Fires in the Desert:

How Kyoto Is Preventing Flare Recovery and Reduction Programs in the GCC

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INTEGRATED ENVIRONMENTAL SOLUTIONS

Agenda

- Flaring
- Kyoto Protocol
- CDM
- Additionality
- Challenges
- Reduction without CDM

Why do we flare?

- Safety
  - Non-Continuous Surges
  - Gas is sour! (High H_2S)
- Economics
  - If there was a market for flared gas then it would be sold already!
- GHG Prevention
  - Fugitive Emissions from additional recovery infrastructure = Higher GHG equivalents

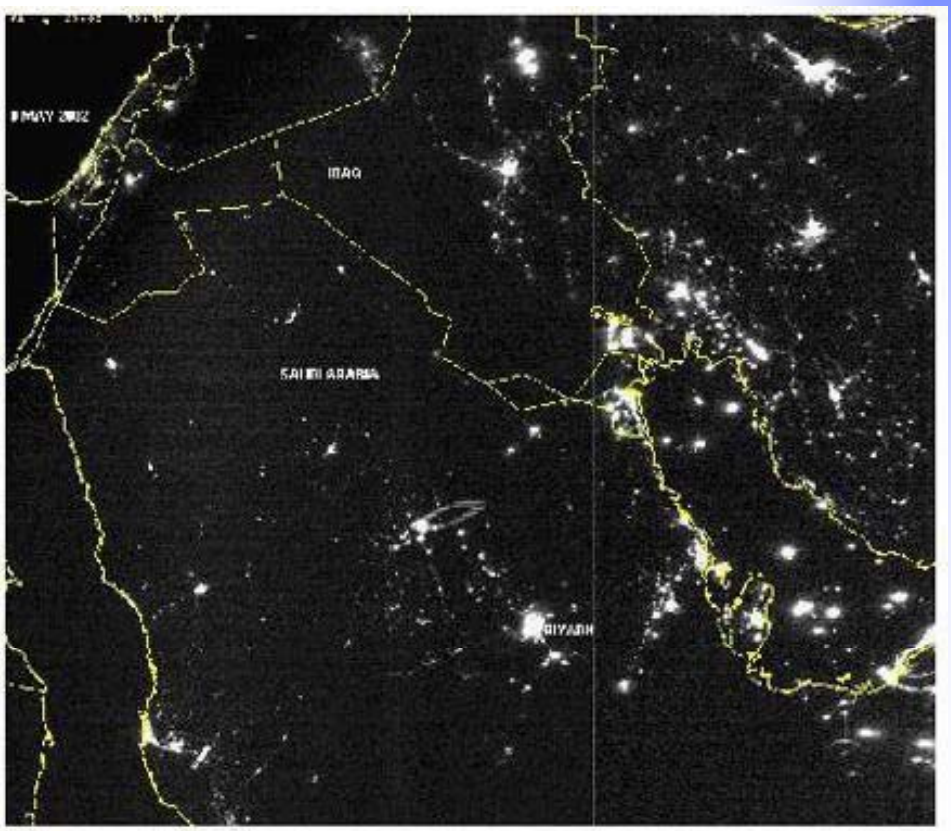
Global Warming Potentials

- CO_2 = 1x
- Methane (CH_4) = 12x

  $CH_4 + 2O_2 \text{ ---> } CO_2 + 2H_2O$
- Burning Methane to convert to CO_2 reduces GHG potential!
- Other Potentials:
  - Nitrous Oxide (N_2O) = 120x
  - Sulfur Hexaflouride (SF_6) = 3200x

Where is the problem?

Who Are the Top Gas Flarers?				
	OFFICIAL DATA for 2004		WHAT IMAGERY SHOWS for 2004	
	Country	Billion Cu. M.'s	Country	Billion Cu. M's
1	Nigeria	24.1	Russia	50.7
2	Russia	14.9	Nigeria	23.0
3	Iran	13.3	Iran	11.4
4	Iraq	8.6	Iraq	8.1
5	Angola	6.8	Kazakhstan	5.8
6	Venezuela	5.4	Algeria	5.5
7	Qatar	4.5	Angola	5.2
8	Algeria	4.3	Libya	4.2
9	Indonesia	3.7	Qatar	3.2
10	Eq. Guinea	3.6	Saudi Arabia	3.0
11	USA	2.8	China	2.9
12	Kuwait	2.7	Indonesia	2.9
13	Kazakhstan	2.7	Kuwait	2.6
14	Libya	2.5	Gabon	2.5
15	Azerbaijan	2.5	Oman	2.5
16	Mexico	1.5	North Sea	2.4
17	U.K.	1.6	Venezuela	2.1
18	Brazil	1.5	Uzbekistan	2.1
19	Gabon	1.4	Malaysia	1.7
20	Congo	1.2	Egypt	1.7



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Flaring Impacts

- 150 to 170 billion cubic meters (bcm) per year
  - 27% of the natural gas consumption of the USA
  - potential market value of US$40 billion
- Adds about 400 million tons of carbon dioxide into the atmosphere annually

Source – NOAA/World Bank's First Global Satellite Survey, 30 May 2007

Kyoto Protocol

- Part of the United Nations Framework Convention on Climate Change (UNFCCC)
- Entered into Force 16 Feb 2005
  - 187 signators
- Commit to average reductions of 5.2% from 1990 levels by the year 2012
- Assigns
  - Annex B countries (industrialized countries and economies in transition that historically contributed the most Carbon
- Establishes “Flexible Mechanisms” for emission reduction

Flexible Mechanisms

- Emission Trading Programs
  - Annex B countries can trade to meet emission commitments
  - Must be **supplemental** to national effort
- Clean Development Mechanism (CDM)
  - project-based mechanism
  - allows credits from emission reduction projects in **poorer** countries to be used by **rich** countries
- Joint Implementation (JI)
  - project-based mechanism
  - enables countries with binding targets to get credit from projects carried out in other countries with binding targets

Joint Implementation

- Creates Emission Reduction Units (ERUs)
  - Similar to CER (1 metric tonne CO_2eq)
- Similar approval processes to CDM
- Open to all market segments
- Designed for Annex B countries
- Less chance of “Spurious Emissions”
  - ERUs stay within Annex I countries

CDM Projects

- Since 2006
  - 1800 projects registered
  - 3.6 Billion Metric Tonnes CO_2eq
- Requires Annex B countries to sponsor projects in developing countries
- Projects must show “Additionality”
- Must have an approved “Methodology”
  - To date there are 82 approved Methodologies
  - 4 Methodologies for flaring

CDM Flare Methodologies

Method Number	Approved Large Scale Methodology Title
AM0009	**Recovery and utilization of gas from oil wells that would otherwise be flared or vented --- Versions 2,3, & 4**
AM0037	Flare (or vent) reduction and utilization of gas from oil wells as a feedstock --- Version 2.1
AM0055	Baseline and Monitoring Methodology for the recovery and utilization of waste gas in refinery facilities --- Version 1.2
AM0077	Recovery of gas from oil wells that would otherwise be vented or flared and its delivery to specific end-users --- Version 1

Current AM0009 Projects

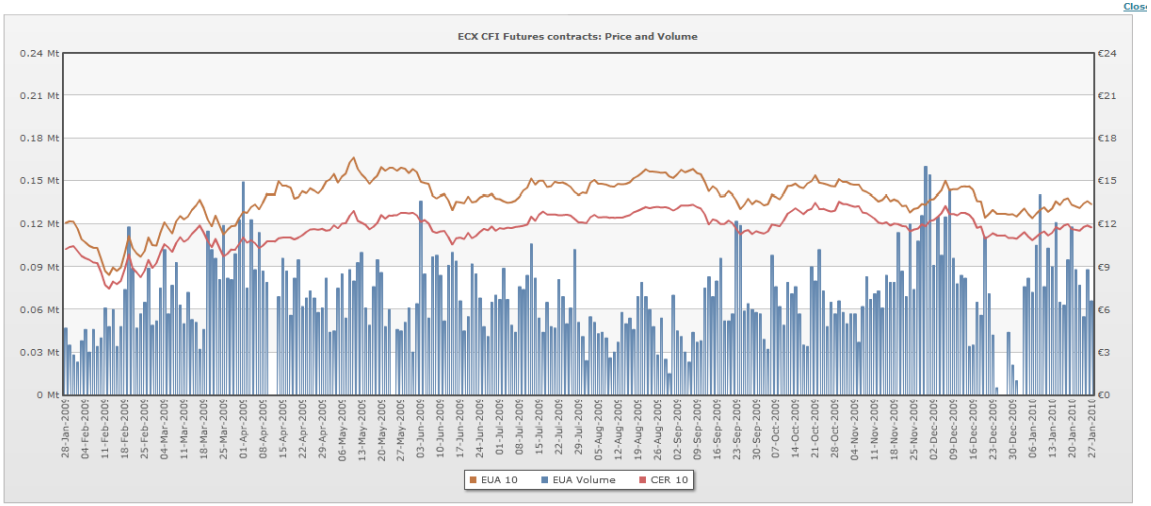
Project	Name	Country	CO_2 e (Metric Tonnes)	Date	Annex II Sponsor Countries
0152	Rang Dong Oil Field Associated Gas Recovery and Utilization Project	Vietnam	677,000	04 Feb 06	Japan & UK
0553	Recovery of associated gas that would otherwise be flared at Kwale oil-gas processing plant	Nigeria	1,496,934	9-Nov-06	Italy
0763	Al-Shaheen Oil Field Gas Recovery and Utilization Project	Qatar	2,499,649	29 May 07	N/A
1144	Tambun LPG Associated Gas Recovery and Utilization Project	Indonesia	390,893	01 Feb 08	UK & Switzerland
2029	Pan Ocean Gas Utilization Project	Nigeria	2,626,735	01 Feb 09	Norway
2126	Oil India Limited (OIL) – Greenhouse Gas Emission Reduction through Recovery and Utilization of Flare Gas	India	53,082	26 Jan 09	N/A
2422	Soroosh & Nowrooz Early Gas Gathering and Utilization Project	Iran	463,122	23 Nov 09	Norway
2908	Tarim Oilfield Associated Gas Recovery and Utilization Project	China	291,032	Review	UK

Additionality

- Applicant (Annex B Country) must make the case that the carbon project would not have happened unless CDM sponsoring took place
- Environmental Additionality - a project is additional if the emissions from the project are lower than the baseline
- Project Additionality - the project must not have happened without the CDM
- Financial Additionality - Is the project economically non-viable project but becomes viable as a direct result of CDM revenues?
- Investment Additionality – If the project exceeds a certain risk-adjusted profitability threshold it may be deemed non-additional

Investment

- Typical CDM return is around10%
- E&P return usually 20%-30%
- Self-Sponsorship
- Stability of CER market



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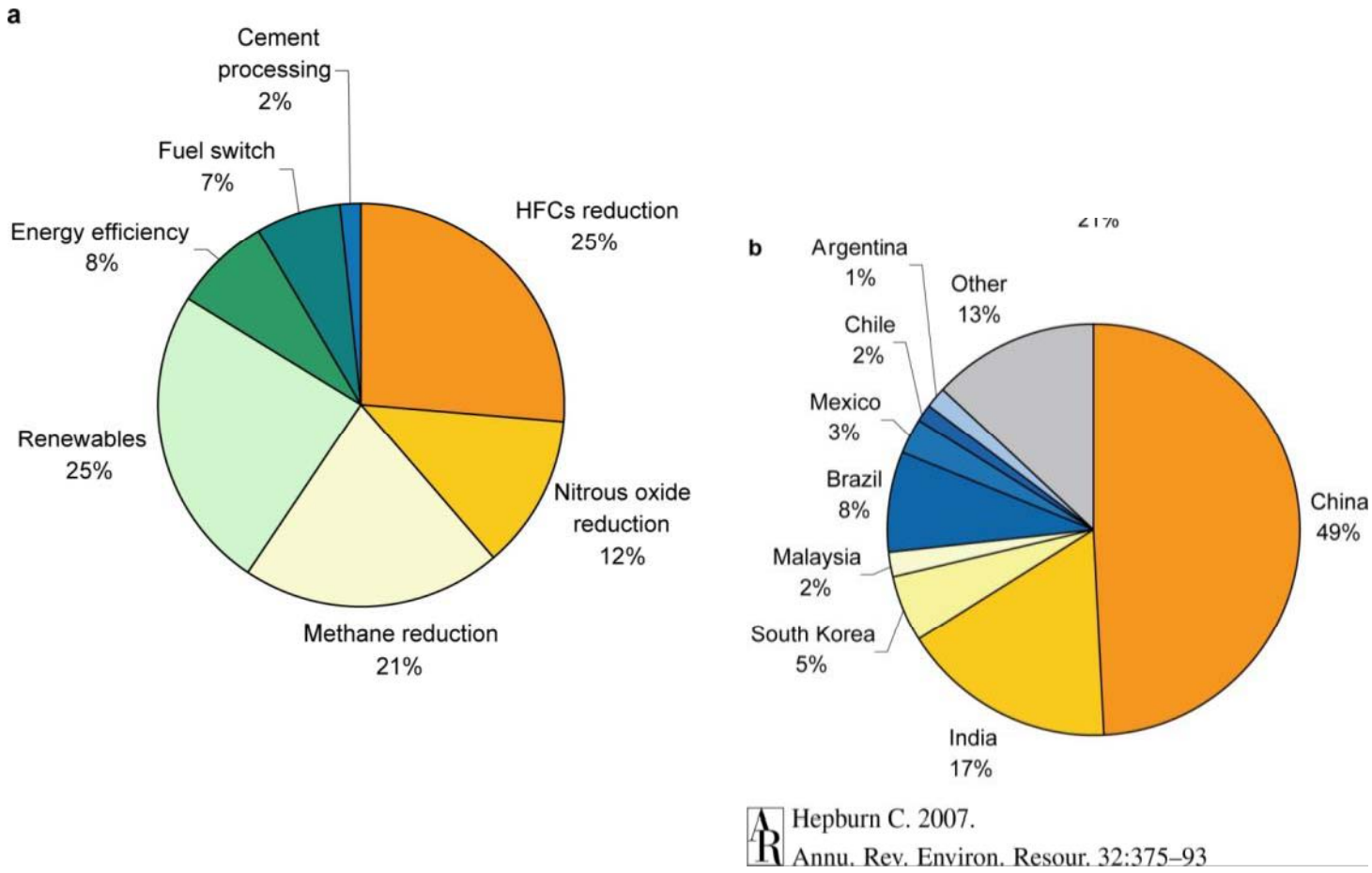
Baseline of Emissions

- Based on Emissions (that would have occurred without the project) – Emissions (of the project)
- Estimation of Emissions
  - similar activities and technologies in the same country or other countries
  - actual emissions prior to project implementation
- Effective Monitoring

Carbon Emission Markets

- Assigned Amount Units (AAUs), the unit assigned directly to nations
- Certified Emission Reductions (CERs) from project activities under the CDM
- Emission Reduction Units (ERUs) from JI projects
- Removal units on the basis of Land Use, Land-Use Change and Forestry (LULUCF) activities.
- Markets:
  - EU Emission Trading Scheme (ETS)
    - CERs around 13.9 Euros/metric tonne
    - $30 Billion USD in 2006
  - Chicago Climate Exchange
    - Voluntary Market

CDM Projects



Hepburn C. 2007. Annu. Rev. Environ. Resour. 32:375–93

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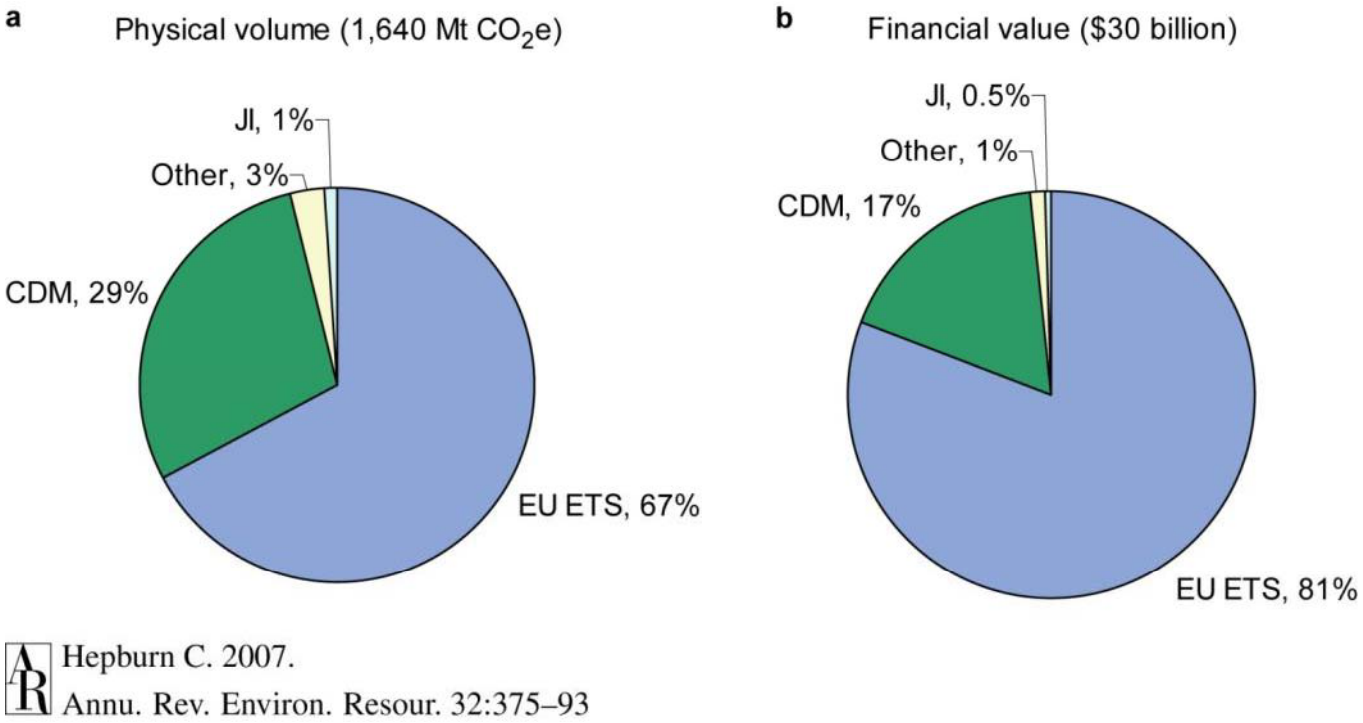
Global Emissions Trading



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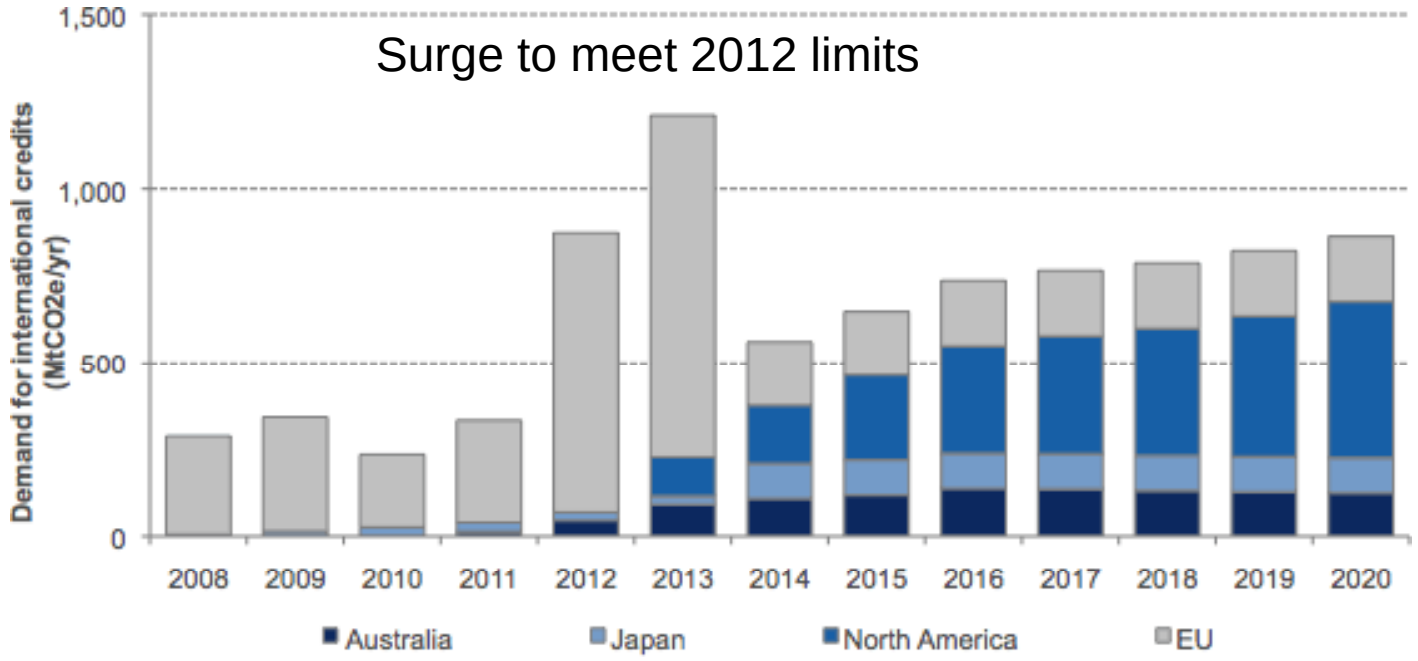
Emission Credit Forecast



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Copenhagen Summit Results

- Non-binding accord to limit temperature rise to 2^{o} Celsius
- No new thresholds
- $30Bm USD for “Adaption”
- No new guidance on Kyoto

CDM Flaring challenges in the GCC

- Inadequate reporting
- Insufficient monitoring
- Rich nation status
- Prior project consideration
- Sour gas considerations
- Regulatory requirements

CDM Flaring challenges in the GCC – cont.

- Hard to show Additionality
- Unapproved Methodologies
- Lack of Understanding*
- Poor Investment Returns*
- Slow Decision Making*
- Unclear CER Ownership*
- Lack of further guidance

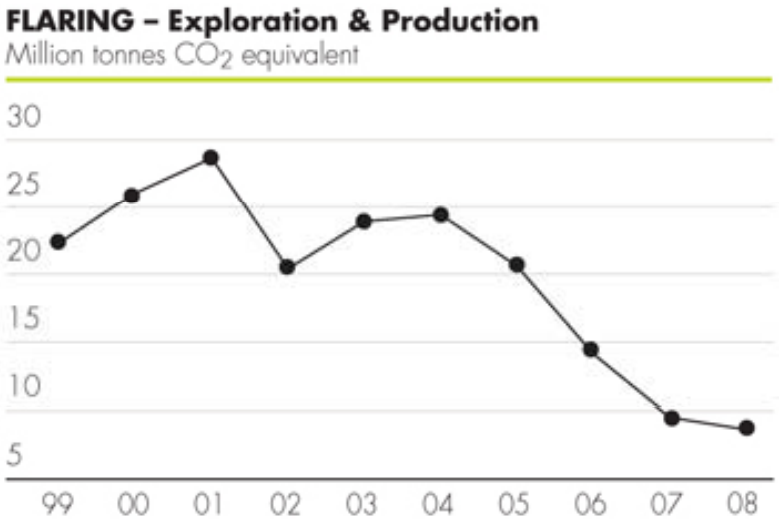
* - Observations from EcoSecurities Group PLC

CDM Challenge Scenarios

Scenario	CDM Impact	Comments
Enforcement Agency Requires Flare Reduction	N/A	Cannot apply Additionality - becomes a requirement
Company Announces Flare Reduction Program	N/A	Cannot apply Additionality - becomes a requirement
Technology Pilot Program	Limited	CDM not intended for evaluation

Flare Reduction Successes

- Shell Oil Company reduced flaring world-wide by 70% since 2001
- Invested $3Billion in Nigeria to reduce local flaring by 30%



No CDM used!

Summary

- We flare because we care
  - Safety consideration are biggest driver
  - But still can reduce/eliminate continuous flaring
- CDM not designed for rich hydrocarbon-economy countries
  - Pay for it yourself!
- Kyoto has loop-holes that have not been fixed
  - Need to add emission reductions from non-CDM projects
- Flare reduction can take place due to regulatory enforcement and corporate policy

Questions?

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