

Carbon Finance

ANAT PRAPASAWAD

ADVANCE ENERGY PLUS

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WITH AN EMERGING CARBON MARKET WE COULD HELP OPEN BUSINESS OPPORTUNITIES AND INCREASE YOUR COMPETITIVENESS BY CARBON CREDITS REVENUE THROUGH THE RIGHT EXPERTISE AND POSITIVE APPROACH TOWARD NEW DEVELOPMENTS



ADVANCE ENERGY PLUS

Established since March 13, 2007 by a group of experts *with over 15 years experiences* in energy and environment project/ program :

- .The World Bank: Chiller Replacement Program
- .The World Bank: Ozone Project Trust Fund
- .The UNDP: Removal of Barriers for Biomass Generation and Co-Generation Investment Projects in Thailand
- .The Royal Danish Embassy: CDM Capacity Build up Program
- .The Ministry of Energy: Revolving Fund
- .Bank of Thailand: Energy Efficiency and Environment Loan Programs
- .The JBIC: Energy Efficiency and Environment Loan Programs
- .Ministry of Energy: Biodiesel Feasibility Study
- .The World Bank: AEP Livestock CDM Bundling Project
- .ADB: Mainstreaming Energy Efficiency in Thai Municipalities Project
- .AFD: The study on innovative biomass to power technology
- .The World Bank : Program of Activities (PoA) Project



Support Throughout Project Cycle

Project Management Services

Carbon Credit Services

Project Identification

Project Development

Project Approval

Procurement

Project Implementation

Project Operation

**Public
Hearing
Arrangement**

PIN

**Credit
Buyer
Approach**

PDD

**DNA
Registration**

Validation

EB Registration

Monitoring

Verification

CERs Issuance



AEP Experiences

- More than 70 CDM projects in Thailand



Biomass Powerplant



Solar Power



Biogas



Waste-to-Energy



Energy Efficiency



Hydro



แนวโน้มทิศทางการธุรกิจคาร์บอนเครดิตไทย Global Levels

- Cancun Agreement
- Existing market mechanisms are not sufficient
- Lack of practical insight on how to implement new mechanisms
- What current practical elements can be incorporated from CDM into NAMAs
- Can POA be a stepping stone into NAMAs and if yes how and what else will be needed?
- Learning by doing
- Work in progress and expected outcome earliest in 2015



CER/ERU offset use - rules

Fully eligible subject to quality restrictions	Article 11 a sub paragraph
CERs/ERUs issued with respect to emissions reductions made before 2013	2
If no international agreement	
Projects registered before 2013 – emissions reductions made post 2012	3
LDC hosted CERs	4
Bilateral agreements with specific hosts	5
International agreement	
Only projects from countries ratifying that agreement	7
Quality restrictions:	EU Regulation
From May 2013, the use of ERU/CERs from HFC-23 and N ₂ O adipic acid is prohibited. Others can be considered.	



CER/ERU markets biggest question is demand

Potential demand (mt)

	2012	2013-2020	2020 Total
EU			
Sovereign	200	500	700
EU ETS	800	900	1,700
Japan	210	?	210
US	-	?	?
Australia	-	470	470
Others*	40	50	110
Total	1,250	1,920	3,190

Source: Barclays Capital



Quality restrictions: Supply

million CERs	2012		2013 to 2020		2020 total	
	Pipeline	Risk Adj	Pipeline	Risk Adj	Pipeline	Risk Adj
Registered projects	2090	1,200	3,720	2,230	5,810	3,430
HFC-23	477	500	606	636	1,082	1,136
N20	247	272	383	421	630	693
LDC supply	5	1.6	11.5	3.4	16.6	5
At Validation	610	50	3,000	900	3,610	950
HFC-23	-	-	-	-	-	-
N20	6	0.6	126	8	151	8
LDC supply	8	1	44	9	51	10
ERU supply		350				350
TOTAL SUPPLY	2,700	1,600	6,720	3,130	9,420	4,730
Eligible Supply EU ETS	2,700	1,600	5,730	2,073	8,430	3,673

Carbon Markets Post GFC/ Sovereign Debt

State of the carbon markets

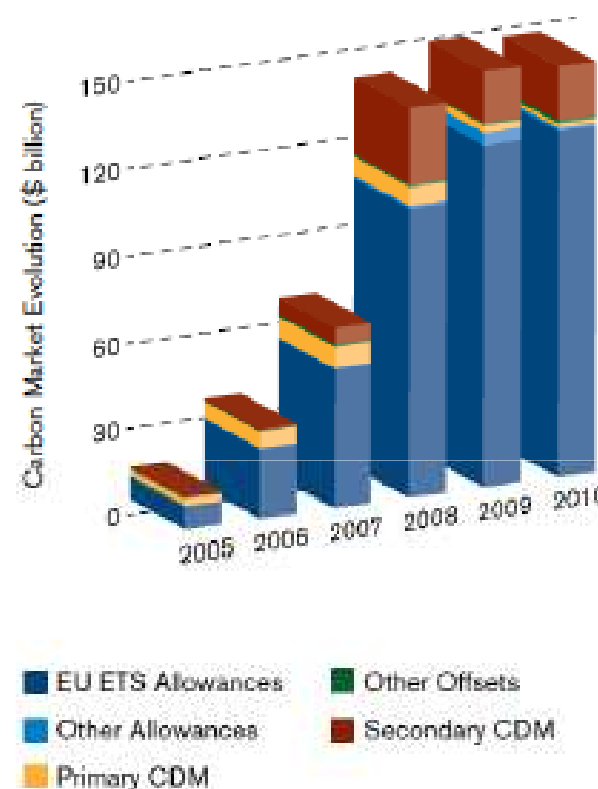
Robust trade but no growth

- 2004 Start to 2008/9 growth
 - 2004 Russia in, started
 - 2005 up to \$11B+
 - 2006 up to \$31.2B+
 - 2007 up to \$63B+
 - 2008 up to \$135.1B+
 - 2009 up to \$143.7B+
 - 2010 stalled at \$141.9B

“Nature doesn’t negotiate”

“Berkeley Earth Project” data from 40K weather stations, data from 1800-2011 and funded by Koch Brothers and others after “Climate Gate”

Findings: “Our biggest surprise was that the new results agreed so closely with the warming values published previously”



Sources: World Bank, Thomson Reuters Point Carbon, Bloomberg New Energy Finance, and Ecosystem Marketplace

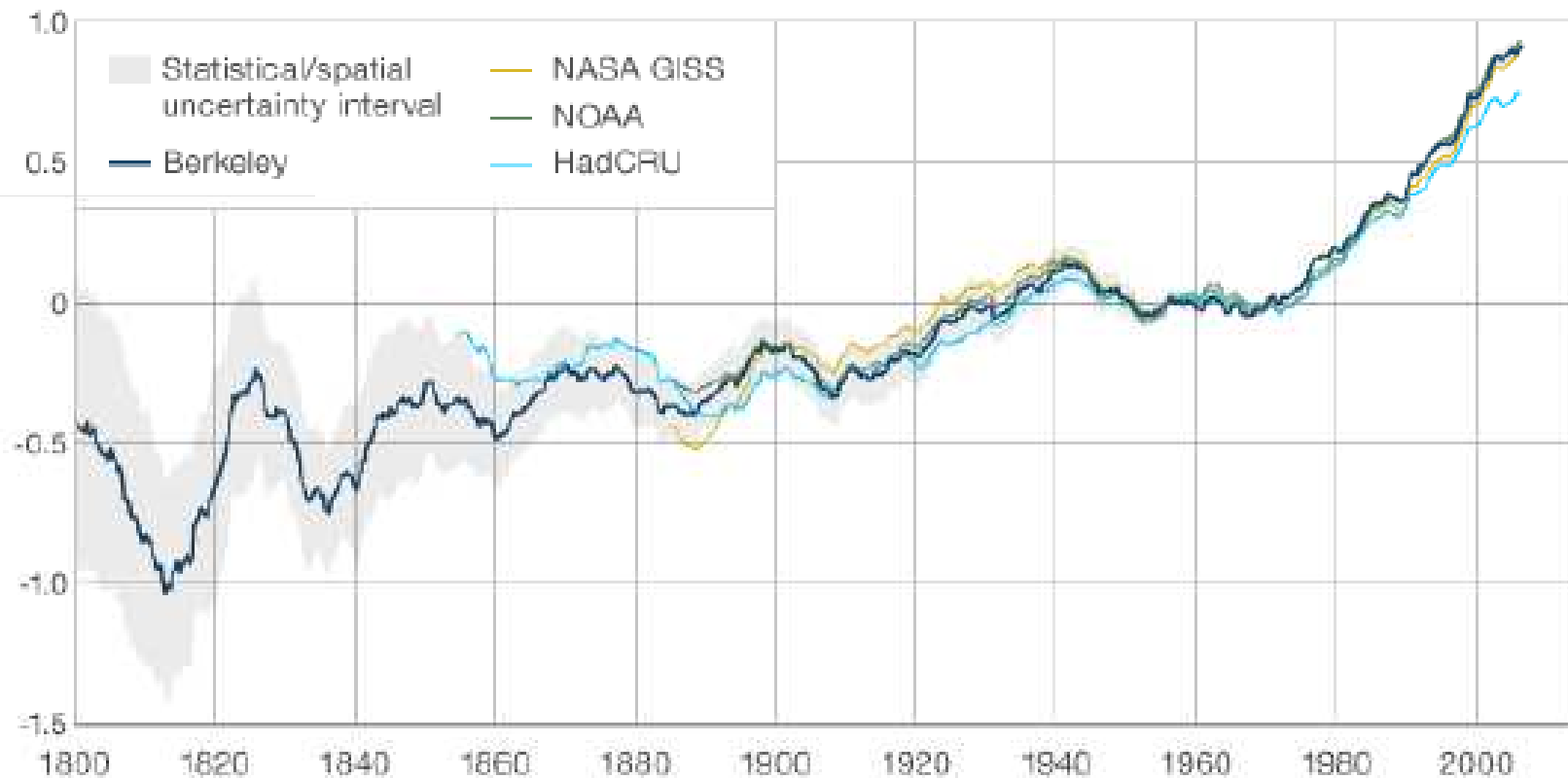


Carbon Markets Post GFC/ Sovereign Debt

Carbon prices may go up or down but the temperature just goes up

Decadal land-surface average temperature

Temperature anomaly (°C)



Source: Berkeley Earth Project

Carbon Markets Post GFC/ Sovereign Debt

Carbon Markets will come back, just positioning for the upswing 2015

Policy uncertainty, EU sovereign debt crisis, US policy stalemate

- **International compliance carbon re-booting in 3 years to 2015**
 - Long term bullish on carbon because nature doesn't negotiate
 - 2010 hottest on record, Bangkok Floods, Australian flood, droughts
 - Fragmented international markets means arbitrage opportunities
 - Japan \$1B deal with Indonesia on low carbon tech, forestry

Voluntary markets are a beacon of hope at \$6 average

- **Voluntary markets grew 34% in volume and to triple to 2015**
 - Voluntary carbon markets grew to at least \$424 million 2010
 - 2010, total volume of 131.2 MtCO₂e transacted vs 98 MtCO₂e transacted in 2009, up 34% “over-the-counter” (OTC)
 - 2015, suppliers' predicted a market size to triple to 406 MtCO₂e

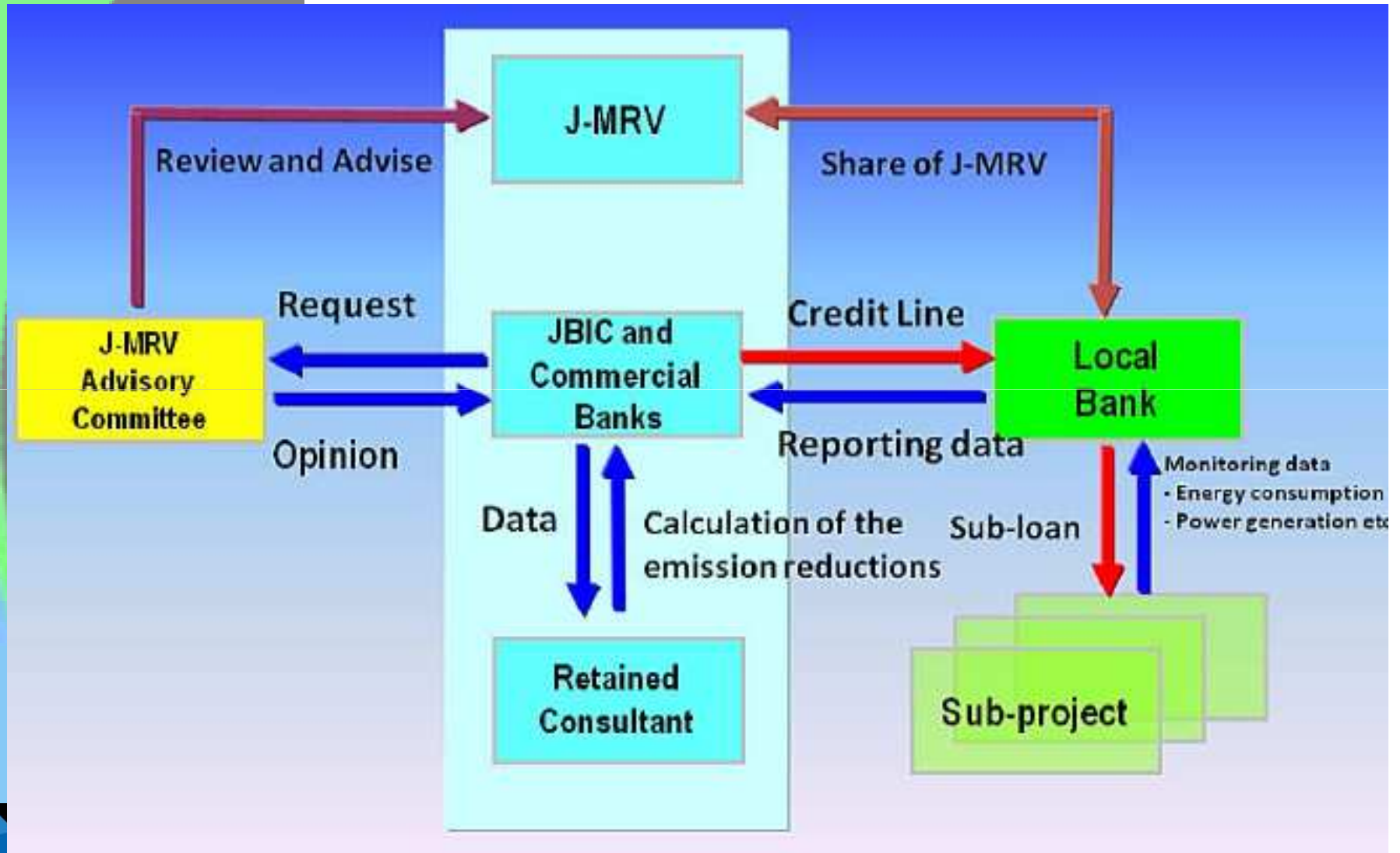
Carbon Markets Post GFC/ Sovereign Debt

30.1M tCO₂e Forest carbon contracted with \$432M to date

Voluntary forest carbon projects continue to grow

- Forest carbon projects exceeded record-breaking years in 2008 and 2009, respondents reported a total of 30.1 million metric tonnes of carbon dioxide equivalent (MtCO₂e) contracted across the primary and secondary markets in 2010
- The estimated total value of transactions in 2010 was \$178 million
- Historic scale of the forest carbon markets climbed to 75 MtCO₂e, valued at an estimated \$432 million with projects impacting more than 7.9 million hectares in 49 countries from every region of the world
- 2010, the volume-weighted average price of credits transacted on the voluntary OTC market fell slightly to \$6/tCO₂e from \$6.5/tCO₂e

Good Practice – Green Credit Line + MRV

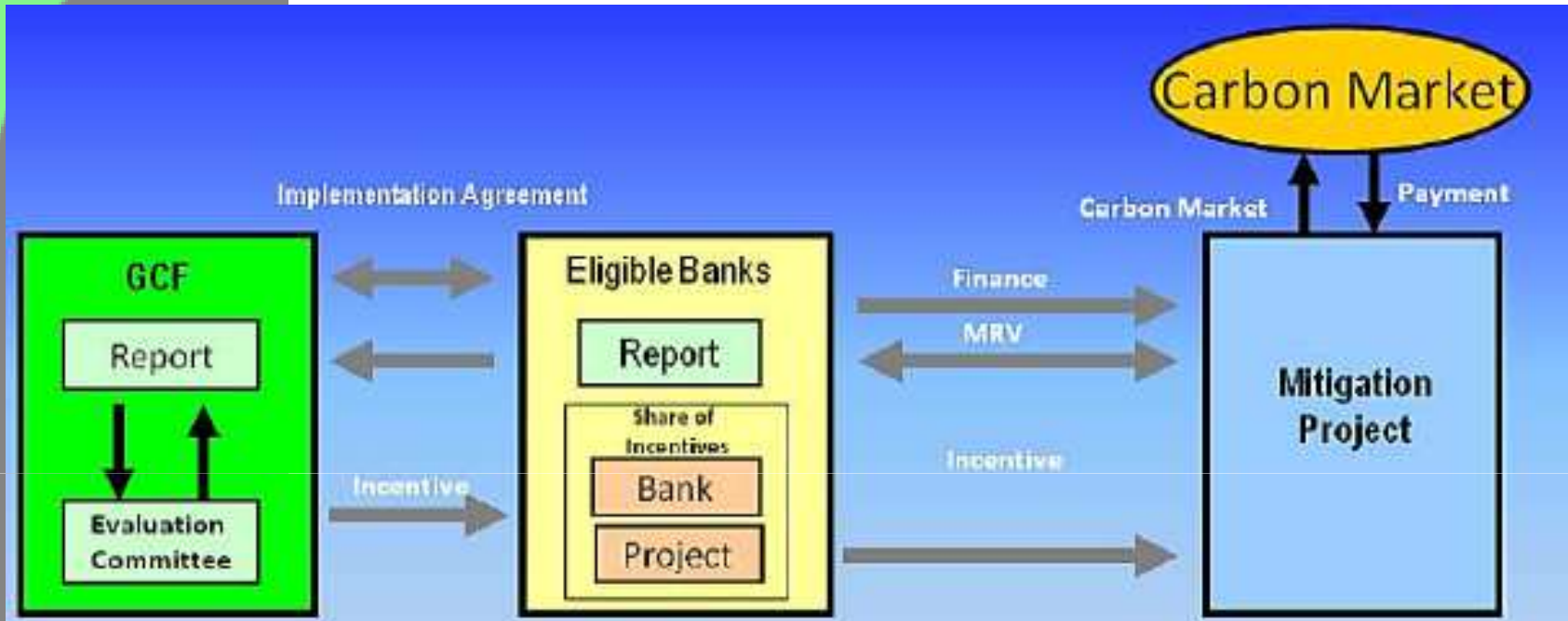


CDM and J - MRV

	Clean Development Mechanism (CDM)	CDM Methodology and J-MRV J-MRV
Purpose	Crediting mechanism under Kyoto Protocol	Confirmation of the emission reductions (A condition of a JBIC's financing program (GREEN))
Principle	Conservativeness	Simple and practical
Facilitation of investment	Facilitate the additional investment	Facilitate the emission reduction projects globally
Reduction	Baseline emission – projects emission	Baseline emission – projects emission
Baseline emission	Emission without the project. Technology and financial additionalities shall be considered	Actual emission before the investment. National average or mission from the installations before investment
Measurement	Physical measurement is in principle	Estimation by using theoretical value and sampling are allowed as practical one
Minor effect	Why "Minor " is needed to be proved	Minor effect can be deducted by the certain rule
Approach	Bottom up	Top down and put high priority on the consistency



GCF and Performance-base Incentive System

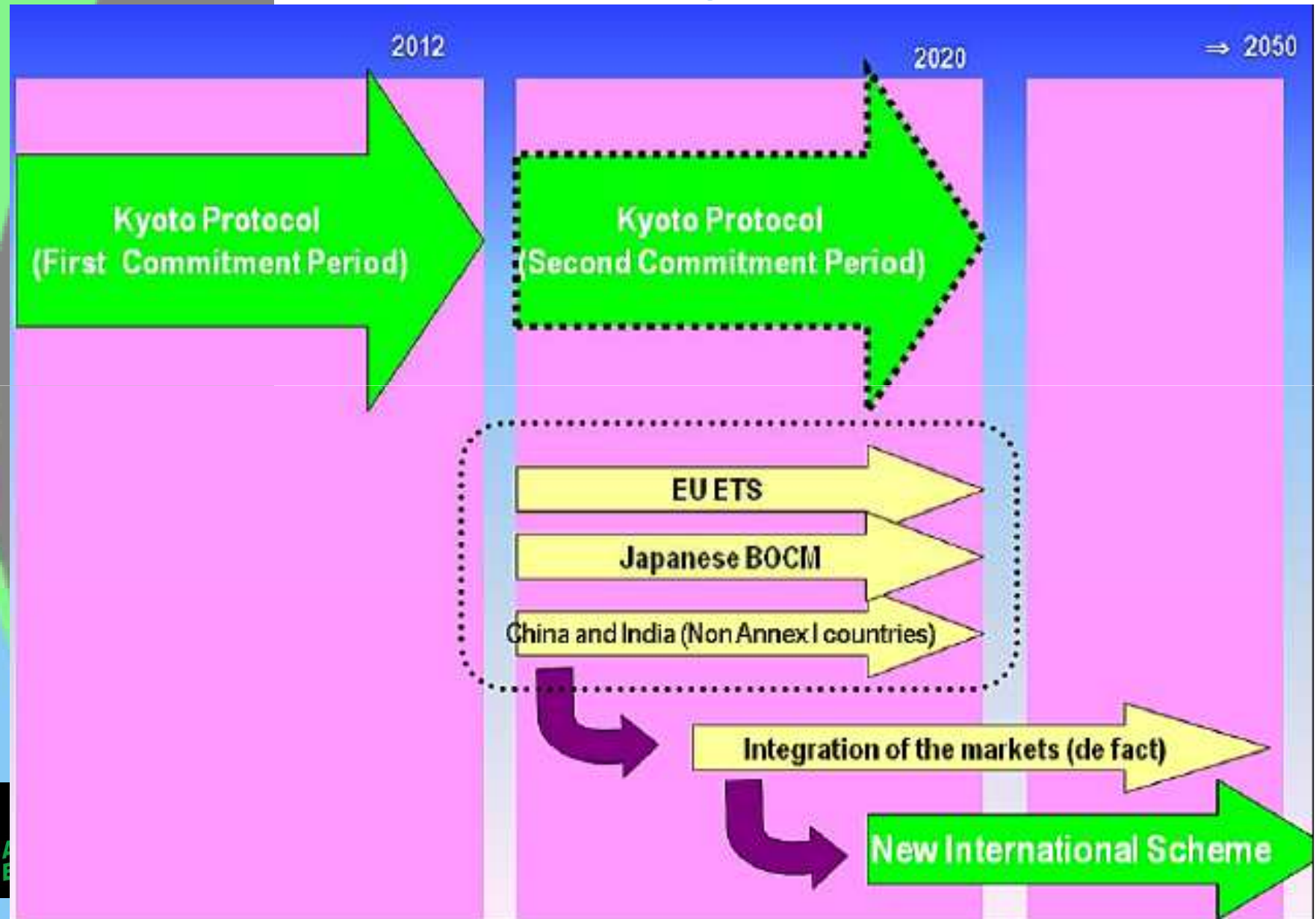


Eligible Project:	CO2 emission reduction project
Amount of Incentive:	Depending on CO2 emission reductions Price is pre-fixed by GCF
Eligible Banks:	Banks able to manage MRV process defined by GCF
Role of GCF:	Delivery of incentives and administration of Evaluation Committee

- Low financial risk for GCF → Realizing small capacity of GCF
- Use incentives effectively
- Wide Window ⇒ Support many and varieties of private projects



Carbon Market beyond 2012



Trends for the Carbon Markets

1. Shift Towards Regional Trending Schemes
2. Scaled-up Market Mechanism

(Single CDM → Bundling CDM → POAs → Sectorals → NAMAs)



Carbon Finance

- This term generally use when a project is considering “Carbon Asset Value” in the investment analysis
- Carbon Finance involves calculation of “the amount of GHG emission reduction and estimating the price of credits and the length of the purchasing period”



Carbon Finance

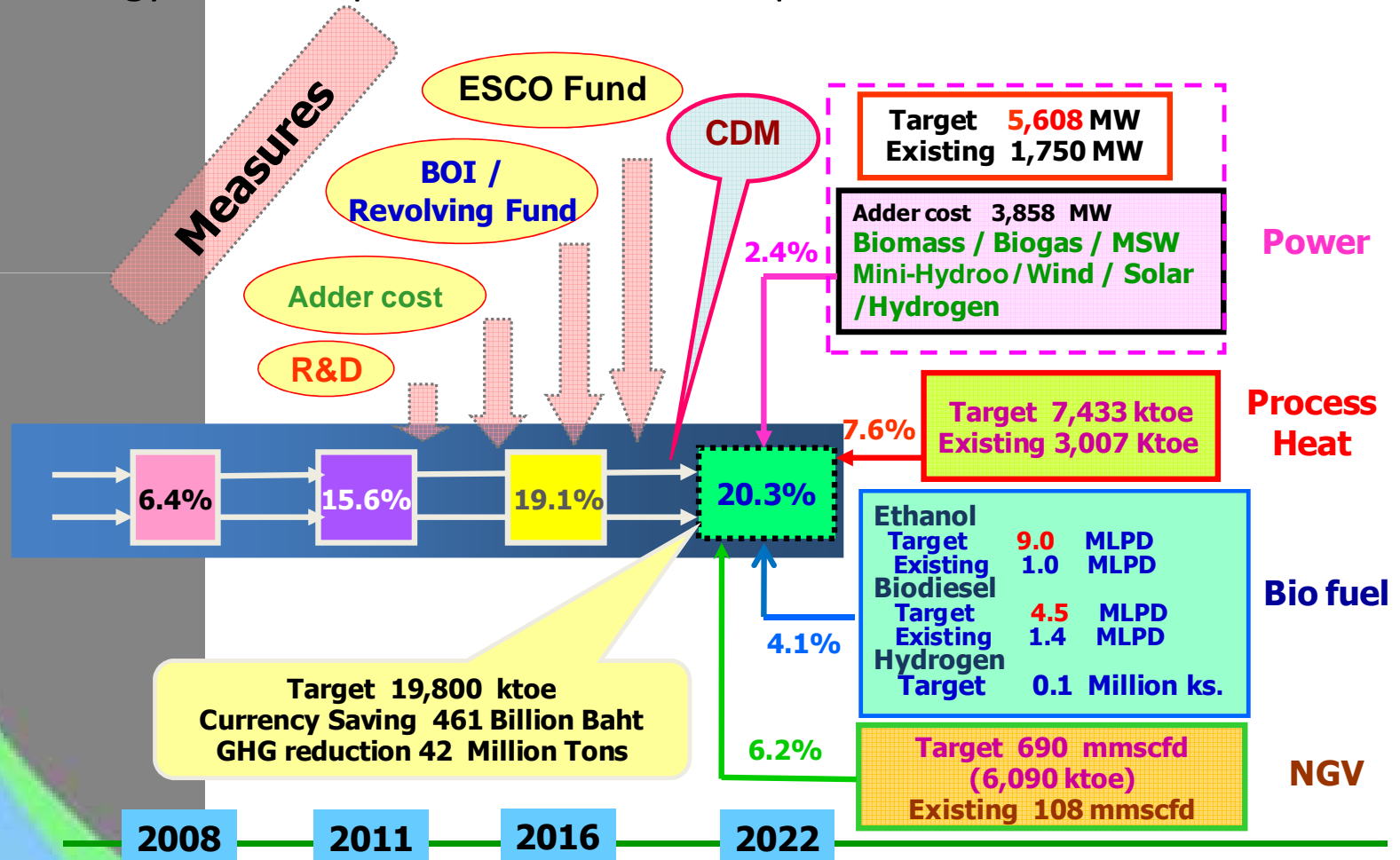
The Carbon Asset can be used for many purposes and help mitigate many barriers

1. Upfront financing
2. Mezzanine finance
3. More easy to access equity
4. Using to structure innovative programs like POAs
5. Using to structure programs to access to the EU restriction market
6. Using for other innovative mechanisms like J-MRV



Alternative Energy Development Plan (AEDP) (2008 - 2022)

- Alternative Energy Development Plan (AEDP) target to increase the share of alternative energy from 6.4 percent in 2008 to 14 percent in 2022.



Status

Type	Potential (MW) 1/	Target (MW) (Gov.) up to 2022 1/	Approved License (MW) 2/	Connected to grid (MW) 2/	Current Adder (Bht / kWh)
Solar	50,000	500	2,219	42	8
Wind	1,600	800	610	0.38	3.5 – 4.5
Biomass	4,400	3,700	1,897	675	0.3 - 0.5
Biogas	190	600	107	75	0.3 - 0.5
MSW	400	160	116	30	2.5 – 3.5

1/ Department of Alternative Energy Development and Efficiency, Ministry of Energy

2/ SPP & VSPP status - as of Mar 2011, Power Policy Bureau Energy Policy and Planning Office, Ministry of Energy



Solar Technology

- Type: Solar Thermal, Solar Drying, Solar Cooling, Solar PV
- Critical Issues:
 1. Adder new Feed-in-Tariff (Solar Farm)
 2. Focus should be more on Solar Rooftop (proposed 10-13 Bht/kWh for 10-15 yrs)
 3. Difficult to acquired contract & licenses for Solar Farm
 4. New regulation on land use may impact on Solar Farm
 5. Local content will be an issue on near future
 6. Difficult to obtain bank approval
 7. Finance



Wind Power

- Type: Small Scale Wind Turbine VS. Big Wind Farm
- Critical Issues:
 1. For Big Wind Farm, complication due to involvement of 4 ministries (each has its own law, regulation)
 2. For Big Wind Farm, potential areas are difficult to access (1A or 1B)
 3. Average wind velocity is 4.5 m/s
 4. Unreliability wind map
 5. Proposed Adder for very small wind turbine
<100 kW : 10 Bht/kWh,
for 100 kW to <1MW : 6 Bht/kWh
>=1 MW : 4 Bht/kWh
 6. Finance



Biomass Project

- Critical Issues:
 1. No more easy access feedstock project
 2. Target need to be revised or;
 3. Need of innovation and new incentives
- Measurement to meet the target
 1. Promotion for fast growing plant
 2. Community should be involved
 3. Revision on policy and regulation
 4. Adder \square depend on sources;
 - Biomass from industrial waste (by product); 0.3 – 1 Bht/kWh
 - Biomass from fast growing crop plantation, biomass which remaining in field after harvest, root, etc.; 1-2 Bht/kWh



Biogas Project

- Type: any digester using waste from process, digester using crop
- Critical Issues:
 1. Some sector like starch factory, preferably using biogas for process
 2. Most of potential projects in starch plants and palm oil mills have installed digester system
 3. Small and low operating hrs plants are not viable to install digester system
 4. Difficult wastewater from some sectors is challenging
 5. Future of this project type depending on government policy on biogas from crop
- Adder: Proposed from business group
 1. From wastewater, < 1MW = 0.50 Bht/kWh
> 1 MW = 0.30 Bht/kWh
 2. From crops, < 1MW = 4.00 Bht/kWh
> 1 MW = 3.00 Bht/kWh



MSW to Energy Project

- Type: Thermal process, Landfill Gas
- Critical Issues:
 1. Policy and Regulation need to be revised (reduction target, regulation barriers, better waste management from sources, new incentives, etc.)
 2. What Adders that investors needs?

Landfill Gas

<1.5 MW = 3.5 Bht/kWh

>1.5 MW = 2.5 Bht/kWh

Thermal Process

1.5 MW = 4.5 Bht/kWh

>1.5 MW = 3.5 Bht/kWh



What should be a new goal for year 2022 from private sector point of view?

Type	Target	Requested new Adder (Bht/kWh)
Solar	2,000 – 2,500 MW	10 -13
Wind	800 MW (unlikely)	4-10
Biomass	5,000 MW	0.3 - 2
Biogas	1,000 MW	0.3 – 4
MSW	500 MW	2.5 – 4.5



THANK YOU

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anat_p@aep.co.th

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