spending between operating and capital
  – Develop alliances with service providers (drilling, seismic, etc.)

It’s all about execution!
Precision Drilling Mexicana Rig 723 on the plains of the Burgos
MSC Supply Scenario

- Multiple bidding rounds for MSCs are envisioned

- Multiple Services Contracts will be awarded for a number of blocks in the Burgos Basin to add 1 bcf/d by 2007.

- Over 20 years, PEMEX expects recovery of 3 to 5 tcf from Round 1 contracts

- Exploration and development projects targeting 20 to 250 mmcf/d per block would be ongoing simultaneously

Initial 8 blocks to yield 1 bcf/d
PEMEX Block Offerings

- MISION
- CUERVITO
- FRONTERIZO
- PANDURA-OLMOS
- REYNOSA-HUIZACHE
- MONTERREY-PASCAULITO
- CORINDON-RENO
- RICOS
PEMEX Offering

• Eight blocks outlined, ranging in size from 230 km² to 4000 km²; the small blocks are designed so specifically for small, independent operators

• Most blocks located at or near the Rio Bravo (Mexico – USA border)

• All blocks contain existing production (from 2 mmcf/d to 67 mmcf/d)

• Both exploitable lands and undeveloped areas exist in each block; each block also contains undiscovered potential

• All 8 blocks combined have PDP reserves of 140 bcf; 3P reserves of just over 1 tcf are envisioned with further development

• PEMEX remains open to additional posting requests by operators
• Current production from 150 wells on 8 blocks totals 135 mmcf/d, but decline rates averaging 35% per year are expected
• In aggregate, 740 bcf of Proved and Probable reserves
• Over half the area is covered with 3D seismic

Development potential available
PEMEX Blocks: Bidder Qualification

• Two large blocks (Ricos and Pandura – Olmos), with over 3000 km$^2$ each, are designed for large IOCs
  – Qualification: must operate 600 mmcf/d in ’02, $750mm in capex in ’02 and have international operations

• Four medium sized blocks (Reynosa, Monterrey, Mision and Corindon), with 1000 to 2000 km$^2$ each, are designed for medium sized companies
  – Qualification: must operate 300 mmcf/d in ’02, $300mm in capex in ’02 and have international operations

• Two small blocks (Cuervito and Fronterizo), with only 230 km$^2$ each, are designed specifically for small, independent operators
  – Qualification: must operate 12-50 mmcf/d in ’02, $10-50mm in capex in ’02 but do not require international operations

PEMEX offering something for everyone
Contract Economics – Example Small Block

- Example for a small block development: 3 existing wells
- Contractor drills 9 new wells, 2 dry wells, installs facilities
- Produces 21.6 bcf over 8 years (1.8 bcf/well)
- No royalties, severance tax or property tax on assets built for PEMEX

<table>
<thead>
<tr>
<th></th>
<th>Fees (US $mm)</th>
<th>Costs (US $mm)</th>
<th>Margin (US $mm)</th>
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</thead>
<tbody>
<tr>
<td>Capex</td>
<td>21.2</td>
<td>17.4</td>
<td>3.8</td>
</tr>
<tr>
<td>Maintenance</td>
<td>17.2</td>
<td>12.3</td>
<td>4.9</td>
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<tr>
<td>Interest</td>
<td>1.5</td>
<td>0.0</td>
<td>1.5</td>
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<tr>
<td>Total</td>
<td>39.9</td>
<td>29.7</td>
<td>10.2</td>
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<tr>
<td>Income Tax (32%)</td>
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<td>3.3</td>
<td></td>
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<tr>
<td>Net</td>
<td></td>
<td></td>
<td>6.9</td>
</tr>
</tbody>
</table>

SOURCE: PEMEX, 2003-03

24% IRR; NPV$_{10\%}$ = $3.0mm
**Contract Economics – Example Small Block**

- IRR of example block, initial reserves plus undiscovered potential
- PEMEX calculation of contractor position (March, 2003)

<table>
<thead>
<tr>
<th>Gas Price</th>
<th>Low Production</th>
<th>Medium Production</th>
<th>High Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2.50/mcf</td>
<td>18%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$3.50/mcf</td>
<td>10%</td>
<td>24%</td>
<td>26%</td>
</tr>
<tr>
<td>$4.50/mcf</td>
<td>24%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Low Production – 1.1 bcf/well
- Medium Production – 1.8 bcf/well
- High Production – 3.1 bcf/well

*SOURCE: PEMEX, 2003-03*

**Attractive to contractor with sufficient reserves and reasonable prices**
Contractor Risks

- Monthly Payment Limit could be restricted by:
  - Insufficient production volumes from the block
  - Low gas prices

- Competition for services with other MSC operators

- Cross-cultural operations

- Political roadblocks that could delay MSCs
  - From political opposition
  - Within Mexican government bureaucracy
  - Within PEMEX
  - Unions
  - Landowners
  - Others

MSCs provide relief for some of these risks; some risks need more planning
Bid Process and Timing

• December 2001: PEMEX official announcement of program start
• June 2002: IOC conference and 1st draft of model contract
• August 2002: 2nd draft of model contract
• Sep/Oct 2002: legal and economics conferences
• January 2003: 3rd draft of model contract
• February 2003: Release of viewable data

• April 2003: expected approval of new Public Works Law
• April 2003 technical conference, Reynosa
• May 2003: close of small block request period
• End of June 2003: call for bids for Round 1
• August to Sept 2003: closing of bids
• Sept to Oct 2003: contract signing

2003 timing may slide
Bid Evaluation Process

Potential → Development → Value → Bid
Burgos Basin

- Location
- Trends and schematic
- Production history
- Production potential
- Producing characteristics
- Success factors
Regional Geology - Trend Map
Growth Fault Zones

Multiple Reservoir Sands
Local Areas of Thick Net Sand
Seismic Section – E Trend

Complex Compartmentalized Structures
Unconformity – bounded Sequences

Source: Whitbread et al,
The Burgos Basin and the prolific gas fields of South Texas are part of the same geological province. South Texas has been producing close to 4 bcf/d for almost 30 years. The Burgos has similar potential.

Some estimates place potential as high as 30 tcf, compared to the 6 tcf of total reserves estimated by PEMEX. This reserve base is capable of supporting in excess of 3 bcf/d of production compared to the current 1 bcf/d.
Original growth limited to 5 major fields – Upper Wilcox trend
Production by Trend, South Texas

RR#4 Production Rate 1965-2000, all products (gas only)

- All others
- F trend
- E trend
- C trend
- B trend
- all gasonly 44287

Production Rate, (mmcf/d)

Production by Trend, South Texas

U & L Wilcoxon and Vicksburg Trends Important
Producing Characteristics

• Reservoirs compartmentalized
  – Compartments bounded by complex faulting
  – Facies control on rock types/reservoir geometry
  – Multiple stacked sandstones
• Low permeability sandstones
• Geopressured and hot
• Dry gas in deeper and older reservoirs
• Characteristics vary by trend

$\textbf{$\$\ Diablo$ are in the Details $\$}$
Technical Success Factors

• 3D seismic to identify fault-bounded reservoir compartments
• Seismic attribute analysis and seismic inversion to map petrophysical properties
• Petrophysical pay recognition
• Drilling
  – Directional to maximize reservoir intersection
  – Deep and geopressured
• Fracture stimulation
  – Optimum frac length, height, direction – well spacing
  – Large fracs, stronger proppants
• Commingling
Returning to the surface . . .
Business Success Factors

- Low cost operations
- Supplier management
  - Selection
  - Ongoing integration
- Efficient back office processes
  - Adherence to contract provisions
- Cultural integration
- Contract management
  - Identifying and exploiting opportunities
- Corporate reporting, communications
  - Reporting to stakeholders about a ‘non-standard’ business activity
Summary

• Mexico needs to develop domestic gas supply
• Multiple Services Contracts are a unique contract structure for IOCs
• MSCs require Contractors to implement effectively to manage cost and revenue risks
• Burgos Basin gas potential significantly underdeveloped relative to South Texas
• Application of new technology will reduce costs and identify new reserves
• Successful business integration will be necessary
• Mexico has created a new set of opportunities for IOCs to evaluate
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