



Carbon Markets and Clean Energy Investment

Monetizing Environmental Value

Asia Clean Energy Forum
June 27th, 2007

Mitsubishi UFJ Securities
Clean Energy Finance Committee

- Clean Development Mechanism
- Financing Aspect
- Project / Case Studies
- Carbon Market
- Mitsubishi UFJ Securities

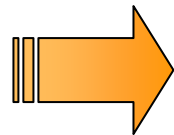
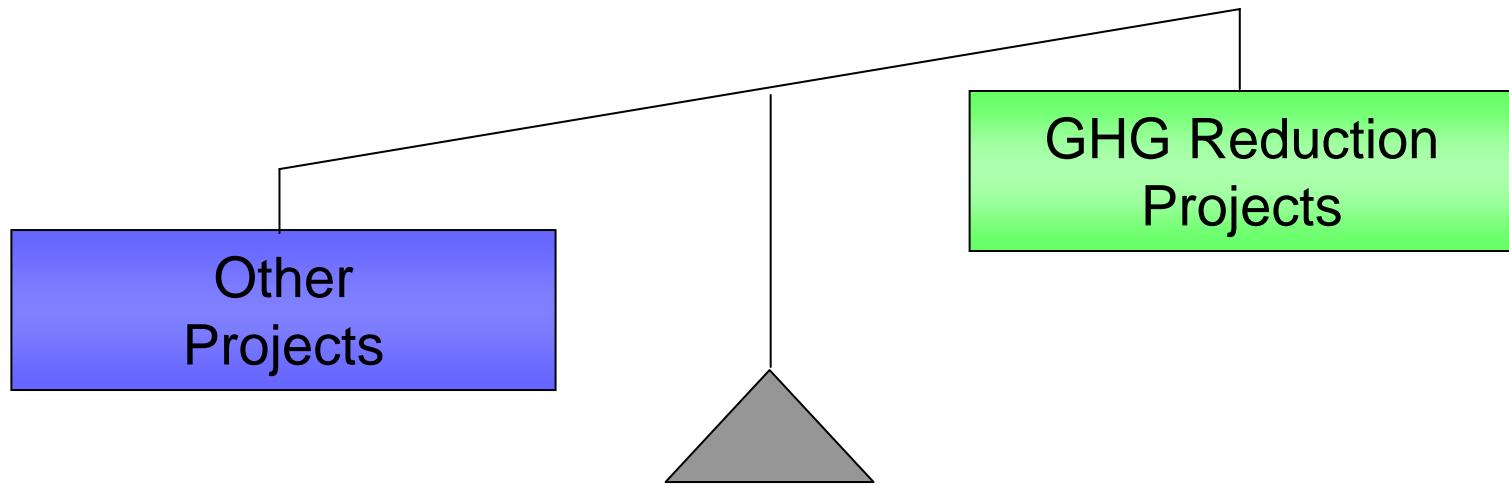


Clean Development Mechanism

- Greenhouse gas (GHG) reduction projects' Pros and Cons:
- Pros
 - Reducing GHG
 - Improving Environmental Condition
 - Contributing to Socially Sustainable Development
 - Contributing to Technology/Know-How Transfer
 - Reducing Consumption of Fossil Fuel
- Cons
 - **Involve High Cost Investment**
 - **Lower IRR compared to normal projects / investments**
 - Complexity
 - Installation may suspend the operation

Business Decision !!

- Oftentimes, GHG reduction Projects or Clean Technologies do not stand the monetary cost and benefit analysis, or simply not affordable.



Require Additional Revenues

- Clean Development Mechanism (CDM): a mechanism to monetize environmental value of pro-environmental projects.

CDM thus gives additional revenues to GHG mitigation projects.

- In addition, CDM status often helps with financing. A project is more attractive to equity and debt investors with CDM status.

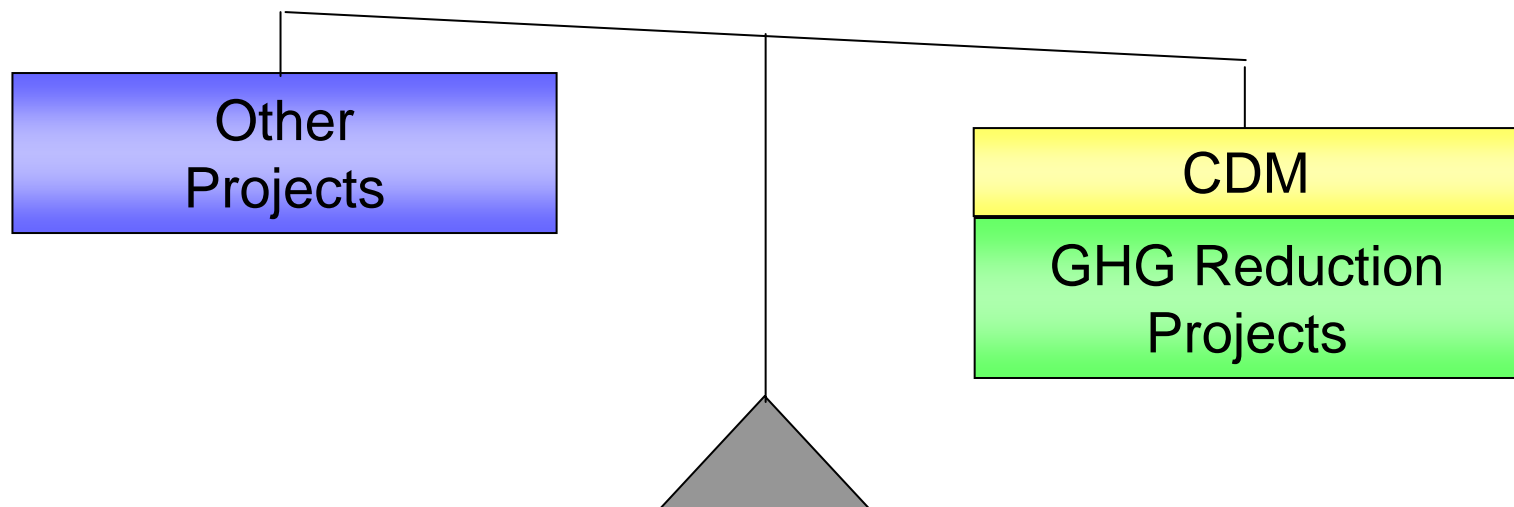
- Assist host counties (Non-Annex I) to
 - Achieve sustainable development, while contributing to global GHG emissions reductions
 - Host countries benefit through investment, technology transfer, and local sustainable development

- Assist buyers (Annex I countries) to
 - Meet GHG reduction commitments in a flexible and cost-effective manner
 - Investors benefit by obtaining carbon credit, i.e. Certified Emissions Reductions (CERs)

What is CDM? (continued)

- Contribution to the sustainable development of the host country
- GHG emission reductions in real and measurable manner
- Additionality
 - CDM project must be additional. This concept requires careful attention.
 - The CDM status will be given only to those projects that cannot be implemented without it.
 - Those projects that can/will be carried out in the course of regular Business (Business-As-Usual: BAU) are disqualified.
 - It is advisable not to start construction until the major part of the initial CDM process is finished. This will help avoid being confused as a BAU project.

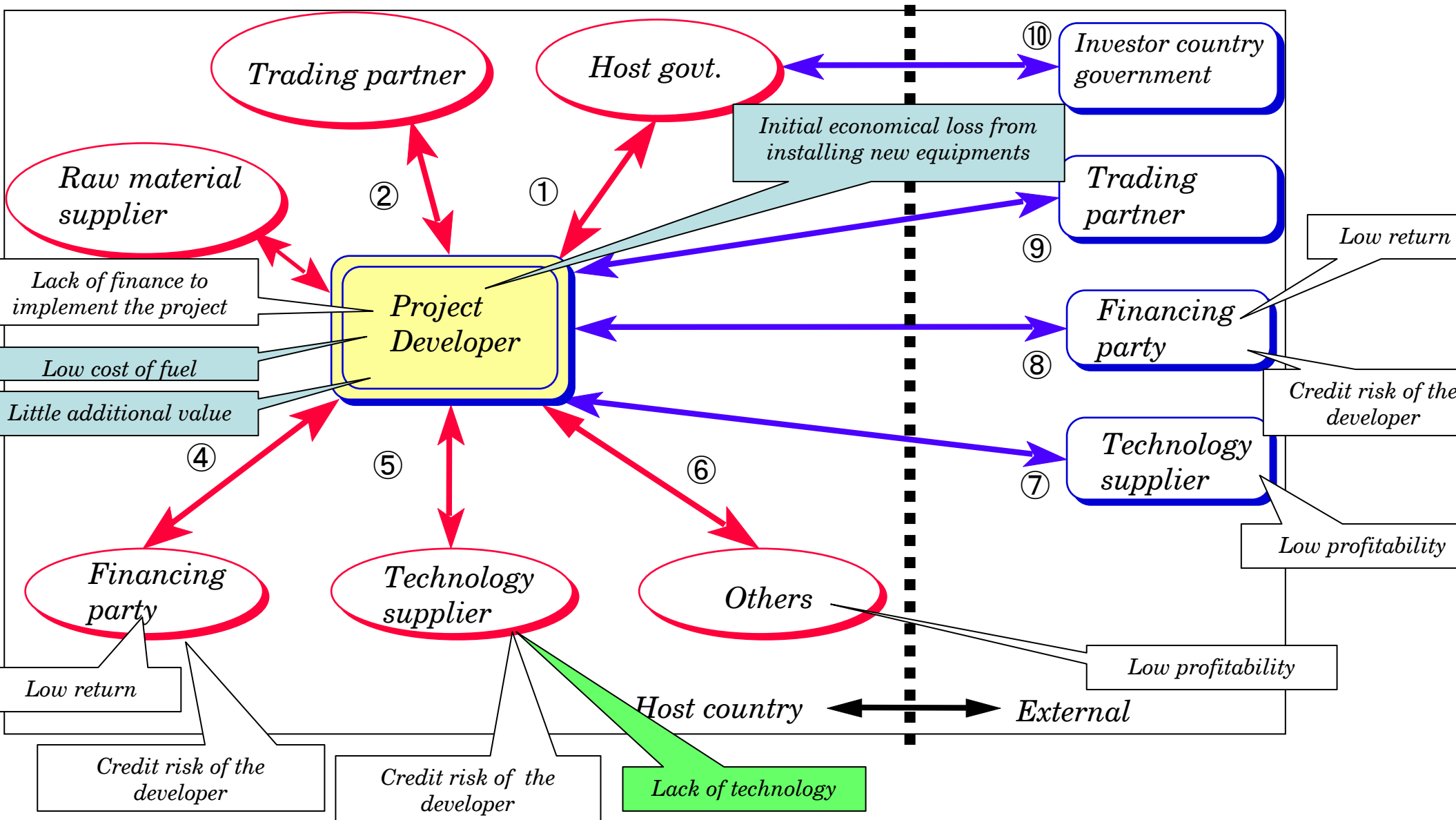
- Represents GHG mitigation contribution of a project. Measured in tonnes of CO₂.
- Certified Emission Reductions (CERs) can be sold in exchange for hard currencies.
- Often case, the CER revenue is just enough to save those GHG Reduction Projects.





Financing Aspect

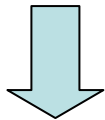
Barrier Analysis: Typical CDM Project



Developer's View: Two Main Barriers

Aspect 1: Little Incentive

- Projects are
 - Low return (if not non or negative)
 - Difficult to implement



Solution : CER

Aspect 2 : Limited Financing

- Projects
 - High cost
 - Low return (if not any)
 - Difficult to implement
- Developers
 - Lack financial resource
 - Lack financial credibility

(Aspect 1)

Lack of incentive

(Aspect 2)

*Availability of
Finance*

No Implementation

Merit

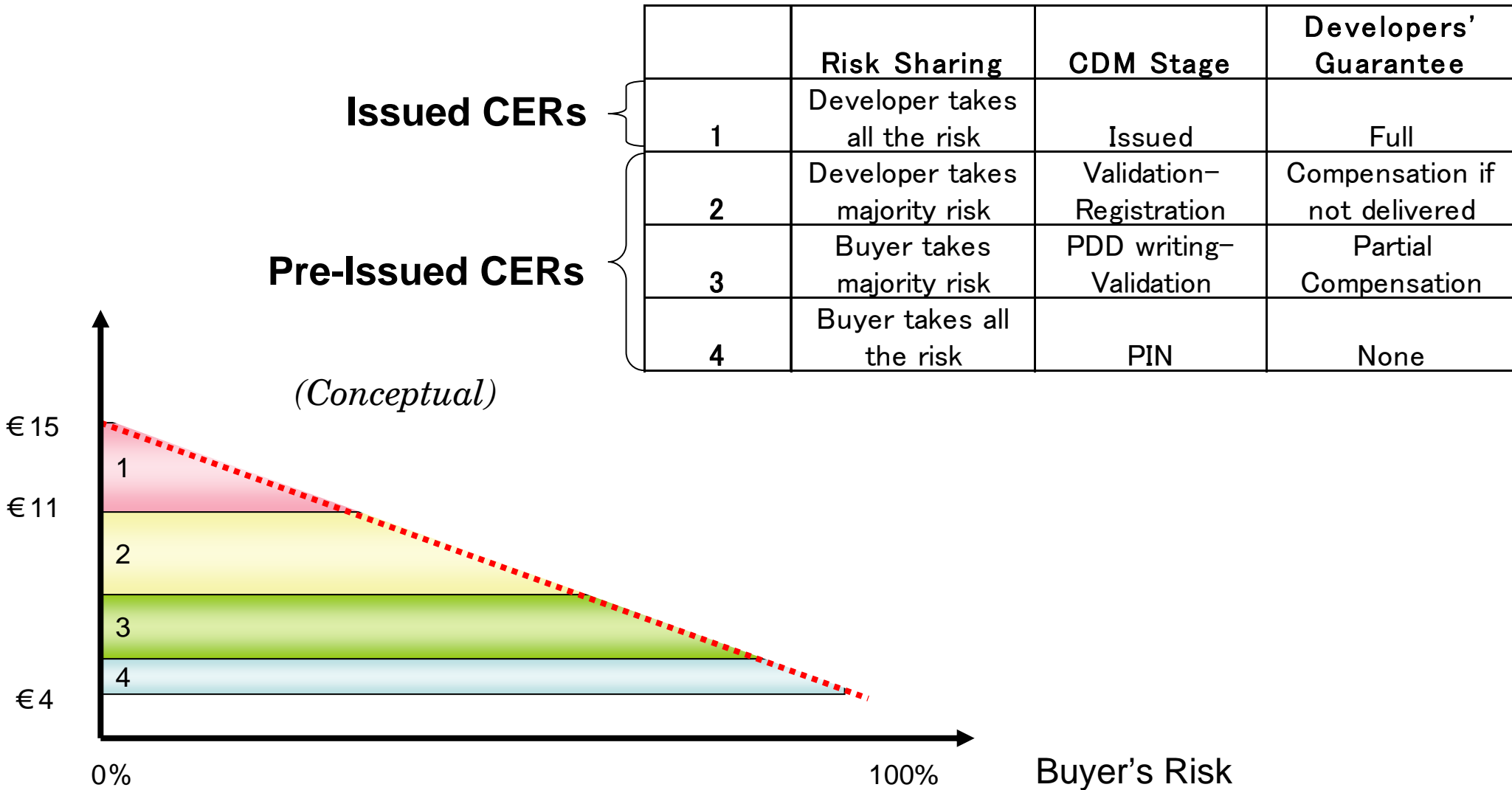
- Potential revenue from CERs
- Meet its own obligation
- Diversify the portfolio (adding non-conventional energy projects)
- Entering into a fast growing market
- Good corporate image
 - CSR
 - Contribution to the sustainable development of local community
 - Environmentally friendly
 - Publicity

Demerit

- High recovery risk
- Low profit margin
- Entering into a high risk market
- Limited know-how
- Complicated process of dealing with CERs
- Complicate issues related to cross-border transactions

- EU-Emission Allowance 2008 delivery under the EU-Emission Trading Scheme is often used as a price indicator

- Price of CERs: Pricing (discounting) factors are:
 - Risk (Project, Kyoto etc.)
 - Project types
 - Size of project
 - Delivery schedule
 - Project stage (upon signing of ERPA)
 - Cost sharing
 - Upfront payment



- A large number of worthy GHG reduction projects, even when profitability is high enough with CER sales, are precluded from implementation for lack of funding/financing.

Possible solutions are :

- Public-Private Partnership
 - With partial funding by the public sector and indirect supports by Governments / International Financial Institutions, risks can be mitigated
- Due Diligence
- Technology Assessment



Project / Case Studies

Case Study 1: Cement WHR Project in China

- Waste Heat Recovery project at a Cement factory in China
- With a new line, capacity of producing 4,500t/day of clinker
- Currently, importing 185,000 MWh / year from the grid (grid carbon intensity of 0.866 t CO₂ / MWh)
- Project: installment of a new 8MW pure low temperature waste heat power generation to partially substitute the imported electricity
- Estimated power generation: 48,506 MWh / year

Case Study 1: Cement WHR Project in China (Continued)

- IRR without CDM
 - Technology : € 5.7 million (58,760,000RMB)
 - O&M cost : € 825,500 / year (8,517,500 RMB)
 - Electricity Tariff : € 0.03 / kWh (0.316 RMB)
 - Electricity Saving (48,506 MWh) : € 1,500 / year (15,000 RBM)
 - Project life : 20 years
 - Income Tax : 33%
 - **IRR : 6.56%**

Case Study 1: Cement WHR Project in China (Continued)

- IRR with CDM
 - Baseline:
$$48,506 \text{ MWh} \times 0.866 \text{ t CO}_2 / \text{MWh (CEF of the grid)}$$
$$= 42,000 \text{ t CO}_2 \text{ (CERs)}$$
 - CER revenue:
$$42,000 \text{ CERs} \times \text{€} 8 = 336,000 \text{ EUR}$$
 - IRR with CDM : **17.02%** (without CDM: 6.56%)

- Biomass project in India
- The developer produces medium density fiberboard
- Currently, biomass is being used
 - To run a 4MW power generator for in-house use
 - To produce steam for in-house use
- Project:
 - Up-grade the factory to reduce required energy
 - Up-grade the power generator to 9MW
 - Export the excess power to the grid

Case Study 2: Biomass Project in India (Continued)

- IRR without CDM
 - Technology : € 3.87 million (212.54m INR)
 - O&M cost : € 116,000 / year (6.37m INR)
 - Electricity Tariff : € 0.06 / kWh (3.32 INR)
 - Electricity sale (28,476 MWh) : € 1.7 m / year (94.5m INR)
 - Project life : 10 years
 - **IRR : 5.17%**

Case Study 2: Biomass Project in India (Continued)

- IRR with CDM
 - Baseline:
$$28,476 \text{ MWh} \times 0.75 \text{ t CO}_2 / \text{MWh (CEF of the grid)}$$
$$= 21,357 \text{ t CO}_2 \text{ (CERs)}$$
 - CER revenue:
$$21,357 \text{ CERs} \times \text{€}8 = 170,856 \text{ EUR}$$
 - IRR with CDM : **12%** (without CDM : 5.17%)



CER Market

- As of Jun 2007, 700 projects have been registered with 54 million issued CERs

Source: UNFCCC

However,

- Over 450 million CERs were traded in 2006
- Total transaction was over US\$ 4.8 billion
- Majority of the traded CER is pre-issued CER

Source: World Bank

Two types of CERs

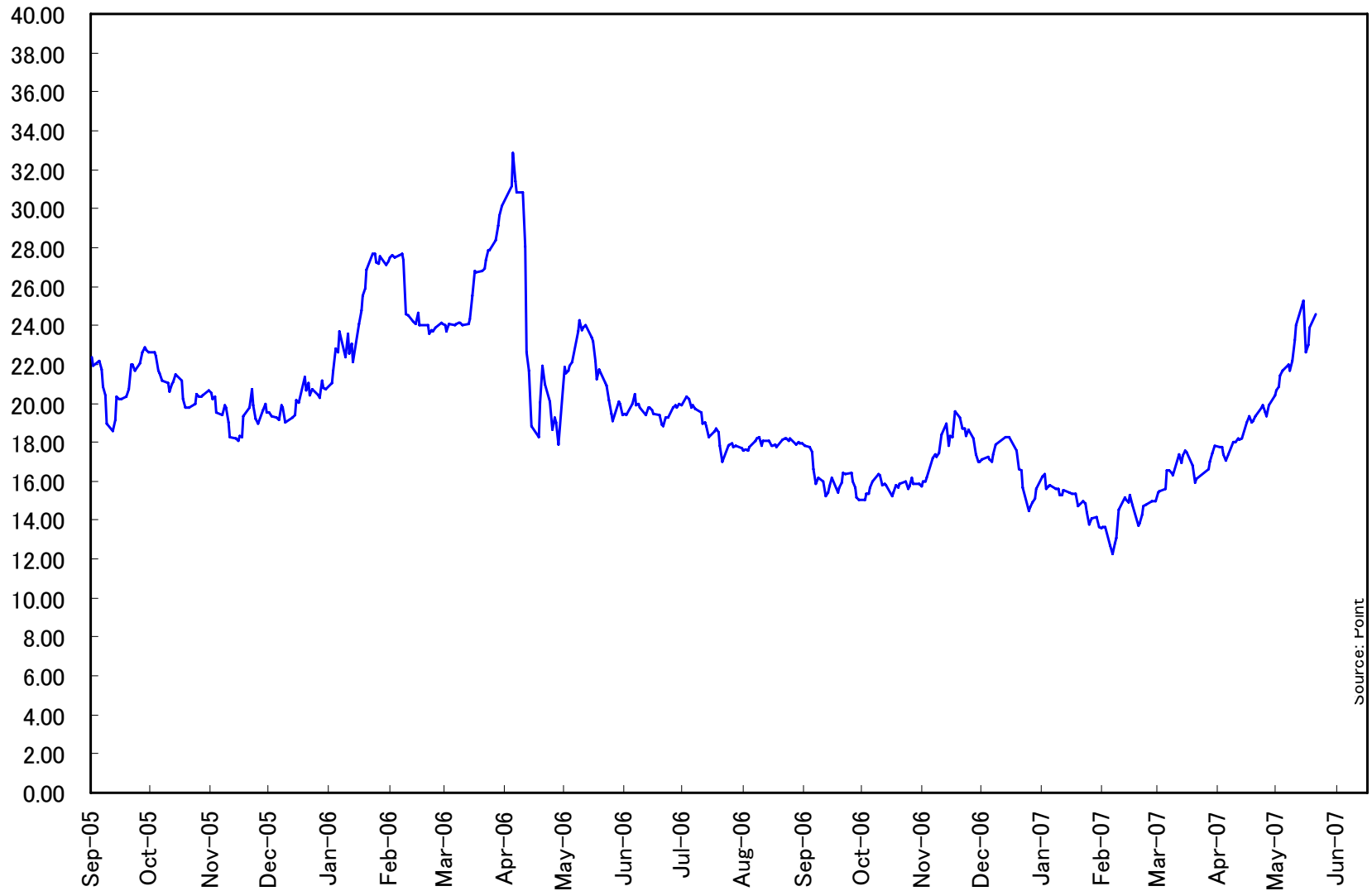
- Issued CERs (includes secondary market): no risk but high price, about 75% of EUA
- Pre-issued CERs: some risk but lower price

- What is EU-ETS?
 - A Cap and Trade mechanism: Mandatory caps
 - Reduce the emission internally, or
 - Buy carbon credits from the market
 - Phase I: 2005~2007, Phase II: 2008~2012 and Phase III....
 - Phase I, cap was placed for high energy using industries such as power, cement, steel etc.
- The largest carbon credit market is EU-Emission Trading Scheme (EU-ETS)
- Over 1 billion EU-Allowances (EUAs) were traded in 2006 whereas 450 million CERs were traded
- Total transaction of US\$ 24.4 billion in 2006 whereas CDM is US\$ 4.8 billion

Source: World Bank

(Unit: Euro)

EUA2008 price trend



Source: Point Carbon

- CER can be used to meet EU-ETS's compliance (with limitation)
- EUA and CER are both equivalent of 1 tCO₂
- EU-ETS (phase II) and Kyoto 1st commitment are both expected to fall short (there is enough demand)
- Correlation of EUA and CER seems high

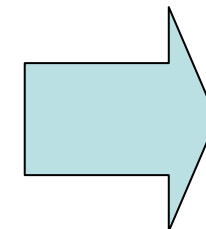
- However, CER is

- Heavily discounted (Issued CER is about 75% of EUA)

- Traded volume is about 50% of EUA

- Traded value is about 20% of EUA

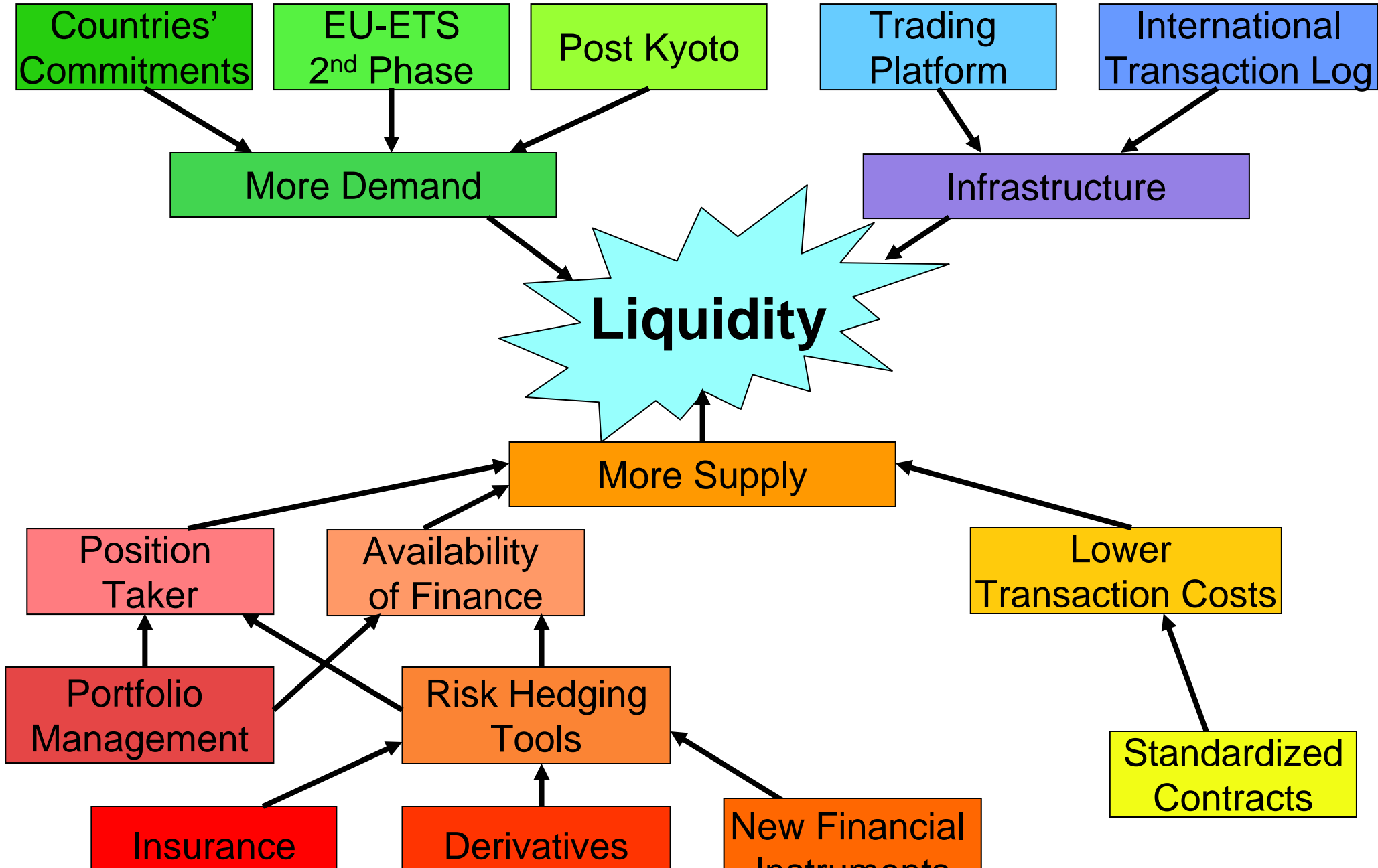
Q: WHY?



A: Low Liquidity



Increasing Liquidity





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- 1) As part of new environmental business unit, it was established in Feb. 2001 to assist renewable energy and energy efficiency projects in developing countries with our firm's financial expertise.
- 2) The Committee is a fully-fledged business unit with thirty-two staff, speaking thirteen languages in total.
- 3) Networking with local consultants in Hong Kong, India, Philippines, Indonesia, Brazil and Argentina.
- 4) A global leader in CDM consultancy: one of the only three private firms in the world with five approved methodologies.

- Methodology Development
 - 5 Approved
 - 3 Consideration by the Methodology Panel
- MUS has written over 80 PDDs for CDM projects in various countries.
 - Registered projects :8
 - Request for registration: 2
 - Currently Undergoing Validation : 15
 - more in the pipeline
- MUS has completed a number of research projects for Japanese Government, Multilateral Development Agencies and International Financial Institutions.
- To promote further development of CDM projects, MUS has hosted capacity building workshops around the world.

- **Initial Project Assessment**
 1. The policy frameworks relating to the CDM
 2. Preliminary assessment of the Project
 3. Estimated amount of CERs
- **Assistance in the Management of the Project for CDM**
 1. Revenue and cost estimates for the Project under the CDM
 2. Scheduling
 3. Presentations to the management, the board of directors, and other decision-making organizations
 4. Advice on client workload and staffing for CDM finance
- **Development of the Project Design Document (PDD)**
 1. Formal analysis of relevant factors
 2. Production of a PDD
 3. Development of a baseline and monitoring methodology, if necessary, and submission to the Methodology Panel.
- **Assistance in Obtaining Necessary Approvals**
- **Structuring the Sale of CERs from the Project**



Clean Energy Finance Committee

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