



# CORPORATE CONCERNS ON CLIMATE CHANGE

Presentation

by

INDIAN OIL CORPORATION LIMITED

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# CLIMATE CHANGE



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Increased concentration of GHGs ( $\text{CO}_2$ ,  $\text{CH}_4$ ,  $\text{N}_2\text{O}$ , PFCs, HFCs,  $\text{SF}_6$ ) in atmosphere due to increased human activities (last 150 years) have resulted into climate change.

$\text{CO}_2$  concentration in atmosphere has increased from 278 PPM (1850) to 386 PPM (2008).

Average global temp. rise was  $0.74^\circ\text{C}$  in last 100 years.

$\text{CO}_2$  concentration of 450 PPM will make the global climate more hostile.

The climate change phenomenon has put a serious social and economic challenges on us.

# CLIMATE CHANGE - IMPACT



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- \* Extreme changes of weather all over the world (draught, floods, heavy snow falls, melting of snow from north poles and glaciers, heat waves etc.)
- \* Increased sea levels will affect densely populated coastal line.
- \* Changes in crop yields. Severe shortage of food.
- \* Drinking water shortage.
- \* New diseases & health problems.
- \* Water used for cooling will be at a higher temp.

# GHG EMISSION BY COUNTRIES



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Countries	Survey Year	CO2 eq MMT	Population (Millions)	Per capita CO2 eq
Australia	2000	535 (VII)	19.44	27.54
USA	2002	6746 (I)	280	24.09
Canada	2004	740 (VI)	31.56	23.45
Russian Federation	1999	1880 (IV)	145.60	12.91
European Union	1999	4030 (II)	375.30	10.74
China	1994	3650 (III)	1198.50	3.05
India	2001	1228 (V)	914.00	1.34

( ) Position based on discharge volume

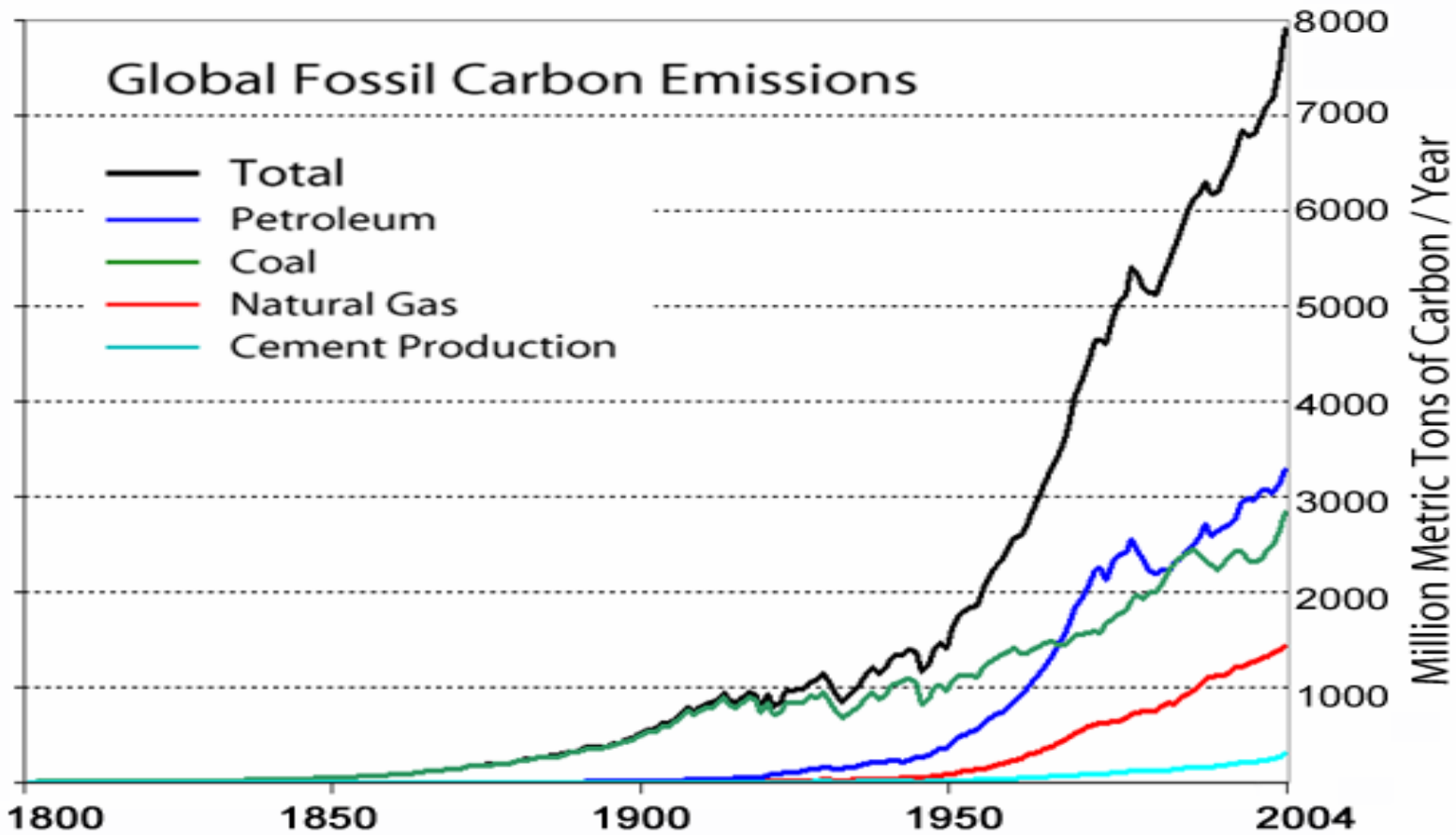
Source: carbon planet.com

# GHGs EMISSION - INDUSTRY WISE



* Power sector	-	21.3%
* Industrial processes	-	16.8%
* Transportation	-	14%
* Agricultural by-product	-	12.5%
* Fossil fuel retrieval, processing & dist.	-	11.3%
* Residential commercial & other sources	-	10.3%
* land use & Bio mass Burning	-	10%
* Waste disposal & treatment	-	3.4%

# Emissions from fossil carbon sources



Source: Wikipedia encyclopedia

Out of six GHGs, two are emitted mainly from petroleum sector:

- ★ Carbon-di-oxide (from heaters / boilers / DG sets)
- ★ Methane ( from upstream operation)

# WARMING POTENTIAL - CONCERN



Warming potential of CO<sub>2</sub> is lowest out of six GHGs but emission volume is large in petroleum sector :

	Name	Formula	CO <sub>2</sub> equivalent ( Warming Potential )
1	<b>Carbon dioxide</b>	<b>CO<sub>2</sub></b>	<b>1</b>
2	<b>Methane</b>	<b>CH<sub>4</sub></b>	<b>21</b>
3	Nitrous Oxide	N <sub>2</sub> O	310
4	Per Fluorocarbon	PFCs	9200
5	Hydro fluorocarbons	HFCs	11700
6	Sulphur Hexafluoride	SF <sub>6</sub>	23900

# MITIGATION - OPTIONS



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To create environmentally, technically and economically sound solution for responsible growth; **Four fold approach** has been considered:-

- \* Reducing emission of GHGs and increasing energy efficiency.
- \* Investing in research development and improved technology.
- \* Pursuing business opportunity in promising innovative energy technologies.
- \* Supporting flexible and economically sound policies and mechanisms that protect the environment.

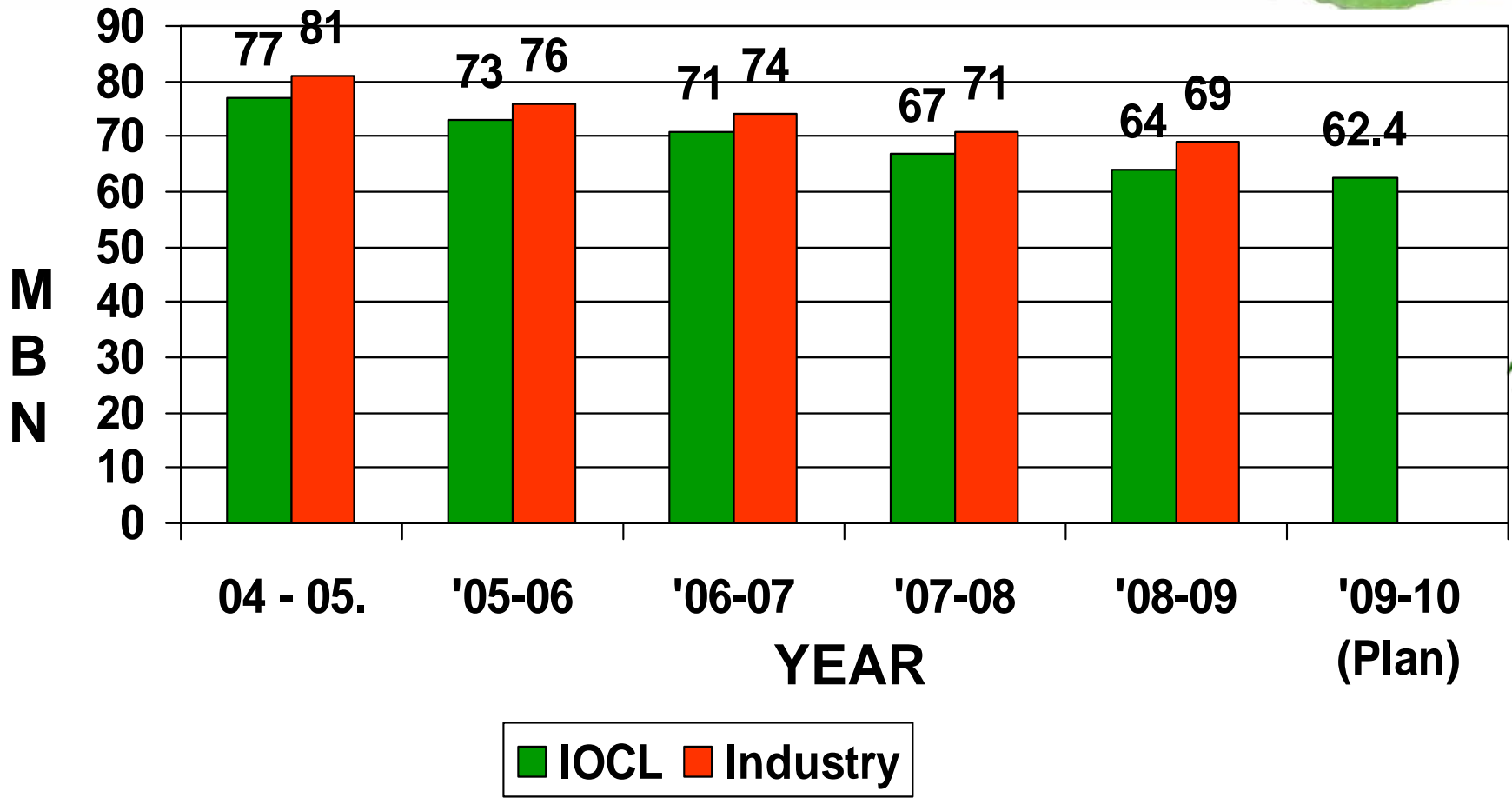


- ★ Over the years, refining industries have undertaken efficiency improvement initiatives through energy conservation projects, operational improvement/ awareness building & hydrocarbon loss control .
- ★ As a result , *“specific energy consumption”*, measured in terms of MBTU/ BBL/ NRGF (**MBN**), which is an objective measurement of energy intensity of refineries, has been improving continuously.

# ENERGY EFFICIENCY IMPROVEMENT



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# ENERGY EFFICIENCY IMPROVEMENT - IOCL



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Reduction of Standard Refinery Fuel (SRF) achieved through energy conservation projects in refineries have reduced the GHG emission as under:

Year	SRFT / YR saving	Reduction of CO2 emission MT/YR
04 - 05	48458	145374
05 - 06	32890	98670
06 - -7	24326	72978
07 - 08	27227	81681
08 - 09	73558	220674

# ENERGY EFFICIENCY IMPROVEMENT - IOCL



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Some of the major initiatives resulted in reduction of SRFT / GHG emission at IOCL Refineries:

- \* Gas turbine with heat recovery steam generator.
- \* Flare gas recovery.
- \* Pre-heat improvement.
- \* High efficiency burners.
- \* Heat integration of process units.
- \* Modernisation of instrumentation controls and application of advance process control.
- \* Insulation improvement

# CDM INITIATIVES - IOCL



## Registered Projects:

S.No	Projects registered with UNFCCC	Estimated CER (MT/Yr)
1	Flare Gas Recovery at Haldia Refinery	17610
2	AVU Energy Optimisation at Digboi Refinery	2610
3	Flare Gas Recovery at Barauni Refinery	8320
	TOTAL	28540

# CDM INITIATIVES - IOCL



## Projects under registration process:

S.No	Projects	Estimated CER (MT/Yr)
1	Flare Gas Recovery at Guwahati Refinery	3690
2	Flare Gas Recovery at Gujarat Refinery	14300
3	Fuel Oil consumption ,reduction and avoidance of methane emission in VDU furnace by recovery of VDU vent gas at Haldia Refinery	20750
	<b>TOTAL</b>	<b>38740</b>

# CDM INITIATIVES - IOCL



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## Projects under process:

S.No	Project	Expected CER
1	Idling of DHDT furnaces at MR	3800
2	Pressure Recovery Turbine at FCCU of MR	10500
3	Flare Gas recovery system at PR	14300
4	Fuel Switch from Naphtha to Natural Gas in Hydrogen Generation Unit at JR	60000
	Total Expected CER	88600



- ★ Wind energy (21 MW) has been tapped in Gujarat.
- ★ Planned to tap more wind energy (50 MW) at Kandla
- ★ Alternate site for wind energy are being explored
- ★ Use of solar power equipment (lantern, cooker, water heater, street light) started in a limited way

# INVESTING IN R&D AND IMPROVED TECHNOLOGY



To develop and applied cost effective technology that reduced the carbon emission of producing and delivering:-

- \* Carbon capture and storage (CCS) for gas, bio mass, coal / oil fired boilers and heaters.
- \* Concentrating solar / solar PV (photo voltaic).
- \* Renewable tidal and wave energy.
- \* Carbon capture and converting to bio mass.



**Assessment of GHGs Emission and reduction opportunity has been under taken at all IOCL Refineries to strengthen our efforts towards sustainable development. Some activities are:-**

- Energy consumption & establish baseline data
- Carbon emission – baseline data
- Carbon emission from ongoing initiatives
- Resource utilization (plants / machineries / process)
- Carbon footprint of products / plants / supply chain
- Generation of Waste & Hazardous material

# SUMMARY



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- ★ Climate change is considered as a serious social & economic challenge
- ★ All cost effective GHG abatement possibilities, particularly in energy efficiency to be implemented without loss of time
- ★ To adopt all best available low carbon technologies
- ★ Investing in R&D and improved technology
- ★ Pursuing business opportunities in promising innovative energy technologies.



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Thanks