

Emission Reductions Trading – Relevance to Project Finance for India

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CDM Opportunities in Rajasthan

Jaipur

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About Clean Tech Solutions

- Clean Tech Solutions – a nascent trim consulting organization
- Specializing in cleaner techno-commercial solutions
- Thrust on implementable, effective and affordable options that result in bankable projects
- A participative approach – Association with clients at each stage
- Cleaner production technologies, clean energy projects, waste to energy, carbon finance



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CTS Services

- **Carbon Finance for Clean Energy Projects**
 - Promoter analysis, Baseline and M&V Methodology, PDD, Additionality evaluation and ERPA development
- **Urban Bodies/ State Administration – Solid Waste Management**
 - SWM policy development, Integrated MSW management Roadmap development
- **Industrial Environmental Analysis**
 - Operations review and emissions inventory
- **Energy Efficiency and Renewable Energy Project development**
 - DPR Preparation, finance syndication
- **Urban Bodies/ State Administration Water Supply Networks**
- **Project environmental reviews for multi and bilateral aid agencies**



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Brief Overview of the Climate Convention



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The Greenhouse Effect

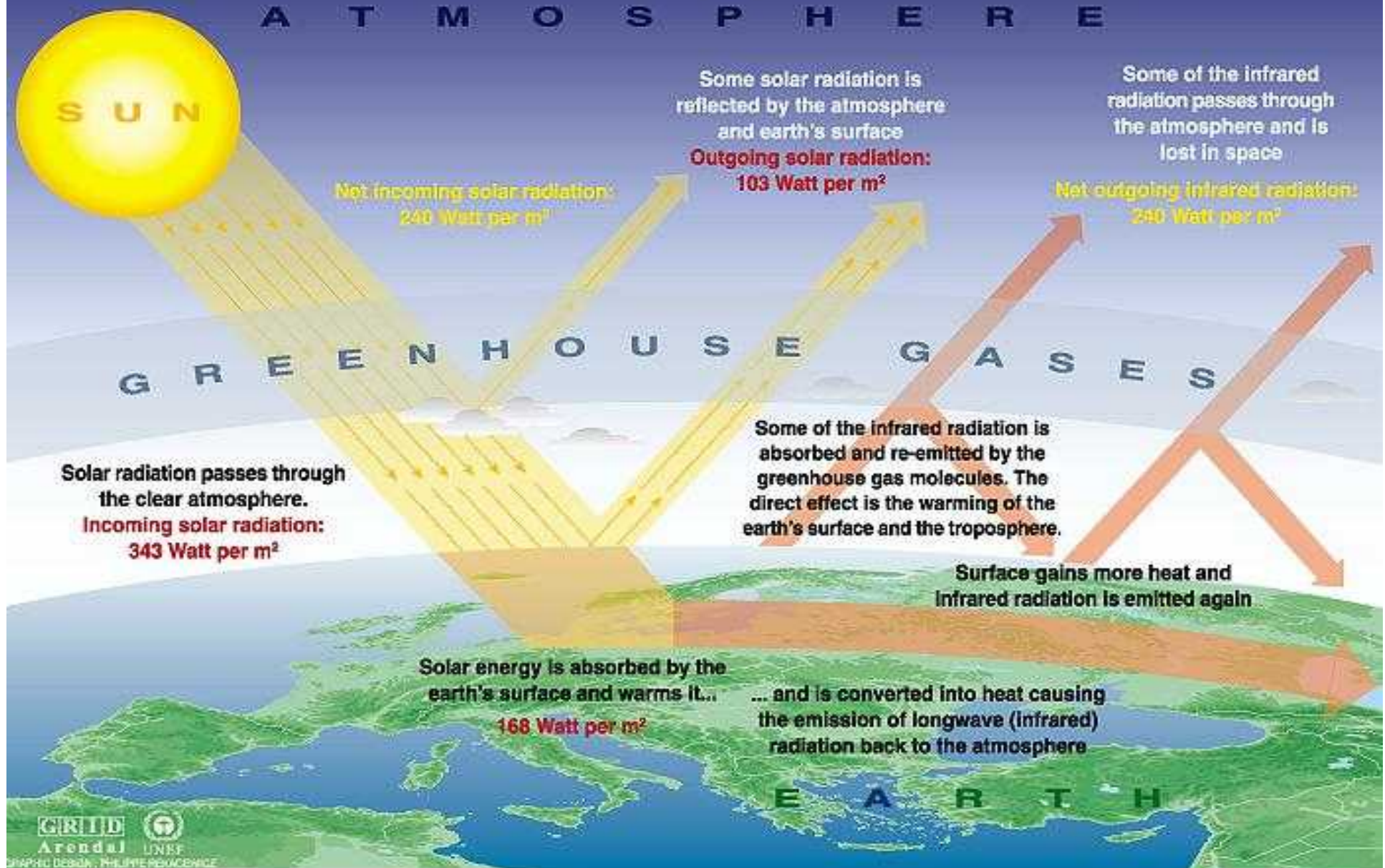
- The earth's climate is driven by a continuous flow of energy from the sun.
- The earth must send this energy back out into space in the form of infrared radiation.
- Greenhouse gases in the atmosphere block infrared radiation from escaping directly from the surface to space.
- Levels of all key greenhouse gases are rising as a direct result of human activity.
- In the 200 years since 1800, levels of CO₂ have risen by over 30% as against less than 10% in the earlier 10,000 years
- The earth's climate is already adjusting to past greenhouse gas emissions



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The Greenhouse effect



Sources: Okanagan university college in Canada, Department of geography, University of Oxford, school of geography; United States Environmental Protection Agency (EPA), Washington; Climate change 1995, The science of climate change, contribution of working group 1 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge university press, 1996.

Climate Change

- “Weather and climate have a profound influence on life on Earth. They are part of the daily experience of human beings and are essential for health, food production and well-being” - IPCC Third Assessment Report
- Human activities are releasing greenhouse gases into the atmosphere
- Measurement records indicate an increase of $0.6\pm 0.2^{\circ}\text{C}$ in global average temperature since the late 19th century.
- Climate models predict that the global temperature will rise by about $1.4 - 5.8^{\circ}\text{C}$ by the year 2100
- Climate change is likely to have a significant impact on the global environment
- Mean sea level has risen by 10 to 20 cm
- Snow cover has declined by some 10% since the late 1960s
- The frequency and intensity of extreme weather events are likely to change



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The main greenhouse gases

Greenhouse gases	Chemical formula	Pre-Industrial concentration	Concentration in 1994	Atmospheric lifetime (years) ^{***}	Anthropogenic sources	Global warming potential (GWP) [*]
Carbon-dioxide	CO ₂	278 000 ppbv	358 000 ppbv	Variable	Fossil fuel combustion Land use conversion Cement production	1
Methane	CH ₄	700 ppbv	1721 ppbv	12,2 +/- 3	Fossil fuels Rice paddies Waste dumps Livestock	21 **
Nitrous oxide	N ₂ O	275 ppbv	311 ppbv	120	Fertilizer industrial processes combustion	310
CFC-12	CCl ₂ F ₂	0	0,503 ppbv	102	Liquid coolants. Foams	6200-7100 ****
HCFC-22	CHClF ₂	0	0,105 ppbv	12,1	Liquid coolants	1300-1400 ****
Perfluoromethane	CF ₄	0	0,070 ppbv	50 000	Production of aluminium	6 500
Sulphur hexa-fluoride	SF ₆	0	0,032 ppbv	3 200	Dielectric fluid	23 900

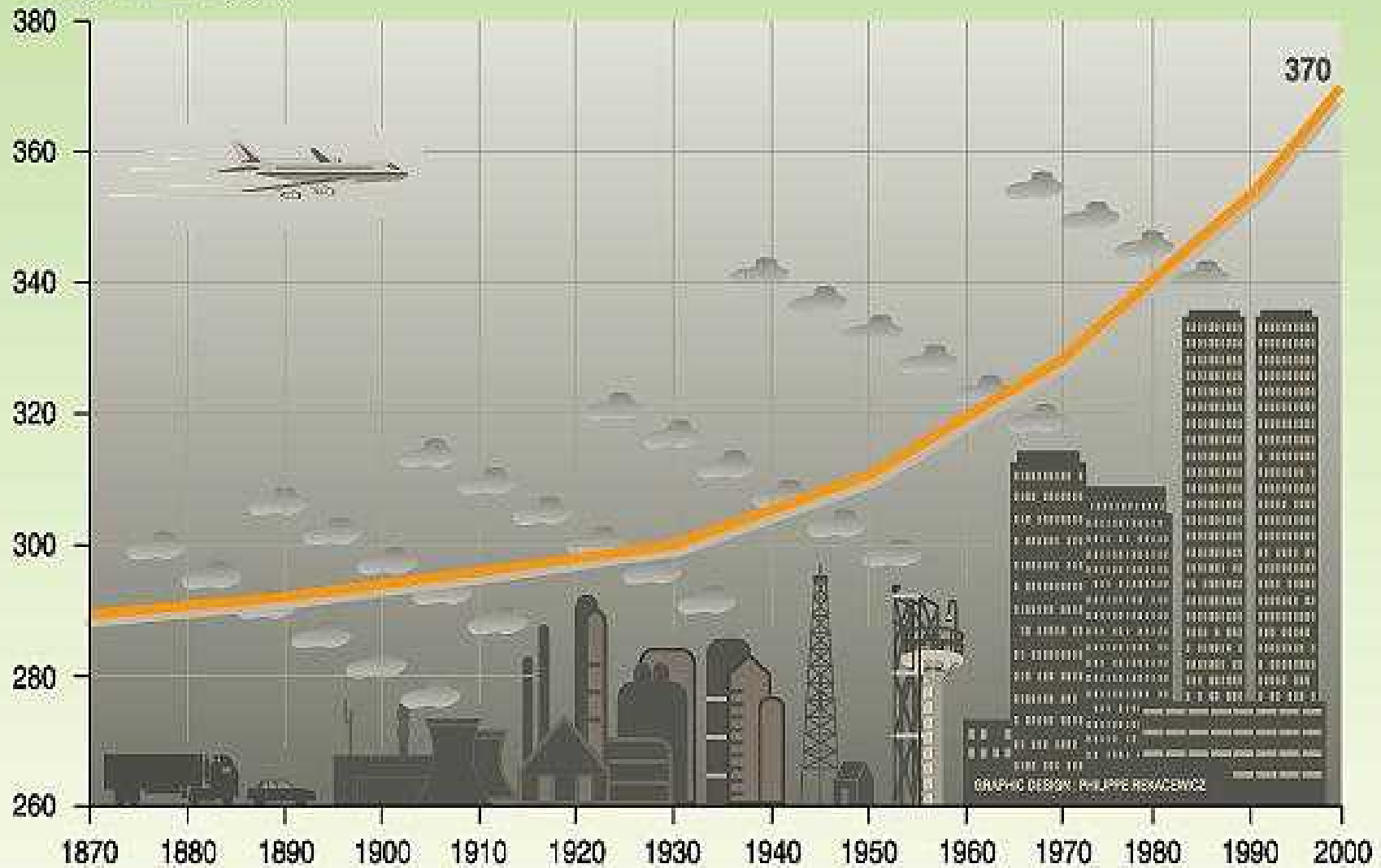
Note : pptv= 1 part per trillion by volume; ppbv= 1 part per billion by volume, ppm v= 1 part per million by volume

* GWP for 100 year time horizon. ** Includes indirect effects of tropospheric ozone production and stratospheric water vapour production. *** On page 15 of the IPCC SAR. No single lifetime for CO₂ can be defined because of the different rates of uptake by different sink processes. **** Net global warming potential (i.e., including the indirect effect due to ozone depletion).



Global atmospheric concentration of CO₂

Parts per million (ppm)



GRID
Arendal UNEP

GRAPHIC DESIGN: PHILIPPE REMACHEL

International Response to Climate Change

- First World Climate Conference 1979 recognized climate change as a serious problem
- A number of intergovernmental conferences focusing on climate change were held in the late 1980s and early 1990s
- Intergovernmental Panel on Climate Change (IPCC) released its First Assessment Report in 1990
- UN Framework Convention on Climate Change (UNFCCC) was signed by 154 states (plus the EC) at Earth Summit Rio de Janeiro 1992. It entered into force on 21 March 1994
- Both developed and developing countries accept a number of general commitments
- The principle of the **common but differentiated responsibilities** of states assigns the lead in combating climate change to developed countries



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Progress on Negotiations

- IPCC Second Assessment Report December 1995, Third Report early 2001
- Industrialized countries undertake several specific commitments for adopting policies and measures aimed at returning their greenhouse gas emissions to 1990 level
- The Convention also establishes two subsidiary bodies. The Subsidiary Body for Scientific and Technological Advice (SBSTA) and Subsidiary Body for Implementation (SBI)
- Conference of the Parties is the “supreme body” of the Climate Change Convention to promote and review its implementation
- It has met 11 times so far COP 1-1995, COP 2-1996, COP3-1997, COP4-1998, COP5-1999, COP6-2000, COP6 Bis and COP7-2001, COP8-2002, COP9-2003 and COP10-2004
- COP 3, COP6 Bis and COP 7 have been historic



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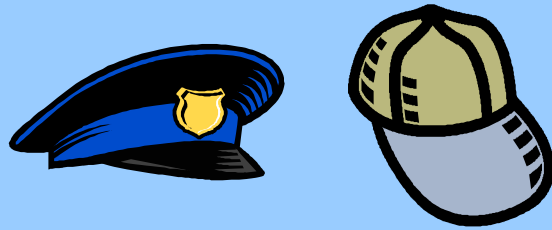
Kyoto Protocol



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Cap & Trade



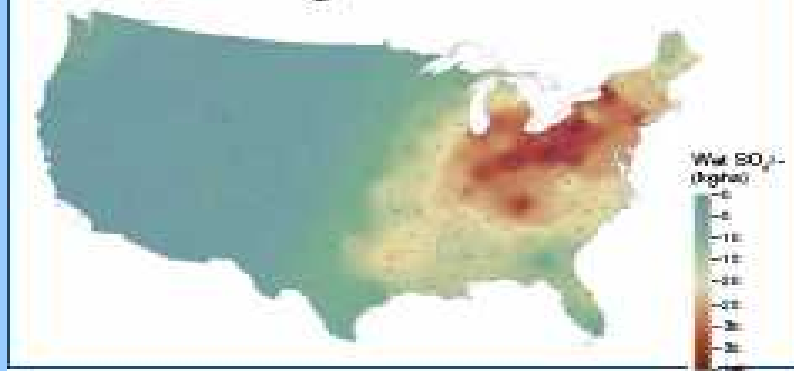
- Basic tenet is to put an upper limit on emissions by industrialized nations and allow them to invest in offsets elsewhere
- Market based policy as opposed to Command & Control
- Possible in case of GHG emissions since a ton of CO₂ emitted in UK = that in India or elsewhere
- Experience with US 1605 (b) SO_x/NO_x market under the highly successful trading system formed under the Acid rain program of Clean Air Act since 1995

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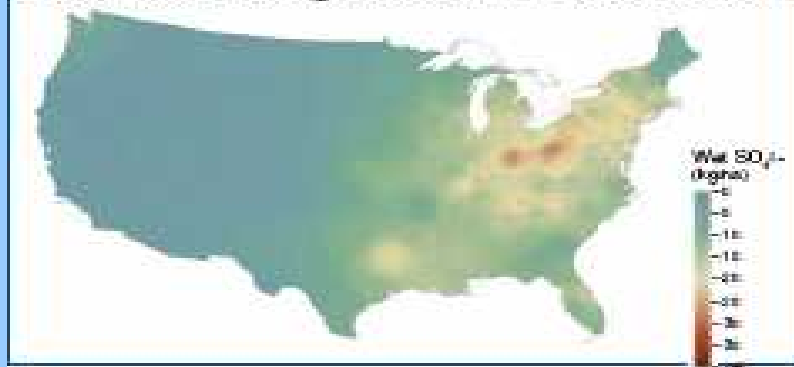
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Acid Rain Program Performance

1989-1991 Average Acid Rain Concentrations



2000-2002 Average Acid Rain Concentrations



Monitors show significant decreases in wet sulfate deposition in the Eastern U. S. Source: NADP



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A Landmark Development

- KP recognized differentiated responsibilities of industrialized and developing nations
 - Industrialized nations to own responsibility of past GHG emission levels responsible for today's global warming
 - Developing nations to achieve a decoupling of GDP growth and emissions by promoting “sustainable development”
- It established legally binding quantified emission limitation or reduction commitments for industrialized nations Annex 1
- These QELRCs aim at bringing down GHG emission levels to 5.2% below the levels in base year 1990 to be demonstrated in the first target period 2008 – 12
- Options to achieve these targets: domestic actions, purchase from other Annex 1 nations through both project activities (i) and trading (ii) and purchase from non Annex 1 nations (iii)
- It establishes three “flexible mechanisms”
 - Joint Implementation -----(i)
 - International Emission Trading -----(ii)
 - Clean Development Mechanism -----(iii)



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CDM – Putting in Perspective

- CDM is a flexible mechanism that creates a “Market Based Instrument”, which ‘commoditizes’ environmental performance over business-as-usual
- It creates a financial instrument “**CER**”, which can be sold to parties with a Commitment
- Prerequisite for KP was that Annex 1 nations representing 55% GHG emissions ratify it.
- Having achieved this after Russian ratification, it will become officially operative on 16 February 2005 when the Kyoto Protocol takes effect



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What Is CDM?

- A mechanism to enable Annex I parties to “purchase” GHG emission reduction from projects in developing nations
- A commodity Certified Emission Reduction (CER), equivalent to 1 ton of CO₂ is proposed
- When a project activity in Annex 1 does better than “Business as Usual” scenario the emission reduction over that level is translated into CER
- The business as usual case is defined as Baseline Scenario approved by a regulator viz. CDM Executive Board (EB)
- CERs accrue each year after the project performance is “verified” through a pre approved methodology



Project Finance structure is most appropriate



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Initiatives in India

- GOI has done quite a lot in the last couple of years!
 - Organized the COP 8 in October 2002
 - Formed a Task Force under Planning Commission for operationalizing CDM
 - Formed the CDM National Authority and made it active – It is understood to have given HC clearance to 30 projects so far
 - Prepared the first National Communication on GHG inventory and sent to UNFCCC
- India is, therefore, seen as a strong HC for supply of CERs as ranked by carbon broker Point Carbon



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Point Carbon HC Ratings

Updated CDM host country rating (as of 24 November 2004)

1. India BBB (last month: no 1, rated BBB)
2. Chile BBB (2, BB)
3. Brazil BB (3, BB)
4. Peru B (5, B)
5. China B (8, CCC)
6. Morocco B (6, B)
7. Mexico B (4, BB)
8. Vietnam CCC (7, CCC)
9. Thailand CCC (11, CCC)
10. South Africa CCC (10, CCC)
11. Indonesia CCC (9, CCC)

Rating of CDM host countries is based on Point Carbon's recently developed methodology which includes assessment of host countries' institutional conditions for CDM, investment climate, as well as project status and potential.

Ref: <http://www.wbcsd.org/plugins/DocSearch/details.asp?type=DocDet&ObjectId=11997>



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India's GHG Inventory

GHG emissions from key sectors* [with 5% or more contribution]

- Fuel Combustion

- Energy & Transformation Industries 28.9%
- Industry 12.3%
- Transport 6.5%

- Industrial Processes 8.4%

- Agriculture

- Enteric Fermentation 15.3%
- Rice cultivation 7.0%



* Source: India's initial National Communication – June 2004

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Energy Sector

- Largest potential for projects for generating Emission Reductions
 - Coal – Clean coal technologies like IGCC, Super critical process, coal beneficiation
 - Fuel switch – coal/diesel based plants to Natural Gas/other cleaner fuels
 - Renewable Energy – India blessed with solar, wind, biomass
 - Waste to energy – emerging area needing greater attention
 - Repowering – renovation and modernization, demand side management
 - Energy efficiency – end use energy efficiency, reduction in specific energy consumption in supply of services such as litre water delivered, lumens of light provided, TOR in HVAC systems



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Industrial Energy

- Specific energy consumption improvement projects
 - Major contributors – steel, aluminium, pulp & paper, textiles, sugar, chemicals and fertilizers, bulk chemicals, cement, petrochemicals etc.
 - Options – waste heat recovery, efficient cycles, new materials, efficient energy recovery/conversion equipment, process integration through heat exchanger networking
 - Alternate fuels like biomass, wastes



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Industrial Processes

- **Specific to the industries – some examples**
 - Iron & Steel – alternate materials for reduction of metal, gas capture from furnaces, CO₂ recovery from BF, optimization of coal and graphite electrodes in electric arc furnace
 - Distilleries – capture of CO₂ from fermentation process
 - Lime – CO₂ capture from limestone kilns (in cement, construction, paper, sugar industries)
 - Carbide – optimization coal used in reduction, and limestone used for producing CaO
 - Aluminium – optimization of electrolysis to reduce emission of CO₂, use of alternate anode materials and processes to reduce anode effects that release per fluoro carbons
 - Nitric Acid – capture of N₂O by extended absorption, selective catalytic reduction
 - Circuit Breakers – technologies to reduce emissions of SF₆ from sparking effects in power lines
 - Dairy – Efficient manure management to reduce methane emission



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Transport Sector

- Switch over from road to rail for cargo transport
- Promotion of waterways
- Transport/traffic planning – staggered work timing, redistribution of work and domestic spaces, effective master planning
- Alternate fuels like CNG, bio-diesel, blending agro based ethanol, battery operated vehicles



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Urban Sector

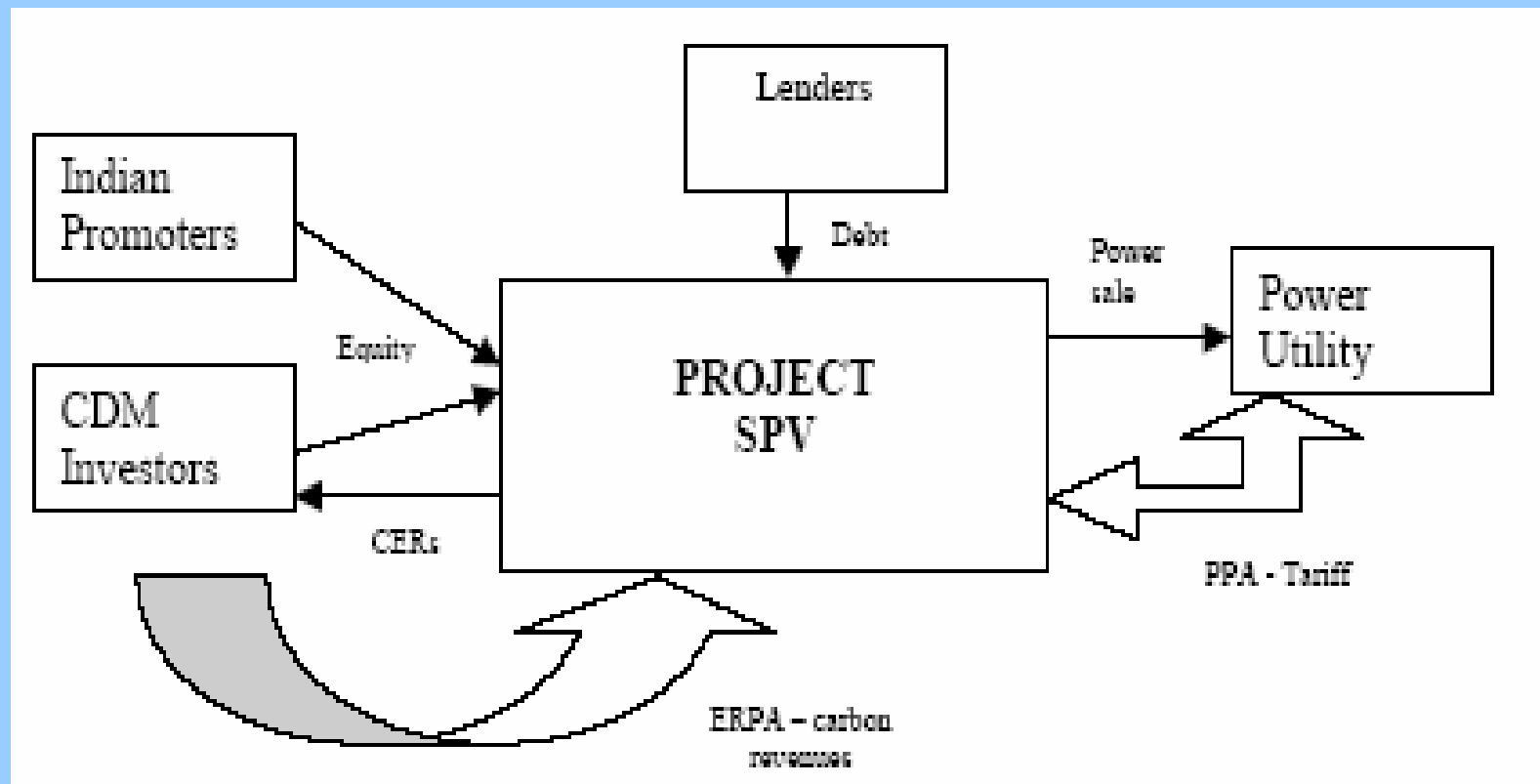
- Efficient water management to reduce wastage and pumping load
- Better street lighting with efficient lamps
- Building energy use efficiency improvement
- Plantation and afforestation wherever possible
- Proper MSW collection, transport, treatment and disposal
- Proper wastewater planning and management



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CDM Project Structure



Financing Structures for CDM Projects in India and Capacity Building Options for EU-Indo Collaboration, Vinay Deodhar, Axel Michaelowa, Matthias Krey HWWA Discussion Paper 247, September 2003



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Fit for Project Finance Structure

- Structure dependent on revenue streams generated by the project
- Project assets serve as lenders security
- No or limited recourse to the promoters' books "off" balance sheet finance
- Ideal for large infrastructure projects Need proper legal and regulatory framework
- CER revenues only "Icing on the cake"



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Operationalization Issues

- GOI – All geared up – environmental approval process in line with UNFCCC CDM requirements
- CDM NA has instituted host country clearance process – sustainable development assessment
- FI sector has lagged behind
- Financial and insurance products necessary to keep pace with CDM projects
- Regulatory issues - CER has to be recognized by the legal/banking system
- An acceptable ERPA to the industry is yet to be developed
- Develop funds for investing in CDM projects

Remember Emission Trading for Indian entities limited to Sale of CERs!



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Why Domestic Emission Reduction Trading?



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What to Trade?

- Basic difference between KP IET and domestic trading system
- Concentration based limits prevalent in India as opposed to quantitative limits prescribed for Annex I nations
- Therefore, Emission Reductions (ER) Trading is relevant for India
- ER could serve Cap and Trade system or for voluntary purchasers like U.S. corporates



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Advantages of Trading

- Lowering the transactions cost. Bring smaller players in market.
- Carbon offset prices depend on the stage at which ERPA is negotiated. Intermediary would enable higher prices.
- So far no restrictions on “Unilateral” CDM projects
- CDM project developers are mainly from SME sector. Their interest is primarily to sell the CERs quickly to enhance the project financials
- Holding capacity of domestic ERs increased by domestic players with stronger and bigger balance sheets!
- Annex B CER purchasers would view the “intermediary” holders as a risk mitigation measure
- International ERPA likely to be more balanced as against current drafts, which are buyer centric
- All in all the intermediate CER holders would increase CER prices and increase FDI in India!!



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Design Issues for Registries

- **Organizational**
 - Mandate/policy objectives
 - Nature Public/private, voluntary/mandated
 - Funding/resources
 - Adaptability
- **Data/System Integrity**
 - Measurement/quantification of data (protocol)
 - Data verification procedures
 - Auditing
 - Compliance/enforcement/liability
- **Public Access/Stakeholder involvement**
 - Consultation
 - Outreach
 - Website content
 - Confidentiality
- **Reporting/Data Management**
 - Coordination with other registries
 - Ability to provide TA/support
 - Ease and mechanics of reporting

Ref: Design issues for implementation and operation of GHG inventories and ER registries, Disc. Paper C3-09, Aug 2002, Climate Change Central



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Some International Registries

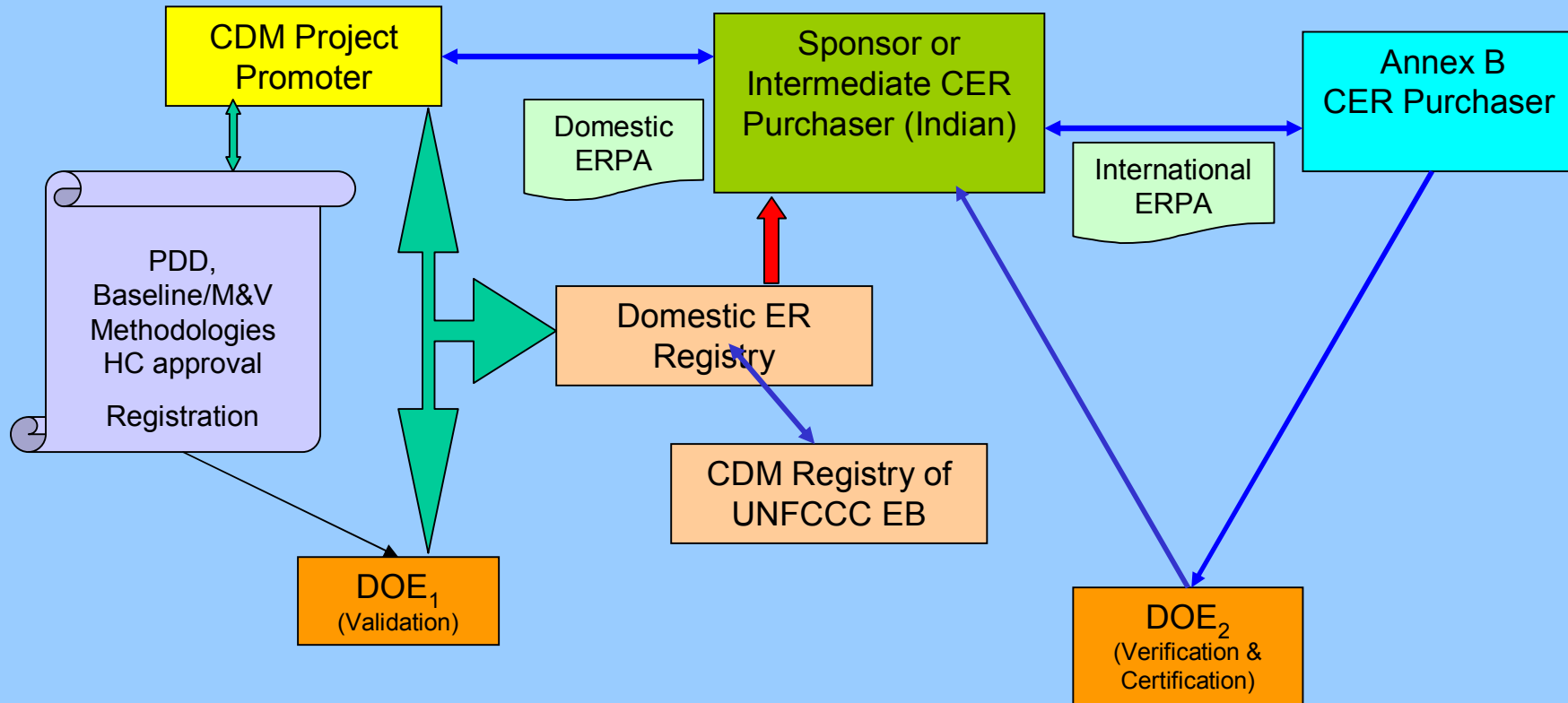
- California Climate Action Registry
- U.S. State registries: Oregon, Illinois, Maine, New England, New Hampshire, New Jersey, New York, Texas, Wisconsin
- Environmental Resource Trust GHG Registry
- World Economic Forum Global GHG Register
- EU ETS Registry
- U.K. ET
- Voluntary USDOE 1605(b) GHG Registry
- Canadian GHG Challenge Registry



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What is Meant by ER Trading?



Operational Features

- Primary responsibility of development of the CDM Project, baseline/M&V methodologies, PDD, host country approval and hiring of DOE₁ for validating the document lies with the promoter
- The project is registered with an ER Registry, which also conducts background due diligence and acts as “depository” to market the project to Indian Corporates and HNIs
- Indian Sponsors/Intermediaries interact with the Registry, DOE₁ and do their own due diligence and enter into a domestic ERPA with Promoters
- They hire the DOE₂ for verification and certification of project CERs
- They scout out for international CER purchasers from investors in nations covered in KP Annex B and negotiate and sign International ERPA
- Both interact with the DOE₂
- Actual transaction takes place when the project performs and Annex B party pays to Sponsor and they in turn pay off the original promoter
- Project performance is the key to the whole transaction structure



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Specific design issues for ER Registry

- Rules for setting baselines
 - CDM standardized baselines
- Rules for claiming ERs, credits and ownership
- Tracking ERs
- Rules for ER transfer and enabling ET
- Linking with CDM log at EB and with CDM NA of GOI



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Risks in the Structure

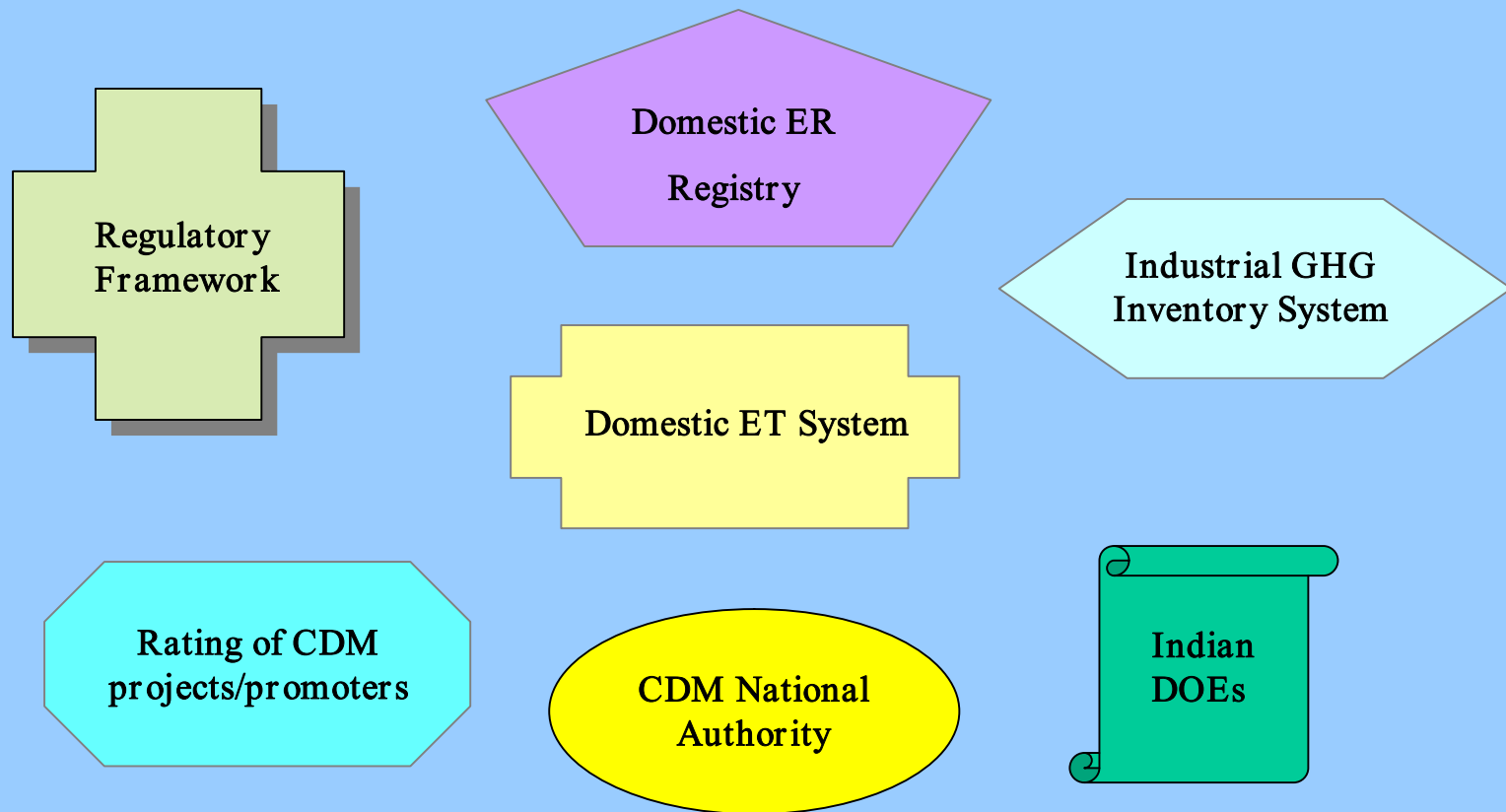
- Up to the approval of the project by CDM EB lie with the promoter as prevalent today
- CER price risk with sponsor
- Project performance risk with promoter but shared with sponsor
- Promoter credibility risk with domestic intermediary – Credit rating plays important role



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Institutional Structure Necessary



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Co-Benefits of the ER Trading System

- Encouragement to small promoters for taking up CDM project development
- Possible development of native DOEs
- Experience with drafting and operating ERPAs
- Increasing awareness among industry on resource conservation and eco efficiency improvement
- A positive step towards adoption of Life Cycle cost/ Full cost concepts
- Increased level of understanding through learning by doing
- Overall development of Commodities market and new tradable products e.g. weather futures
- Transfer of learning of market based mechanisms to other sector
- Need based structured products development e.g. CER insurance
- Spread of sustainable development concepts like Triple Bottom line
- Useful for preparation for Cap in future for India



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Thank you for your attention!!

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