Methane to Markets

Financing Oil and Gas Sector Methane Emissions Reduction Projects through Carbon Markets

Oil and Gas Subcommittee Technology Transfer Workshop

January 28, 2009
Monterrey, Mexico

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Climate Change and Sustainable Development in the O&G Industry

- Production processes and energy consumption have an impact on the environment.

- Sustainability is attainable. It depends on:
  - Public policies and regulations
  - Modification of individual and corporate habits /practices
  - Voluntary initiatives in companies

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Challenges for 21st Century O&G Companies

- Peak oil: 2010 – 2030
- Geopolitical crisis – Oil availability shortages
- Environmental pressure – Climate Change
- Forecasts on depletion of critical natural resources – Growth or expansion limits
- Kyoto Protocol
- Emerging markets – Energy companies

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Climate Change Challenges

- Greenhouse gases (GHG) intensity reductions for processes and products
  - Increased sustainability, mitigation of climate change effects
- Objectives
  - Minimize exposure to climate change associated risks
  - Strengthen strategies and actions aiming at climate change mitigation and make them more visible

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GHG Intensity Indicators for the O&G Industry

- E&P: $kgCO_2e$ / ton crude oil equivalent production
- Refining: $kgCO_2e$ / Equivalent distillation charge
- Transport: $kgCO_2e$ / ton–km transported
- Utilities: $kgCO_2e$ / MWh generated
- Other operations: $kgCO_2e$ / BOE produced

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O&G Industry Initiatives

- Technology improvements / Revamping
- Energy efficiency / Utilization of currently vented or flared gas
- Cogeneration / Power generation
- Renewable energy development
- Biofuels / Ethanol fuel mixes

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Climate Change Related Organizations / Agreements

- 1992: United Nations Framework Convention on Climate Change (UNFCCC)
- 1997: Kyoto Protocol (KP)
- 2005: Kyoto Protocol Ratification

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Kyoto Protocol Agreements

- Focal point: GHG reduction or limitation targets.
  - Annex 1 countries – Commitments
  - Non Annex 1 countries – Signatory countries with no GHG reduction or limitation commitments (Mexico)
- Due to emission reduction goals adopted by Annex 1 countries, emissions reductions acquired a market value.

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Kyoto Protocol Goals

- Annex 1 countries must achieve on average GHG emission reductions so as to have net GHG emissions generation levels below 95% of those they had in 1990. This must be achieved in the 2008 – 2012 period.

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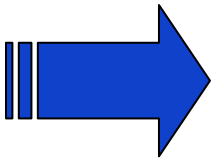
GHG Emissions Market Value

- Emissions over and above the assigned amounts could involve potential imposed costs.
- Due to this, organizations surpassing their GHG emissions reduction goals have an asset equivalent to the market value of such “surplus” reductions.
- Therefore, emission reductions are treated as a new commodity
- Main GHG: CO_2,  “Carbon market”
- Carbon (CO_2) is traded as any other market commodity.

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Carbon Market Actors

- Public Sector
  - Multilateral Development Banks (e.g. World Bank)
  - Government Agencies
  - UN Agencies
  - NGO's

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Carbon Market Actors

- Private Sector
  - Organizations with emission reductions (ER) obligations
  - Organizations with voluntary emissions reductions commitments
  - ER project developers
  - Banks
  - Investment funds
  - Financial agents
  - Law firms
  - Accounting firms
  - Technology developers
  - Consulting firms

Carbon Markets
Flexible Mechanisms

- Emissions trading
- Joint Implementation (JI)
- Clean Development Mechanism, (CDM)

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Flexible Mechanism Goals

- Contribute to sustainable development in non Annex 1 countries
- Technology transfer to developing countries
- Possibility of an alternative for compliance with emission reduction goals by Annex 1 countries

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Emissions Trading Units

- Trading Unit: 1 tCO_2e (all)
  - AAU (Assigned Amount Units) Issued by an Annex 1 party as part of its assigned emissions amount.
  - RMU (Removal Units) Issued by an Annex 1 party on the basis of land use, land use change and forestry (LULUCF) activities.
  - ERU (Emission Reduction Units) Generated by a Joint Implementation project
  - **CER (Certified Emission Reductions) Generated from a Clean Development Mechanism project**
  - **VER (Verified Emission Reductions) Tradable credits for GHG emission reductions generated to meet voluntary demand for carbon credits**

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Emissions Trading

- Exclusively to take place among Annex 1 countries
- An Annex 1 country buys ERUs from another Annex 1 country to meet its reduction goals
- There is a system and software that guarantees safe tracking and trading of ERUs
- Regulated by the European Union Emissions Trading Scheme

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Joint Implementation(JI)

- Project based
- Implemented among Annex 1 countries
- An emission reduction project is implemented in one Annex 1 country to credit the ERs obtained to an organization in another Annex 1 country
- Eligibility criteria must be met, and UNFCCC approved CDM methodologies must be used

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Clean Development Mechanism (CDM)

- Project based
- Implemented between Annex 1 and non Annex 1 countries
- An emission reductions project is implemented in a non Annex 1 country to credit the ERs obtained to an organization in an Annex 1 country
- Eligibility criteria must be met, and UNFCCC approved methodologies must be used

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JI and CDM Common Elements

- Project based
- Baseline and monitoring required
- Parameters and development conditions for projects must be validated
- Reduced emissions must be verified as a condition to issue ERUs or CERs

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CDM Features

- Basis: GHG Emission Reductions achieved in developing countries can be certified and sold to Annex 1 countries
- Goals:
  - Contribute to sustainable development in non Annex 1 countries
  - Alternative emission reductions goal compliance possibility for Annex 1 countries
- Rules, procedures and modalities as defined in Kyoto Protocol, Marrakech Agreements and CDM Executive Board Decisions

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CDM Eligible Projects

- In principle, any Kyoto Protocol referred GHG reduction project (CO_2, **CH_4**, N_2O, PFC's, CFC's, SF_6):
- Carbon "sinks" are also considered:
  - Afforestation and reforestation
  - Carbon capture and geological storage, CCS (rules under consideration)
- Exclusions:
  - Nuclear energy
  - Forest conservation

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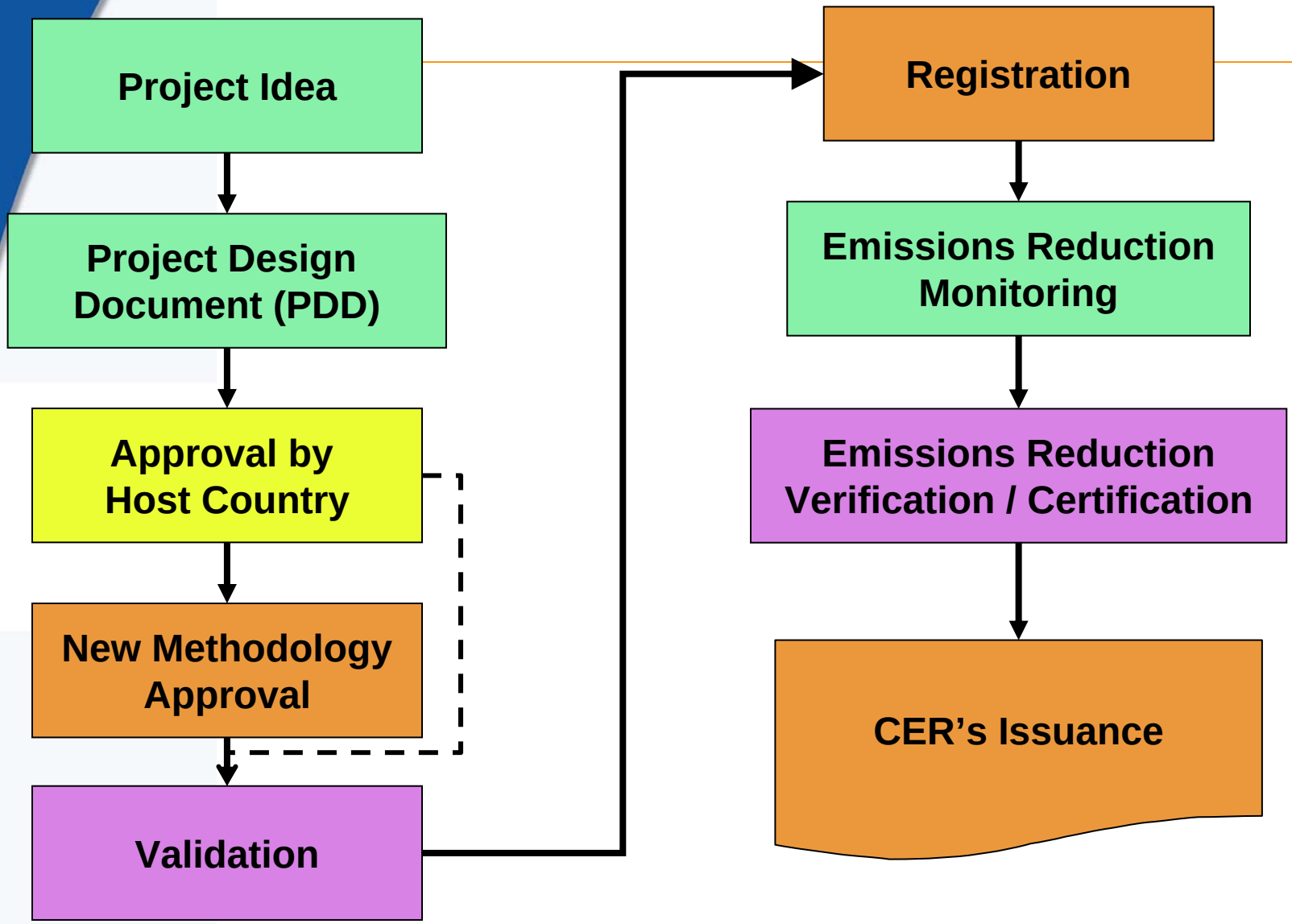
CDM Project Cycle



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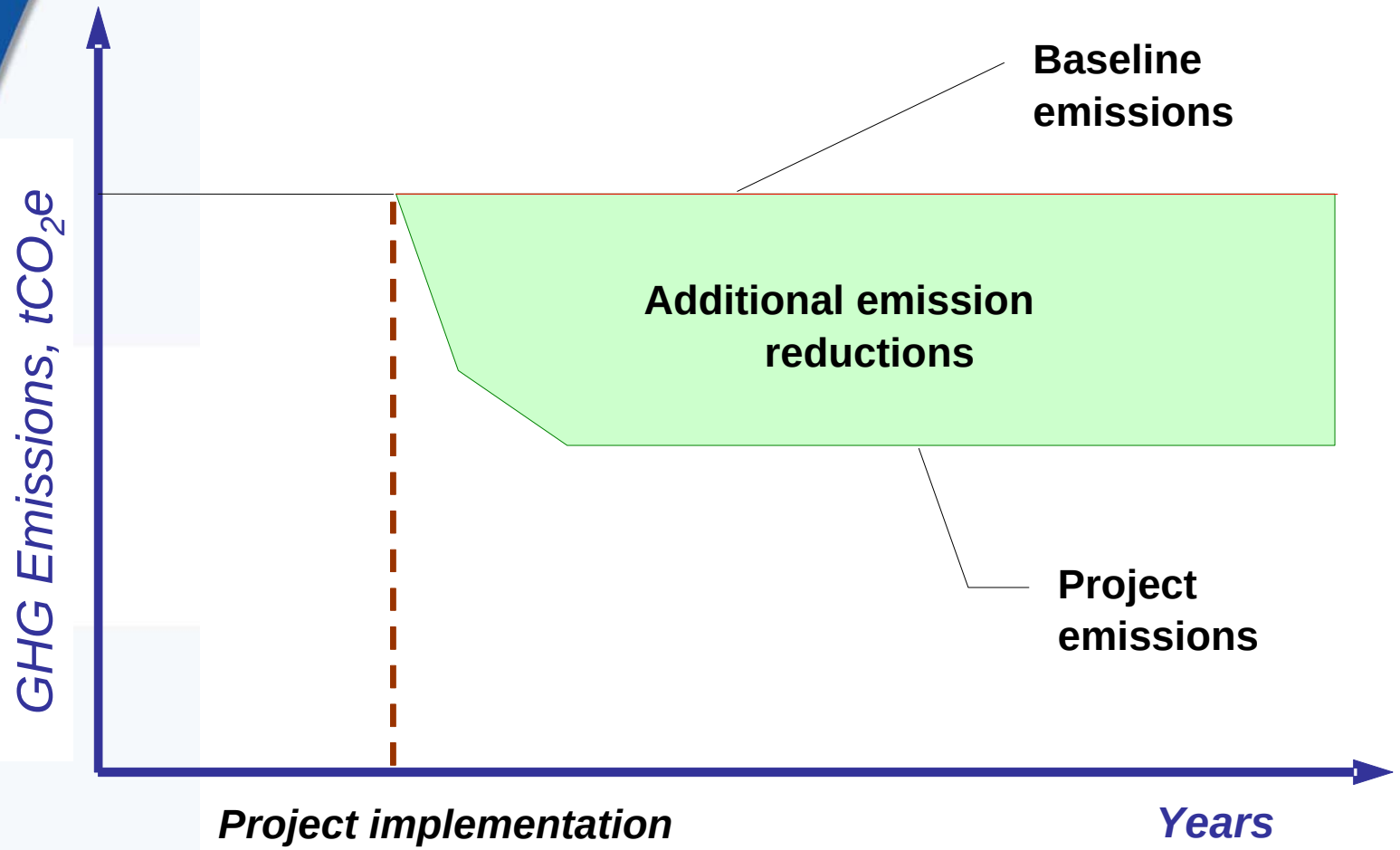
Emissions reduction calculation and baseline determination

- According to selected methodology
- Accepted factors utilization
  - IPCC (Intergovernmental Panel on Climate Change)
  - USEPA (United States Environmental Protection Agency)
  - National factors and indicators
  - Global Warming Potential Factors
  - Internationally recognized technical references

Baseline and additionality for CDM projects



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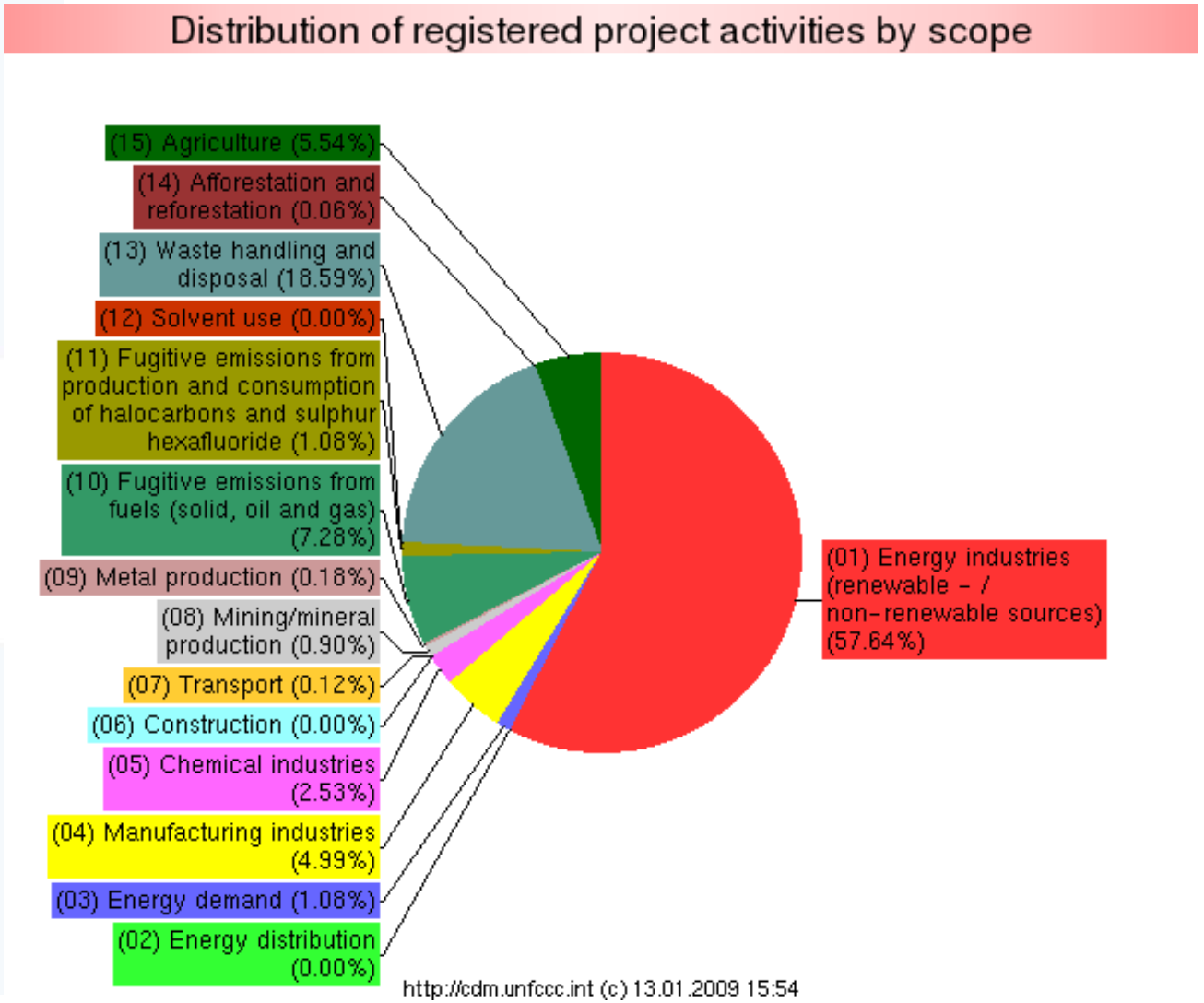
Registered CDM Projects (1,662)



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Case Study: Flare Gas Recovery and Utilization at Al-Shaheen Field

- Project description:
  - Platform flare gas recovery. New gas pipeline required
  - Recovered gas will be used as feedstock in an onshore facility
- Selected additionality demonstration method: Barriers
  - Project is not a common practice
  - “One of a kind” project
  - Technological barriers due to project operation

Al-Shaheen field

Storage Gas Well (NFIS)

Re-injection

Dry Gas Producti

Electricity generation for National Grid, Fuel for NGL Complex

NGL 3

North Field Alpha

Dry Gas Production

Feed for local industries QAPCO, QChem, QAFAC

LPG Production

NGL 4 Train 1

Condensate Production

Feed for export

C_1 component C_2 component C_3 component C_4 component C_5 component

Project Activity

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Case Study: Flare Gas Recovery and Utilization at Al-Shaheen Field

- Sector: Exploration and Production
- Date: October, 2006
- Company: Qatar Petroleum, Maersk Qatar Oil
- Country: Qatar
- Estimated emission reductions:
  - 2,499,649 tCO_2e / year
- Approved UNFCCC Methodology: AM0009 “Recovery and utilization of gas from oil wells that would otherwise be flared”

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CDM Projects in PEMEX

- Project identification under way in all four subsidiary companies
- Project Idea Note (PIN)
- Additional cash flow estimation
- Main lines of activity
  - Cogeneration
  - Energy efficiency improvement
  - Reduction in flaring / recovery of gases with high energy content
  - Leak reduction

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Conclusions

- Climate change mitigation project development is in line with PEMEX operational safety, energy security and profitability policies.
- CDM projects have a relevant role in this effort, representing examples and developing standards to spread environmental, safety and economic benefits throughout the whole organization.