Summary of Discussions
Special Meeting of the GMS Subregional Energy Sector Forum (Special SEF)
Bangkok, Thailand, 18-19 March 2009

1. **Objectives.** The Special SEF meeting was held to refine and finalize the GMS Road Map for Expanded Energy Cooperation, for endorsing it to the 15th GMS Ministerial Meeting to be held in Thailand in June 2009. Formulated in line with the recommendations of the recently-completed GMS Energy Strategy Study, the Road Map was earlier presented at the SEF meeting in Ho Chi Minh City, Viet Nam and at the GMS Senior Officials' Meeting (SOM) in Bangkok, Thailand, both held in November 2008. These meetings agreed to further review and hold internal consultations on the Road Map. The special meeting of the SEF will incorporate the results of the internal review of the Road Map by the GMS countries.

2. Since the Road Map is one of the key items expected to be endorsed at the 15th GMS Ministerial Meeting, the Special SEF meeting will specifically undertake the following: (i) discuss the countries' views on the Road Map, to guide in refining and readying the Road Map for final review of the countries by mid-April 2009 and for endorsement by GMS Ministers at the 15th GMS Ministerial Meeting; and (ii) plan the next steps with respect to the Road Map, such as formulating the detailed proposals and identifying possible partnerships in implementing these.

3. The Special SEF meeting was held in Bangkok, Thailand on 18-19 March 2009 and co-organized by the Energy Policy and Planning Office (EPPO) of Thailand, and the Asian Development Bank (ADB). It was co-chaired by Mr. Chavalit Pichalai, Deputy Director General, EPPO Thailand, and Mr. Yongping Zhai, Lead Professional (Energy), Energy and Water Division, Southeast Asia Department, ADB. It was attended by representatives of the six GMS member countries, as well as by representatives of ADB and Environment Operations Center (EOC). Attached is the agenda and program of the meeting (**Annex 1**) and the list of Special SEF participants (**Annex 2**).

Opening Session

4. Mr. Chavalit Pichalai, Deputy Director General, EPPO of Thailand, warmly welcomed the participants to Thailand and noted the current efforts to expand cooperation to other energy subsectors resulting from last year's energy strategy study. He said the Road Map would be reviewed, revised and finalized for endorsement at the 15th GMS Ministerial Meeting in Thailand in June 2009. He cited the emerging areas of cooperation that would mitigate global warming and lower carbon emissions of the subregion, such as renewable energy, clean coal technology, energy efficiency and conservation, and nuclear energy. He said the Thai Government's policy emphasis is on exploration and development of local energy resources, e.g., biomass, solar, and wind energy, which will reduce dependence on fossil fuels and enhance agriculture incomes. He cited the need for cooperation in technology exchanges such as in clean coal technology experience of PRC and said that detailed priority projects in the Road Map provide opportunities for technology sharing. He expressed confidence that GMS energy cooperation would be rewarded with attainment of the GMS vision of sustainable and equitable development. He thanked ADB for its support and wished everyone successful deliberations and a pleasant time in Thailand.

5. Mr. Yongping Zhai of ADB welcomed the participants and thanked Thailand for the hospitality and excellent meeting arrangements. He explained the meeting's special purpose, e.g., to refine and finalize the GMS Road Map for Expanded Energy Cooperation for

endorsement to the 15th GMS Ministerial Conference in June 2009. He recalled the review process that the Road Map underwent since it was first presented at the SEF-2 in Ho Chi Minh City in November last year. He said comments received from the countries since then provided the basis for the changes reflected in the revised Road Map, which will be presented later. Discussions would also focus on the Road Map's linkages with ADB's Climate Change Implementation Plan (CCIP) and the GMS Core Environment Program. Later on the meeting would tackle the process and timeline for clearing the Road Map for endorsement by the countries, and the next steps to further refine it, such as the development of detailed project proposals starting with the three identified projects whose concept papers would also be presented later. He wished everyone a productive meeting.

Country Comments on the GMS Road Map for Expanded Energy Cooperation

6. Mr. Zhai gave a quick presentation of the revised Road Map (**Annex 3**) based on the comments given by the GMS countries since the SEF-2 meeting in November 2008. He recalled the rationale for expanding GMS energy cooperation and the recent progress and pending issues, and showed the comments received from the countries he used as basis for further revising the Road Map. He outlined the revised Road Map's goal and strategic objectives and policy framework, and presented the detailed work plan listing the priority proposals for 2009-2015. Mr. Tito Tranquilino, Consultant, ADB, briefly discussed the general concepts of three priority project proposals and invited comments on the possible scope, specific activities and financing plan for these projects. Mr. Zhai requested the participants' views on the general framework of the Road Map, and their views on inclusion in the Road Map of cooperation projects in coal and nuclear energy.

7. **Discussions**. The meeting raised the following points on the revised Road Map:

a. Lao PDR representative noted that the revised Road Map reflects the views of the countries and is now better structured and more focused and achievable. He suggested that the framework explicitly mention cooperation between energy and the transport, agriculture and tourism sectors. He said that small and medium enterprises (SMEs) should be the focus of the Road Map in promoting private participation in energy development.

b. Thai representative agreed with Lao PDR on the proposed SME focus of the Road Map as far as private sector participation is concerned. He noted that Carbon Capture and Storage (CCS) technology is still in the pilot stage and that the Road Map should instead focus on improving efficiency of existing plants in order to reduce carbon emissions. He suggested for the Road Map to include the sharing of community best practices in biofuels, as well as in increasing awareness of energy efficiency in the residential sector.

c. Cambodia representative noted the Road Map's similarity with its Strategic Planning and Management (SPM) document for the energy sector, developed as a result of the Johannesburg Earth Summit in 2002. He noted Cambodia's low electrification rate (20%) which needs to be improved, and the priority being accorded to development of renewable energy for off-grid power systems.

d. Viet Nam representative noted that the revised Road Map is consistent with Viet Nam's national policies. He further noted the need for appropriate financial incentives for promoting renewable energy. He said Viet Nam is looking at nuclear energy development within 10-15 years but conceded that complex issues needed to be dealt

with. He proposed that PRC share its experiences in overcoming initial barriers in nuclear energy development.

e. PRC representative proposed special attention to enhancing the poor's access to modern energy and thus promote poverty reduction. He suggested that in developing best practices to improve efficiency of thermal plants, mention should be made to promote clean coal technology in general, instead of just IGCC specifically. In regional energy planning, he suggested cooperation through exchange of information and best practices in each country's five-year plans. He noted that PRC has increased its target share of renewable energy from 10% to 15% of total energy; in this case renewable energy includes natural gas and nuclear energy sources.

f. Myanmar representative reiterated its earlier comments that the Road Map projects should be complementary to the ASEAN energy cooperation program. He said Myanmar would like to include promotion of Clean Coal Technology as well as development of coal- fired power plant in the Road Map and looks forward to PRC sharing its experience in this field. Myanmar currently has no nuclear electrification plan, but will support SEF's suggestion to include study of nuclear in the Road Map for future consideration.

Mainstreaming Climate Change in the GMS Road Map

8. Mr. Jun Tian, Advisor, ADB, presented on ADB's efforts to mainstream climate change in its core development operations (**Annex 4**). He presented ADB's Strategy 2020 in relation to climate change, the core elements of climate change mitigation and adaptation, and the financing tools, initiatives, projects and actions/ activities for mitigation and adaptation. He discussed the climate change related funds, knowledge development activities and the collaboration among development partners in this area, and explained the mechanics of the Climate Investment Funds (CIF).

9. Mr. Pavit Ramachandran of the EOC explained the scope of mainstreaming climate change (CC) in the GMS energy sector (**Annex 5**). He explained the climate change risks and energy sector vulnerabilities, showing the cost of potential energy investments that could be affected, power infrastructure included. He discussed the possibilities for climate proofing investments, and cited efforts at CC adaptation at the energy sector level, and at converting challenges into opportunities such as exploring co-benefits of CC mitigation (such as between energy and transport) and off-grid renewable promotion for livelihood development. He summarized the GMS CC portfolio and entry points for intervention such as climate change funds (CCF), the climate change implementation plan (CCIP), the VPOA, country strategic plans and other GMS initiatives (e.g., SEF, WGA).

10. **Discussions**. Thailand representative inquired about access to CIF and asked about examples of climate change responses of developed countries. EOC representative cited the dike system in the Netherlands to stem flooding from storms and the efforts of the US in Louisiana in the wake of Hurricane Katrina. Mr. Zhai asked whether there are EOC estimates of potential CC impacts on hydrology resources for power generation. EOC representative explained that CC will change the intensities and distribution of rainfall which will affect hydrology estimates for hydropower planning and development. The meeting also discussed the extent to which energy investments should be adjusted or retrofitted to account for potential CC impacts. EOC representative said it would be important to account for a project's life span and location in examining CC risks.

Country Presentations on Recent Developments in the Energy Sector (Country Presentations, **Annex 6**)

11. **Cambodia**. Mr. Victor Jona of the General Department of Energy, Ministry of Industry, Mines and Energy (MIME) presented the current status of energy development in Cambodia, consisting of the overview of Cambodia's energy policy, structure of its energy sector, and its energy efficiency and conservation efforts. He discussed Cambodia's efforts under the ASEAN energy cooperation framework, and presented Cambodia's potential renewable energy (RE) sources (solar, wind, hydro, biomass, biogas, and biofuel). He discussed the national policy on rural electrification by renewable energy, detailed the implementation of specific projects in this area, and showed projections of oil consumption.

12. **Discussions**. Mr. Zhai inquired about the principle followed in energy pricing. Cambodia representative said oil pricing is cost-based while social tariffs for the poor are in force in the power sector.

13. **PRC**. Mr. Gao Shixian, Assistant Director General, Energy Research Institute, National Development and Reform Commission (NDRC), provided an overview of the energy sector in PRC, showing the trend in energy output, consumption and power generation, and 2007 energy balance. He discussed the mechanism for energy administration and future energy policies consisting of enhancing energy infrastructure, optimizing the energy structure, and strengthening international energy cooperation. He showed efforts in the development and management of coal, oil and natural gas, renewable energy (e.g., hydro, wind, solar, biomass/ biofuels), and energy efficiency and technology. He expounded on PRC's programs for clean coal use, RE development, and nuclear power development.

14. **Discussions**. Mr. Zhai noted the significant development of wind power in PRC and asked how PRC managed to exceed its target in this area. PRC representative said the incentive for wind power is through a combination of subsidy (including for technology research) and regulation (e.g., allowing wind power for grid connections). In response to Lao PDR representative's query, PRC representative noted that biomass material is composed of rice husks and other agricultural wastes.

15. **Lao PDR**. Mr. Khamso Kouphokham, Chief of Executive Planning Division, Department of Electricity, Ministry of Energy and Mines, provided an overview of indigenous energy production and final energy consumption of Lao PDR. He briefed on the government's development strategies for renewable energy (e.g., biofuels, and small and mini-hydro), rural electrification (using solar technology), and oil and gas. He discussed Lao PDR's participation in energy programs of ASEAN and ACMECS, and Finland's bilateral assistance program.

16. **Discussions**. On ADB's query about the subsidies for RE, Lao PDR representative clarified that the tariff structure receives subsidy only for the maintenance portion.

17. **Myanmar**. U Htin Aung, Deputy Director General of the Energy Planning Department, Ministry of Energy, discussed the policy and institutional structure of the energy sector. He showed the development areas for the oil and gas sector, and its status as exporter of gas by pipeline. He noted the development efforts in coal and electrification by renewable energy. He said the biofuel program is the effort of joint public-private participation and is funded by the private sector.

18. **Thailand**. Mr. Samerjai Suksumek, Acting Director of the Bureau of Power Policy, EPPO, updated on the developments in Thailand's institutional and policy framework for energy, comprised by its energy policy under the current government, energy industry regulation, and strategies to enhance energy security. He then discussed the progress in Thailand's energy programs, namely (i) natural gas supply management, (ii) oil supply management, (iii) alternative/ renewable energy strategy, plan, actions and targets (including for nuclear energy), and (iv) energy efficiency improvement. He discussed the mechanics of demand side management by bidding mechanism.

19. **Discussion**. Thai representative clarified that the target for RE would depend on the potential for the particular RE source. Thai representative also explained the mechanics of the energy conservation fund, which is used to finance RE projects. Lao PDR representative asked about the key to success of development programs, and Thai representative said that firm guidance and clear directions from policy makers are important success factors. Myanmar observed that time is now ripe to develop RE sources, in anticipation of oil prices rising in the future.

20. **Viet Nam**. Mr. Nguyen Anh Tuan, Chief, Power System Development Department, Institute of Energy, provided an overview of the energy sector covering the production, final consumption, power generation, generation fuel mix, and demand forecast. He discussed the potential and current use for various types of RE sources such as small hydropower and solar energy. He presented the primary energy supply capability and energy demand-supply balance, and discussed the various considerations in energy development planning and implementation. He gave the policy and strategy for RE development and the energy issues and challenges that should be addressed.

21. **Discussion**. Thailand representative asked whether low power tariffs act as disincentive to investors. Viet Nam representative responded that low power tariffs indeed pose constraints to RE development.

22. **General Comments on Presentations**. Mr. Tian of ADB shared his understanding of PRC's success in promoting RE, having been a former official of NDRC. He shared that the major constraint in RE is the high cost of such technologies, and PRC's thrust is to lower the cost, particularly for wind turbines and super-critical power technologies, through its focus on research and development, and reduction in manufacturing cost. He explained the tariff policy which allowed rate increments for the amount of power obtained from RE sources. The rate increases are blended in the tariff structure and not subsidized by government. He discussed the new obstacles that emerged after the take-off of wind power sources, such as the risk of disruptions due to natural upheavals, and the changes in value-added taxation which will have the effect of reducing the incentive to local governments to develop RE sources. He informed of the experiment to follow an order of preference for dispatch of energy to the grid, which would be RE first, then nuclear, followed by gas and then finally coal.

23. Thai representative it may be difficult to impose higher cost to the consumer for energy obtained from RE sources, especially if the cost increase will be used to pay for the RE equipment manufactured in another country.

Integration of Country Comments in the Revised Road Map/ Plenary Discussions on Revisions/ Discussion of Next Steps for the Road Map

24. Mr. Zhai cited the importance of information sharing in GMS energy cooperation as demonstrated in the meeting discussions on RE development. He raised additional questions to the countries to clarify further the points made during the country presentations. In Thailand's case, it was explained that the subsidies paid to RE sponsors are financed out of levies on energy sales.

25. Thai representative noted the need to clarify the benefits from particular RE sources, which could be used as benchmarks when determining the viability of RE development. Mr. Lefevre informed that a number of studies have yielded benefits estimates for various RE sources, in relation to Kyoto Protocol requirements, and these estimates are available at the web. Mr. Lefevre will provide ADB with the links to the websites containing such information. Mr. Zhai said that development of benefits benchmarks for various RE sources in the GMS, and comparing these to the costs of RE development, could be a good area of study under the Road Map. The output of such study will facilitate the conduct of feasibility studies for RE projects.

26. The meeting discussed the risks in implementing market-based energy pricing. Mr. Tian discussed the problems with full marker deregulation experienced by the power grids in California and the Northeastern areas of the US, because it led investors to work the grid system to its maximum technical capacity which later led to power outages. Viet Nam representative explained the regulatory and market practices adopted for the Viet Nam power system, which were designed to safeguard against such problems. PRC representative explained the discussions in PRC on the power sector unbundling issue. Lao PDR representative informed of CDM-supported projects in Lao PDR.

27. Mr. Zhai asked the countries to share examples of successful public-private partnerships in energy projects. He further suggested that for future SEF meetings, the country presentations include specific cases that could be shared with the countries. He cited the possible cases for specific countries as follows: (i) for PRC, the success factors in wind power development, the policy, funding, grid connections, and technical issues; (ii) for Thailand, the workings of incentive packages such as escrow funds; (iii) for Cambodia, the efforts to sustain donor funding such as maintenance fees charged to consumers; (iv) for Lao PDR, its experience in securing CDM support, which could provide feedback to the donor community in streamlining the CDM process; and (v) for Viet Nam, its experience in power sector restructuring and benefits it derives from the wholesale competitive market. Mr. Zhai said this information sharing in SEF meetings would be included as a mechanism under the Road Map. The GMS representatives suggested additional topics that could be shared during SEF country presentations. Cambodia representative requested Lao PDR to present on the lessons on public-private partnerships from Nam Theun 2. Lao PDR representative would like to learn more about market based energy pricing in PRC.

28. Mr. Zhai said that a further refinement to the Road Map is the introduction of performance targets. He noted that in the country presentations, certain targets have already been mentioned by the countries, such as for rural electrification coverage and share of RE to total energy. The targets already adopted by the countries were listed as follows:

a. PRC- RE development from 8% (2008) to 10% (2010) and 16% (2020); Nuclear power to increase to 5% of capacity by 2020;

b. Cambodia- Target is to achieve 100% village electrification by 2020, and 70% of households with access to electricity by 2030;

c. Thailand- Target alternative energy to comprise 20.3% of total energy by 2022, and energy saving target is set at 10.8% in 2011;

d. Lao PDR- Target biofuel consumption share to total energy mix to 10-30% in 2020 and to increase percentage of households with access to electricity to 90%;

e. Myanmar- Rural electrification and promotion of biogas are undertaken on area-specific basis;

f. Viet Nam- Share of RE to total energy to increase from 3% in 2010 to 5% in 2020, biodiesel use to increase from 1% of gasoline demand in 2015 to 5% in 2025, rural access to grid to rise to 100% in 2020.

29. Mr. Zhai announced circulation of the revised Road Map (**Annex 7**) incorporating the comments made during the meeting. He asked the countries to submit additional comments, if any, within two weeks. He informed of the immediate next steps with respect to the Road Map, such as submission to the GMS National Coordinator for internal government clearances and review/ endorsement by the GMS Minister. He noted further steps needed such as formulating the detailed proposals and identifying possible partnerships in implementing these projects.

30. Lao PDR representative suggested including in the Road Map, an initiative on energy stockpiling and strategic reserves for enhancing energy security. He also suggested that the Road Map explain the implementation procedure for advancing progress of priority projects. Viet Nam suggested indicating the timeline for each project in the work plan. Mr. Zhai said that a section called “Implementation” will be added in the Road Map. This section will describe the further steps to be taken in formulating the concept notes and detailed proposals, the lead roles of GMS countries in the development of each proposal (leading to enhanced GMS ownership of the projects), and the identification of possible partnerships in financing and implementing the projects.

Session VI: Closing Session

31. **Synthesis of Discussions/ Agreements**. Mr. Zhai was pleased to note the meeting’s substantive discussions and agreements on the Road Map. He reiterated his request for the countries’ additional feedback on the proposed Road Map within two weeks.

32. **Consideration and Adoption of Proceedings**. Mr. Zhai announced the distribution of the draft summary of proceedings for review by the body. After the SEF members reviewed the draft summary of proceedings, and after incorporation of suggested changes, the body therefore approved the minutes of the Special SEF meeting *ad referendum*.

33. **Closing Remarks**. Mr. Zhai tanked the participants for their substantive contributions to the meeting. He thanked the Thai Government for successfully hosting the meeting.

Greater Mekong Subregion
Special Subregional Energy Forum (SEF)
Mekong and Tonle Sap Conference Room
Asian Development Bank
Thailand Resident Mission Bangkok,
Thailand. 18-19 March 2009

AGENDA AND PROGRAM

18 March (Wed) **Day 1**

08:45am – 09:00am Registration

09:00am-09:20am Opening Session

Welcome Remarks
- Mr. Chavalit Pichalai
  Deputy Director General
  Energy Policy and Planning Office (EPPO)
  Ministry of Energy

Opening Remarks/ Introduction
- Mr. Yongping Zhai
  Lead Professional (Energy)
  Energy and Water Division
  Southeast Asia Department

09:20am – 10:15am Presentation/ Discussion of Country Comments on the GMS Road Map for Expanded Energy Cooperation
- Presentation of Highlights of Road Map, Proposed Projects/ Activities, Timetable (Mr. Yongping Zhai, ADB)
- Country Views/ Comments (Covering Proposed Priority Areas, Scope of Cooperation, Proposed Priority Projects/ Concept Notes)
  - Cambodia
  - People's Republic of China
  - Lao PDR
  - Myanmar
  - Thailand
  - Viet Nam
- Discussions/ Responses to Comments (ADB)

10:15am- 10:30am Coffee Break

10:30am- 11:20am Presentation/ Discussion of Country Comments on the GMS Road Map for Expanded Energy Cooperation (continued) – Concept Notes of proposed regional cooperation project in environmentally friendly power trade, renewable energy and energy efficiency
(Mr. Jesusito Tranquilino, ADB)

11:20am- 12:00nn Mainstreaming Climate Change in the GMS Road Map
(Moderator: Mr. Jun Tian, ADB)
- Climate change related funding sources (Mr. Jun Tian, ADB)
- Presentation by Environment Operations Center on on-going regional initiatives (Mr. Pavit Ramachandran, EOC)

12:00nn– 1:30pm	**Lunch Break**
01:30pm- 03:00pm	Country Presentations on Recent Developments in Energy Sector (oil, gas, renewable, etc.-other than power), Highlighting the Implications of the Proposed Road Map on Each Country's Energy Programs o Cambodia o People's Republic of China o Lao PDR o Myanmar o Thailand o Viet Nam
03:00pm- 03:15pm	Coffee Break
03:15pm- 05:00pm	Brainstorming Discussion - Discussions on Synchronizing Country Comments and Integrating these in the Revised Road Map - (May involve breakout sessions with each group focusing on the strategic thrust or energy subsector in the Road Map) - (ADB)
19 March (Thu)	**Day 2**
08:45am – 09:00am	Registration
09:00am-10:30am	Plenary Discussions on Revisions in the Road Map - To discuss Changes in the Road Map (Objectives/ Strategic Thrusts, Priority Areas, Projects/ Timelines, etc.) (ADB)
10:30am- 10:45am	Coffee Break
10:45am- 11:30am	Discussion of the Next Steps for the Road Map - Process/Timeline for Internal Clearance/ Finalization of Road Map for Endorsement at the 15th GMS Ministerial Meeting - Plan for Formulating Detailed Proposals (Based on Prioritization) - Identification of Partnerships in Implementing Projects in Road Map
11:30am- 11:50am	Closing Session - Chair's Synthesis of Discussions/ Agreements in Special SEF - Consideration and Adoption of Proceedings - Closing Remarks

Greater Mekong Subregion
Special Subregional Energy Forum
Thailand Resident Mission
Bangkok, Thailand
18–19 March 2009

LIST OF PARTICIPANTS

A. GMS COUNTRIES

1. Cambodia

Mr. Victor Jona
Deputy Director General, General Department of Energy, MIME
Ministry of Industry, Mines and Energy
#45 Norodom Blvd., Phom Penh, Cambodia
Tel: +855-2-918-401; Fax No.: +855- 23 - 214-304
Email: jvictor.mime@gmail.com / j.victor@mobitel.com.kh

Mr. Heng Kunleang
Director, Energy Development Department
Ministry of Industry, Mines and Energy
#45 Norodom Blvd., Phom Penh, Cambodia
Tel: (855 12) 829 228; Fax no.: 855 23 295 677
Email: hengkunleang@yahoo.com

Mr. Praing Chullasa
Director, Cooperate Planning and Project Department
Electricite du Cambodge
Yukunthor St., Watpnom Dawn Penh, District, Phnom Penh, Cambodia
Tel. No.: 855 12 444 968; Fax No.: 855 23 426 018
Email: chulasa@online.com.kh

2. People's Republic of China

Mr. Gao Shixian
Assistant Director General
Director of Center for Energy Economics and Development Strategy
Energy Research Institute, NDRC, China
B1411, Guohong Mansion Muxidi Beili Jia No. A-11
Xicheng District, Beijing, 100038, PRC
Tel: +86 10 63908471; Fax: +86 10 63908472
Email: gaoshixian@amr.gov.cn

Ms. Long Qing
Section Chief, Senior Economist
International Cooperation Dept., CSG
Zhujiang New Town, Huasui Road #6, Guangzhou,Guangdong PRC 510632
Tel: 86-20-3812-1823; Fax No.: 8620 – 38120189; Email: longqing@csg.cn

3. Lao PDR

Dr. Daovong Phonekeo
Deputy Director General, Department of Electricity
Ministry of Energy and Mines

Nongbone Road, Ban Fai Village, Saysettha District Vientiane Capitol,
P.O. Box 4708, Vientiane, Lao PDR
Tel: 856 21 951 072/413012; Fax: 856 21 413013; Email: daovongph@yahoo.com

Mr. Khamso Kouphokham
Chief of Executive Planning Division
Department of Electricity Ministry of Energy and Mines
Nongbone Road, Vientiane, Lao PDR
Tel: 856 21 413012; Fax: 856 21 413013
Email: khamsokouphokham@yahoo.com

Mr. Heuan Chanphana
Deputy Head of GMS National Secretariat
Water Resources and environment Administration (WREA)
Prime Minister's Office
Tel: 856 21 243701; Fax: 856 21 243700
Email: hcpn@hotmail.com

4. Myanmar

U Htin Aung
Deputy Director General
Energy Planning Department
Ministry of Energy
#6 Nay Pyi Taw, Union of Myanmar
Tel. No.: 95 67 411046; Fax No.: 95 67 411113; Email: myanmoe@mptmail.net.mm

U Tun Myat
Director
Ministry of National Planning and Economic Development
Room (12), Bldg. 4111, Shwenantha Houses Complex, Nawpyitaw, Myanmar
Tel. No.: 95 67 407103; Fax No.: 95 67 407293; Email: utunmyat@gmail.com

Daw Hla Hla Kywe
Staff Officer
Ministry of Energy
#6 Nay Pyi Taw, Union of Myanmar
Tel No.: 95 67 411058; Fax No.: 95 67 411113/411479
Email: myanmoe@mptmail.net.mm

5. Thailand

Mr. Chavalit Pichalai
Deputy Director General, Energy Policy and Planning Office (EPPO)
121/1-2 Phetchaburi Road, Ratchathews District, Bangkok 10400, Thaialnd
Tel: 662 612-1555; ext 600; Mobile: (089) 927 5313
Fax: 662 612-1532; Email: Chavalit@eppo.go.th

Mr. Samerjai Suksumek
Acting Director, Bureau of Power Policy
Energy Policy and Planning Office (EPPO)
Tel. No.: 66(2) 612 1555 ext 431; Fax:66(2) 612 1384; Email: samerjai@eppo.go.th

Ms. Punnee Rojrungsithum
Senior Policy and Plan Analyst

Bureau of Power Policy, EPPO
Tel No.: 66(2) 612 1555 ext 502; Fax:66(2) 612 1386; Email: punnee@eppo.go.th

Dr. Veerapat Kiatfuengfoo
Director, Petroleum Business Group, Petroleum and Petrochemical Policy Bureau, EPPO

Mr. Varavoot Siripol
Director, Corporate Planning Division
Electricity Generating Authority of Thailand (EGAT)
Tel: 66(2) 436 3502; Fax:66(2) 436 3592 ; Email: varavoot.s@egat.co.th

Mr. Sompol Uthaichalanonta
Assistant Director, System Control and Operation Division-Technical
Electricity Generating Authority of Thailand (EGAT)
Tel: 66(2) 436 2102; Fax:66(2) 879 5069; Email: sompol.u@egat.co.th

Ms. Somruedee Tipmabutr
Administrative Officer
Electricity Generating Authority of Thailand (EGAT)
53 Charabsinitwong, Bangkruai, Nonthaburi 11130, Thailand
Tel: 66(2) 436 2165; Fax: 66(2) 436 2194; Email: somruedee.t@egat.co.th

Mr. Tawatchai Sunranwanich
Head, Transmission System Development Planning Section
Electricity Generating Authority of Thailand (EGAT)
53 Charabsinitwong, Bangkruai, Nonthaburi 11130, Thailand
Tel: 66(2) 436 3525; Fax:66(2) 436 3590; Email: tawatchai.s.@egat.co.th

Mr. Rangsan Sarochawikasit
Director, Bureau of Energy Research
Department of Alternative Energy Development and Efficiency

Mrs. Munlika Sompranon
Senior Policy and Planning Analyst
Department of Alternative Energy Development and Efficiency

Ms.Dararut Ritboonyakorn
Chief, International Energy Cooperation Office, Ministry of Energy

Ms.Suda Chaiwasi
Foreign Relations Officer, Ministry of Energy

Mrs. Porntip Viraseranee
Senior Analyst, Petroleum Authority of Thailand

Mrs. Pakkapatee Luanpaisanon
Analyst, Petroleum Authority of Thailand

Lefevre Thierry
Director, CEERD/FIHRD
(Center for Energy Environment Resources Development)
SLD Building (78 & 14A), 13/11 Saladaeng 1, Rama IV Road, Silon Sub. District
Bangkok 10500, Thailand
Tel: +66 02 2355817/Fax No.: +66 02 2369576
Email: t.lefevre@ceerd.net

6. Viet Nam

Mr. Nguyen Vu Quang
Deputy Director General
Ministry of Industry and Trade
11, Khuat Duy Tien Str., Thanh Xuan, Hanoi Viet Nam
Tel. No.: (844) 2120779, Fax No.: (844) 5543008; Mobile: 0913 583 787
Email: quangnv@moit.gov.vn

Ms. Dao Minh Hien
Director
Power System Planning & Licensing Department
Electricity Regulatory Authority of Vietnam (ERAV)
D11 Khuat Duy Tien, Thanxuan, Hanoi Viet Nam
Tel: (84-0) 9130700035; Email: hiendm@moit.gov.vn

Mr. Nguyen Anh Tuan
Chief
Power System Development Department
Institute of Energy
6 Ton That Tung, Khuong Thoung Dong Da – Hanoi
Tel. No.: (084) 38523762/090225246, Fax No.: (844) 38523311; Email: tuanan@fpt.vn

B. CIVIL SOCIETIES

1. Environment Operations Center (EOC)

Mr. Pavit Ramachandran
Component Leader - Strategic Environmental Assessments
Environment Operations Center (EOC)
23rd Floor, Offices at Central World
999/9 Rama I Road, Pathumwan, Bangkok 10330
Tel. No.: (66)-2-207-4424 (direct); Mobile: (66)-868873813; Fax No.: (66)-2-207-4400
E-mail: pavit1512@yahoo.com

C. ASIAN DEVELOPMENT BANK

Mr. Zhai Yongping
Principal Energy Specialist, Infrastructure Division, Southeast Asia Department
Tel: (63 2) 632 5976; Fax: (63 2) 636 2336; Email: yzhai@adb.org

Mr. Jun Tian
Advisor, Office of the Director General, Regional and Sustainable Development Department
Tel: (63 2) 632 4912; Fax: (63 2) 636 2198; Email: jtian@adb.org

Ms. Maila Conchita M. Abao
Senior Project Assistant, Infrastructure Division, Southeast Asia Department
Tel: (63 2) 632 6409; Fax (63 2) 636 2336; Email: mcabao@adb.org

Mr. Jesusito Tranquilino
ADB Consultant, GMS Unit, Operations Coordination Division, Southeast Asia Department
Tel: (63 2) 632 5448, Fax: (63 2) 636 2226; E-mail: jtranquilino@adb.org

GMS Road Map for Expanded Energy Cooperation: Providing Affordable and Sustainable Energy for All

Special Subregional Energy Forum Meeting

ADB Thailand Resident Mission

18-19 March 2009

y expand cooperation beyond power?

- Reduce costs by tapping supply outside
- Expand markets for scale efficiency
- Diversify sources for improved security
- Address trans-border environmental implications: addressing climate change challenges
- Enhance efficiency of regional energy system

Recent Progress and Pending Issues

Road map consistent with GMS Program's Strategic Framework (SF) and Mid-Term Review proposals

Remaining challenges need to be addressed: policy/ institutional constraints, divergent capacities and levels of development

Recent Progress:

- **Second Subregional Energy Forum (SEF-2), Ho Chi Minh City, Viet Nam, 22 November 2008:** Reviewed the proposed road map and agreed to provide comments to refine the work plan consistent with country priorities
- Emerging areas of interest: sharing of best practices in renewable energy options for off-grid power; energy efficiency best practices; gas pricing and regulatory frameworks
- Critical Role of Development Partners

Comments Received from GMS Countries

Country	Comments
Myanmar	• Reiterated suggestion to coordinate with ASEAN re projects/ activities under ASEAN Energy Cooperation. • Work Plan should be in line with GMS countries' priorities and suggestions.
Thailand	• Renewable off-grid electrification. • Clean coal technology. • Improve energy efficiency. • Best practice policy/ regulations for gas exploration and pipeline development
Lao PDR	• Promotion of electric cars for CO2 abatement. • Include Clean Development Mechanism (CDM) in strategic objective, important for renewable energy (RE) promotion. • Priority for access to clean energy by rural population to reduce damage to woodland environment; joint small scale development of RE sources for community such as micro hydro, biogas, biomass, etc.

REVISED ROAD MAP AND WORK PLAN

Goal: An integrated approach to deliver sustainable, secure and competitive low carbon energy in the GMS

Major Strategic Objectives:

- Enhance **access to modern energy** to all sectors/ communities
- Develop/ utilize **low carbon, renewable domestic** resources while reducing oil dependence
- Improve **regional energy cooperation and security**
- Promote **private participation** in GMS energy development

Enhance access to modern energy:

- Establish interconnection arrangements
- Promote cost-effective rural electrification schemes
- Promote best practices for off-grid systems

Develop low carbon, renewable domestic resources:

- Develop GMS performance standards, codes and labels for energy efficiency, renewable and clean energy technology
- Promote use of renewable energy resources
- Enhance energy efficiency/ conservation at demand and supply sides
- Ensure benefit sharing and risk monitoring from energy projects

Improve regional cooperation and energy security:

- Strengthen information exchange and collaboration
- Enhance institutional and technical capacity in cross-border trade and energy integration beyond the power sector
- Improve transport modal mix

Promote private participation in GMS energy development:

- Enhance investment climate through enabling institutional/ policy environment and best practices dissemination
- Share best practices in incentives to project sponsors
- Promote networking and exchanges in state of art technology in energy efficiency, renewable and clean technologies
- Coordinate capacity building activities for greater synergies

Work Plan for Expanded Energy Cooperation:
Key Thrusts, Priority Projects, 2009-2015

Medium Term Thrusts	Priority Projects/ Activities/ Timeline
Energy Efficiency (EE) and Conservation	
Information sharing/ networking on best practices in GMS context	a. Study on development of GMS Energy Efficiency Network b. Improving Energy Efficiency through Demand Side Management and Energy Conservation in the GMS
Enhanced energy management in industrial and commercial sectors	Study of prospects for public-private partnerships for EE (e.g. for hotels under Tourism Working Group)

Work Plan for Expanded Energy Cooperation:
Key Thrusts, Priority Projects, 2009-2015

Medium Term Thrusts	Priority Projects/ Activities/ Timeline
Energy Efficiency (cont.)	
Energy efficiency in the transport sector	a. Study on carbon-neutral GMS corridors (with Environment Operations Center) b. Energy efficient transport modal mix (with GMS Transport Forum) c. Improvement of transport system efficiency (Thailand)
Financing for EE Initiatives	Regional Energy Efficiency Program
New and Renewable Energy (NRE) Sources	
Policy/ institutional framework for NRE development, financing, private investment	a. Regional framework for New and Renewable Energy development

Work Plan for Expanded Energy Cooperation:
Key Thrusts, Priority Projects, 2009-2015

Medium Term Thrusts	Priority Projects/ Activities/ Timeline
New and Renewable Energy (cont.)	
Policy/ institutional framework for NRE development, financing, private investment	b. Small Scale Clean Generation Fund c. Renewable Energy Resource Assessment Studies d. Promoting Development of Renewable Energy and Clean Fuels
Promoting biofuels and biomass	a. Biomass Generation Project b. Coordination between Energy Forum and Working Group on Agriculture on Rural Renewable Energy
Information networking in GMS-appropriate New and Renewable Energy technology	a. Study on propagating New and Renewable Energy technology b. Renewable Energy Advocacy Program for GMS

Work Plan for Expanded Energy Cooperation:
Key Thrusts, Priority Projects, 2009-2015

Medium Term Thrusts	Priority Projects/ Activities/ Timeline
Regional Energy Planning, Policy, Program (REPPP)	
Energy policy, planning, program management, coordination and networking	a. Energy database development, publications, networking (link to Regional Power Trade Coordination Committee [RPTCC] database) b. Training needs analysis (TNA) and capacity building (with ASEAN Plan of Action for Energy Cooperation) c. Study on Accreditation Schemes for energy managers/ technical staff
Sustainable financing and support for road map	Regional Project Preparation TA Facility

Work Plan for Expanded Energy Cooperation:
Key Thrusts, Priority Projects, 2009-2015

Medium Term Thrusts	Priority Projects/ Activities/ Timeline
Power	
Policy/ regulatory framework for power trade	Items in Vientiane Plan of Action (VPOA), 2008-2012 such as: (i) Regional Database/ Website; (ii) Environmentally-Sustainable Power Infrastructure; (iii) Regional Transmission and Regulatory Authority
Grid interconnection infrastructure and power generation for export	a. Interconnection items in VPOA, such as Na Bong-Udon Thani, GMS Northern Power, Viet Nam-PRC 500 kV Interconnection b. Generation projects such as Xe Kaman 1, Nam Ngum 3, Xe Kaman 3 (Lao PDR), Jinghong (PRC)

Work Plan for Expanded Energy Cooperation:
Key Thrusts, Priority Projects, 2009-2015

Medium Term Thrusts	Priority Projects/ Activities/ Timeline
Power (cont.)	
Grid interconnection infrastructure and power generation for export	c. Study for Regional Power Transmission Development Program,
Power coverage to all (rural electrification)	a. Rural Electrification linked to backbone lines (e.g. GMS Northern Power Transmission) b. Off-grid systems incentives (e.g. Lao micro/mini hydropower) c. Piloting smart subsidies for new and renewable energy (e.g. Thailand feed-in tariffs)

Work Plan for Expanded Energy Cooperation:
Key Thrusts, Priority Projects, 2009-2015

Medium Term Thrusts	Priority Projects/ Activities/ Timeline
Power (continued)	
Promoting environmentally-sustainable power infrastructure	a. Coordination of RPTCC and Environment Operations Center (EOC) on Strategic Environmental Assessments (SEAs) b. Promoting Environmentally Sustainable Power Trade Planning, Coordination and Development
Oil and Gas	
GMS Segments of Trans-ASEAN Gas Pipeline (TAGP)	TAGP logistics, contractual arrangements (Under ASEAN)
Oil and Natural Gas Logistics and network	Use of natural gas in transport

Work Plan for Expanded Energy Cooperation:
Key Thrusts, Priority Projects, 2009-2015

Medium Term Thrusts	Priority Projects/ Activities/ Timeline
Oil and Gas (cont.)	
Mitigation of environmental risks	Studies on safety, environment-risk miligation of pipelines
Coal	
Promoting clean coal technologies	Abated Clean Coal Generation in Viet Nam
Strengthening framework for trade, investment in coal	a. Coal Liquefaction and Carbon Neutrality Technical Assistance b. Piloting Integrated Gasification Combined Cycle (IGCC) and Carbon Capture and Storage (CCS)

Project: Improving Energy Efficiency (EE) through Demand Side Management (DSM) and Energy Conservation (EC) in the GMS

Objective:	Establish joint program for rapid development and adoption of DSM and EC programs in the GMS.
Scope:	a. Provide forum for exchange of best practices; b. Assist in national plan/ program formulation; c. Facilitate training in DSM/ EC, including accreditation scheme; d. Provide for piloting DSM/ EC in commerce and industry; e. Support studies to assess EE prospects; f. Support advocacy program. g. Others ???
Specific Activities:	Suggestions from GMS countries???
Financing Plan:	Suggestions from GMS countries???

Project: Promoting Renewable Energy (RE) and Clean Fuels (CF) in the GMS

Objective:	Establish joint program to promote and propagate best practice RE policies, technology and investments, toward optimal energy mix with reduced carbon emissions.
Scope:	a. Provide forum for exchange of best practices; b. Assist in national plan/ program formulation; c. Facilitate training in DRE/ CF promotion; d. Provide for piloting RE such as mini/micro hydro, and for CF such as biogas for cooking; e. Support studies to do RE resource assessment; f. Support for RE advocacy program. g. Others ???
Specific Activities:	Suggestions from GMS countries???
Financing Plan:	Suggestions from GMS countries???

Project: Promoting Environmentally-Sustainable Regional Power Trade Planning, Coordination and Development in the GMS

Objective:	Establish joint program for comprehensive promotion of strategic environmental assessment (SEA) and other environmental management tools, to consider cumulative and indirect impacts early in the planning process.
Scope:	a. Undertake assessment of capacity of power authorities for environment planning; b. Pilot test application of environmental management tools (SEA, etc.); c. Develop/ implement capacity building program; d. Set up regular monitoring and evaluation mechanisms with power utilities and environment agencies; e. Provide forum for information exchange and sharing of best practices. f. Others ???
Specific Activities:	Suggestions from GMS countries???
Financing Plan:	Suggestions from GMS countries???

Thank You!

ADB's Response:

Mainstream Climate Change into Core Development Operations

Jun Tian
Asian Development Bank
18 March 2009 Bangkok

ADB's Strategy 2020 and Climate Change

- Inclusive Economic Growth
- Regional Integration
- Environmentally sustainable growth
  - Environment including climate change: one of the five core areas of operations
  - Aims to scale up support for projects that address climate change

Core Elements:
Climate Change **Mitigation**

Help build low-carbon economies by:

- Advancing energy efficiency and low-carbon energy sources (e.g. renewables)
- Enabling sustainable transport policies and applying efficient systems
- Promoting improved urban sanitation and reduction of fugitive methane emissions (e.g. landfills)
- Promoting sustainable land use and forestry

Core Elements:
Climate Change **Adaptation**

Help build climate-resilient economies by:

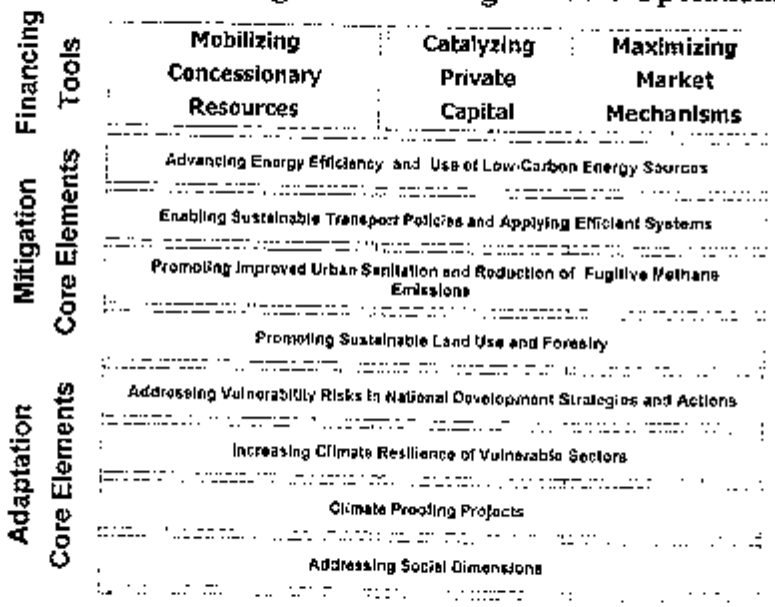
- Addressing vulnerability risks in national development strategies and actions
- Increasing climate resilience of vulnerable sectors (e.g. water, agriculture)
- Climate proofing projects
- Addressing social dimensions (e.g. gender, migration)

Financing Tools: Mitigation and Adaptation

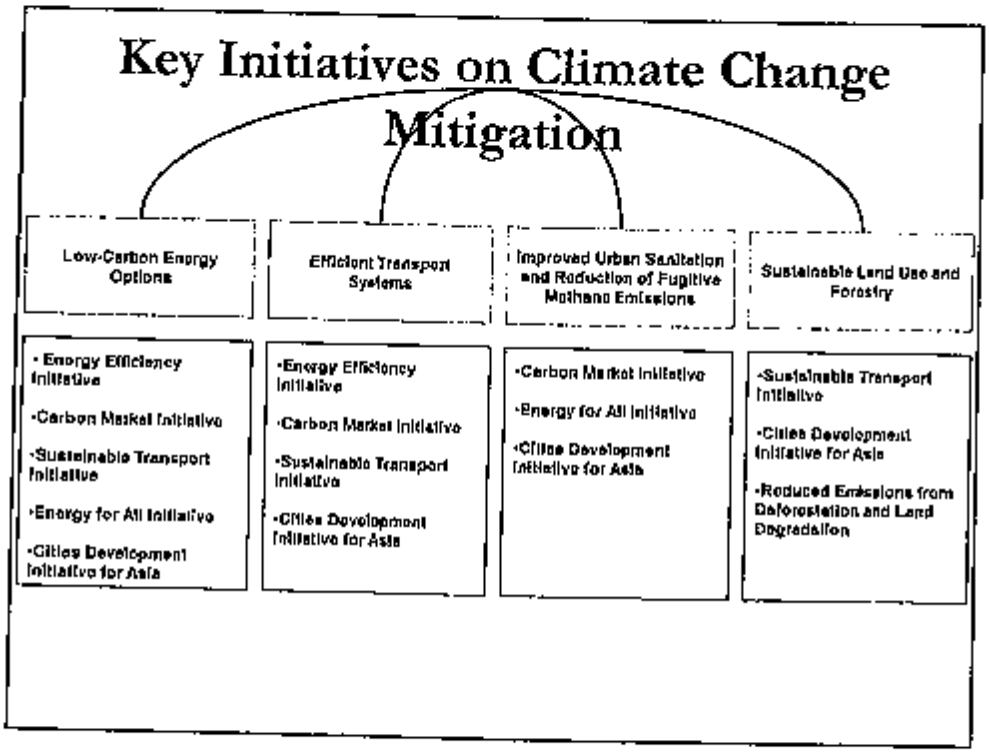
Help make climate change mitigation and adaptation actions affordable and more competitive to DMCs through:

- Mobilizing concessionary resources
- Catalyzing private capital
- Maximizing the use of market-based mechanisms (e.g. carbon and insurance markets)

ADB's Climate Change Program: Mainstreaming Climate Change in Core Operations



Key Initiatives on Climate Change Mitigation



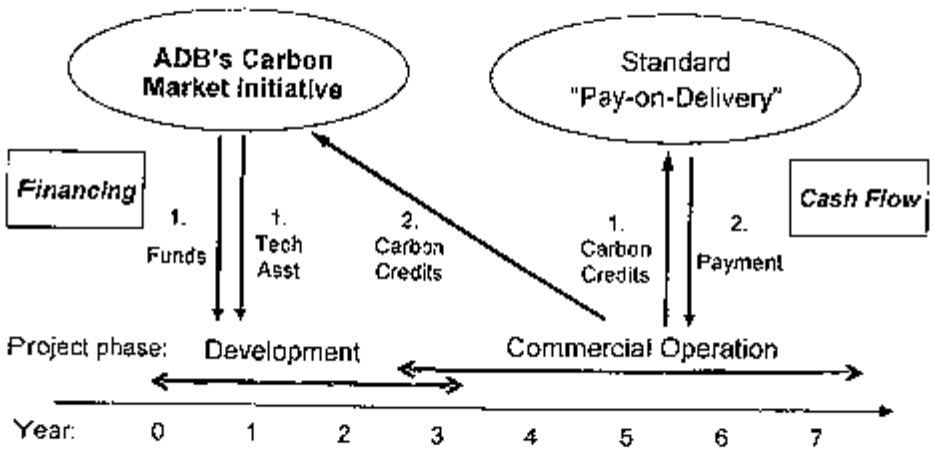
Clean Energy Investments (2003-2008)

Year	Clean Energy Component (in $ millions)
2003	226
2004	306
2005	757
2006	657
2007	668
2008	1,699

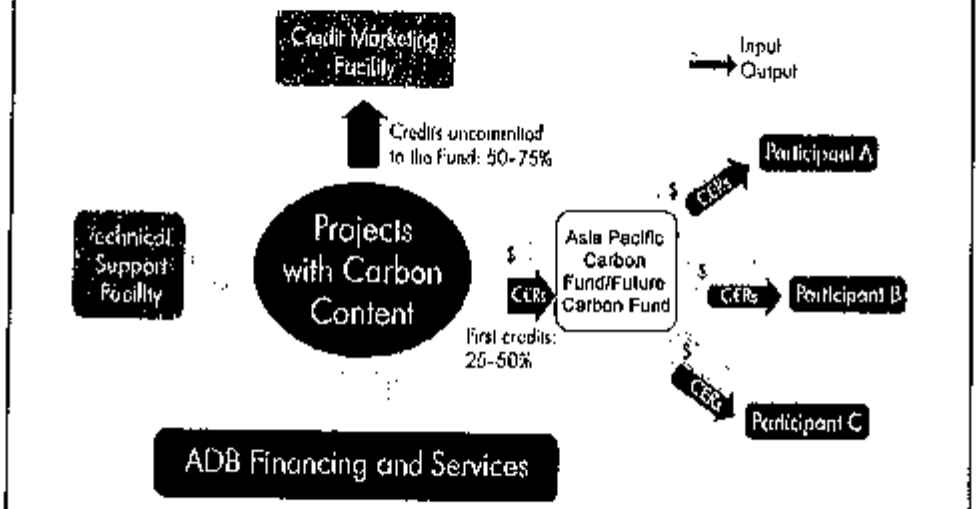
EEI Project Examples

- Guangdong Energy Efficiency and Environment Improvement Program (PRC)
- Nagpur Water Supply Project, with energy efficiency improvement (IND)
- Public-Private Infrastructure Development Facility (solar projects) (BAN)
- DSM for Municipal Street lighting (SRI)
- Renewable Energy for Remote Island and Mountain Communes (VIE)

Carbon Market Initiative



Mechanisms (Carbon Market Initiative)



CMI Project Examples

- Guangdong Energy Efficiency and Environment Improvement Program (PRC)
- New Bong Escape Hydropower (PAK)
- Kerala Sustainable Urban Development Project (solid waste management) (IND)
- Efficient Utilization of Agricultural Wastes (PRC)
- Baoding Geothermal (PRC)
- Wind Power Project in Sindh Province (PAK)

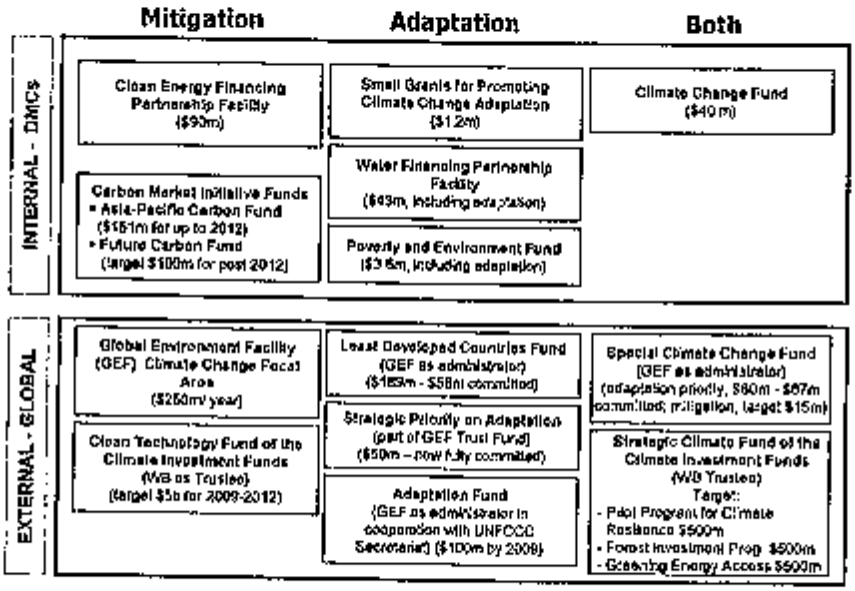
ADB's Adaptation Actions

- Portfolio at Risk Assessment
- Development of Project Screening Tool
- Country/Sector Assessments (e.g., PAL, NEP, BAN)
- Climate Proofing
- Knowledge Products
- Capacity Development
- Partnerships

Adaptation – Example Activities

- Climate Change Adaptation (CCA) in the Coral Triangle
- Community-based Vulnerability Assessment, Risk Mapping and Adaptation Planning in Nepal
- CCA in Asian Coastal Mega Cities: The Ho Chi Minh City (HCMC) Case Study
- Crops research (ICRISAT)- Vulnerability to Climate Change: Adaptation Strategies and Layers of Resilience
- Infrastructure Development Project in the Cook Islands
- Jiangxi Sustainable Forest Ecosystem Development Project in PRC
- Preparing the Central Asia South Asia Regional Electricity Market Project

Climate Change-Related Funds



Knowledge Development

- Flagship studies
  - Climate Change and Energy
  - Building Climate Resilience in the Agriculture Sector
  - Climate Change and Migration
  - Southeast Asia Economics of Climate Change
- Knowledge-sharing events, e.g.:
  - Clean Energy Forum (annual)
  - Transport Forum (Sept. 2008, 2009)
  - Better Air Quality Workshop (biennial)
  - High-level Dialogue on Climate Change, June 2009 (w/ TERI)

Collaboration with Development Partners

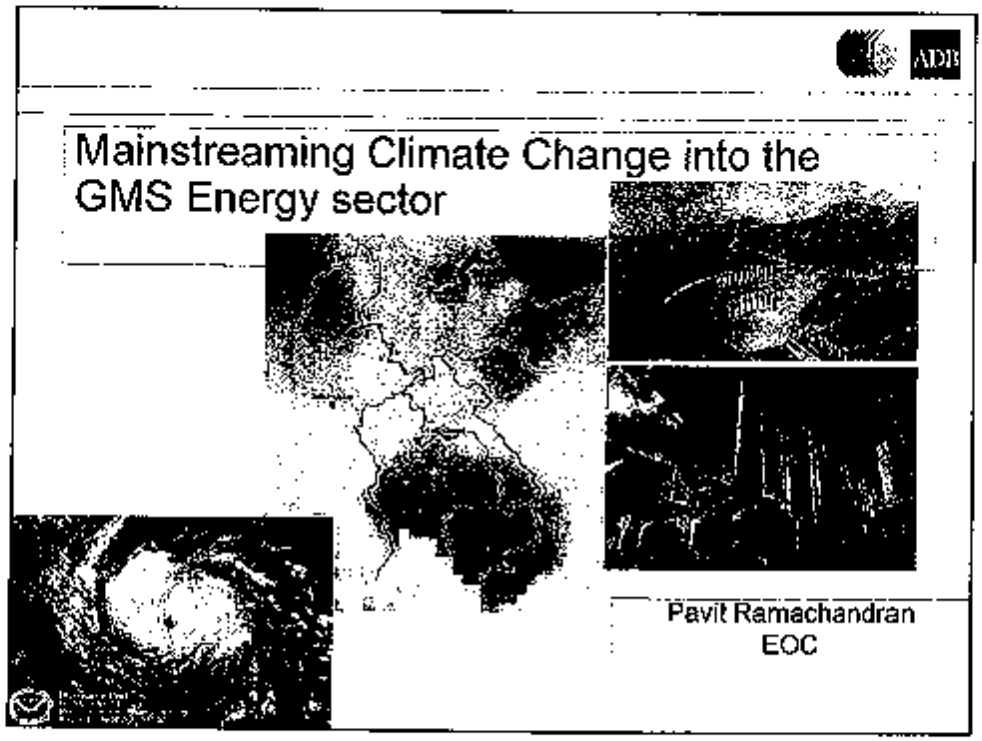
- Other MDBs
  - Clean Energy Investment Framework (CEIF)
  - Climate Investment Funds (CIF)
- Bilateral partners, others
  - Cities Development Initiative for Asia (GTZ, Sweden)
  - Study on Climate Change Impact on Coastal Cities (JICA, WB)
  - Coral Triangle Initiative (Australia, US, GEF, NGOs)
- Knowledge Institutions
  - The Energy and Resources Institute (TERI), India: on clean energy
  - Tsinghua University, PRC: on climate change
  - Institute for Global Environmental Strategies (IGES), Japan: on 3R
  - National Hydraulic Research Institute of Malaysia (NARIM): on water and climate change adaptation in the Asia Pacific
  - PUB Waterhub, Singapore: on urban water management

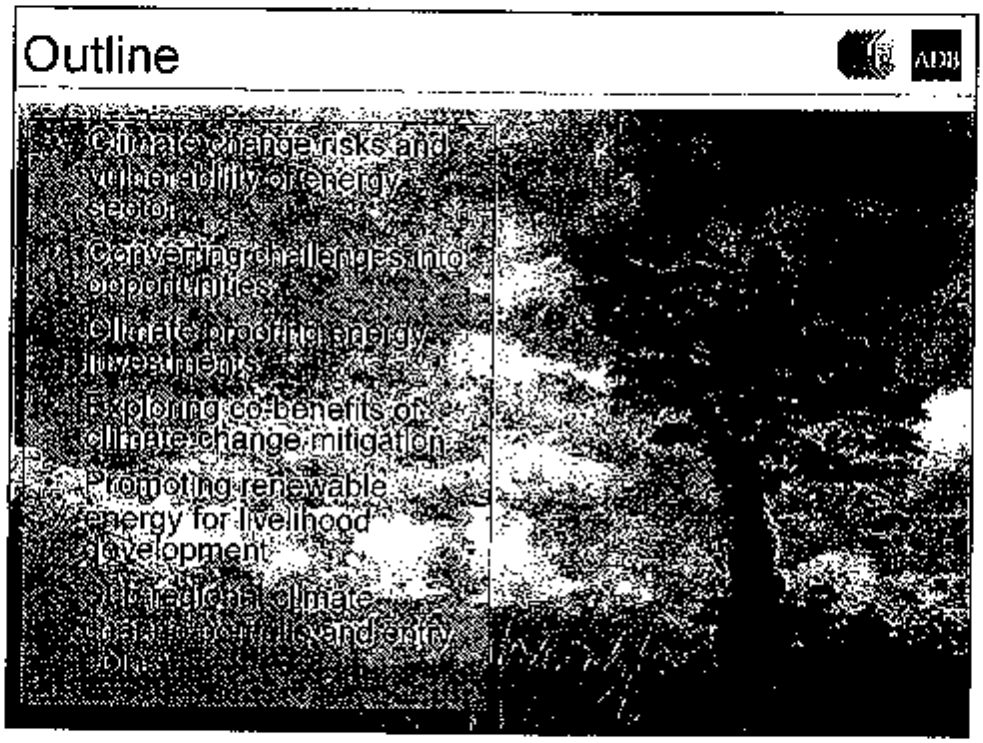
Climate Investment Funds (CIF)

- A portfolio of funds established jointly by ADB, AfDB, EBRD, IDB, and the World Bank
- To provide scaled up assistance to developing countries for climate change mitigation and adaptation until 2012
- Consists of 2 funds:
  - Clean Technology Fund (CTF)
    demonstration, deployment, and transfer of low-carbon technologies
  - Strategic Climate Fund (SCF)
    innovative approaches or scale up activities for targeted actions (e.g. national level actions for climate resilience, forest investment program)

THANK YOU

Jun Tian
Advisor, Department of
Regional and Sustainable Development
Asian Development Bank
jtian@adb.org

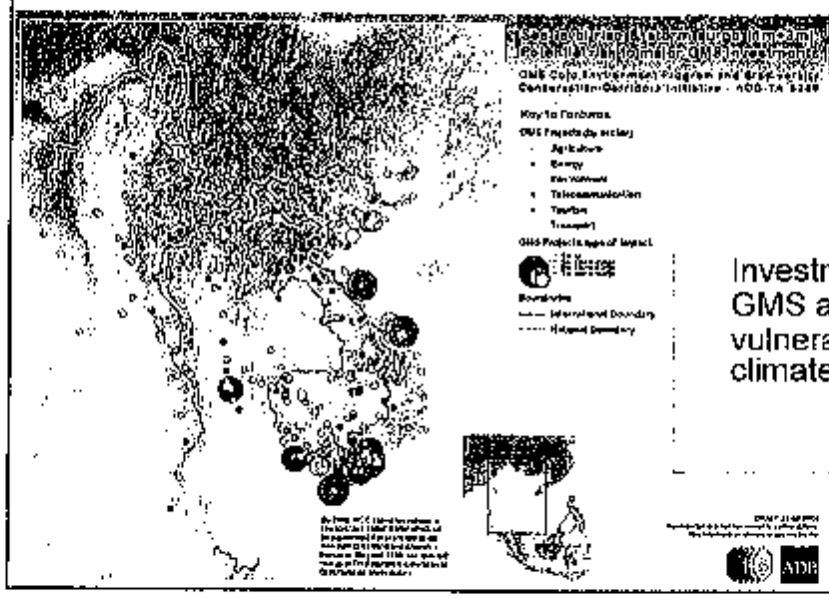

Mainstreaming Climate Change into the GMS Energy sector
Pavit Ramachandran
EOC


Outline
Climate change risks and vulnerability of energy sector
Converting challenges into opportunities
Climate proofing energy investments
Exploring co-benefits of climate change mitigation
Promoting renewable energy for livelihood development
Mainstreaming climate change in policy, regulatory and entry

Energy Sector in the GMS: Key Challenges and Opportunities

- High degree of energy poverty – 74 million or 20% without electricity
- Non-commercial energy sources (biomass) dominate in rural areas - 80% in Lao PDR, 83% in Cambodia
- Rising carbon footprint has implications for energy technology options
- Strong arguments for regional integration - cost savings of 19% of total energy costs, reduced reliance on imports , diminished GWP.
- 228 GW of new capacity and $115 billion in power investments will need to be mobilized
- Multiple transitions within the sector need to be managed – Opportunities for improving productivity, efficiency and resiliency

Climate change risks and vulnerability to energy sector



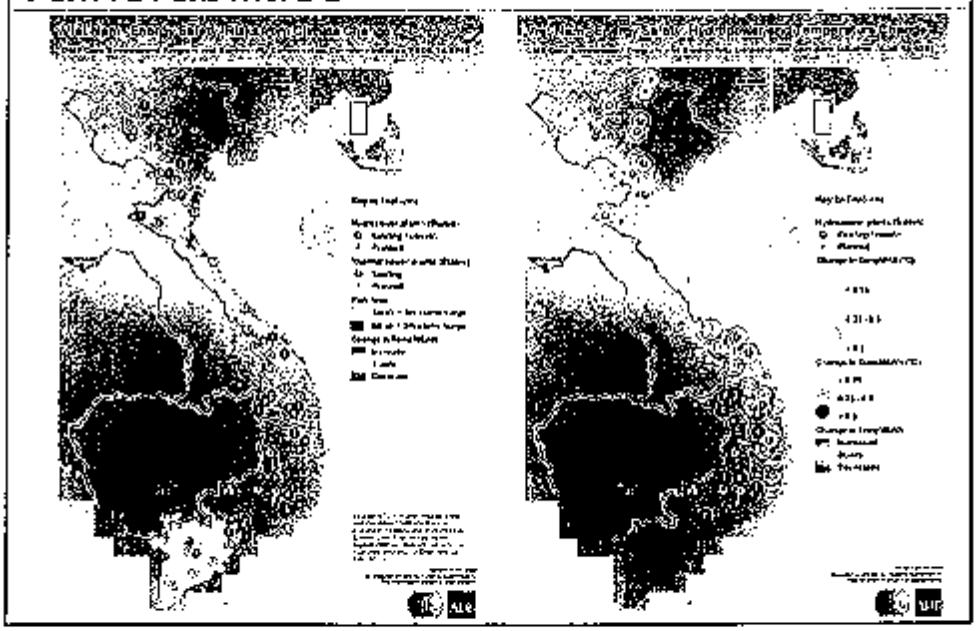
Investments in GMS are vulnerable to climate change

Climate change risks and vulnerability to energy sector

GMS projects (on-going or planned with estimated value) located partially or fully in climate change vulnerable areas

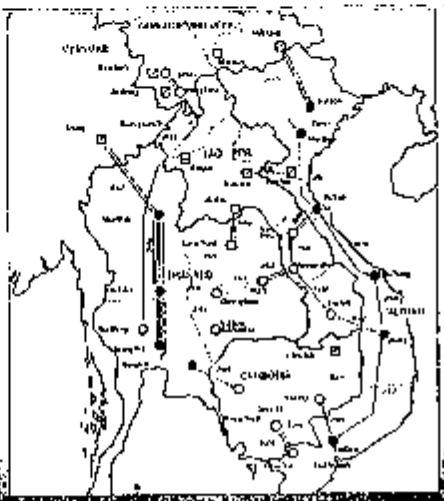
Sector	Scenarios	Value/Cost of affected GMS Projects (US $ million)
Energy	1m sea level rise and up to 3m storm	1,630
	5m sea level rise and up to 3m storm surge	1,751
	Total	3,381
Transport	1m sea level rise and up to 3m storm surge	3,240.8
	5m sea level rise and up to 3m storm surge	6,984.3
	Total	10,225.1

Climate change risks and energy vulnerabilities

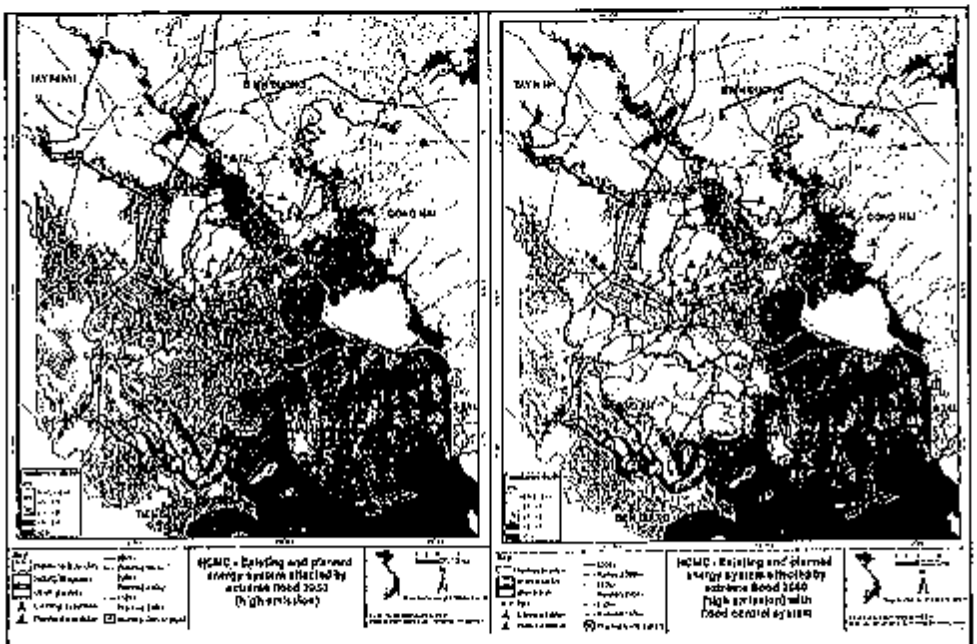


Climate change risks and energy vulnerabilities

- Weather extremes will also impact power distribution infrastructure affecting sub-regional power trade



Indicative Master Plan on Power Interconnection in the GMS



2050 existing and planned power infrastructure (i) without and (ii) with dyke systems

Climate proofing investments

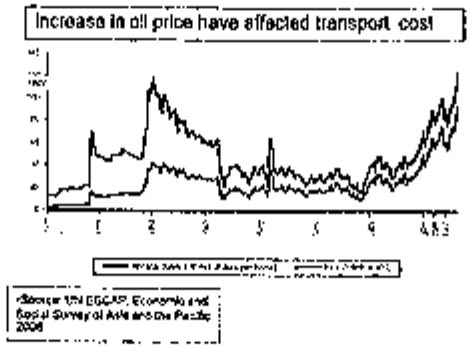
- Power Sector (PS) planning cycles provide a framework for comparing supply options along different criteria (quantitative and qualitative)
- Strategic Environmental Assessment (SEA) can clarify alternatives and optimize efficiencies in system planning
- SEA experience of Viet Nam's hydropower master plan (PDP VI) shows mitigation and compensation packages can be streamlined within the least cost planning framework.
- Strengthening IWRM and energy sector interface.

CC Adaptation at sector level

- Coordination between RPTCC and EOC (2009-2010)
  - Master Plan development, implementation
  - EIA, EMP and SEA capacity development
  - Demand side, energy efficiency measures
  - Piloting SEAs
- SEA of Viet Nam's PDP VII (2009-2010)
  - Review and upgrading design standards
  - Identify adaptation costs, trade-off's and synergies
  - Introducing systems of monitoring, auditing and reporting on sector adaptation performance.

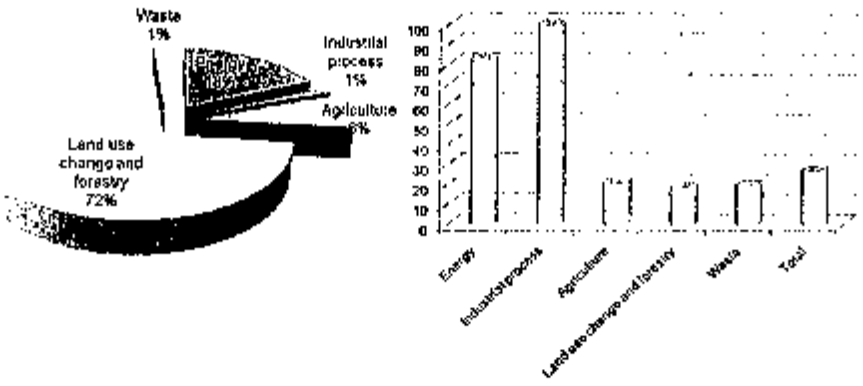
Converting challenges into opportunities

- Economy and environment convergence
  - Opportunity to enhance both economical and environmental performance efficiency and co-benefits



Exploring co-benefits of climate change mitigations

Trend of GHG Emissions in Southeast Asia (Mt CO_2-eq.)

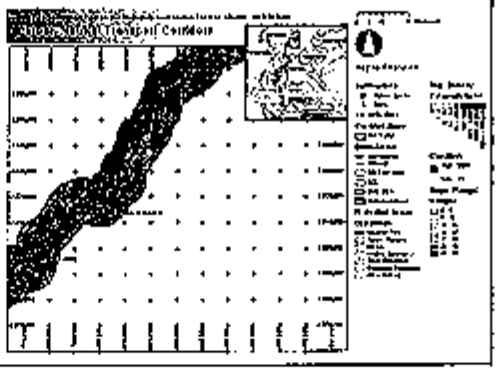


Source: CAIT Database (2008); cited in ADB, 2009, A Regional Review of the Economics of Climate Change in Southeast Asia

Exploring co-benefits of climate change mitigations

Carbon Neutral Transport Corridor

- Improving freight traffic management and engine efficiency
- Greening of the corridor
- Bio-fuel feasibility/ promotion as fuel substitute



Off-grid Renewable promotion for livelihood development

- Designing intervention to alleviate energy poverty along East West Economic Corridor
- Backward linkages to rural development
- Graduate communities from subsistence farming by diversifying livelihood opportunities and adding values to local products

Sub regional climate change portfolio and entry points

- Climate change funds (Climate Investment Facility, Strategic Carbon Facility, ADB's Carbon Market Initiative etc)
- Climate change implementation plan
- Vientiane plan of Action
- Country strategic plans
- Other sub regional initiatives
  - Subregional Energy Forum
  - Working Group on Agriculture

Thank you

For more information please visit

www.gms-eoc.org

Greater Mekong Subregion (GMS)

Special Subregional Energy Forum (SEF)

The Current Status of Energy Development in Cambodia

Energy Policy

To provide an adequate supply of energy throughout Cambodia at reasonable and affordable price,

To ensure a reliable and secured electricity supply at reasonable prices, which facilitates the investments in Cambodia and developments of the national economy,

To encourage exploration and environmentally and socially acceptable development of energy resources needed for supply to all sectors of Cambodia economy,

To encourage the efficient use of energy and to minimize the detrimental environmental effects resulted from energy supply and consumption.

Current Structure of Energy Sector

- MIME : responsible for government policy, strategies and planning in the energy sector;
- CNPA (1998) : Role and responsibility to manage and develop both downstream and upstream activities within the petroleum sector
- EAC (Sept., 2001): a regulatory body, responsible for licensing, tariff setting and regulations.
- EDC (March, 1996): limited liability company owned by government; consolidated license granted by EAC.

CNPA : Cambodian National Petroleum Authority MIME: Ministry of Industry, Mines and Energy
EAC : Electricity Authority of Cambodia EDC : Electricite du Cambodge

1. Energy Efficiency and Conservation

- Start from year 2000, Cambodia had a good opportunity to join Energy Efficiency & Conservation Programme (EE&C) with ASEAN countries.
- We had mainly technical cooperation, particularly in the form of "on-the-job training" from some institutions & countries, e.g. ACE, EU, ECCJ, UN-ESCAP, ADBME,... in EE&C in the Industry & Building sectors.

ASEAN ENERGY COOPERATION

Building (Competition)
- ⇨ Le Royal Hotel (Retrofitted), Year 2001
- ⇨ Sofitel Royal Angkor (New and Existing), year 2002
- ⇨ Angkor Century Hotel (New and Existing), year 2003

Industry (Actual Energy Audit)
- ⇨ M & V International Manufacturing, December 2002 and February 2003
- ⇨ June Textile Co., December 2002 and February 2003

Training/Capacity building
- ⇨ Arab-Malaysia Development Berhad Textile Factory, in Penang City, Malaysia on 14 – 20 January 2001
- ⇨ Ceramics Factory, in Hanoi City, Vietnam on 14-20 January 2002
- ⇨ Mini-hydro power plant, in Vientiane, Laos PDR on 14-20 January 2002

2. RENEWABLE ENERGY RESOURCES

- **Solar Energy:** the average sunshine duration of 6-9 hours per day, giving an average of 5kWh/sq.m-day.
- **Wind Energy:** The southern part of the great lake Tonle Sap, the mountainous districts in the southwest and the coastal regions, such as Sihanoukville, Kampot,Kep and Koh Kong have the annual average wind speed of 6m/s or greater. The total area around 5%.
- **Hydro:** The potentiality of hydro resource is about 10,000MW, but currently electricity coming from hydro resource is less than 20MW.

RENEWABLE ENERGY RESOURCES (Con't)

- **Biomass:** The report prepared by NEDO on "the Assistance Project for the Establishment of an Energy Master Plan" identified significant biomass energy resources from a variety of agricultural residues such as rice husk., Cassia, Cassava, Jatropha, Mulberry, Coconut, SEM, Peo..
- **Biogas:** The effectiveness of small scale biogas has been demonstrated in Cambodia by a number of different projects. The use of animal wastes to generate high quality gas for cooking has significant economic, health, social and environment benefits for poor rural households.
- **Biofuel:** Jatropha – 200 ha , Palm Oil – 4,000 ha (recently) and will be increased to 10, 000 ha in the next few years , sugar cane 20,000 ha and cassava also promoted.

National Policy on Rural Electrification by Renewable Energy

1) Endeavor to provide access to reliable, safe electricity services, with insignificant impact on the environment and at an affordable price for rural communities,
2) Provide effective legal, regulatory frameworks and various to s encouragements and train the private sector to participate in providing electricity services by renewable energy in the rural areas;
3) Act as a market enabler, through various incentives, for enabling equity in access to reliable and safe electricity services, with insignificant impact on the environment, at an affordable price for the rural communities;

National Policy on Rural Electrification by Renewable Energy (Con't)

4) Encourage the efficient generation, transmission and distribution of electricity using the renewable energy technologies, through tariffs, which are in conformity with the Electricity Authority of Cambodia (EAC)'s regulations;
5) Promote electricity systems by renewable energy at least cost for rural communities, through research and pilot development, as part of RGC's portfolio on grid and off-grid technologies; and
6) Ensure adequate resources, appropriate institutional mechanisms and training to empower the poor involving in rural electrification to participate.

Project Implementation

- **Solar Photovoltaic:** Project with NEDO Japan, SIDA , other international and national institutions including Prime Minister project we had installed around 0.5 MW in the country.
- **Biomass Gasification:** Project with Canada in Battambang (7kw + 20kw) and with DIODE Thailand in Kompong Cham (30kw). On going project in Sambour District, Kompong Thom Province with the capacity 30kw by PONDEM France, will start to install in 2009 and a number of biomass gasifiers done by local investors.
- **Microhydro:** On Going Project with UNIDO capacity 65kw two units, Grant from JICA 2 micro hydropower plants 370 kw.

Project Implementation (Con't)

- **Bio-fuel:** Have more than 10 companies doing with Jatropha, planing around 1,000 ha, no once do with big scale yet.
- **Bio-Energy:** One company from Koren doing on this field with the production capacity of ethanol 36,000 t/year from 100,000 tons of cassava.
- The WB assist to Rural Electrification Fund by providing granted (GEF) and IDA Loan Aprox. USD 12 mil. to implement the following projects:
  1- Expansion off-grid new 50,000 connections with subsidy $45/connection,
  2- Study and development of micro hydropower plants (village hydro) with investment cost USD 2.7 mil.,
  3- Install 12,000 SHS to people in rural areas – people have to pay back all the cost during 5 yes period (maximum).

3. Oil and Gas

- Cambodia has been importing all necessary petroleum products from neighboring countries such as Thailand, Vietnam and Singapore
- Recently Cambodia has discovered oil in four exploration wells in Block "A" covers 6,276 km2; which is located in the offshore Cambodia, approximetely 120 km south-west far from the main land
- With the recent rise in fuel prices and as well as for industrialization of the country it has become prudent for the country to build her own refinery to:
  - Reduce the burden of fuel imports on the budget;
  - Ensure a sustainable energy supply system and security
  - Satisfy domestic demand
- An oil refinery is planned to be constructed utilizing domestic crude oil to be expectedly produced offshore and The Refinery will be located in Sihanouk Ville (Cambodia) near the port
- The refinery shall be operated by government agency called CNPA (Cambodian National Petroleum Authority)

Vision & Purposes : Oil & Gas Development in Cambodia

- Oil & gas for Economic Growth, Energy Security, Environmental Protection & Conservation, Poverty Alleviation and Peace and Stability in the region ;
- To enable Cambodia to monetize it's petroleum resources;
- To reduce Cambodia's total dependence on imported petroleum finished products;
- To develop a natural gas & crude oil market national, regional and international;
- Convertible electricity generation based on indigenous gas and;
- To reduce electricity prices...expand energy consumption & network;

Cambodian Petroleum Industry

- Cambodia's petroleum industry is in the early stages of development. The Government, however, created the Cambodian National Petroleum Authority (CNPA) in 1998.

- Promote investment in Cambodia's upstream oil and gas sectors

- Investigate potential downstream markets for natural gas in Cambodia, including electricity generation

- Update and enhance regulatory framework and reliability of information

Cambodian Petroleum Industry (Cont.)

Current major exploration projects in Cambodia's oil and gas sector include:

- Ongoing exploration & drilling program by ChevronTexaco in Block A, offshore
- Encouraging data acquisition and exploration activity:
  - –Tonle Sap area, onshore (new frontier).
  - –Blocks B and C, D, E and F offshore, Cambodia.

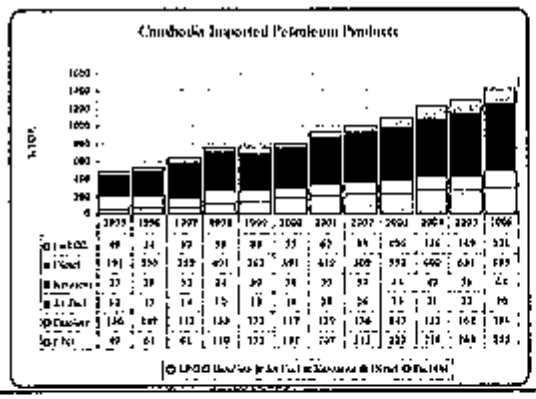
Crude Oil Refinery

- The initial plant capacity is estimated 30,000 barrel/day; maximum capacity is about 50,000 barrel/day of crude oil
- Crude oil is expected to be supplied from offshore oil fields in Cambodia by year 2010.

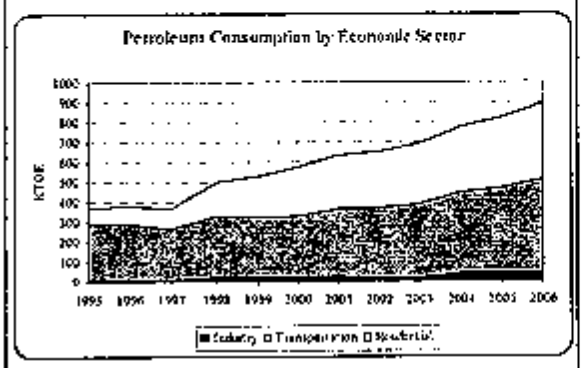
Oil Production

- Produce petroleum products aim at domestic market
- Production outputs:
  - Regular Gasoline;
  - Premium Gasoline;
  - Kerosene;
  - Diesel; and
  - Fuel Oil

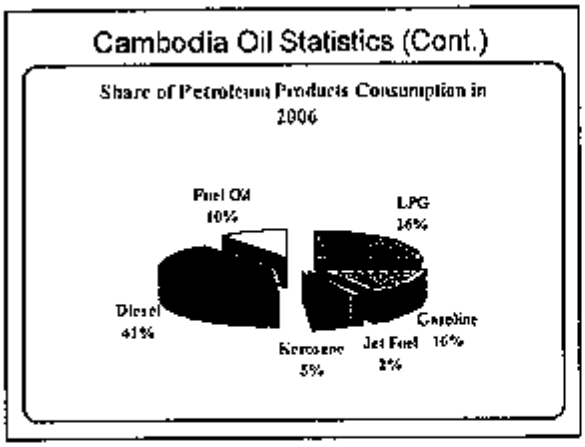
Cambodia Oil Statistics

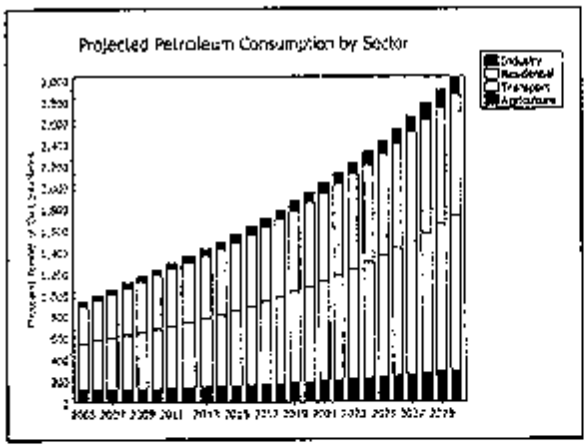


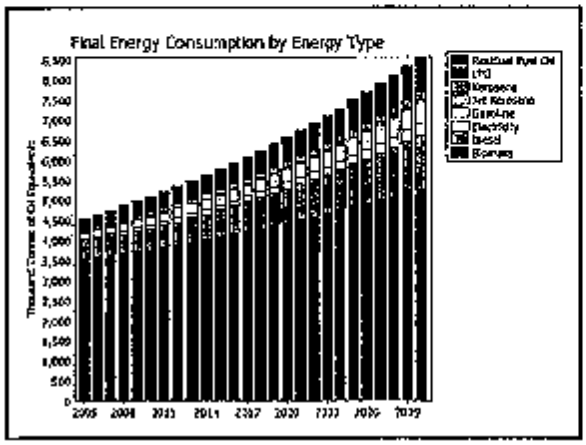
Cambodia Oil Statistics (Cont.)

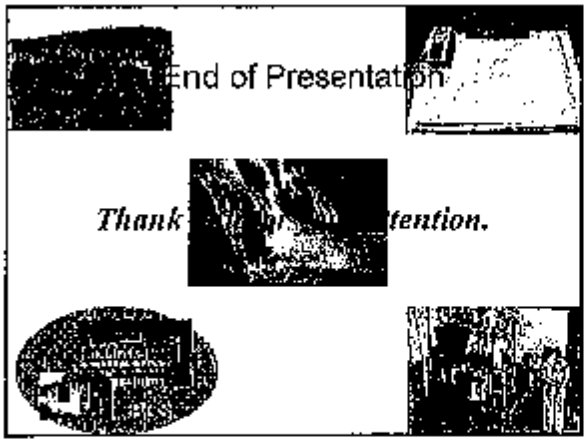


Cambodia Oil Statistics (Cont.)






Final Energy Consumption by Energy Type


End of Presentation
Thank
tention.

GMS SEF

China's Presentation on Recent Development in Energy Sector

GAO Shixian
Energy Research Institute,
National Development & Reform Commission, P.R. China

gaoshixian@amr.gov.cn
Tel: +86-10-6390-8471;
Fax: +86-10-6390-8472

March 18-19, 2009
Bangkok, Thailand

1

Outline

1. Energy Current Situation
2. Energy policies in the near future

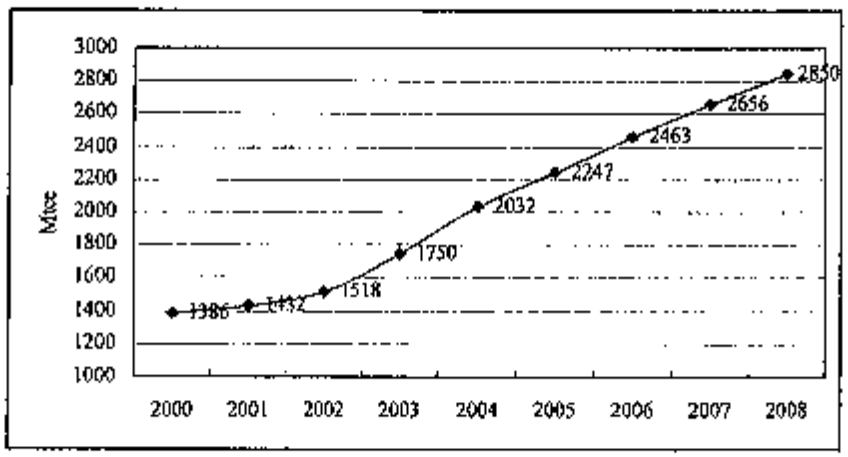
2

1.1 Energy output and consumption in China in 2008

The energy intensity in tern of GDP decreased 4.59%.

3

1.1 China's energy consumption

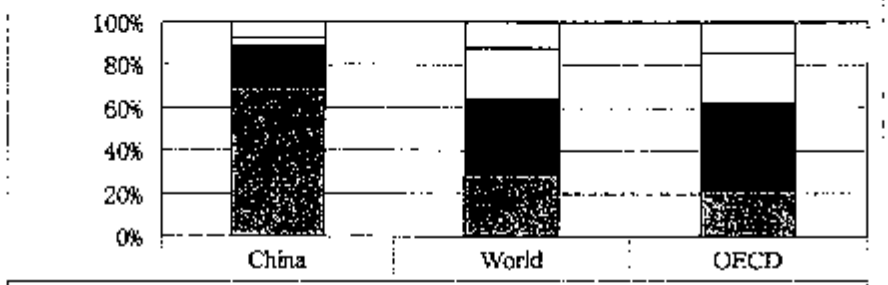


The growth rate of energy consumption during 2000-2008 was 9.43%;

It was 8.25% during 2005-2008

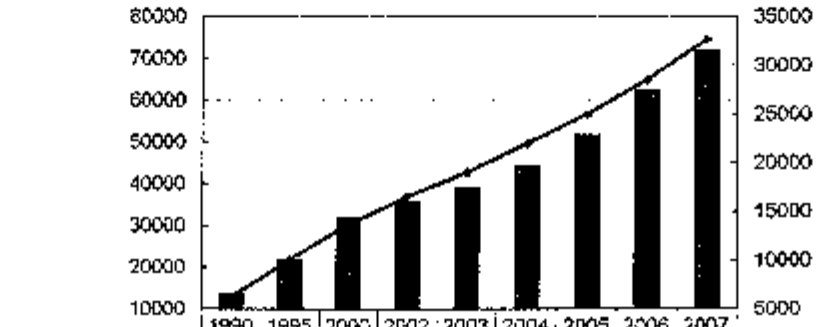
4

1.1 Composition of Energy Consumption in China in 2007



	China	World	OECD
Primary Electricity	7.2%	12.0%	14.7%
Natural gas	3.4%	23.8%	23.7%
Petroleum	20.0%	35.6%	40.4%
Coal	69.4%	28.6%	21.3%

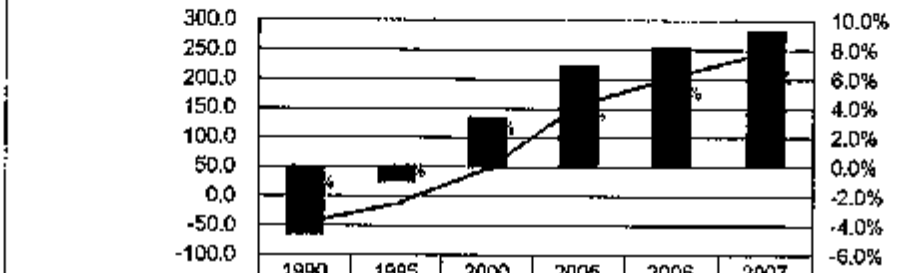
1.2 Power Generation



79.3 GW and 3467 TWh in 2008;

1.3 2007 Energy Balance

In 2007, total domestic production of primary energy was 2.66 billion tce, with a overseas dependency at 9.3%.



	1990	1995	2000	2005	2006	2007
Foreign dependency	-4.6%	-1.0%	3.4%	6.9%	8.2%	9.3%
Net import, Mtce	-45.7	-13.2	47.0	155.1	202.5	246.1

1.4 Energy Administration

In 2008, A new organization titled National Energy Administration (NEA) was set up.

NEA is in charge of overall energy management.

2. Energy policies in the near future

Enhance development of energy infrastructure and key program , such as coal bases, nuclear power , electricity from west to east, natural gas from west to east, oil stockpile, energy equipment innovation;

Optimize energy structure: heighten the proportion of natural gas, hydropower, nuclear power, wind power in total primary energy;

Strengthen energy international cooperation .

2. 1 Coal Sector

Speed up developing 13 coal bases projected, heighten the proportion of coal base in total output;

Restructure coal mines;

Improve coal mine safety;

Speed up developing railway for coal transportation

2. 2 Oil and natural gas Sector

Strengthen oil and natural gas international dialogue and cooperation;

Use more international resources;

Develop actively oil and natural gas transport ways;

Strengthen oil stockpile .

2. 3 Renewable Energy Sector

Develop actively hydro power;

Promote wind power development at large scale; (capacity reached about 10 GW by end of 2008, will develop 4 wind-power bases with 10 GW respectively)

Push developing solar energy;

Push development and utilization of bio-mass and bio-fuel.

2. 4 Energy efficiency and technology

Strengthen to improve energy efficiency;

Push key energy technological innovations;

Heighten energy equipment level.

13

- **Clean coal use**
  - **Traditional CCTs;**
  - **Advanced CCTs, such as IGCC, DME, Coal liquefaction**
- **Renewable energy development**
  - **10% by 2010, 16% by 2020 (current 8%)**
  - **30 GW wind power and 30 GW biomass for power**
  - **10 million tons of bio-fuels**
- **Development nuclear power**
  - **60 -70 GW by 2020,**
  - **5% in total capacity by 2020**

14

Thank you for your attention!

RECENT DEVELOPMENT IN LAO PDR ENERGY SECTOR

Khamso Kouphokham
Chief of Executive Planning Division
Department of Electricity
Ministry of Energy and Mines, Lao PDR
18-19 March 2009

OUTLINE

- BACKGROUND
- DEVELOPMENT

BACKGROUND

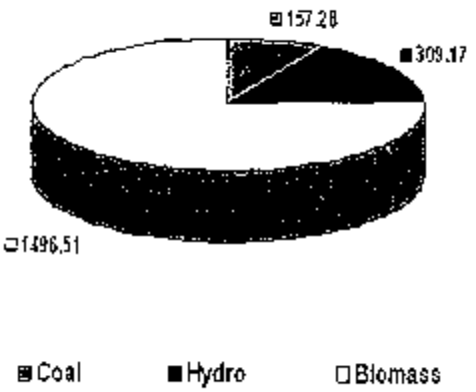
INDIGENOUS PRODUCTION OF ENERGY, 2006

TOTAL: 1,962.95 KTOE

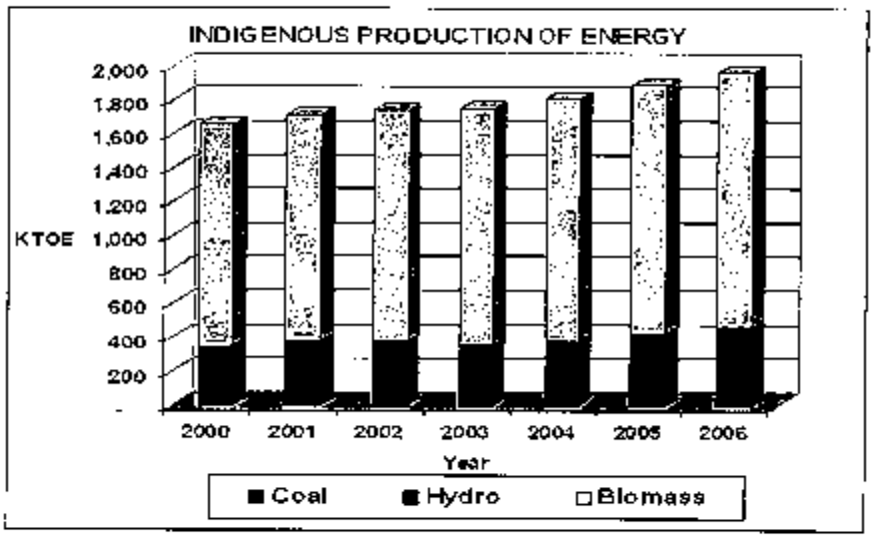
BIOMASS: 76.24%

HYDRO: 15.75%

COAL: 8.01%



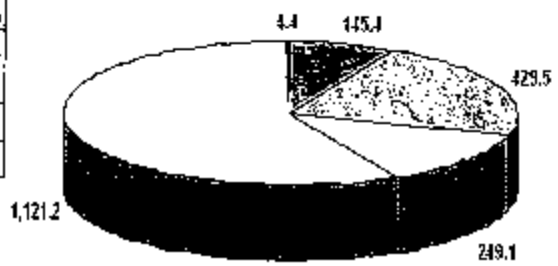
BACKGROUND



BACKGROUND

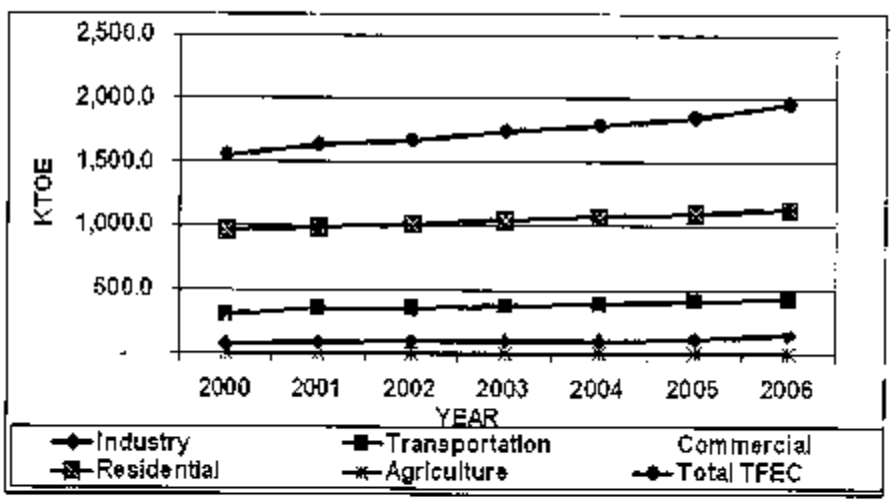
FINAL ENERGY CONSUMPTION, 2006

Industry	7.5%
Transportatio	22.0%
Commercial	12.8%
Residential	57.5%
Agriculture	0.2%
	100.0%



BACKGROUND

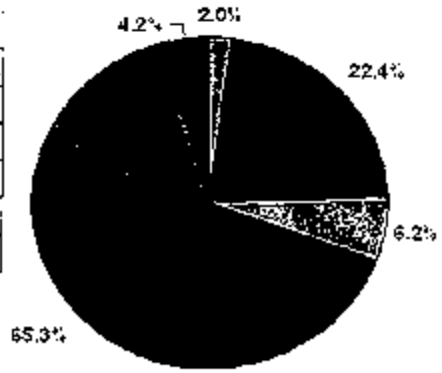
FINAL ENERGY CONSUMPTION GROWTH



BACKGROUND

FINAL ENERGY CONSUMPTION BY TYPES

	KTOE	%
TFEC	1,949.6	100.0%
Coal	39.0	2.0%
Petroleum Products	437.2	22.4%
Electricity	120.2	6.2%
Fuel Wood	1,272.2	65.3%
Charcoal	81.0	4.2%



DEVELOPMENT

- The government has issued Renewable Energy Policy, which focuses mainly on bio fuel promotion and development, to increase bio fuel consumption share in total energy mix to 10-30% in 2020.
- The development strategy to implement this policy is being drafted.
- Rural Electrification Program 1: Funded by World Bank, 3,750 sets of solar photovoltaic systems have been already installed for rural households and remaining 5,250 sets to be installed in this year (all 9,000 sets).
- Rural Electrification Program 2: 10,000 sets of solar photovoltaic systems are going to be installed by 2011, funding scheme: WB and AusAid.

DEVELOPMENT

- The government has signed many agreements with private companies to plant the jatropha to produce bio diesel.
- In January 2009, the government has allowed British Salamander Energy Co.Ltd to invest in an oil and gas exploration project in Central part of Lao PDR.
- September 2008, Ministry of Energy and Mines has signed MOU with ADB to prepare a policy to encourage development of medium, small and mini hydroelectric power projects (public and private sector) to provide electricity from a clean and renewable source of energy and then apply for CDM.

DEVELOPMENT

ASEAN:

- Participate the ASEAN Energy Sub-Sector Network on Renewable, Energy Efficiency and Conservation, Regional Energy Policy and Planning and Nuclear Energy Safety;
- Participate the ASEAN Council on Petroleum
- Participate Promotion of Energy Efficiency and Conservation Project (PROMEEC);
- Participate the Energy Supply Security Planning in ASEAN (ESSPA);
- Develop ASEAN-German Mini Hydro Project.

DEVELOPMENT

ACMECS (2008):

- Promotion on Energy Efficiency and Conservation for Lao PDR;
- Energy Promotion for Rural Village in Lao PDR;
- Energy Audit Training;
- Training on Energy Statistics for Lao PDR.

DEVELOPMENT

Finland (2009):

- The Lao PDR Renewable Energy: Strategy Development and Capacity Building;
- Future Resource Economy and Policies in Laos till the Year 2020;
- Energy and Environment Partnership in the Mekong Region;

THANK YOU FOR YOUR KIND ATTENTION

Greater Mekong Subregion

Special Subregional Energy Forum

Bangkok, Thailand , 18 – 19 March 2009

Developments in Myanmar Energy Sector

[redacted]

Policy

- To maintain the Status of Energy Independence
- To promote wider use of New and Renewable Sources of Energy
- To promote Energy Efficiency and Conservation
- To promote use of Alternative Fuels in household

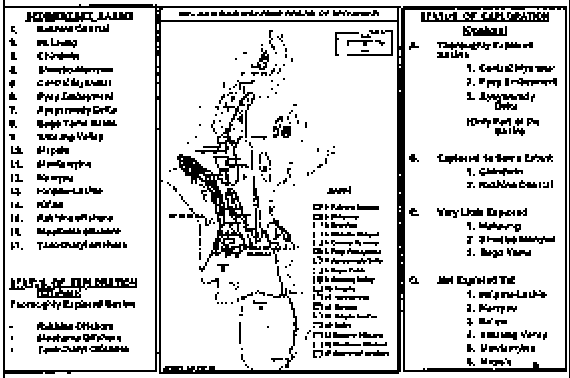
Institutions

(1) Petroleum	- Ministry of Energy
(2) Electric Power	- Ministry of Electric Power(1)
(Hydropower)	
Thermal power	- Ministry of Electric Power(2)
Power transmission and distribution	
(3) Coal	- Ministry of Mines
(4) Biomass and	- Ministry of Forestry
Fuelwood	- Ministry of Agriculture and Irrigation
(5) Renewable	- Ministry of Science & Technology

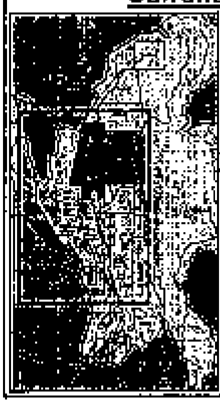
- Ministry of Energy is a Focal Point of the Myanmar Energy Sector Cooperations

- Petroleum Sub-Sector

Oil and Gas Bearing Areas of Myanmar



Current Onshore Activities

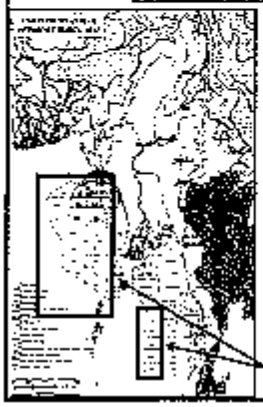


Company/Operator	Block	Area
MPRL E & P (Singapore)	MOGE-3 (N)	(Mann Field)
GOLDPETROL (Indonesia)	MOGE-1	(Yenangyaung Field)
	IOR-[illegible]	(Chauk Field)
FOCUS ENERGY (Switzerland)	MOGE-3 (S)	(Htaukshabin / Kanni Field)
CNOOC (China)	PSC-M	([illegible])
	PSC-C1	([illegible])
	PSC-C2	(Shwebo-Monywa)
SINOPEC (China)	PSC-D	(Mahudaung)
ESSAR (India)	PSC-L	(Sittwe)
SILVER WAVE ENERGY (Russia)	PSC-B2	(Zebyutaung-Nandaw)
[illegible] Oil Company	PSC-A	(Hukaung)
Nobel Oil	PSC-B1	(Uyu)

In onshore Area, 12 Contracts are active in 12 onshore blocks with 11 foreign companies.

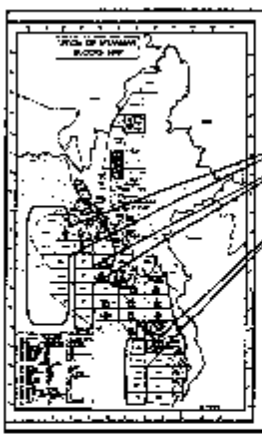
The other onshore blocks are reserved for MOGE operations.

Current Offshore Activities



Company / Operator	Block
TOTAL	M-5 , M-6 (Yadana Project)
PETRONAS Carigali	M-12 , M-13 , M-14 (Yetagun Project)
DAEWOO INTERNATIONAL	A-1 , A-3 (Shwe Project)
PTTEP	M-3 , M-8 , M-7 , M-11 , M-9 (Zawtika Project)
CNOOC	A-4 , M-10
ESSAR	A-2
SUNTERA	M-8
OANFORD EQUITIES	YEB
OAIL + SILVER WAVE	A-7
CAIRC INTERNATIONAL LTD	AD-1, AD-6 , A-3
MPRL E & P	A-6
ISHIKAWAJIMA PETROGAS	M-1
PETROVIETNAM / VIETSOVPETRO	M-3
DAEWOO INTERNATIONAL	AD-7
OAIDC VIDESH	AD-2 , AD-3 , AD-8

In offshore area, 27 Contracts are active in 26 offshore blocks with 22 foreign companies.
19 new deep water blocks are open for new investors



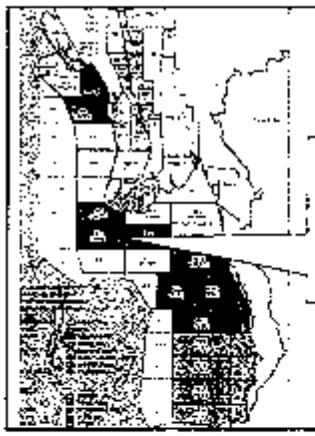
Newly Demarcated Deep Water Blocks

- Rakhine Offshore Area
16 Blocks (AD-1 to AD-16)

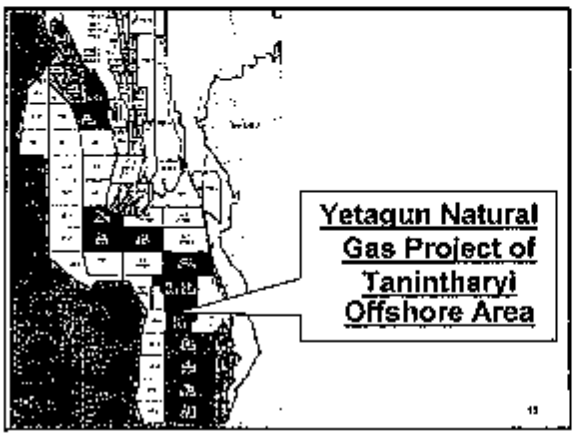
- Moattama/Tanintharyi Offshore Area
6 Blocks (MD-1 to MD-6)

OPEN OFFSHORE BLOCKS

- Newly Open Deep Water Blocks : 19 Blocks



Yadana Natural Gas Project of Moattama Offshore Area



Yetagun Natural Gas Project of Tanintharyi Offshore Area

Gas Export (Myanmar)

(BSCF)

Sr. No.	YEAR	YADANA	YETAGUN	TOTAL
1.	1998-99	30.000	-	30.000
2.	1999-2000	148.455	-	148.455
3.	2000-01	233.252	47.920	281.172
4.	2001-02	197.130	79.830	276.960
5.	2002-03	191.695	91.900	283.595
6.	2003-04	190.392	92.339	282.731
7.	2004-05	193.343	108.659	302.033
8.	2005-06	161.120	142.163	303.283
9.	2006-07	236.630	153.277	389.727
10.	2007-08	241.732	157.793	399.525

Natural Gas Trade Movement by Pipeline

(BP Statistical Review of World Energy June 2008)

Sr. No.	Country	Export Volume (BCM)
1.	Russian Federation	147.53
2.	Canada	107.30
3.	Norway	86.05
4.	Netherland	50.06
5.	Algeria	34.03
6.	USA	22.01
7.	Germany	16.98
8.	Other Europe & Eurasia	12.82
9.	Bolivia	11.73
10.	UK	10.38
11.	**Myanmar**	**9.69**
12	Libya	9.20

Natural Gas Trade Movement by Pipeline (Cont.)

(BP Statistical Review of World Energy June 2008)

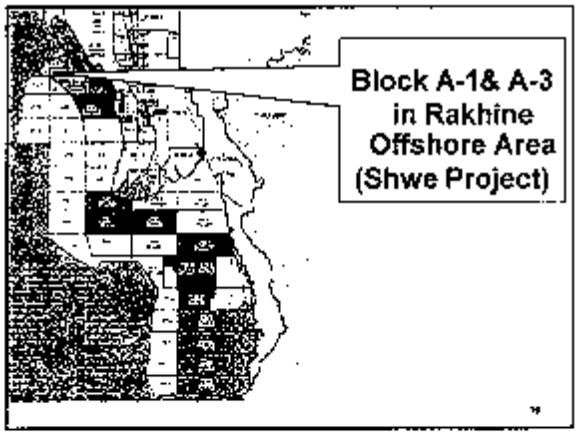
Sr. No.	Country	Export Volume (BCM)
13.	Iran	6.18
14.	Turkmenistan	5.10
15.	Indonesia	5.99
16.	Belgium	4.50
17.	Other Latin America	2.69
18.	Egypt	2.35
19.	Malaysia	1.78
20.	Mexico	1.60
21.	Oman	0.95
22.	Qatar	0.60
	TOTAL EXPORT	549.66

Asia Pacific Region Gas Trade Movement by Pipeline

(Billion Cubic Meters – BCM)

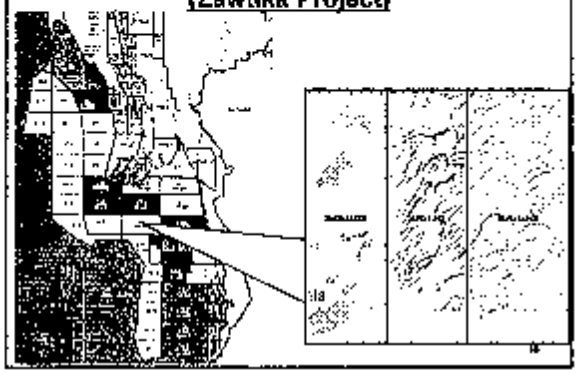
(BP Statistical Review of World Energy June 2008)

Sr. No.	Country	Year 2004	Year 2005	Year 2006	Year 2007
1.	*Myanmar*	*7.60*	*8.90*	*8.98*	*9.89*
2.	Indonesia	8.16	4.83	4.83	5.39
3.	Malaysia	1.60	1.76	1,78	1.78



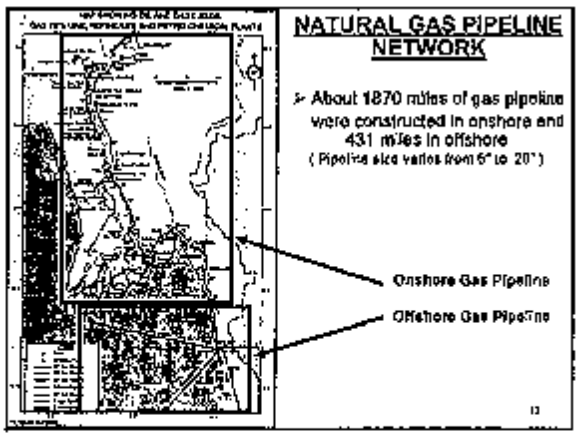
Block A-1& A-3 in Rakhine Offshore Area (Shwe Project)

Moattama Offshore Block M-9 (Zawtika Project)



NATURAL GAS PIPELINE NETWORK

- About 1870 miles of gas pipeline were constructed in onshore and 431 miles in offshore
  (Pipeline size varies from 6" to 20")



CNG / NGV PROGRAMME IN MYANMAR

- Initiated in Myanmar since 1998.
- 1998 – August 2004 :
  - 5 CNG Refueling Stations -
    - 2 in Yangon City
    - 2 in Yenangyaung Field
    - 1 in Chauk Field
  - 587 NGVs (Converted from petrol buses)
- CNG / NGV Programme was restarted in August 2004.
- As at March 2009 :
  - 47 CNG Refueling Stations in Myanmar -
    - 42 in Yangon City
    - 2 in Mandalay City
    - 2 in Yenangyaung Field
    - 1 in Chauk Field
  - more than 25,000 NGVs (Converted from both petrol / diesel cars)
- Future : CNG Refueling Stations will be installed along the existing domestic pipeline corridors

- Coal Sub-Sector

Coal Production and Consumption

Tons in Thousands

Year	Production	Consumption	Export
2000-01	[illegible]	132.71	[illegible]
2001-02	[illegible]	[illegible]	[illegible]
2002-03	[illegible]	[illegible]	[illegible]
2003-04	[illegible]	[illegible]	[illegible]
2004-05	[illegible]	[illegible]	[illegible]
2005-06	[illegible]	[illegible]	[illegible]
2006-07	[illegible]	[illegible]	[illegible]
2007-08	1117.29	888.70	228.59

Coal Production Forecast

Tons in Thousand

Year	Production	State Owned	JV Operation	Private
2010-2015	1734.80	48.80	761.00	925.00
2015-2020	2326.00	50.00	1086.00	1190.00
2020-2025	2761.00	50.00	1406.00	1305.00
2025-2030	4593.00	55.00	3218.00	1320.00
2030-2035	5654.00	55.00	4264.00	1335.00

- Renewable Sub-Sector

Electrification by Renewable in Myanmar

Type	Installed Capacity (MW)
Solar	= 0.1157
Wind	= 0.6194
Mini Hydro	= 8.3530
Biomass	=18.1942
Biogas	= 1.6993

More Renewables

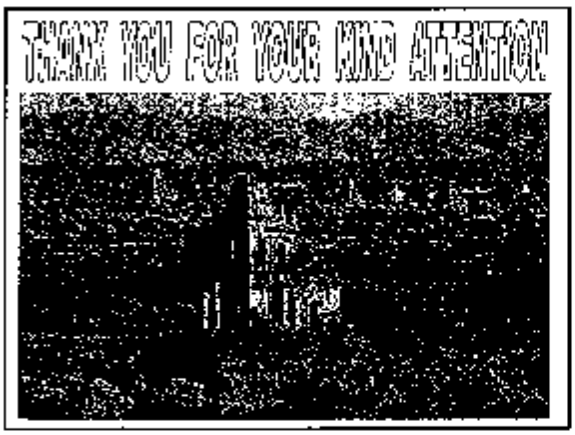
- Rice husk Gasifier Plant
- Biogasifier Plant
- Jatropha Plantation

Biofuel Programme

Jatropha Curcas plants are grown in homesteads and cultivable land to use the oil as an alternate fuel, it is planned to plant 500,000 acres of Jatropha plants in every State and Division of the Country within 3 years, amounting to 7 million acres for the whole country. The programme is ongoing.

By the time the programme is fully onstream, Myanmar will produce 700 million gallons of Jatropha oil annually.

Myanmar is also implementing programme to produce Bio-ethanol and Bio-diesel as alternative fuel in the transport sector.



กระทรวงพลังงาน
MINISTRY OF ENERGY

Thailand: Recent Developments in the Energy Sector

GMS: Special Meeting of the Sub-regional Energy Forum
Bangkok, Thailand, 18-19 March 2009

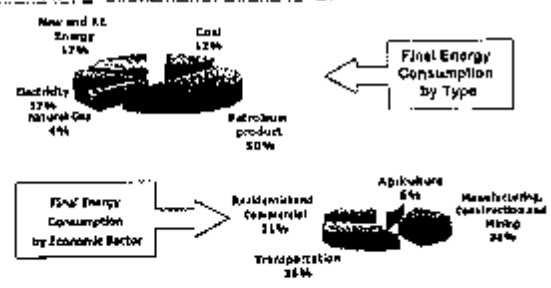
1

Agenda

- **Developments in Institutional/Policy Framework**
  - Thailand's Energy Policy under the Present Government
  - Energy Industry Regulation in Thailand
  - Thailand's Strategies to Enhance Energy Security
- **Progress in Energy Programs**
  - Natural Gas Supply Management
  - Oil Supply Management
  - Alternative/Renewable Energy Strategy and Target
  - Energy Efficiency Improvement

Energy Situation in Thailand

Thailand Energy Situation in 2007



Total final energy consumption 64.87 Mtoe (Energy Import 24,052 Million USD)*

2

Thailand's Energy Policy (PM Abhisit Administration)

1. **Intensify Energy Development for Greater Self-reliance**
   - expediting more investment in E&P of energy within the country, in JDAs and from neighboring countries, including creating energy mix in power development – particularly, power generation from potential domestic RE sources.
2. **Set the Policy on Alternative Energy as a National Agenda**
   - by encouraging production and use of alternative energy, particularly biofuels and biomass, to enhance energy security; encouraging production & use of RE at the community level; expediting greater use of NG in the transportation sector; and promoting R&D of all forms of RE.
3. **Supervise & Maintain Energy Prices at appropriate, stable & affordable levels**
   - by setting appropriate price structure; managing prices through market mechanism and Oil Fund to promote economical use of energy; and encouraging competition and investment in energy business, including improvement of service quality and safety.
4. **Promote Serious and Continuous Energy Conservation and Efficiency**
   - in the household, industrial, service & transportation sectors, with appropriate incentives, by setting energy efficiency standards of electrical appliances & buildings and supporting development of mass public transportation and rail systems.
5. **Promote Energy Production & Consumption concurrently with Environmental Conservation**
   - giving importance to [illegible]

Energy Industry Regulation in Thailand

- **Energy Industry Act B.E. 2550 (2007) has come into force since 11 December 2007.**
- **The Energy Regulatory Commission (ERC)** was graciously appointed by His Majesty the King on 1 February 2008.
- **The ERC is responsible for regulating the electricity and natural gas industry** under the policy framework of the government.
- **The Office of the Energy Regulatory Commission (OERC)** has been established to function as the Secretariat to the ERC.

Thailand's Strategies to Enhance Energy Security

Apart from **efficient supply management of conventional fuel:**

- **Natural Gas Supply Management**
- **Oil Supply Management**
- **Power Supply Management**

another major approach in the energy sector to enhance energy security is **to diversify energy types and supply sources,** taking into consideration environmental dimension.

- **Promotion of Alternative/Renewable Energy**
- **Consideration on Nuclear Energy**

Energy efficiency improvement is another important means that helps reduce overall energy demand, and hence reduce dependency on energy import.

Natural Gas Supply Management (1)

- Natural Gas Demand
  - In Thailand, NG utilization is promoted, particularly in power generation and transport sectors, to replace petroleum products such as fuel oil, diesel and gasoline.
  - Since the world oil prices have increased during recent years, more industries have switched to use NG instead of oil.
  - Based on PDP 2007, NG demand during 2007-2011 is projected to increase by an average of 6% per year for power generation.
  - If included industry and transport demand, NG demand will grow at an average of 10% per year.

Natural Gas Supply Management (2)

- Natural Gas Supply
  - Total supply of NG (Aug 2008) was 3,652 million cubic feet per day (MMSCFD), 6.75% increase from the end of 2007.
    - 2,805 MMSCFD (77%) produced in Thailand.
    - 847 MMSCFD (23%) imported from Myanmar.
  - It is expected that NG production will increase to about 5,400 MMSCFD in 2012 and about 7,440 MMSCFD in 2021.
  - Support PTTEP to be the arm of the government in petroleum resource development, particularly at the international level.
  - Encourage Thai energy operators to joint venture in energy projects overseas.

Oil Supply Management (1)

- Oil demand is projected to increase at an average growth rate of 3.3% during 2007-2021.
- Oil remains to be the major fuel of the country in spite of promotion of energy conservation and greater use of NG.
- Oil remains the major fuel in the transport sector.

Projection of Oil Demand up to 2021 Unit: KBD

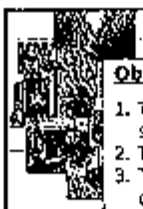
Type	2006	2007	2011	2016	2021	CAGR %				
						2007	2007-11	2012-16	2017-21	2007-21
LPG*	86	88	100	131	169	2.2	3.0	6.6	5.2	4.6
Gasoline**	124	128	140	172	200	3.9	3.7	2.8	3.0	3.2
Jet & Kerosene	78	81	97	121	155	4.1	4.3	4.6	4.9	4.7
Diesel**	317	329	381	444	530	3.9	3.7	3.2	3.5	3.5
Fuel Oil	101	85	82	80	93	-16.3	-4.2	-0.5	4.5	-0.3
Total	707	711	800	951	1,154	0.6	2.7	3.3	3.8	3.3

* [illegible]
** [illegible]

Review of Alternative/RE Strategy and Target

- **Former target** according to the Energy Conservation Plan, Phase 3, was to increase the use of RE to 9% by 2011.
- Given the highly volatile oil price in the past year, Thailand plans to boost RE development in order to reduce dependency on imported oil.
- **A 15-year Renewable Energy Development Plan (REDP)** was submitted to the National Energy Policy Council on 16 January 2009 and further presented and approved by the Cabinet on 28 January 2009.

Alternative Energy Policy In Thailand



Alternative Energy Development Plan (2008-2022)

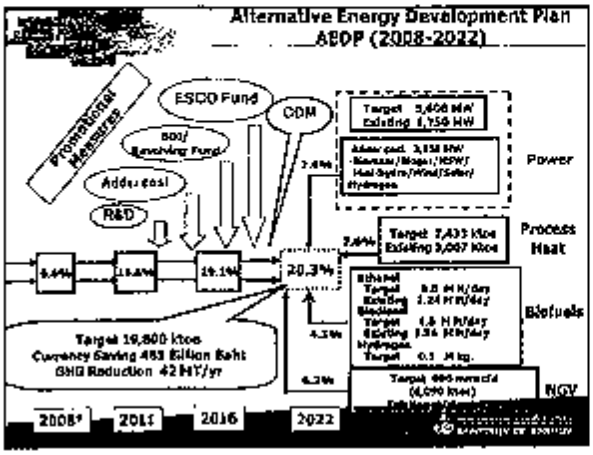
Objectives:

1. To utilize alternative energy as a major energy supply of the country for replacing oil import,
2. To increase energy security of the country,
3. To promote an integrated green energy utilization in communities,
4. To enhance the development of alternative energy technology industry,
5. To research and encourage high efficiency alternative energy technologies.

Target

"To increase a share of alternative energy mixed to be 20% of the country final energy demand in the year 2022"

Alternative Energy Development Plan AEDP (2008-2022)



Alternative Energy Development Plan AEDP (2008-2022)

Overview of Alternative Energy Development Plan: AEDP

- **Short term (2008-2011)**
  - Emphasize on promotion of commercial alternative energy technologies and high potential energy sources such as biofuels, co-generation from biomass with fully supports from measures provided.
- **Mid term (2012-2016)**
  - Focus on development of alternative energy technology industry, encourage new alternative energy R&D to achieve economic viability including new technologies for biofuels production and introduce a model development of Green City to communities for sufficient economy and sustainability development.
- **Long term (2017-2022)**
  - Enhance utilization of new available alternative energy technolos i.e. hydrogen, bio hydrogenated (BHD), extend green city modes throughout Thai communities and encourage to be hub of biofuel and alternative technology exports in ASEAN regions

Alternative Energy Development Plan AEDP (2008-2022)

Moving from Plan to Action

(1) Promote the utilization of Renewable Energy
- Proper and fair incentive, encourage local people to participate in RE fuel management.
- Legislation, legislation, re-evaluate and launch measures of adder cost, tax incentive, BOI previlege, promote the investment through ESCO Fund and utilize the CDM project together with the promotion of RE technology industry.

(2) Research and Development Promotion
- Fully allocate budget and collaboration for upstream and downstream researches on RE technologies, development and demonstration as well as the extension of the research and knowledge sharing.

(3) Dissemination
- Disseminate all stakeholder to realize the signification of RE as well as access to RE policy and RE measurements.
- Establish RE network for knowledge sharing, workshop and seminar and establishment of academic booklet for students.

Alternative Energy Development Plan AEDP (2008-2022)

Key Success Factors

1. Subject RE as a "National Agenda".
2. Government continuously and strongly support RE, especially, incentive of BOI, ESCO Fund, Revolving Fund and add cost
3. Government provides infrastructure for the RE expansion.
4. Revise of the obstructive legislation.
5. Fully allocate the budget for research, development, demonstration, dissemination and public relation of RE.
6. Accessibility of RE data, e.g. Potential and raw material management
7. RE technology standards.

Alternative Energy Development Plan AEDP (2008-2022)

Output and Outcome

(1) Economics aspect
- Currency saving on energy import 460,000 MB/year within 2565.
- Increase investment of private sector 382,240 MB.
- Creates 40,000 clean and new jobs.
- Opportunity to earn 14,000 MB/year from Carbon Credit trading.
- Delay the construction of new fossil fuel power plant 3,8000 MV (equivalent to 120,000 MB).
- Create Country's incomes by exporting biofuels, RE technologies (Gasification, Biogas fermentation system).

(2) Social aspect
- Migration mitigation due to job creation in rural areas.
- Extra income to farmers.
- Improve quality of life for Thai people.

(3) Environmental aspect
- Low Carbon Society to mitigate the global warming

Nuclear Power:

Major Reasons for Nuclear Power Introduction

1. Energy Security

At present, Thailand uses natural gas from the Gulf of Thailand and import from Myanmar for power generation, accounting for a share of almost 70%.

However, the R/P of domestic natural gas reserves is rather low (~ 30 years), which is considered a high risk in terms of energy supply and resources.

2. Concern over Global Warming And Climate Change

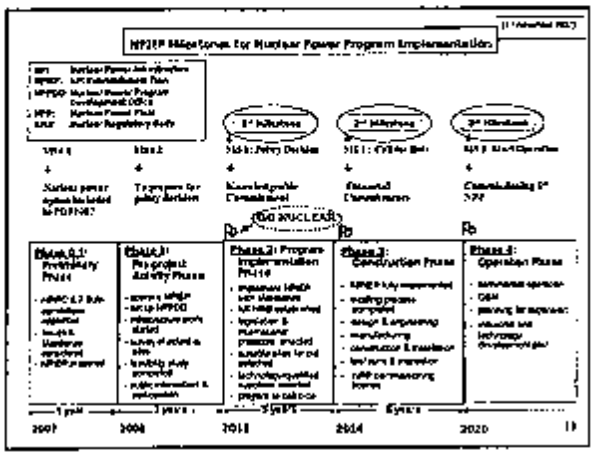
The global warming crisis has clearly and vigorously affected itself in climate change, resulting in the global pressure to reduce GHG emissions urgently.

For an NPP, no GHG emission from the power generation process.

3. Maintenance of Energy Price Stability & Competitiveness in the Long Run

In the past 5-6 years, there has been a 3-4 fold increase in the prices of petroleum and natural gas and the prices have been volatile.

Nuclear power is a fuel option for large-scale power generation, with low generation cost that can be competitive with other types of power plants.



Major Issues to be Prepared for the Nuclear Power Program Development

ISSUES
1. Legal and Regulatory Systems and International Protocols
2. Nuclear Safety and Environmental Protection
3. Industrial and Commerce Infrastructure
4. Human Resources Development and Technology Transfer
5. Public Information, Participation and Acceptance
6. Nuclear Power Utility Planning Work

Promotion of Energy Efficiency Improvement

Set Energy Saving Target at 10.6% in 2011

Logistic System
- Improve & expand public transport systems/promote rail & waterway transport modes
- Promote energy-saving vehicles

Promote CHP (Combined Heat and Power) System
- Promote power & cool water generation using Distributed-Generation (DG) system in large department stores
- Promote Energy Services Company (ESCO) business
- Provide revolving funds/tax incentives/investment promotion via BOI privileges

Speed up energy efficiency labelling
- Establish Minimum Energy Performance Standards (MEPS): air-conditioners, refrigerators, ballast, fluorescent lamps and compact fluorescent lamps
- Building code & building material standards

Public Awareness Campaigns on energy saving

Energy Efficiency Improvement

ENCON Program, Phase 3 (2008-2011)	Projected Energy Demand in 2011 (ktoe)		Target in 2011	
	BAU Case	With ENCON Plan	ktoe	%
Energy Efficiency Improvement Program	80,333	72,511	7,820	10.8*
(1) Industrial Sector	31,847	28,658	3,190	9.4
(2) Transportation Sector	28,781	25,357	3,423	4.7
(3) Residential Sector	19,704	18,496	1,207	1.7

- On-going implementation with support/promotional measures:
  - revolving funds
  - tax incentives
  - investment promotion measures via BOI
  - promotion of Energy Services Company (ESCO) business
  - experts' visit to SME facilities to give advice on efficient energy management.

Demand Side Management by Bidding Mechanism

Expected saving 149 ktoe

- Provide financial support to encourage business operators to invest in higher energy efficiency machines/equipment.
- Subsidy is based on actual units of energy saving achieved in a year. (subsidy = annual energy saving x subsidy rate as bid by each company!)
- Max. subsidy rate for each energy type is shown in the table:

Energy Type	Maximum Subsidy Rate
Electricity	3 Baht/kWh
Heat From liquid and gas fuels e.g. fuel oil, LPG, natural gas, etc.	76 Baht/MMBtu
Heat From solid fuels e.g. coal, wood, rice husks, sawdust, bagasse and other agricultural waste	45 Baht/MMBtu

- Company requesting lower weighted subsidy rate will be subsidized first, i.e. bidding mechanism.
- Therefore, this program will result in higher energy saving to subsidy ratio.
- Currently, 54 projects are approved, resulting in approximate annual energy saving of 39 ktoe (197,000 MMBTU and 70 GWh). The requested subsidy totals 72 million Baht.

"We commit to the stability of energy development"

Thank you for you kind attention

GREATER MEKONG SUBREGION ADB

Special Subregional Energy Forum (SEF)

DEVELOPMENT IN VIETNAM ENERGY SECTOR

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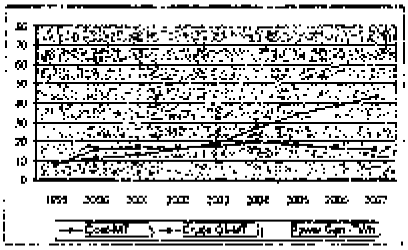
I ENERGY PRODUCTION PERIOD 1995-2007



Growth Rate 1995-2007:
- Coal Production 14,6 %
- Electricity 13,8 %
- Crude oil 6,3 %

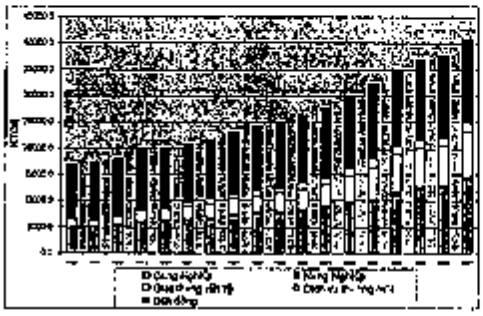
2007
- Coal: 43,2 Mill.tons
- Elect. Power 69,1 TWh
- Crude oil: 16.9

I FINAL ENERGY CONSUMPTION 1990-2007

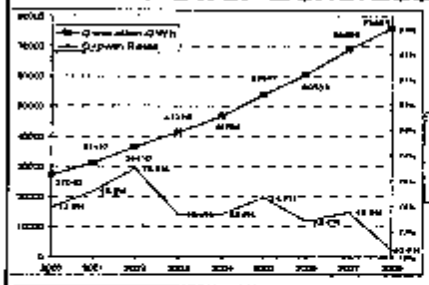
Unit XTOE

[illegible]	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007
Coal	1324	2603	3223	3743	4217	4337	4851	5351	5526	6060
Petroleum	2470	4247	6930	7457	6884	10395	11688	12254	12917	14016
Gas	5.9	21.2	19.4	18	18	18	270	515	310	543
Electricity	532	953	1927	2223	2600	3067	3435	4251	4630	5298
Non-Commercial	12421	12872	14151	14297	14399	14694	14734	14780	14841	14846
Total	16709	20717	26244	27768	28916	33336	35148	38164	37627	40762

I FINAL ENERGY CONSUMPTION 1990-2007



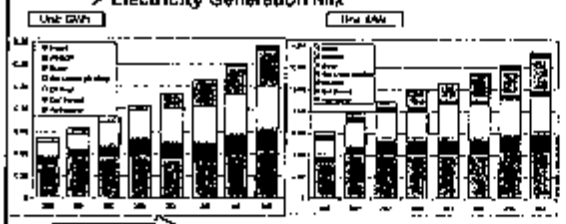
Power Generation



Annual Growth rate (2001-2008):
- *Gen. output: 13.8%*
- *Power sale: 14.4%*
- *Peak: 12.2%*

✓Total installed capacity of Power Plants as of 2007: 13512 MW
✓ 2008: 15763 MW
✓Peak Demand 2008: 12636 MW

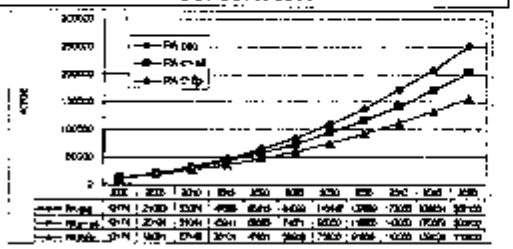
➢ Electricity Generation Mix



Share of RE-2007

5.1% of Installed Capacity, including:
- Wind 0.004%
- Small Hydro 0.021%
- PV Solar 0.004%
- Biomass 1.127%

DEMAND OF FINAL COMMERCIAL ENERGY CONSUMPTION



Growth rate 2000 – 2007: 11%

	2001-2020	2021-2030	2031-2040	2041-2050
- High case	6.8%	5,4 %	4,5%	3,9%
- Base case	8.2%	4,9 %	4,2%	3,6%
- Low case	7.1%	4,6 %	4,1%	3,4%

Renewable/biomass Energy: Potential & Current Use

VN is relatively endowed with multiform RE resources.

Main RE resources like biomass/biogas/bio-fuel, wind, solar, small hydro and geothermal energy.

The most basic use of renewable energy is biomass for heat. Fuelwood, agricultural residue and animal waste are used as heat source of households

Up to day, only biomass (bagasse) and small hydro is used for power generation to supply to national - grid. Others, e.g. Solar and wind to off - grid

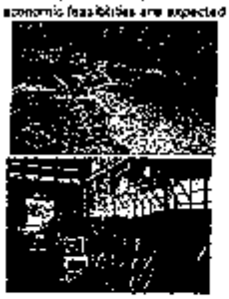
Target for bio-fuels (ethanol and bio-diesel) was set up and considered for development.

Small Hydropower

Potential

Small hydropower potential (<30MW): over 4,000MW with 12,000-14,000GWh

However, since some potential sites are located far from load center and their economic feasibilities are expected to be low.



Current Use

+ There are more than 50 grid-connected small hydropower plants (total capacity: 64MW, unit capacity: 100kW-10MW).

+ And there are about 300 off-grid small hydropower plants (total capacity: 70MW, unit capacity: 5-200kW).

+ Also, about 150,000 small hydropower systems (0.1-1kW) for households have been sold

Solar Energy

Potential

Vietnam is relatively rich in the solar energy potential with 4-5kWh/m²/day of annual average sunshine nationwide. Especially solar potential in central and central-southern provinces, where amount of solar radiation is stable throughout the year, is high. (5.15kWh/m²/day of annual average sunshine hours)

Current use

1250 kW of solar PV power systems installed, Market shares:

Exclusive systems (50%)

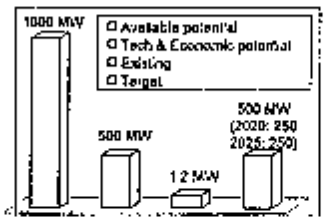
Institution, school, hospital and battery charging systems (20%)

Household PV power systems (30%).

Solar water heaters: Some design prototypes of solar water heater were studied and installed in Vietnam for hospitals, kindergartens, schools, restaurants, health care centers etc

Wind Power

- Larger potential (3000km of coastal line and islands)
- On grid and off grid
- Some activities have been being done
- Promoting R & D
- Installation of measurement towers (50-80m)
- Prefeasibility reports (6) ~2100 MW



Geothermal Power Resources

300 hot mineral water resources, surface water temperature 40-100 °C. Total capacity of about 200 -340 MW may be developed

Biomass Energy

Potential:

+ Total biomass potential: more than 60 million tons produced annually, including:
  - Rice husk: 7-7.5 million tons
  - Bagasse: 4-4.5 million tons
  - Rice straw: 35-37 million tons
  - Wood and wood wastes (saw dusts, wood wastes): 10-15 million tons
  - Others (coffee husks, coconuts...): 1-1.5 million tons

Biomass for heat

* Consumption in rural households (cooking): 10,500 KTOE

* Consumption in rural small scale industry (brick making, cassava burning, food processing...): 2,500 KTOE

Biomass for power

Potential:

More than 500 MW

- Bagasse in sugar mills (Cogeneration) : 250 MW
- Rice Husk Fired Power Plants: 200MW
- Others (Wood Processing, Coffee Husk) 50 MW

Current

- For Cogen: 130 MW installed in 42 sugar mills

Biogas Energy

About 100,000 household size biogas digesters have been constructed (average capacity: 5-10 m3)

In many localities, there are groups of private builders providing construction services.

Bio-fuel (Ethanol and Bio-diesel)

A. Available raw material for Ethanol

1. Sugar plant (sugar cane, molasses..)
2. Starch plants (cassava, sweet potatoes, corn, cane)

B. Available raw material for Bio-Diesel

1. Coconuts
2. Bass, ta ish

C. Target:

Bio-Ethanol and Bio-diesel production has been being promoted and

Utilization action plan for 2015 & 2025

PRIMARY ENERGY SUPPLY CAPABILTY

Up to 2025

- Coal: ~80 - 90 MT/anm
- Crude oil: 18-21 MT/anm
- Gas: 16.5 BCM/anm
- Hydropower: 60 TWh/anm.

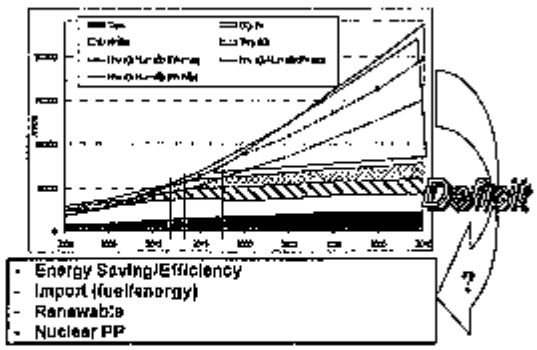
... to 2030

- Coal: >100 MT/anm,
- Crude oil: 18-22 MT/anm
- Gas: 18 - 20 BCM/anm,
- Hydropower: 70 - 80 TWh/anm.

Renewable energy for power generation

	2007		Potential to 2025		Potential to 2030	
	MW	TWh	MW	TWh	MW	TWh
Small HPPs	430	1350	3000-4500	15 -> 20	9000	39.5
Win	1.2	0	550			
Solar	1,75	NA	40-60			
Biomass	150	NA	500			
Geothermal	0	0	200			
Total	500	~1.4	5200-5700			

ENERGY DEMAND – SUPPLY BALANCE



- Energy Saving/Efficiency
- Import (fuel/energy)
- Renewable
- Nuclear PP

ENERGY development PLANNING & Implementing

- Diversifying
  - *Energy type (Renewable, import/Exchange, Nuclear power plant...)*
  - *Investment sources (IPP, BOT...)*
- Refineries (1,2 &3): *The 1st is in operation by Feb. 2009 (Dzung Quat Refinery – 6.5 Mill. Ton/annum)*
- Commercial Energy Efficiency program/ Energy Efficiency program: *Energy audit program, Promote the development of ESCO in Industry & Commercial sectors*
- National DSM program: *Load research, TOU, Labeling... in power sector*

ENERGY development PLANNING & implementing (Cont's)

- Import fuel: *meet the regional coal exporters to find out a source*
- Power Interconnection/Trade: *a new power trading between VN and Cambodia: prepare sending power to Phnompenh via 220kV Chaudoc – Takeo – Phnompenh in 2009; Developing HPPs in Lao PDR & Cambodia…*
- Restructure Power sector: *Government has a Road map for restructure power sector (ERAV was established by 19 Oct. 2005)*
- Nuclear PP: *going to submit Pre-FS of 1st NPP to VN National Assembly*
- Promoting Renewable Energy Development: *Decision of government no 1855-2007 and 177-2007:*

Policy/Strategy for Renewable Energy Development

a). The Decision No. 1855/QĐ-TTg dated 27 December 2007 by Prime Minister approving Strategy on Vietnam National Energy Development up to 2020, and outlook to 2050

Some main contents of strategies on national energy development related to promotion of renewable energy development

i) Diversification of renewable energy resources

ii) Encouraging study and use of renewable energy types, focus on remote mountainous, island areas

iv) Strive to increase share of renewable energy to about 3% of total commercial primary energy in 2010; 5% to 2020 and 11% in 2050.

v) By 2020, most rural population will have access to electricity (based on both grid and off-grid local power resources).

Policy/Strategy for Renewable Energy Development (cont's)

b). The Decision No. 177/2007/QĐ-TTg dated 20 November 2007, by the Prime Minister approving "Project on Biofuel Development for Period up to 2015, Outlook to 2025".

The main objective of this project is to develop biofuels, one renewable energy type for substituting a part of traditional fossil fuels, contributing to ensuring energy security and environmental protection. The main contents are as follows.

i). In period 2011-2015, Mastering technology and manufacturing additives for production of biofuels

ii) By 2015: Production of ethanol and bio-diesel will be 250,000 tons, accounting for 1% of gasoline and diesel demand of the whole country

iii) By 2025: Production of ethanol and bio-diesel will be 1.8 million tons, accounting for 5% of gasoline and diesel demand of the whole country.

ENERGY issues/ CHALLENGERS

- Electricity Power price is low (social policy for poor areas):
  - *Power sector faces a low finance balance*
  - *Not attractive the private investors for new power plants*
- Difficulty to import coal for the coal-fired power plants in the South of Vietnam
- Uncertainty of off-shore gas supply
- Energy statistic system needs to be upgraded
- Institutional model for power trade in GMS
- Challengers in RE development:
  - *Lack of investigation/measurement to quantify RE potential*
  - *Lack of new technology transfer*
  - *There is no specific mechanism for promoting RE in pricing, financing subsidiary*
  - *Limited capital investment*
  - *High cost*
  - *Energy price not attractive to the investors (Tariff)*

Thank you

Road Map for Expanded Energy Cooperation in the Greater Mekong Subregion (GMS)

Rationale for Expanded Energy Cooperation

Given the widespread energy poverty of the Greater Mekong Sub-region (GMS), coupled with recent global developments- such as financial turmoil, fluctuating energy prices, pressures on the environment, geopolitical uncertainties of energy supply, interconnectedness of global energy markets- GMS countries today have never felt a stronger need for an integrated approach to deliver sustainable, secure and competitive energy.

Regional cooperation as en effective way to ensure cost-effective energy supply The GMS's energy sector initiatives have centered around the power sector, with focus on cross-border electricity trading, and the interconnection of transmission networks to connect strong energy demand growth centers with rich indigenous energy resource centers. The GMS countries recognize that access to energy is critical to economic development and that there are potential benefits to be gained from expanding cooperation in energy beyond the power sector. Each country has individual energy needs and different resources; integrated regional planning and coordination allow for identification of most cost-effective energy projects as some individual national markets are too small to justify large investments needed for economy of scale. Cross-border energy supply also allows diversification of sources and enhances energy supply security.

Regional cooperation as en effective way to mitigate climate change The need for responses to climate change in GMS is real and imminent, as the region is expected to suffer from many of climate change's most detrimental impacts from sea level rise, changing precipitation patterns and more intense tropical storms. Coupled with recurring food, oil and financial crises, climate change will have very serious implications for the region's economic development and the livelihoods of its population. Mitigation measures to addressing climate change needs public policy actions not only at the national level, but also at the regional level. Regional cooperation and integration have the potential to enhance efficiency of the entire regional energy system by exploiting subregional resources in an optimal manner with least environmental impact. Moreover, regional cooperation will also enable propagation of best practices in developing energy efficiency, renewable energy and clean energy technologies.

This proposed road map for expanded cooperation in the energy sector in the GMS is developed taking into account GMS Strategic Framework (SF), 2002-2012 and the need for improved energy security in the GMS, better utilization of energy resources, and mutually beneficial energy trade, to meet national and regional energy needs in a sustainable manner. This road map presents: (i) the goal and strategic objectives for expanded GMS energy cooperation, to provide overall guidance to the GMS countries energy cooperation, (ii) a desired policy framework that include the measures and actions that should be given priority in expanding GMS energy cooperation; and (iii) a concrete, practical and implementable short to medium-term (2009-2015) work plan that details the specific activities and general timetable for realizing the road map's objectives.

Goal and Strategic Objectives

The goal of GMS expanded cooperation is to deliver sustainable, secure, competitive and low carbon energy in the subregion through a cooperative and integrated approach. Specifically, the road map for expanded GMS energy cooperation will focus on the following four major strategic objectives:

(i) Enhance access to energy of all sectors and communities particularly the poor in the GMS through promotion of best energy practices in the subregion.

(ii) Develop and utilize more efficiently indigenous, low carbon and renewable resources, while reducing the subregion's dependence on imported fossil fuels.

(iii) Improve energy supply security through cross-border trade while optimizing use of subregional energy resources.

(iv) Promote public-private partnership and private sector participation particularly through small and medium sized enterprises for subregional energy development.

Policy Framework

In order to in enhance access to energy of all sectors and communities in the GMS, following policy measures and actions will be considered:

a. Making regional cooperation as a pillar of national energy strategy, with establishment of interconnection arrangements that will harness the energy complementarities existing in the subregion, such as in natural gas, in addition to current efforts in GMS power trade development.
b. Promotion of innovative, cost-effective rural electrification schemes for poverty reduction, taking advantage of regional grid infrastructure development.
c. Promotion of best regional practices of off-grid/ decentralized energy systems for integration and accelerated development of isolated areas using in particular, renewable energy resources.
d. Coordination with other GMS cooperation in transport, trade, agriculture, tourism to maximize synergies.

In order to develop and utilize more efficiently indigenous, low carbon, renewable resources, following policy measures and actions will be considered:

e. Sharing experiences in energy efficiency, renewable and clean coal technologies and recommending suitable practices and appropriate standards for GMS countries.
f. Promoting use of renewable energy resources, including biomass, biofuels, solar (photo-voltaic), wind, micro-hydro, and other locally-available energy sources by up scaling best practices and pilot projects in GMS.
g. Promoting development of subregional engineering and manufacturing capacity for renewable energy such as mini-hydro, wind and solar.
h. Enhancing energy efficiency and conservation at both the demand and supply side, improving their availability and affordability by up scaling best practices and pilot projects in GMS.
i. Ensuring benefit sharing and risk monitoring from energy projects in one GMS country that impact on other GMS countries.

j. Developing technologies and promoting best practices to improve efficiency of thermal power plants particularly for locally available gas and coal.
k. Developing institutional capacity to develop renewable energy projects particularly mini hydro using clean development mechanism (CDM).
l. Monitoring international technical progress (including costs) in carbon capture and storage (CCS) for GMS countries' awareness and for consideration in their future energy development plans.

In order to improve subregional energy supply security, the following policy measures and actions will be considered:

m. Strengthen information exchange and collaboration among national and regional institutions in energy policy and planning and supply security through establishment of a community of practice (COP) for subregional energy development.
n. Enhance institutional and technical capacity in developing cross-border trade and energy integration beyond the power sector.
o. Improve the transport modal mix to sustain growth in the transport sector.

In order to promote public-private sector partnership and private sector participation particularly through small and medium-sized enterprises in subregional energy development, the following policy measures and actions will be considered:

p. Enhancing institutional and regulatory environment conducive for private sector investment.
q. Sharing and coordination of best practices in terms of incentive package provided to private project sponsors.
r. Promotion of networking and exchange of knowledge and experiences on the state of art energy efficiency, renewable and clean energy technologies adapted to the needs of the subregion.

Medium Term Thrusts and Work Plan (2009-2015)

Guided by the above stated strategic objectives and policy framework while taking into account the existing energy cooperation framework of ASEAN countries to maximize synergies and reduce duplication, GMS countries identify the medium term thrusts (2008-2015) for the specific GMS energy subsectors, and their corresponding priority projects/ activities as specified in the Work Plan (Appendix 1).

To realize the goal of expanded energy cooperation, the Work Plan (2009-2015) includes the priority regional initiatives (i) promoting environmentally-sustainable regional power trade planning, coordination and development in the GMS, with a view to establishing a joint program for comprehensive promotion of SEA and other environmental management tools to ensure that environmental and social aspects, including cumulative and indirect impacts are considered at an earlier stage in the power sector plans in the GMS; (ii) improving energy efficiency (EE) through demand side management (DSM) and energy conservation (EC) in the GMS, with a view to establishing a joint program to ensure rapid development and adoption of DSM and EC programs and reduce energy consumption per unit of GDP generated; and (iii) promoting the development of renewable energy sources such as biogas, solar, wind, hydro, geothermal etc.

and clean fuels such as compressed natural gas (CNG), ethanol etc. in the GMS, with a view to establishing a joint program to promote and propagate best practices and realize a more optimal energy mix that reduces greenhouse gas emissions in the subregion.

In the power subsector, the focus will continue to be the development of a regional power market through a two-pronged approach: providing the policy and institutional framework for power trading, and developing the grid interconnection infrastructure to connect the various GMS power systems as specified in Vientiane Plan of Action. In the oil and gas subsector, GMS countries will support realization of GMS segments of Trans-ASEAN Gas Pipeline (TAGP) and promoting the development of environmental friendly oil and natural gas logistics and network in the GMS. In the coal subsector, while recognizing its importance in meeting the countries' energy demand, effort will be made to promote clean coal technologies, including using IGCC for coal power plants.

Implementation of the Road Map

The implementation of the Road Map will be guided by the following principles and procedures:

- In order to ensure GMS ownership of the projects in the Road Map, a GMS member country will assume the "Lead" role in the development of specific projects included in the Road Map.

- As "Lead", the GMS member country will be tasked to oversee the progress of its assigned project, including the formulation and refinement of the project proposal, and coordination with development partners for possible financing and technical support to the project.

- The GMS countries also agree to hold regular meetings, at least once a year, of the Subregional Energy Forum (SEF): (i) to regularly monitor the progress of the Road Map; and (ii) to serve as the vehicle for information sharing in GMS energy cooperation.

- The GMS countries agree to adopt performance targets in order to properly monitor and reflect the successes in realizing their goals, at both the national and subregional levels, in various areas of the energy Road Map.

Appendix 1: Work Plan (2009-2015)

Medium Term Thrusts	Priority Projects/ Activities
New and Renewable Energy (NRE) Sources	
1. Enhancing the policy and institutional framework for development, financing and private investment in NRE	a. Regional framework for RE development (coherent policy for stimulating investments in NRE in GMS context) b. Small scale clean generation fund (study for fund to support community based clean generation like micro hydro, biofuels/ biomass, micro-grids, solar, etc.) c. Renewable energy resource assessment studies (research and development, demonstration projects in GMS) d. Promoting the development of renewable energy and clean fuels in GMS
2. Promoting utilization of biofuels and biomass.	a. Sharing best practice in biofuels b. Biomass generation project (piloting of private/ community-owned biomass-fired power plants) c. Coordination between SEF and Working Group on Agriculture (WGA) on Rural Renewable Energy (RRE) Project d. Training on Biodiesel at the community level
3. Strengthening of information networking particularly in GMS-appropriate NRE technology.	a. Study on networking for propagating GMS-appropriate NRE (e.g. dissemination of findings/ applications of the WGA's RRE project) b. Renewable energy advocacy program for the GMS
Energy Efficiency (EE) and Conservation	
1. Promoting information sharing/ dissemination and networking on best practices in the GMS context.	a. Study on development of GMS EE network (sharing of EE practices in GMS context, such as improving fuel conversion for power plants for the GMS grid, energy audits for industries in GMS corridors, etc.) b. Improving energy efficiency (EE) through demand side management (DSM) and energy conservation (EC) in the GMS c. Implementing public awareness campaign for energy conservation particularly in residential sector
2. Expanding private sector involvement through enhanced energy management in industrial and commercial sectors.	Study of prospects of public-private partnerships for EE (covering (i) government owned buildings, enterprises in special economic zones, (ii) hotels [with Tourism Working Group], and (iii) revolving fund, tax incentives and promotion of energy services companies)
3. Promoting energy efficiency in the transport sector.	a. Study on promoting carbon-neutral GMS economic corridors (included in Environment Operations Center [EOC] work program) b. Energy efficient transport modal mix (with Subregional Transport Forum [STF]) c. Improvement of transport system efficiency d. Study for promoting use of electric cars in GMS

Medium Term Thrusts	Priority Projects/ Activities
	countries
4. Expanding financing for energy efficiency initiatives.	Regional energy efficiency program (support for studies/ fund windows for broad range of EE programs)
Regional Energy Planning, Policy and Program Coordination	
1. Strengthening the energy policy and planning, and program management, coordination and networking in the GMS.	a. GMS energy database development, publications, and networking (under SEF supervision, to be linked to RPTCC database and website) b. Sharing of methodology and analysis for developing each country's economy and energy development plan c. Training needs analysis and capacity building program for energy initiatives in the Road Map (in coordination with ASEAN Plan of Action on Energy [APAEC]) d. Study on accreditation schemes for energy managers/ technical personnel in the GMS e. Study on initiative for oil stockpiling and strategic reserves for enhanced oil security within GMS f. Sharing of knowledge and experience in nuclear energy development, safety issues, and public information/ awareness campaigns
2. Ensuring sustainable financing and support for initiatives under the road map for expanded GMS energy cooperation.	Regional project preparation TA facility (for funding studies for priority projects under the road map)
Power	
1. Establishing the policy and regulatory framework for power trade in the GMS (including building capacity for power trade operation, coordination and grid interconnections).	Major items include (i) regional power database and website; (ii) development of performance standards; and (iii) developing the regional transmission and regulatory authority.
2. Developing the grid interconnection infrastructure and power generation projects for export.	a. Priority interconnections such as: GMS Laos (Nabong)- Thailand (Udon Thani) Power Transmission; Viet Nam-PRC (Yunnan) 500 kV Interconnection; Laos (Ban Sok)- Vietnam (Pleiku); Laos (Ban Sok) – Cambodia (Stung Treng)- Vietnam (Thay Ninh); China (CSG grid)-Laos-Thailand (Nong Don) 500 KV Interconnection; Myanmar (Shweli)-China (Yunnan Interconnection) b. Power generation projects such as: - Lao PDR: Export of 7000 MW to Thailand, including Nam Thuen 2 Hydro (920MW), Nam Ngum 2 Hydro (615MW); Theun Hinboun Hydro Expansion (220MW), Nam Tuen 1 Hydro (523 MW), Nam Ngum 3 Hydro (440MW); 5000MW exports to Vietnam including Sekaman Hydro 1-4 (907 MW); Nam Kong Hydro 1,2,3 (240 MW); - Cambodia: Lower Sesan II + Lower Srepok II Hydro (420 MW), Steung Treng Power Hydro (980MW),

Medium Term Thrusts	Priority Projects/ Activities
	Sambor Hydro (2600 MW); - Myanmar: Shweli Hydro 1,2,3 (600MW+460MW+360 MW)
3. Expanding power coverage to all (rural electrification).	a. Power distribution and rural electrification projects linked to backbone transmission lines (e.g. GMS Northern Power Transmission Project of Lao PDR) b. Development of decentralized (off-grid) energy systems for integration of isolated areas (e.g. review of policy/ regulations, incentives for private sector investment, sharing technology and piloting of micro/mini hydropower) c. Piloting of smart subsidies for the use of RE technologies in off-grid systems (e.g. feed-in tariff for renewable energy)
4. Promoting environmentally sustainable development of electricity infrastructure.	a. Coordination between RPTCC and Environment Operations Center (EOC), e.g., conduct of strategic environmental assessments (SEAs) for the power sector, and environmental impact assessments (EIAs) for energy projects b. Promoting environmentally-sustainable regional power trade planning, coordination and development in GMS
Oil and Gas	
1. Supporting realization of GMS segments of Trans-ASEAN Gas Pipeline (TAGP).	a. Review of identified GMS segments of TAGP, other possible segments (e.g., production-distribution logistics, facilitation of contractual arrangements for exploration/ supply of gas, pipelines and interconnection policy, etc. b. Sharing experience and best practice on regulatory issues and legal framework
2. Promoting the development of oil and natural gas logistics and network in the GMS.	a. Development/ propagation of the use of natural gas in transport (e.g. Thailand tax incentive and revolving fund for natural gas in vehicles) b. Coordination of efforts to enhance energy market integration in ASEAN (ASCOPE-HAPUA)
3. Mitigation of environmental risks in construction/ operation of pipelines.	Conduct of Studies (on safety and security of oil/ gas pipelines, environmental risk mitigation, research and development on carbon sequestration, etc.)
Coal	
1. Promotion of energy efficiency, clean coal technologies and reducing carbon emissions from coal plants.	Abated Clean Coal Generation (promotion of carbon abatement technology); Development of energy efficiency and clean coal technology, and sharing of technology with other GMS countries
2. Strengthening of policy and institutional framework to enhance GMS trade and private investments in the coal subsector.	a. Coal liquefaction and carbon neutrality technical assistance (study on technical viability of coal to liquids processes). b. Monitoring international technical progress (including costs) in carbon capture and storage (CCS)