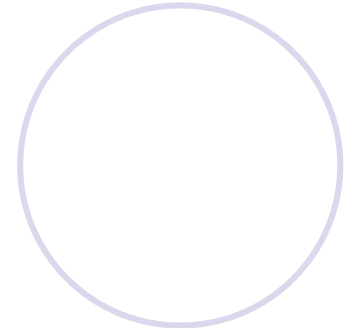
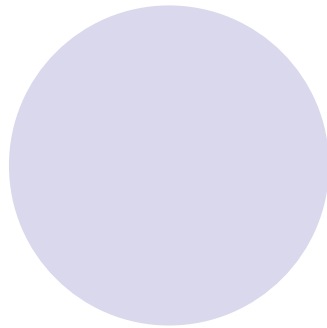
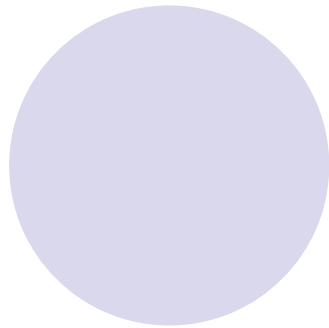


The World Bank and Carbon Finance: The new prospective for developing Municipal Solid Waste project.

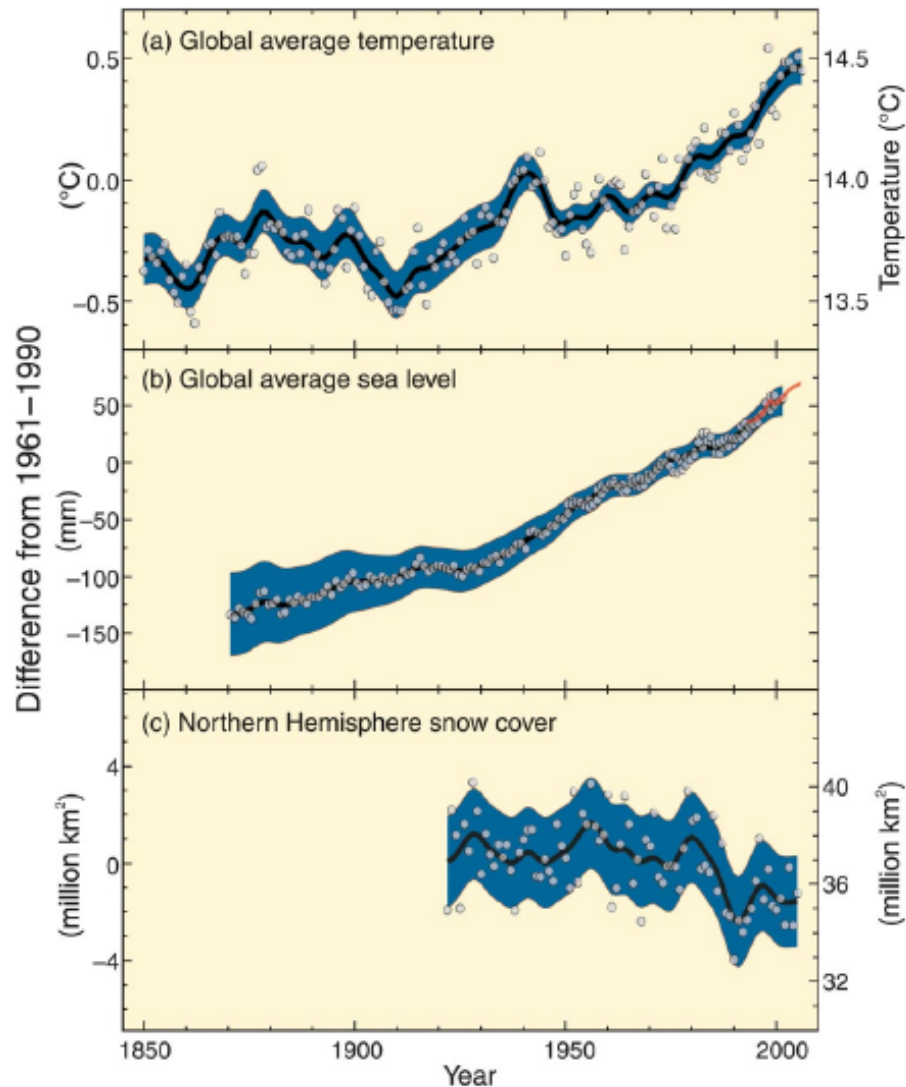
January 24, 2008



1. Climate Change: what we now
know for certain
(IPCC 4th Assessment)



Climate Change is UNEQUIVOCAL



- Extreme weather events have increased
- Temperatures have risen
- Sea levels are rising
- Arctic summer sea ice is likely to disappear in second half of century
- Parts of the world to see increase in the number of heat-waves
- Climate change is likely to lead to increased intensity of tropical storms

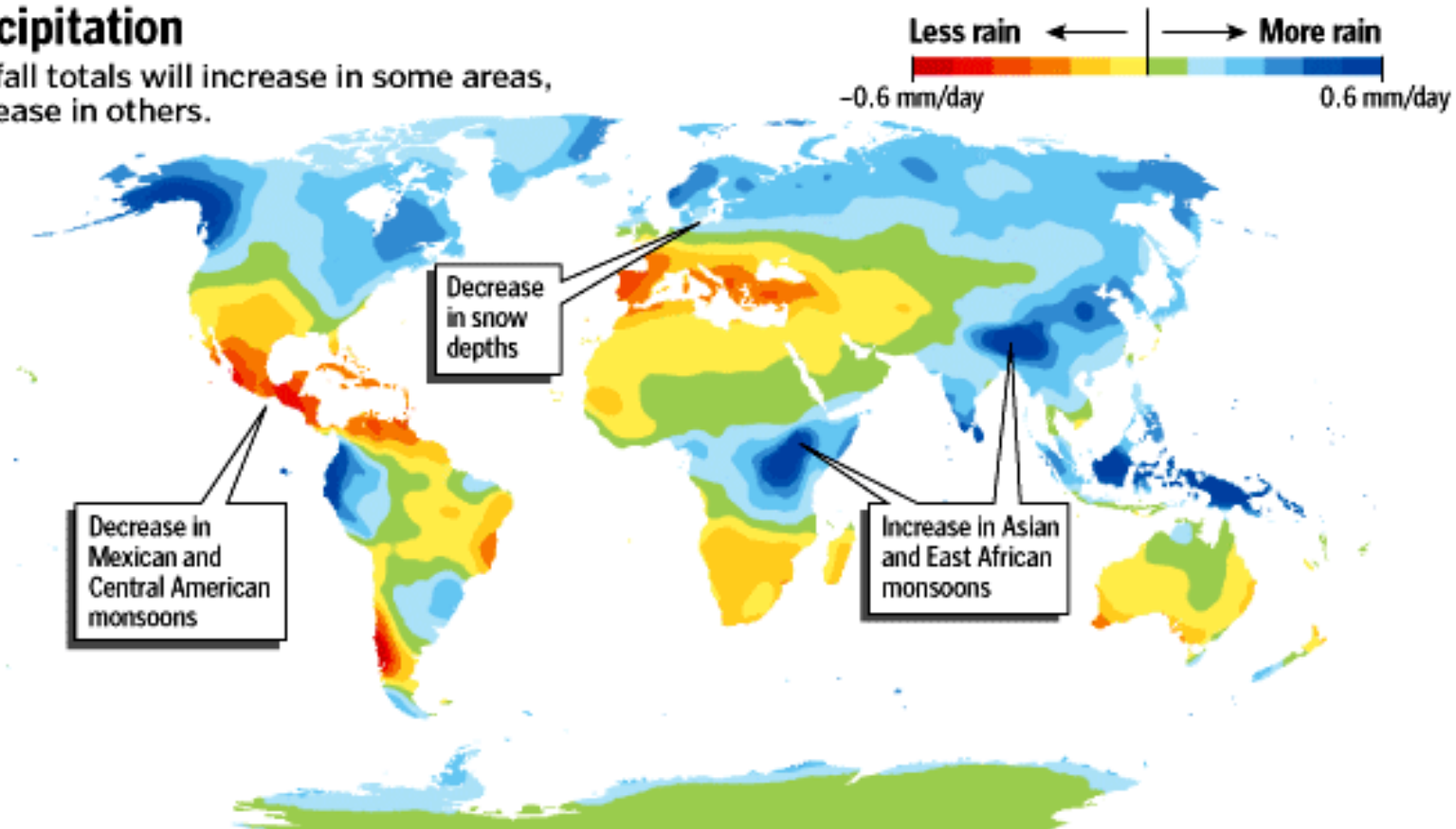
Impacts to be felt IN THIS CENTURY (Washington Post, Aug 20 2007)

I. Changing rainfall patterns...

Climate projections from multiple models for the end of the 21st century* (compared with the end of the 20th century*):

Precipitation

Rainfall totals will increase in some areas,
decrease in others.

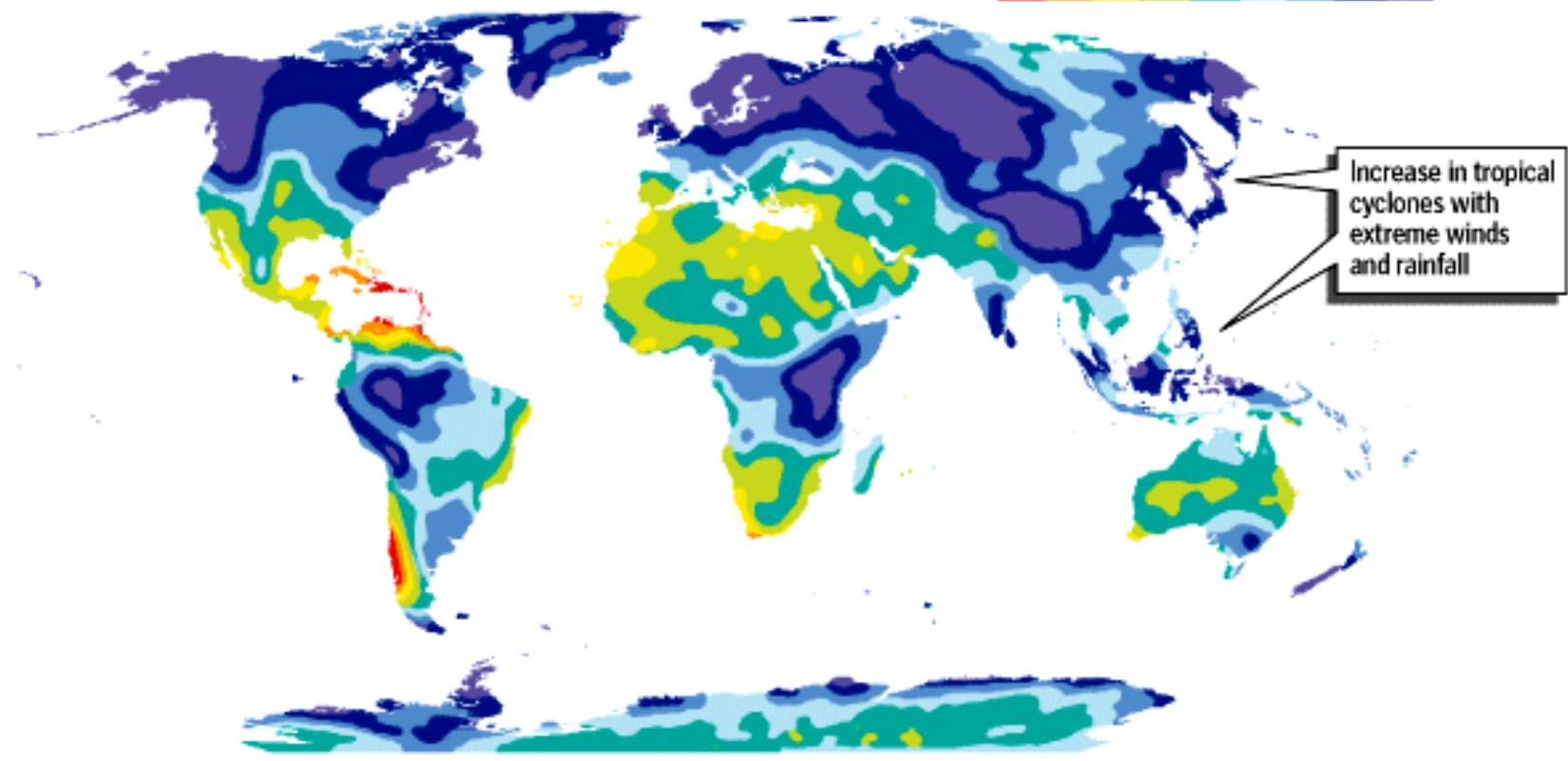


.....means more rain in fewer days
per year.....

Precipitation intensity

Total rainfall becomes concentrated into fewer days.

Less intense ← → More intense

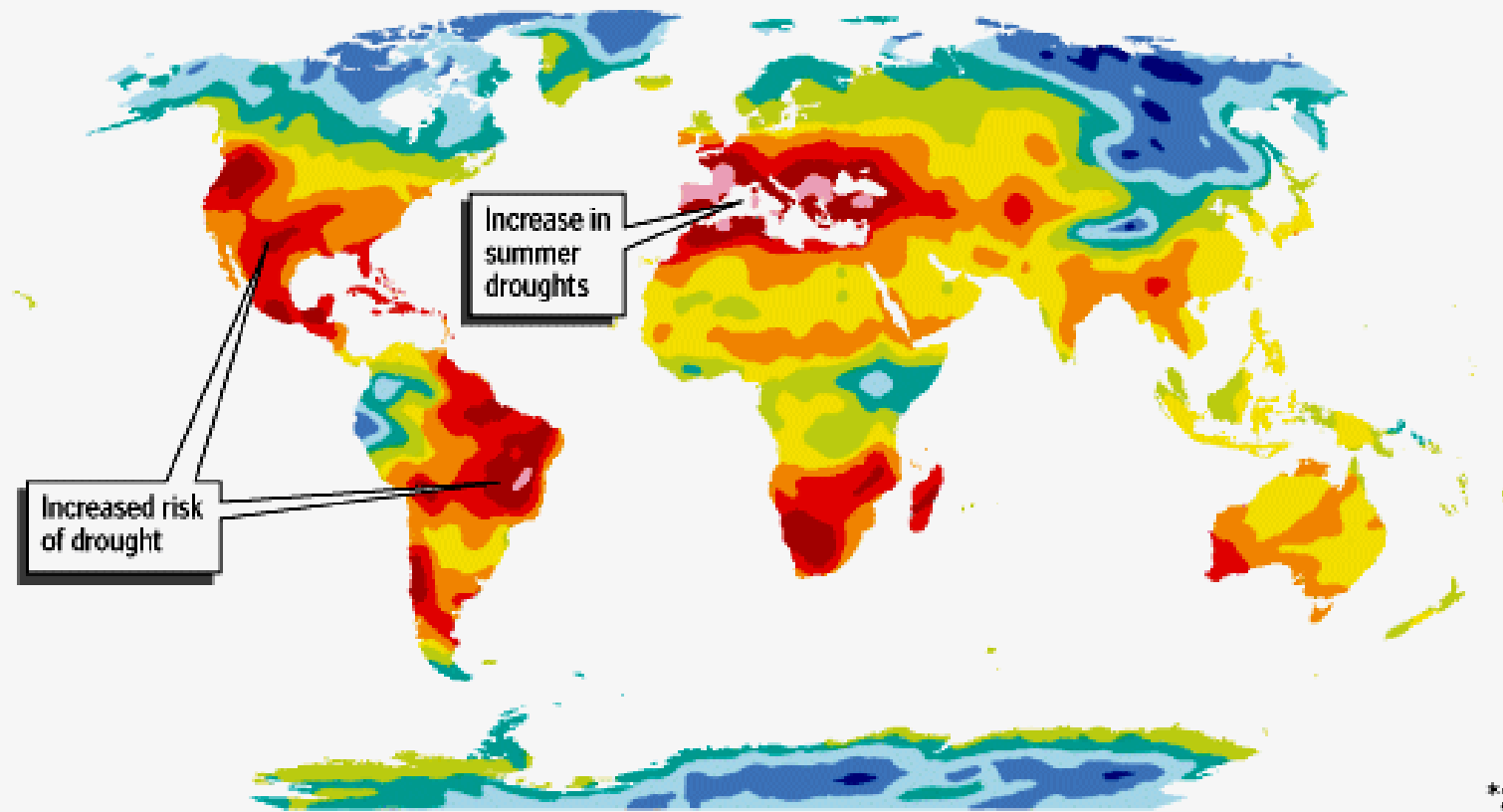


....and will mean too many days without rain.

Dry days

Longer periods without rain.

Fewer dry days ← | → More dry days



*20-year averages

Expected Impacts for Thailand and similar locations

- Rise in temperature
- Precipitation variability
 - Both droughts and floods to increase.
- Large variation in soil moisture, agri. impacts
- Rise in sea levels, subsidence of land
- Increased coastal erosion
- Other climatic changes (e.g. larger cyclones accompanied by higher storm surges)

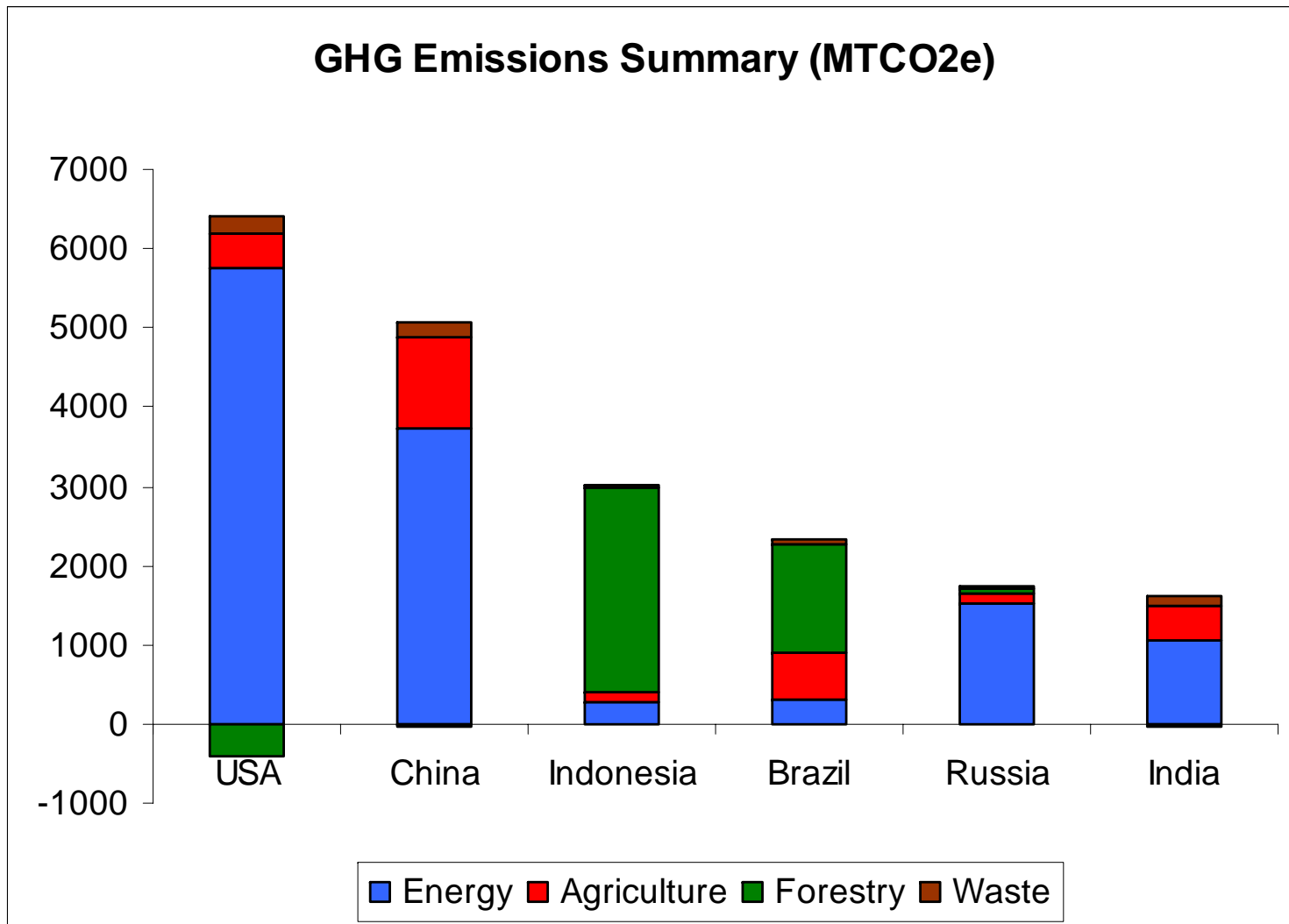
Contributors to Climate Change:

Human activity

- increased emissions of greenhouse gases (GHG):
 - **Carbon dioxide (CO₂): fossil fuel-based energy generation and use...**
 - **Methane (CH₄): landfills, gas flaring, agriculture...**
 - **Nitrous oxide (N₂O): fertilizer, forest to grass land and field, agriculture...**
 - **Specific industrial gases – HFCs, PFCs, SF₆**
 - **Non-Kyoto gases –**
 - CFCs: solvents, foam, fire-resistance, air-conditioning...
 - Other: ozone, water vapor...

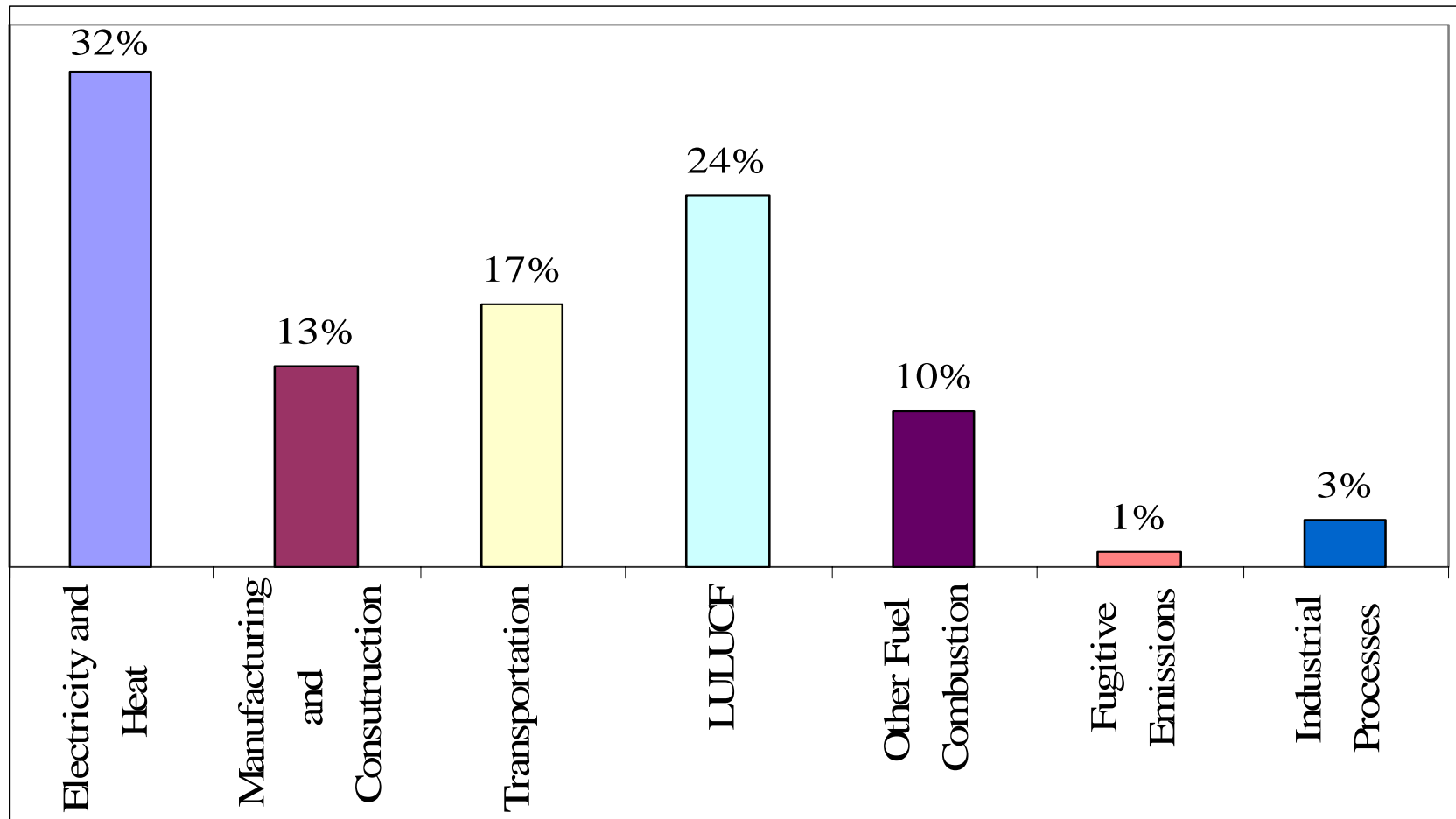
MAIN EMITTERS

Source: World Bank, 2007

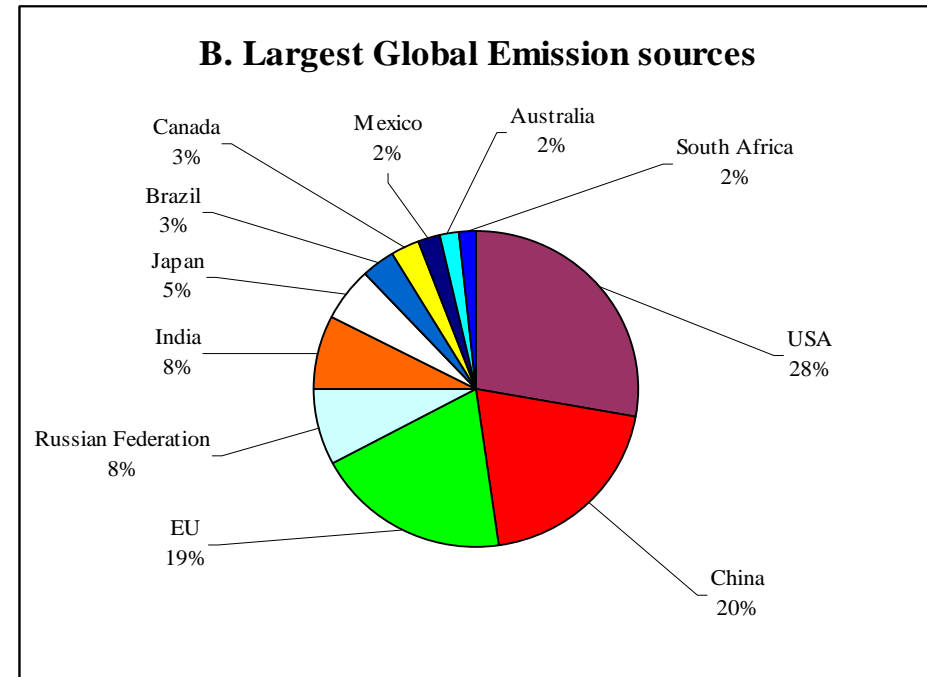
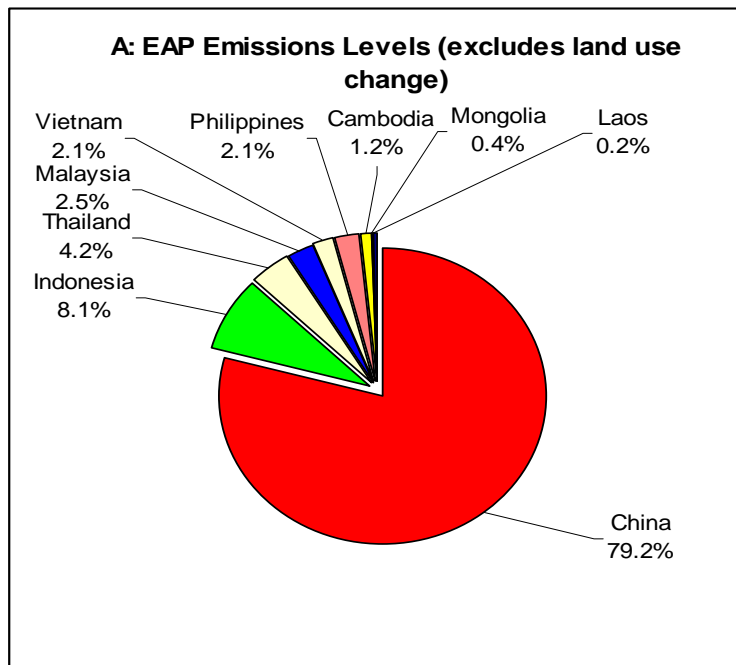


Global CO2 emissions by Sector (2000)

[WRI, CAIT 2006]



Share of Countries and Country Groups in Global GHG Emissions



Source: Climate Analysis Indicators Tool (CAIT) Version 4.0. (World Resources Institute, 2007)

The slide features a decorative arrangement of six circles. Three circles are solid light purple, and three are hollow with a light purple outline. They are arranged in two rows of three. The top row circles are positioned behind the main title text. The bottom row circles are positioned behind the subtitle text.

2. Carbon markets and Carbon Finance

CDM: Old Carbon Markets

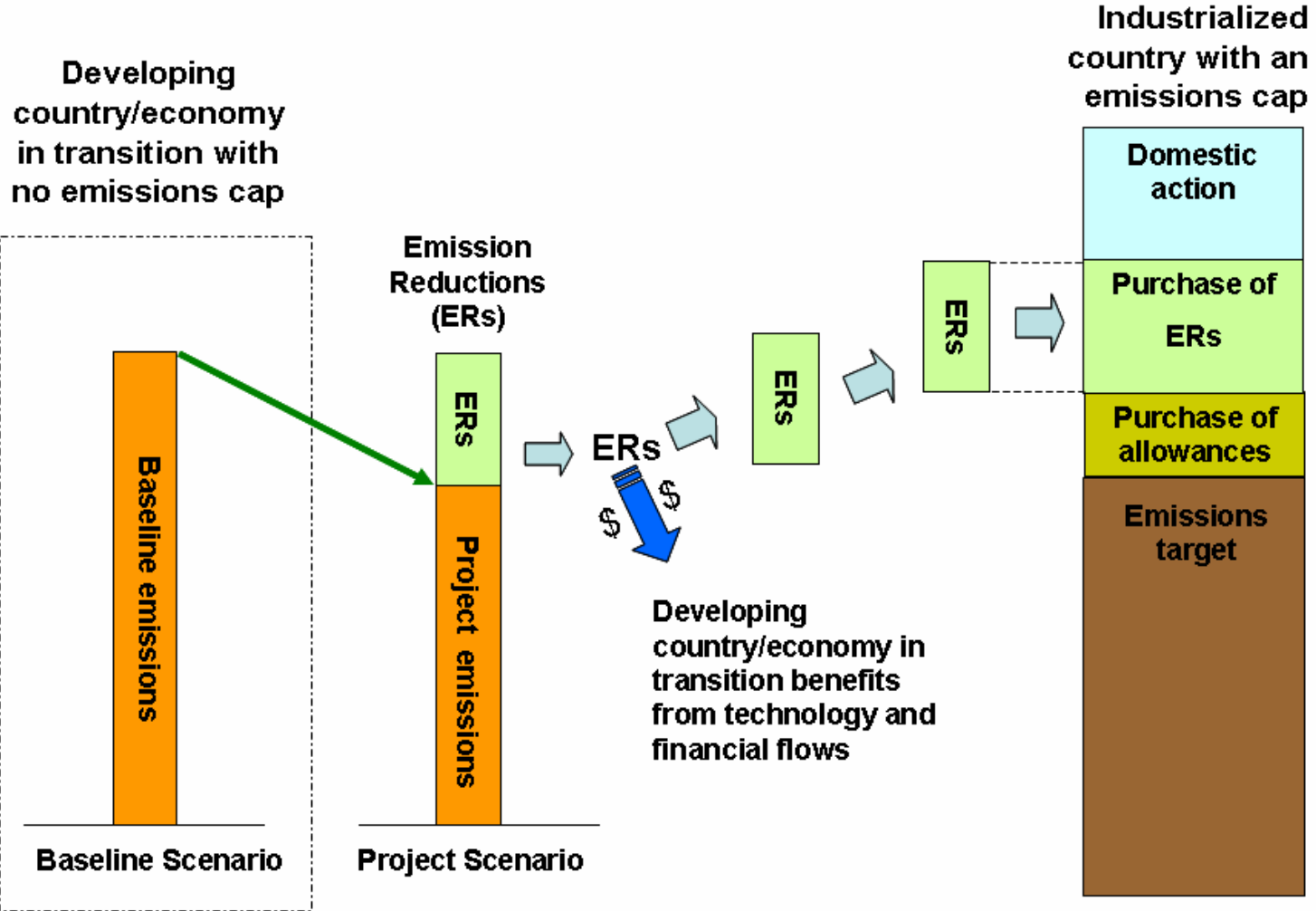
CDM: Current carbon market

- Kyoto Protocol: 38 industrialized (Annex 1) countries to reduce their emissions by 5.2% below 1990 levels **(in numbers, this is 5.0 to 5.5 billion tonnes CO₂e) during the period 2008-2012**
- Countries can use market-based mechanisms to reduce their emissions. Kyoto targets to be achieved through:
 - Reductions in home country
 - Purchasing emission reductions credits and international emissions allowances
 - Credits from projects in developing countries (Clean Development Mechanism – CDM)
 - Credits from projects in economies in transition (Joint Implementation – JI)
 - International Emissions Trading of allowances

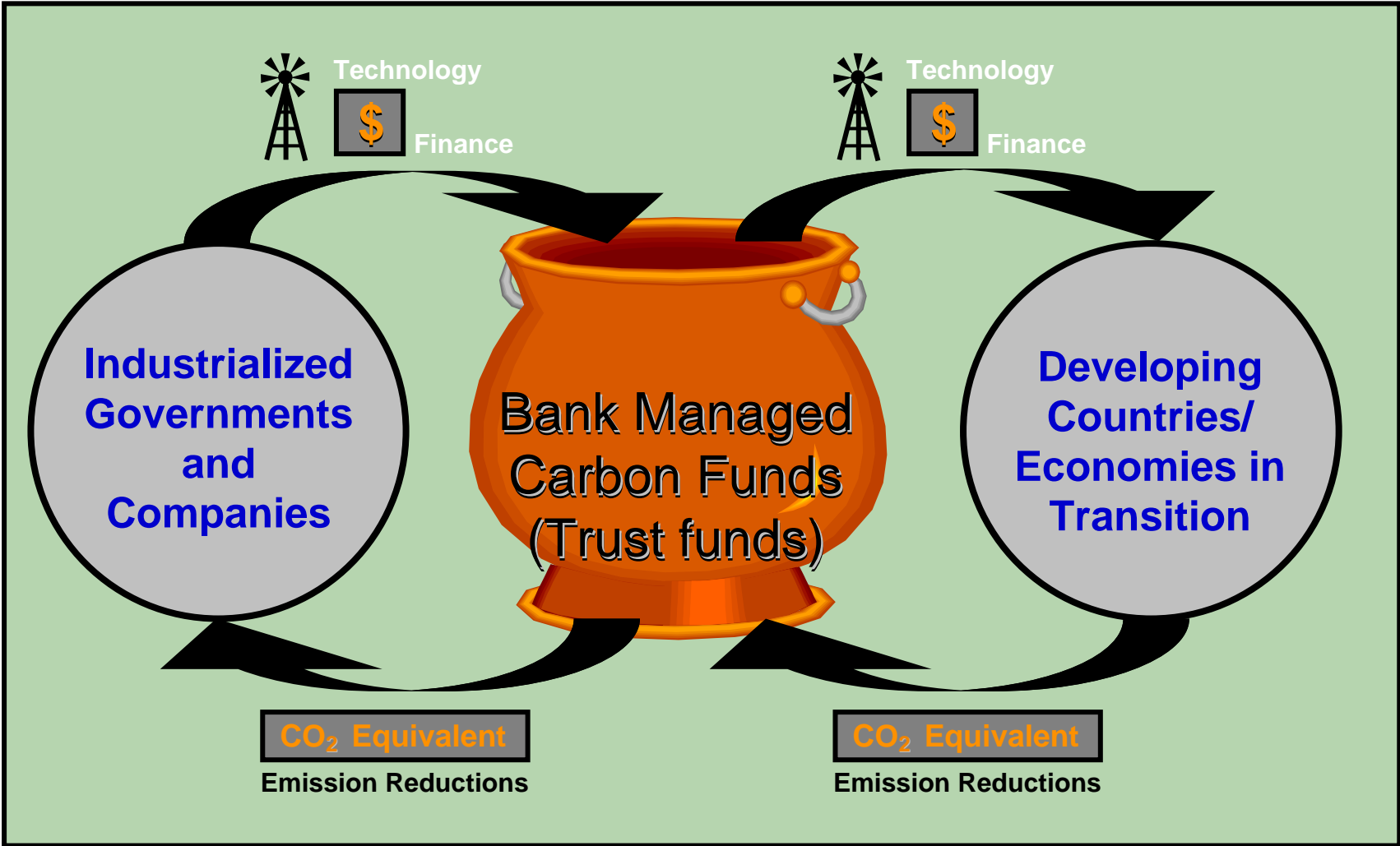


This is
where the
Carbon
Funds come

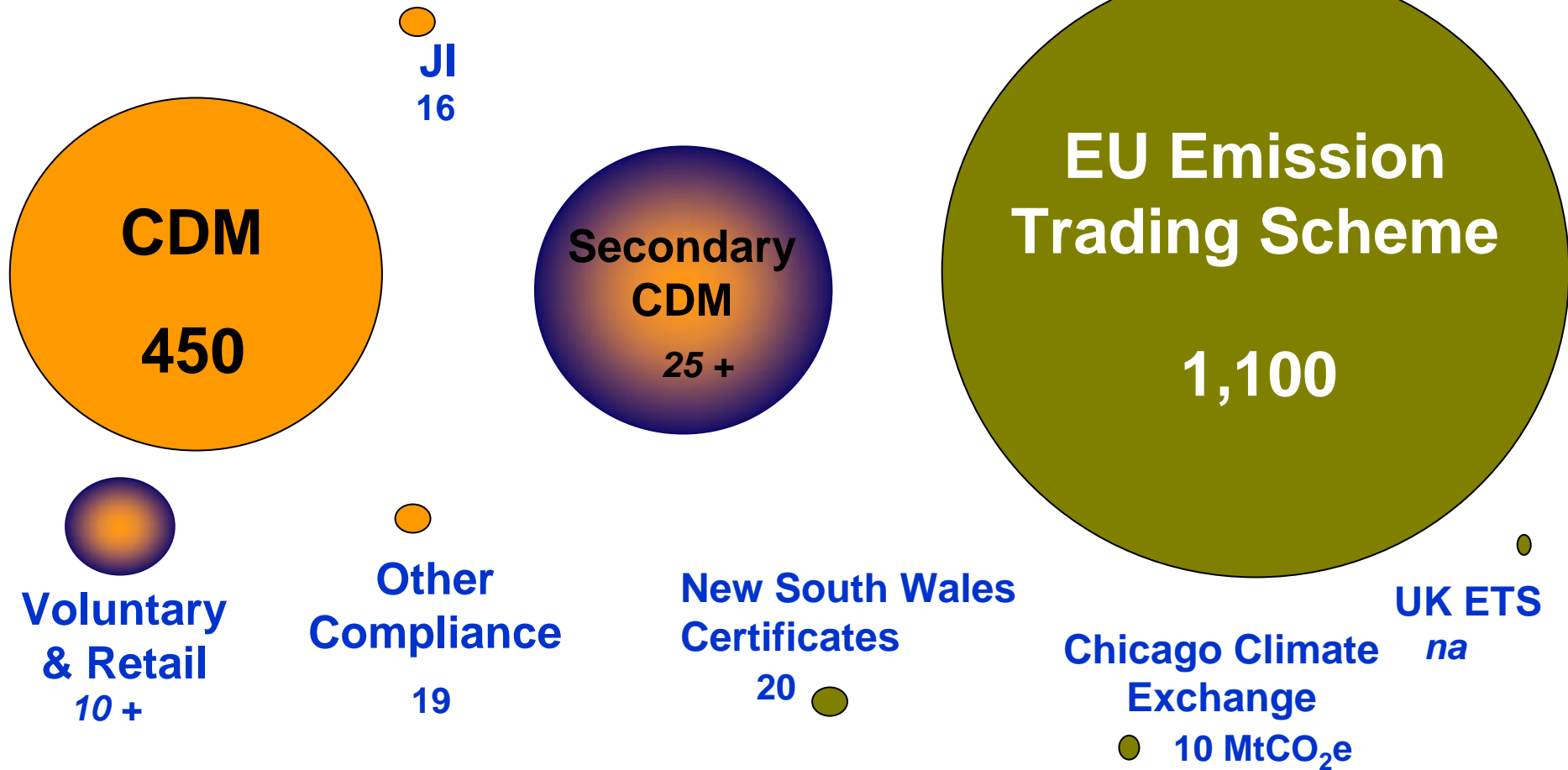
How Carbon is traded



How carbon funds work



Carbon Market in 2006: Volumes transacted (MtCO₂e)



Carbon Finance at the World Bank

- Bank start with the first carbon fund, in 1999 (US\$ 180 million, **Prototype Carbon Fund**) to purchase carbon credits.
- The World Bank portfolio is now more than **US\$ 2 billion (ten carbon funds)**
- The World Bank purchases carbon emission reductions on behalf of our Fund Participants.





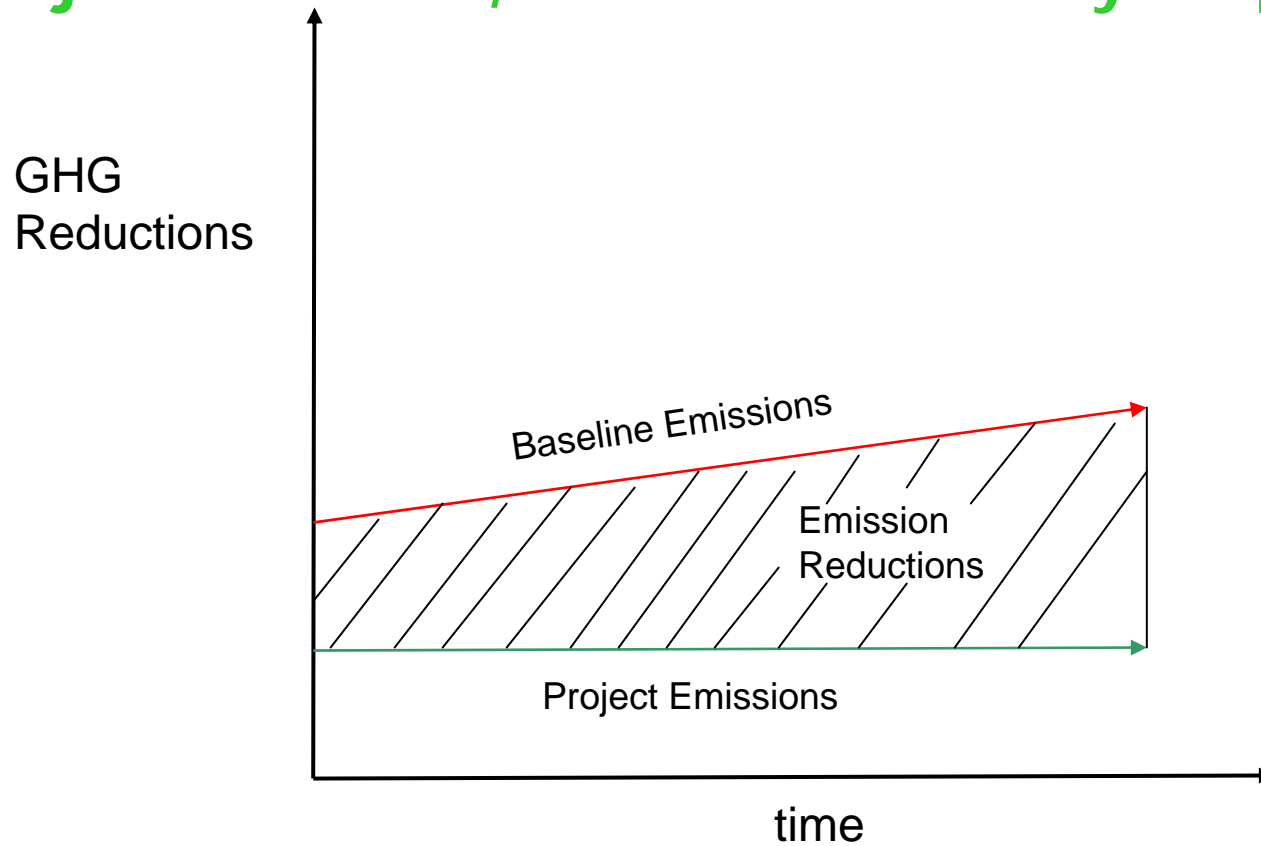
How a carbon project is created

- Needs a proposed activity, with a boundary (a manufacturing plant, or a hydro reservoir and generating station)
- Must be consistent with national sustainable development priorities (DNA – MONRE- to approve)
- Under CDM rules, must be real, measurable, verifiable, additional (would not have happened without CDM)
- CDM therefore addresses a barrier (financial, technological, other)

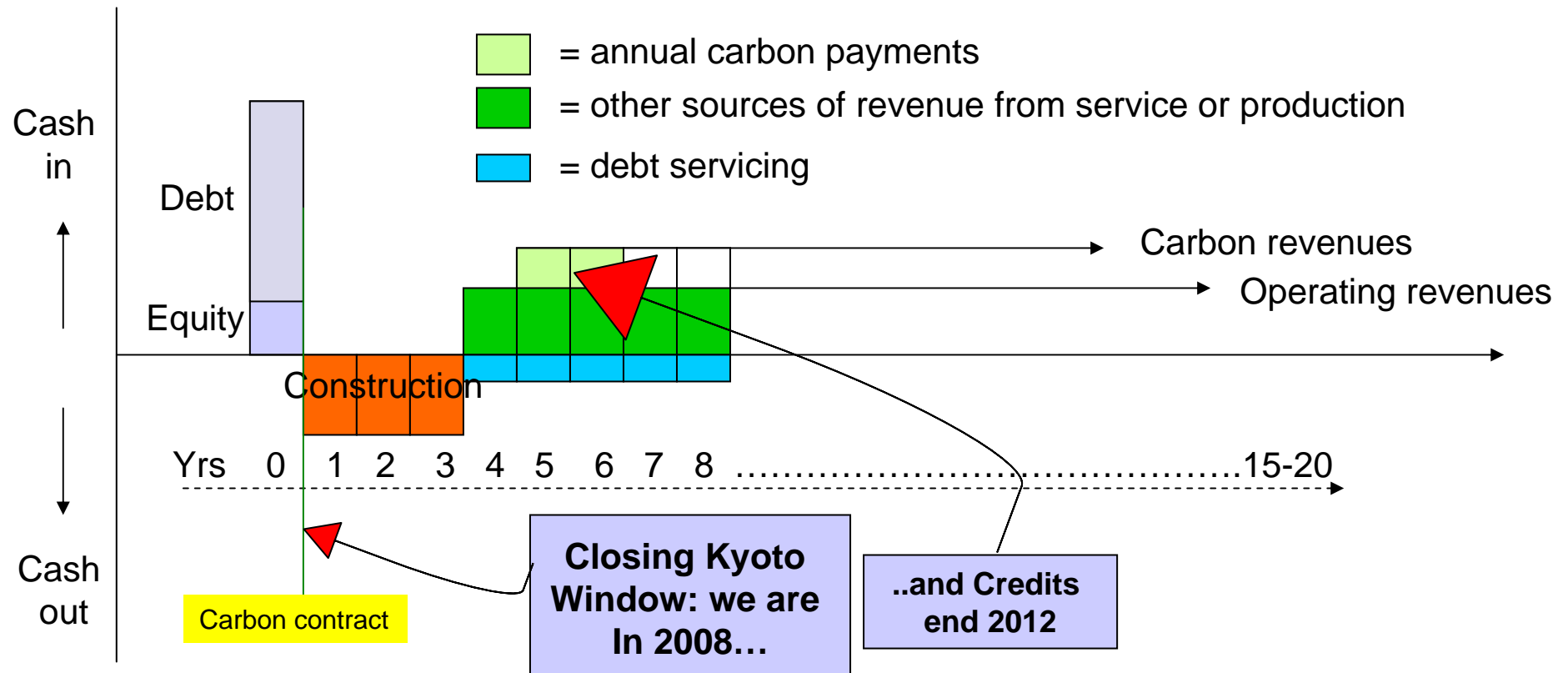
Example: Baseline vs. actual emissions

Baseline=emissions from 100 MW coal-fired plant

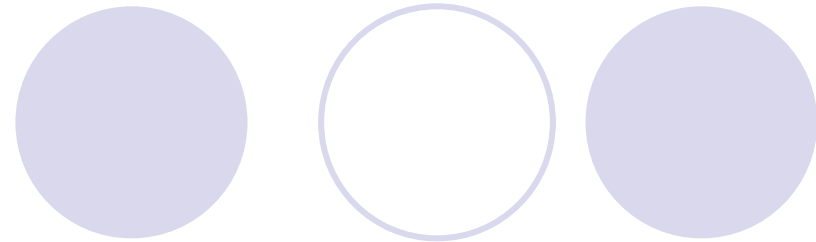
Project= instead, choose 100 MW hydro plant.



First generation projects: payments for a stream of emission reductions

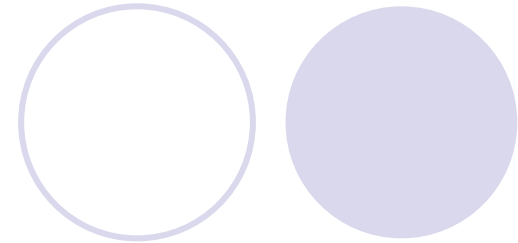


EAP Portfolio (signed projects)



China		Other EAP	
Project name	Rationale for support	Project name	Rationale for support
Gansu Xiaogushan Run-of-river Hydro	Pilot at GOC request, underlying ADB project	INDOCEMENT (Indonesia)	Pilot. 1st ever EASEG project.
Shanxi Jincheng Coal Mine Methane	Pilot at GOC request, underlying ADB project	Nasulo Geothermal Power (Philippines)	Pilot private sector.
Nanjing Iron & Steel	Pilot in China at GOC request.	Northwind Bangui Power (Philippines)	Pilot private sector.
Jiangsu Meilan HFC-23	Large industrial gas project, policy dialogue on CDM Fund	Northern Negros Geothermal (Philippines)	Pilot Private Sector.
Jiangsu Changshu 3F HFC-23	As above.	Laguna de Bay BioCF (Philippines)	Supported underlying Bank project
Guanxi Forestry	Pilot in China on Sequestration	Laguna de Bay Community Carbon (Philippines)	Supported underlying Bank project
Hubei Guangrun Hydropower	Loan Savings from small hydro project	Pontianak landfill gas (Indonesia)	Pilot Private Sector.
Inner Mongolia Huitengxile Wind Farm	Supported CRESP	Lahengdong Geothermal (Indonesia)	Pilot PrivateSector
Tianjin landfill gas	Supported underlying Bank project		

New Directions: a closing window, an opening door



- Now limited space left in Kyoto for infrastructure projects, but some options in small / renewable energy, energy efficiency, biomass, chemicals. However..
- A RAPIDLY growing business. State and Trends of Market Report (World Bank/IETA, May 2007):
 - 2005 value, US\$ 11.05 billion;
 - 2006 US\$ 30+ billion!
- Bali talks reaffirm that there will be a market after 2012
- Bank has already started installing a new Fund to buy Carbon credits beyond 2012
 - Carbon Partnership Facility

3. Carbon markets and Carbon Finance

CDM+: NEW Challenges

The Carbon
Partnership Facility

Mitigation Background - What is needed now?

- In post-Bali climate change challenges, urgent need to take action and scale up mitigation efforts.
- A carbon price signal is considered essential.
 - Support long-term investments for transition to *low-carbon economy*; integrate carbon finance into public and private *investment decisions*
 - Shift away from a project-by-project approach to systematic *programs* of investments in a strategic way
 - Establish a *long-term regulatory framework* that provides certainty of a carbon price signal
 - Provide incentives for development of low-carbon *technology*
 - Create incentives for *avoiding deforestation*

The New Carbon Partnership Facility (CPF)

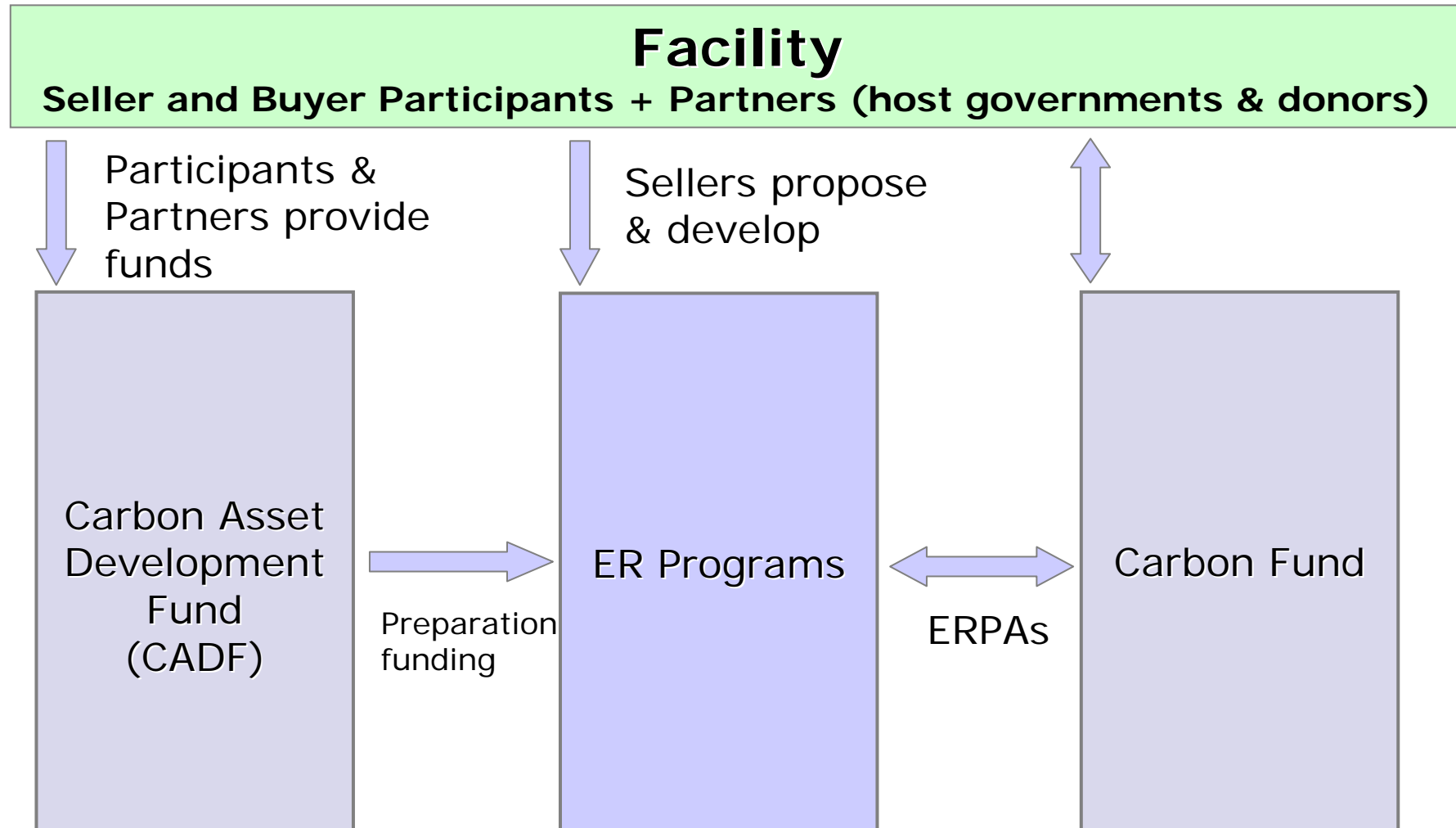
- Commensurate with the climate change challenge, there is an urgent need to step up mitigation efforts
- This calls for **scaling up** of carbon finance through efforts that:
 - integrate carbon into investment decisions early on
 - move to more programmatic approaches
 - work on multiple sectors at the country level over a long period of time
 - focus on the period post-2012
- Carbon Partnership Facility builds on World Bank dialogue with client countries



Objectives of the Facility

- Assist developing countries and countries with economies in transition in the transition towards a low-carbon economy and contribute to global climate change mitigation efforts
- Support greenhouse gas emissions mitigation programs that are strategic and entail transformational interventions

Basic Structure

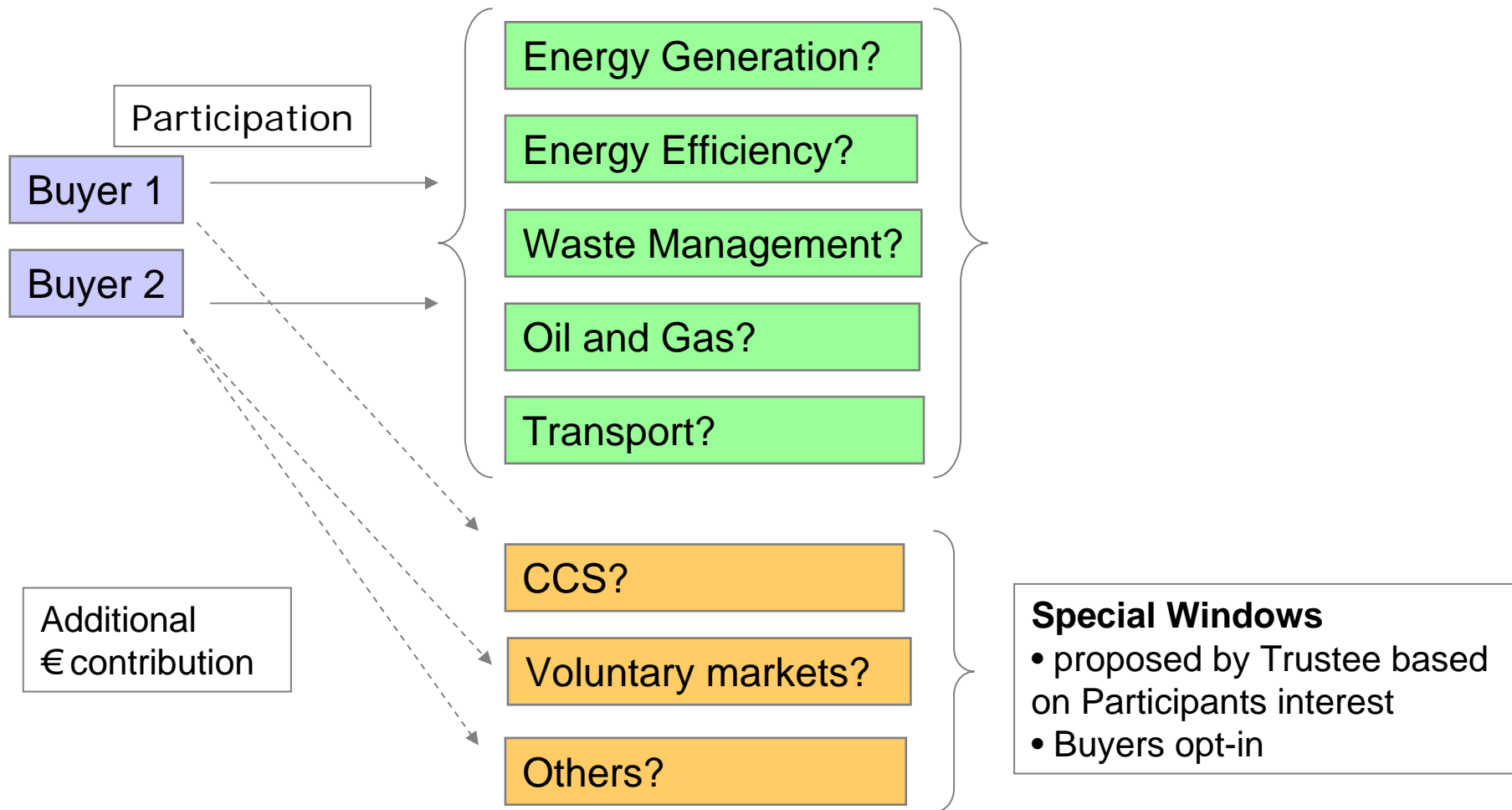




Carbon Asset Development Fund

- New feature compared to existing WB funds
- Will benefit Sellers and host country entities by providing resources for:
 - ER program development
 - Carbon-related elements of feasibility studies
 - Methodology work
 - Enabling environment
- Will benefit Buyers by enhancing the quality and timeliness of the ER Programs
- Funded by
 - fees from Buyers (upfront and annually over time) and Sellers (ERPA payment deductions)
 - Donor contributions

Basic Portfolio & Special Windows



Methodologies



- May use CDM/JI methodologies, CDM Program of Activities approach
- Other programmatic/sectoral approaches would be explored, e.g.,
 - A common baseline for, e.g., power or a product, expressed as a carbon intensity/emission per unit of production
 - “Deemed savings” approach (pre-determined emission credit per activity) in lieu of tracking over time
 - Agreed “automatic” eligibility of certain technologies/activities to claim credits (in a country and timeframe)
 - Standardization, benchmarks



What is an ER Program?

- A series of the same and/or associated activities for which a common approach can be developed
- Involves scale-up through replication and “mass-production”
- May include multiple entities undertaking the investments, and involve one or several ERPAs
- May be undertaken through a program implementing agent
- Would support sectoral strategies and transformation
- May include elements that help create or improve the enabling environment, and assist with technology dissemination

Comprehensive approach possible

Barriers to scaling up →

Identify key barriers

Limited local markets / demand
Infrastructural limitations
Financial problems
Policy & regulatory failures

Promoting an enabling environment →

Identify key triggers and targets

Key utilization options
Financing structures / guarantees
Coordinated dialogue & Improved regulation

Program development →

Identify priority actions & implementing partners

Develop Program of Activities
Methodology to be used
Boundary and Eligibility criteria

Implement with help of carbon finance

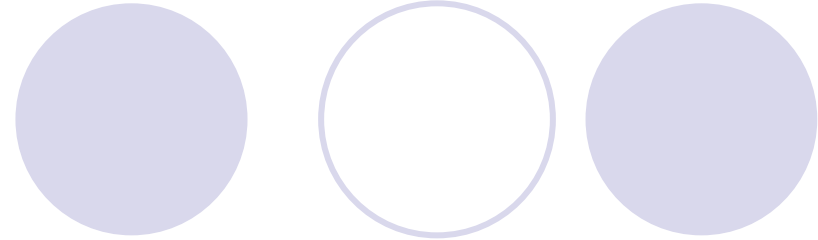
Pricing approach



- Objective to agree to an approach that is transparent, coherent, and able to adjust to changing market conditions
- Needs to reflect the transaction risk profile, e.g.,
 - asset type and market segment
 - length of the contract
 - risk sharing between the Sellers and Buyers
- It may use, as appropriate:
 - both fixed and variable pricing elements
 - indexation and inflation/currency devaluation-based corrections
- Such an approach would imply that some ERPAs defined in fixed € terms rather than fixed volume
 - delivered ER volume becomes the variable
- The pricing approach will be developed in consultation with the Participants and approved by the Partnership Committee

Examples from China:

I. Biogas program



Rationale for engagement

Min. of Agri. is targeting an increase of household bio-digester installation by 18 million units by 2010 and 20 million by 2015 (China Biogas program).

Existing Bank Dialogue

Already five provinces in the Bank's China eco-farming project, targeting installation of over 580,000 bio-digesters. Pilot project (Hubei) well advanced in CDM validation process and will establish a standardized procedure for quick replication.

Potential

Scope for pilot and scale-up, including Household Bio-digester Program, Large-scale farm biogas program, Biomass gasification Program to all five provinces.

- Danish Energy Authority/Foreign Ministry keen on associated TA support



II. Provincial EE program

Rationale for engagement

Provinces are allocated 20% of national Energy Intensity Reduction target and have to achieve this via concrete regulations, policies and programs.

Existing Bank dialogue

Bank in discussions with 3-4 provinces (highest energy consumers) on a package including loans, CF, TA to support their EE programs.

Potential areas of engagement

- green lighting, public building retrofitting, building codes, Labeling, mandated higher energy performance standards for household Electric appliances
- Conversion of existing power plant to CHP to supply heat to new primary district heating systems
- Key industrial companies to undertake process integration and optimization (steel, oil refinery, ammonia)
- Government procurement program to make procurement decision based on **life-time cost (more energy efficient) rather than least upfront cost**

Carbon Bundling Arrangement:

Can be bundled through FI involved in financing program, or other coordinating entity to blend government subsidy with CF and commercial loans

- Shandong wants Bank to provide TA to establish a CDM center for this.

What's different from current carbon finance operations?

- Firmly anchored and “driven” by CAS/CPF, Region and client priorities
- More transactions based on Bank lending and other operations
- Sellers have more say in governance, pipeline development, pricing and other contract terms
- Counterparts on seller side more likely to be in the public sector than in current CF
- Project development/preparation TA facility (Carbon Asset Development Fund)



Business implications

- Targets:

- CPF operational April/May 2008

- Capitalize at a rate of \$1bn/year over FY09-FY13

- Each \$1bn would support 10-20 major programs*

- Pilot program development in FY08

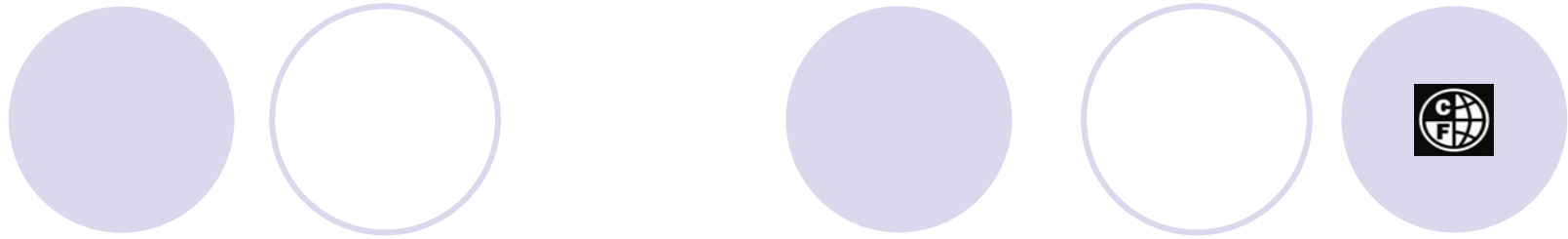
- Scale up in operations from FY09 onwards, with roughly 1-4 programs/Region/year*

* assuming 5m tons/program and \$10-\$20/ton of emission reduction



Next Steps

- December 2007: Announcement at Bali - done.
- January – March 2008: Joint consultative meetings with potential buyer and seller participants to finalize detailed design and governance of CPF; release of Information Memorandum
- Spring 2008: CPF could start operations, if \$500 million in purchase commitments has been reached by then.



4. Potential Carbon Finance Projects for Thailand

Potential Carbon Finance Projects in Power Sector (Renewable)



- Power Generation from Renewable Energy Sources
 - New small run-off river hydropower plants
 - Rehabilitation of existing hydropower plants to increase output
 - New Wind Farms
 - New Solar Power Plants
 - New Biomass Power Plants

Potential Carbon Finance Projects in Power Sector (Energy Efficiency)



- Improvement in energy efficiency
 - Retrofitting existing CCGT power plants to recover output using Turbine Inlet Air Cooling (TIAC) technology
 - New CCGT power plants with higher energy efficiency using TIAC or other technology
 - Converting Single-Cycle power plant to CCGT
 - Fuel switching from Heavy Fuel Oil to less carbon emitting fuels
 - Loss reduction from transmission and distribution
 - Energy efficient light bulbs e.g., replacing T8 with T5
 - Clean coal technology e.g., Integrated Gasification Combined Cycle (IGCC) with Carbon Captured and Storage (CCS)
 - Demand side management

Potential Carbon Finance Projects in Transport Sector



- Bus Rapid Transit
- Production of biodiesel based on waste oils and/or waste fats from biogenic origin for use as fuel
- Emission reductions by low greenhouse gas emitting vehicles
- Introduction of low-emission vehicles to commercial vehicle fleets
- Plant oil production and use for transport applications

Potential Carbon Finance Projects in Industrial Sector



- Energy efficiency (e.g., utilization of waste heat for power generation) for cement, iron and steel, glass industries
- Blending for the cement industry
- Improvement in the wastewater treatment facility for agro-industry e.g., frozen food and canning, pulp and paper, biofuel, etc.
- Associated gas utilization

Potential Carbon Finance Projects in Waste Management

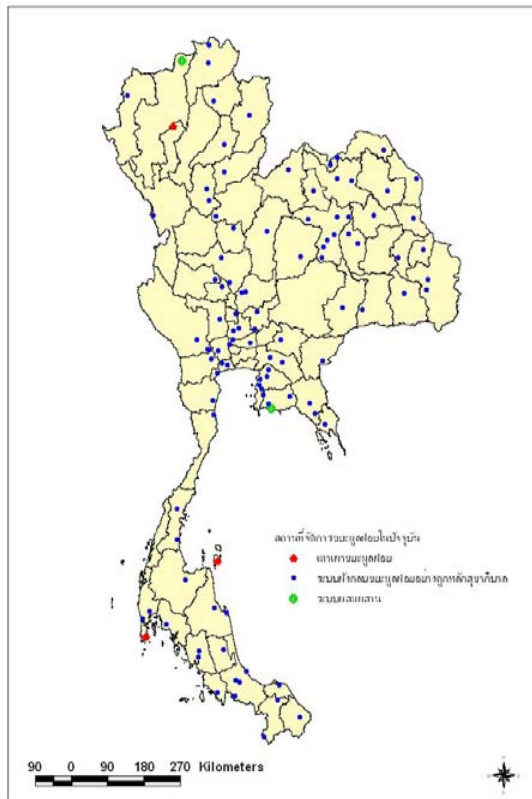


- Biomass (from agricultural waste or municipal waste) fired power generation
- Using biogas from anaerobic digestion of organic waste and/or wastewater to generate heat and/or power
- Methane avoidance from composting of organic waste
- Landfill gas capturing for heat and/or power

Potential Carbon Finance Projects in Waste Management Sector



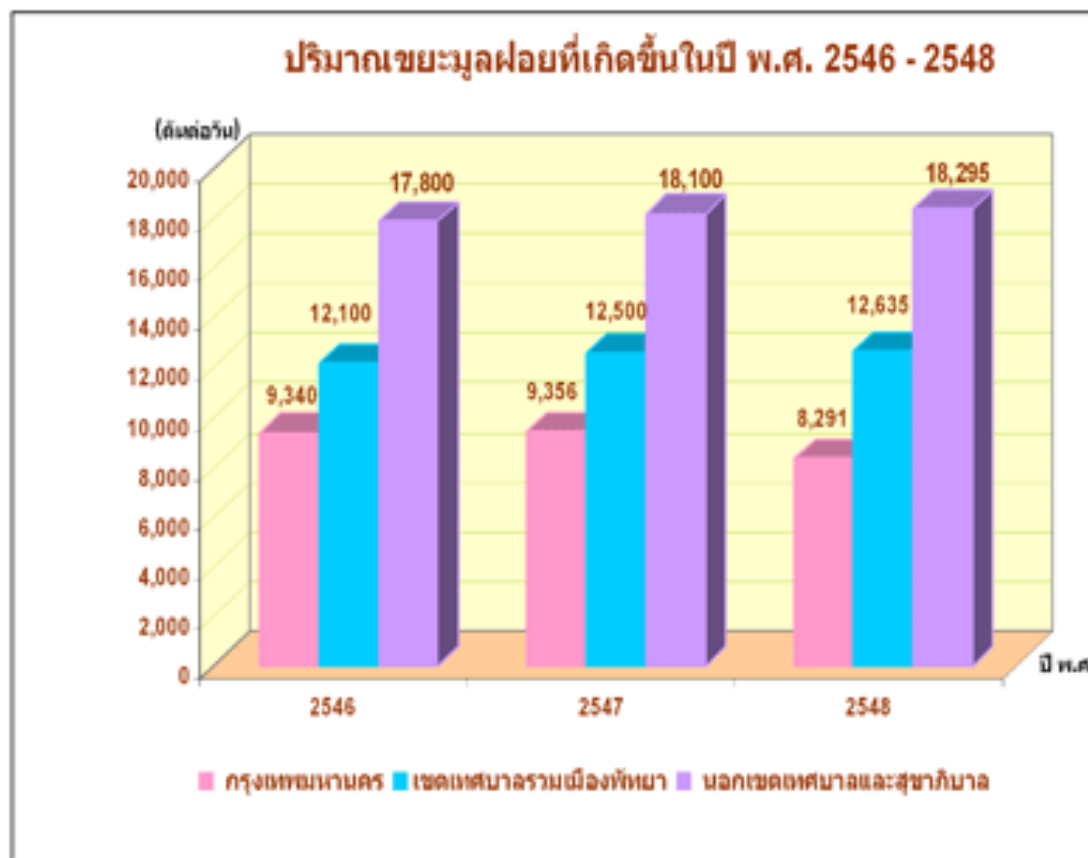
- Landfill gas recovery and use
- Waste-to energy conversion activities
- Composting from municipal organic waste



Solid Waste Treatment Site	No. Site
Sanitary Landfill	104
Operating	93
Construction	11
Incinerator	3
Combine System	3
Total	110

Source: Pollution Control Department, 2005

More Waste More Problems to solve!!



Source: www.pcd.go.th January 23, 2008



Thank You!

Questions?

nprasad@worldbank.org

npinnoi@worldbank.org

<http://www.carbonfinance.org>