

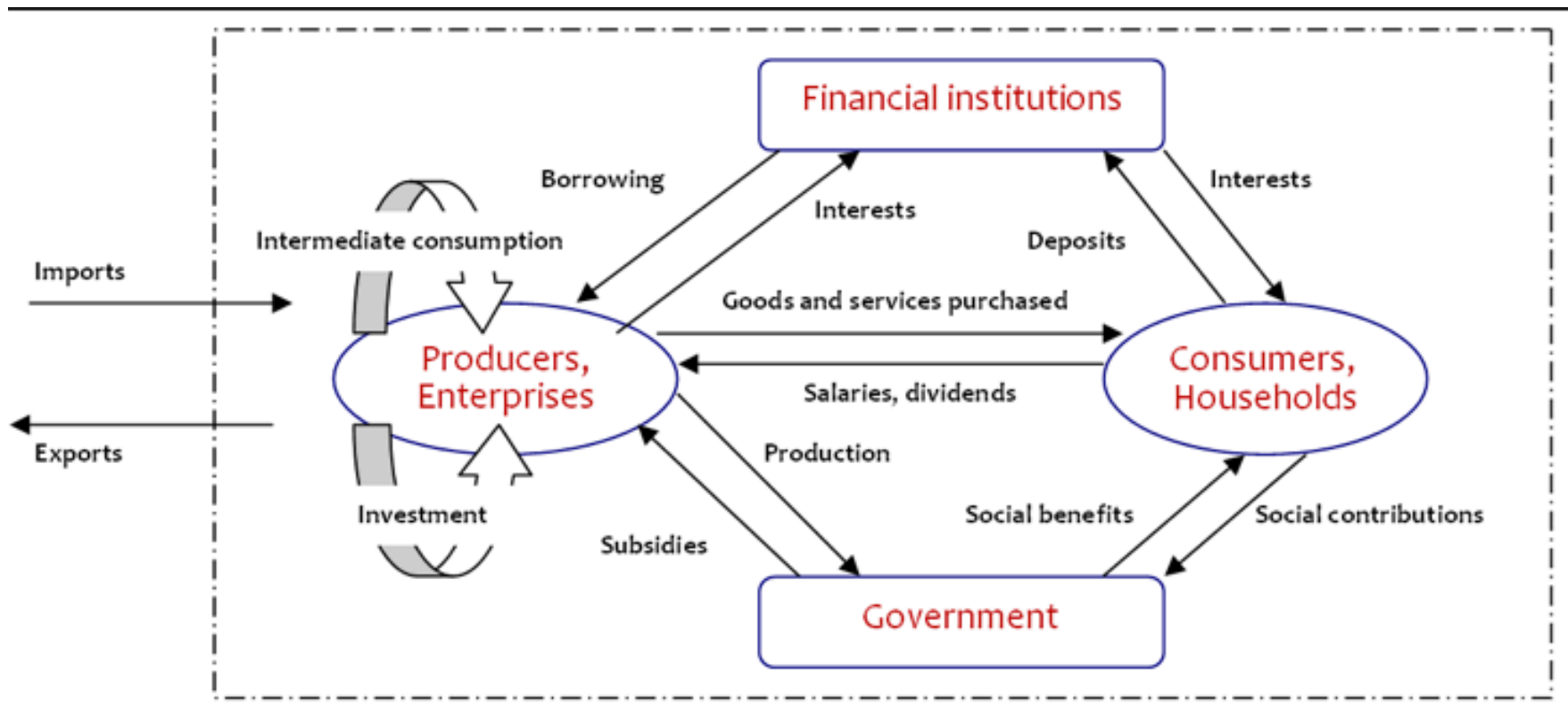
Environmental & Carbon Finance

Swapan Mehra, CEO

IORA Ecological Solutions

**“I believe that the great part of
miseries of mankind are brought
upon them by false estimates they
have made of the value of things.”**

Benjamin Franklin, 1706-1790





Opportunity Cost



Ecological
Economics

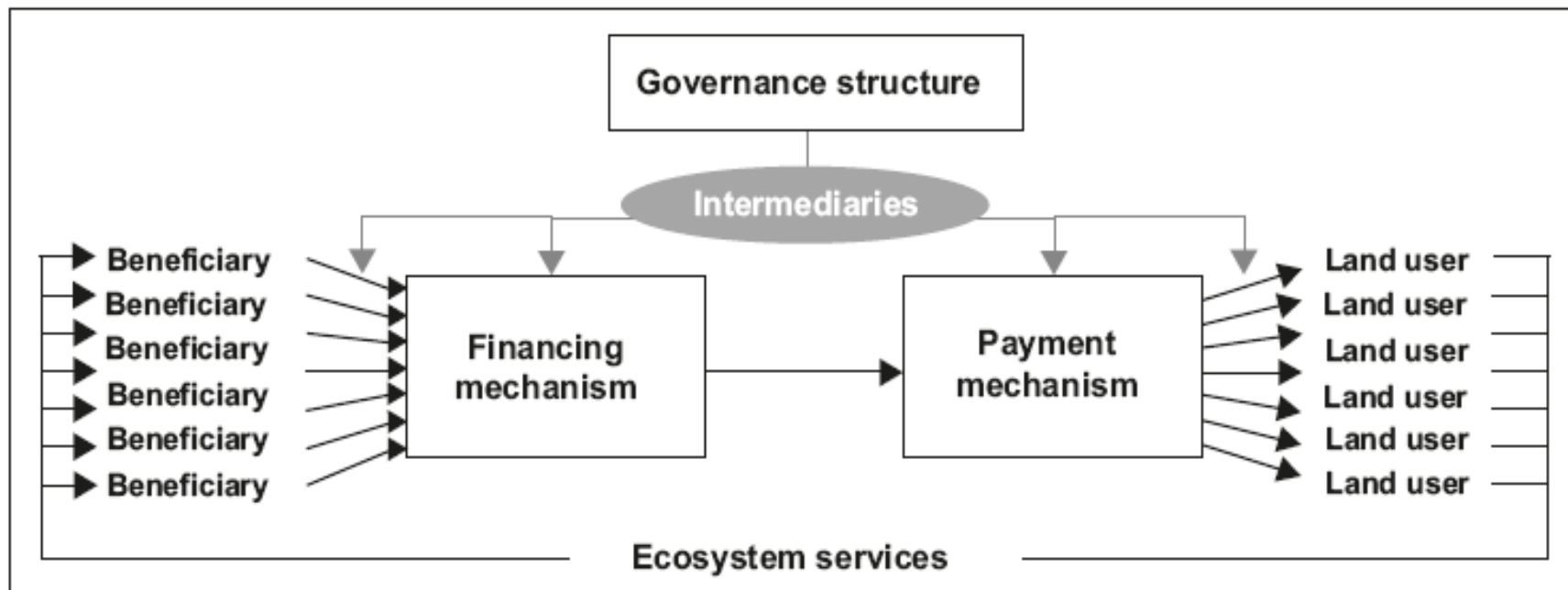
Environmental
Economics

Environmental
Finance

Environmental Finance: Financing Environmentally Responsive Projects / Activities

Environmental Finance is the use of various financial instruments (most notably land trusts and Emissions trading) to protect the environment. The field is part of both environmental economics and the conservation movement.

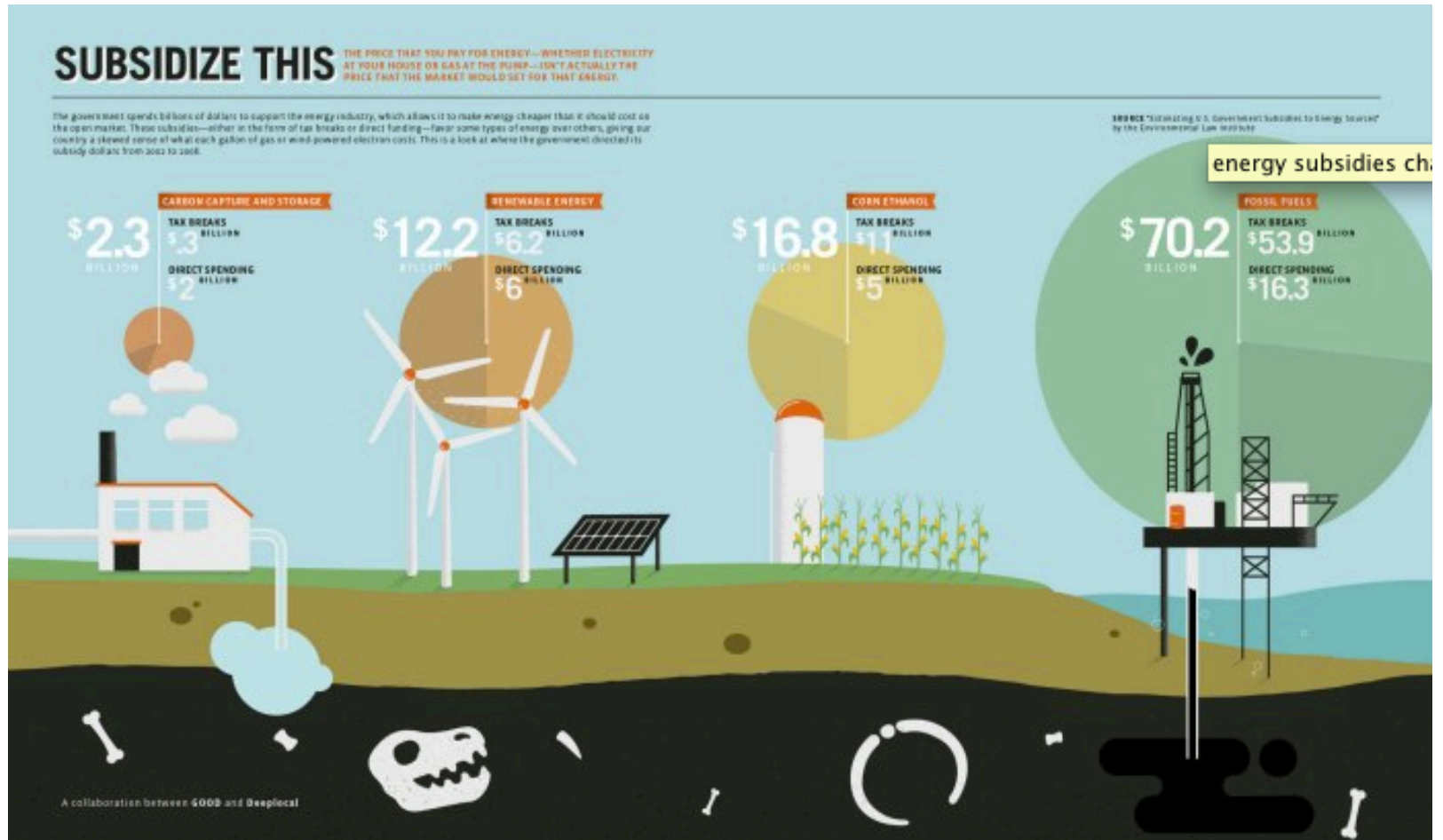




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Subsidies; Taxes and charges;• Performance bonds and deposit-refund schemes;• Tradable permits and rights,

Subsidies



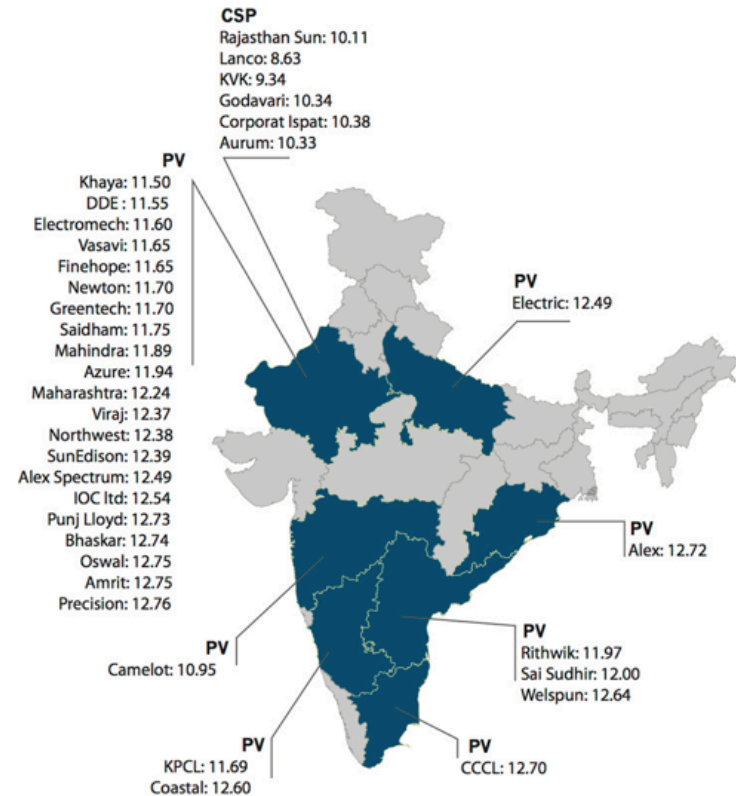
Subsidy India Biogas

The pattern of Central Financial Assistance under National Biogas and Manure Management Programme

w.e.f. 1st November 2009 and for remaining period of 11th Plan.

Sl. No.	Items for Central Financial Assistance(CFA)	Family type Biogas Plants under CDM		Family type Biogas plants under NBMMP**	
		1 cum	2-4 cum	1 cum	2-4 cum
A. Central Financial Assistance to beneficiaries of Biogas Plant (in Rs. per plant)					
1.	NER States, Sikkim (except plain areas of Assam)	11,700	11,700	14,700	14,700
2.	Plain areas of Assam	9,000	9,000	9,000	10,000
3.	Jammu & Kashmir, Himachal Pradesh, Uttrakhand, Niligiri of Tamil Nadu, Sadar Kurseong & Kalimpong Sub-Divisions of Darjeeling, Sunderbans (W.B.)	3,500	4,500	4,000	10,000

GBI Subsidy India Solar



Median Bid PV:
INR 12.00

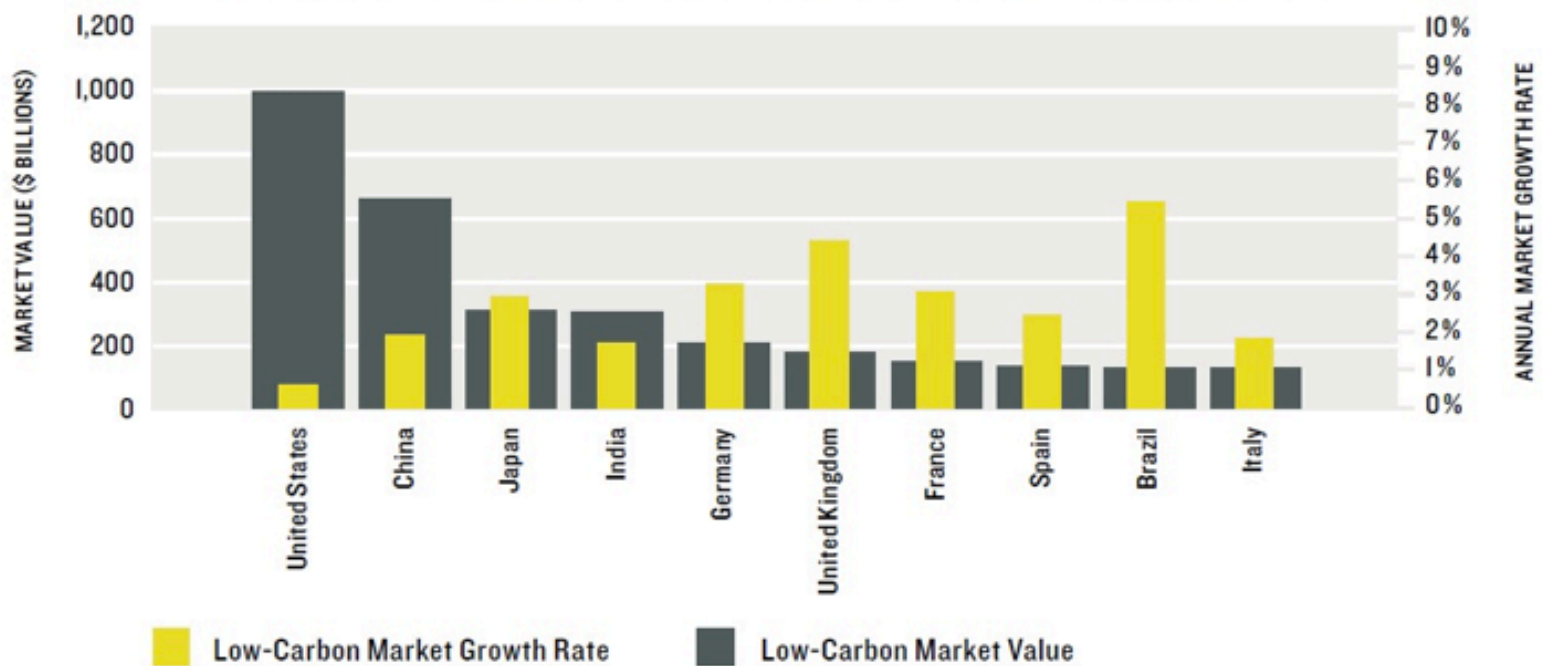
Median Bid CSP:
INR 9.50

Sunday, 2 December 2012

Solar Power - 30% Subsidy in India

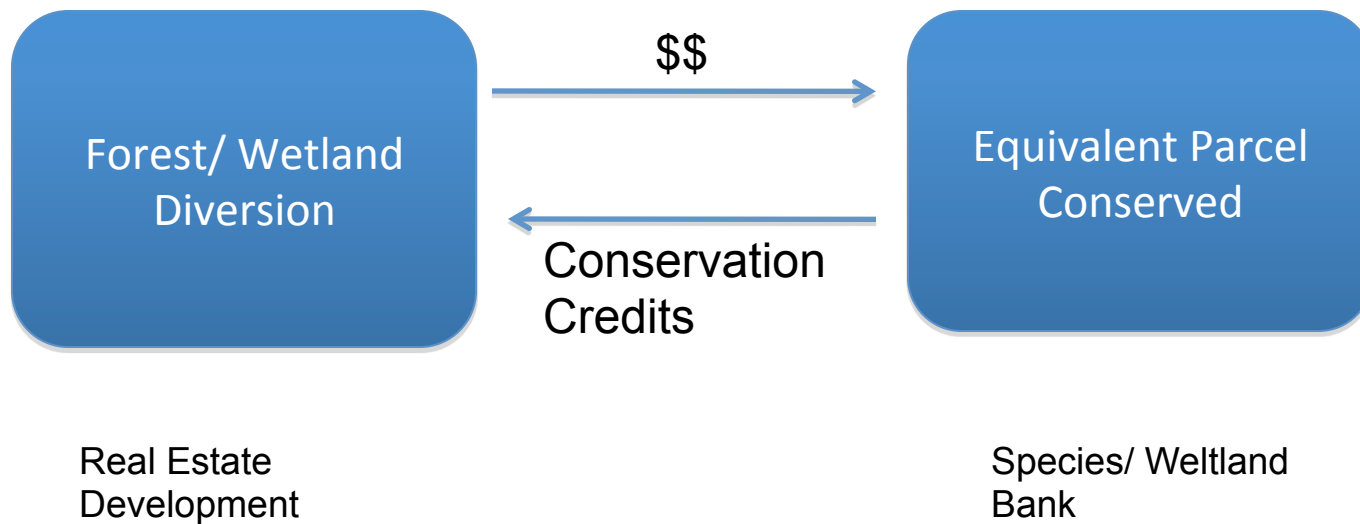
Photo Voltaic Solar Power - although considered quite expensive is actually becoming practical and viable with falling prices in cost of generation. This is mainly attributed to the significant cost in fall of PV Modules - which form a significant component of the project cost. ([More about Photo Voltaics](#))

TOP TEN GLOBAL MARKETS FOR LOW-CARBON GOODS AND SERVICES (2009)



Source: Innovas Solutions Ltd. 2010

Conservation Banking – How?



Current State of Biodiv Markets

Table 5.5 Biodiversity and ecosystem service market opportunities			
Biodiversity and ecosystem service market opportunities	Market size (US\$ per annum)		
	2008 (actual)	2020 (est.)	2050 (est.)
Certified agricultural products (e.g., organic, fair-trade)	\$40 billion (2.5% of global food and beverage market)	\$210 billion	\$900 billion
Certified forest products	\$5 billion of FSC-certified products	\$15 billion	\$50 billion
Forest-based carbon offsets in regulated markets (e.g. CDM, REDD+)	Various pilots (e.g. New South Wales GHG Abatement Scheme): \$0.5 million	\$5 billion	\$5 billion
Forest-based carbon offsets in voluntary markets (e.g. VCS)	\$21 million in 2006	\$5 billion	\$5 billion
Payments for ecosystem services mediated by government	\$3 billion	\$7 billion	\$15 billion
Government payments for water-related ecosystem services	\$5.2 billion	\$6 billion	\$20 billion
Voluntary payments for watershed management	Various pilots such as in Costa Rica, Ecuador, etc: \$5 million	\$2 billion	\$10 billion
Biodiversity offsets in regulated markets (e.g. US wetland banking)	\$3.4 billion	\$10 billion	\$20 billion
Voluntary biodiversity offsets	\$17 million	\$100 million	\$400 million
Bio-prospecting agreements	\$30 million	\$100 million	\$500 million
Land trusts, easements and other fiscal incentives for conservation (e.g. TNC programmes in North America and Australia)	\$8 billion in U.S. alone	\$20 billion	Difficult to predict

Adapted from: http://modemcms.ecosystemmarketplace.com/repository/modemcms_documents/PES_MATRIX_06-16-08_oriented.1.pdf

Biodiversity Markets

Regional Payments

North America	\$1.4-\$2.5 billion
Central and South America	\$2.65 million
Africa	Unknown
Europe	Unknown
Asia	>\$390 million
Australia/New Zealand	\$1.3 million
Total known REGIONAL PAYMENTS per annum	US\$1.8 - \$2.9 billion

Active Programs

North America	14
Central and South America	5
Africa	0
Europe	4
Asia	4
Australia/New Zealand	12
Total ACTIVE Programs	39

Green Bonds

IFC Green Bonds support climate-related investments across the globe

The IFC Green Bond program supports one of IFC's strategic priorities to develop and promote innovative financial products that attract greater investments to climate-related projects. To date, IFC medium term Green Bonds have raised \$1.2 billion. The proceeds of the bonds are set aside in a separate account for investing exclusively in renewable energy, energy efficient, and other climate-friendly projects in developing countries. The most recent transaction in April 2012, raised \$500 million. In our fiscal year ending J invested \$1.6 billion in transactions.



Korean Exp-Imp Bank \$500m Green Bond: way-oversubscribed, 95bps over UST. Bingo & bravo!

Posted on 22. Feb, 2013 by [Sean Kidney](#) in [blog](#)

As reported yesterday, the [Export-Import Bank of Korea \(Kexim\)](#) has issued its first "green" or climate friendly bond – \$500m in size, 5 year tenor, coupon 1.75%. This is the first benchmark-sized bond marketed as a green bond outside the multi-lateral development banks. A big step forward and a big contribution from [Korea, the standard-bearer of Green Growth Government](#).

ENERGY EFFICIENCY FOR LEADING INDIAN PAPER MILL

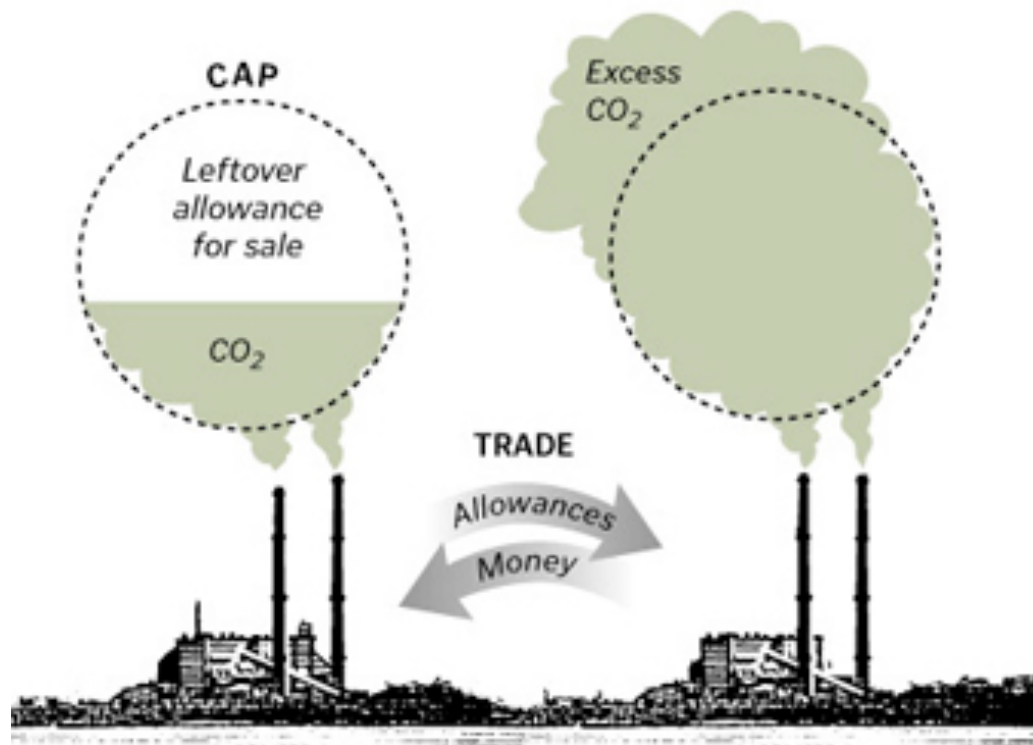


JK Paper Ltd., operates two paper plants in India with a combined capacity of 185,000 tons per year.

IFC assisted JK Paper with a resource efficiency assessment which identified annual savings of 15.6 gigawatt-hours of electricity, 3,336 metric tons of coal and 3,427,350 kilolitres of water - representing \$1.86 million p.a. IFC, through a special fast-track



Cap and Trade



Carbon Markets

	2010		2011	
	Volume (MtCO ₂ e)	Value (US\$ million)	Volume (MtCO ₂ e)	Value (US\$ million)
Allowances market				
EUA	6,789	133,598	7,853	147,848
AAU	62	626	47	318
RMU	-	-	4	12
NZU	7	101	27	351
RGGI	210	458	120	249
CCA	-	-	4	63
Others	94	151	26	40
Subtotal	7,162	134,935	8,081	148,881
Spot & Secondary offset market				
sCER	1,260	20,453	1,734	22,333
sERU	6	94	76	780
Others	10	90	12	137
Subtotal	1,275	20,637	1,822	23,250
Forward (primary) project-based transactions				
pCER pre-2013	124	1,458	91	990
pCER post-2012	100	1,217	173	1,990
pERU	41	530	28	339
Voluntary market	69	414	87	569
Subtotal	334	3,620	378	3,889
TOTAL	8,772	159,191	10,281	176,020

Fragmentation of Carbon Emission Reduction Schemes



In 2006, California passed Assembly Bill-32 which requires the California Air Resources Board (CARB) to reduce greenhouse gas emissions to 1990 levels by 2020.

It is often referred to as requiring a 25% reduction.

Kyoto Protocol

Splits the world into two categories; Annex I (With Binding Targets) and Non Annex I (Developing Countries, No Binding targets).

Binding Targets for reduction in Global Emissions

Flexibility Mechanisms:

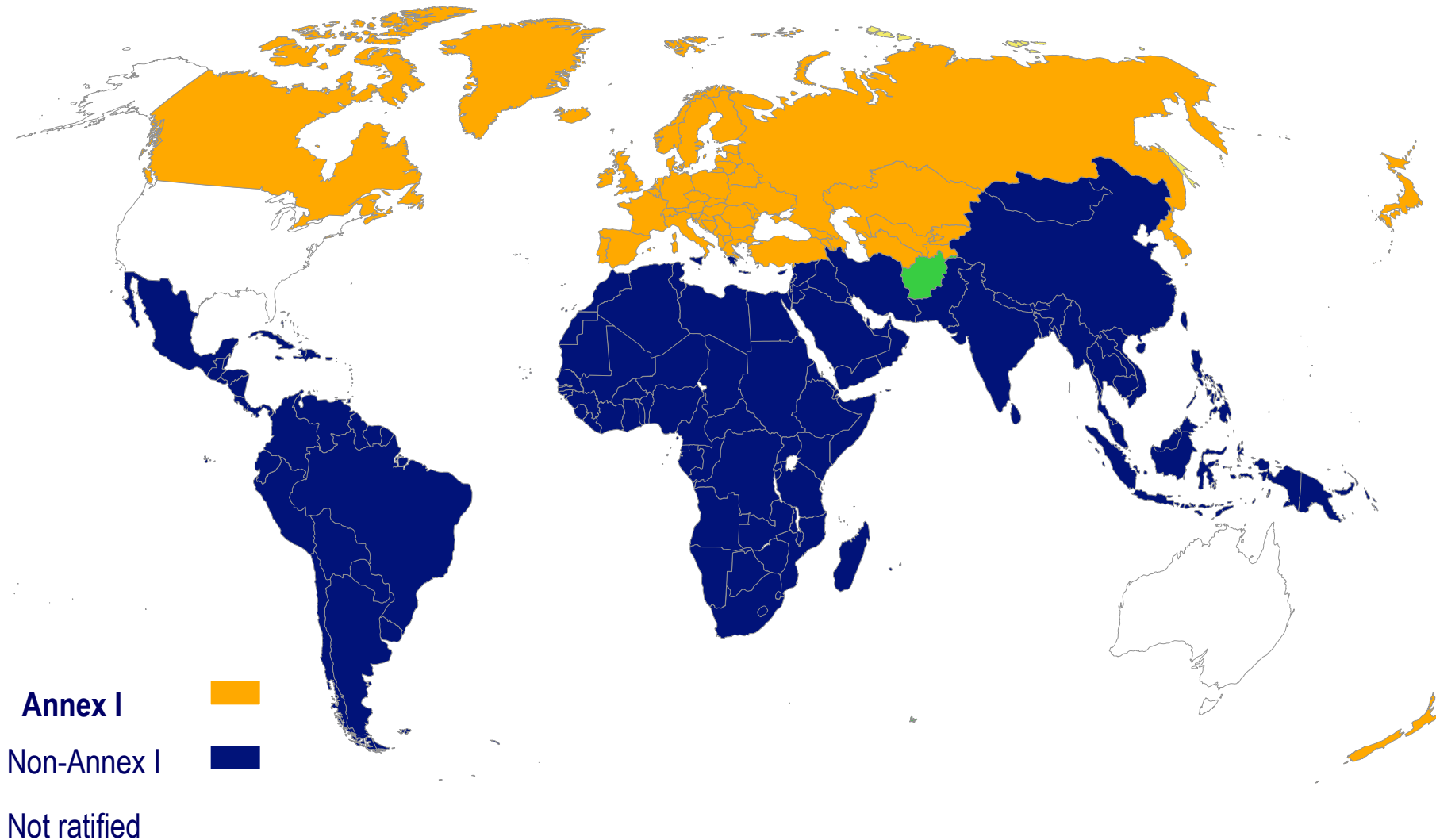
Emission Trading

Joint Implementation

Clean Development Mechanism

Emission reductions average 5% below 1990 levels

Kyoto Protocol

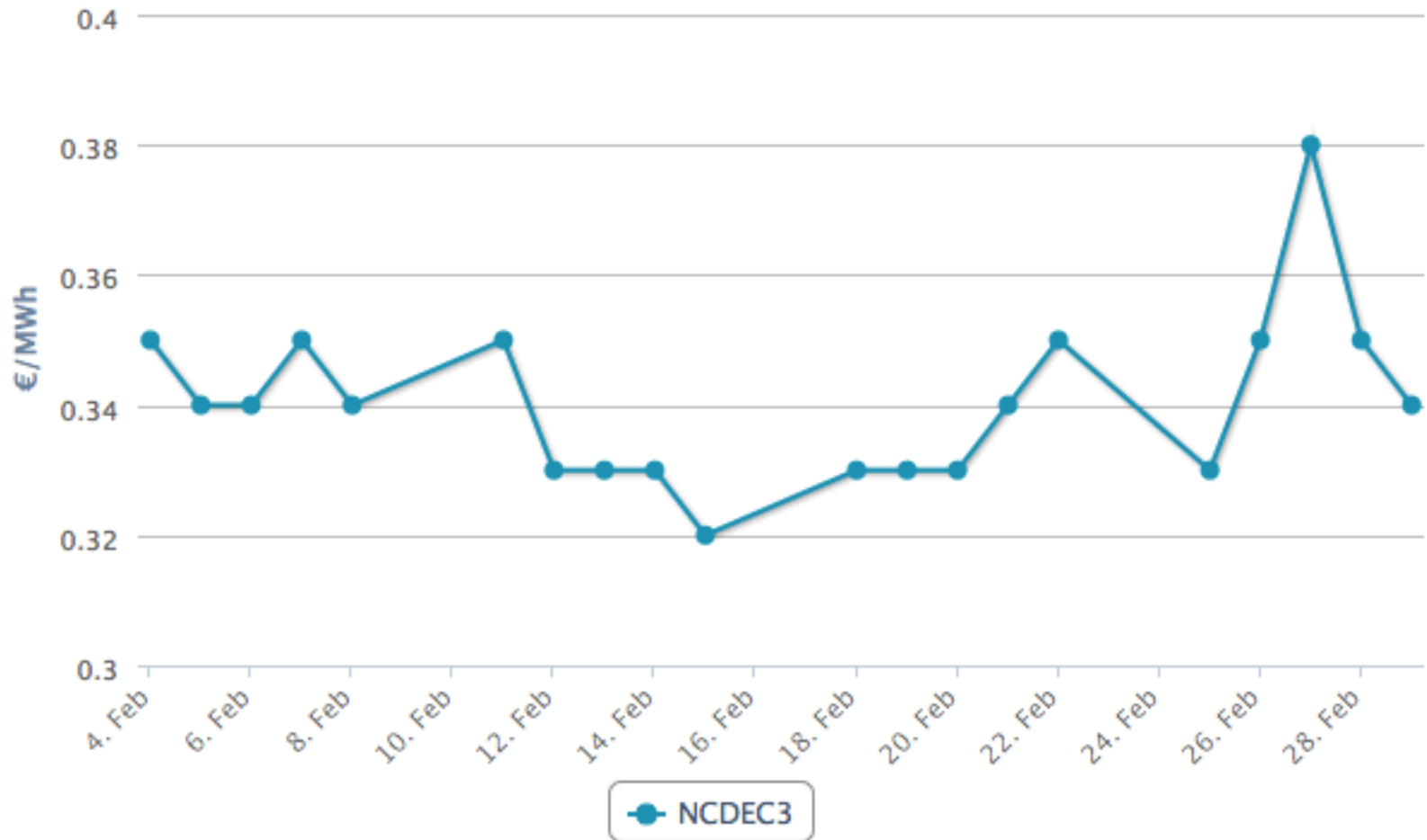


Carbon Market Instruments

EUAs: European Union Allowances

- European Union Emission Trading System
- A Cap and trade system
- Europe's Adaptation of the Emission Trading Scheme under the Kyoto Protocol
- By Volume and value the largest Carbon Market till date
- The primary Carbon Instrument is called the **EUA** – The basic currency of the carbon market at the moment
- The UNFCCC Targets are distributed amongst European Nations and then amongst Corporations vide National Allocation Plans

Carbon CER



Carbon link to other markets



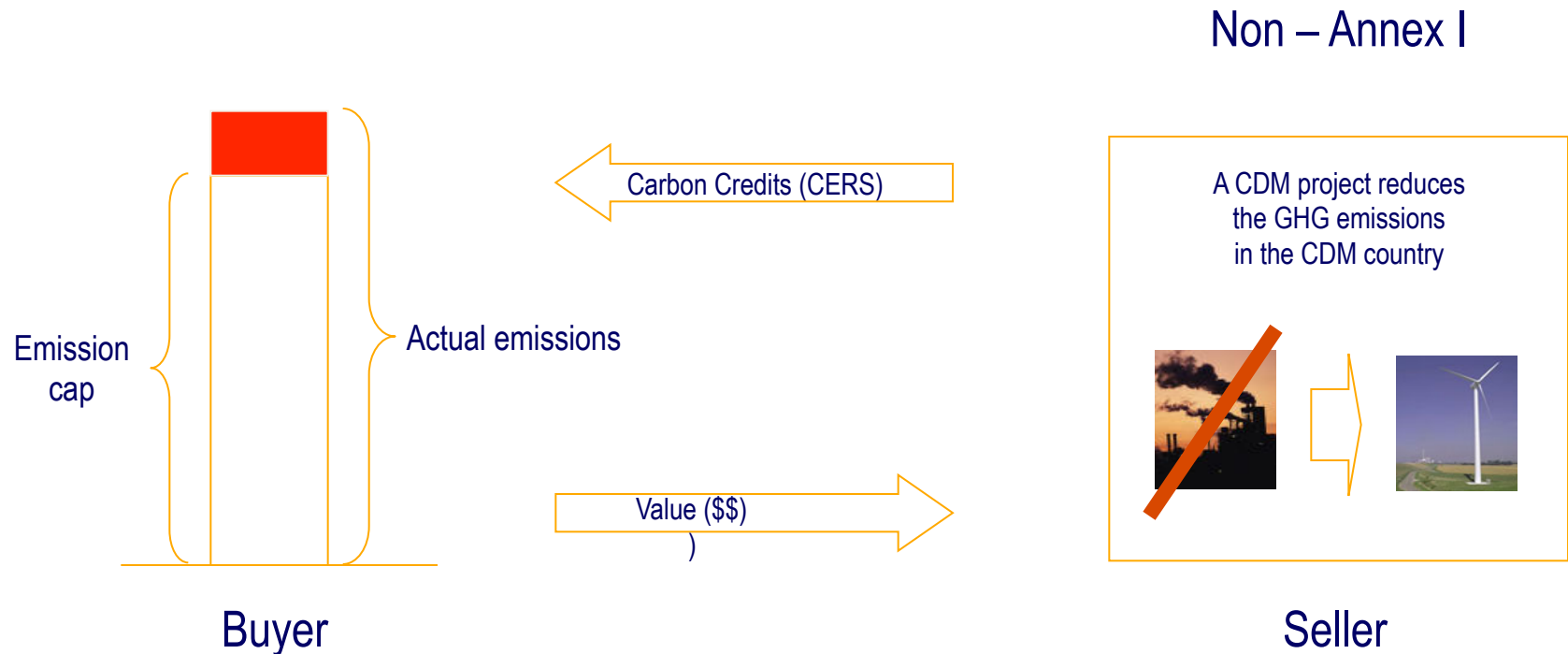
Carbon Market Instruments

- CERs: Certified Emission Reductions
 - Clean Development Mechanism
 - Project based mechanism
 - Leading to least cost of mitigation
 - Technology transfer

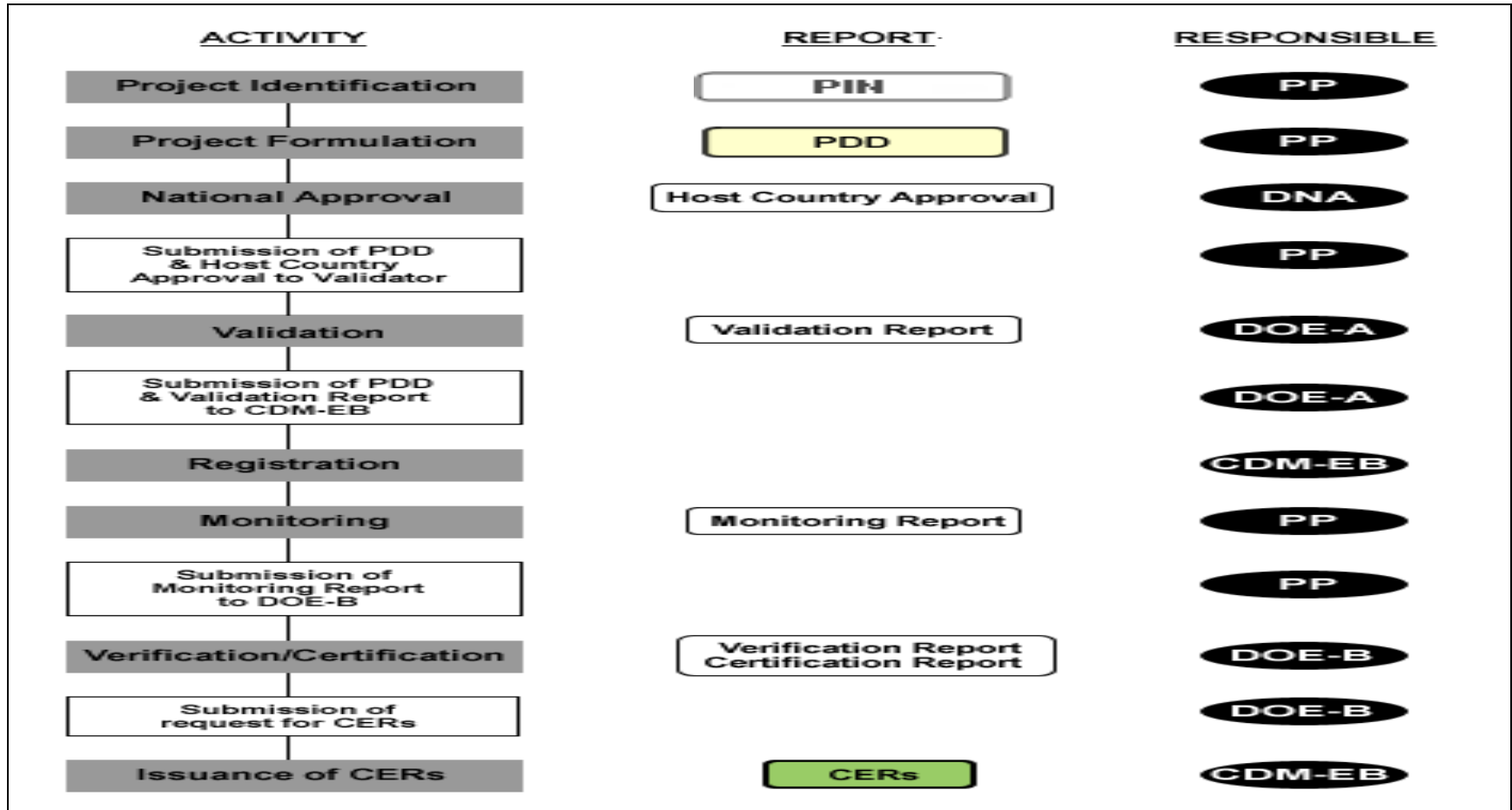
Clean Development Mechanism

CDM Continued

The reduced GHGs in a Non-Annex I countries can be sold to an Annex I country



CDM Process



CDM Financing



20 MW Run of River Hydro

Produces 7,00,80,000 Units of Power

56,064 CERs per annum

Annual Income of : Eur 672,768

IRR without carbon 16%

IRR with carbon 18%

CDM Financing



5 MW Solar Power Plant

Produces 1,05,12,000 Units of Power

8,409 CERs per annum

Annual Income of : Eur 100,915

IRR without carbon 14%

IRR with carbon 16%

THE INTENSIVE "WHO CARES?" UNIT

PROUDLY PRESENTS:

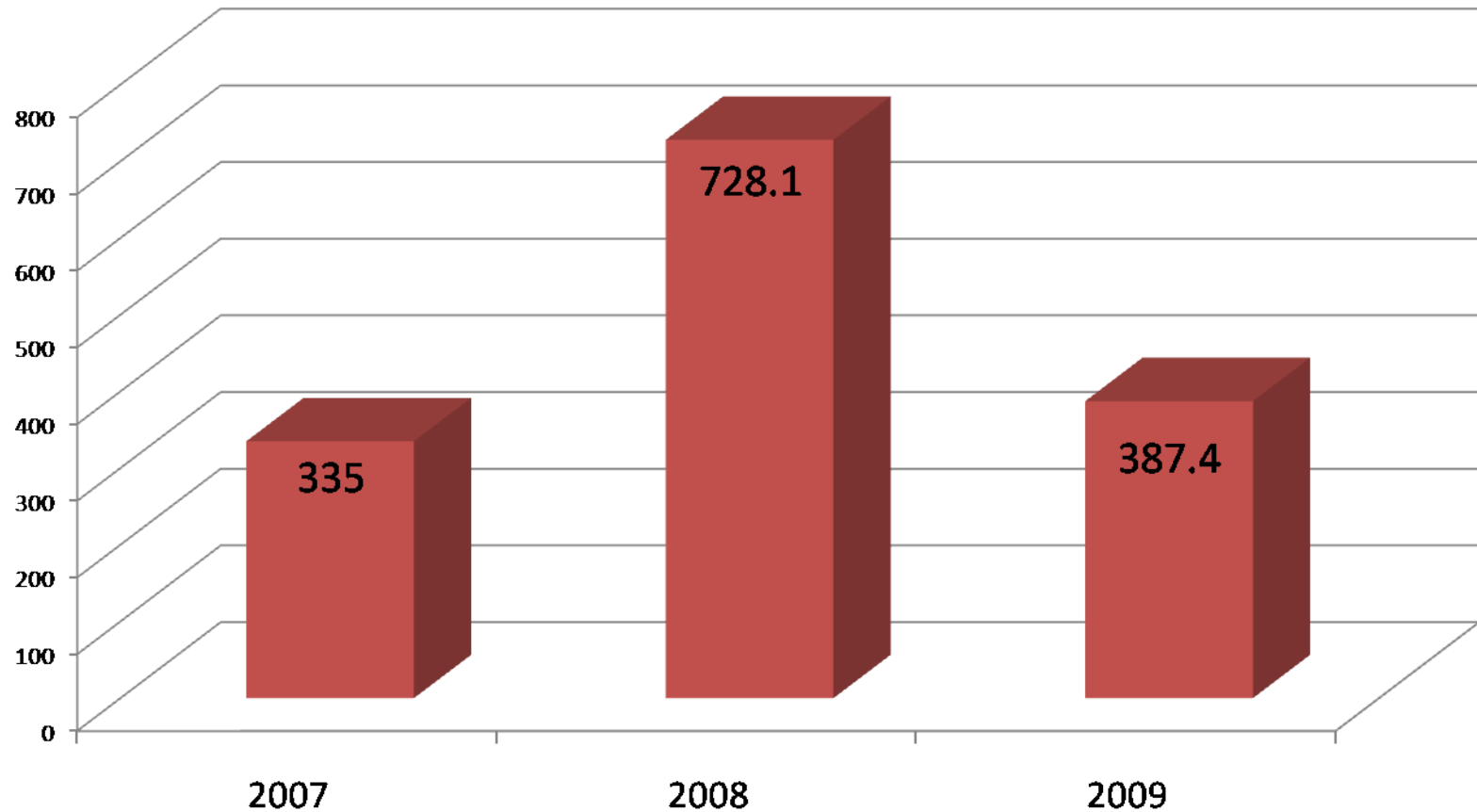
Save the Kyoto Protocol!



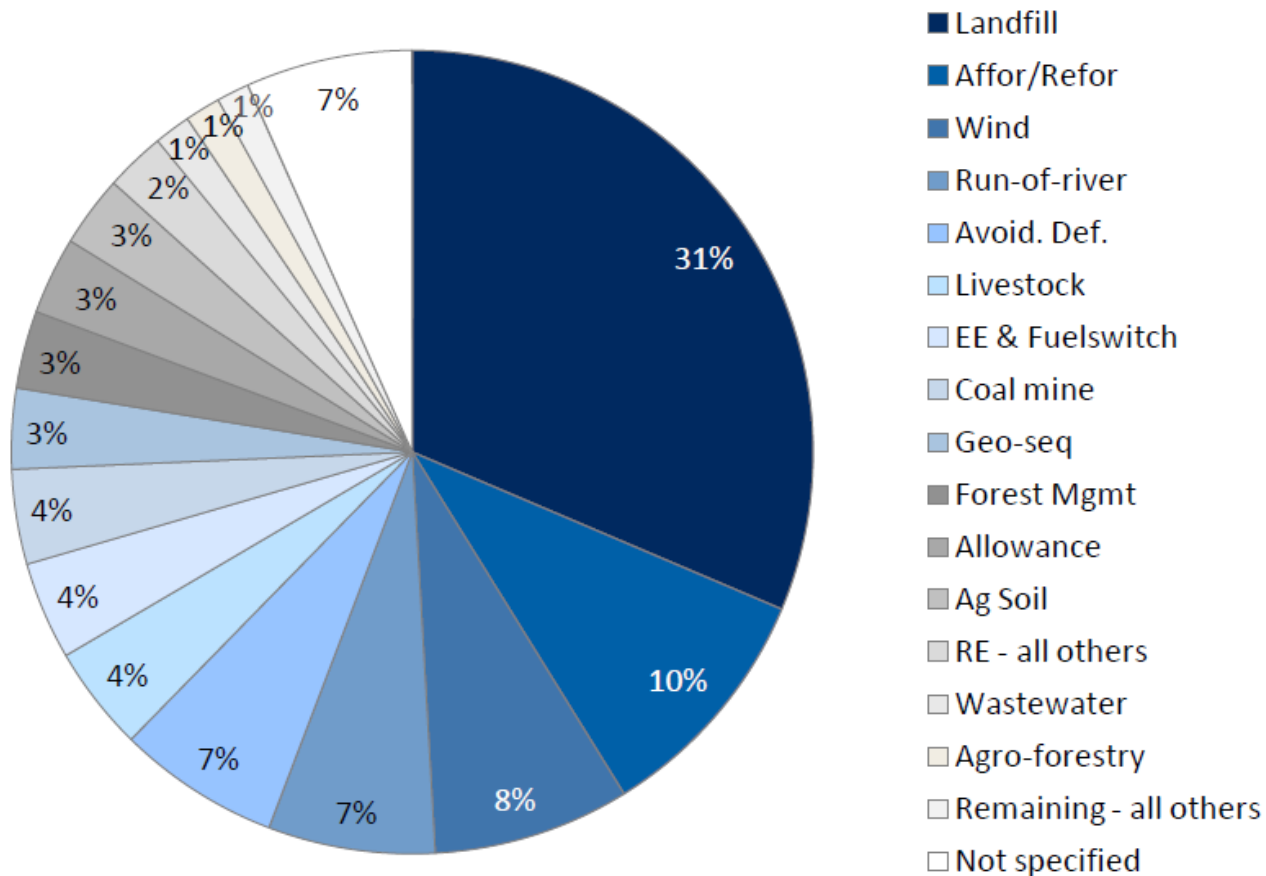


Voluntary Carbon Markets

(USD Millions)



Sectoral Breakup: 2010



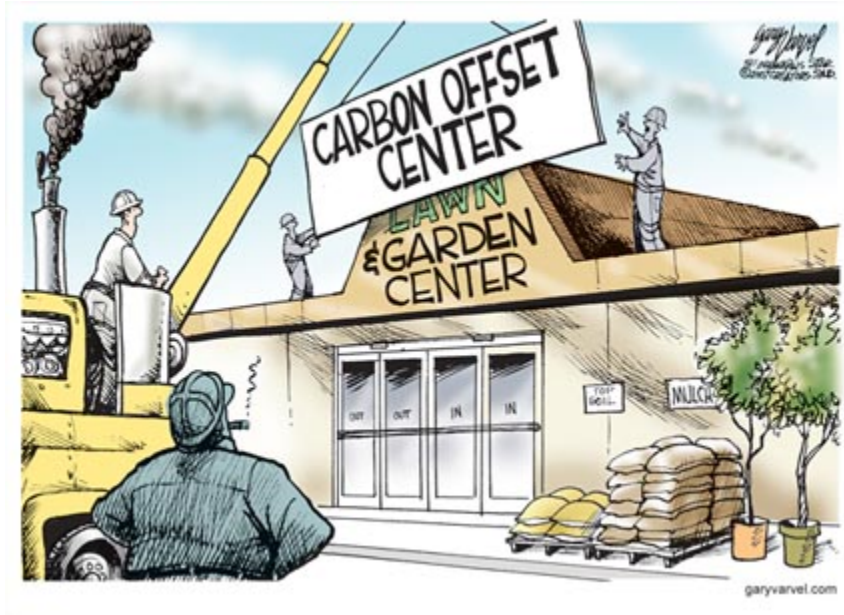
Source: State of Voluntary Carbon Markets 2010

Advantages: VCMs

- Lower transaction costs as compared to Regulatory Markets
- Can support much smaller projects
- Price of credits reflects
 - Quality of projects
 - Premium for additional Community and Environmental benefits delivered by projects
- Deliver a low cost option to move towards compliance markets
- The lower price can enable individual compliance

Disadvantages VCMs

- Are known to be less stringent on additionality than regulatory markets -> reward activities which are business as usual
- Known to have less stringent monitoring -> reward unreal emission reductions



Voluntary Standards

VCS

1. Single largest Voluntary market standard
2. Verified projects mounted on Registries
3. Includes Forestry

CCX

1. Exchange traded standard
2. Was the largest in the US till recently
3. Includes Forestry

The Gold Standard

1. Premium for high social, environmental quotient
2. Forestry not included

VER+

1. Standard promoted by TUV
2. Standard almost non existent now

Forestry and VCMs

- Forestry projects fall under the AFOLU category and are eligible to be awarded with VCUs under several systems:
 - VCS
 - Plan Vivo
 - Several standalone standards
- A number of voluntary A/R and AD projects have taken place across the world
- A huge pipeline building of Voluntary REDD+ activities

“Whatever I dig out from you, O Earth! May that
have quick regeneration again; may we not
damage thy vital habitat and heart”

Atharva Veda (12.1.35)

“O Earth! Pleasant be thy hills, snow-clad
mountains and forests; O numerous coloured,
firm and protected Earth! On this earth I stand,
undefeated, unslain, unhurt.”

Atharva Veda (12.1.11)

Voluntary REDD+ “Kick started”

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TOP STORY



Kenyan Carbon Project Earns First-Ever Voluntary REDD Credits

Shockingly, no formal voluntary carbon standard has verified carbon credits from projects that reduce greenhouse gas emissions from deforestation and forest degradation (REDD) -- until now. Here's a look at the first official REDD project recognized by a formal voluntary carbon standard, and what it means for the future of carbon finance -- both compliance and voluntary. [[Go To Article](#)]

COUNTRY	PROJECT	VOLUME	VINTAGES	CERTIFICATION	CCY	BUY	SELL
Kenya	REDD	1 Mln	2010-15	VCS+CCBA	USD	4.00 / 5.50	
Brazil	Biomass	30,000	2008-10	Pure VCS	EUR	3.50 / 5.00	
India	Small Hydro	32,000	2008-10	Pre-CDM VCS	USD	2.00 / 2.50	
Ghana	Cookstoves	40,000	2008-09	Gold Standard	EUR	8.00 / 10.00	
India	Wind	85,000	2008-09	Pure VCS	USD	2.25 / 2.75	
Turkey	LFG	100,000	2009-10	Gold Standard	EUR	6.00 / 7.00	
Borneo	REDD	30,000	2010	CCBA+VCS	US\$	#Trades	10.00#
China	Wind	25,000	2009-10	Pre-CDM VCS	US\$	#Trades	2.65#
Sri Lanka	Biomass	50,000	2006-10	Pure VCS	US\$	#Trades	4.00#

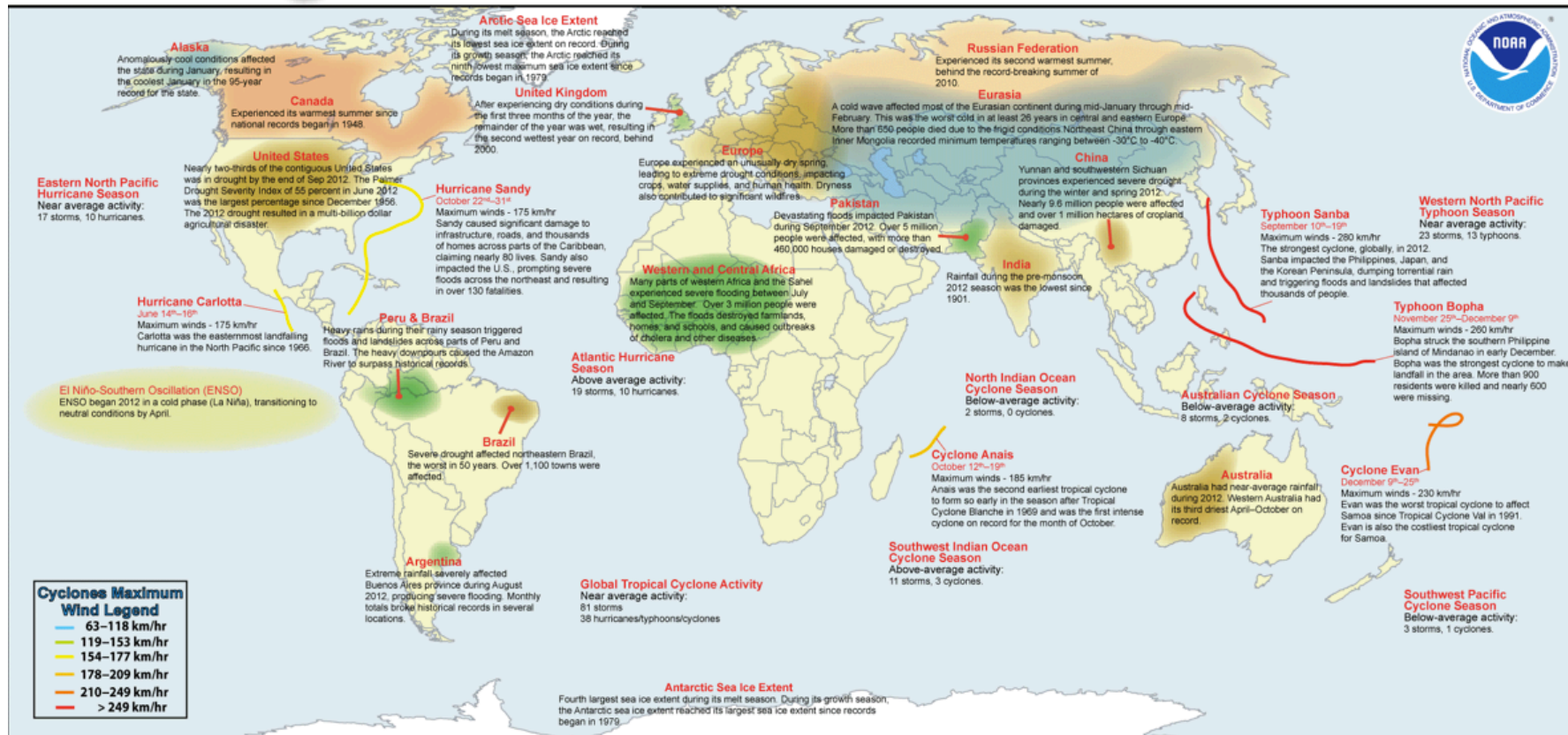
COUNTRY	PROJECT	VOLUME	VINTAGES	CERTIFICATION	CCY	BUY	SELL
India	Wind	80kt	2006-07	Pure VCS	US\$	~Trades	P&C~
Thailand	LFG	100kt	2010	Pre CDM VCS	US\$	3.50 / 4.50	
Turkey	Wind	50kt	2010-11	Gold Standard	EUR	4.75 / 5.25	
Peru	Biomass	20kt	2009	Pure VCS	US\$	~Trades	5.00~
China	Wind	80kt	2009-10	Pre CDM VCS	US\$	~Trades	1.25~
China	WHR	150kt	2008	Pre CDM VCS	US\$	~Trades	1.00~
Kenya	REDD	20kt	2010	VCS+CCBA	US\$	~Trades	P&C~
India	Wind	75kt	2009-10	Pre CDM VCS	US\$	1.00 / 1.25	
E.Africa	Cookstoves	15kt	2010-11	Gold Standard	EUR	~POA~	

Carbon Finance: Forerunner in Global Env. Finance

- Future Cash Flows turned into Present Cash Flows: Upfront Carbon Finance!!!
- Form Part of Central Project Finance.
- Fill in the gaps in Project Finance.
- Classical Case of Environmental Finance for implementing Clean Projects !!!

Climate Insurance

2012 Significant Climate Anomalies and Events

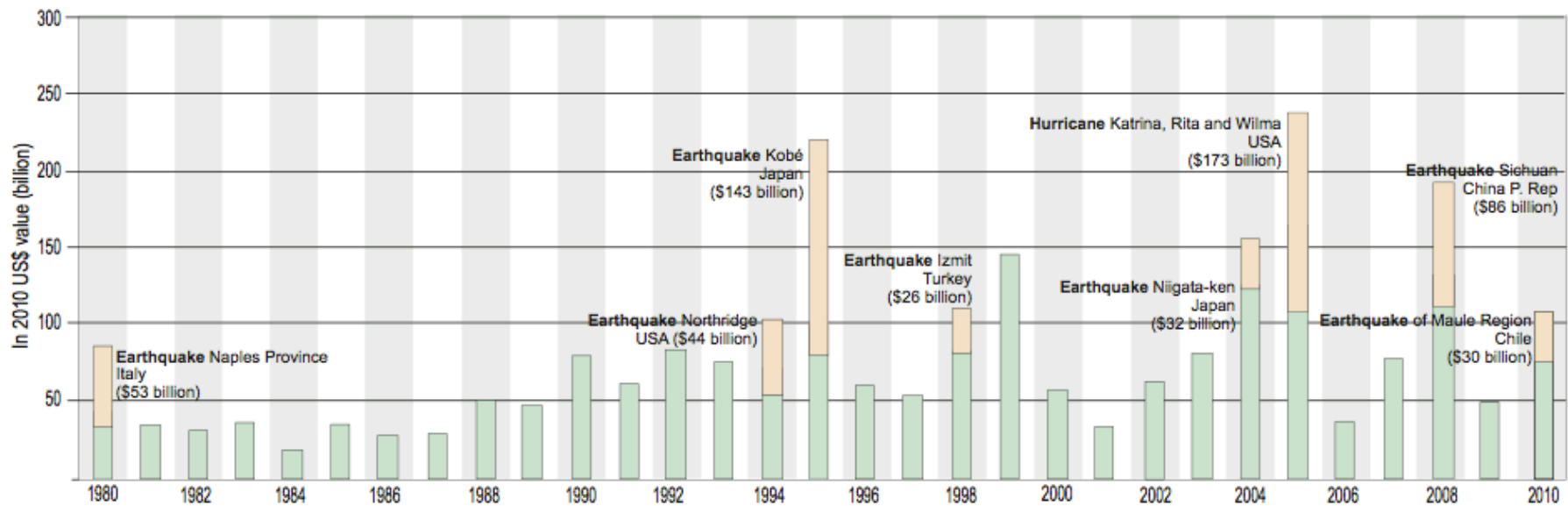


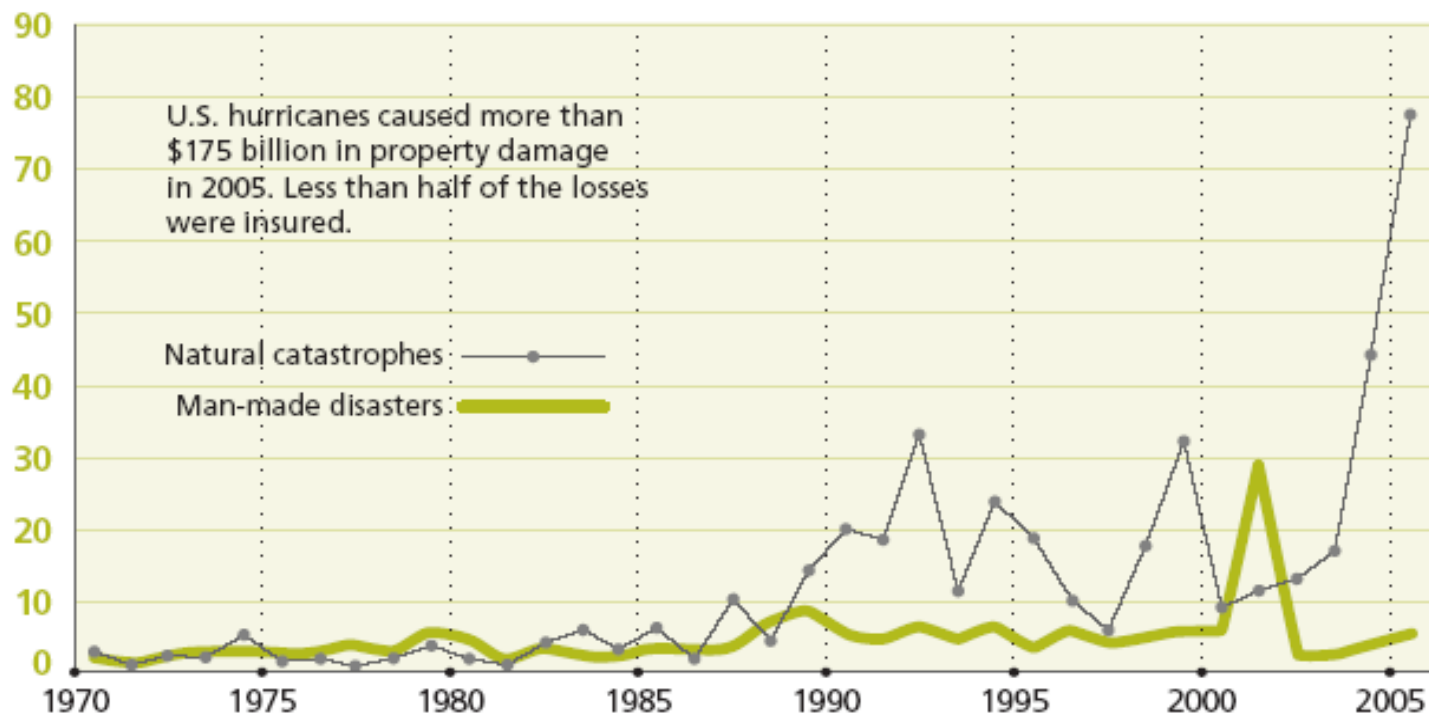
Top 10

Natural disasters by number of deaths⁽²⁾ - 2010

Earthquake, January	Haiti	222 570 ⁽³⁾
Heat wave, June-August	Russia	55 736
Earthquake, April	China, P Rep	2 968
Flood, July-August	Pakistan	1 985
Landslides, August	China, P Rep	1 765
Flood, May-August	China, P Rep	1 691
Earthquake, February	Chile	562
Earthquake, October	Indonesia	530
Cold wave, July-December	Peru	409
Landslides, February-March	Uganda	388

Annual reported economic damages from natural disasters: 1980-2010





Insured Losses 1970–2005

Source: Swiss Re

"We'd be out of our minds if we wrote weather insurance on the opinion global warming would have no effect at all."

-Warren Buffett, May 2006

Climate Insurance

The **Bali Action Plan** called for
“*consideration of risk sharing and
transfer mechanisms, such as
insurance*”

Insurance can be both preventive,
adaptative

Bali action Plan

- Revenues are to be raised through a uniform global levy on CO₂.
- Part of the revenues will be contributed to a Multi Lateral Fund
- Fund to be spent on two themes:
 - Prevention Pillar: Adaptation
 - Insurance Pillar: Climate Impact response; relief

Action Plan

- Prevention measures to reduce climate-related risks, including economic risks, [to human and economic well-being];
- A Climate Insurance Assistance Facility (CIAF) to provide technical support and financial assistance to enable countries to access regional private and public-private insurance systems for middle layers of acute climate-related risks.⁵
- Additional international support for developing countries is provided by
- (c) A Climate Insurance Pool (CIP) to absorb a proportion of high layers of acute climate related risks;
(d) A Chronic Risk Management Facility (CRMF) to plan for and absorb a proportion of chronic climate-related risks (e.g. sea level rise, desertification, etc.).^{6,7}

What's in store?

Developing nations benefit from agreed-upon coverage for high-level losses through a Climate Insurance Pool with premiums paid fully by developed countries through the financial mechanism of the future climate change regime and from assistance for risk-pooling mechanisms that cover residual middle-layer risks (CIAF).

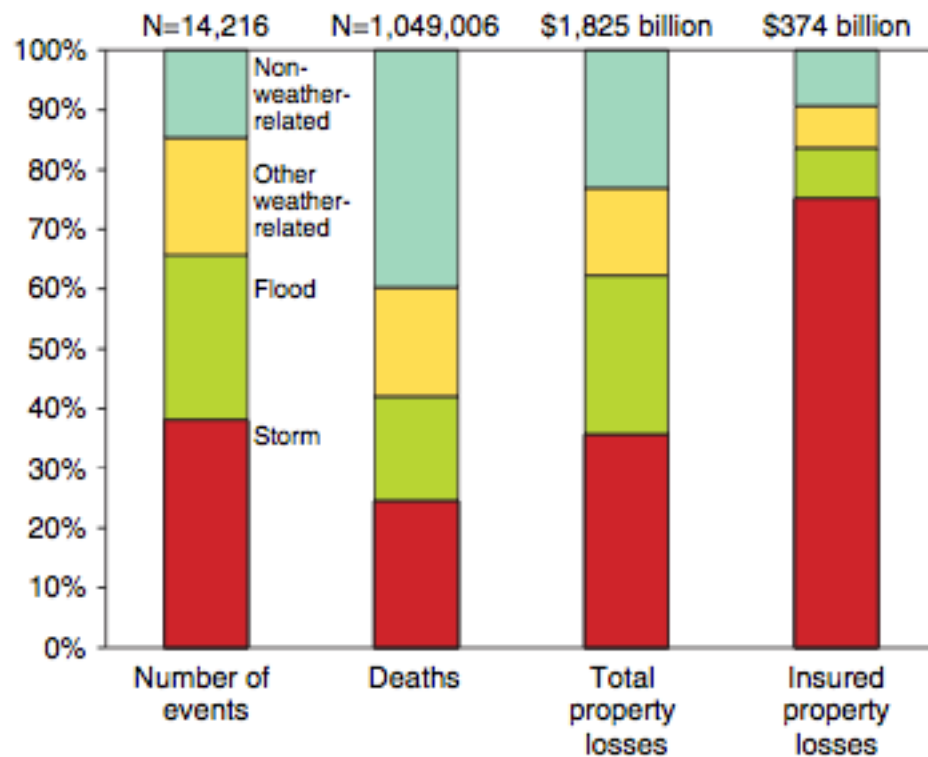


Fig. 1. Global impacts of natural disasters from 1980 to 2004. Insured property losses are dominated by storm events due to risk-selection preferences of insurers and coverage of flood and crop exposures by public entities, and low penetration of earthquake insurance. Economic values are inflation-adjusted to 2004 levels. [Source: Munich Re, NatCatSERVICE]

Industry Response

- World's largest insurance company, AIG, just released a new climate change policy
- World's largest reinsurer, Swiss Re, is heavily engaged in the climate change debate
 - lobbying for US carbon cap (McCain-Lieberman bill)
 - asking questions of D&O clients
 - directly involved in and funds research on science, economic impacts, modeling issues
- World's largest broker, Marsh, is engaging its corporate clients on the need to deal with climate risk, and developing new products/services to help clients manage these risks
 - white paper
 - client call
 - differential pricing on D&O insurance?
- One of the world's largest providers of surplus and specialty lines, Lloyd's, recently issued a strong call to action to the global insurance industry



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ClimateWire: U.S. utility programs result in widely varying levels of energy efficiency

11/10/2011: A study of 50 electric utilities across the United States

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CLIMATE RISK
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BUILDING INDIA

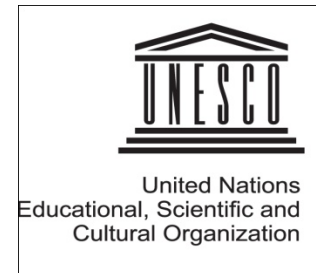


RELIANCE Power
Anil Dhirubhai Ambani Group

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Science & Technology
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VCS | VERIFIED
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