

**Great Socialist People's Libyan Arab Jamahiriya**

**Renewable Energy Authority of Libya**



# **Clean Development Mechanism In Libya**

## **Opportunities and Prospects**

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**October - 2009**

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## The climate change phenomenon (in brief)

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- Increase in the average temperature of the Earth
- Increase in the rate of melting ice and rising sea level
- Change in the rates of rainfall
- The receding in agricultural areas
- Decrease in the amount of water suitable for drinking
- Increase in (number & intensity) of storms
- etc...



# International convention on climate change

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**United Nations Conference on Environment and Development (UNCED) -1992 in Rio de Janeiro**



**United Nations Framework Convention on Climate Change (UNFCCC) -1994**



**Kyoto Protocol  
1997**



**Annex I countries will reduce their greenhouse gas emissions by 5% below 1990 level during 2008-2012**

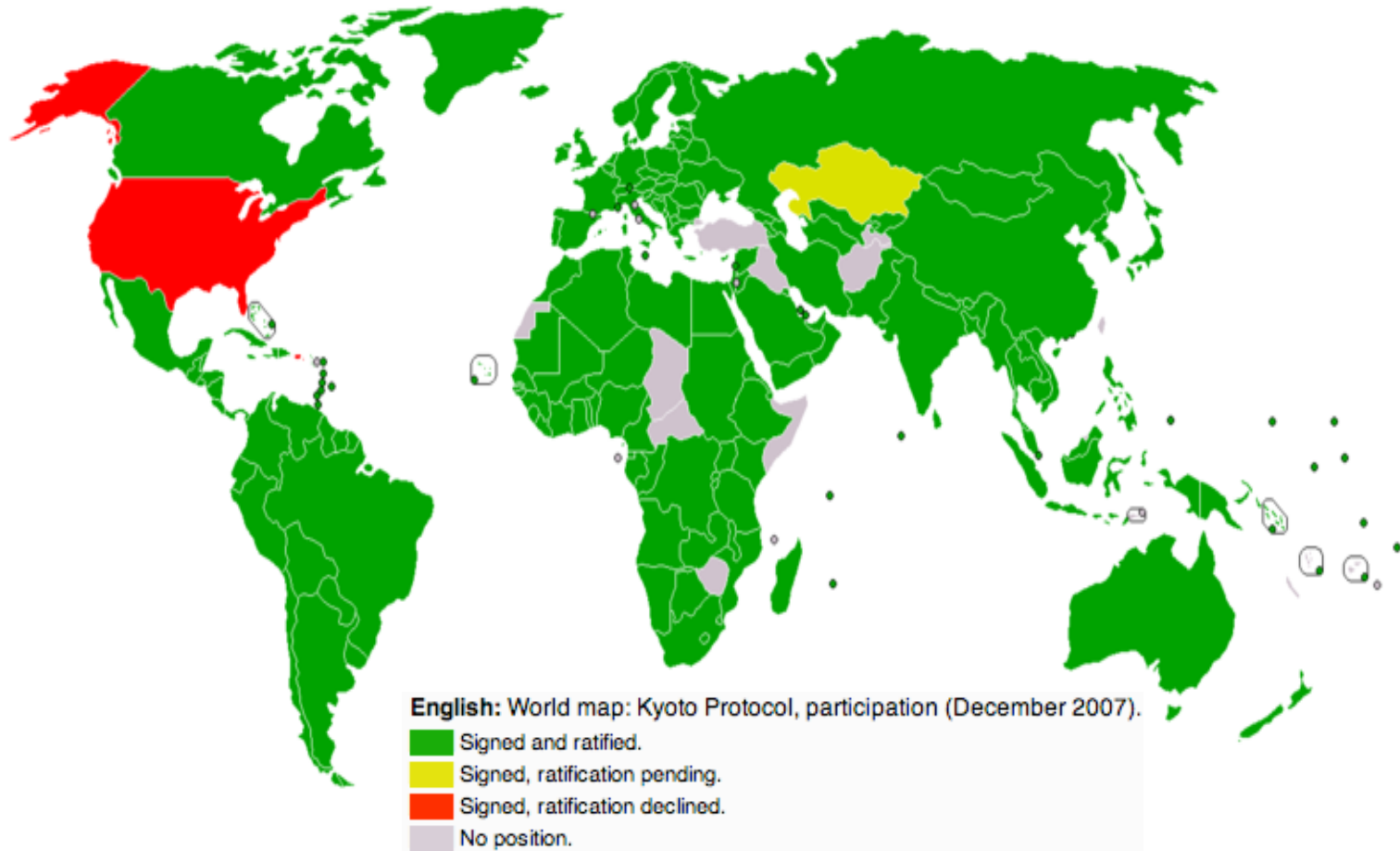


**Stabilization GHG Concentrations Common but Differentiated Responsibilities**

# Kyoto Protocol

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- ❑ Kyoto Protocol entered into force on 16 February 2005 and ratified by > 175 Countries



# Greenhouse Gases (GHG)

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- Carbon dioxide (CO<sub>2</sub>)
- Methane (CH<sub>4</sub>)
- Nitrous oxide (N<sub>2</sub>O)
- Hydro fluorocarbons (HFCs)
- Per fluorocarbons (PFCs)
- Sulphur hexafluoride (SF<sub>6</sub>)



# Global Warming Potential

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Greenhouse Gas (GHG)	Global Warming Potential (GWP)
Carbon dioxide	1
Methane	21
Nitrous oxide	310
Hydro fluorocarbons	150 – 11,700
Per fluorocarbons	6,500 – 9,200
Sulphur hexafluoride	23,900

Carbon credits are always expressed in terms of 'carbon dioxide equivalence' (CO<sub>2</sub>e)

e.g. 1 tonne of CO<sub>2</sub> = 1 tCO<sub>2</sub>e = 1 carbon credit = 1 CER

e.g. 1 tonne of CH<sub>4</sub> = 21 tCO<sub>2</sub>e = 21 CERs

e.g. 1 tonne of SF<sub>6</sub> = 23,900 tCO<sub>2</sub>e = 23,900 CERs

SOURCE: Guidebook to financing CDM projects-2007

# Kyoto Mechanisms

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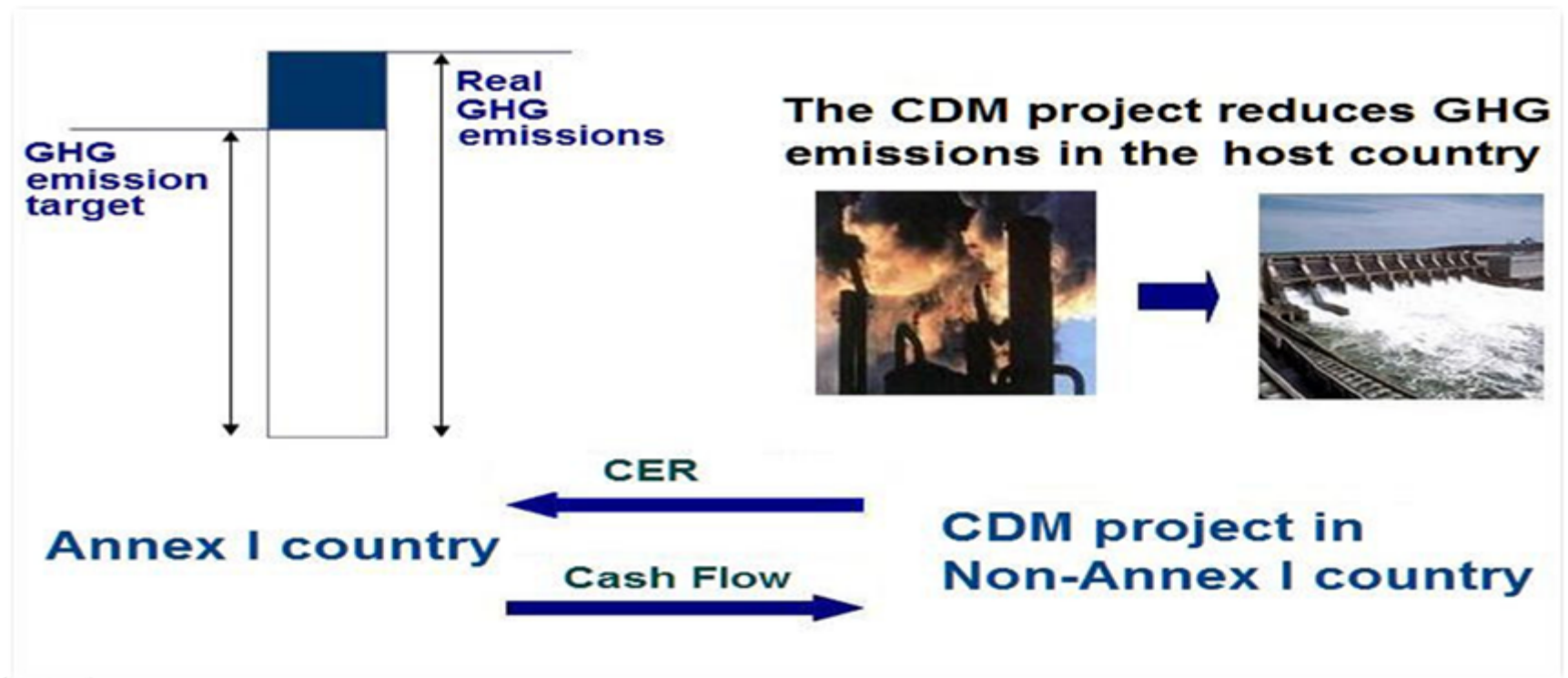
- ❑ Joint implementation (JI) – Article 6
- ❑ Clean development mechanism (CDM) – Article 12
- ❑ International Emission Trading (IET) – Article 17



# Clean Development Mechanism (CDM)

## □ The Clean Development Mechanism (CDM):

Allows (38) industrialized countries to achieve part of their Green House Gas (GHG) emission reduction target through investment in projects that reduce GHG emission in developing countries.



## Objectives of the CDM

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- ❑ To Contribute the ultimate objective of the UNFCCC; i.e. ( to stabilize greenhouse gas concentrations in the Earth's atmosphere ).
- ❑ To assist (Annex I) countries in achieving the removal target.
- ❑ To assist (non-Annex I ) countries in achieving the sustainable development



## Eligibility Criteria for CDM Projects

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- ❑ Implemented in a non-Annex I country that is a party to the Kyoto Protocol.
- ❑ Result in real, measurable, and long term benefits related to mitigation of climate change.
- ❑ The reductions in GHG emissions from the CDM project should be additional to any that would occur in the absence of the CDM. (**The additionality criterion**).
- ❑ Support sustainable development in the host country.



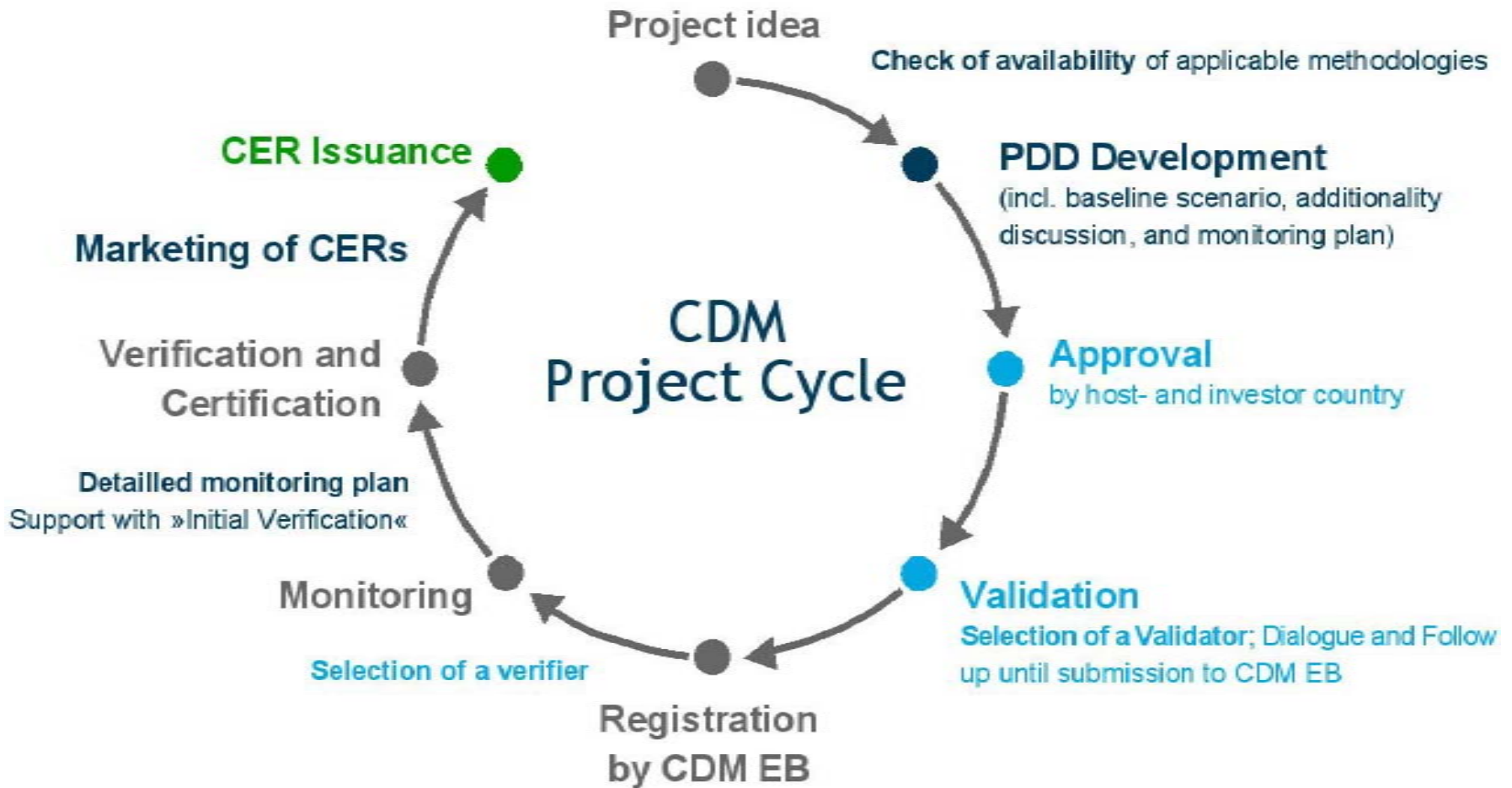
## Host country requirements

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- Ratification of Kyoto Protocol
- Participation in CDM projects is a voluntary
- Designated National Authority (DNA)



# The CDM project cycle



## Specific costs associated with CDM stages

Project cycle step	Cost (US \$)
Project Idea Note (PIN)	5,000-30,000
Project Design Document and Monitoring Plan (PDD)	15,000-100,000
Validation	8,000-30,000
Registration with EB	0.10 US \$/CER for the first 15,000 CERs per year, and 0.20US \$/CER for any CERs above 15,000 CERs per year
Verification	5,000-25,000

**SOURCE: Guidebook to financing CDM projects-2007**



## CDM Project timeline

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Project cycle step	Time required
Project preparation and assessment	~ 1-2 months
Project Design Document & Monitoring Plan	~ 1-3 months
Validation	~ 2 months
Registration with EB	~ 1.5 month





# Libya and CDM

## Libya Status

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<b>CO<sub>2</sub> Emissions in Libya (2006)</b>	
Carbon dioxide emissions	60.7 million tonnes (55% due to oil,45% due to N.G)
Emissions share of world total	0.2 %
CO <sub>2</sub> emissions per capita	10 tonnes !!!

SOURCE : Libyan energy data profile- September- 2007



## Libya Status (Cont...)

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<b>CO<sub>2</sub> Emissions by sector in Libya (2006)</b>		
<b>Sector</b>	<b>(Mt of CO<sub>2</sub>/year)</b>	<b>%</b>
Industry	4.20	6.92
Transportation	12.40	20.42
Power plants	24.00	39.55
Others	20.10	33.11
<b>Total</b>	<b>60.70</b>	<b>100</b>

SOURCE : Libyan energy data profile- September- 2007



# Libya and UNFCCC

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<b>Libya and UNFCCC</b>	
Ratification of the UNFCCC	June 14 <sup>th</sup> 1999 As non-Annex I
Ratification of Kyoto protocol	August 24 <sup>th</sup> 2006
<b>Designated National Authority (DNA)</b>	<b>Under Construction</b>



## Benefits of the CDM for Libya

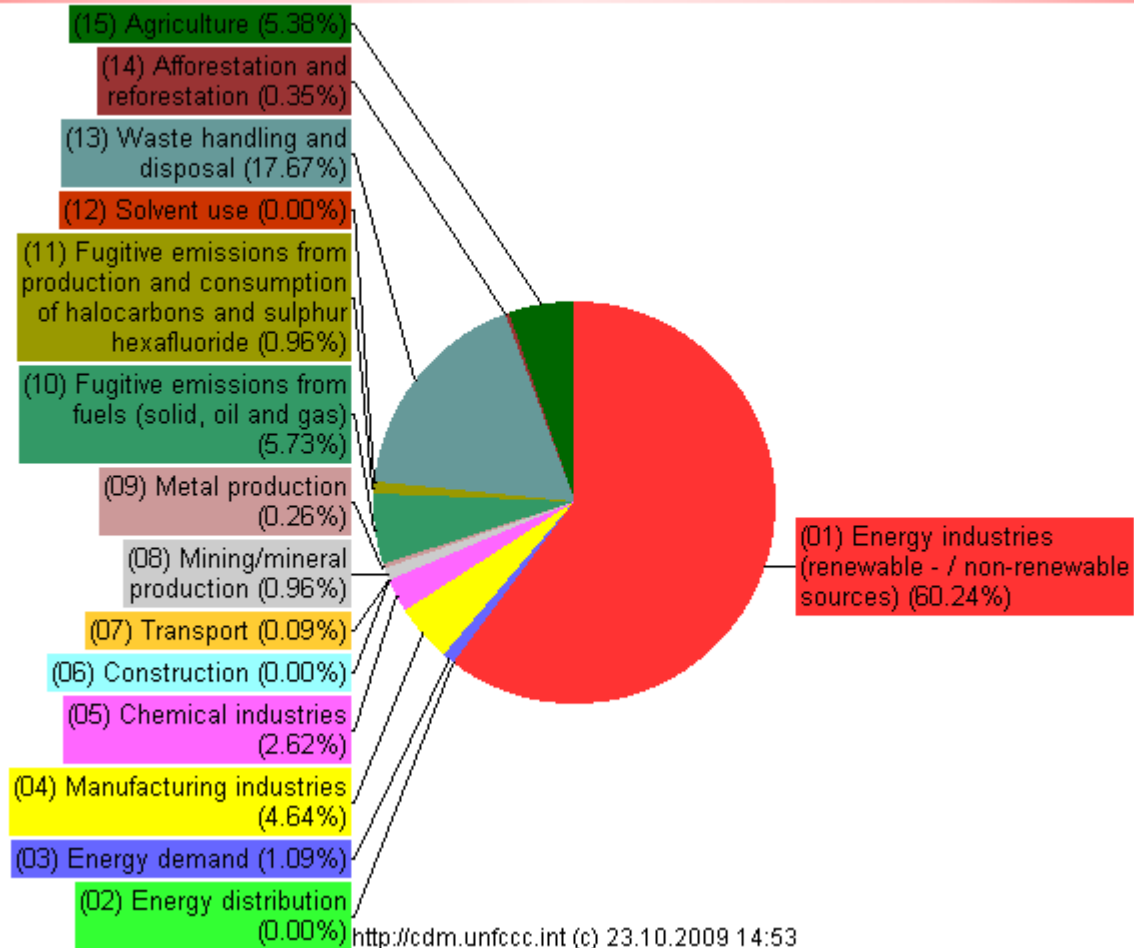
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- ❑ Increase of project profitability ( from CERs selling ).
- ❑ Attractive of foreign investment.
- ❑ Transfer of appropriate clean and reliable technology.
- ❑ CDM investments create employment opportunities.
- ❑ CDM projects bring local environmental benefits such as pollution reduction ,.....



# CDM Statistics (October-2009)

Distribution of registered project activities by scope



# CDM opportunities in Libya

The most important opportunities for CDM projects in Libya are in areas such as:

- Renewable energy
- Power plants
- Manufacturing sector
- Oil sector
- Chemical industries
- Transport sector
- Mining and mineral production
- Waste handling and disposal
- Afforestation and reforestation



# 1- CDM in Renewable Energy

□ Involve the generation of zero-emission energy from renewable sources such as wind.

<b>Mid-term plan of wind farms in Libya in (2010-2020)</b>			
Wind farm	Capacity (MW)	Expected emission reduction CO <sub>2</sub> /year (ton)	Expected revenues (US \$/year)
Dernah wind farm (I&II)	120	336,384	3,363,840
Magroun wind farm(I&II)	240	672,768	6,727,680
Western wind farms	250	613,200	6,132,000
Southern wind farms	320	784,896	7,848,960
Baida wind farm	70	171,696	1,716,960
<b>Total</b>	<b>1000</b>	<b>2,578,944</b>	<b>25,789,440</b>

**All calculations at :**

**Emission factor = 0.8 ton CO<sub>2</sub>/MWh      &      Price 10 US \$/ton CO<sub>2</sub>**

## 2- CDM in Power Sector

### ❑ Fossil fuel switching:

Involve the substitution of one fossil fuel with another which has lower emissions (e.g. a switch from oil to natural gas).

### ❑ Supply-side energy efficiency projects:

Involve an improvement to increase the efficiency of a power generation plant (e.g. changing from open cycle to combined cycle gas turbines , Rehabilitation of boilers to increase efficiency of steam generation).

### ❑ Demand-side energy efficiency projects:

Involve increase the efficiency of specific technologies at demand.



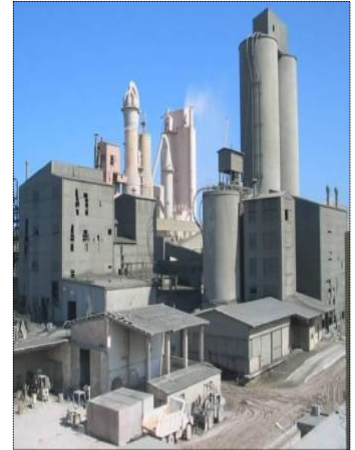
### 3- CDM in Cement Industry

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❑ **In Cement Industry** Carbon dioxide is produced directly during the production of clinker (clinker is an intermediate product from which cement is made) as well as indirectly by the thermal power plants, due to electricity consumption for cement production.

**So emissions can be reduced by:**

Substitution of clinker with alternative products such as volcanic ash **And** use of Alternative fuels.



## 4- CDM in Iron Steel Industry

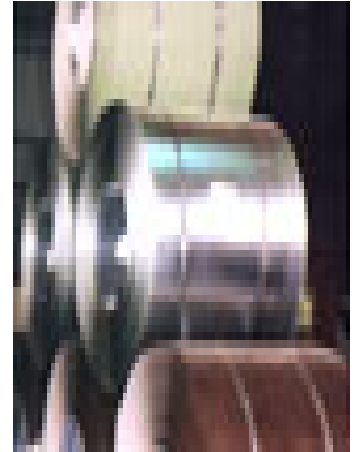
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### **The iron and steel industry:**

It is the largest consumer of energy among all industrial sectors.

### **The CDM in steel industry include:**

- Switch of CO<sub>2</sub> intensive fuel (i.e. oil to gas).
- Implementation of energy efficiency in process.
- Waste processing (waste heat recovery).



## 5- CDM in Oil Sector

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**The main greenhouse gases (GHG) in oil and gas sector are:**

- Carbon dioxide (CO<sub>2</sub>)
- Methane (CH<sub>4</sub>)
- Nitrous oxide (N<sub>2</sub>O)

**CDM projects in oil and gas sector include :**

- Recovery and utilization of gas flared from oil wells.
- Leak reduction from Natural Gas pipeline and compressors.
- Energy efficiency improvement in the oil refinery.



## 6- CDM in fertilizer industry

□ **The Fertilizer industry** is classified as an ideal Nitrous Oxide CDM Project. Nitrous Oxide  $N_2O$  is a byproduct from the production of nitric acid, which has a global warming potential of 310 stronger than carbon dioxide, hence more carbon credits can be obtained in fertilizer industry projects. In these type of CDM projects (utilizing cutting edge catalyst technology) which converts nitrous oxide into its components (nitrogen and oxygen).

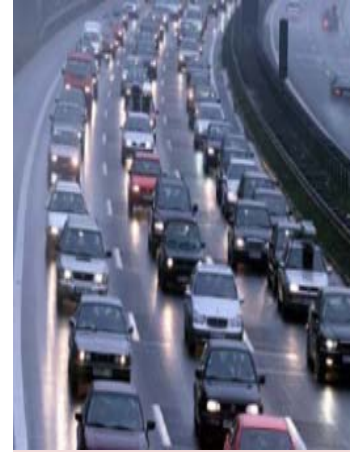


## 7- CDM in Transport Sector

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### CDM projects in the transport sector include:

- Projects that aid the improvement of public transport services.
- Projects that focus on the use of low-emission vehicles.
- Projects that focus on switching to fuels with lower emission factors.

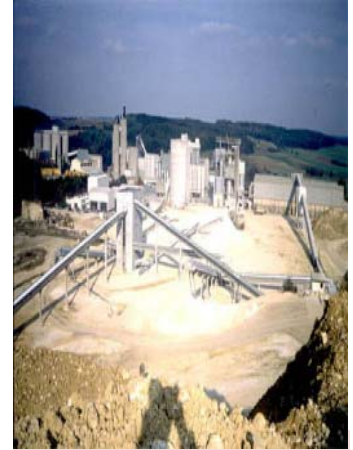


## 8- CDM in Mining and Mineral Production

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**CDM projects in the Mining and mineral production include:**

Reduction of methane emissions from deferent sources, the methane which is captured may be flared or used for electricity generation.



## 9- CDM in Waste Handling and Disposal

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- ❑ About 60%- 65% of landfill gas is usually composed of methane.
- ❑ Methane has a global warming potential 21 stronger than carbon dioxide hence more carbon credits can be obtained in waste management projects.
- ❑ Some of the various options, other than gas flaring, available for making productive use of methane include heat or electricity generation.



## 10- CDM in Afforestation and Reforestation

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### CDM projects in this category include :

projects that increasing removal of GHG from the atmosphere, by planting trees or managing forests, or by reducing emissions , i.e. by curbing deforestation.

- **Afforestation** : Involves planting trees on land which was not previously forested.
- **Reforestation** : Refers to planting trees on land which was recently cleared ( prior to 1990).



## Barriers of CDM projects

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Barriers that hinder implementation of CDM projects in developing countries looks like Libya include:

- ❑ Low level of awareness and capacity amongst the public, private and financial sectors about CDM opportunities.
- ❑ Long time is required for permissions to implement CDM projects.
- ❑ Lack of financial and technological sources to implement CDM projects.
- ❑ Lack of enough baseline data.
- ❑ Competition with other developing countries (non Annex I countries)
- ❑ Difficulty in achieving eligibility for some CDM projects due to confusion as to the meaning of additionality .

## Recommendations

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- ❑ Without a DNA, Libya cannot formally approve CDM projects, and registration of CDM projects in Libya will be impossible. **Therefore Libya needs to rapidly establish a Designated National Authority (DNA)**
- ❑ Libya should establish conditions that makes it an attractive place for CDM projects
- ❑ We need to identify CDM projects which has both the adaptation and mitigation benefits.
- ❑ We need to simplify the lengthy process.
- ❑ We need to enhance the capacity of the staffs and officials of public and private sector about CDM projects.





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