



WORKSHOP BIO-ENERGY, CCS & BECCS : OPTIONS FOR INDONESIA

**Financing Bioenergy and
CCS-Challenges and
Opportunities**

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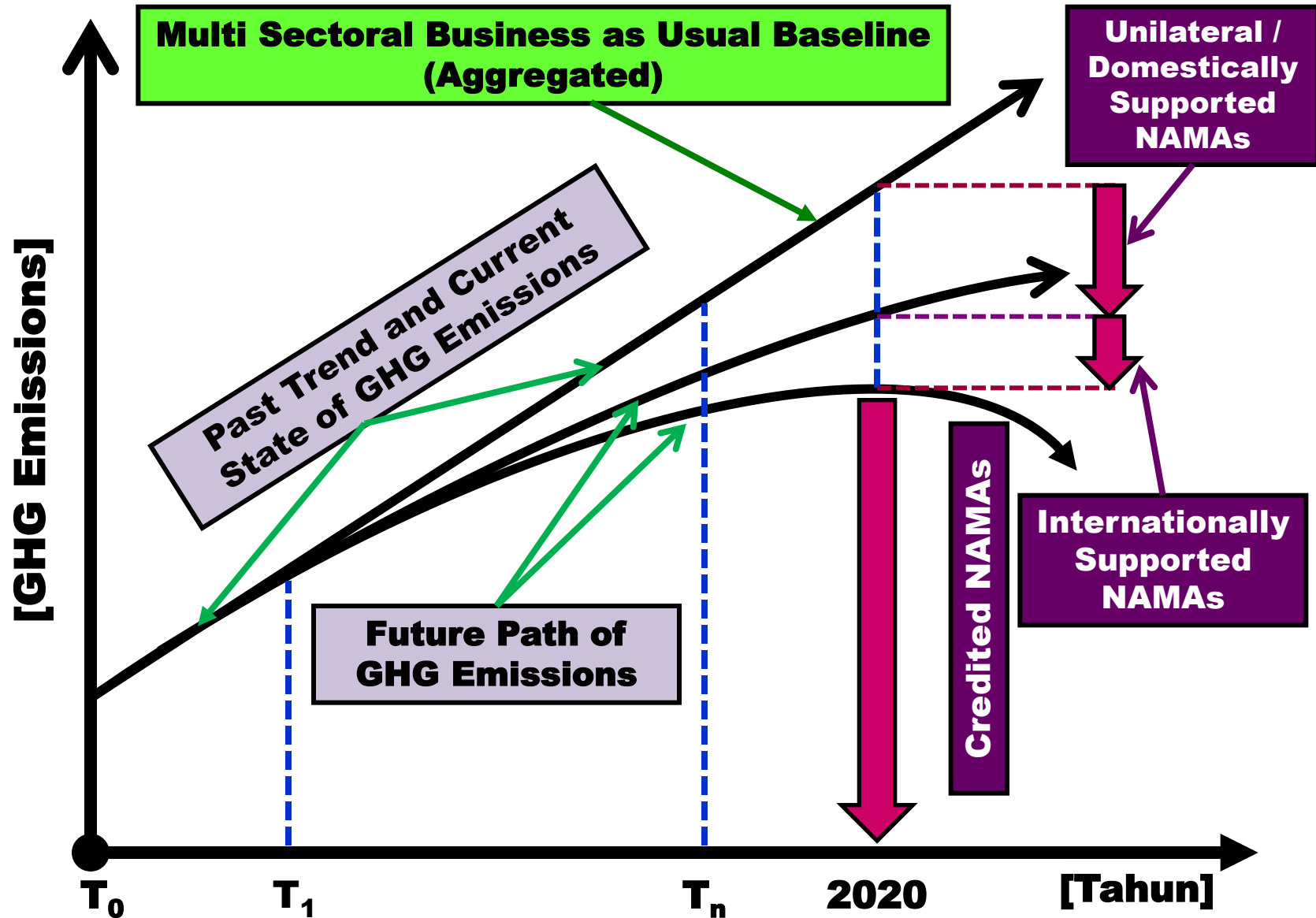


Kyoto, 2 July 2011

NAMAs by DEVELOPING COUNTRY PARTIES

[Its Categories]

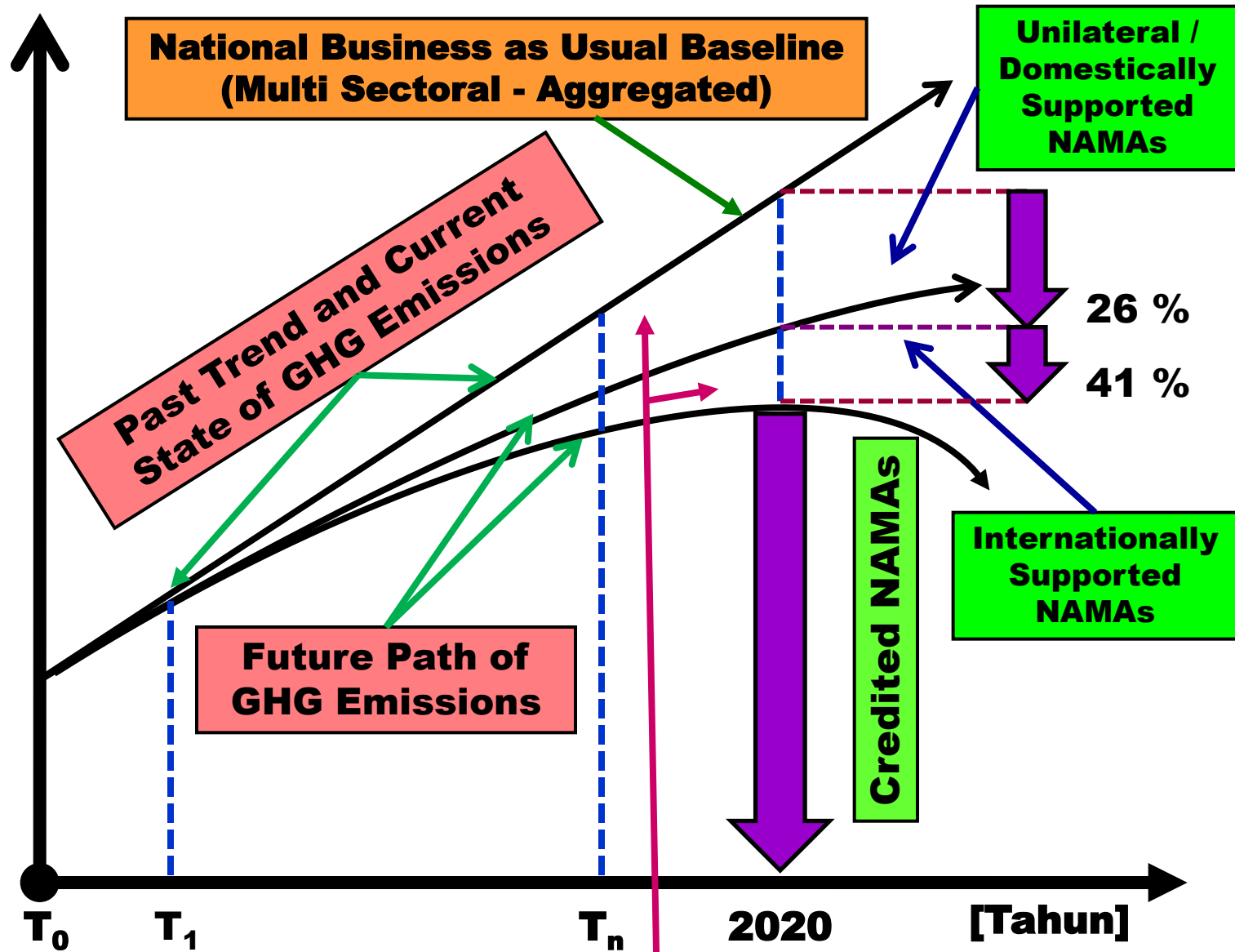
Category	Remarks
1. Domestically Supported NAMAs	Undertaken by Developing Country Parties by their own: voluntarily, self financing.
2. Internationally Supported NAMAs	Supported by direct finance from Developed Country Parties. This agreed emission reductions cannot be used as an offset by Developed Country Parties to fulfill their commitment for their emission reductions.
3. Credited NAMAs → <u>These potential options need to be confirmed further.</u>	Additional Mitigation actions in Developing Country Parties which can generate credits, and can be used as an offset by Developed Country Parties to fulfill their emission reductions commitment through carbon market or non-market instruments. For instances: (i) Carbon market, such as sectoral crediting, (ii) Non market instrument, such as bilateral arrangement.



NAMAs Categories of Developing Country Parties

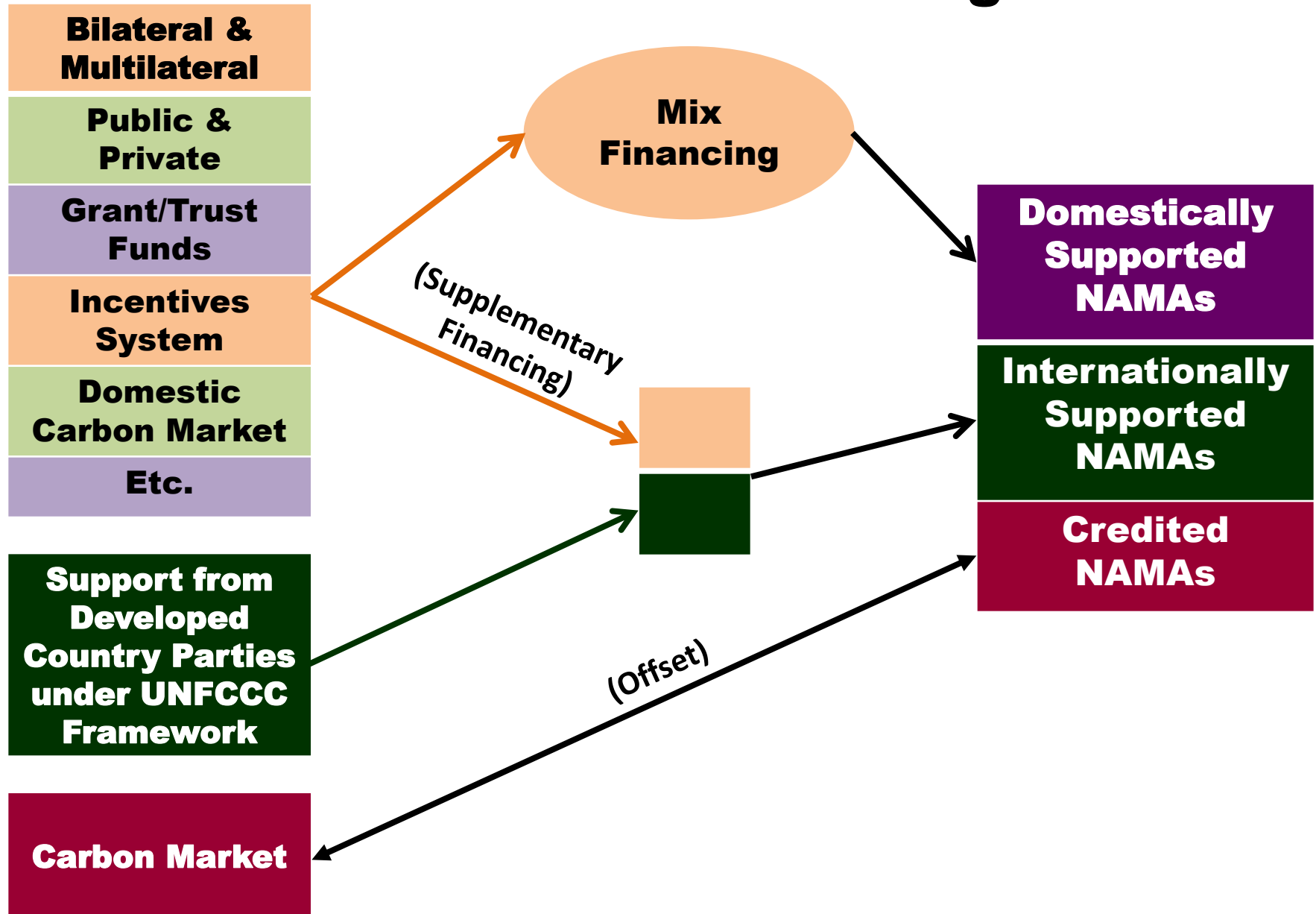
INDONESIA

[GHG Emissions]



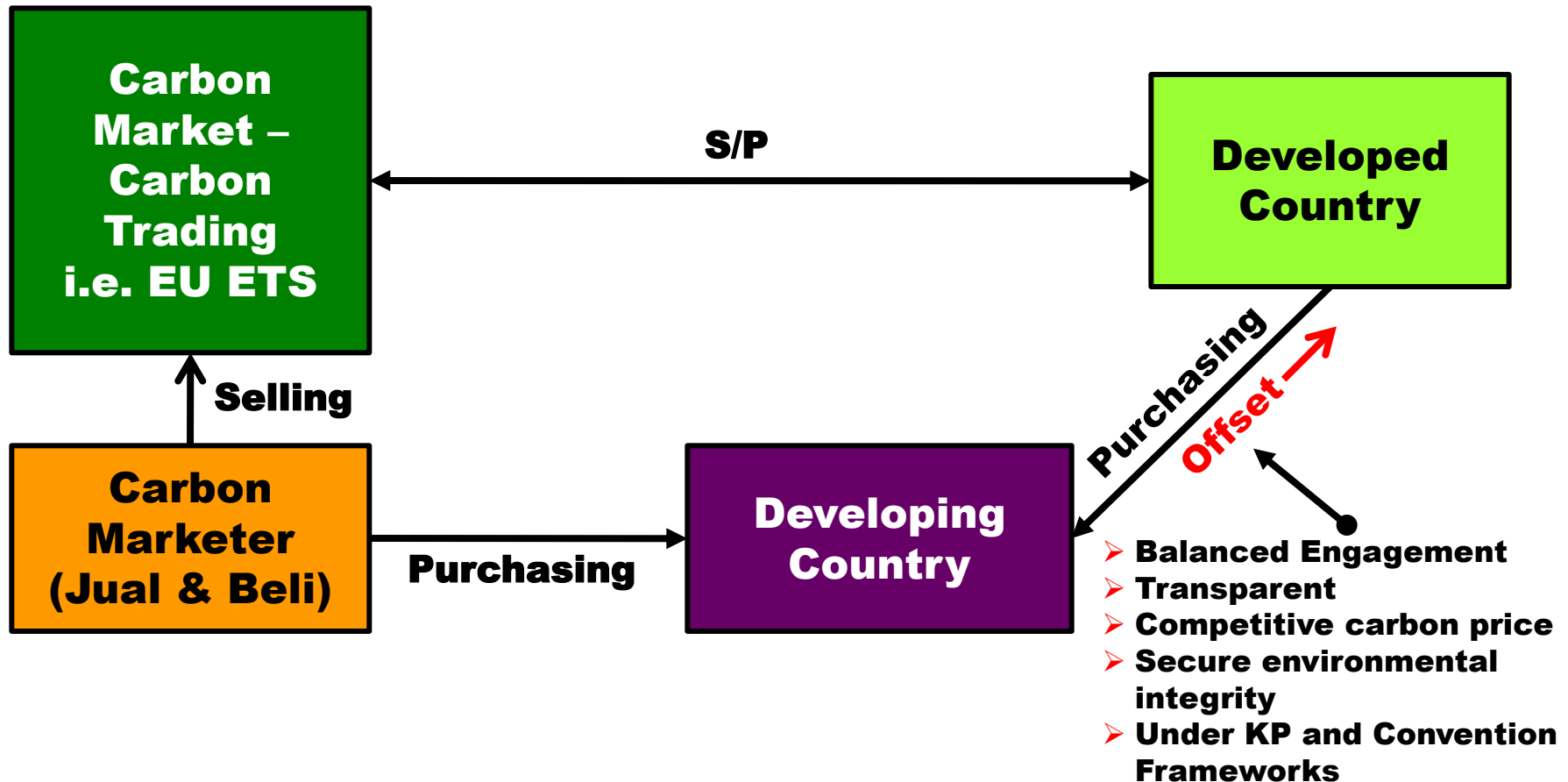
National integrated processes in meeting the national emission reduction target based on cost effectiveness and its implementability level.

Possible Financing Scheme

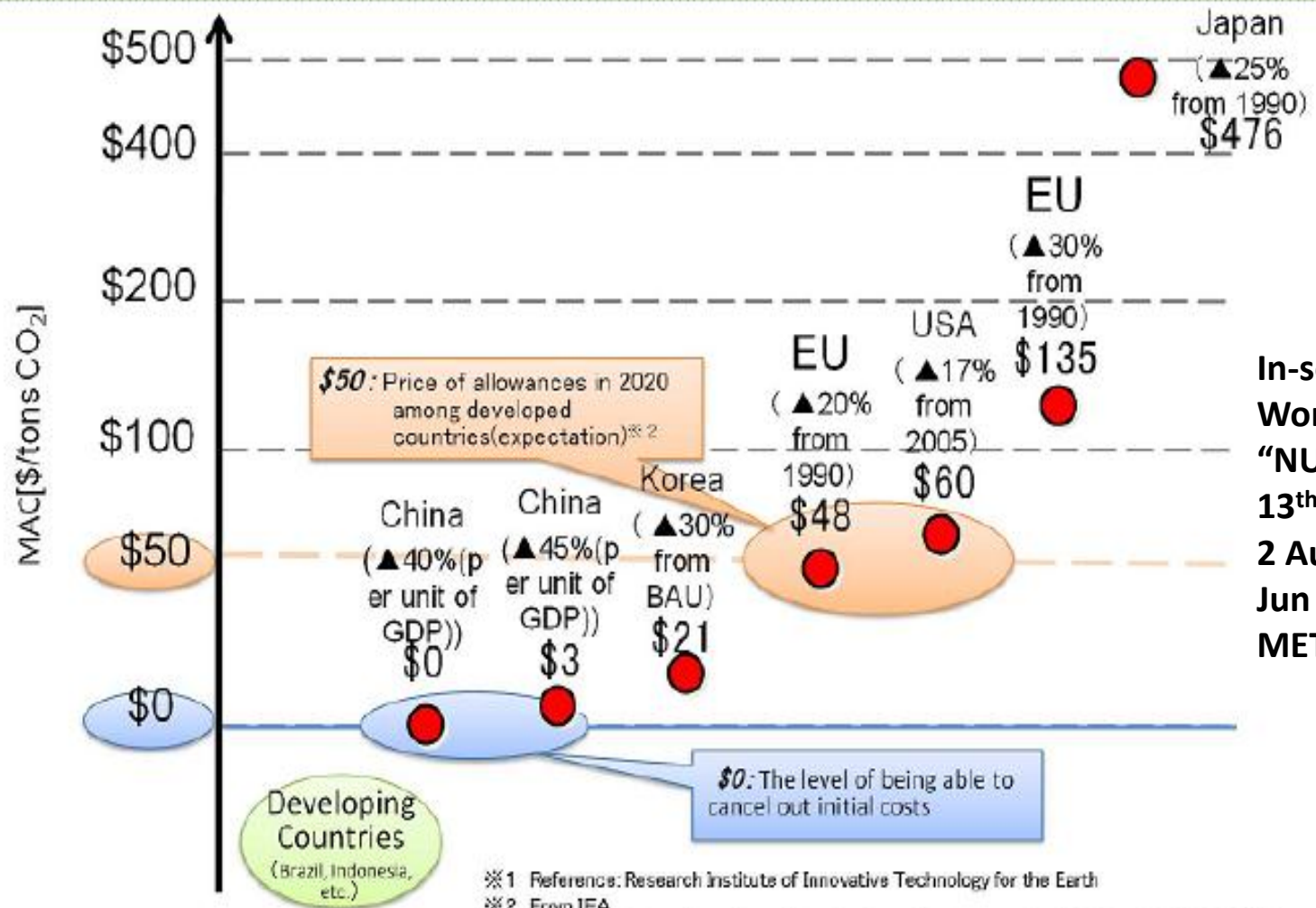


Credited NAMAs

OFFSET Option Perceptions



- Japan's target is conditional and inscribed under the CA (not KP 2CP).
- MAC of Japan's target is significantly higher than those of other AI and N-AI Parties.



In-session
Workshop on
“NUMBER”;
13th AWG-KP,
2 August 2010;
Jun Arima,
METI, Japan.

※1 Reference: Research Institute of Innovative Technology for the Earth

※2 From IEA

※3 China proclaims to lower its carbon dioxide emissions per unit of GDP by 40–45% by 2020 compared to the 2005 level.

The Need of Predictable Carbon Prices

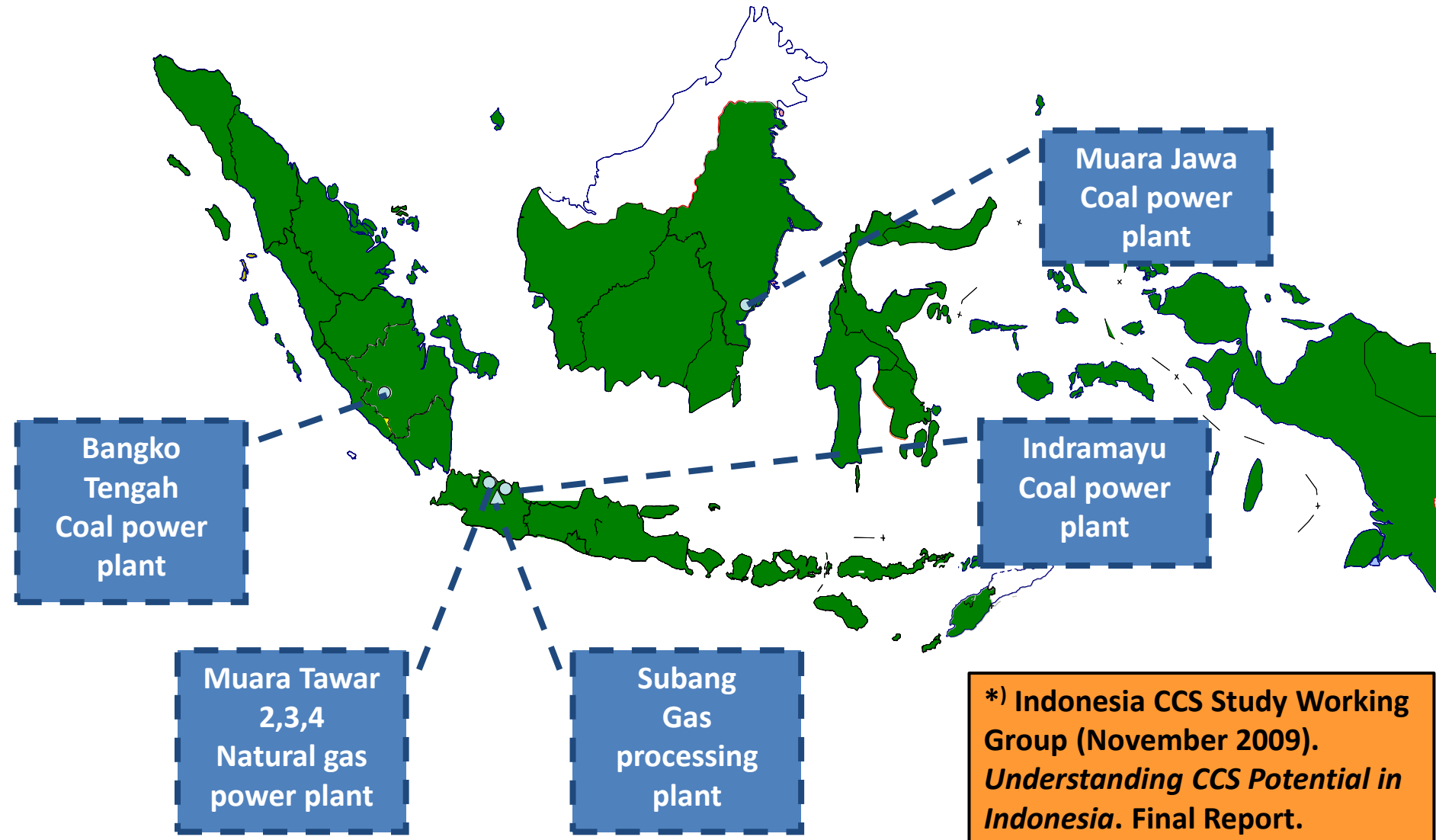


Opera House, Centro Historico, Mexico City, 8 Nov'08

The Main Part of the Study - CO₂ Emission Sources

4 Power Plants & 1 Gas Processing Plant

CCS Capture Options



CO₂ Sources, Geological Potential Storage Locations & Estimated Avoided Costs

CO₂ Sources	Geological Potential Storage Location	Pipeline Distance (Km)	Estimated Avoided Cost (US\$/tCO₂)
Indramayu 1000 MW Steam Coal Power Plant	South Sumatra region (onshore)	655	62.1 (versus 1000 MW plant without capture)
Muara Tawar 750 MW NGCC Power Plant	North Jawa sea (offshore)	15	71.4 (versus NGCC without capture)
Bangko Tengah 600 MW Steam Coal Power Plant	South Sumatra region (onshore)	60	56.2 (versus 600 MW plant without capture)
Muara Jawa 100 MW Steam Coal Power Plant	East Kalimantan region (onshore)	60	76.3 (versus 100 MW plant without capture)
Subang Field Natural Gas Processing Plant	North Jawa sea (offshore)	79.7	10.7 (cost of compressing)

Cost of Various Components of a CCS System

CCS System Components		Cost Range	Remarks
Capture	From a coal or gas fired power plant	15 – 75 US\$/tCO ₂ net captured	Net costs of captured CO ₂ compared to the same plant without capture
	From hydrogen & ammonia production or gas processing	5 – 55 US\$/tCO ₂ net captured	Applies to high-purity sources requiring simple drying and compression.
	From other industrial sources	25 – 115 US\$/tCO ₂ net captured	Range reflects use of a number of different technologies and fuels.
Transportation	Via pipeline or ship	1 – 8 US\$/tCO ₂ transported	Per 250 km pipeline or shipping for mass flow rates of 5 (high end) to 40 (low end) MtCO ₂ /yr.
Storage	Geological storage*	0.5 – 8 US\$/tCO ₂ net injected	Excluding potential revenues from EOR or Enhanced Coal Bed Methane (ECBM).
	Geological storage: monitoring & verification	0.1 – 0.3 US\$/tCO ₂ injected	This covers pre-injection, injection, and post injection monitoring, and depends on the regulatory requirements.
	Ocean storage	5 – 30 US\$/tCO ₂ net injected	Including offshore transportation of 100-500 km, excluding monitoring and verification.

* Over the long-term, there may be additional costs for remediation and liabilities; *Source*: Carbon Dioxide Capture and Storage, Summary for Policymakers and Technical Summary, IPCC, 2006.

Transfer Technology to Developing Countries and Delivering Emission Reductions

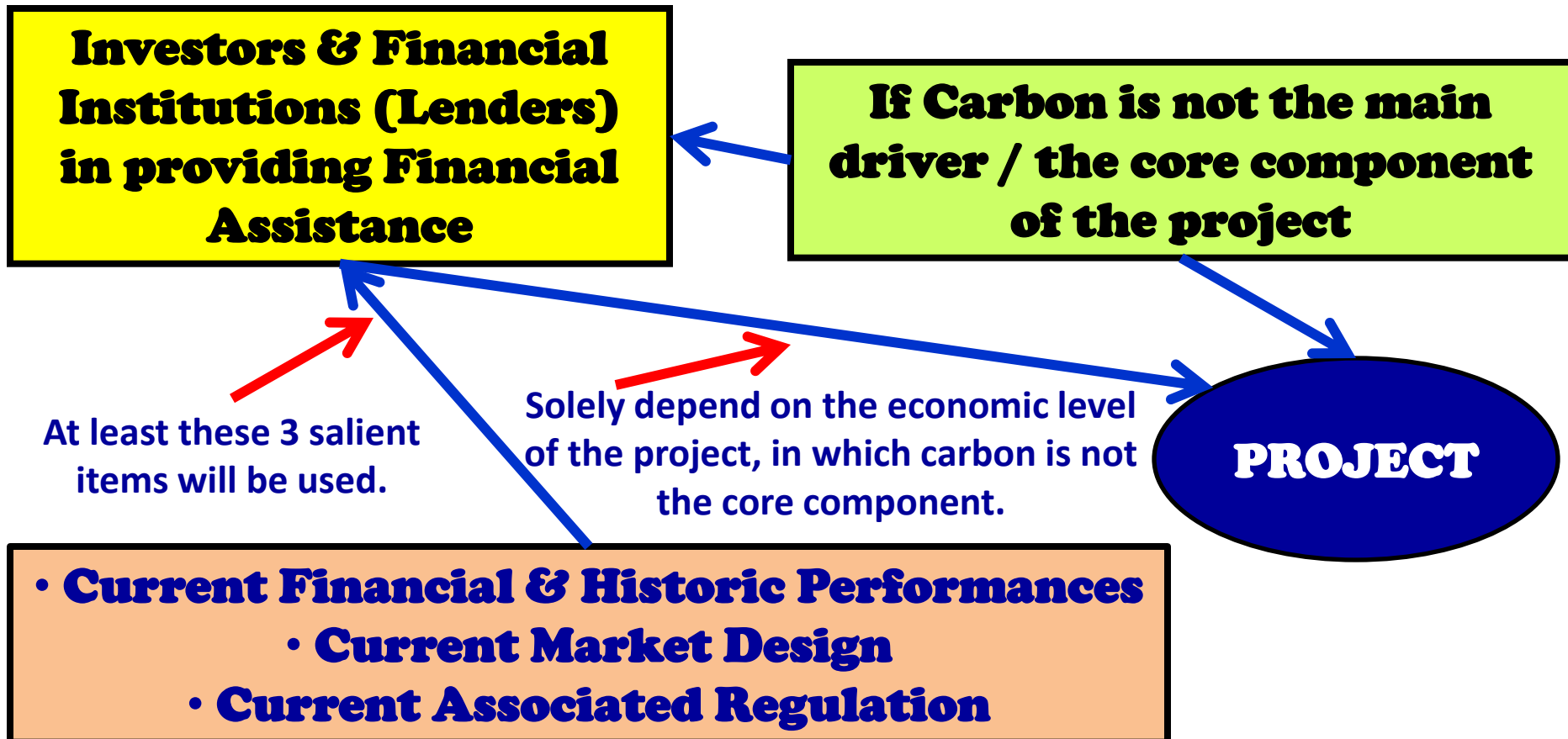
- CCS would provide an important contribution to the development of the technology and its transfer to developing countries.
- CCS can support potentially the objective of the Convention in delivering emission reductions, however its cost effectiveness still remains a key issue, cost reduction particularly at capture side is strongly required.
- A coordinated international CCS pilot project is strongly required in developing countries that may also provide important direction and opportunities for reducing costs of CCS technology.



Funding, Carbon Policies and Trading Scheme

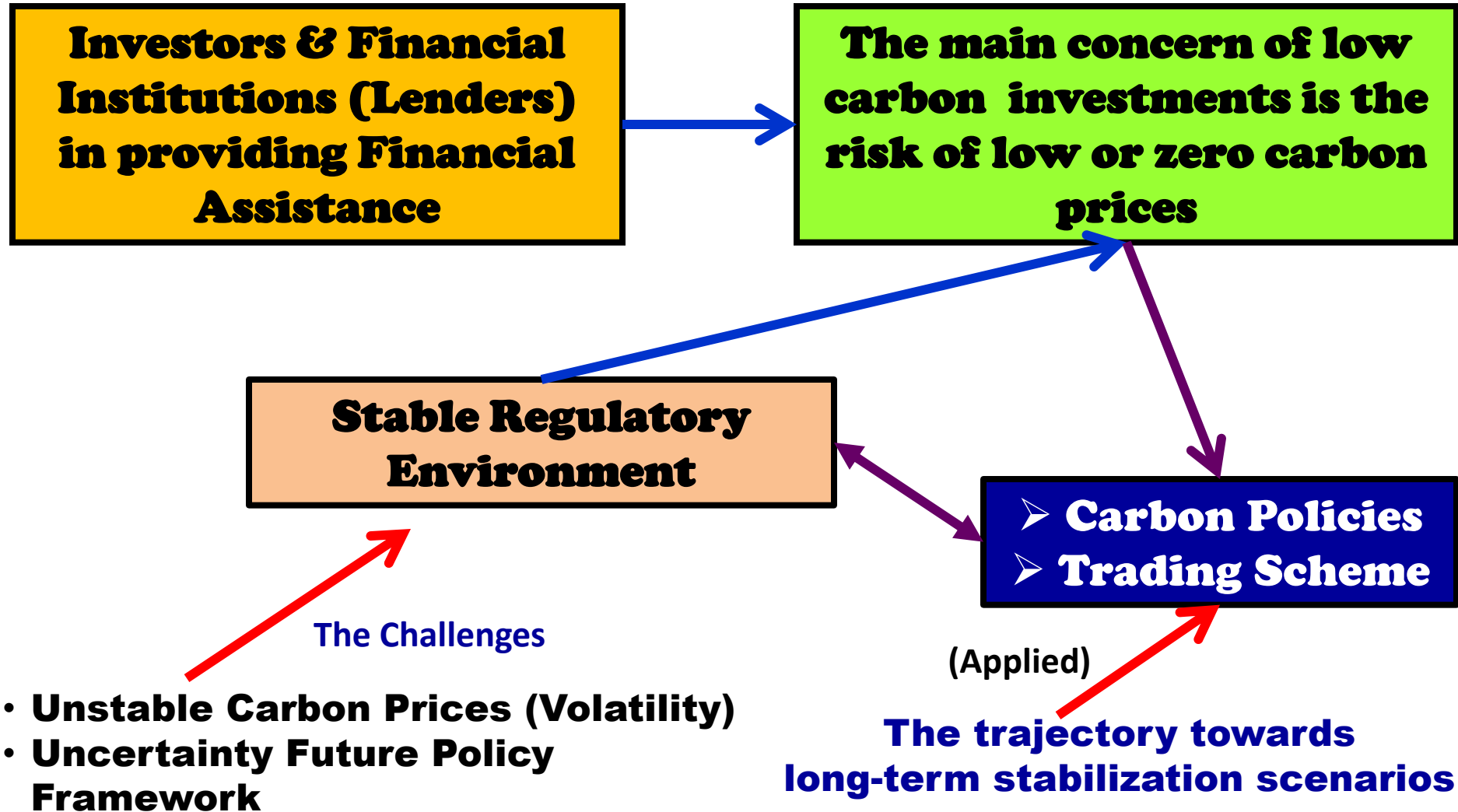
- If the funding available under the financial mechanism of the Convention remains at its current level and continues to rely mainly on voluntary contributions, it will not be sufficient to address the future financial flows estimated to be needed for mitigation and adaptation (transfers of resources and technologies from the developed countries). Additional external funding will be required, particularly for sectors in developing countries that depend on government investment and financial flows.
- The expansion of the carbon market and the auction of allowances for emissions, could generate revenues commensurate with the additional needs can be one of the options.
- CCS-EOR can be one the viable options in financing pilot projects, together with the government supports to render CCS trust fund.

Need of Predictable Carbon Prices



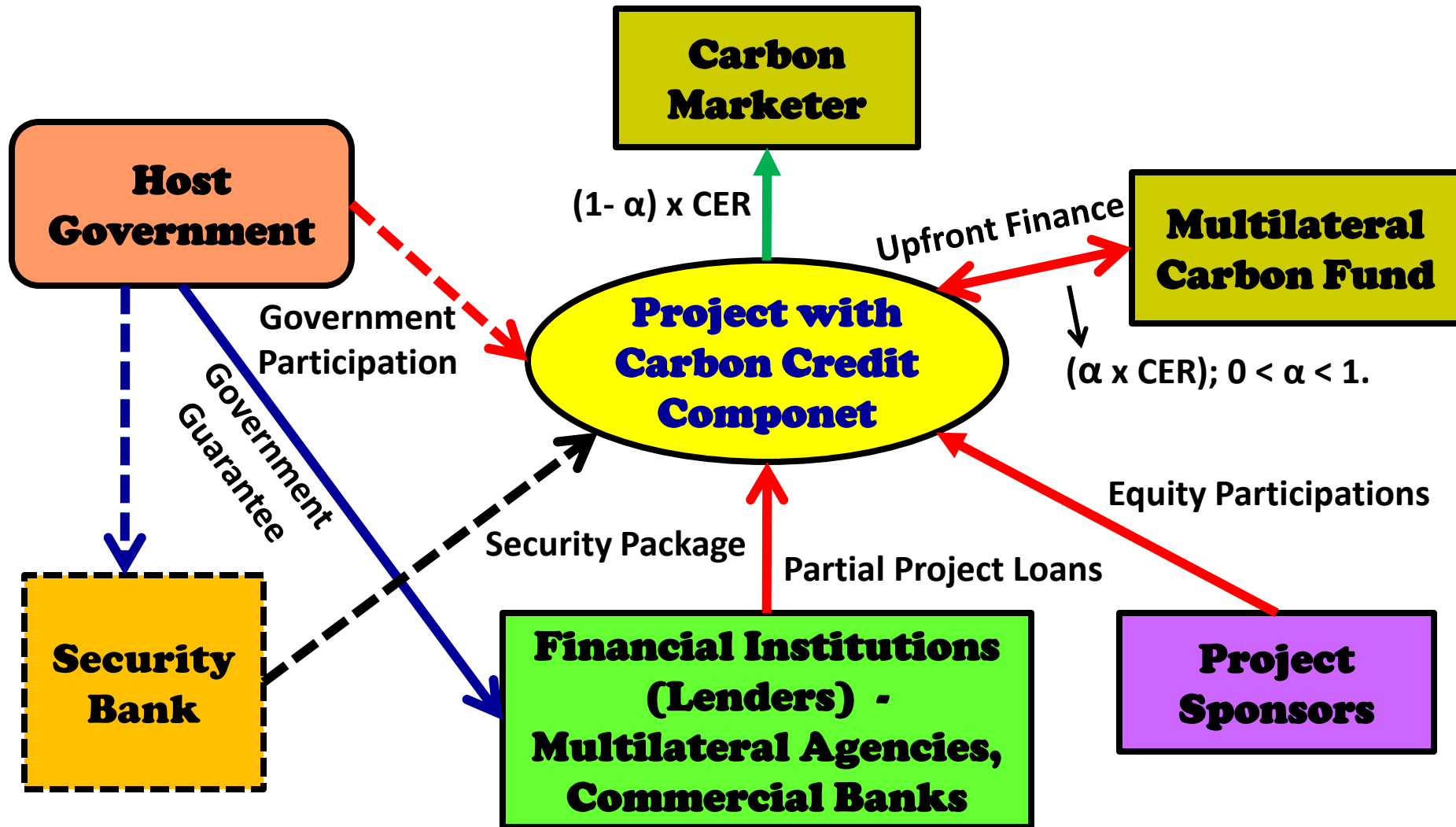
Karsten Neuhoff; "Tackling carbon – How to Price Carbon for Climate Policy", University of Cambridge, Electricity Policy Research Group, Version 1.0, May 23, 2008.

Need of Predictable Carbon Prices



POSSIBLE FINANCING SCHEME

(Basic Elements – Global Carbon Market)



FINANCING CHALLENGES IN INDONESIA

- **Lack of awareness on climate change and the role of CCS**

The relatively low level of understanding amongst the key stakeholders (incl. policymakers, financial players) on the gravity of climate change issue and the role that CCS needs to play will make it difficult to secure financing.

- **Competition with “mainstream” projects**

“Mainstream” carbon reduction projects (e.g. geothermal, solar, waste management, etc.) will likely still dominate the competition for low-carbon finance in Indonesia, leaving very little room for Biomass + CCS.

- **Lack of CO₂ price and weak demand for CO₂ reduction**

The absence of domestic CO₂ price and the weak international CO₂ price provides very little incentives to commercially pursue Bioenergy + CCS projects.







- **Price of electricity**

The regulated (low) price for electricity disincentivises innovative low carbon source of power such as Bioenergy + CCS.

FINANCING OPPORTUNITIES FOR INDONESIA

- **Clean Development Mechanism (CDM) modalities & procedures**
CCS is now recognised under the CDM with a set of modalities and procedures. These procedures set an international precedent that can be used by other financing schemes including potential new carbon market(s).
- **Feed-in tariff system**
Recognising Bioenergy + CCS as part of a Feed-in tariff system will provide needed incentive to finance and invest in such projects.
- **Multischeme financing**
A Bioenergy + CCS project may attract different financing schemes that could be combined e.g. the Bioenergy Generation stands on its own commercial merit whereas the CCS cost is financed through carbon market, grants, green bonds, or even revenue from potential Enhanced Oil Recovery applications.
- **Bilateral and multilateral cooperation**
Existing and future bilateral / multilateral cooperations on low carbon development and financing may consider Bioenergy + CCS as an attractive and much needed negative emissions projects, provided that the standards and the provisions for the resulting carbon credits are clear.

COMBINING BIOENERGY WITH CCS MAY PROVIDE MORE FINANCING FLEXIBILITY

	BIOENERGY	CCS	BIOENERGY+CCS
Without CO ₂ price			
With CO ₂ price			

 Commercially feasible  Commercially not feasible  Commercially may be feasible

- Because Bioenergy projects could still be commercial without CO₂ price, combining Bioenergy with CCS provides more options and flexibility in the financing scheme.
- Therefore, combining Bioenergy with CCS is an attractive “bridge” to allow deployment of CCS technology until a strong CO₂ price emerge to commercially justify stand-alone CCS projects.

Thank You



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