



# Financing Oil & Gas Sector Gas Recovery and Flare Reduction Projects

Monterrey 28 January, 2009



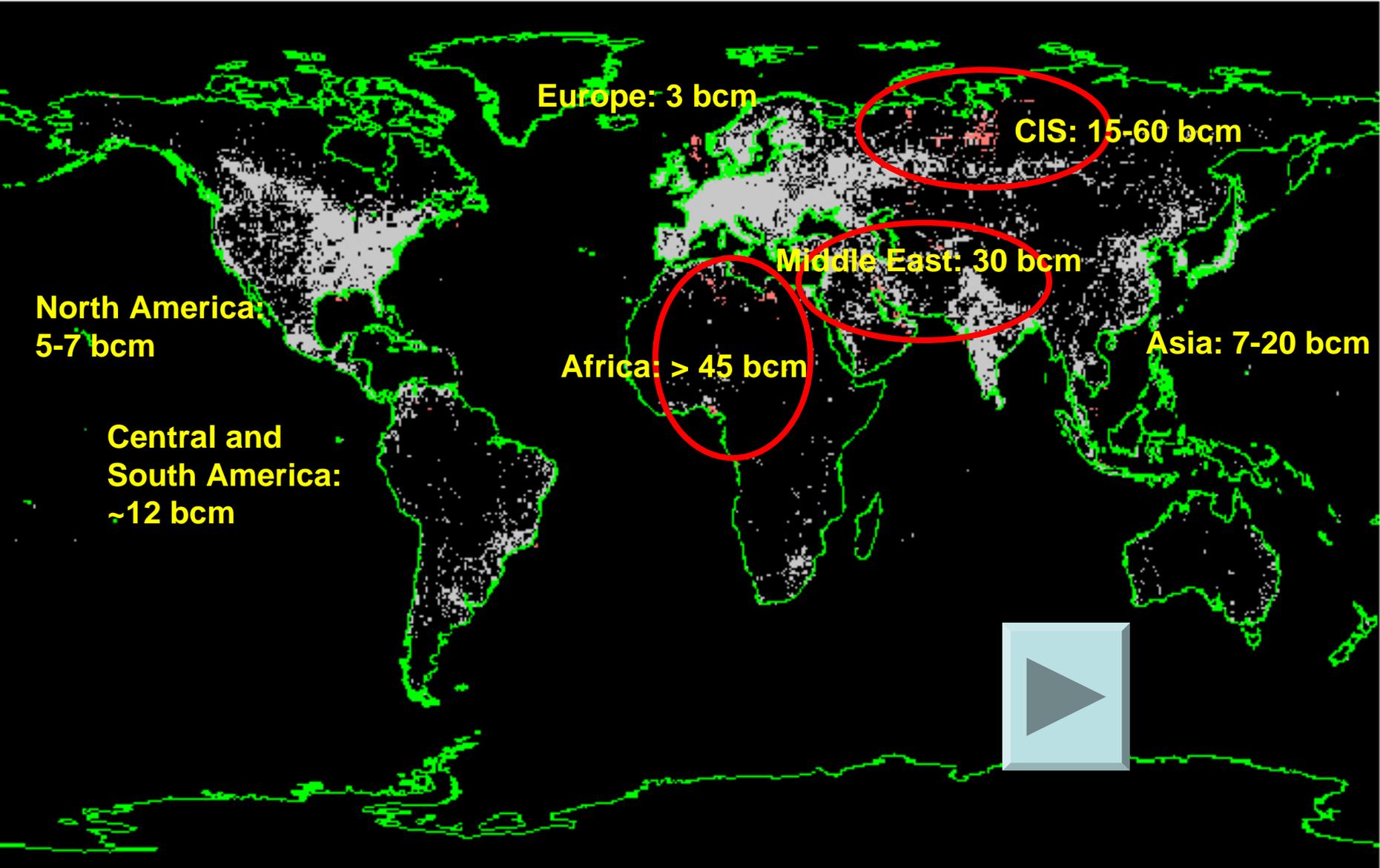
- Global Gas Flaring Reduction Partnership (GGFR)
- Flaring in Mexico
- Carbon finance and flaring reduction projects
- Carbon finance activities in GGFR
- GGFR and Mexico

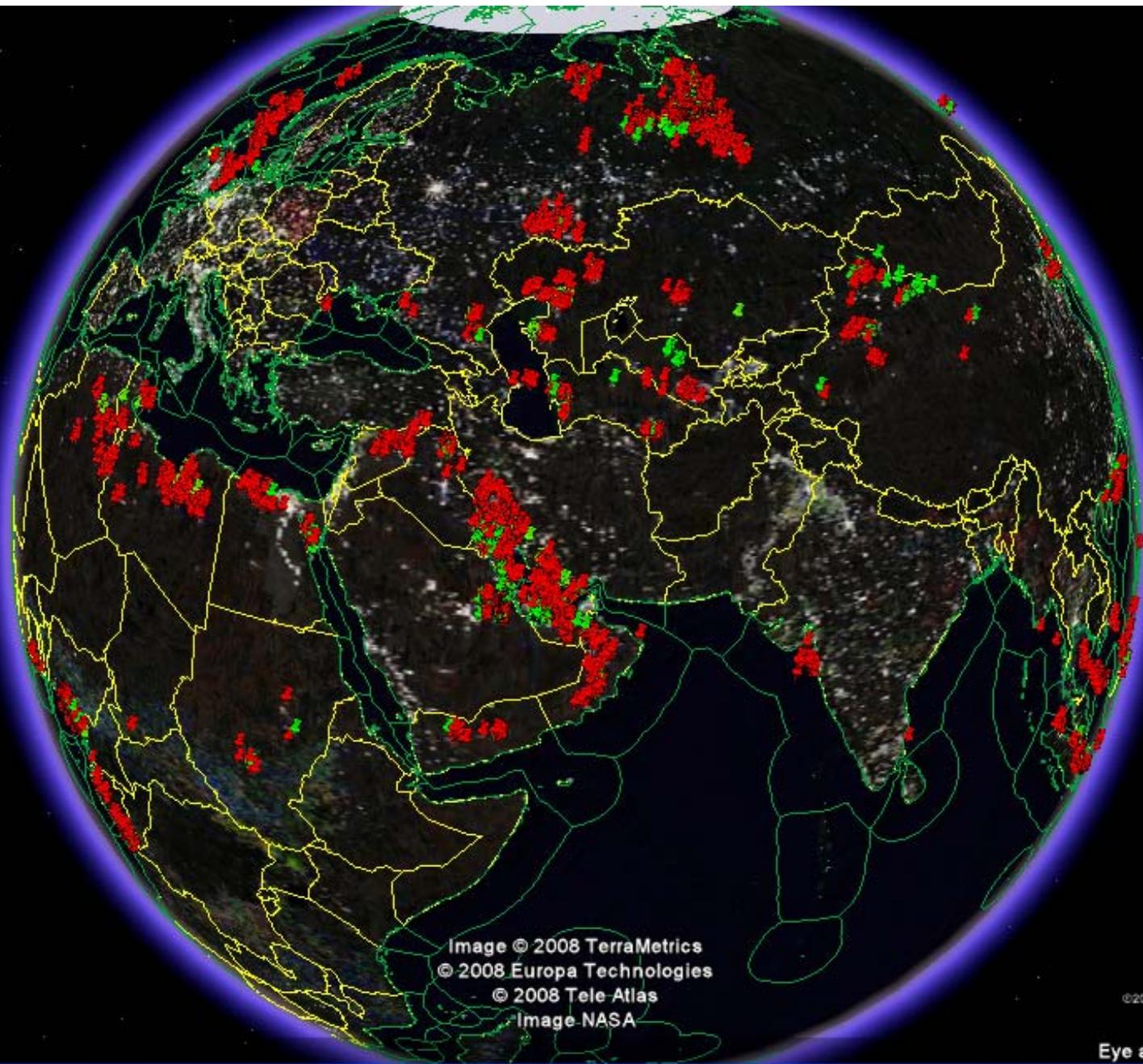
# Global Gas Flaring



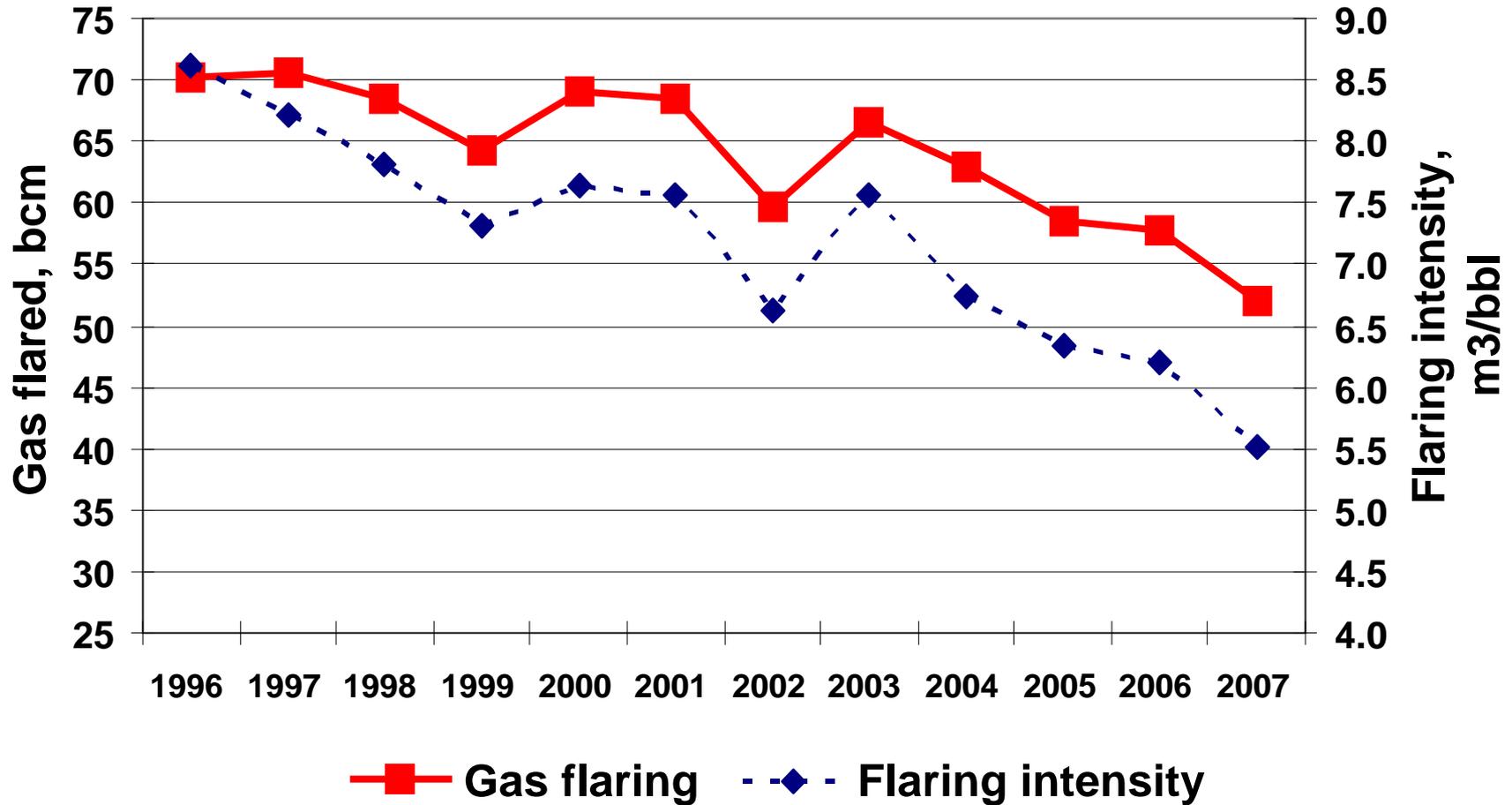
- An estimated 150-170 bcm of gas is flared globally (about 25% of US consumption)
- Adds more than 400 million tons of carbon dioxide into the atmosphere each year
- 75% of global flaring occurs in fewer than 10 countries
- Major flaring areas are: Russia, Gulf of Guinea and the Middle East
- Flaring levels remain constant despite increased oil production

# Where Gas is Flared?





# Partner country gas flaring from satellite data



# Why so much flaring - usual barriers

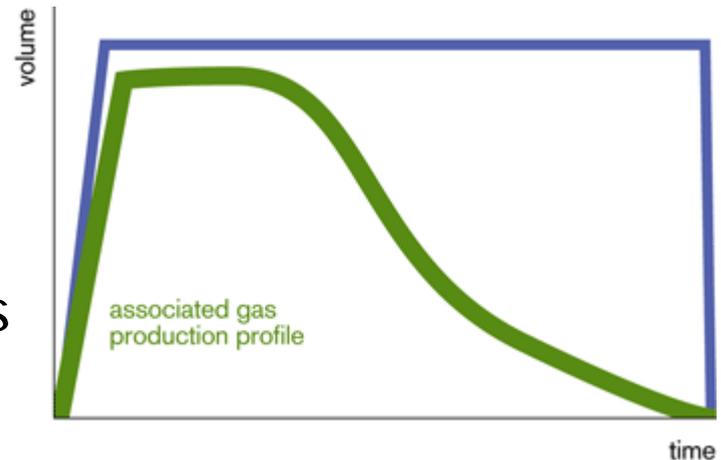
## “Soft” causes:

- ✓ Limited frameworks and complex commercial situations
- ✓ Supporting fiscal terms
- ✓ Underdeveloped domestic market



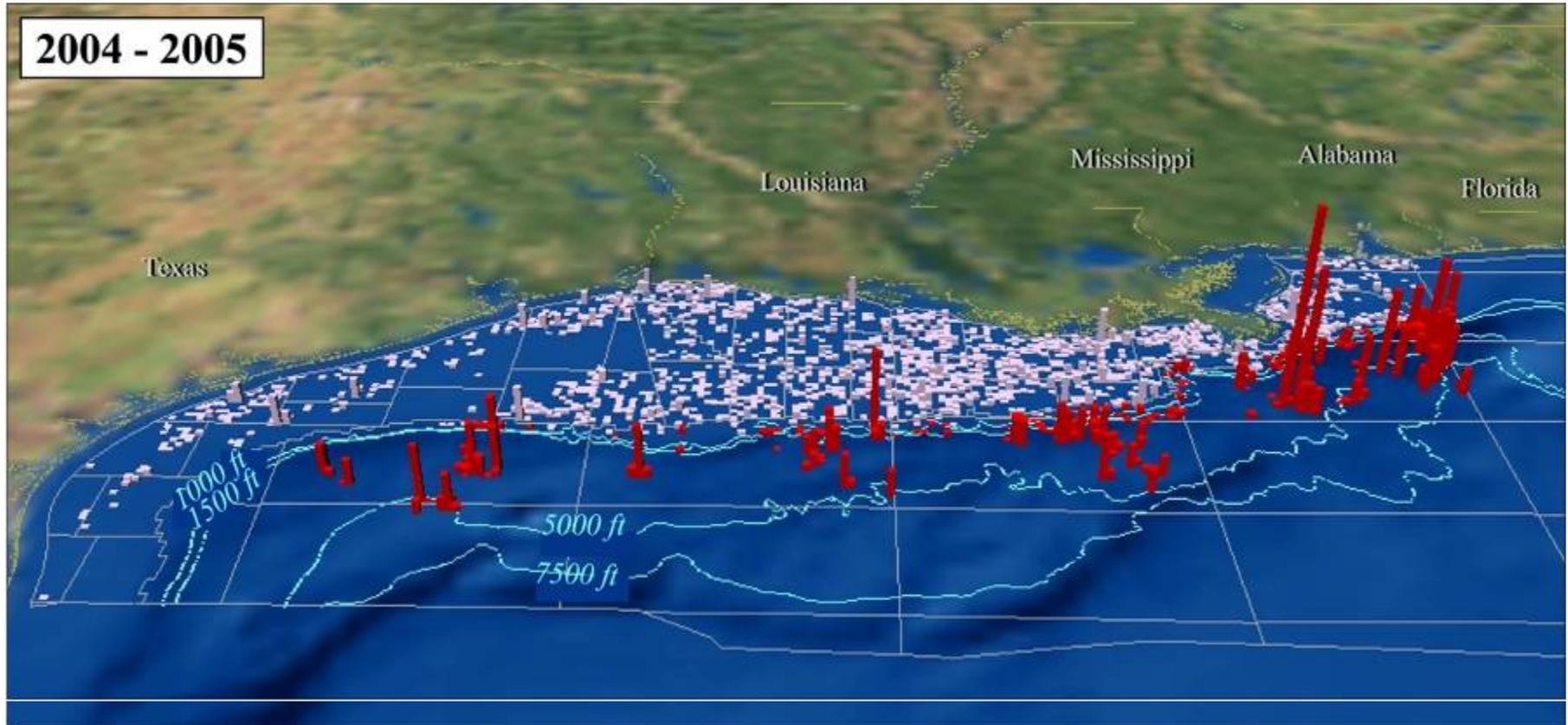
## “Hard” causes:

- ✓ Lack of infrastructure
- ✓ Risks of gas re-injection in oil reservoir
- ✓ Distance from significant gas markets
- ✓ Reliability of supply from associated gas



# US Gulf of Mexico

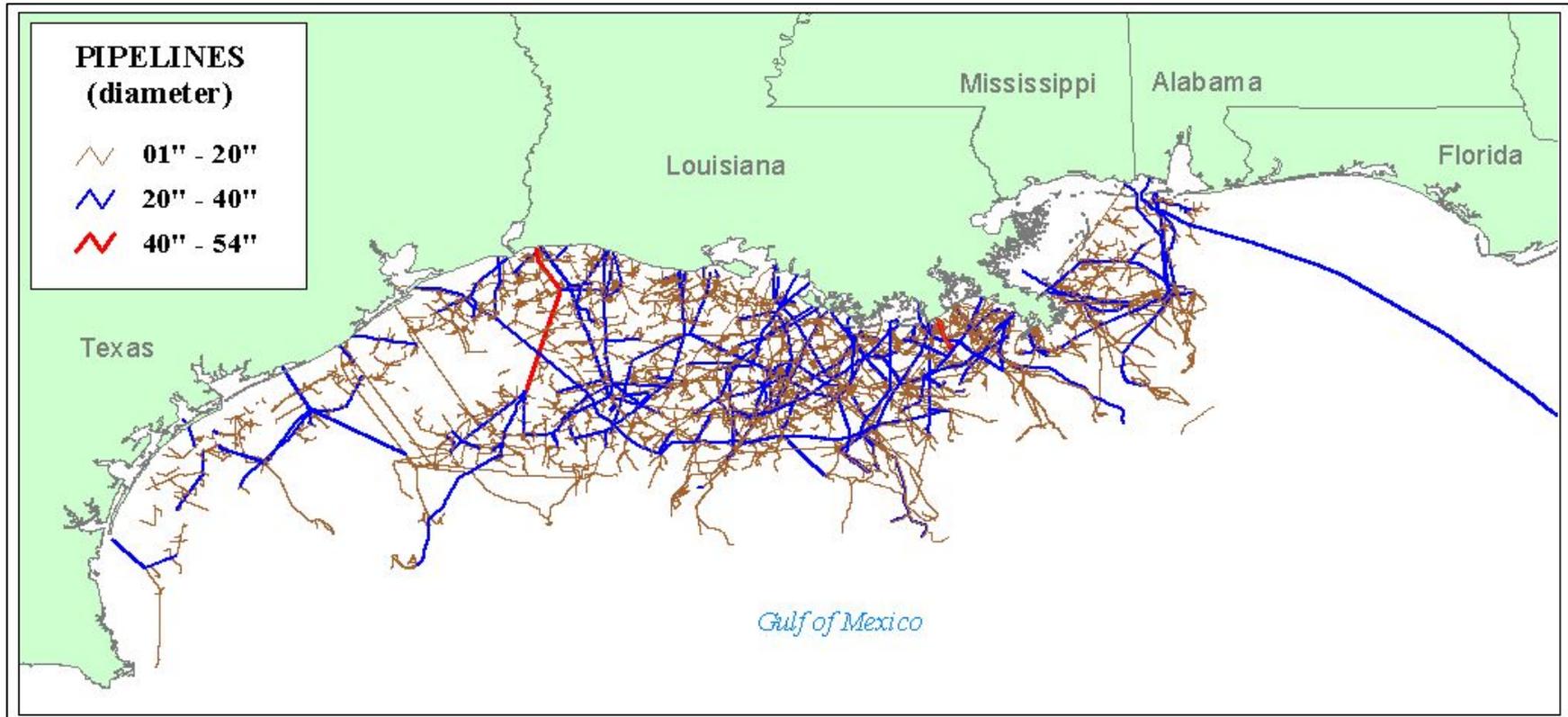
(Bar height indicates volume)



Source:

J. Michael MELANCON, MMS, Gulf of Mexico OCS , Region U.S. Dept. of Interior

## Pipeline Infrastructure



Source

J. Michael MELANCON, MMS, Gulf of Mexico OCS , Region U.S. Dept. of Interior

# World Bank-Led Public & Private Partnership

## Countries/NOCs

Algeria (Sonatrach)  
 Angola  
 Cameroon (SNH)  
 Chad  
 Ecuador  
 Equatorial Guinea  
 Indonesia  
 Kazakhstan  
 Khanty Mansiysk (Russia)  
 Nigeria  
**Gabon**  
**Azerbaijan** (Socar)  
**Uzbequistan**  
 Iraq

## IOCs

BP  
 Chevron  
**Conoco Phillips**  
 ENI  
 ExxonMobil  
 Marathon Oil  
 Shell  
 Statoil Hydro  
 Total

**Goal:** Reduce Global gas flaring

**Basis:** collaborative effort  
 between Governments, IOCs and  
 NOCs and other stakeholders

## Donors

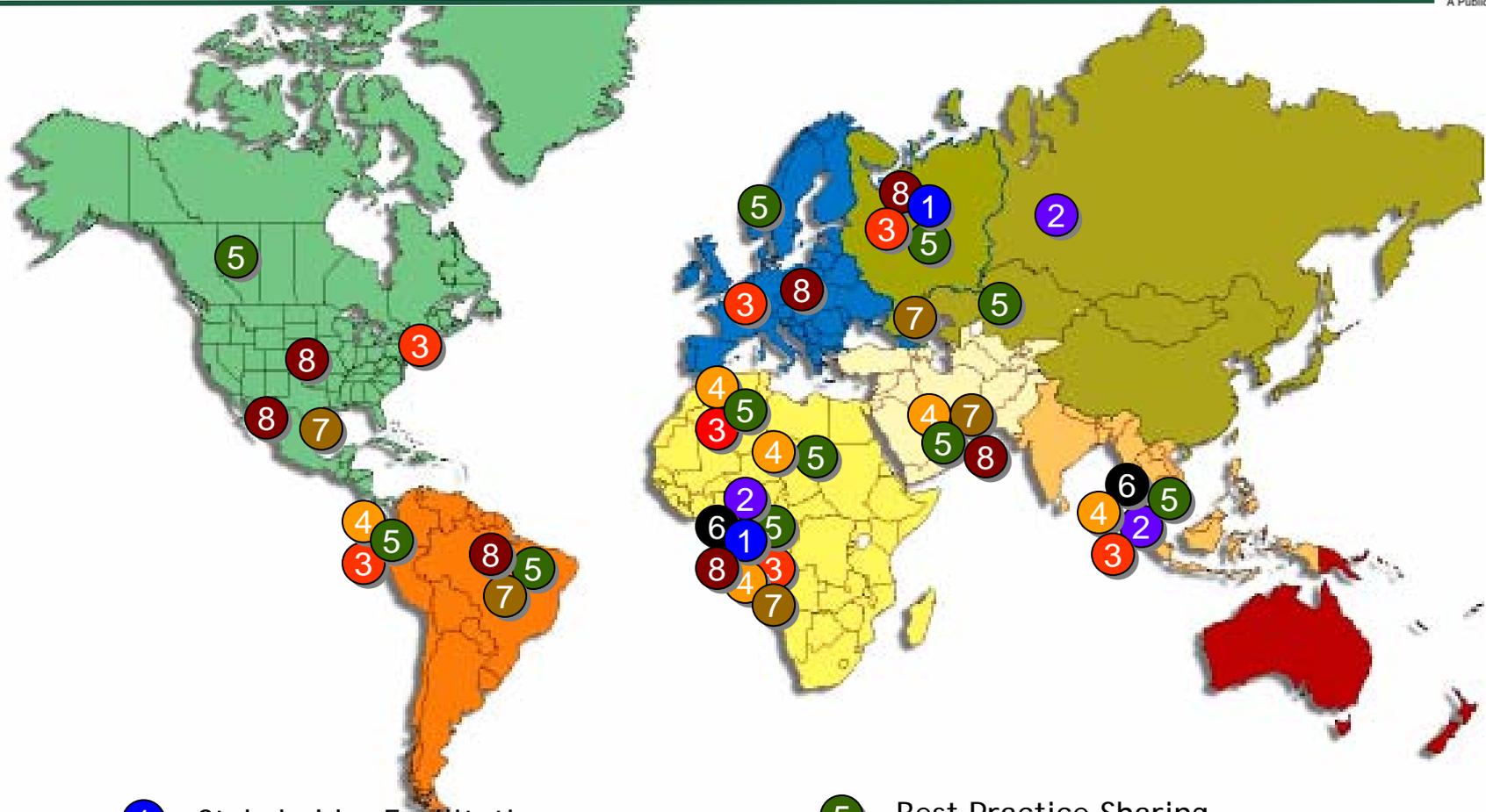
Canada  
**European Union** (as of 2008)  
**France**  
 Norway  
 USA

## Multilateral Organizations

The World Bank  
 OPEC Secretariat



# GGFR Activities Worldwide



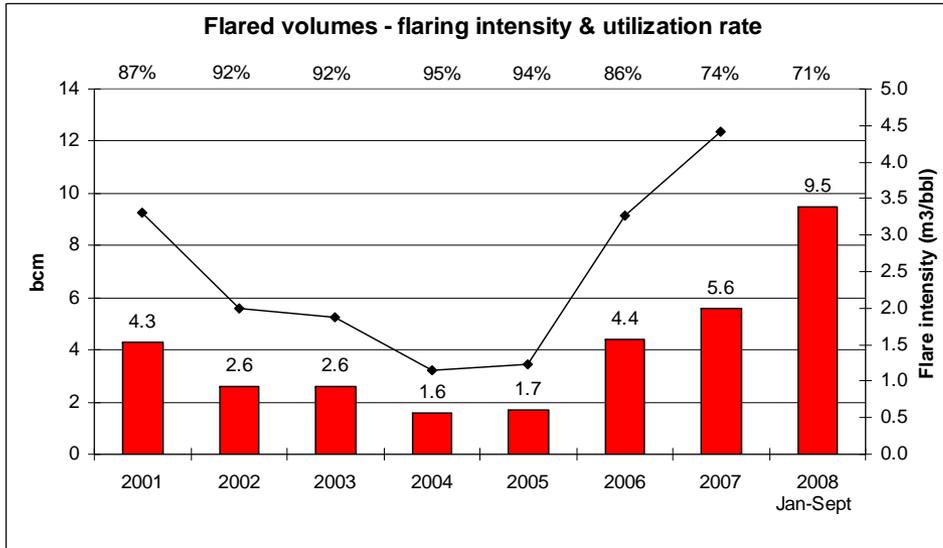
- 1 Stakeholder Facilitation
- 2 Project Facilitation
- 3 Carbon Finance
- 4 Gas Utilization & Feasibility Study

- 5 Best Practice Sharing
- 6 Gas Flare Data Collection
- 7 New Programs
- 8 Communications and Outreach

- Facilitation
  - In the Gas Flaring Reduction Committee in Nigeria
  - In Russia, bilateral discussions with GoR and stakeholders
  - In Equatorial Guinea, Gabon,...
- Best Practice dissemination activities
  - Global Forum, Regional Conferences, Workshops, Best Management Practice (sharing best operational practices among operators)
- Technology
  - Global Forum on Flare and Vent Reduction, Amsterdam, December 2008
- Country Implementation Plans
  - GGFR is facilitating some CIPs to eliminate flaring
  - Helping countries to implement flaring policies : Nigeria, Algeria, Gabon...
- Carbon Finance
  - Technical assistance, leverage of Kyoto Clean Development Mechanism
  - Scaling up under new World Bank funds
  - Demo projects



# Gas Flaring in Mexico

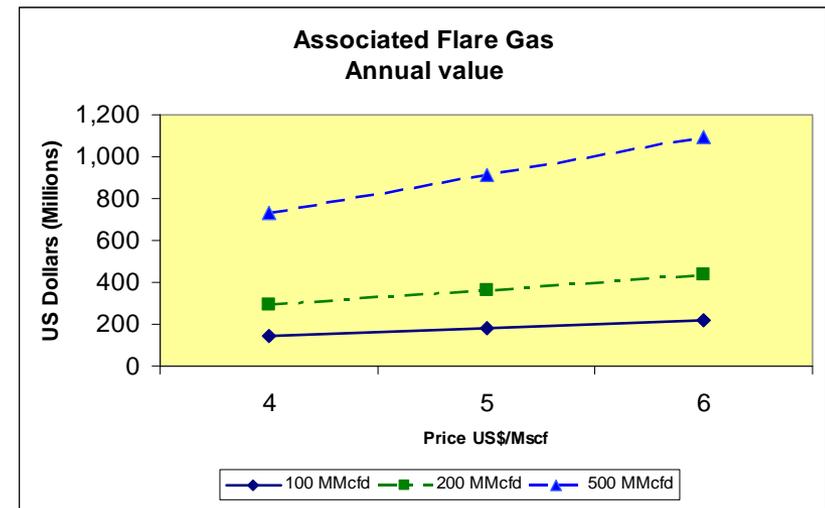


Source: various reports from Pemex

- Mexico reported flaring 9.5 bcm in 2008 (until Sept.) – 70% increase
- A valuable resource for Mexico
  - Equal to 51% of imports (2007)
- Significant opportunity for mitigating country GHG emissions
  - 2-4% of national GHG
  - At current rate of 1231 MMscfd (up to Sept 08), CO<sub>2</sub>e could reach 22 million tons annually

## Barriers

- Insufficient infrastructure (gathering, processing, treating and compressing)
- Operational conditions (e.g. nitrogen re injection and AG composition)
- Focus on oil production maximization
- Fiscal regime neutral to flaring and venting
- Institutional setting surrounding oil & gas operations (e.g. restricted access to CAPEX)



# Mexico Flares from Satellite



Flare DG

**Tres Hermanos**

**Golfo de Campeche  
Cantarell**

Many Flares

Veracruz

Flare DG

**Morelos / Dos Bocas**

Guerrero

Oaxaca

Chiapas

Beliz

NOAA Study

214 mi

© 2009 Tele Atlas  
© 2009 Europa Technologies

Google

# Cantarell - Campeche





Map navigation controls: North arrow, compass, pan, zoom in (+), zoom out (-)

Flare DG

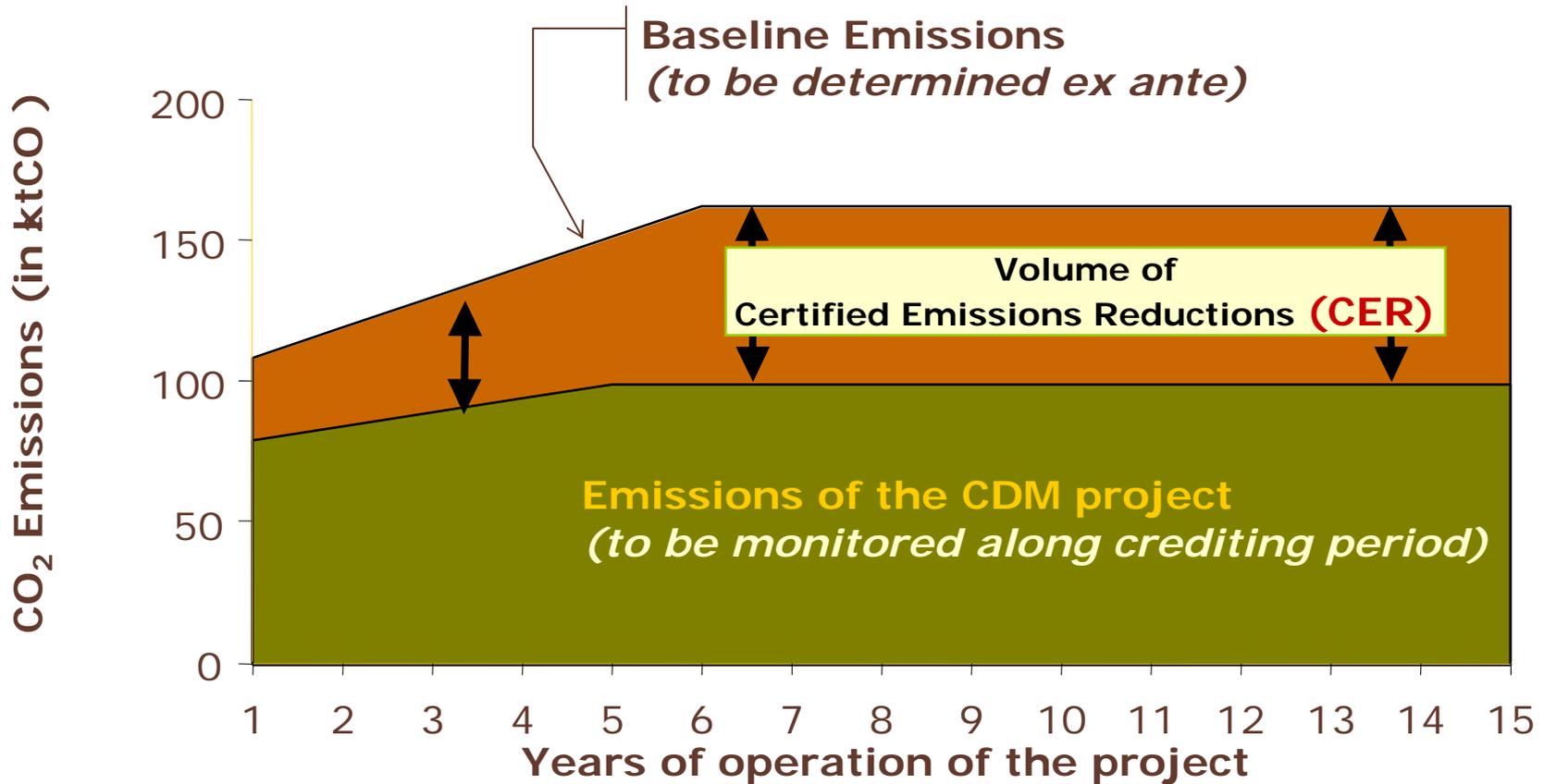
4124 ft



- Pemex announced efforts
  - New 2008-2012 operational efficiency program (PEO)
    - E&P to sustainly reduce gas venting and flaring
    - Pemex Gas to improve efficiency of gas processing operations
- Regulatory conditions
  - New "*Programa Sectorial de Energía*" (Prosener)
    - Line of action: give priority to AG recovery over oil production, and gas flaring reduction
    - Associated Gas Utilization Rate Goal

Venting and Flaring Reduction Goals	2008	2009	2010	2011	2012
Min	89.1	94	96.4	96.4	96.4
Max	96.7	97.5	98.0	98.0	98.3

# Carbon Finance Basics



- Methodologies required for :
- Determination of Baseline Emissions
  - Monitoring CDM Project Emissions
  - Calculation of Emission Reductions

# Key concept: *ADDITIONALITY*

- 1 CER = 1 more ton CO<sub>2</sub> emitted in Annex 1 countries
- Only emission reductions that are **ADDITIONAL** to emission reductions that would have occurred without CDM
  - ➔ Not all “Emission Reductions” are eligible to CDM  
Ex: least cost hydro may or may not be eligible

## **Additionality established on the basis of:**

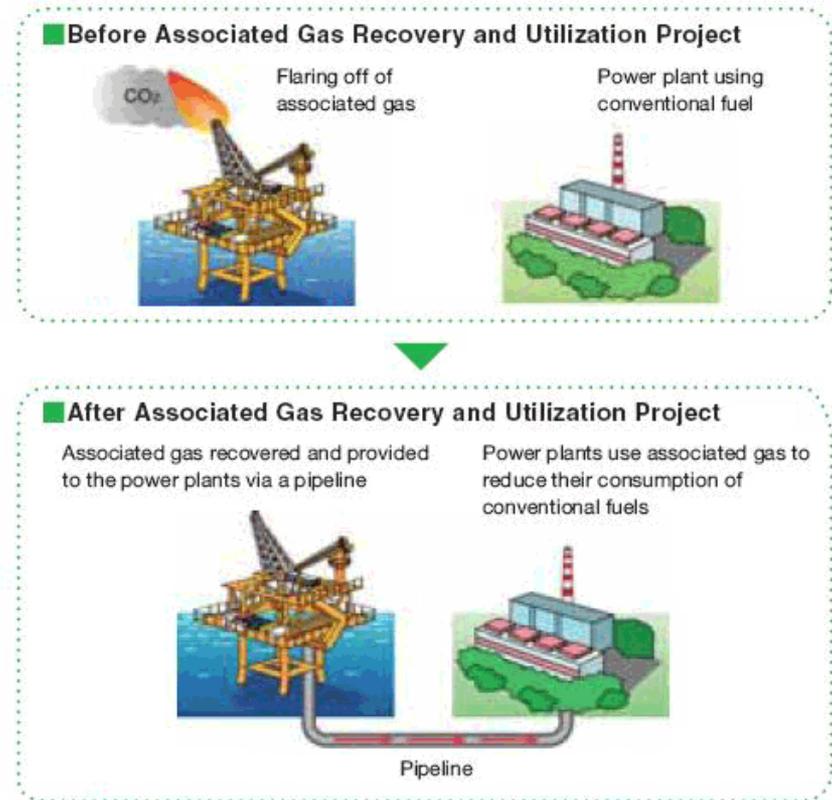
- Financial Analysis : Additional cost, lower IRR, etc...

### OR:

- Barriers preventing the “clean” project to take place:
  - Difficulties to achieve financial closure (*no long term commercial loans*)
  - Technology Risk: first of kind in the country (*high pressure boilers Cogen*)
  - Social / market acceptability (*scavengers resettlement for landfill gas to power*)
  - *Etc.*

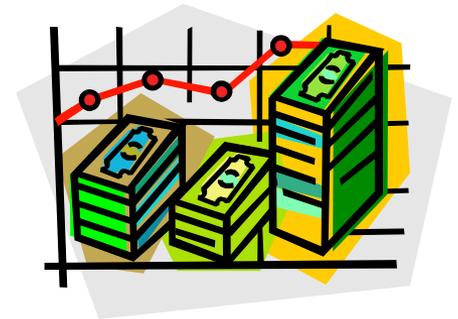
# Steps to Developing Gas Flare CDM Projects

- Identify key flaring projects and establish methodology
- Do initial assessment of potential projects (PINs)
  - Establish alternative uses for the gas
  - Feasibility of Physical Implementation
- Develop PDDs on high priority projects (*e.g. based on Gas Utilization program*)
  - Establish Baseline based on historical flaring
  - Determine Additionality (bases on alternative uses)
  - Establish a solid Monitoring Plan (*very important!!!*)
- Approval by DNA and Register with UNFCCC
- Implement and Monitor



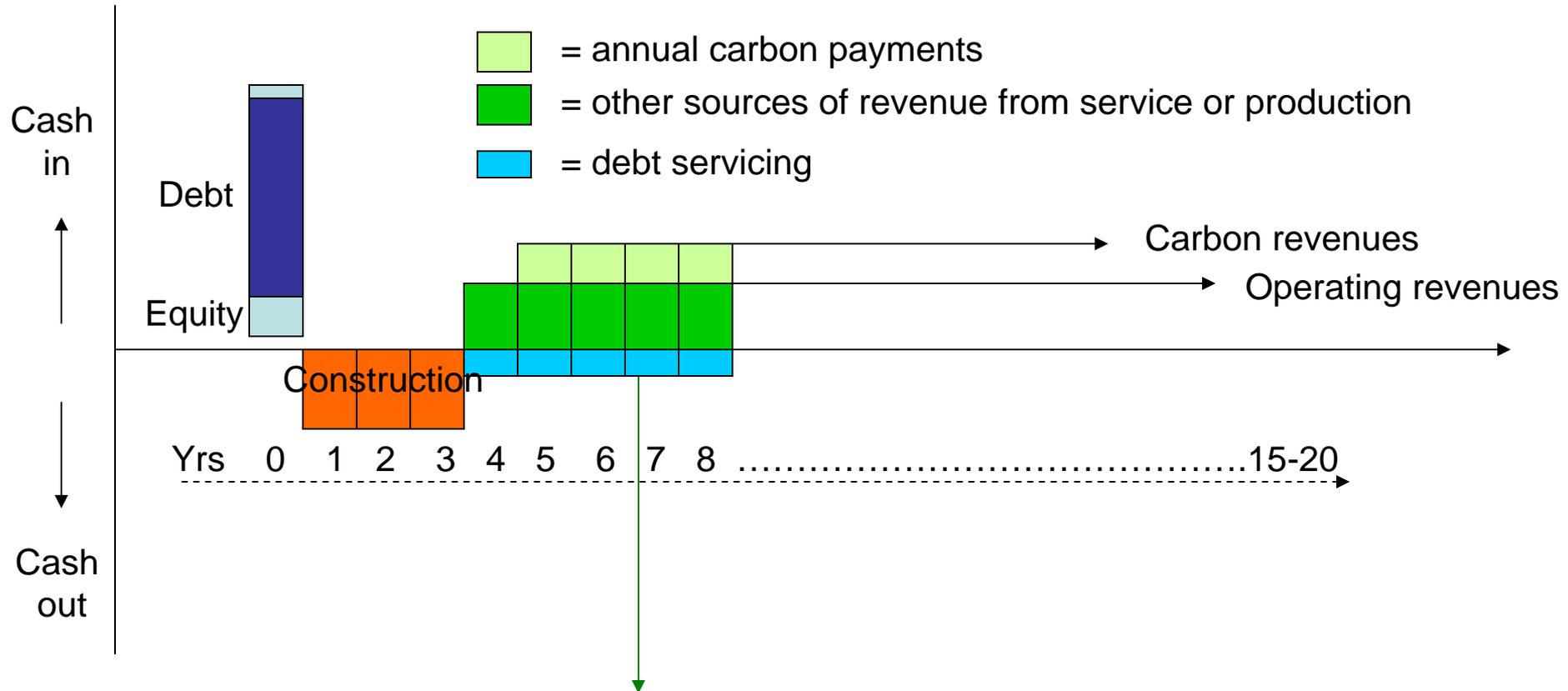
Source [www.eneos.co.jp/](http://www.eneos.co.jp/)

- By-product of gas/NGL project
- Improves cash flow by 20% to 30% (or more depending on gas usage and content)
- Major improvement in project profitability
  - No additional capital investment
  - Very low operating costs
  - High margins



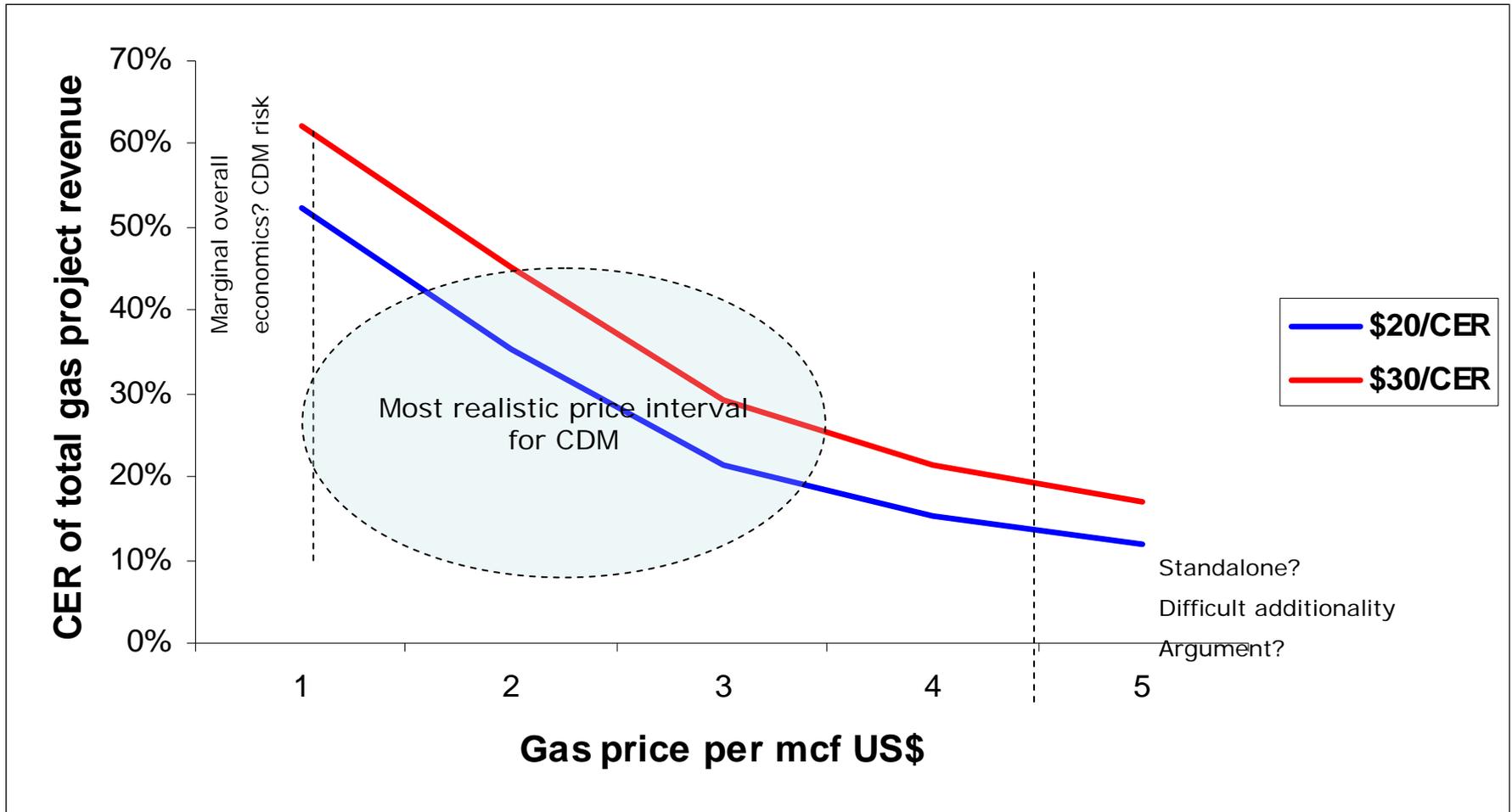
# Economics of Gas Flare CDM

## Revenue stream from emission reductions



Emission reductions created when a specific project (e.g. flare reduction) is implemented and operational

# Economics of Gas Flare CDM

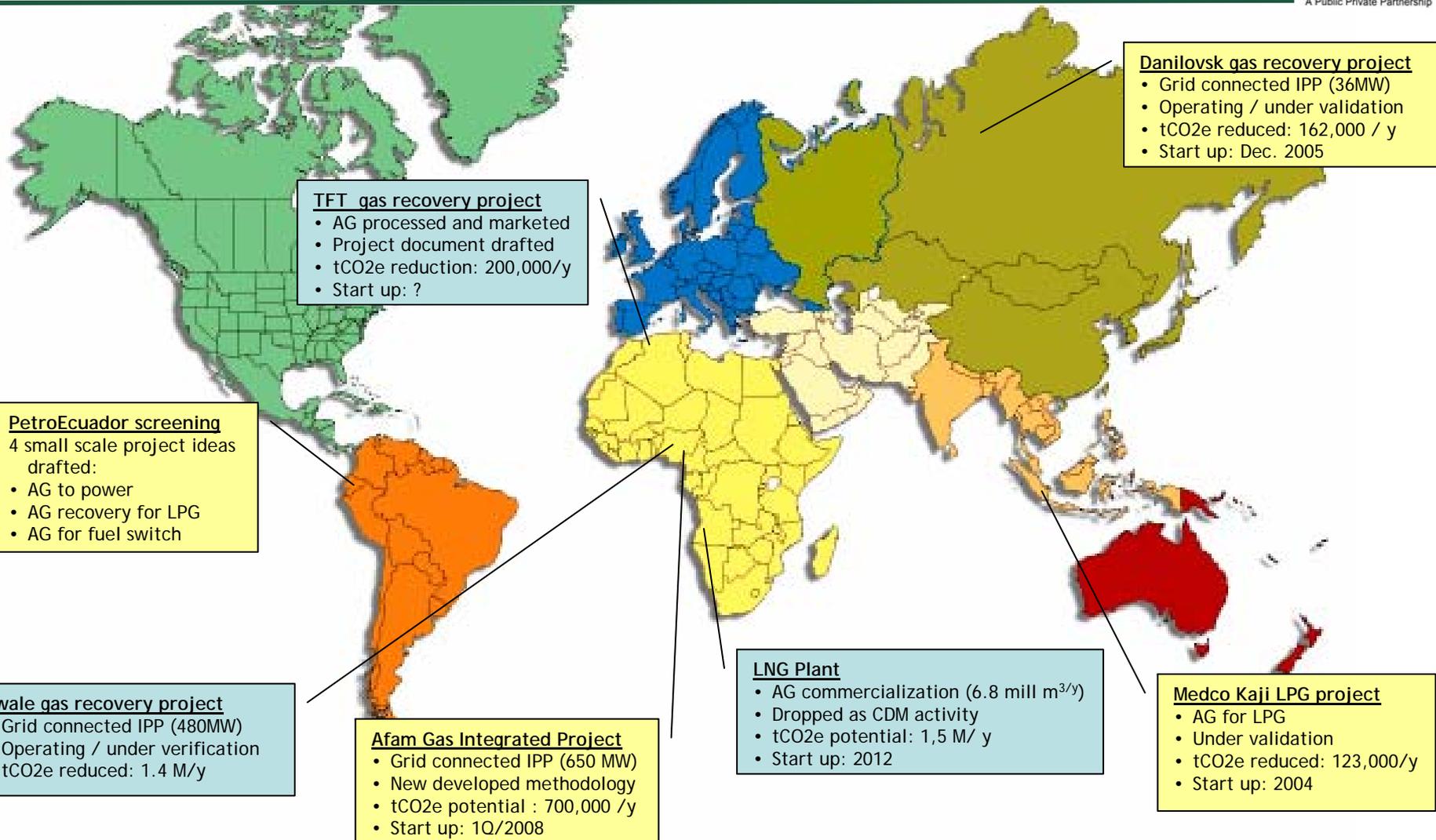


Source: Sindicatum Carbon Capital

- To help initiation of government body (DNAs) in GGFR partner countries (e.g. Angola, Nigeria, Indonesia, Algeria, and Russia)
- To facilitate flaring reduction projects earn carbon credits and achieve results
- To make a GHG mitigation difference: projects offer large, real, measurable ERs
- To motivate industry, which is engaged but not strongly linked with emerging carbon mechanisms
- Do to the few # of projects back then (and still now)
- Limited (and limiting) associated gas utilization methodologies (AM 0009 & 37 upstream and AM 0055 for downstream)
- Due to the actual sustainable development benefits: from small to large scale projects

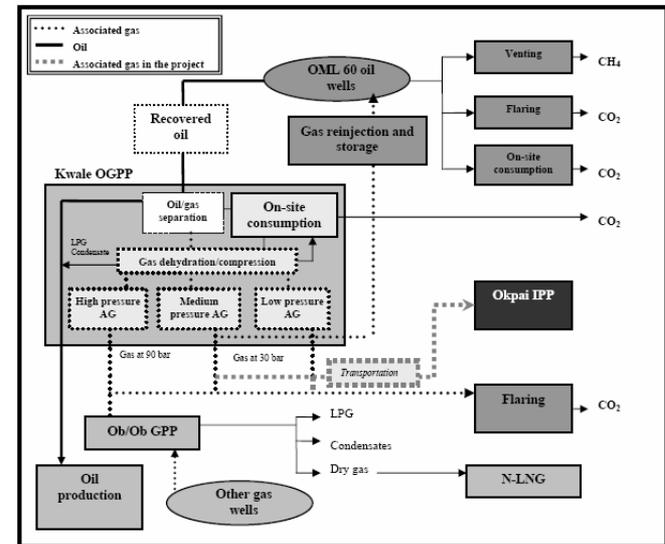
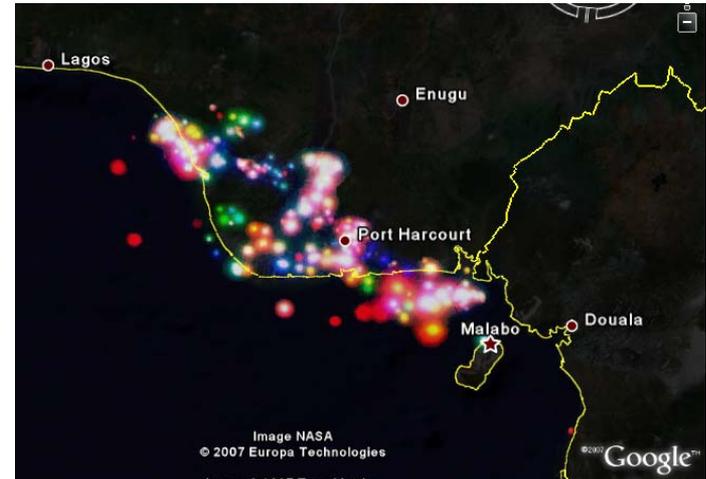


# Carbon Finance demonstration projects



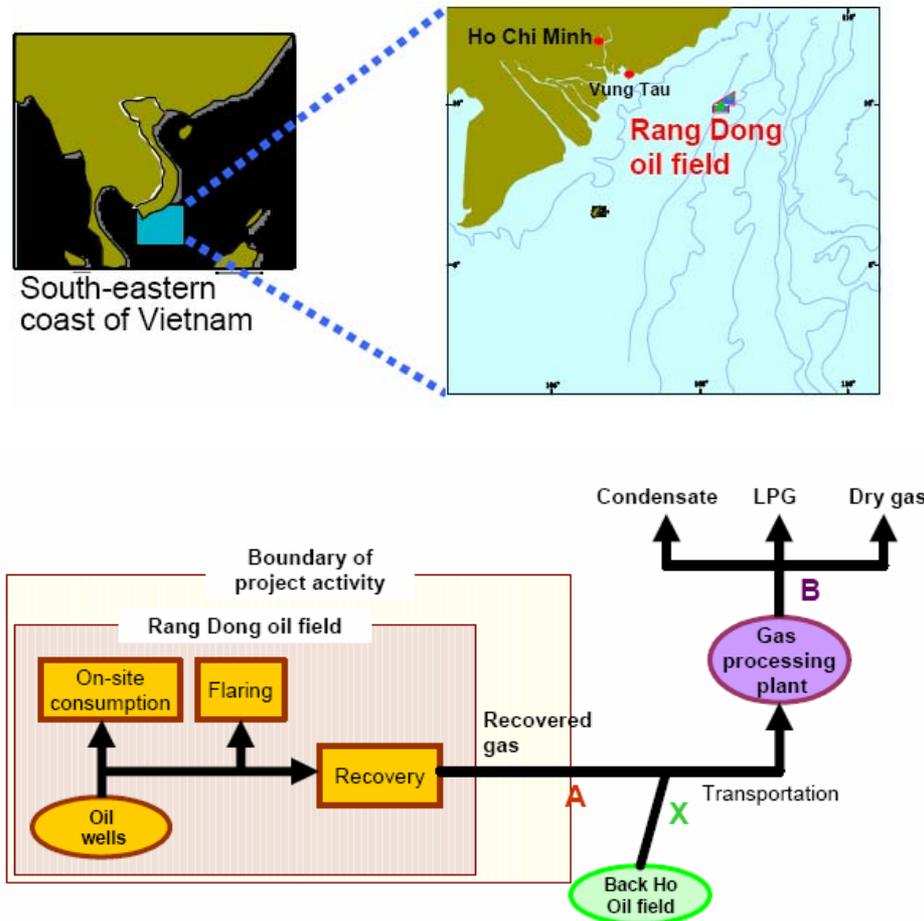
# Nigeria - Kwale associated gas recovery

- **Project:** capture and utilization of flared AG for independent power generation (480MW)
- **Status:** registered (verification)
- **Partners:** JV NNPC (60%), Agip (20% and operator) and ConocoPhillips (20%)
- **Alternatives** -> flaring, venting, on-site use, re-injection, AG recovery (project activity)
- **Carbon reduction:** aprox. 1.5 M tCO<sub>2</sub>/year (10 years)
- **Start up:** 06/2005
- Project economics
  - IRR 13% to 15% range ante tax (below minimum investment return for Nigeria)
- **Sustainable development contribution:**
  - Increase energy and electricity supply
  - Reduced local pollution in highly vulnerable and unstable Delta region
  - Potential displacement of small diesel power widely used in Nigeria



# Vietnam - Rang Dong oil field

- **Project:** Recover and use of associated gas from off shore field (140 Kms)
- **Status:** Verified - 4 Million CERs generated
- **Partners:** Petrovietname, JVPC, and, ConocoPhillips
- **Alternatives** -> venting; flaring (BL); onsite consumption; re injection; recovery; or process and transport (project activity)
- **Carbon reduction:** aprox. 677,000 tCO<sub>2</sub>/year (10 years)
- **Start up:** 4Q/2001
- **Additionality**
  - Financial analysis, IRR without CER 8-9%
- **Sustainable development contribution:**
  - Additional source of clean gas
  - Cleaner power (displacement of diesel)
  - Reduced pollution
  - Reducing gas imports
  -



# Nigeria - Afam Integrated Gas & Power

- **Project:** Grid connected IPP (650 MW) combined cycle plant with AG and non-associated gas
- **Status:** NM208 rejected
- **Partners:** JV NNPC (60%), Shell (40%)
- **Alternatives** -> off grid diesel, existing on grid power, new open cycle plant, new CCT (project activity)
- **Carbon reduction:** aprox. 700,000 tCO<sub>2</sub>/year (7 years)
- **Start up:** 1Q/2008
- **Additionality**
  - Barrier analysis
- **Sustainable development contribution:**
  - Flaring reduction in Delta region
  - Cleaner power (displacement of small diesel)
  - Reducing capacity deficit
  - Increase electricity reliability

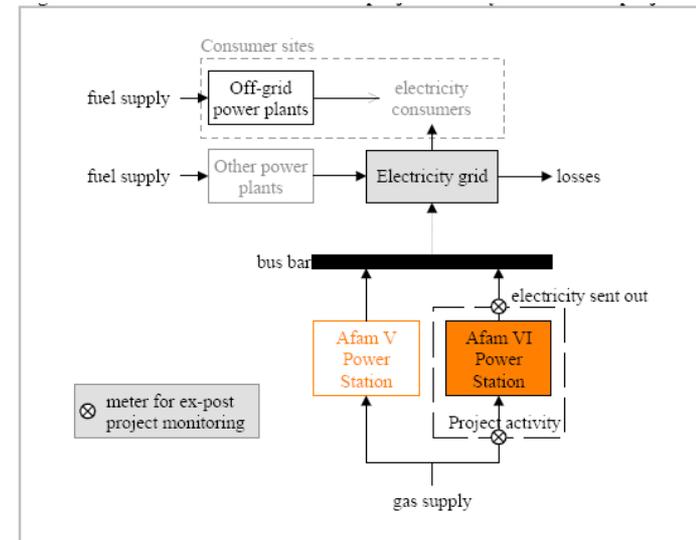
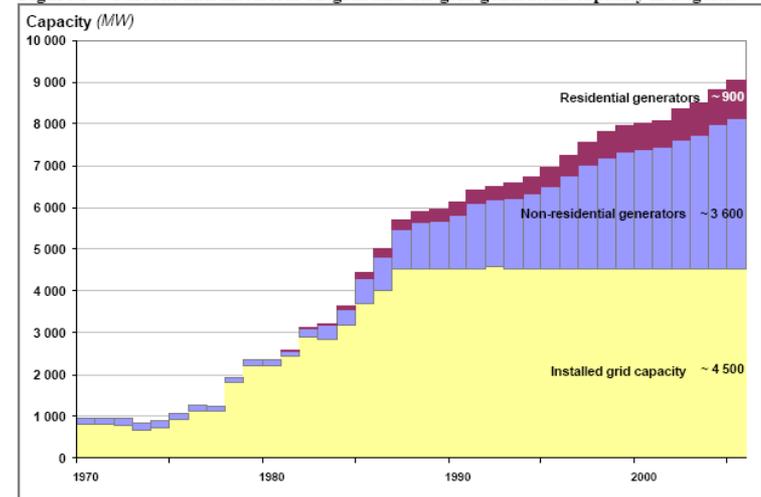


Figure 3 – Current and historical on-grid and off-grid generation capacity in Nigeria



Source: NEPA, Triple-E: Off-grid diesel baseline study, 2003

- Carbon Finance assistance to Cameroon, Gabon, Qatar, Indonesia, and Azerbaijan
  - Project screening and identification
  - Early project preparation
- Leading effort to create an independent **CDM Methodology Workgroup** (under evaluation)
- Looking into potential gas flaring reduction program under new **WB Carbon Partnership Facility**
  - Post 2012 carbon fund to focus on sectors (not project by project)
    - Oil & Gas: flaring reduction, cogeneration, etc.

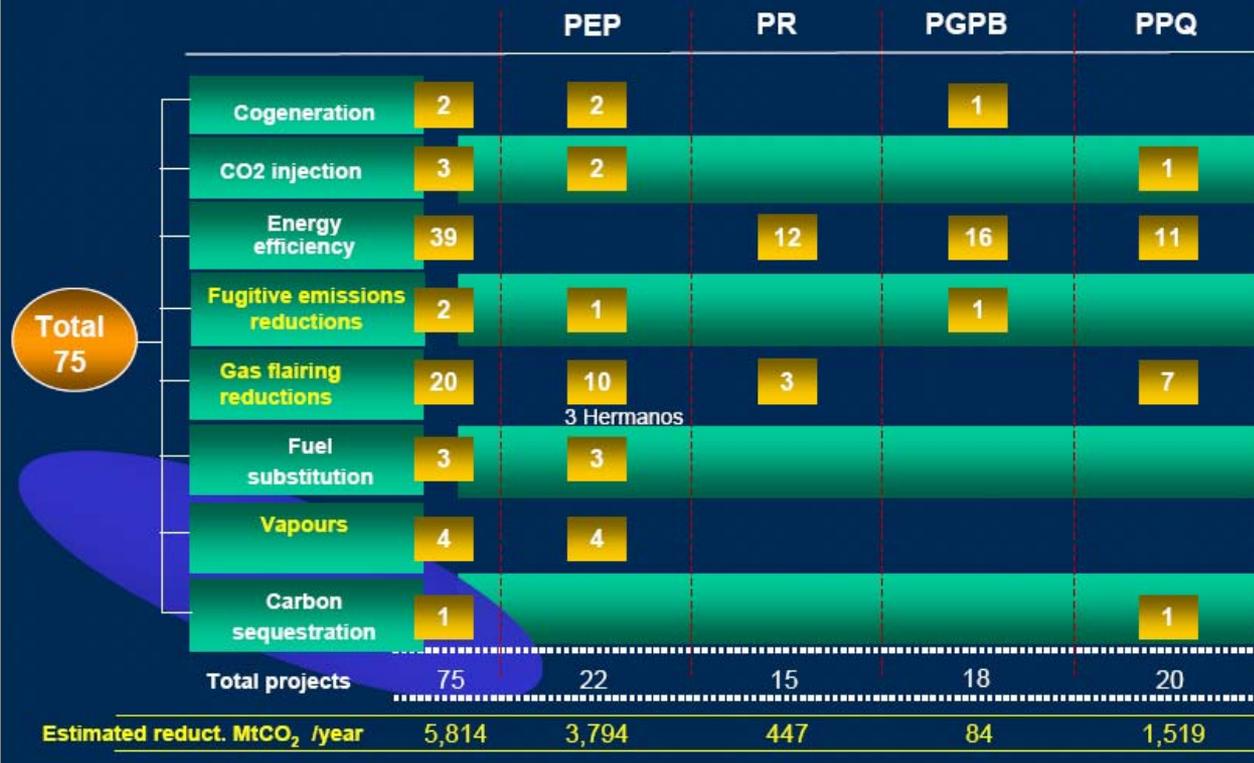


- Ongoing dialogue based on potential participation of Mexico into GGFR
- Support offered on:
  - Economic and technical feasibility of gas recovery project
  - Development of Associated Gas Recovery Plan (AGRP) for Pemex
  - Regulatory advice on key elements of flare and vent policy (implementation of Global Voluntary Standard)
  - Best practice sharing, e.g. flare and vent gas measurement
  - Support in leveraging carbon finance for gas recovery

# Opportunities in Pemex?

## GHG reductions. Opportunity areas in PEMEX 2005-2008

PEMEX has identified projects in each opportunity area:



14

[http://www.methanetomarkets.org/events/2005/oil-gas/docs/mexico\\_profile.pdf](http://www.methanetomarkets.org/events/2005/oil-gas/docs/mexico_profile.pdf)

# GGFR's Vision is...



Thank you!

Further information:

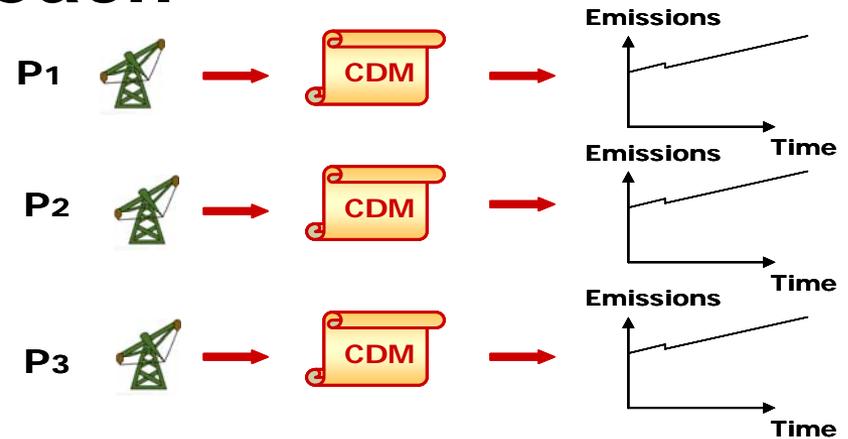
[fsucre@worldbank.org](mailto:fsucre@worldbank.org)

[www.worldbank.org/ggfr](http://www.worldbank.org/ggfr)

Back Up

# Project by project vs programmatic approach

- Project by project approach:
  - Higher transaction costs
  - Lower predictability for project owners
  - “Individual” impact on emissions



- Programmatic approach:
  - Larger scale of activities
  - Better planning environment for project owners
  - Transformational impact on emission trend

