ASEAN PLAN OF ACTION FOR ENERGY COOPERATION 2010 – 2015

(APAEC 2010 – 2015)

ASEAN CENTRE FOR ENERGY

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Executive Summary

This document is prepared as the third series of implementation plan of the ASEAN Vision 2020 as prescribed in the ASEAN Economic Community Blueprint 2015. It serves as the blueprint for ASEAN cooperation in the field of energy for the period 2010-2015 under the theme "Bringing Policies to Actions: Towards a Cleaner, more Efficient and Sustainable ASEAN Energy Community".

The plan covers the energy component of the ASEAN Economic Community Blueprint 2015 signed by ASEAN Leaders on 20 November 2007, which directs ASEAN towards achieving the following specific objective of the APAEC 2010-2015, that is, to enhance energy security and sustainability for the ASEAN region including health, safety and environment through accelerated implementation of action plans, including, but not limited to: a) ASEAN Power Grid, b) Trans-ASEAN Gas Pipeline, c) Coal and Clean Coal Technology, d) Renewable Energy, e) Energy Efficiency and Conservation, f) Regional Energy Policy and Planning, and g) Civilian Nuclear Energy.

The APAEC 2010-2015 contains 26 strategies and 91 actions. The program strategies and the division of tasks among the ASEAN specialized energy bodies under the plan of action are clearly specified as follows:

Program Area	Strategies	Ownership
1. ASEAN Power Grid	• Accelerate the development of the ASEAN Power Grid Interconnection projects • Optimize the generation sector vis-à-vis the available indigenous energy resources in the region • Encourage and optimize the utilization of ASEAN resources, such as, funding, expertise and products to develop the generation, transmission, and distribution sectors	HAPUA
2. Trans-ASEAN Gas Pipeline	• Collectively implement the ASEAN MOU on TAGP by ASCOPE Members • PERTAMINA and PSC Partners to undertake detailed feasibility study for East Natuna Gas Field Development • Implement the approved Roadmap for TAGP by respective ASCOPE Members • Implement the approved 5-year ASCOPE Gas Centre (AGC) Work Program	ASCOPE
3. Coal and Clean Coal Technology	• Strengthen Institutional and Policy Framework and build an ASEAN Coal Image • Promote Coal and Clean Coal Technologies • Promote Intra-ASEAN Coal Trade & Investment • Enhance environmental planning and assessment of coal projects	AFOC (ACE as Secretariat)
4. Energy Efficiency and Conservation	• Develop Energy Efficiency Policy and Build Capacity • Enhance awareness raising and dissemination of information • Promote good energy management practices, especially for industrial and commercial sectors • Facilitate Energy Efficiency Financing	EE&C-SSN (ACE as Secretariat)
5. Renewable Energy	• Increase the development and utilization of RE sources to achieve the 15% target share of RE in ASEAN power generation mix • Enhance awareness and information sharing and strengthen networks • Promote intra-ASEAN cooperation on ASEAN-made products and services • Promote renewable energy financing scheme • Promote the commercial development and utilization of biofuels • Develop ASEAN as a hub for renewable energy	RE-SSN (ACE as Secretariat)
6. Regional Energy Policy and Planning	• Enhance energy policy and supply security information sharing network • Conduct capacity building in energy and environmental policy planning and energy supply security assessment • Prepare regional energy outlooks and conducting ASEAN energy policy reviews and analysis series • Strengthen collaboration and dialogues with ASEAN partners and with national, regional and global institutions • Monitor and evaluate the progress of APAEC programs	REPP-SSN (ACE as Secretariat)
7. Civilian Nuclear Energy	• Conduct capacity building among ASEAN Member States • Strengthen public information and public education on nuclear power generation • Strengthen institutional, legal and regulatory capacities on nuclear energy for power generation.	(ACE as Secretariat)

The detailed work programme, fund sourcing, budget and other implementing arrangements shall be prepared by the above mentioned energy organizations based on this plan of action approved by the ASEAN Senior Officials Meeting on Energy (SOME) and the ASEAN Minister's of Energy Meeting (AMEM).

The ASEAN Centre for Energy (ACE) is tasked to facilitate and technically coordinate the work of the implementing organizations, such as, in the conduct of project preparation, feasibility studies, sourcing of funds and other services that the Member States, through SOME and the ASEAN Secretariat, may consider necessary. The SOME, jointly with the ASEAN Secretariat through ACE, shall coordinate, manage and monitor the implementation of this plan. The ASEAN Secretariat shall further provide the program coordination and other requirements with the other ASEAN coordinating bodies and the ASEAN dialogue partners.

ASEAN PLAN OF ACTION FOR ENERGY COOPERATION 2010 – 2015

Bringing Policies to Actions:
Towards a Cleaner, more Efficient and Sustainable ASEAN Energy Community

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I. INTRODUCTION

a. Energy Challenges Facing ASEAN

1. Energy is crucial to the transformation of ASEAN into a stable, secure, prosperous, rules-based, competitive, resilient and integrated economic community by 2015.

2. ASEAN is one of the fastest growing economic regions in the world and has a fast growing energy demand driven by economic and demographic growth. ASEAN's primary energy requirement (Reference Scenario) is projected to triple between 2005 and 2030. Energy demand reaches 1,252 MTOE in 2030 from 474 MTOE in 2005, an increase by an average annual growth rate of 4% (ACE and IEEJ 2nd ASEAN Energy Outlook, 2009). This is higher than the world's average growth rate of 1.8% in primary energy consumption through 2030 (IEA World Energy Outlook, 2009).

3. Meeting the region's energy needs – with unprecedented increases in coal use, oil and gas imports, and GHG emissions – will thus prove to be a challenge. For ASEAN, which has demonstrated a high economic growth and a high need of energy supply, the challenge to ensure a secure supply is an overriding concern.

4. For one, rising demand has led countries in the region to scout and compete among themselves for every available energy resource. Already, there is a growing competition for natural gas as demand accelerates. Meanwhile, traditional gas suppliers to the world market, including some ASEAN Member States, have recently imposed policies biased towards domestic consumption and conservation of natural gas for higher-value use. And as worldwide energy demand soars, so does GHG emissions. For ASEAN, the challenges are more serious. With projected dominance of fossil fuels, ASEAN is poised to become one of the big contributors to global warming. At the same time, ASEAN is also at a risk on the impact of climate change with lesser ability and capacity to cope with its effects compared to other regions. Some governments, already faced with financial constraints, will be confronted with additional costs associated with climate change mitigation and adaptation in the future.

5. One of the way forward is to meet demand while preventing irreversible damage to environment, i.e., *Open to All Options for ASEAN's Energy Mix.* Indeed, increased use of fossil fuel should move ASEAN to real action that should be undertaken now. The stable upward trend in demand makes it critical for ASEAN to have its arms wide open to all available and possible sources of energy to keep its growth momentum. Diversification of energy resources and supply sources as a high policy agenda should be pursued. For example, apart from conventional oil and gas sources, abundance of renewable energy, however, will place the region on a better footing for additional sources given the right conditions to spur its development. Many ASEAN countries have recently adopted policies setting specific targets for renewable energy utilization, while some started opening its doors anew to other options, namely; nuclear power.

b. The New APAEC 2010-2015

6. The ASEAN Plan of Action for Energy Cooperation (APAEC) 2010-2015 is the third series of implementation plan, a continuation of the two previous energy plans, namely: APAEC 2004-2009

completed on June 30, 2009 and APAEC 1999-2004 completed on June 30, 2004. It covers the energy component of the ASEAN Economic Community Blueprint 2015, such as, ensuring a secure and reliable energy supply for the region through collaborative partnerships in the ASEAN Power Grid (APG) and Trans-ASEAN Gas Pipeline (TAGP) including the promotion of cleaner coal use, energy efficiency and conservation, and renewable energy, including biofuels as well as nuclear energy as an option, to support and sustain economic and industrial activities. Recognizing the limited global reserve of fossil fuels and unstable energy prices, the APAEC emphasizes strategies to further strengthen renewable energy development, such as bio-fuels, as well as to promote open trade, facilitation and cooperation in the renewable energy industry. Moreover, the APAEC recognizes global and regional issues and challenges on energy and climate change including inter-related issues on food and energy security as well as the impacts of energy development on health, safety and environment. In addition, the APAEC recognizes the importance of establishing an efficient, transparent, reliable and flexible energy markets in the ASEAN region and improvement of access to affordable energy to eradicate energy poverty.

7. The APAEC 2010-2015 contains strategic programs with some quantitative, aspirational goals or targets that are expected to move the region towards enhancing greater energy security and strengthening international cooperation, including financial institutions and dialogue partners, to tap their resources and expertise. It recognizes the available facilities of the ASEAN Economic Community and other instruments and avenues of ASEAN cooperation including the ASEAN Infrastructure Financing Mechanism to move the plan of actions to reality by 2015.

8. The APAEC 2010-2015 is a product of deliberation by the APAEC Drafting Committee (chaired by Thailand) established by the Special SOME held in Singapore on 15 November 2007. The ASEAN Centre for Energy (ACE), together with the ADC Members consisting of representatives of ASEAN SOE Leaders, ASEAN Secretariat and the specialized energy organizations, was tasked to lead in the coordination, formulation and finalization of the APAEC 2010-2015.

9. Now, the need to update, modify and expand the APAEC 2010-2015 is timely, considering the new directives and pronouncements agreed by the ASEAN Leaders and the ASEAN Ministers on Energy in attaining the ASEAN Community 2015 of the ASEAN Vision 2020.

II. Impact of Global Economic Crisis

10. The impacts of the global financial crisis, oil price volatility,and over dependency on fossil fuel have created their marks in the energy industry and to the entire regional economy. In spite of this, ASEAN is expected to weather the crisis, with its economy projected to remain dynamic and resilient. In 2005, ASEAN's combined gross domestic product was valued at USD 876 billion and is expected to grow at an average annual rate of 4.9% through 2030. ASEAN comprises up of 567 million strong people in 10 Member States that produce and consume its own energy resources. It markets and processes energy sources for the major economies, such as, China, Japan and South Korea. It possesses a strategic waterway that 80% of the energy to East Asia passes. ASEAN exported 74.8 MTOE of coal and 60.7 MTOE of natural gas in 2005. Since 1995, ASEAN, which used to be a net oil exporter, has become a net importer. In 2005, 30% of its total oil requirements were imported.

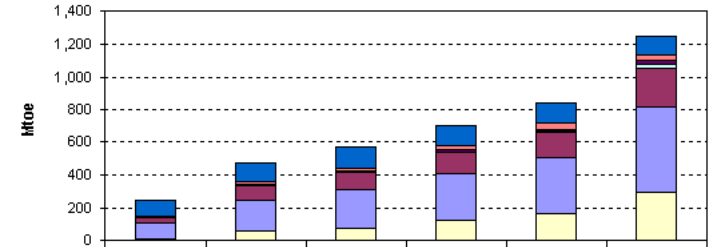
11. In spite of the crisis, the APAEC 2010-2015 presents itself many opportunities and challenges as outlined in this document to stimulate investment, trade and cooperation in the energy sector in ASEAN.

12. Moreover, the impacts of the crisis will be further cushioned by the physical integration of energy infrastructures such as the APG and the TAGP. This provides optimal solution for stimulating and strengthening the economy of the ASEAN region.

III. ASEAN Energy Demand and Supply Outlook: Overview

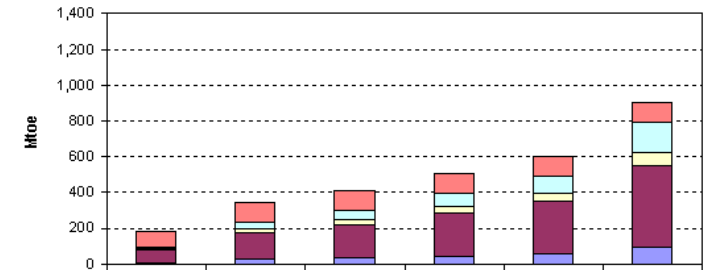
13. In ASEAN, fossil fuels remains the major source of energy, with a share of 84.4% in 2030 and the remainder is accounted for by geothermal, hydro, and other sources. Oil remains the major energy source with a share in total primary energy supply of 40.9% in 2005 to 41.5% in 2030 driven by the rapid growth in consumption in the transport sector, which is largely fuelled by oil products. Coal grows the fastest at 6.9% yearly due to rapid increase in electricity consumption, pushing its share from 11.8% in 2005 to 23.7% in 2030. Natural gas grows at a slower average rate of 4% yearly, registering a share of 19.2% in 2005 and 2030. Consumption of other fuels, which are mostly "traditional" biomass, increases at snail pace of 0.2%, decreasing its share from 24.1% in 2005 to only 9.6% in 2030. Electricity use grows more than four times from 38 MTOE in 2005 to 164 MTOE in 2030. Its share increases from 11% to 18.2% during the outlook period (ACE and IEEJ 2nd ASEAN Energy Outlook, 2009).

Primary Energy Consumption



	1990	2005	2010	2015	2020	2030
Others	101	114	123	123	123	120
Geothermal	6	14	25	31	37	37
Hydro	3	5	10	14	17	18
Nuclear	0	0	0	4	7	20
Natural gas	33	91	100	125	149	240
Oil	97	194	233	291	348	520
Coal	12	56	80	121	162	297

Final Energy Demand



	1990	2005	2010	2015	2020	2030
Others	89	109	113	114	114	113
Heat	0	0	0	0	0	0
Electricity	11	38	51	73	94	164
Natural gas	8	21	27	37	46	70
Oil	71	152	187	240	292	454
Coal	4	24	33	47	60	100

14. ASEAN's per capita primary energy consumption was 0.9 TOE in 2005 and is expected to increase to 1.7 TOE in 2030. Primary energy intensity was 627 TOE/million USD in 2005. Energy to GDP elasticity from 1990 to 2005 was 0.86 indicating growth in energy consumption at a slower rate than GDP. CO_2 emission per unit of energy consumption increases from 0.52 tons of carbon equivalent (kt-C)/TOE in 2005 to 0.68 kt-C/TOE in 2030. Over the outlook period, a massive investment is required for energy infrastructure to meet rising regional energy demand, improve energy access, and address energy poverty. And, ensuring a reliable, stable, and affordable supply of energy while maintaining environmental sustainability and competitiveness in the context of sustainable

development is a formidable challenge for the ASEAN Member States to realize. Relevant ASEAN energy – economy data, energy statistics and estimated CO_2 emissions of energy use are attached in ***ANNEX A***.

Summary of the 2nd Energy Outlook Study

Presented below are the highlights of the ACE and IEEJ 2nd ASEAN Energy Outlook, 2009 on energy and CO_2 emission outlook in the next two and a half decades:

- Final energy consumption in ASEAN will grow at an average annual rate of 3.9 percent from 343 MTOE 2005 to 901 MTOE 2030 in the Reference scenario with the transportation sector experiencing the highest growth in consumption of 5.1 percent per annum. The industry sector consumption will grow at an annual rate of 4.6 percent while the consumption of the combined residential, commercial and agriculture sectors will have a slower growth of 2.4 percent per annum. Electricity will have the highest growth rate among the energy consumed in the final consumption sector at 6.1 percent per annum. This is followed by coal at 5.9 percent, natural gas at 5.0 percent and oil at 4.5 percent. Biomass will have a slow growth rate of 0.2 percent per annum.
- The corresponding primary energy consumption will have a faster growth rate of 4.0 percent per annum with coal having the fastest annual growth rate of 6.9 percent. This is due to the projected rapid growth in electricity consumption that will be met largely by coal-fired generation. Hydropower will have the second fastest growth rate of 5.4 percent as countries in the Great Mekong Sub-region decide to develop their vast hydropower potential. Oil and natural gas will have the next fastest growth rates of 4.0 percent per annum. Oil will remain as the major source of energy in the region even increasing its share to the total primary energy supply from 40.9 percent in 2005 to 41.5 percent in 2030. Nuclear energy will be introduced in the region before 2020 and will have a 0.9 percent share of the total by 2020 which will increase to 1.6 percent in 2030. Geothermal energy will be further developed in the Philippines and Indonesia which will result to 3.9 percent annual growth rate in the primary energy supply. Biomass will continue to grow albeit at a slow pace of 0.2 percent per annum. The growth in energy consumption will increase per capita energy consumption from 0.9 TOE per person in 2005 to 1.8 TOE per person in 2030. However, energy consumption per unit of GDP will decrease from 627 TOE/million US dollars[1] (USD) in 2005 to 500 TOE/million USD in 2030, a reduction of 20.3 percent over a 25-year period.
- The above growth in primary energy consumption will result to a corresponding 5.1 percent annual growth in CO_2 emission. This is due to the faster growth rate in the consumption of carbon-based energy sources than in the growth of carbon-free sources such as nuclear and renewable energy. As a result, CO_2 emission per unit of energy consumption will increase from 0.52 tons of carbon equivalent (kt-C)/TOE in 2005 to 0.68 kt-C/TOE in 2030. CO_2 emission per unit of GDP will also increase at average annual rate of 0.2 percent from 325 kt-C/million USD in 2005 to 339 kt-C/million USD in 2030.

[1] All US dollar (USD) values are in constant 2000 prices unless specified

IV. APAEC: Bringing Policies to Actions Towards a Cleaner, more Efficient and Sustainable ASEAN Energy Community

IV.1 ACCOMPLISHMENTS AND LESSONS LEARNED

15. The ASEAN energy cooperation has achieved significant milestones in seeking strategies and actions for ensuring greater energy security and sustainable energy development since the establishment of ASEAN in 1967. The milestones of ASEAN energy cooperation are summarized in ***ANNEX B***.

16. ASEAN has already implemented two plans of actions of energy, namely: APAEC 1999-2004 and APAEC 2004-2009.

17. Under the first APAEC 1999-2004 of the Hanoi Plan of Action (HPA), the region's energy cooperation agenda included the implementation of strategies and measures for ensuring regional energy supply security, efficient utilization of energy resources, and the rational management of energy demand, taking into account environmental sustainability. It laid down the foundations for creating sound policy framework and implementation modalities by 2004 for the early realization of the trans-ASEAN energy networks covering the APG and TAGP, as a more focused continuation of the ASEAN Medium-Term Program of Action for Energy Cooperation 1995-1999.

18. Cooperation activities in 1999-2004 period were focused on the completion of the TAGP Master Plan by ASCOPE and ASEAN Interconnection Master Plan Study by HAPUA to develop and expand gas and power trade by interconnecting physical infrastructures and strengthening institutions. The Trans-Borneo Grid Interconnection Coordination Committee was created to coordinate and oversee the implementation of the Borneo Island's power grid interconnection study. The first energy competitions were launched for energy efficiency and conservation and renewable energy. Several capacity building activities such as training, seminars and workshops on various energy sub-sectors of APAEC were organized to enhance awareness and broaden perspectives on the sustainable use of energy. Cooperative partnerships were forged with ASEAN Dialogue Partners, notably, Australia, European Union, Germany and Japan and with relevant international and regional organizations such as UN-ESCAP, APERC, IEA, and the Energy Charter Secretariat. The accomplishments of the APAEC 1999-2004 are summarized in ***ANNEX C.***

19. The APAEC 2004-2009 supported the energy cooperation agenda of the Vientiane Action Plan (VAP) under the ASEAN Vision 2020. It pursued sustainable energy development based primarily on individual sectoral plans of action and roadmaps, including, but not limited to, the ASEAN Power Grid, Trans-ASEAN Gas Pipeline, Coal and Clean Coal Technology, Energy Efficiency and Conservation, Renewable Energy and Regional Energy Policy and Planning. Cooperation activities, including with Dialogue Partners, were focused on enhancing the integration of the regional energy infrastructures, promoting energy security, creating responsive policies to progressively enhance market reforms and liberalization, as well as preserve the sustainability of the environment.

20. The notable achievements of the APAEC 2004-2009 are as follows:
    a) signing of MOU for APG giving more concrete steps to realize the regional power grid interconnection systems, establishment of the APG Consultative Council to oversee the overall development and implementation of the APG projects initially through bilateral arrangements and then to be expanded to multilateral arrangements;
    b) establishment of the ASCOPE Gas Center (AGC) by ASCOPE to implement a 5-year work program to accelerate the development of viable institutional arrangements and models for TAGP projects based on bilateral schemes, commercial viability and strategic approaches;

c) initiated coal cooperation with partners on cleaner coal through regional dialogue and technical assistance and information sharing programs and promotion of clean coal technologies and trade through organization of seminars, workshops and trainings;
d) implementation of 19 EE&C projects under the EAEF of ACE, launching of competition for energy management and yearly conduct of EE&C competition for buildings, conduct of capacity building activities, such as, energy auditing for engineers and technicians, development and application of energy management tools such as in-house database, Technical Directory and handbooks, and conduct of annual training for ASEAN EE&C specialists and practitioners in Japan;
e) implementation of 48 projects on Renewable Energy funded under the ACE's EAEF program, implementation of the ASEAN German Minihydro Project, yearly conduct of RE Project Competition, and achieving the 10% regional target in installed capacities using RE-based power generation plants;
f) establishment of the Regional Energy Policy and Planning Sub-sector Network that is mandated to oversee the overall implementation of the APAEC and to undertake policy reviews and recommendations towards a deeper and closer regional energy cooperation. The accomplishments of APAEC 2004–2009 are summarized in ***ANNEX D***.

21. While all the strategies and targets of the two previous APAEC have been satisfactorily met, the overall pacing of activities should be expedited by putting up an effective coordination arrangements and monitoring and score card schemes.

22. International cooperation offers good prospects for meeting the APAEC activities and, therefore, need to be strategic in broadening perspectives and the focus of action to meet with flexibility the ever changing global and regional energy environments. Moreover, the strength of cooperation programs should be leveraged through partnerships with Dialogue Partners, the private sector, and donor agencies.

IV.2 GUIDELINES FOR THE FORMULATION OF APAEC 2010-2015

A. COMMITMENTS FOR REALIZATION OF ASEAN COMMUNITY 2015

23. Cha-am Hua Hin Declaration on the Roadmap for the ASEAN Community (2009-2015) signed by the ASEAN Leaders at the 14th ASEAN Summit held in Cha-am Huahin, Thailand, in March 2009 reaffirms the commitment of the ASEAN Member States to accelerate the establishment of the ASEAN Community, comprising three pillars, namely political-security community, economic community and socio-cultural community, by 5 years to 2015, as agreed in Cebu, the Philippines in 2007. The Declaration marks the Leaders' commitment that the Blueprint of each Pillar shall constitute the Roadmap for an ASEAN Community (2009-2015), and each ASEAN Member State shall ensure its timely implementation. The Leaders task the concerned ASEAN Sectoral Ministerial Bodies together with the Secretary-General of ASEAN to implement the Declaration and monitor commitments as well as report to them regularly through the respective ASEAN Community Councils on the progress of its implementation.

24. The ASEAN Economic Community Blueprint adopted at the 13th ASEAN Summit in Singapore in 2007 will transform ASEAN into a single market and production base, a highly competitive economic region, a region of equitable economic development, and a region fully integrated into the global economy by 2015. Specific to energy, the energy policy agenda of the AEC are geared towards, among others,

a) to ensure a secure and reliable supply of energy including, bio-fuel, which is crucial to support and sustain economic and industrial activities;
b) to expedite the development of ASEAN Power Grid (APG) and the Trans-ASEAN Gas Pipeline (TAGP) which allow the optimization of the region's energy resources for greater security and provide opportunities for private sector involvement in terms of investment, including financing

and technology transfer. Integrated networks of electricity and gas pipelines offer significant benefits both in terms of security, flexibility, and quality of energy supply;

c) to ensure sustainable energy development, through mitigating greenhouse gas emission by means of effective policies and measures, among others; and

d) to strengthen renewable energy development, such as, bio-fuels, as well as to promote open trade, facilitation and cooperation in the renewable energy sector and related industries as well as investment in the requisite infrastructure for renewable energy development.

25. At the 14th ASEAN Summit held on 28 February–01 March 2009 in Cha-am, Thailand, under the theme of "ASEAN Charter for ASEAN Peoples", the ASEAN Heads of State/Government, recognized and agreed, among others, the following:

a) address the challenge of climate change and the need for ASEAN to work closely together with other Partners for a successful Copenhagen Conference of States Parties;

b) address the inter-related issues of food and energy security in a comprehensive manner;

c) ASEAN energy cooperation to ensure greater security and sustainability of energy through diversification, development and conservation of resources, the efficient use of energy as well as the wider application of environmentally-sound technologies;

d) strengthen regional cooperation on the development of renewable energy and alternative energy including hydropower and bio-fuels, the ASEAN Energy Ministers to set a collective target for renewable energy in the total energy mix for the next five years, and promote the development of centers of research and development on renewable energy in the region;

e) welcomed the signing of the ASEAN Petroleum Security Agreement (APSA) and its ANNEX on Coordinated Emergency Response Measures (CERM) which will help contribute to energy security, and e) pay attention to the security, environmental, health and safety dimensions of the energy sector

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26. At the 13th ASEAN Summit held in November 2007 in Singapore, the ASEAN Leaders agreed to explore alternative sources of energy and stressed the need that these sources are sustainable and safe. In this regard, the Leaders agreed on the following:

a) welcomed the Energy Ministers work in following up their discussion at the 12th ASEAN Summit in Cebu, Philippines in particular, the move to establish the Nuclear Energy Safety Sub-sector Network to discuss civilian nuclear energy regime that meets international standards at the regional level; and

b) stressed that there should be a stronger and better cooperation on the development of renewable sources of energy in an effort by ASEAN to address climate change issues. The ASEAN Leaders also agreed, in a signed ASEAN Declaration on Environmental Sustainability, to forge ASEAN-wide cooperation to establish a regional nuclear safety regime.

B. DIRECTIVES FROM ASEAN MINISTERS OF ENERGY

27. The 25th and the 26th ASEAN Ministers of Energy Meeting held in November 2007 in Singapore and in August 2008 in Bangkok, Thailand, respectively, provided the following guidelines/directives towards enhancing regional cooperation on energy:

a). Promote greater energy stability, security and sustainability as a pathway to building the ASEAN Economic Community 2015; to balance economic development with environmental sustainability, through improving energy efficiency, developing competitive regional energy markets, investing in energy research and development, and promoting a clean environment, and to foster closer dialogue and cooperation to effectively address global energy and environmental issues;

b). Consider a broad range of measures and policy responses to combat the impacts of soaring high oil prices by intensifying efforts to improve energy security through: i) promoting energy efficiency and conservation, ii) increase the use of renewable energy sources, iii) explore alternative energy sources including biofuels which would not adversely affect the production of food in the region, iv) civilian nuclear energy for interested parties while ensuring and addressing nuclear safety, security and non-proliferation issues, and v) enhancing regional cooperation to develop cost effective carbon mitigation technologies, cleaner fossil fuel technologies including use of clean coal technology;

c). Expand external energy cooperation and to continue joint programs under the ASEAN+3 and the East Asia Summit (EAS) energy cooperation programs and dialogue partners, such as, the European Union, Japan, Australia, Germany, etc.

d). Strengthen sustainable energy development through the expanding markets for renewable energy technologies and energy efficient products; to promote comprehensive institutional arrangement for enhanced security and stability of energy supply in ASEAN; to develop regional energy infrastructure facilities, and to intensify regional cooperation in enhancing energy integration;

e). Foster closer cooperation in promoting biofuels produced in a sustainable manner and to forge further regional cooperative partnership to promote solar, wind, geothermal, hydro, and biomass energy and to further intensify cooperation in the area of energy efficiency and conservation to, among others, mitigate greenhouse gas emissions; and

f). Create suitable conditions that facilitate energy infrastructure investments, in particular, in energy production, to secure adequate and stable supply of energy.

IV.3 OBJECTIVES AND APPROACHES

IV.3.1 OBJECTIVES

28. In general, the objective of APAEC 2010-2015 is to support the realization of the ASEAN Community towards 2015 and beyond.

29. The specific objective of APAEC 2010-2015 is to enhance energy security, accessibility and sustainability for the ASEAN region with due consideration to health, safety and environment through accelerated implementation of action plans, including, but not limited to:
    a) ASEAN Power Grid
    b) Trans-ASEAN Gas Pipeline
    c) Coal and Clean Coal Technology
    d) Renewable Energy
    e) Energy Efficiency and Conservation
    f) Regional Energy Policy and Planning
    g) Civilian Nuclear Energy

IV.3.2 APPROACHES

30. The approaches to achieve the above objectives are as follows:

- Strengthen coordination, participation in all program areas to narrow development gap, improve energy access, and to facilitate economic integration of the ASEAN region;
- Adopt targets or aspirational goals in programs and consider cross-sector issues towards accelerating all the initiatives taking into account the domestic energy situation of the individual ASEAN Member State;
- Provide a conducive environment for greater private sector involvement and participation, including securing foreign direct investment;

- Broaden perspective and focus of action on human resources and capacity building skills;
- Recognize enabling factors and barriers, such as human and financial resources and regulatory issues;
- Develop and implement transparent legal, regulatory and technical frameworks in various energy projects, in particular, on the cross border interconnection projects to promote open and flexible energy trade; and
- Develop and expand the energy mix and supply sources in a sustainable and environmental-friendly manner through optimal utilization of potential energy sources of the region to include frontier exploration and development and extensive research on both fossil fuels and renewable energy resources and energy efficiency and conservation.

IV.4 PROGRAM AREAS

Program Area No. 1 ASEAN Power Grid

31. ASEAN recognizes the critical role of an efficient, reliable and resilient electricity infrastructure for stimulating regional economic growth and development. The continuing efforts of the ASEAN Member States in strengthening and/or restructuring their respective power market industry are oriented towards this direction. Currently, electricity is accessed by roughly 66% of the ASEAN peoples made available through grid power supply, stand-alone and distributed power generation systems. Electricity is produced through a mix of oil, gas, coal, hydro, geothermal and other renewable energy sources. Regional electricity production grew at an average yearly rate of 8% from 1990 to 2005 and is projected to grow at 6.1% annually from 2005 to 2030. Enhancing electricity trade across borders, through integrating the national power grids of the ASEAN Member States, is expected to provide benefits of meeting the rising electricity demand and improving access to energy services.

32. The ASEAN Power Grid (APG) is a flagship program mandated in 1997 by the ASEAN Heads of States/Governments under the ASEAN Vision 2020 towards ensuring regional energy security while promoting the efficient utilization and sharing of resources. To pursue the program, ASEAN adopts a strategy that encourages interconnections of 15 identified projects, first on cross-border bilateral terms, then gradually expand to sub-regional basis and, finally to a totally integrated Southeast Asian power grid system. Currently, the APG is in progress with four on-going interconnection projects and additional 11 projects are planned for interconnection through 2015. The investment requirement of the APG is estimated at USD 5.9 billion. A potential savings of about USD 662 million dollars in new investment and operating costs is estimated resulting from the proposed interconnection projects.

33. Objective: To facilitate and expedite the implementation of the ASEAN Interconnection Master Plan and to further harmonize technical standards and operating procedures as well as regulatory and policy frameworks among the ASEAN Member States.

Strategic Goals
• To achieve a long-term security, availability and reliability of energy supply, particularly in electricity through regional energy cooperation in Trans-ASEAN Energy Network • To optimize the region's energy resources towards an integrated ASEAN Power Grid system, and • To further harmonize all aspect of technical standard and operating procedure as well as regulatory frame works among member country.

Strategy	Action
1. Accelerate the development of the ASEAN Power Grid Interconnection projects, namely: i) 3 APG projects are under construction: 1) Project No 9: Thailand – Lao PDR • Roi Et – Nam Theun 2 expected completion 2009 • Udon Tani – Nabong expected completion 2011 2) Project No 10: Lao PDR - Vietnam Expected completion 2010 3) Project No 13: Lao PDR – Cambodia expected completion 2011 ii) 8 APG projects and their completion dates* are as follows: 1) Project No 3: Sarawak – Peninsular Malaysia • Survey and Detail design (2015) 2) Project No 4: Peninsular Malaysia – Sumatra • Detail Design Completed (2012) 3) Project No 5: Batam - Bintan - Singapore • Study in progress (2015) 4) Project No 6: Sarawak - West Kalimantan • Study on Cross Border issues (2012) 5) Project No 7: Philippines - Sabah • Study in Progress (2015)** 6) Project No 8: Sarawak - Sabah - Brunei • Study in Progress (2015) 7) Project No 11: Thailand - Myanmar • Under Negotiation (2014) 8) Project No 15: East Kalimantan - Sabah • Under Study * Completion dates are only indicative **It is subject to the finalization of the study	1.1. Work on the full functioning and operationalization of the APG Consultative Committee (APGCC) towards the realization of the interconnection projects 1.2. Conduct studies to address barriers to interconnection, cross-border trade and investment by the 8 HAPUA WGs, such as, but not limited to the following: i. Harmonization of technical standard codes or guidelines for APG in the areas of planning, design, system operation and maintenance. ii. Harmonization of legal and regulatory framework for bilateral and cross border power interconnection and trade and formulation of institutional and contractual arrangements for cross border trade to include taxation, tariff and Third Party Access (Wheeling Charge) iii. Identification and recommendation of Financing Modalities for realizing the APG 1.3. Review and update the AIMS by incorporating new elements of AMS's long-term power demand forecast, optimization of regional long-term power development plan (with interconnection scheme), identification of feasible interconnection project and to implement the recommendations of the updated AIMS.
2. Optimize the generation sector vis-à-vis the available indigenous energy resources in the region	2.1. Conduct further optimization studies on the most economic operation and possible reserve sharing scheme within the region 2.2. Promote the optimal development of generation resources within the ASEAN region in line with the ASEAN Fuel Policy for power generation to be formulated by REPP-SSN
3. Encourage and optimize the utilization of ASEAN resources, such as, funding, expertise and products to develop the generation, transmission, and distribution sectors	3.1. Conduct study and identify areas where ASEAN resources can be fully utilized to benefit the ASEAN region 3.2 Implement the AIMS recommendation and pursue the appropriate options for ASEAN Member States 3.3 Encourage the private sector to jointly develop power projects within ASEAN region,

	notwithstanding the importance of the interconnection projects

Highlights

- Implement 15 interconnection projects of which 4 are in operation, 3 under construction, and 8 under preparation
- Total investment including upgrading of existing interconnections is estimated at USD 5.9 billion
- Projects are open for private and public sector investment, supported by the ASEAN Infrastructure Financing Mechanism (AIFM) which will be formulated by the ASEAN Finance Ministers

Program Area No. 2. Trans-ASEAN Gas Pipeline

34. The ASEAN Vision 2020 emphasizes on the establishment of the interconnecting arrangements towards achieving a long-term security, availability and reliability of energy supply, particularly in oil and gas through regional energy cooperation in Trans-ASEAN Energy Network comprising of the Trans-ASEAN Gas Pipeline (TAGP) and the ASEAN Power Grid (APG). TAGP aims to interconnect the gas pipeline infrastructure of ASEAN Member States and to enable gas to be transported across the borders of the Member States. APG, on the other hand, ensures that gas for power is also being optimized with other potential sources of energy.

35. The original TAGP aims to develop a regional gas grid by 2020, by linking the existing and planned gas pipeline networks of the ASEAN Member States. The updated ASCOPE-TAGP Masterplan 2000 involves the construction of 4,500 kilometers of pipelines mainly undersea, worth USD 7 billion. Eight bilateral gas pipeline interconnection projects, with total length of approximately 2,300 km, are currently operating. They are: i) P. Malaysia – Singapore in 1991, ii) Yadana, Myanmar to Ratchaburi, Thailand in 1999, iii) Yetagun, Myanmar to Ratchaburi, Thailand in 2000, iv) West Natuna, Indonesia to Singapore in 2001, v) West Natuna, Indonesia to Duyong, Malaysia in 2001, vi) South Sumatra, Indonesia to Singapore in 2003, vii) Malaysia-Thailand Joint Development Area – Malaysia via Songkla in 2004, and viii) Malaysia-Singapore in 2006. These interconnections form part of the backbone of energy security and sustainability of supply objectives of ASEAN to be accelerated by 2015 and serve as a key driver of growth to the various energy consuming sectors of the ASEAN economies.

2001 TAGP Masterplan : Agreed 7 Trans-ASEAN Gas Pipeline				
Pipeline Interconnections		Commencement of Detailed Feasibility Study	Commencement of Development	Likely Years of Operation
1.	South Sumatra, Indonesia-Malaysia	2000	2005	2006
2.	West Natuna, Indonesia-Duyong, Malaysia	2000	2001	2002
3.	East Natuna, Indonesia – JDA – Erawan, Thailand	2001	2005	2012
4a+4b	East Natuna, Indonesia – Kerteh, Malaysia	2001	2003	2010
4a+4c	East Natuna, Indonesia – Singapore	2001	2003	2010
5.	East Natuna, Indonesia – Brunei	2005	2008	2015

	Darussalam – Sabah, Malaysia – Palawan – Luzon, Philippines			
6.	Malaysia – Thailand JDA – Vietnam	2005	2009	2016
7.	Peninslar Malaysia – Arun, Sumatera, Indonesia (Bilateral)	2003	2005	2010

April 2009 TAGP Current and Future 4 Trans-ASEAN Gas Pipeline			
Pipeline Interconnections		Actual Date of Completion	Status
1.	Malaysia – Singapore, 5 km via Johore Straits	1991	Completed
2.	Yadana, Myanmar- Ratchaburi, Thailand, 470km	1999	Completed
3.	Yetagun, Myanmar - Ratchaburi, Thailand, 340km	2000	Completed
4.	West Natuna, Indonesia-Singapore, 660km	2001	Completed
5.	West Natuna, Indonesia-Duyong, Malaysia, 100km	2001	Completed
6.	South Sumatra, Indonesia-Singapore, 470km	2003	Completed
7.	Malaysia – Thailand JDA, 270km	2005	Completed
8.	Malaysia – Singapore, 4km	2006	Completed
9.	Malaysia – Vietnam, 325km through PM3-Ca Mau Pipeline,	2007	Completed
10.	East Natuna, Indonesia – JDA – Erawan, Thailand (~ 1500km)	Commencement date will be approximately 7 years from East Natuna gas supply sanction. Approximate volume to make each pipeline viable is 1 BSCF/day (i.e. 36"-42"diameter of pipeline)	Subject to Supply Commercial viability
11.	East Natuna, Indonesia – Kerteh, Malaysia (~600km)		
12.	East Natuna, Indonesia - Java, Indonesia (~1400km)		
13.	East Natuna, Indonesia – Vietnam (~900km)		
	Further Review		
	East Natuna-Indonesia-Brunei Darussalam-Sabah, Malaysia-Palawan	*In the updated Masterplan, the proposed East Natuna-Indonesia-Brunei Darussalam-Sabah, Malaysia-Palawan, Philippine pipeline was deferred in view of the commercial viability and other economic considerations in establishing the interconnection for the Philippines leg. Moreover, regional assumptions on East Natuna Gas field have changed since the 2000 Original TAGP Masterplan. Much higher demand and limited gas supply plus high unproductive CO2 content has increased cost of development of this pipeline.*	

36. Over the years, natural gas demand has increased tremendously while new gas finds are not imminent to meet this new regional demand growing yearly at about 7-8%. ASEAN consumes approximately 10 billion cubic feet per day (BCFPD) of natural gas. ASCOPE has reflected in its updating of the TAGP 2000 Study and Roadmap the latest gas supply and demand situation in the region. Findings indicated that there is a widening supply gap from 2017 rising to more than 12,000 MMSCFD by 2025. ASCOPE E&P BDC has been tasked to study on how best to further increase the gas supply. Many options are considered to address the future shortfall on gas such as exploring new discoveries in the region, or by increasing imports of LNG Gas. Coal Bed Methane (CBM) is also identified as possible additional supply source. However, the East Natuna

gas field of Indonesia remains as the main source of energy in ASEAN for the future and its commercialization is key to address the supply gap. The said gas field has about 70% CO_2 and reserve of 45 trillion cubic feet (excluding CO_2), with gas price that is affordable and competitive to alternative fuels, such as, coal or fuel oil. ASEAN Member States are also building LNG regas terminals to supplement their energy needs. Moreover, ASCOPE and HAPUA are strategizing actions to strike a supply-demand balance for gas to be used in the TAGP and APG in view of the growing regional gas demand.

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37. Objective: To facilitate the implementation and realization of the Trans-ASEAN Gas Pipeline Infrastructure Project to ensure greater security of gas supply.

STRATEGIC GOALS

- To achieve a long-term security, availability and reliability of energy supply, particularly in oil and gas through regional energy cooperation in Trans-ASEAN Energy Network
- To work on managing high CO_2 gas fields
- To commercialize East Natuna Gas Field to fulfill current demand and address the future supply gap.
- To further explore and secure additional gas supply from non-conventional source, i.e Coal Bed Methane (CBM)
- To expedite the pipeline construction under TAGP Updated Masterplan 2008, once the East Natuna supply is available.
- To leverage existing bilateral pipeline interconnections for future gas mobility within the region.

Strategy	Action
1. ASCOPE Member Countriess to collectively implement ASEAN MOU on TAGP	1.1 Create Pipeline JVC to undertake implementation of gas pipeline project 1.2 Continue to address interconnecting issues for future reference and implementation 1.3 Finalize the Gas Transit Principles 1.4 Unbundle costs issues 1.5 Harmonize tariff and taxation principles
2. PERTAMINA and PSC* Partners to undertake detailed feasibility study for East Natuna Gas Field Development *Production Sharing Contracts *Project Sharing Contractors	2.1 Government of Indonesia has commissioned PERTAMINA to resolve the PSC issues and should be ready to build the infrastructure beginning 2011 2.2 ASCOPE Member States will continue to work on a hypothetical situation to be ready when East Natuna Gas eventually flows to the market 2.3 Address high CO_2 gas field and utilization of high CO_2 gas
3. Respective ASCOPE Member Countries to implement the approved Roadmap for TAGP accordingly	3.1 Consolidate supply-demand gap with HAPUA to manage regional gas demand 3.2 Explore ideas with ASCOPE E&P Committee for additional gas supply from both conventional and non-conventional sources
4. ASCOPE Gas Centre (AGC) to implement the Approved 5-year Work	AGC to continue provide assistance on gas industry development and promote technological capability

Programme	enhancement in the following areas: <u>Technical</u> 4.1 Study on CBM Potential 4.2 CBM waste water management and overlapping land claims 4.3 Conduct studies to facilitate timely development of high CO_2 content gas 4.4 Evaluate opportunities for demonstration of carbon capture and storage technologies in the ASEAN region 4.5 Maintain "Unaccounted for Gas" guideline. 4.6 Develop guidelines as appropriate including in the areas of environmental, safety and integrity management 4.7 Establish Emergency Pipeline Repair Equipment Sharing <u>Commercial</u> 4.8 Work closely with AGCC to further develop appropriate regulatory principles on cross border gas trading 4.9 Provide advice as appropriate to the TAGP Task Force
Note: 1st 5-year Work Plan is almost complete while 2nd 5-year Work Plan is being prepared	<u>Knowledge Management</u> 4.10 Continue to built up SEAPOG and APCE as a meeting platform for pipeline practitioners

HIGHLIGHTS

- Implement the ASEAN MOU based on the 13 approved pipelines in the Updated TAGP Masterplan 2008;
- Explore and secure additional gas supply from non-conventional sources;
- Address legal, technical and commercial issues of the planned infrastructure with the assistance of AGC on development of guidelines in environment, safety and integrity management, CBM and High CO2 gas;
- Coordinate with AGCC to further develop appropriate regulatory principles on cross border gas trading
- Reconcile and consolidate the supply-demand figures with HAPUA and ACE to address the demand management issue.

Program Area No. 3. <u>Coal and Clean Coal Technology</u>

38. Coal use worldwide is projected to increase significantly and is expected to be the fastest growing primary energy source from 2005 to 2030. Coal demand jumps by 38% between 2005 and 2015 and 73% by 2030 (IEA, World Energy Outlook 2007). In ASEAN, the primary coal supply is expected to increase from 56 MTOE in 2005 to 297 MTOE in 2030. This is equivalent to an annual growth rate of 6.9%, making coal the fastest growing energy source from 2005 to 2030 due to the increasing demand for fuel for electricity generation and in the industrial sector.

39. The energy plans of the ASEAN Member States indicate the rapid growth of coal utilization for power generation and this presents itself an opportunity to promote and increase cleaner coal use and trade that could bring in mutual economic benefits towards regional energy security. There are already substantial capacities of coal-fired power plants in the region and coal resources remain largely untapped as presented in ***ANNEX E***. Despite growing environmental controls, more coal power projects are moving forward, with increasing preference to use clean coal technologies. A collective action is, therefore, called for to strengthen cooperative partnerships in the promotion and utilization of coal and clean coal technologies among the Member States.

40. Objective: To promote the development and use of clean coal technologies and to facilitate intra-ASEAN coal trade towards enhancing regional energy security needs as well as to cooperate and promote sustainable development and utilization of coal while addressing environmental issues and facilitating intra-ASEAN coal related issues.

STRATEGIC GOALS
• To promote and increase cleaner coal use and trade for regional energy security; • To strongly encourage the use of clean coal technologies through regional cooperation; and • To build coal image to the public in a concrete manner.

Strategy	Action
1. Strengthening of Institutional and Policy Framework and building an ASEAN Coal Image	1.1. Compile and analyze coal policies, regulations, plans and programs and institutional arrangements of the ASEAN Member States to aid in the development and promotion of a regional policy on coal trade 1.2. Conduct inventory of ASEAN coal resources 1.3. Harmonize instruments to enhance coal supply and facilitate delivery arrangements 1.4. Adopt an ASEAN Agreement on Coal Supply and Trading 1.5. Promote collaborative image-building for coal and CCTs in the light of global environmental concerns 1.6. Organize media campaigns, conferences, seminars, workshops and information sharing on CCT.

2. Promotion of Coal and Clean Coal Technologies	2.1. Work towards the development and well-functioning of the "Clean Coal for Asia Initiative" 2.2. Prepare a comprehensive program on "ASEAN Cleaner Coal Development Cooperation" 2.3. Conduct studies on upgraded brown coal, coal liquefaction, clean coal technology and integrated coal gasification and look into the potential of carbon capture and storage (CCS) technology 2.4. Organize ASEAN Clean Coal Competition under the ASEAN Energy Awards 2.5. Study successful cases / best practices on coal and CCTs 2.6. Encourage private sector investment and participation 2.7. Publish ASEAN Coal Newsletter on a quarterly basis 2.8. Enhance the low quality coal to high quality coal
3. Promoting intra-ASEAN Coal Trade and Investment	3.1 Study and adopt standard coal nomenclatures and a single international standard for coal quality testing for ASEAN. 3.2 Establish AFOC Coal Price Index 3.3 Promote increased coal trade, exploration and investment through seminars, workshops, tours and business-to-business arrangements 3.4 Facilitate bilateral negotiations to procure supply from coal-producing countries.
4. Enhancing environmental planning and assessment of coal projects	4.1 Harmonize emission standards and minimum efficiency requirements for coal-fired power plants 4.2 Organize capacity building activities

PROGRAM HIGHLIGHTS

- Building of an ASEAN coal image is a key success factor;
- Development of ASEAN Coal Price Index, setting up of coal laboratory and standards; promote intra-ASEAN coal trade by facilitating bilateral and multilateral long-term coal supply agreements, etc.;
- Formulate an MOU similar to ASEAN Petroleum Security Agreement (APSA) to enhance regional security of coal supply;
- Development of strategy / action towards harmonization of local practices to encourage coal trading and sharing of resources and facilities.

Program Area No. 4. Energy Efficiency and Conservation

41. Energy efficiency is viewed as one of the most cost-effective ways of enhancing energy security and addressing climate change as well as promoting competitiveness in the ASEAN Member States. The policies, plans, programs and targets for EE&C in the ASEAN Member States are summarized in ***ANNEX F***.

42. Energy efficiency aims to reduce energy consumption without reducing the use of energy-consuming plant and equipment. It intends to make better use of energy, resulting to the promotion of individual behavior, working methods and manufacturing/industrial practices which

are less energy-intensive. Various measures to promote energy efficiency form part of the objectives of the EE&C-SSN program for the next six years.

43. Objective: To strengthen cooperation in energy efficiency and conservation through institutional capacity building and increasing private sector involvement including enhancing public awareness as well as expanding markets for energy efficient products

- To pursue the aspirational goal of reducing regional energy intensity of at least 8% by 2015 based on 2005 level
- To achieve higher end-use energy efficiency for all sectors through regulatory and market approaches, where appropriate
- To enhance institutional and human capacity emphasizing the development of energy efficiency technology and service providers in the ASEAN region
- To encourage private sector participation, especially financial institutions to support EE&C investment and implementation

Strategy	Action
1. Development of Energy Efficiency Policy and Build Capacity	1.1. Develop a clear policy and plan to promote energy efficiency 1.2. Setting national energy efficiency target and develop a plan to monitor the results 1.3. Strengthen human capacity and enhance infrastructure to facilitate the EE policy and plan
2. Awareness raising and dissemination of information	2.1. Develop and run EE&C campaigns to raise awareness, emphasizing on global environmental issues 2.2. Disseminate information using all appropriate medias (including energy labels) to help energy consumers make a right decision 2.3. Demonstrate best energy practices and successful cases, e.g, public-private sector collaboration on EE&C
3. Promoting good energy management practices, especially for industrial and commercial sectors	3.1. Develop regulation and/or provide incentives to encourage good energy management practices in facilities 3.2. Build up capacity for all stakeholders to implement good energy management
4. Facilitation of Energy Efficiency Financing	4.1. Develop mechanism (s) to enhance financing for energy efficiency and conservation project implementation 4.2. Increase involvement of banking sector and financial institutes both domestic and international agencies in financing energy efficiency projects

PROGRAM HIGHLIGHTS

- Development of EE&C tools, such as, database, technical directory, handbook, benchmark, and guidelines;
- Continue capacity building activities such as Multi-Country Training Program on EE&C;
- Promotion of ASEAN Energy Awards on energy efficiency and conservation; and
- Promotion of high-performance energy efficiency technologies and practices.

Program Area No. 5. Renewable Energy

44. Renewable energy sources accounted for 19% of the world's total primary energy demand in 2005 and are projected to have a share of 18% in 2015 and 2030. Geothermal, solar, wind, tidal and wave energy, grow faster than any other energy source at an average annual growth of 6.7% over the 2005-2030 outlook period (IEA, WEO 2007). In ASEAN, the share of renewable energy in primary energy consumption was 28.1% in 2005 equivalent to 133 MTOE and is expected to grow annually at a rate of 9.1% to reach 185 MTOE in 2030.

45. During the APAEC 2004-2009, the 10% target to increase the installed RE-based capacities for power generation was met. As of 2008, the RE installed capacity of the ASEAN region was 37,100 MW (by WEC definition) which is attached as ***ANNEX G***. During the 2010-2015 APAEC period, renewable energies are needed to increase the diversity of energy supply and to reduce the environmental impact of energy use in the ASEAN region. And, sensible deployment of renewable energy will accelerate the economic and social development of the ASEAN Member States. It is seen as the right candidate to complement fossil fuel in order to support sustainable energy development. It is also envisaged that by end of the Plan period, clear policies and responsive plans and program for RE development are addressed to enhance commercialization, investment, market and trade potentials of RE technologies.

46. Objective: To institute and maintain sustainable development on the use of renewable energy and its technologies

STRATEGIC GOALS

- To achieve a collective target of 15%* for regional renewable energy in the total power installed capacity by 2015
- To strengthen regional cooperation on the development of renewable energy and alternative energy including hydropower and bio-fuels
- To promote the development of centers of research and development on renewable energy in the region;
- To promote open trade, facilitation and cooperation in the renewable energy sector and related industries as well as investment in the requisite infrastructure for renewable energy development

Strategy	Action
1. Increasing the development and utilization of RE sources to achieve the 15% target share of RE in ASEAN power generation mix	1.1. Achieve by 2015, at least 15% based on WEC definition of RE additional RE installed capacities in power generation mix 1.2. Promote technical cooperation to complement efforts on RE targets of the ASEAN Member States 1.3. Promote national RE programs, available market and feasibility studies to investors, project developers, power utilities and funding institutions 1.4 Monitor RE installed capacity additions bi-annually
2. Enhancing awareness and information sharing and strengthening networks	2.1. Organize media campaigns, conferences, seminars and workshops, and renewable energy competition under the ASEAN energy awards 2.2. Sharing of information on research and innovation policies, market deployment policies, and market-based energy policies including the promotion of successful cases of RE projects to encourage positive attitude in the further development of RE 2.3. Establish a network of R&D, training and education centers involved in RE to promote cooperation and synergy, with active participation of the private sector and other relevant organizations 2.4. Strengthen collaboration with leading regional and global RE centers to enhance ASEAN RE networks 2.5. Promote the use of CDM in the light of climate change and mitigation
3. Promoting intra-ASEAN cooperation on ASEAN-made products and services	3.1. Conduct regional market studies on RE 3.2. Propose harmonized standards for RE products 3.3. Develop the policy and system to strengthen local manufacturing capabilities for RE technologies and products 3.4. Encourage investment in manufacturing and fabrication 3.5. Work towards the establishment of an ASEAN renewable energy association forum
4. Promotion of renewable energy financing scheme	4.1. Establish the framework for promoting innovative financing instruments or mechanism to support and enhance RE projects implementation 4.2. Encourage involvement of the banking sector and financial institutions in RE projects 4.3. Develop an ASEAN policy paper series (such as on incentives / measures for lenders/investors in RE projects) 4.4. Strengthen collaboration with ASEAN dialogue partners and international agencies to support RE projects in the ASEAN Member States

5. Promoting the commercial development and utilization of biofuels	5.1. Establish a functioning network consisting of key players in the biofuels and related industries to pursue cooperative partnerships in R&D and to promote sharing of information 5.2. Enhance commercialization of biofuels 5.3. Develop "ASEAN RE Policy Paper" on long-term sustainability of biofuels 5.4. Develop harmonized specifications for biofuels
6. Develop ASEAN as hub for RE	6.1 Establish a working Task Force to stockpile the development of RE and prepare RE Roadmap

PROGRAM HIGHLIGHTS

- Enhance the share of RE in regional power generation installed capacity;
- Facilitate intra-ASEAN trade for RE and to turn ASEAN as the hub for Renewable Energy;
- Promote biofuels as substitute fuel for the transportation sector;
- Promote enabling mechanisms or policy instruments to accelerate research, development and demonstration of RE;
- Promote RE for CDM in the light of climate change and mitigation; and
- Promote the development and synergy of Research and Development Centers for Renewable Energy in the region

Program Area No. 6. Regional Energy Policy and Planning

47. Regional energy policy and planning is crucial to attaining the shared goals of enhancing greater energy security and environmental sustainability in the context of open market competition and sustainable development in the ASEAN region. In the ASEAN Member States, energy has become one of the most critical areas for government policy interventions. Overall, energy policies critically address the key areas of energy supply development, energy demand, oil operational reserves, transformation, transport and distribution sectors, and environmental protection. These areas need to be planned properly to evolve a dynamic and responsive energy policy for ensuring a secure, affordable, reliable and competitive energy supply in the context of sustainable development in the ASEAN region.

48. As new energy landscapes and challenges arise, ASEAN views the need for ASEAN countries to move beyond independent energy policies and planning to an inter-dependent, inter-country and outward looking policies for greater economic integration and narrowing the development gap. Thus, ASEAN energy security policy and planning should ensure to consolidate and harmonize the standards of policy and planning activities on energy security in the Member States. The end-goal is to enhance the individual national energy policy and planning activities of the Member States and integrate, mainstream them into a cohesive and effective regional energy policy analysis and planning towards sustainable development.

49. Objective: To enhance cooperation on regional energy policy analysis and planning towards sustainable development and to effectively manage the implementation of APAEC.

STRATEGIC GOALS

- To effectively manage the implementation, monitoring and evaluation of the progress of APAEC programs;
- To develop tools and instruments for monitoring the APAEC;
- To strengthen collaborative efforts towards regional energy policy and planning for sustainable development; and
- To strengthen capacity building in formulating sound regional energy policies and coordinated courses of action to meet the overall goal of the APAEC.

Strategy	Action
1. Enhancing energy policy and supply security information sharing network	1.1. Continue, update and expand the ACE energy database and strengthen IT infrastructure 1.2. Conduct emergency communication dialogues on energy to be participated by ASEAN SOME Leaders, SOME+3 Leaders, etc. through Chat & BBS to be facilitated by ACE 1.3. Submit energy data and policy reports regularly by Member States to ACE 1.4. Establish REPP-SSN Infonet in ACE Website 1.5. Publish ASEAN Energy Review and Energy Indicators 1.6. Study to accelerate the electrification program for the rural and remote areas in the ASEAN region
2. Effectively manage the implementation of APAEC 2010-2015	2.1 Monitor and evaluate the progress of APAEC programs 2.2 Conduct of APAEC Mid-Term Review 2.3 Yearly reporting of APAEC progress to SOME/AMEM
3. Conduct capacity building in energy and environmental policy planning and energy supply security assessment	3.1 Organize trainings and workshops in yearly basis 3.2 Address and analyze issues between environment and energy 3.3 Develop indicators for energy- environmental linkages
4. Preparing regional energy outlooks and conducting ASEAN energy policy reviews and analysis series	4.1 Conduct of ASEAN energy supply-demand outlook studies 4.2 Publication and dissemination of outlook studies, key findings and recommendations 4.3 Publication of ASEAN energy policy reviews and analysis series including issues related to the APAEC programs 4.4 Formulate ASEAN Fuel Policy for power generation in cooperation with ASEAN specialized energy bodies and sub-sector networks
5. Strengthening collaboration and dialogues with ASEAN partners and with national, regional and global institutions	5.1 Work towards a well-functioning energy nodal networks 5.2 Organize policy dialogues with global and regional institutions 5.3 Pursue studies on evolving regional energy policy reform/issues with partners and institutions

PROGRAM HIGHLIGHTS

- Conduct regional energy policy works including ASEAN Fuel Policy, Energy Outlook, Review and Analysis;
- Study on rural electrification acceleration programme to improve energy accessibility;
- Effectively manage the deliverables of APAEC; and
- Provide directions and guidance on APAEC programs including cross-sector issues.

Program Area No. 7. Civilian Nuclear Energy

50. The inevitable increase in the use of fossil fuels and the stable upward trends in the region's energy demand have prompted ASEAN to look for alternative fuel options to sustain its growth momentum. Diversification of energy resources and supply source as a high policy agenda should be pursued. Many countries in the world started opening the doors anew to nuclear power, citing energy security, escalating prices of fossil fuel and climate change as major reasons in considering its development. Likewise, some countries in ASEAN have considered the use of nuclear energy for power generation as a long-term option.

51. On the previous ASEAN high officials meetings in 2007 and 2008, the Leaders agreed to explore nuclear as an alternative source of energy and stressed the need that this source should be sustainable, safe and environmental friendly. The Special Senior official Meeting in 2009 tasked to proceed with the drafting of the Program Area No. 7 with activities limited to capacity building and institutional arrangements for cooperation on nuclear energy. The Program Area will facilitate the discussion or sharing information and assistances in support of civilian nuclear power plants, but not limited to the following regional approaches:
    - Public information on nuclear energy for power generation ;
    - Capacity building includes human resource development and training.
    - Regulatory framework, including nuclear energy regulators network
    - Emergency preparedness and response plans; and
    - Cooperation among nuclear energy agencies in ASEAN engaged in promotion, project development and R&D

    In achieving the above approaches, this Program Area may draw from the expertise, cooperation, training assistance and resources of relevant international and regional organizations, including the ASEAN's Dialogue Partners.

52. Objective*:* To cooperate on a voluntary and non-binding basis, the sharing and exchange of information and knowledge, technical assistance, networking and training on nuclear energy for power generation. The cooperation shall be achieved gradually in accordance with the laws and regulations of the respective ASEAN Member States and the relevant international agreements, co-operations and standards within the framework of existing international and regional organizations and cooperation on nuclear energy, i.e. International Atomic Energy Agency (IAEA), Asian Nuclear Safety Network (ANSN), Forum for Nuclear Cooperation in Asia (FNCA), among others.

STRATEGIC GOALS

- To strengthen regional capacity building in nuclear energy for regulators, operators and relevant educational institutions, among other things through training, workshop, seminar and information exchange.
- To support the use of nuclear energy as clean and zero emission fuel and to promote public understanding on the use of nuclear energy for power generation.
- To enhance regional cooperation among nuclear energy regulators and operators

Strategy	Action
1. Conduct capacity building among ASEAN Member States	• Encourage personnel exchange and cross-study training • Facilitate and organize technical training on nuclear usage e.g. a series of short training sessions in nuclear technologies & safety. • Conduct seminars and workshops jointly with nuclear industry and business with particular focus on economic aspect, finance and investment as well as with social community and NGOs • Create human network and cyber communities on nuclear • Share the progress/lessons learned and experiences on S&T activities with regard to NPP in each Member State
2. Strengthen public information and public education on nuclear power generation	• Exchange of information on strategies and experiences in public education & public information program. • Conduct group discussion involving government-private sector participation such as Ministerial-CEO Dialogue on Nuclear Energy as a meeting platform for common understanding and knowledge sharing on the use of nuclear energy. • Educate the public on the support of the development and promotion of nuclear use as an option for power generation. • Create Experience and Knowledge Network in the region by pooling, analyzing and sharing of existing & new knowledge and practical experience among Member States. • Create and promote public understanding of necessity of Nuclear Power as an clear alternative energy option for ASEAN Community competitiveness development

3. Strengthen institutional, legal and regulatory capacities on nuclear energy for power generation.	• Undertake a comparative study on the institutional structure and legislation on civilian nuclear energy • Setting up of nuclear regulatory bodies and networks • Establish capacity to support regional efforts to implement the agreement on civilian nuclear energy • Enhance collaboration with international energy bodies and organizations overseeing the implementation of civilian nuclear energy and nuclear energy cooperation • Conduct a regular dialogue with national and international experts from ASEAN's Dialogue Partners and relevant international and regional organisations, such as the International Atomic Energy Agency (IAEA) and the Asian Nuclear Safety Network (ANSN), and Forum for Nuclear Cooperation in Asia (FNCA) to enhance ASEAN civilian nuclear development

PROGRAM HIGHLIGHTS

1. To create public awareness and public education on nuclear power plants and build a positive image of nuclear use in a comprehensive and concrete manner toward regional energy security.
2. To strongly encourage the information sharing in civilian nuclear energy among ASEAN Member States in a systematic way.

V. INTERNATIONAL COOPERATION AND FINANCING

53. International cooperation, both bilateral and multilateral, for the implementation of the APAEC programs, will be coordinated, strengthened, and expanded in order to achieve, among others, the energy policy agenda of ASEAN onto 2015 and the end-goals of the Initiative for ASEAN Integration (IAI).

54. APAEC 2010-2015 recognizes the available facilities of the ASEAN Economic Community and other instruments and avenues of ASEAN cooperation including the ASEAN Infrastructure Financing Mechanism to move the plan of actions to reality by 2015.

55. The implementation of APAEC programs and projects are financed through a mix of funding sources, namely; the ASEAN Member States, ASEAN Dialogue Partners, aid and donor agencies, and relevant agencies and organizations.

56. For the TAGP and APG programs, national oil and gas companies and national power utilities and authorities have abided on the principle on cost-sharing in implementing their respective work programs under the APAEC. International collaborative partnerships should be promoted.

57. For programs on Coal and Clean Coal Technology, Energy Efficiency and Conservation, Renewable Energy and Regional Energy Policy and Planning, the main sources of funding are ASEAN dialogue partners. These are: the European Union, Japan, Australia, China, Korea, and India. Support to the APAEC programs are also provided by Germany, Switzerland, and US and other regional and global institutions such as UN and its attached agencies, ECCJ, IEEJ, IEA, NEDO, APERC, JOGMEC, JCOAL, Energy Charter Secretariat, ADB, AIT, CDC, and other related institutions and agencies.

58. The EU has been supporting ASEAN in the energy sector for over 25 years. One program is the EC-ASEAN Energy Facility (EAEF) coordinated by ACE from 2003 to 2007. The objectives of the EAEF were: a) increasing the security of energy supply of ASEAN countries and indirectly of Europe, b) increasing the economic exchanges between European Union and ASEAN countries, c) improving the environment at local and global level, and d) facilitating the implementation of the ASEAN Plan of Action for Energy Co-operation 1999-2004 and subsequently 2004-2009. The EAEF is the single biggest source of fund for the APAEC 1999-2004 and APAEC 2004-2009. The estimated combined contribution to APAEC from EAEF was Euro 41.5 million coming from the EC, project partners in ASEAN and EU, and ACE. The EAEF was completed in 2007 with a total of 77 projects implemented from 2003 to 2007. The breakdown are as follows: 15 projects on electricity, 2 projects on natural gas, 19 projects on EE&C, 48 projects on renewable energy, 4 projects on clean coal and 2 projects on regional energy policy and planning. (Some projects support 2 or more energy-sub-sectors so the total will not equal to 77). For the APAEC 2010-2015, the strengthening of the SOME-EU Consultations is expected to bring mutual benefits to both the ASEAN and the EU regions.

59. Japan has been consistently providing support to APAEC since the establishment in 2000 of the SOME-METI Consultations. There are two projects under the SOME-METI Work Program, namely: a) Energy Supply and Security Planning for the ASEAN Region (ESSPA) under the Program no. 6 on Regional Energy Policy and Planning, and b) Promotion of Energy Efficiency and Conservation (PROMEEC) in 3 work streams, namely: building, industry and energy management to support APAEC Program Area No. 4 on Energy Efficiency and Conservation. The implementation of ESSPA and PROMEEC started in 2000 and will still be continued in the APAEC 2010-2015. In addition, METI of Japan is also supporting the training of ASEAN EE&C specialists in Japan since 2005. Some 240 ASEAN nationals have been trained and more training batches are planned in the years to come.

60. The ASEAN+3 (China, Japan, Korea) has adopted a 10-year Cooperation Work Plan 2007-2017 and several activities are expected for implementation, including energy. The Work Program of the SOME+3/AMEM+3 include five fora on energy security, oil market, oil stockpiling, renewable energy and energy efficiency and conservation, and natural gas and business dialogue. The work program will be expanded to include cooperation on CDM and civilian nuclear energy.

61. The East Asia Summit – Energy Cooperation Task Force (EAS-ECTF) held its first meeting in March 2007 in Singapore. Since then, it had organized several meetings and has deepened cooperation in three workstreams, namely:
    a) biofuels for transport and other purposes;
    b) energy efficiency and conservation; and
    c) energy market integration.

62. The ASEAN-German Cooperation is currently on-going with the implementation of the 5-year project on ASEAN - German Mini Hydro Project (AGMHP). The project aims, among others, to improve the preconditions for sustainable utilization of mini-hydropower (MHP) sources in Cambodia, Lao PDR and Vietnam.

63. The USAID has expressed interest to forge collaborative partnerships with ASEAN through ACE to pursue some programs in the areas of:
    a) Efficient Window Technology – A workshop and follow-on activities to promote energy efficiency;
    b) Efficient Cook Stoves – A program to develop and introduce more efficient cooking technology in ASEAN; and
    c) Conference on Clean/Sustainable/Alternative Sources of Energy and Technologies for ASEAN–Tied to the Ministerial or some other event.

64. Switzerland has expressed interest to work with ASEAN through ACE to implement a regional program on mini-hydro power development.

VI. IMPLEMENTATION AND MONITORING ARRANGEMENTS

65. The ASEAN Senior Officials Meeting on Energy (SOME) shall have the overall responsibility in the supervision, coordination and implementation of APAEC 2010-2015, with the following specific responsibilities:

    - Undertake all measures for its implementation, including determining priorities, carrying out periodic reviews, and the approval of the necessary cooperating programs, projects and activities;
    - Serve as the principal coordinating body to address all issues relating to its implementation;
    - Identify financial support and assistance, as well as relevant technologies from within and outside ASEAN, to include but not limited to the private sector, the ASEAN Dialogue Partners and relevant international and regional organizations; and
    - Report on the overall implementation progress to the annual ASEAN Ministers on Energy Meeting (AMEM).

66. The ASEAN Member States shall collectively determine the implementation priorities, develop work programs or plans for the program areas, for consideration/approval by SOME/AMEM. Participation of the ASEAN private or business sector, ASEAN Dialogue Partners and the relevant regional/international organizations shall be encouraged in the development and implementation of the work programs/plans.

67. The relevant ASEAN energy sub-sector networks or specialized bodies, namely; ASEAN Council on Petroleum (ASCOPE), Heads of ASEAN Power Utilities/Authorities (HAPUA), ASEAN Forum on Coal (AFOC), Energy Efficiency and Conservation Sub-sector Network (EE&C-SSN), Renewable Energy Subs-sector Network (RE-SSN), Regional Energy Policy and Planning Sub-sector Network (REPP-SSN) and *in pipeline* Nuclear Energy Safety Sub-sector Network (NES-SSN) shall serve as the SOME's implementing arms in their respective program area. They shall convene their respective meetings or Experts Group, as deemed necessary, to determine the priorities and implementing arrangements, further elaborate the cooperation work programs, and prepare the necessary project proposals/documents. The designation of country coordinators for specific programs/activities would be subject to mutual agreement by the Member States/SOME.

68. The ASEAN Centre for Energy (ACE) and REPP-SSN, in coordination with ASEAN Secretariat, shall assist SOME and the ASEAN energy specialized bodies and sub-sector networks in carrying out the above responsibilities, including technical support and assistance in the supervision, coordination and review of the cooperation programs, projects and activities. In particular, ACE shall provide technical coordination, as well as facilitate the task of the implementing organizations such as the planning and fund sourcing, among others. The ASEAN Secretariat shall be responsible for program coordination and other requirements with the other ASEAN coordinating bodies and the ASEAN Dialogue Partners. ACE jointly with the ASEAN Secretariat shall prepare regular implementation progress reports, for submission to the annual SOME/AMEM meetings.

69. The Regional Energy Policy and Planning Sub-sector Network (REPP-SSN) jointly with ACE shall undertake the monitoring and evaluation of the progress of the APAEC upon approval of SOME.

70. SOME, with the assistance of ACE and the ASEAN Secretariat, may undertake resource mobilization activities for securing potential funding support for the APAEC 2010-2015 projects and activities. Technical assistance from ASEAN Dialogue Partners, ASEAN private sector organizations, international and regional organizations and other related institutions are most welcome to ensure the successful implementation of APAEC 2010-2015.

71. The AMEM would provide the issues and concerns of common interest and set policy and program directions for the effective implementation of APAEC 2010-2015.

72. The progress of implementation of the APAEC programs will be regularly monitored. A mid-term review and evaluation shall be conducted taking into account the dynamic and ever-changing energy landscape regionally and globally.

73. The scorecard mechanism will be pursued to capture the milestones achieved in the implementation of the APAEC 2010-2015.

VII. CONCLUSION

74. The APAEC 2010-2015 is a dynamic and living document which outlines ASEAN's priorities and responses to emerging global and regional challenges.

75. ASEAN Member States' commitment is crucial to the implementation of the Plan. The effective implementation of the Plan shall bring benefits to all ASEAN Member States in accordance with the aspirations of the ASEAN Community by 2015.

76. Enhanced cooperation at the regional and international levels shall be pursued strongly. Greater involvement and engagement of various sectors and partners will make ASEAN and the world rise above the challenges.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACE	= ASEAN Centre for Energy
ADC	= APAEC Drafting Committee
AEC	= ASEAN Economic Community
AFOC	= ASEAN Forum on Coal
AGC	= ASCOPE Gas Centre
AGMHP	= ASEAN-German Minihydro Project
AIMS	= ASEAN Interconnection Master Plan Study
AMEM	= ASEAN Ministers of Energy Meeting
APAEC	= ASEAN Plan of Action for Energy Cooperation
APSA	= ASEAN Petroleum Security Agreement (APSA)
APERC	= Asia Pacific Energy Research Center
APG	= ASEAN Power Grid
APGCC	= ASEAN Power Grid Consultative Committee
ASCOPE	= ASEAN Council on Petroleum
ASEAN	= Association of South East Asian Nation
BCFPD	= Billion Cubic Feet per Day
CBM	= Coal Bed Methane
CCT	= Clean Coal Technology
CDM	= Clean Development Mechanism
CERM	= Coordinated Emergency Response Measures
EAEF	= European Union - ASEAN Energy Facility
EAS	= East Asia Summit
EAS-ECTF	= East Asia Summit – Energy Cooperation Task Force
EE&C	= Energy Efficiency and Conservation
EE&C-SSN	= Energy Efficiency and Conservation Sub-sector Network
ESSPA	= Energy Supply Security Planning for ASEAN
EU	= European Union
GDP	= Gross Domestic Product
HPA	= Hanoi Plan of Action
VAP	= Vientiane Action Plan
IEA	= International Energy Agency
IEEJ	= Institute of Energy Economics Japan
IAI	= Initiative for ASEAN Integration
(kt-C)/TOE	= Tons of carbon equivalent
METI	= Ministry of Economy, Trade and Industry, Japan
MMSCFD	= Million Standard Cubic Feet per Day
MOU	= Memorandum of Understanding
MTOE	= Million Tons of Oil Equivalent
RE	= Renewable Energy
RE-SSN	= Renewable Energy
REPP	= Regional Energy Policy and Planning
REPP-SSN	= Regional Energy Policy and Planning
SOME	= Senior Officials Meeting on Energy
SOME-METI	= Senior Officials Meeting on Energy–Ministry of Economy, Trade and Industry, Japan
SOME-EU	= Senior Officials Meeting on Energy – European Union
SOME+3	= Senior Officials Meeting on Energy+3 (China, Japan, Korea)
TAGP	= Trans ASEAN Gas Pipeline
UN-ESCAP	= United Nations – Economic and Social Commission for Asia and the Pacific
USAID	= United States Agency for International Development
VAP	= Vientiane Action Plan
WEC	= World Energy Council