Case Study: Oil and Gas Sector

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Topics for Today

- Key CDM Project Components
- Where are the CDM Opportunities in The Oil and Gas Sector?
- What Can Carbon Add? – Some Examples
- Common Challenges For O&G Projects
- Frequently Asked Questions (FAQs)
- World Bank Advantages in Carbon Projects
Key Components of a JI Project

- **Proposed Project** - Defined In Terms of Outputs Produced and GHG Emissions Over The Life of The Project

- **Baseline** – The Most Probable Future Way of Producing The Same Outputs Absent the Proposed Project

- **Emission Reductions** – The Difference Between Baseline and Proposed Project GHG Emissions by Year

- **Crediting Period** – Typically 2008 – 2012

- **Project Boundary** – Defined To Include All GHG Emissions Related to the Proposed Project That Are Under The Control of the Project Participants

- **Additionality** – Claimed Emission Reductions Must be Above and Beyond Those That Would Have Occurred Without the Proposed Project
O&G Sector GHG Emissions

- Oil Production Yields Associated Petroleum Gas (APG)
  - Vented as CH4 (1 MT CH4 = 21 MT CO2e)
  - Flared as CO2 & CH4 if Combustion Is Not Complete

- APG Flaring Is A Very Large Source of GHG Emissions; estimates show figures as high as 60 bln m³
Gas Sector GHG Emissions
Illustrative Example

- 505 MW Combined Cycle Power Plant
  Example:
  
  - 0.5 MT CO2e/MWh Produced
  
  - At 80% Annual Load Factor – 1.8 Million MT CO2e/a

![Pie chart showing GHG emissions distribution for 505 MW CC Power Plant. The chart indicates the following emissions sources: 74.9% from plant operation, 25.0% from gas production & delivery, and 0.1% from other sources.]
Global GHG Emissions Estimates From O&G Sector

- **IPCC Estimate (1996):**
  - 630 – 1,470 Million MTCO2eq/a
  - $3.8 - $8.8 Billion USD/a @ $6.00/MT
  - 55% Are From Russia and FSU Countries
  - Intensity Estimates 247.8 – 579.6 MT CO2e/Million CM of Gas Production
  - Emissions Growth of 60% Expected From 2000-2025 Due To Increases In Production and Longer Transport Distances
O&G Emissions by Source

Methane Emissions in O&G Sector

- Associated Gas: 27%
- Compressors: 25%
- Distribution Leaks: 18%
- Pneumatic Devices: 14%
- Maintenance Venting: 8%
- Other: 8%
## O&G Emission Reduction Target Areas

<table>
<thead>
<tr>
<th>Activity</th>
<th>Technical Potential % Reduction</th>
<th>Economic Potential % Reduction</th>
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<tbody>
<tr>
<td>Exploration</td>
<td>40</td>
<td>0</td>
</tr>
<tr>
<td>Associated Gas</td>
<td>50-90</td>
<td>50</td>
</tr>
<tr>
<td>Venting and Flaring</td>
<td>70</td>
<td>60</td>
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<tr>
<td>Maintenance</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Electricity and Fuel Use</td>
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<td>15</td>
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<tr>
<td>Compressors</td>
<td>90</td>
<td>80</td>
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<tr>
<td>Pneumatic Devices</td>
<td>98</td>
<td>75</td>
</tr>
<tr>
<td>System Upsets</td>
<td>70</td>
<td>0</td>
</tr>
<tr>
<td>Fugitive Emissions</td>
<td>90</td>
<td>5</td>
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</table>
"Indicative" Methane Emission Factors For Russia

<table>
<thead>
<tr>
<th>Facility</th>
<th>Annual Methane Emissions Factor</th>
<th>Unit of Measure</th>
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<tbody>
<tr>
<td>Production, Processing</td>
<td>0.05</td>
<td>% of Net Production</td>
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<tr>
<td>Transmission Pipelines</td>
<td>28.1</td>
<td>tCO2e/km/a</td>
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<tr>
<td>Compressor Stations</td>
<td>281.4</td>
<td>tCO2e/Installed MW/a</td>
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<tr>
<td>Meter and Regulator Stations</td>
<td>703.5</td>
<td>tCO2e/station/a</td>
</tr>
<tr>
<td>Distribution</td>
<td>14.1*</td>
<td>tCO2e/km/a</td>
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</tbody>
</table>

* No Factor For Russia Was Reported. This figure is for Ukraine
O&G Opportunity Summary

- GHG Emissions From This Sector Are Very Large
- FSU Has A Very Large Share of Those Emissions
- APG Utilization, Venting or Flaring Locations, Compressor Stations and High-Bleed Pneumatic Devices Are Large Potential Targets
- Looking For Ways Increase Use of Gas That Would Otherwise be Wasted or To Reduce Leaks or Maintenance Venting
What Can Carbon Add?

- First Illustrative Case Study
  - Danilovsk Use of APG That Would Otherwise Be Flared To Produce Electricity Used For Reinjection Pumping In Oil Fields

- Selling 70% of Expected 2008-2012 Emission Reductions @$6.60/MT CO2e Returns More Than 12% of Total Investment Cost. Total ERs are Almost 163,000 MT CO2e/a.

- Post 2012 Sales Not Clear But Validated Project Could Qualify For Another 15 Years of Sales – Return Would Then Be Nearly Half of The Investment
What Can Carbon Add - 2?

- **Second Case Study – Kursk Gas Distribution System Leak Reduction Program**
  - 7,000 km of Pipelines
  - 229 Regulator Stations
  - 1,431 Pressure Reduction Stations
  - 6,200 Valves, 18,500 Flanges
  - Annual Throughput 1.9 Billion Cubic Meters
  - Annual ERs 321,500 MT CO2e
  - Annual Sales Value @$6.00/MT = $1.9 MUSD
  - May Cover Close To Total Project Costs For Inspection, Monitoring, Leak Repairs & Replacements
O&G Carbon Project Challenges

Baselines and Additionality
- Is Business As Usual (BAU) Really The Baseline?
- Why is it Not Very Profitable To Use Valuable Gas That Is Now Being Wasted?
- If it is Very Profitable, Why Isn’t Recovery The Most Probable Future?
- If The Project Is The Most Probable Future, The Project and The Baseline Are The Same And There Are No ERs To Be Claimed

How To Demonstrate Additionality
- Investment Analysis – Show That BAU Or Another Project Is More Attractive Economically Than The Proposed Project
- Prevailing Practice – Show That Proposed Project Is Not A Common Practice
- Barrier Analysis – If The Project Is Financially Attractive, Document The Barriers That Make The Project An Unlikely Future Absent Carbon Payments
O&G Carbon Project Challenges - 2

- For Flare Reduction Projects
  - Flare Emissions Are Not Easily Monitored or Calculated
  - If Power Is Produced, Grid Displacement Analysis Is Required
    - Which Existing Generating Units Will Produce Less?
    - Which Future Units Will Not Be Built or Will Be Downsized?
O&G Project Challenges

■ For System Leak Reduction Projects
  ■ How To Discover Sources of Leaks In a 7,000 km System?

■ How To Monitor Leaks With and Without The Proposed Improvements

■ How To Demonstrate That Leak Reduction Is Not Highly Profitable and Therefore Likely Without Carbon Payments
Frequently Asked Questions

What Documents Are Required To Qualify A Project For Carbon Payments From CFU of World Bank?

- Project Design Document (PDD)
- Monitoring Plan (MP)
- Emission Reductions Purchase Agreement (ERPA)
- WB Safeguards Clearance

Who Prepares The PDD and MP?

- World Bank Can Hire And Supervise Experts
- Project Sponsors Must Provide Full Cooperation
- Preparation Costs Are Then Deducted From Future Carbon Revenue Stream
Frequently Asked Questions - 2

- **When Are Carbon Payments Received?**
  - PDD and MP Must Be Independently Validates As Appropriate Methods For Calculating ERs.
  - Annual ERs Achieved Must Be Independently Verified Using The Validated Methods
  - Payments Are Made Annually For Reductions Achieved In The Prior Year Following Verification.
World Bank Advantages In Carbon

- Deal Volume
- Cross-Cutting Experience In FSU
- World Bank Vetting Can Mobilize Non-Carbon Financing
- World Bank Safeguards Validate Environmental Integrity of Projects
- Strength of World Bank Projects For Post 2012 Potential Carbon Sales
THANK YOU!

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