THAILAND'S ENERGY POLICY delivered to the National Assembly on 30 December 2008 by Mr. Abhisit Vejjajiva, Prime Minister of Thailand and

ENERGY STRATEGY directed by Mr. Wannarat Channukul, Minister of Energy, on 12 January 2009

STRATEGY 1: ENERGY SECURITY

Policy Directive	Strategy	Target/Outcome	Implementation Methodology
Intensify energy development for greater self-reliance of the country with a view to achieving sufficient and stable energy supply by expediting exploration and development of energy resources at both domestic and international levels; negotiating with neighboring countries at the government level for joint development of energy resources; creating energy mix in power development to reduce risks pertaining to supply, price volatility and production cost; encouraging electricity production from potential renewable energy, particularly from small or very small scale electricity generating projects, as well as studying the appropriateness of other alternative energy for electricity generation.	1.1 Promote domestic production of crude oil and condensate and develop related infrastructure systems.	• To be able to produce crude oil and condensate at more than 230,000 barrels/day in 2009 and 250,000 barrels/day in 2011.	• Expedite and promote greater investment in exploration and production (E&P) of crude oil from domestic resources. • Support the development of oil depot system and oil transportation pipelines so as to reduce the cost of oil distribution to various regions. • Encourage the PTT and PTTEP to invest in the utilization of the deep-sea port in Ranong province as a supply base of petroleum E&P in the Gulf of Martaban. • Stimulate the PTT and PTTEP to invest in overseas E&P of crude oil to be supplied back to Thailand, particularly from oil resources in strategic partner countries having good relationship with Thailand, such as Oman, Iran, Qatar, Bahrain, Algeria and Egypt.

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	1.2 Procure natural gas from both domestic and foreign resources to sufficiently meet the demand and develop related infrastructure systems.	● To maintain the level of natural gas reserve (2P) that can be developed for domestic consumption for no less than 30 years.	● Manage the procurement of natural gas to be in balance with the domestic demand. ● Speed up natural gas procurement to meet the domestic demand, especially the development of the 2nd natural gas resource in the Thailand - Malaysia Joint Development Area, i.e. JDA B17, to meet the schedule. ● Follow up the progress of domestic natural gas fields presently under development, e.g. Plathong 2 and South Bongkot, to be able to supply to the system in 2011/2012. ● Speed up the signing of a Gas Sale Agreement for the purchase of natural gas from a new natural gas resource in Myanmar, i.e. M9 gas field, to enable the commencement of natural gas supply at 240 million cubic feet per day (MMSCFD) by 2011/2012. ● Import LNG to accommodate the demand of natural gas, starting in 2011/2012; in this respect, the signing of LNG sale agreements with foreign countries must be made and the construction of re-gasification facilities in Rayong province must be expedited.

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			● Initiate and speed up negotiation for natural gas supply from Natuna gas field in Indonesia.
	1.3 Develop the electricity supply industry to adequately meet the demand and promote diversification of fuel types.	● To have Thailand Power Development Plan (PDP) correspond with economic and social situations, with a reserve margin at approximately 15-20%. ● To maintain the share of power generation of the Electricity Generating Authority of Thailand (EGAT) at more than 50% of the total generating capacity of the country. ● To impose a cap on dependency on natural gas for power generation, not to exceed 70%.	● Support power purchase from small-scale projects like SPPs (using cogeneration system and renewable energy) and VSPPs to increase power supply to the grid during 2009-2011, which will also boost domestic economic conditions and investment. ● Postpone IPP projects that are not ready to be connected to the grid for 1-3 years. ● Review the purchase of power from neighboring countries through re-negotiation. ● Carry out public information campaigns to make people recognize the importance and necessity of fuel diversification.
	1.4 Conduct feasibility study on the development of other fuel options for power generation, e.g. nuclear, clean coal and oil shale.	● To provide the general public with better knowledge and understanding of new energy options.	● Undertake detailed feasibility study on the development of nuclear power plants, using relevant IAEA guidelines as the implementation framework. ● Carry out public information activities and disseminate clear and correct information to the general public,

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			giving importance to educating the young generation about the benefits, advantages and disadvantages of nuclear power, coal and oil shale. ● Get prepared for presentation to the government to make a policy decision regarding nuclear power development, emphasizing the outcome of in-depth study on the economic cost-effectiveness and public acceptance.
	1.5 Explore energy resource overseas, emphasizing cooperation between the public sector and private Thai operators.	● To enhance better bargaining power of Thailand in negotiating on power purchase from neighboring countries, by encouraging Thai entrepreneurs to enter into joint ventures on power projects. ● To pave the way for moving forward to investment in E&P of oil and natural gas resources in the Middle East, Africa, Asia Minor and the Pacific.	● Policy towards neighboring countries: - Negotiate on the plan for power purchase from Lao PDR to suit with changing situations and costs; - Speed up the establishment of integrated relationship (“Energy Diplomacy”) with Indonesia. ● Policy towards significant strategic partners relative to energy issues: - Maintain good relationship with major oil and natural gas producing countries in the world market, such as UAE, Oman, Iran and Qatar, including Algeria and Egypt; - Strengthen relationship with strategic partner countries in the

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			field of alternative energy and countries with advanced energy technologies, e.g. Brazil, Germany, France, Japan and South Korea; - Expedite relationship establishment with South Africa, Angola and Kazakhstan – countries endowed with various energy resources, e.g. coal and uranium. ● Develop relationship between biofuel producing and consuming countries in the form of "International Dialogue on Biofuels," with Thailand acting as a major lead country.
	1.6 Promote and strengthen the development of energy industry as well as downstream industry.	● To get prepared for scaling up petrochemical development together with biofuel development so as to create new industry of the country, e.g. the development of oleochemical industry.	● Undertake detailed study on the approach to development of value-added creation of domestic petroleum resources, including a survey for potential sites for such development.
	1.7 Devise a plan for energy emergency preparedness.	● To have in place a plan and readiness to address all forms of energy crises.	● Devise an energy crisis preparedness plan together with a coordination system and an exercise in addressing an oil shortage.

STRATEGY 2: ALTERNATIVE ENERGY

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<tr><th>Policy Directive</th><th>Strategy</th><th>Target/Outcome</th><th>Implementation Methodology</th></tr>
<tr>
<td>Set the policy on alternative energy as a national agenda by encouraging production and use of alternative energy, particularly bio-fuel and bio-mass, such as gasohol (E10, E20 and E85), bio-diesel, solid waste and animal manure, to enhance energy security, reduce pollution, and for the benefit of the farmers by encouraging production and use of renewable energy at the community level under appropriate incentive measures; encouraging greater use of natural gas in the transportation sector by expanding natural gas transportation system nationwide; and rigorously and continuously promoting research and development of all forms of alternative energy.</td>
<td>2.1 Promote the production and utilization of biofuels, e.g. ethanol and biodiesel, to replace oil consumption.</td>
<td>

To replace oil consumption with the use of ethanol at no less than 1.4 million litres/day in 2009.

<table>
<tr><th></th><th>Estimated Number of Vehicles</th><th colspan="2">Quantity (M litres/day)</th><th>Service Station</th></tr>
<tr><th></th><th></th><th>Ethanol</th><th>Gasohol</th><th></th></tr>
<tr><td>- E10</td><td>> 3 million</td><td>0.97</td><td>9.7</td><td>5,000</td></tr>
<tr><td>- E20</td><td>318,000</td><td>0.25</td><td>1.05</td><td>120</td></tr>
<tr><td>- E85</td><td>1,000</td><td>0.004</td><td>0.005</td><td>30-50</td></tr>
<tr><td>Motorcycles</td><td>> 10 million</td><td>0.16</td><td>1.6</td><td>5,000</td></tr>
<tr><td>Total</td><td></td><td>1.39</td><td>12.36</td><td></td></tr>
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To forge ahead with the materialization of the use of gasohol E85 and flexible fuel vehicles (FFV) in Thailand, with a promotional target of at least 2,000 FFV.
The target in 2011 is as follows:

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Establish as a “National Agenda” the production and utilization of ethanol and biodiesel, with a Road Map to provide clear implementation direction.
Support the establishment of ethanol production plants, which will enhance Thailand to become the “Ethanol Hub” for ethanol production and distribution in Asia.
Promote wider use of E85 fuel, via supporting the set-up of E85 automobile manufacturing line in Thailand, with an initial target to have 1,000,000 E85 cars by 2018.
Forge ahead with the revision of regulations pertaining to ethanol export.
Initiate aggressive marketing to induce neighboring countries as well as China, Japan and Korea, to seriously consider and increase ethanol use so as to expand ethanol export markets in the future.
Efficiently monitor the price difference between biodiesel B2 and B5 in order to properly

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<tr><th></th><th rowspan="2">Estimated Number of Vehicles</th><th colspan="2">Quantity (M litres/day)</th></tr>
<tr><th></th><th>Ethanol</th><th>Gasohol</th></tr>
<tr><td>- E10</td><td>> 3 million</td><td>1.63</td><td>16.3</td></tr>
<tr><td>- E20</td><td>609,823</td><td>0.57</td><td>2.85</td></tr>
<tr><td>- E85</td><td>90,000</td><td>0.32</td><td>0.376</td></tr>
<tr><td>Motorcycles</td><td>18,522,000</td><td>0.48</td><td>4.8</td></tr>
<tr><td>Total</td><td>22.2 million</td><td>3.00</td><td>24.326</td></tr>
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To produce B100 at no less than 1.8 million litres/day within 2009 and promote the increase in domestic production capacity of B100 to sufficiently meet a demand of about 3 million litres/day in 2011.
</td><td>accommodate the demand of biodiesel B100 to be in line with oil palm production in each period of time.
Expeditiously promote expansion of oil palm plantations together with development of oil palm species/varieties and yield per rai [0.16 hectare].
Continuously promote the “community-scale biodiesel” project, emphasizing technology transfer and suitable technical management so as not to cause environmental impact on the communities.
Make the use of biodiesel B5 mandatory nationwide by 2011.</td></tr>
<tr><td>2.2 Promote the use of natural gas in the transportation (NGV), industrial, commercial and household sectors.</td><td>(A table illustrating the target of NGV utilization and the estimated number of NGV vehicles is being developed.)
To increase NGV mother stations by a minimum of 7 stations within 2009.</td><td>Forge full steam ahead and continuously with the application of NGV to public fleets, focusing on taxis, tuk-tuks (motored tricycles), public and private buses, and trucks.
Prepare for NGV price review, taking into consideration the actual costs and overall economic situations of the country.</td></tr>
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<tr><td></td><td></td><td></td><td>● Plan out the expansion of natural gas transmission pipeline system to be the backbone of NGV growth.</td></tr>
<tr><td></td><td>2.3 Promote all forms of renewable energy – wind, solar, hydropower, biomass, biogas and energy from waste.</td><td>● The target of power generation by renewable energy type is as follows:
<table><tr><th></th><th>At Present (MW)</th><th>Target in 2011 (MW)</th></tr><tr><td>- Solar</td><td>32</td><td>55</td></tr><tr><td>- Wind</td><td>1</td><td>115</td></tr><tr><td>- Mini & Micro-hydropower</td><td>55</td><td>165</td></tr><tr><td>- Biomass</td><td>1,609</td><td>2,800</td></tr><tr><td>- Biogas</td><td>45</td><td>60</td></tr><tr><td>- Electricity from Waste</td><td>5</td><td>78</td></tr></table></td><td>● Promote power generation from renewable energy in all forms, via provision of incentive measures, e.g. the current provision of “Adder” [an additional energy purchasing price on top of the normal prices that power producers will receive when selling electricity to the Power Utilities].
● Promote the conversion of plastic waste into crude oil, in a way similar to the “Adder” provision, by using the Oil Fund to provide support for the cost incurred from Adder provision to oil refineries that purchase oil derived from plastic waste to be further processed.
● Review “Adder” to better suit the domestic situations.</td></tr>
<tr><td></td><td>2.4 Carry out research and development of alternative energy, renewable energy and other innovative energy technologies.</td><td>● To develop and integrate the plans for R&D on alternative energy of concerned agencies to enhance the capability to respond to the approach for renewable energy</td><td>● Support R&D necessary for the development of alternative energy, especially R&D on energy from plants, in terms of both the 2nd Generation Biofuels and equipment for generating energy from biomass and biogas.</td></tr>
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		development as per the already approved 15-year REDP framework.	● R&D on modification of old-modeled cars to be able to use gasohol E20 and E85. ● R&D on car engines to be applicable to biodiesel B10. ● Support research on advanced technologies, e.g. hydrogen and solar cells. ● Increase the share of domestic technology utilization (local contents).
	2.5 Forge ahead to set alternative energy as a national agenda and determine incentive measures.	● To have the National Alternative Energy Master Plan approved and practically implemented.	● Present the 15-year Renewable Energy Development Plan (REDP) to the NEPC/cabinet for approval to be used as the master plan for promotion and support of alternative energy in all forms. ● Develop an integrated Plan of Action to forge ahead with alternative energy development pursuant to the targets set forth in the 15-year REDP.
	2.6 Establish and strengthen renewable energy networks through encouraging a participation	● To establish one prototype of village/community-based energy source in each province, totaling 75 prototypes, within 2009,	● Set up the “Community Energy Volunteers” by selecting community leaders/mentors who are interested in energy issues and who are willing to conduct campaigns promoting

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	process at the community, district and provincial levels in order to create energy security from the foundations.	giving importance to the application of local culture to the fostering of economical and wise usage of energy in a community and to the increase in the economic value of the community. ● To speed up the expansion and further development of prototype communities so as to popularize the concept, by integrating this into the community energy planning project with a target of "one district, one community energy source" by 2011.	energy activities at the community level. ● Devise an alternative energy development plan at the provincial level and at the provincial cluster level, using the "cluster concept" in order to expeditiously and practically convert the existing potential in each area into energy according to the 15-year REDP framework, as approved. ● Accelerate the implementation of community-scale energy projects in an addition of 300 Tambon (sub-district) Administration Organizations nationwide – to be a new channel focusing on grassroots participation in the thinking, planning, implementing and problem solving related to energy for the communities, targeting to reduce the energy cost of each community by 15-20%. ● Promote "Appropriate Technology" that suits the way of living of people, particularly those in rural communities, so that the acquired technology could be practically applied to solve energy problems in each locality, e.g. community-scale biodiesel,

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			training course on manual production of biodiesel, 200-litre charcoal-making stoves, high-efficiency stoves, charcoal briquette-making machines and household biogas digesters, etc. ● Develop the “Green Home Concept” for “urban communities,” by developing technologies appropriate for urban communities, housing estates and condominiums.

STRATEGY 3: SUPERVISE ENERGY PRICES AND SAFETY

Policy Directive	Strategy	Target/Outcome	Implementation Methodology
Supervise and maintain energy prices at appropriate, stable and affordable levels by setting an appropriate fuel price structure which supports the development of energy crops and which best reflects actual production cost; managing prices through the market mechanism and the Oil Fund to promote economical use of energy; and encouraging competition and investment in energy business, including improvement of service quality and safety.	3.1 Supervise energy prices to ensure stability and fairness, while reflecting actual production cost, through the market mechanism.	● To attain fair/affordable domestic energy prices – the energy cost for Thai people must not be higher than that in neighboring countries.	● Supervise the pricing policy and price structures of oil, LPG and natural gas to be in line with the world market mechanisms and to reflect the actual costs; ensure fairness for the general public via efficient use of the Oil Fund mechanism; and monitor the refining and marketing margins to be at appropriate levels. ● As for LPG and NGV prices, implementation will be in line with the resolutions of the NEPC/cabinet, which will not place a burden on consumers. ● Regarding the calculation of ethanol price, the Energy Policy and Planning Office (EPPO) has been entrusted to solicit the Ethanol Producer Association for a more suitable pricing formula for monitoring domestic ethanol prices.
	3.2 Promote service quality and safety improvement of energy-related business, facilities, service stations and equipment.	● Absolute Zero-Accident. ● To complete the establishment of an Provincial Energy Office in	● Accelerate capacity building of Provincial Energy Offices (PEOs) to enhance efficiency of their duty execution, particularly the protection

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		each province by 2011 (to date 36 PEOs have been approved) to enable their practical duty execution and efficient protection of energy consumers' benefits. ● To establish NGV quality standards to ensure safety, including supervision on the installation cost of NGV kits to be appropriate, fair and in line with the economic conditions. ● To establish an energy technique development institute, including procurement of testing equipment. ● To develop safety standards of energy business operation which are suitable for Thailand, and disseminate the standards to provincial areas and local administration organizations.	of energy consumers' benefits. ● Upgrade the Regional Energy Coordination Offices of PEOs to be Regional Energy Learning Centers in order to create knowledge and understanding of the government's energy policy. ● Establish the quality and safety standards of the NGV business chain as a whole. ● Regulate the safety of LPG utilization, by preventing misuse of LPG and guarding against transfer of household LPG to be used in the transport sector while ensuring least impact on taxis, via the mechanism entrusted to five committees appointed by the NEPC.

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	3.3 Encourage competition and investment in energy business.	● To create good environments for investment in energy business, with transparent competition and internationally accepted standards.	● Designate an agency in the form of an “Investor Relation Office” to be exclusively responsible for procedures and process of investment in energy industry. ● Create a mechanism for enhancing a company to be a “service company” in operation and maintenance (O&M) in such business as electricity industry, refineries, gas separation plants and oil/gas rigs, both domestic and overseas. ● Create a favorable atmosphere for investment in energy business, with transparent competition and internationally accepted standards.

STRATEGY 4: ENERGY CONSERVATION AND EFFICIENCY

Policy Directive	Strategy	Target/Outcome	Implementation Methodology
Encourage energy conservation and efficiency in the household, industrial, service and transportation sectors through campaigns fostering energy-saving discipline and conscience and promoting effective energy use; providing incentives to induce private sector investment in opting for energy-saving appliances; setting incentive measures for the household sector to reduce electricity consumption during the peak period; supporting research and development and standard setting for electrical appliances and energy-saving buildings; and supporting the development of mass public transportation and railway system to improve energy efficiency which will help defer the country's investment in energy procurement.	4.1 National energy development and energy conservation.	● To increase the energy conservation target stipulated in the Energy Conservation Program to 20%, focusing on increasing energy-saving achievement in the industrial and transportation sectors.	● Prepare the drafting of Energy Conservation Program, Phase 4 (2012-2016) to be intensive to be able to address future crises caused by oil price volatility, climate change and world food crisis, underlying participation of people and concerned parties at all levels.
	4.2 Organize campaigns to create energy-saving conscience and provide knowledge about energy conservation.	● To forge ahead with the implementation of "11 Energy-Saving Measures for the People" to rapidly attain practical achievement and set an energy-saving target at 100,000 million Baht/year.	● Improve the implementation approach of the "11 Energy-Saving Measures" by placing emphasis on pilot provinces at three scales (SML, i.e. large-scale province: Nakhorn Ratchasima; medium-scale provinces: Phitsanulok and Krabi; small-scale province: Mae Hong Sorn), and by pushing forwards energy-saving measures emphasizing a participation process, mainly through the "Community Energy Volunteers" mechanism, prior to expansion to other provinces in 2011.

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		● To enhance Local Administration Organizations (LAOs) to be focal agencies in creating and disseminating "energy-saving culture" via such target groups as children and juveniles, housewives and senior citizens under the "Community Energy Volunteers" mechanism. ● To attain participation of 100,000 households in the "Household Energy Credit" project, which will contribute to energy-saving at no less than 1,000 million Baht/year. ● A target of energy credit provision is set to reach 60,000 million Baht/year, contributing to energy-saving at no less than 40,000 million Baht/year.	● Enforce measures on mandatory energy performance labeling within 2009, starting with refrigerators and air-conditioners by upgrading/increasing efficiency of No. 5 refrigerators and air-conditioners by at least 10%. ● Expedite coordination with the Office of the Consumer Protection Board (OCPB) and concerned agencies to enable issuance of the mandatory measure on "Standby Power 1-Watt" within early-2010 for pilot appliances such as televisions and air-conditioners, and set a target of electricity saving worth 4,000 million Baht/year. ● Accelerate the replacement of light bulbs by energy-saving lights (No. 5 and T5 fluorescent tubes) in 100 sample temples/mosques within 2009, and complete such replacement in 500 facilities by 2011, to achieve a change to the use of energy-saving light tubes totaling 1,000,000 units, including creation of a sensitizing presenter in each facility.

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			● Speed up the issuance of relevant ministerial orders and announcements pursuant to the Building Energy Code within 2009, together with organizing training/conferences for architects, engineers and concerned institutions so as to attain at least 10% energy-saving in new buildings, accounting for electricity saving at 2,365 GWh/year. ● Speed up the enforcement of laws and announcements related to the regulation of energy conservation in factories (ISO – Energy) within 2009, aiming to attain energy saving worth 90,000 million Baht by 2011. ● Assign the Energy Mobile Units, via the Regional Energy Coordination Offices of all 12 Provincial Energy Offices, to carry out their field work in at least 576 sub-districts nationwide. ● Review the projects on “Clean Air-conditioners Increase Money for Households” and “Engine Tune-up to Reduce Oil Consumption” to be implemented continuously on an annual basis, especially in summer.

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	4.3 Devise incentives and provide privileges to induce investment in energy saving.	● To set a target to reduce "Energy Intensity," or energy consumption per production unit, in the industrial sector by 20% compared with the base year (2006).	● Promotion via 4 major measures, i.e. - Energy Credit and Revolving Fund to promote energy efficiency and alternative energy; - Tax measures and privileges on both cost-based and performance-based basis; - Joint ventures via the use of ESCO Fund; - DSM Bidding.
	4.4 R&D on energy-saving systems and technologies.	● To have in place an Integrated Resources Planning with regard to energy conservation R&D.	● Gather information about energy-saving innovations in each locality and encourage further development. ● Consider clearer determination of the ratio of state budget and budget from the Energy Conservation Promotion Fund to be used for R&D promotion.
	4.5 Set standards, rules and regulations for energy-saving equipment, materials as well as energy management.	● To announce the Minimum Energy Performance Standards (MEPS) of 15 electrical appliances by 2009. ● Expedite the issuance of Ministerial Orders, particularly on the Building Energy Code and ISO - Energy.	● Expedite the issuance of Ministerial Orders with immediate effect.

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	4.6 Promote the creation of prototype networking, e.g. SMEs with distinguishing features or with interest in energy-saving.	● To make “Thailand Energy Awards” recognized by general target groups.	● Intensify the implementation via the “Thailand Energy Awards” project.

STRATEGY 5: ENVIRONMENTAL PROTECTION

Policy Directive	Strategy	Target/Outcome	Implementation Methodology
Encourage energy procurement and consumption which attach importance to the environment, with public participation, by setting relevant standards and promoting greater Clean Development Mechanism (CDM) projects to reduce social and environmental impact as well as greenhouse gas emission.	5.1 Monitor environmental impact caused by energy production, conversion and utilization.	● To set a target together with a plan to boost the management of greenhouse gas emission rate in the energy sector.	● Select pilot power plants and conduct a study on the reduction of GHG emission from: 1) one natural gas-fired thermal power plant; 2) one coal-fired thermal power plant; and 3) one combined cycle power plant, and, devise a plan to reduce GHG emission in the energy industry, e.g. determination of the baseline, together with a clear response plan.
	5.2 Promote the Clean Development Mechanism (CDM) in the energy sector to reduce greenhouse gas emission.	● To enable Thailand to submit energy projects for certification under the CDM, at a total of one million tons CO_2 per year. ● To enhance Thailand to be a leading country in exporting carbon credits in Asia.	● Promote wider use of flare gas, e.g. as a substitute for LPG in the production process of community products or as fuel in community-scale power generation. ● Manage to keep the level of flare gas at the minimum, or prepare the announcement on “Zero Flare” policy, particularly for on-shore petroleum sites. ● Promote study and research on the carbon capture and storage (CCS) technology to compress and store carbon dioxide underground.

Policy Directive	Strategy	Target/Outcome	Implementation Methodology
			● Conduct a feasibility study on CCS technology application in Thailand, together with the development of a pilot project for actual operation trial.
	5.3 Control and monitor the VOC emission standards from petrochemical and refining industries so as not to create environmental impact.	● To control the VOC emission of all factories to meet the standards. ● To create low cost "Appropriate Technology" innovations, which are environmentally friendly and easy for O&M, at least five innovations per year, with support from the Energy Conservation Promotion Fund.	● Expand the implementation of the policy on vapor recovery unit from currently four provinces to cover an addition of seven provinces in areas where a large number of oil reserve depots are located. ● Prepare for consultations with refineries regarding the enforcement schedule of the EURO 4 standards.