
IN THE NAME OF GOD
20 6 2004

CO_2 Reduction Expenses and Potential of CDM Projects in **Iranian Oil Industry**

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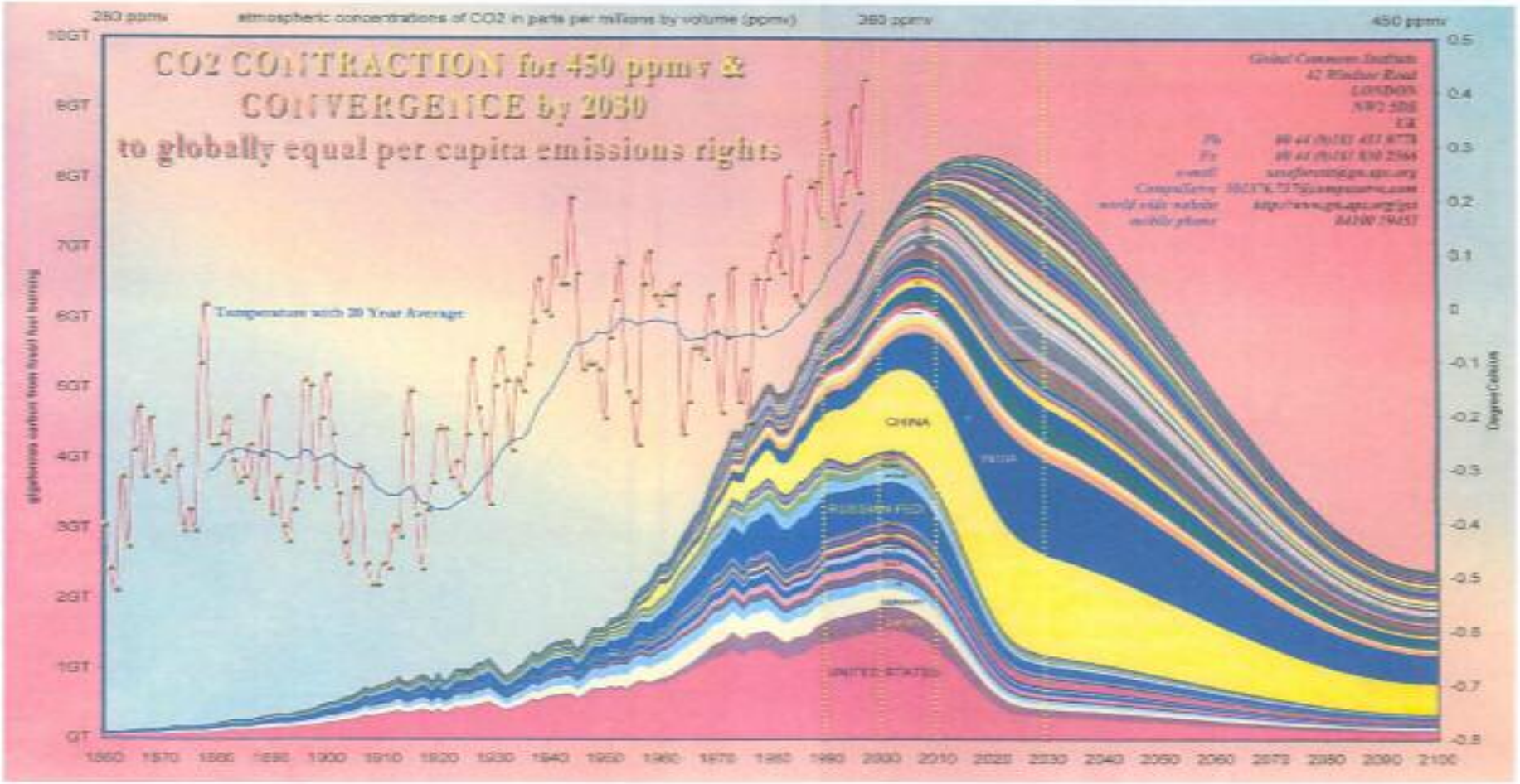
Presented by:

F. Sattari "senior expert of Office of Environment"

INTRODUCTION

نمودار میزان انتشار گازکربنیک توسط کشورهای مختلف جهان



METHODOLOGY

DEFRA GUIDELINE FOR THE MEASURING AND REPORTING OF EMISSION IN THE UK EMISSIONS TRADING SCHEME.

CO2 Emission **(tones)** = Energy consumption (kWh) x fuel emission factor (kg CO2 /kWh) x 0.001

Mitigation expenses in air pollutants and CO2 reduction in the oil industry

- **Mitigation expenses at the origin.**
  - CO2 reduction expenses in oil and gas production and refining operations.
  - CO2 reduction expenses in national energy sector.
  - Oil products quality promotion and environmental pollutants reduction expenses.

- Mitigation expenses of air pollution reduction with the assistance of pollutants omission and pollution diffusion controlling instruments in the fuel consumer systems and centers with participation of other related organizations in the country.

CO_2 emission sources in Oil Industry :

1) Oil wells testing.
2) Onshore and offshore oil and gas production by flaring sour associated gas.
3) Oil and gas pipelines by pressure reduction stations , turbines and generators fuel and pipelines leakage.
4) Oil and gas refineries by processing , furnace fuel , etc.
5) Petrochemical plants as such as item 4.

Oil & gas production in 1380 Table - 3

Item	Operations	1000 b/day (1380)
1	Onshore oil production	3029
2	Offshore oil production	543
total		3572

Gas production and refining in 1380

Figures in :million cubic meter **Table - 3**

Gas production	Refined gas
67333.3	62042.4

Sources of CO_2 emission in oil & gas refineries :

1 - Process

2 - Burning systems

3 - Refinery power plant

CO_2 emissions in oil industry in 1380

Table - 5

Item	Operations	CO_2 (Ggr)
1	Onshore oil production	30784.1
2	Gas condensate production	105021.57
3	Offshore oil production	29081.5
4	Oil & gas pipelines	2351.15
5	Oil refineries	13106.82
6	Gas refineries	445.47
total		180790.61

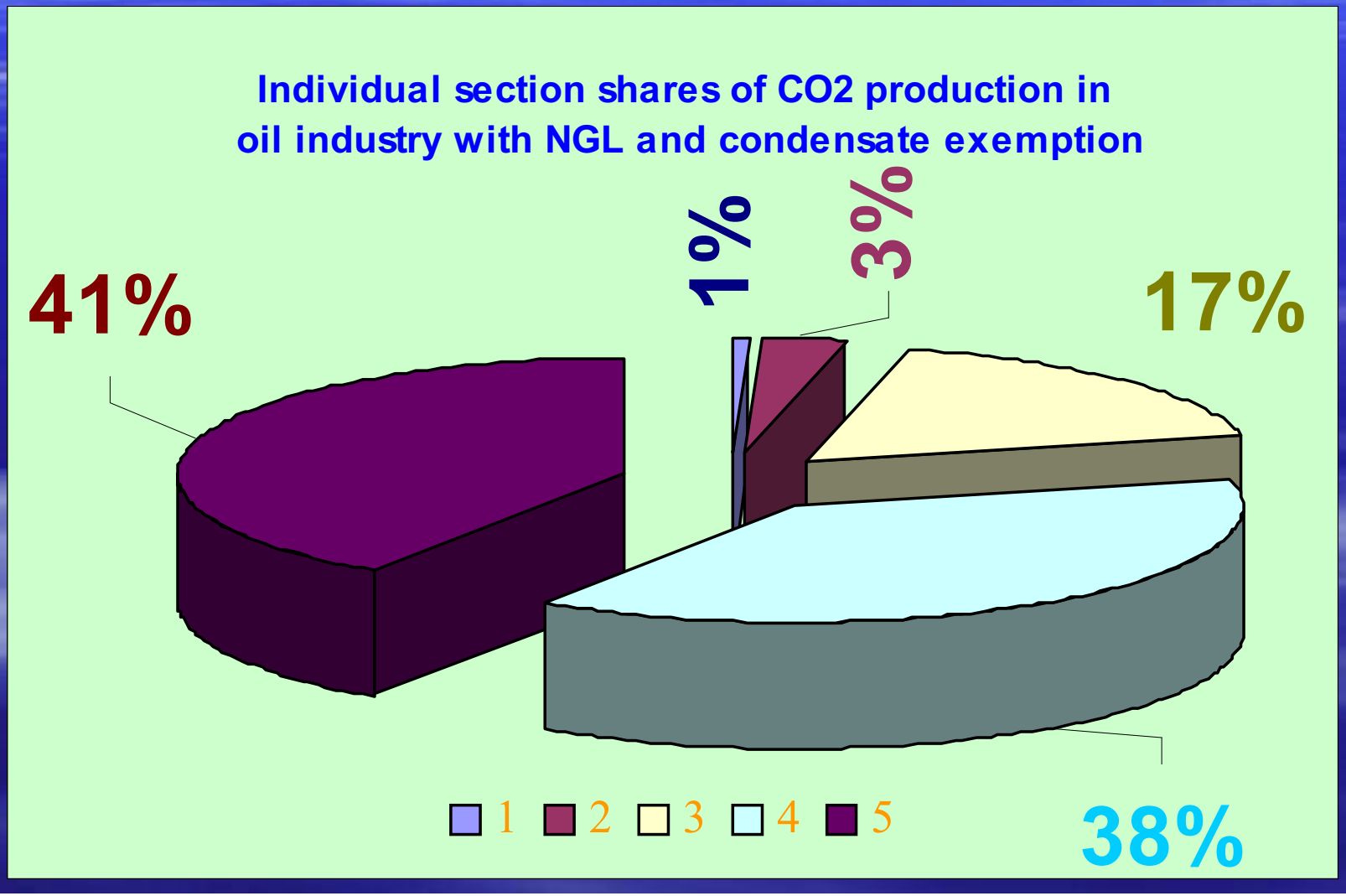
1- Gas refineries

2- Oil & gas pipelines

3- Oil refineries

4-Offshore oil & gas production

5- Onshore // // //



- EPA estimation for cost of CO_2 reduction is 24 USD / ton (1996)

- Expenses of CO_2 reduction in oil production with respect to 24$ per ton reduction of CO_2 will be according to table – 7

CO2 reduction expenses

Table – 7*

Onshore CO2 amount	Onshore CO2 reduction expenses	Offshore CO2 amount	Offshore CO2 reduction expenses
30784100000 Kgr CO2	745 Million $	29081500000 Kgr CO2	704 Million $

* CO2 reduction cost in non-flare gas projects has estimated about 7 USD/CO2(ton).

National CO2 production situation

- CO2 production share in oil and gas production and refining is 32%* of the total national CO2(8.7 ton/capita) production in the beginning of 1381.

* Petrochemical plantsco2 emissions are not taken into account.

- CO2 emission forecasting amount in the future.

Table - 6

CO2 production of Iran in the future

CO2 (Ggr)	2005	2010
In case of gathering associated gas	589904	752156
In case of flaring associated gas	767747	929991

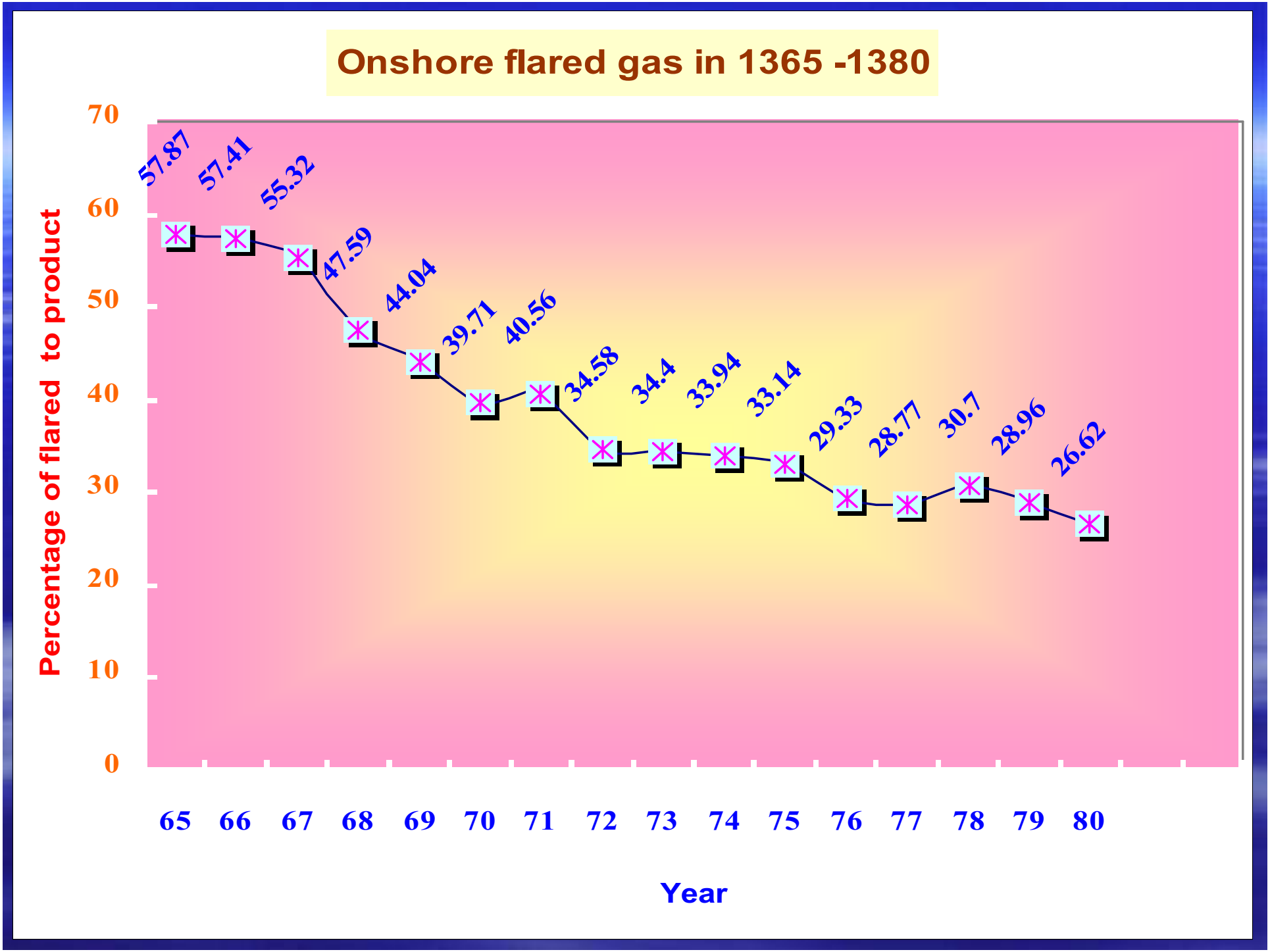
AMAK plan

With completion of this plan , the following major goals will be reached :

- Preventing average flaring of 241 million cubic foot associated gas per day.
- Reduction of some of pollutants from 18600 tones to 1488 tones per day.
- Amount of CO_2 emissions was dropped from 16500 tones to 1320 tones per day to show a 92% reduction.

Flared gas - figures in :million cubic meter / year Table - 2

Year	Associated Gas production	Flared gas	Percent of FG/GP
1365 (1986)	15338.1	8875.5	57.87
1370 (1991)	23265	9237.8	39.71
1375 (1996)	25503.3	8451.6	33.14
1380(2001)	24064.5	6406.8	26.62


Onshore flared gas in 1365 -1380
Percentage of flared to product
70
60
50
40
30
20
10
0
57.87
57.41
55.32
47.59
44.04
39.71
40.56
34.58
34.4
33.94
33.14
29.33
28.77
30.7
28.96
26.62
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
Year

Data required for CDM project evaluation and estimate of CO2 reduction cost Table – 1(AMAK)

Item	Value	Unit
Investment requirement	523	US Dollar
CO2 equivalent reduction	15000	Ton/day
Other revenues of the projects	Gross 220 Net 162	Dollar/year
Capex allocation (Time of investment)	*	Years
Life time of projects	30	Years

* For frist year: %12 For fourth year: % 26

" second " : %22 " fifth " : % 15

" third " : %25 " sixth " : % 15

Investment return time:

29 months

Reduction cost: < 3 $ / ton (co2)

Upstream CDM project

- Associate gas utilization at Kharg Island
  - Recovery of associate methane: 400MMCFD (2,200,000t-C/yr)
  - Gas processing loss: 7%
  - Methanol processing loss: 5%
  - A reduction of 7,550,000t-CO_2/yr, assuming that recovered methane replaces natural gas

    (52million USD / year (@7USD/CO_2 ton)

Downstream CDM project

- Oil refinery energy conservation project (Sample)
  - Conversion of heavy oil mono-generation to gas combined cycle
  - Efficiency increase from 30% to 45%
  - Specification: 500GWhe / 250Tcal
  - GHG reduction: 422,000t-CO_2/yr
    (3 million USD/year (@7USD/CO_2/ton)

CO_2 reduction costs in EUR

- For applicant countries : 10 Eur/metric ton of CO_2 equivalent
- For supplier countries : 4 Eur/metric ton of CO_2 equivalent *

* Average marginal reduction cost per metric ton of CO_2 equivalent.

Source : UN FCCC CDM Projects Mechanism, 2003

CDM projects in oil industry

- Gathering of crude oil associated gas.
- Natural gas substitution in industries.
- Substitution of compressed natural gas instead of gasoline and construction of CNG delivery station.
- Using electrical pumps for agriculture wells.
- Optimizing GHG generated processing.
- Energy consumption optimization in construction.
- Co2 preservation for industrial consumption.

- Optimization in furnace heat recovery and promotion of production with respect to energy system consumption.
- Sour gas containing CO2 and H2S, injection into the oil reservoirs.
- Energy auditing in production plats, oil and gas refining and piping.
- Energy retrieval systems planning.
- Optimization of heat exchangers.
- Heat process integration.
- Feasibility study on membrane technology in natural gas refinery industry.


THANK YOU