

# Green Energy in Thailand under the Current Economic

*This paper is presented by Asst Prof Dr Pathomthat Chiradeja of Thai Electrical & Mechanical Contractors Association at the AFEEC/FAPECA Conference & Meetings 2009 held on 15th July 2009.*

## Introduction

In 2007 Thailand's total commercial primary energy consumption was 80,019 thousand tons of crude oil equivalence (ktoe) while peak generation of the electric power system was recorded at 22,586 MW. The energy consumption in Thailand is being heavily dependent on imported energy in terms of oil, coal, and natural gas from foreign countries. As a result, Thailand has set a policy to encourage the use of renewable energy as well as the use of combined heat and power (CHP), distributed generation (DG), and biofuels.

In fact, Thailand has a large amount of raw agriculture materials for the production of ethanol and biodiesel. In addition, Thailand also has a potential for generation electrical energy by using green energy including biomass, biogas, municipality solid waste (MSW), wind energy, and solar energy.

Actually, Thailand issued a Renewable Portfolio Standard (RPS). According to a resolution of the first workshop on Energy Strategies, held on 28 August 2003, the policy of power generation from renewable energy so called "Renewable Portfolio Standard: RPS", was set with the proportion of capacity of not less than 5 percent of the total new capacity consumed fossil fuel (gas, fuel oil, coal).

For the power development plan (PDP) 2004, RPS 27 proportion had already been included. The included RPS proportion, according to governmental policy, is just only the Electricity Generating Authority of Thailand (EGAT) RPS power plants constructed in 2008-2010 totaling 140.7 MW in capacity. Later on 20 November 2006, by the Committee on Energy Policy Administration (CEPA) meeting and subsequently on 4 December 2006, by the NEPC meeting, the resolution on the EGAT investment on RPS projects of 81.7 MW was passed. Incidentally, for the rest of 140.7 MW, it would be purchased from Small Power Producers (SPPs) and Very Small Power Producers (VSPPs) (private companies). The details are as follows:

Projects by EGAT: the total capacity is 81.7 MW, including:

- Small hydro power plants 78.7 MW
- Solar energy (Solar cell) 1 MW
- Wind energy 2 MW

Power Purchased from Private Companies: the total capacity is 59 MW, including:

- Solar energy 1 MW
- Wind energy 2 MW
- Biomass power plants 36 MW
- Municipal waste power plants 20 MW

## Alternative Energy Potential in Thailand

Thai government has recently set forth a sustainable and rational energy plan that will address the kingdom's short and long term supply and demand issues, and which secures Thailand's future energy sufficiency. Capitalizing on its massive agricultural base, alternative energy such as biofuels will play an increasingly important role in strengthening Thailand's domestic energy supplies. Together with an advanced solar energy sector and commitment to exploring the range of cost-effective alternative energy sources, the future for the alternative energy sector in Thailand has never been brighter.

## Biomass

Produced from byproducts of rice, sugar, palm oil, and wood production, this alternative energy source has the greatest potential in Thailand given the kingdom's massive agricultural base. The Thai government has been promoting supporting infrastructure for this energy source for years. Under the National Biotechnology Policy, a collaborative effort between multiple government agencies, promotional packages and tax incentives are offered to promote research and development in biotechnology and its applications, particularly those which use agricultural outputs and byproducts for alternative energy production.

### Thailand's Major Agricultural Wastes

Agricultural Wastes	Tons/Year
Sugar Cane -Bagasse -Top and leaves	13,960,739 11,412,433
Tapioca -Tapioca Slurry -Tapioca Rhizome	1,331,520 101,771
Oil Palm -Fiber -Shell -Bunches	12,887 16,347 237,285
Rice -Husk -Rice Straw	2,307,984 24,692,013

Source: Ministry of Energy.

### Biomass Power Plant Projects

Type	Number of Projects	Installed Capacity (MW)	Grid Connected (MW)
Bagasse	22	536.2	169.3
Rice Husk	6	85.9	54.0
Rice Husk & Wood	3	60.8	35.2
Rice Husk, Bagasse, & Waste Wood	4	108.8	62.2
Bark, Waste Wood, & Black Liquor	1	87.2	50.0
Black Liquor	1	32.9	25.0
MSW	1	2.5	1.0
<b>Total</b>	<b>38</b>	<b>914.3</b>	<b>396.7</b>

Source: Ministry of Energy.

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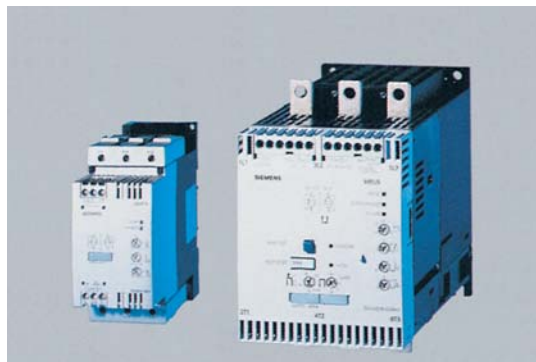
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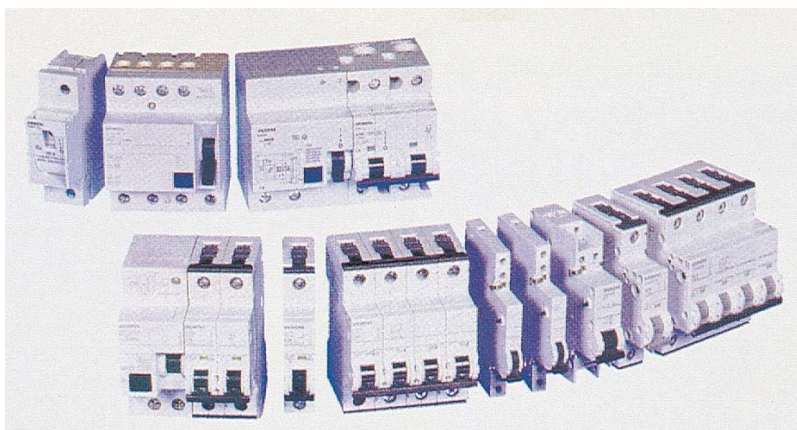
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**Biogas**

Produced from various agricultural and industrial manufacturing processes, and from organic municipal solid waste, this energy source offers incredible opportunities to small-scale producers. Tapioca and palm oil, both exported in great quantity from Thailand, use production processes whose wastewater byproducts can be used to produce biogas.

**Wind Power**

The EGAT has been using wind energy to generate power off the coast of Phuket since 1990. With technological advances in turbine size and efficiency, wind power generation is now commercially viable in areas with wind speeds as low as 4-5 meters per second.

**Solar Energy**

Solar panel use is expanding by 3,000-3,500 square meters per year, and domestic demand has nowhere to go but up to meet the country's need for renewable energy. Currently, much of Thailand's solar-panels are made for export, but private firms are now beginning to market solar roofing and smaller-scale systems for residential and commercial use in the domestic market.

Thailand continues to make significant strides in solar generated electric capacity, which was around 30 MW in 2006. Solar energy development not only offers great potential for filling a domestic energy demand, particularly in remote rural and mountainous regions, but also as a new export product in solar modules. In fact, the BOI is currently awarding and considering investment promotion for several companies involved in the manufacture of solar cell modules, with a collective value of US\$187.79 million.

**Biodiesel**

The government has a target of 4.25 million litres/day of biodiesel, for a 7% consumption substitute of diesel by the year 2011. Palm oil, one of the most readily available inputs for biodiesel production can be found in abundant quantities in Thailand. Its cultivation can produce 5,800 liters of the fuel per hectare (US 580 gallons/acre), making agricultural cultivation of biodiesel incredibly efficient. And, the government is promoting palm oil cultivation to reach 400,000 hectares by 2012. Bio-petrol blends with as little as 2% biodiesel (B2) have been shown to improve engine parts lubrication. Proven biodegradability, flexibility in use, and lower cost should ensure biodiesel growth for years to come.

**Ethanol**

Higher demand and lower supplies equal great investment opportunities. Demand for ethanol will be 3 million litres per day in 2011, for use in making octane 95 gasohol, although Thailand's existing ethanol plants currently are able to produce 825,000 liters/day. Yet another alternative fuel that can be supported by Thailand's strong and vibrant agricultural base, ethanol production uses cassava/tapioca and sugar cane/ molasses as raw inputs. Thailand just happens to be the number one cassava exporter and the number two sugar exporter in the world, with its tapioca export value jumping 27% last year.

**Potential of Green Energy of Thailand**

Based on the data collected and analysed by various agencies, it is found that the potential of power generation using renewable energy is around 2,160 – 2,410 MW, excluding the potential from solar energy and wind energy. It is quite difficult to estimate the potential of power generation from solar and wind energy since it involves several factors such as wind speed, insolation, and site location.

The potential of power generation using biomass is about 1,400 MW. This is estimated from the production quantity and the needs of other industries. However, currently, the price of biomass is surging due to the higher demand in using biomass for power generations and

industries resulting in reducing competitiveness as compared to fossil energy.

The potential of power generation from biogas is estimated at 250 MW, based on the potential of wastewater from livestock farms and industries. Livestock farms with biogas production potential are mostly those raising beef cattle, pigs and chicken. The agriculture industries with high biogas production potential include sugar, palm oil, tapioca starch, paper, and monosodium glutamate industries.

The potential of power generation from municipality solid waste (MSW) is about 100 MW based on the estimation of MSW management potential using various technologies. The MSW amount at a potential site should be more than 50 tons per day.

The average annual wind speed in Thailand is less than 6 meters per second at an altitude of 65 meters, which is not considered to be a high potential source to produce electrical energy. The wind energy potential will be high during June through August and potential areas are located in southern part of Thailand.

The average annual solar radiation nationwide is about 18.2 MJ/m<sup>2</sup>/day and the peak solar energy occurs between April and May. Most of the potential areas are in the northeastern region, where the average annual solar radiation is 20-24 MJ/m<sup>2</sup>/day. However, the estimated potential is delivered without consideration of the land usage constraints. Thus, it is quite difficult to get the actual potential of solar energy.

**Promote Alternative Energy Suitable for Thailand**

In order to diversify fuel types and reduce dependency on energy import, Thailand is promoting alternative energy such as:

- Promote the use of natural gas for vehicles (NGV), gasohol and biodiesel instead of oil in the transport sector, in proportion to the alternative energy development potential of the country.
- Support the purchase of power generated from renewable energy, such as agricultural residue, industrial wastes, biogas, garbage, wind and solar energy, in a suitable proportion and with appropriate purchasing prices by speeding up the announcement on the increase of purchasing capacity from VSPPs and the establishment of purchasing price 'adders' from the prices specified in the Regulations as shown in Table 1.
- Establish a public organisation to carry out the promotion of renewable energy utilisation in the communities to bring about tangible and sustainable outcome as its implementation would be flexible and efficient.
- Support the policy study, research and development on alternative energy so as to determine practical guidelines on alternative energy development of the country.
- Disseminate information about alternative fuels to the general public so that they would recognise and have confidence in the use of such fuels as NGV, gasohol and biodiesel, and carry out public relations work to create knowledge and understanding of the necessity to promote and develop other fuel options, eg coal, and etc.

*Adder for Renewable Energy*

Technology	Adder (Baht/kWh)	Adder (USD/kWh)
Biomass*	0.30	0.009
Biogas*	0.30	0.009
Municipality Solid Waste*	2.50	0.074
Wind**	3.50	0.103
Solar**	8.00	0.235

Note: \* Duration of Financial Assistance: 7 Years  
 \*\* Duration of Financial Assistance: 10 Years  
 Exchange Rate: 34 Baht/USD

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## Target of Power Generation from Renewable Energy\* by 2011

Technology	Power (MW)
Biomass	2,800
Biogas	60
Municipality Solid Waste	100
Wind	115
Solar	45
<b>Total</b>	<b>3,120</b>
Peak Demand	28,000
Percentage Share	11.14%

Note: \*Include Existing

## Economic Current Condition

Bank of Thailand (BOT) issued the report on economic condition in April 2009 by stated that the economy still contracted from the same period last year. Nevertheless, when seasonally adjusted, improving signs were observed in the month-on-month expansions of manufacturing production, exports and imports, as well as Private Consumption Index, despite their contractions when compared to the same period last year. Details of the economic conditions in April 2009 are as follows:

**Manufacturing Production Index** fell 9.7 per cent year-on-year (yoy), contracting at a steadily slower rate and, when seasonally adjusted, expanded 7.6 per cent from the previous month. Improvements were observed in most categories especially export-oriented productions – in particular, electronics and electrical appliances – following a pick up in export orders. Correspondingly, the seasonally-adjusted capacity utilisation rate was at 59.7 per cent, increasing from 58.5 per cent in the previous month.

- **Private Consumption Index** (PCI) shrank 5.3 per cent (yoy), but expanded 0.7 per cent as compared to the previous month.
- **Private Investment Index** (PII) contracted 16.4 per cent (yoy), a rate close to that of the previous month.
- **Export value** shrank 25.2 per cent (yoy) to 10,279 million US dollars, mainly following export volume. The export contraction was across the board, particularly in the high-technology category such as vehicles, computers, and electrical appliances. Nonetheless, when seasonally adjusted, export volume increased 2.6 per cent from the previous month.
- **Import value** also contracted across the board by 36.4 per cent (yoy) to 9,660 million US dollars. When seasonally adjusted, import volume also increased 5.0 per cent from the previous month. Consequently, the trade balance recorded a surplus of 619 million US dollars.
- **Inflation** continued to contract at 0.9 per cent (yoy) in line with low energy prices compared to the same period last year, whereas raw food prices increased at a slower pace. With the high base effect

in prepared food prices, together with the lowered subsidy on water supply fees in some provinces, core inflation decelerated from the previous month to 1.0 per cent (yoy). The Producer Price Index (PPI) continued to contract by 3.0 per cent (yoy), corresponding to the declining prices of mining and manufactured products.

## Alternative Energy under the Current Economics

Although the current economy of Thailand is still under turbulence, several indicators show the improving conditions. As a result, the renewable energy projects are under consideration. Thai government's financial incentives through soft loans and investment subsidies were expanded in amount and coverage for selected types of renewable energy projects, in particular biogas in pig farms and factories producing tapioca starch, palm oil, rubber sheet, ethanol and other types of agro-industry, municipal wastes, and micro-hydro. Some of these are not SPPs or VSPPs, but simply produce energy for their own use or off-grid village-based projects in remote areas.

In addition a larger budget has been made available for the provision of technical assistance to the private sector as well as funding for pilot projects for new or unfamiliar technology.

The Export-Import Bank of Thailand plans to invest \$3.2 million in the MFC Asset Management new energy fund, focused on renewable energy production. The MFC Energy Fund is an open-ended, 10-year fund with \$128 million raised from 11 financial institutions. The Fund is investing in solar, biodiesel, biomass and ethanol projects, and could be expanded to more than \$500 million.

## Summary

The energy consumption in Thailand is heavily dependent on imported energy from abroad especially oil. In order to increase the sustainable for energy in Thailand, Thailand is forced to seeking for alternative energy. Since Thailand has a large agriculture sector, Thai government issued energy policy to encourage the use of biomass, biogas, and biofuel. In addition, Thailand also has potential on alternative energy including municipality solid waste, wind energy and solar energy.

In order to diversify fuel types and reduce dependency on energy import, several policies have been issued including the establishment of purchasing price 'adders' for supporting the purchase of power generated from renewable energy.

Although, the current economic condition is currently contracting, it is predicted that the economy will improve by next year. Consequently, some selected renewable energy projects are under serious consideration with the financial assistance from Thai government.

*Asst Prof Dr Pathomthat Chiradeja is the Secretary General of the Asean Federation of Electrical Engineering Contractors (AFEEC). He is also an Adviser to the Thai Electrical & Mechanical Contractors Association (TEMCA). He can be contacted at [temcathai@yahoo.com](mailto:temcathai@yahoo.com)*



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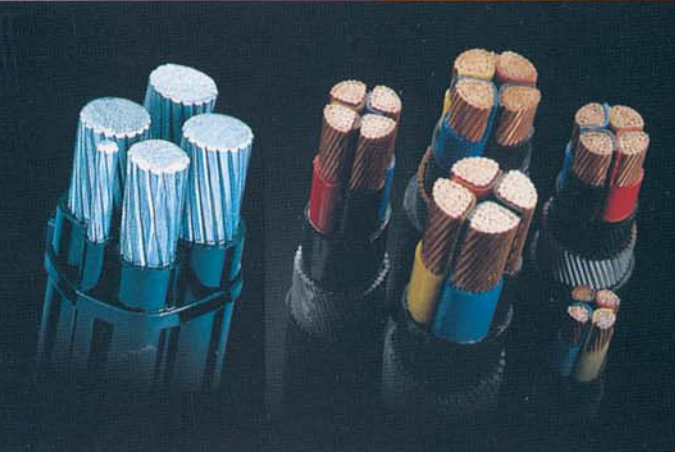
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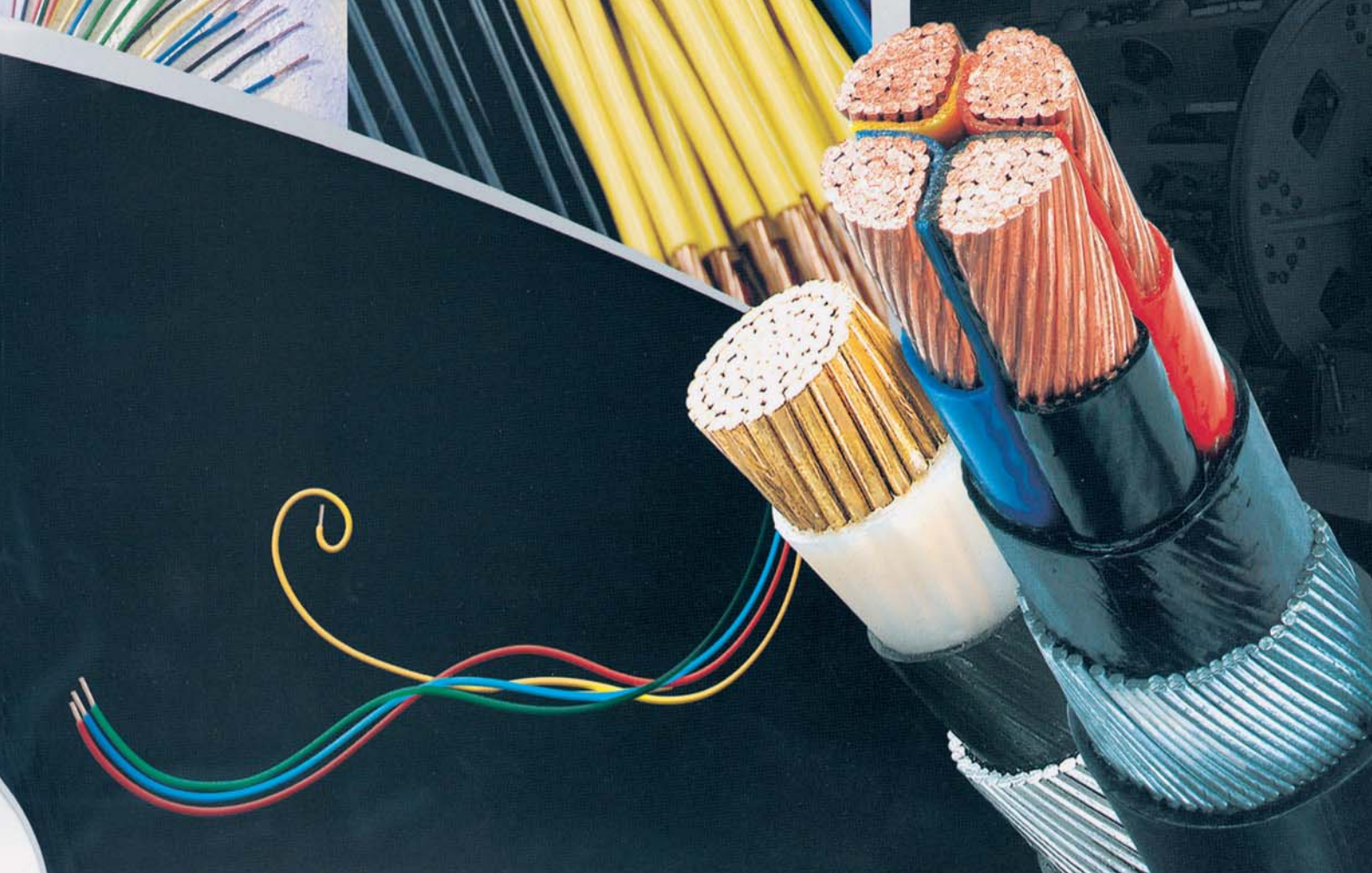
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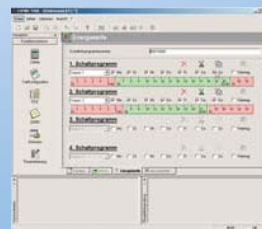
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# Renewable Energy Development of Indonesia

This paper is presented by Mr Moeljadi Oetji of Association of Indonesian Electrical & Mechanical Contractors at the AFEEC/FAPECA Conference & Meetings 2009 held on 15th July 2009.

## Preface

As we all know, likewise in Indonesia, any nations count on coal, oil and natural gas to supply most of their energy needs, but reliance on fossil fuels presents a big problem. Fossil fuels are a finite resource. Eventually, the world will run out of fossil fuels, or it will become too expensive to retrieve those that remain. Fossil fuels also causes air, water and soil pollution, and produce greenhouse gases that contribute to global warming. Renewable energy resources, such as wind, solar and hydropower, offer clean alternatives to fossil fuels. They produce little or no pollution or greenhouse gases, and they will never run out.

We have to develop and exploit alternatives sources of energy, especially those that are friendly to the environment. This includes an array of bio-fuels, hydrogen cars, clean coal, solar energy, and nuclear energy.

We have to change. It's about the values, about mindset, about the behavior, how to develop a culture, a lifestyle that can use energy wisely and efficiently.

These alternatives take time to develop. They require long gestation period before they can be ready to take over from fossil-based fuels. The situation calls for action, now. Let's develop more green energy!

In Indonesia, where the estimated annual growth rate of electricity demand is between 8 – 10 %, the country would require over 27,000 MW of aggregate capacity by the year 2010 for Java & Bali only, while the rest of the archipelago require 9,000 MW. The energy consumption still mainly depends on conventional energy resources such as gas, coal and oil. On the other hand it is widely known that the national oil resources are depleting.

Fortunately, Indonesia has abundant renewable energy resources, which provide alternatives to the use of the fossil based energies. However, only a very little portion of these alternatives have been utilised. It is estimated that the renewable energy potential in the country is more than 236,000 MW, ranging from solar, wind, hydro, and biomass to geothermal energies. In terms of geothermal resources, the Indonesian archipelago lies in a ring of volcanic chains, and therefore endowed with high potential of geothermal energy. Indonesia islands are scattered in the equatorial zone, giving another benefit of having long hours of sunlight for the whole year.

Huge number of people are without energy access to meet their basic needs, with 35 million people lack of clean and safe cooking fuels and must depend on traditional biomass sources and have no electricity for lighting. For electricity provision, Indonesian government set 10,000 MW electricity development program using coal resources (coal fired power plant). The second stage 10,000 MW acceleration program has been set, and 70 % it will use renewable energy resources mainly geothermal.

## National Issue on Energy

### Social aspects:

- Limited energy infrastructure
- Low energy consumption per capita compared to other countries
- Low electrification ratio (64 %)
- Electricity crisis in several areas, particularly outside the Java-Madura-Bali system

### Economical aspects:

- High energy growth and intensity.
- Imbalance between supply and demand of energy.
- High independency on oil products with fluctuate price.
- Energy price does not reflect its economic production price.
- Limited oil reserves.
- High potential of alternative energy reserves, particularly new and renewable energy, while its utilisation is still low.
- Limited investment for energy sector development, while its business climate is less conducive for local and international investor.

### Environmental Aspects:

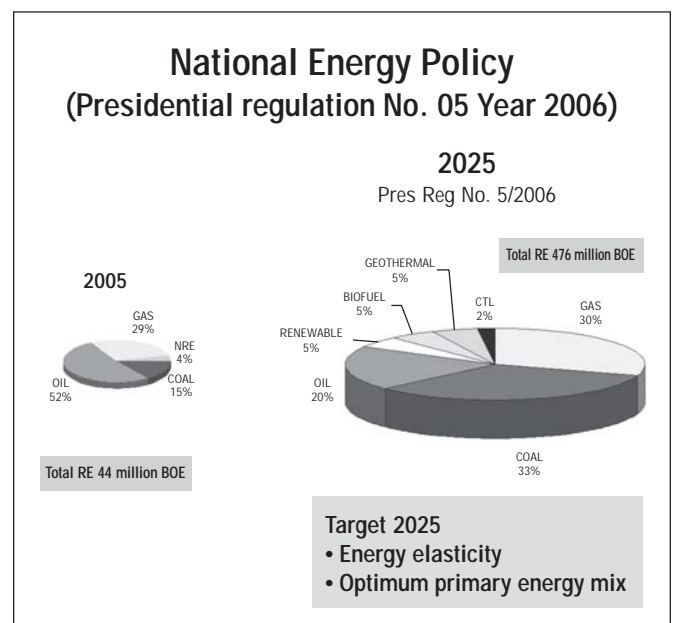
- Environmental problems caused by utilisation of fossil fuel

### Renewable Energy Potential and Installed Capacity

Type of Energy	Potential	Installed Capacity
Hydro	75.67 GW	4200 MW
Geothermal	27 GW	1062 MW
Mini/Micro Hydro	712 MW	86.1 MW
Biomass	49.81 GW	446 MW
Solar	4.8 kWh/m <sup>2</sup> /day	12.1 MW
Wind	3 – 6 m/sec	1.1 MW

### Energy Conservation Potential

Sector	Total Consumption (Thousand BOE)	Energy Conservation Potential	
		(Thousand BOE)	(%)
Industry	300.613	45.092 – 90.194	15 – 30
Transportation	179.136	44.784	25
Household & Commercial	346.473	34.647 – 103.402	10 - 30





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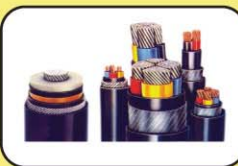
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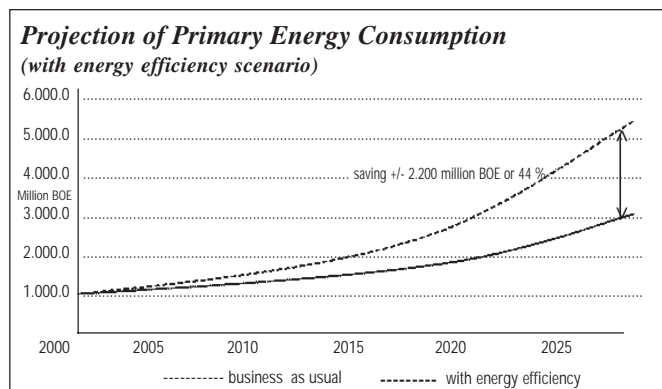
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..... Continue Renewable Energy Development in Indonesia

## New and Renewable Energy Development Plan (Based on Blueprint National Energy Management 2006 – 2025)

Type of Energy	Unit	2010	2015	2020	2025
Bio diesel	Kilo liter	2.410.000	4.250.000	7.230.000	10.220.000
Bio ethanol	Kilo liter	1.480.000	2.780.000	4.530.000	6.280.000
Bio oil	Kilo liter	1.040.000	2.540.000	3.305.000	4.070.000
Bio mass/waste	MW	30	60	120	200
Geothermal	MW	1.320	4.340	5.090	5.270
Wind	MW	10	40	80	160
Solar	MW	80	100	120	580
Micro Hydro	MW	450	740	950	950
Liquified Coal	Million BOE	-	14	46	69
Nuclear	Million BOE	-	-	27	48

BOE = Barrel Oil Equivalent



## New and Renewable Energy Development Programme

### Non Commercial-based

- Carried out by the Government through Rural Electrification Program and Energy Self-Sufficient Village (SSEV)

### Commercial-based (business as usual)

- Private entities are expected to play a major role in its development.
- Government will support the pilot projects, such as Solar Photovoltaic for Urban Area.

## Non Commercial-Based New and Renewable Energy Development

### Rural Electrification Program

- Replacing diesel power plant (PP) by using local energy source: micro hydro, solar PV, wind, biomass (stand alone/or hybrid system).
- Government and regional government provide the budget for rural electrification and the rural consumers are obliged to pay monthly payment depends on local conditions.
- Establishing local institution in operation and maintenance of the asset.
- Developing of isolated system in remote areas with the utilization of local energy resources, such as micro hydro, wind, solar PV, etc, through stand alone or hybrid system.
- Target to be achieved in 2025, for rural electrification reach 95 %.

### Renewable energy utilisation for rural electrification program (2005 – 2009)

Type	Year				
	2005	2006	2007	2008	2009
Wind Energy PP	80kW (1 unit)	240 kW (3 unit)	735 kW (9 unit)	200 kW (2 unit)	600 kW (6 unit)
Solar Energy					
a. Solar Home System(SHS)	119.5 kWp (2.390 unit)	1.574 kWp (31.488 unit)	2.029 kWp (40.598 unit)	1.865 kWp (37.279 unit)	3.871 kWp (77.433 unit)
b. Centralised Solar PP	18 kWp (5 unit)	-	102.4 kWp (5 unit)	150 kWp (9 unit)	-
Hydro					
a. Micro hydro	155 kW (4 unit)	702 kW (12 unit)	1.169 kW (7unit)	935 kW (7 unit)	2.781 kW (51 unit)
b. Pico hydro	50 kW (25 unit)	30 kW (15 UNIT)	45 kW (18 UNIT)	-	-

### Energy Self - Sufficient Village (ESSV)

- ESSV is a village having capability to produce a part/whole their energy demand for consumptive and productive use.
- Criteria
  - Utilisation of locally available energy (renewable energy)
  - Creation of productive activities
  - Job creation
- Program
  - Utilisation of locally available energy resources
  - Development of productive activities
  - Development of applicable technologies
  - Development of institution and people participatory

### Target ESSV (cummulative)

Program	2007	2008	2009
Biofuel-based ESSV	100	500	1000
Non-biofuel-based ESSV	100	500	1000

ESSV implementation up to 2008 :

- Biofuel-based ESSV = 138
- Non biofuel-based ESSV = 286
- Total = 424

ESSV or DME: An Indonesian government program launched on 14th February 2007, targeted at remote villages, which are highly dependent on fossil-fuel, to be energy self-sustaining, using local primary resources such as jatropha, hydro, solar and wind, in which the government provides bio-fuel seed plants (jatropha, sugar cane, palm oil & cassava) and involves seven departments in the implementation (Mine & Energy, Agriculture, Employment & Transmigration, Home Affair, Development of Disadvantaged Regions, Government Enterprise, and Marine & Fisheries).

### Renewable Energy Power Generation Interconnection Program

Government will assist the interconnection of small and medium renewable energy power plant to PLN's (state owned electricity utility company) electricity grid. The electricity purchasing tariff from RE power is 80 % from PLN local production cost, if it is connected to medium voltage, 60 % for low voltage.

### Integrated Micro hydro Development

To increase the capacity in the development, utilisation and sustainability of existing micro hydro power plant. To prepare the mycro hydro expert in design and fabrication workshop and to prepare the institution in operation phase.

### Solar PV for Urban Area Program

The Minister of Energy and Mineral Resources, the Minister of Research and Technology and the Minister of Environment has launched the solar energy for urban area program in 2003. This program directed to promote electricity production from solar energy in urban area.

## Impact of Global Economic Crisis to Renewable Energy Development

Due to global economic crisis, economic activities will be slowed down:

- Demand of energy will decline.
- The energy will be more unaffordable, particularly for renewable energy.

It will create uncertainty for renewable energy and energy efficiency investment, particularly in a country such as Indonesia that is accustomed to cheap energy (getting subsidy).

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- Programming lock to prevent unwanted configuration changes.
- Input rating up to 480 Vac, 1 A or 5 A



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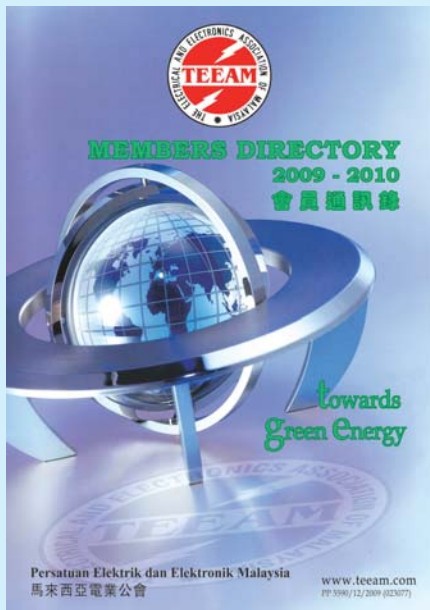


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- List of ACEM panel firms on M&E discipline
- Contacts of Embassies and High Commissions in Malaysia
- List of MATRADE Overseas Network

This directory can be purchased from the TEEAM Secretariat at RM 40 (member) / RM 50 (non-member) per copy. For enquiry, please contact the TEEAM Secretariat at:

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 Tee of Time : 7.30 am  
 Venue : Kelab Golf Sultan Abdul Aziz Shah (KGSAA) Selangor Darul Ehsan

Registration: Contact TEEAM Secretariat  
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 Fax : 603-9221 8212  
 E-mail : teeam@po.jaring.my / teeam@streamyx.com  
 Website : www.teeam.com

..... Continue Renewable Energy Development in Indonesia

### Incentives for Development of Renewable Energy for Electricity (commercial-based)

- Priority given for local renewable energy sources (tender not necessary)
- Mandatory to purchase electricity generated by renewable energy power plant
- Electricity price decision based on economic scale (ceiling price is given for electricity from renewable energy with maximum capacity up to 10 MW)
- Income tax incentive for new investment on renewable energy (currently valid for geothermal)
- Import duty exemption for renewable energy
- Simplified permit procedure for renewable energy
- Feasibility study for renewable energy conducted by the Government

### Incentives for Development of Biofuel

- Domestic market guarantee through ruling on mandatory in the utilisation of biofuel in stages.
- Value Added Tax (PPN) paid by the Government.
- Income tax incentive for new investment on biofuel industry.
- Subsidy for biofuel utilised in transportation sector.
- Bank interest subsidy on credit for development of plantation for biofuel.
- Simplified permit procedure.

*Mr Moeljadi Oetji is a Senior Adviser of the Association of Indonesian Electrical and Mechanical Contractors.*

*He can be reached at moetji@indo.net.id*



1) VRYTYCH EXPULSION PROOF LIGHTING

1) ZONE 1,22



PITBUL - N (IP 65)

2) ZONE 2,22

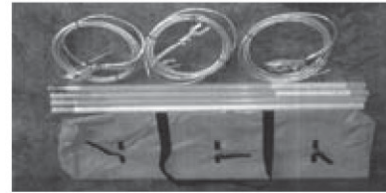


VIPET - N - 1 (IP 65)

2) HARDWARE FOR DISTRIBUTION & TRANSMISSION SYSTEM



3) EARTHING EQUIPMENT FOR 11KV UP TO 500KV

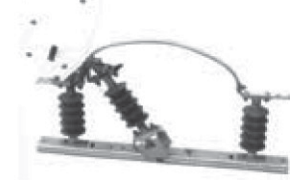


4) ISOLATORS FOR 11KV UP TO 275KV

A) DROP OUT FUSE



B) ISOLATING LINK 11/22/33KV



5) MAXLANE BIMETAL LUG, CABLE LUG, CRIMPING FERRULES APPROVED BY TNB



6) CABLE SPIKER UP TO 1500MM2



7) LIGHTNING ARRESTER, POLYMER & PORCELAIN INSULATOR FROM 450V UP TO 500KV

A) LIGHTNING ARRESTER (USA) B) POLYMER INSULATOR(USA) C) PORCELIN INSULATOR (AUSTRIA)

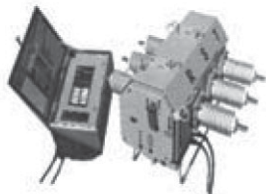


8) RMU, AUTORECLOSER, SF6 LBS, FEEDERHLLAR & FUSES

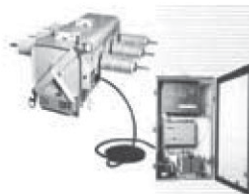
A) RMU (SPAIN)



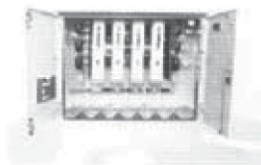
B) AUTORECLOSER(KOREA)



C) SF6 LOAD BREAK SWITCH



D) FEEDER PILLAR



E) FUSES (BUSSMAN)



9) INSULATED CONDUCTIVE BOOTS, GLOVE AND TOOLS, LADDER FROM 450V UP TO 500KV

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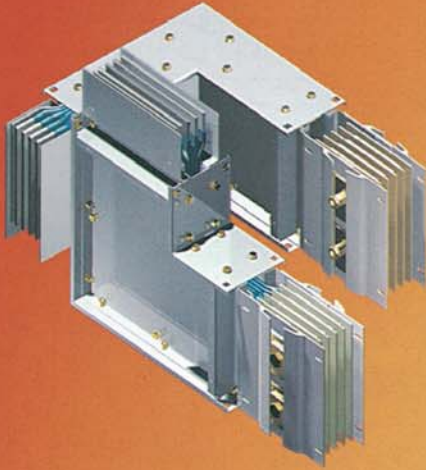
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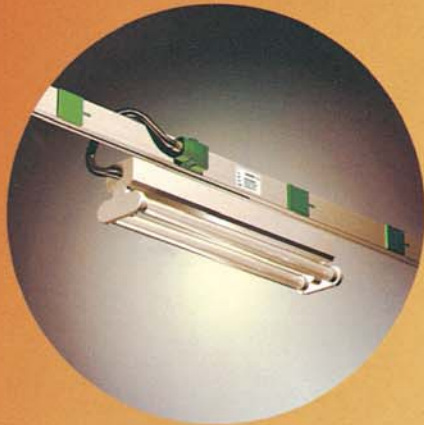
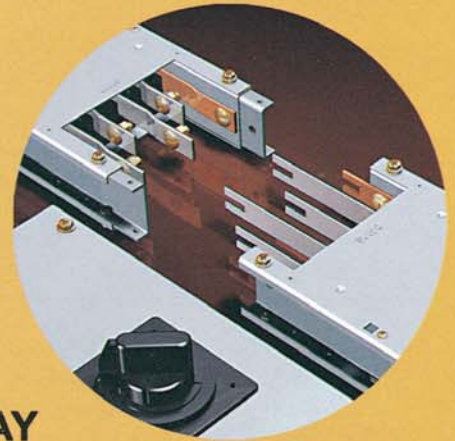
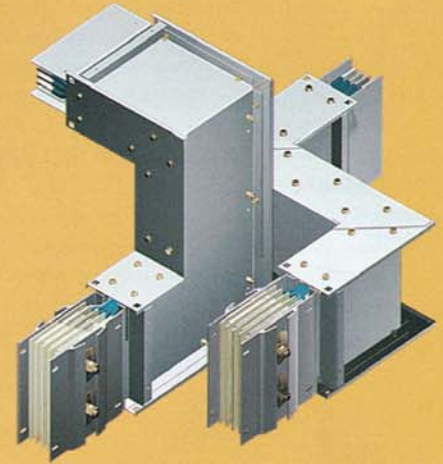


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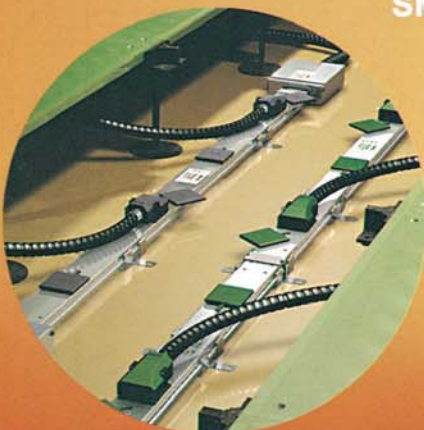
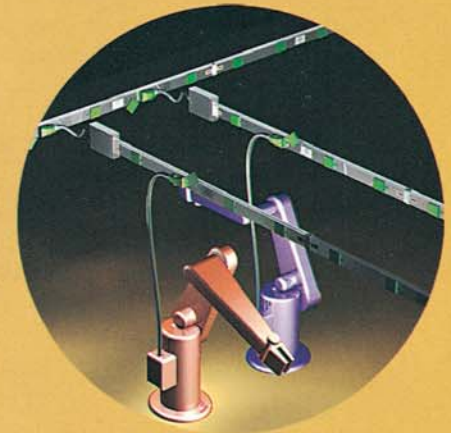


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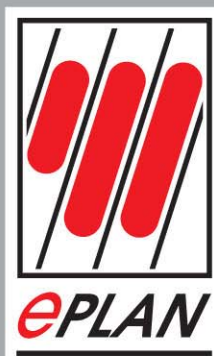
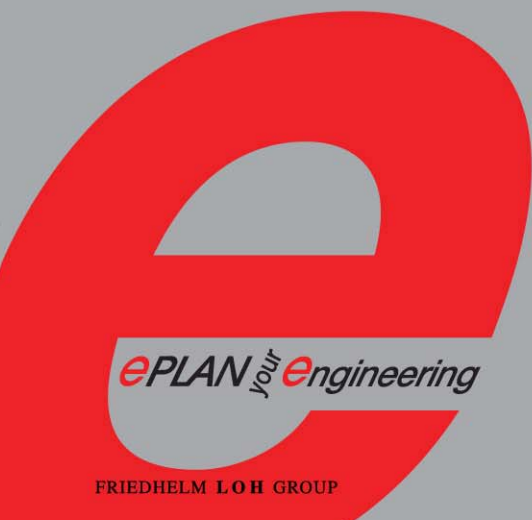
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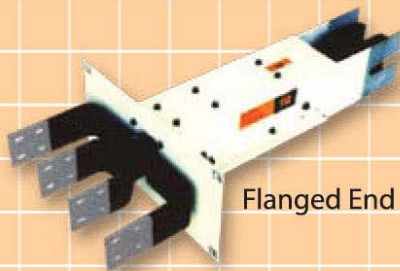
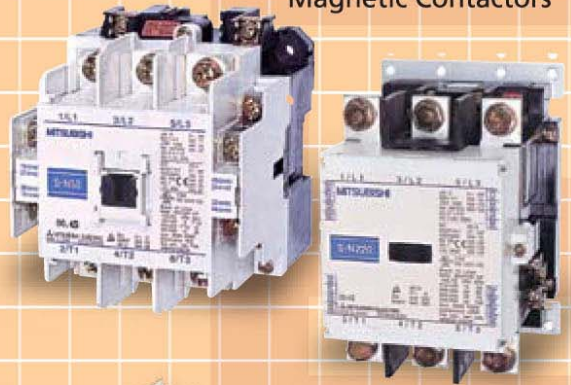
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# Popular Chinese Herbs and Tonic Products – Part 2

*This article is extracted with courtesy of “Health Discovery” magazine published by Life Publishers Berhad.*

## Ginseng

There are many types of ginseng in the market, with markedly different prices. The best are the wild ones from northern China and Korea, with shapes similar to that of human figure. Despite being a powerful tonic, it is not everybody's choice, especially those having a 'hot' constitution. It is therefore advisable to consult the medical practitioner before consuming it regularly.

Generally, it helps to strengthen the physique, stomach and mind. For those with anemia and breathing problem, the effect of ginseng is most significant.

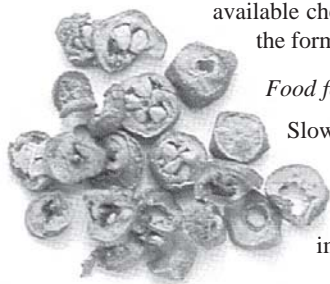
*Food for thought : Ginseng and black bone chicken soup*

Double boil ginseng and black bone chicken over moderate heat for four hours. Add salt and wine to taste. This highly tonic soup will surely give you the oomph!



## Hawthorn Fruit

This renowned fruit is rich in vitamin A, B and C, as well as organic acids. Beside curbing high blood pressure and strengthening the heart, it is also good for the digestive system. It is also available cheaply in the market in small rolls in the form of sweetened red colour flakes.



*Food for thought : Hawthorn meat soup*

Slow boil hawthorn, red dates and meat bone for two hours. Add salt to taste. A simple, but delicious soup to help control your blood pressure, beside improving your appetite.

## Peppermint

Also known as Brandy Mint, it contains menthol for which it is famous. It helps to soothen the digestive system and refresh the mind.

*Food for thought : Peppermint egg soup*

A dinner soup with a special flavour. Beat up several eggs and add peppermint leaves. Stir while frying the mixture, then add water to boil. Salt to taste. It helps to soothen the digestive system.

Peppermint can also be added onto any hot deep-fried delicacies, not only for decorative purposes, but as a cooling supplement.



## Ginseng Rootlets

The ginseng rootlets have completely different properties compared to the valuable main root. It is not a tonic, but a 'heat' eliminator. With good moisturising effect, it benefits the over-worked organs within the body, especially the liver and pancreas. Being relatively cheap, it is a common herb for general healthcare.



*Food for thought : Ginseng rootlet chicken legs*

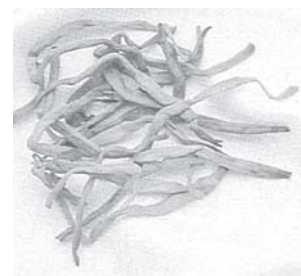
Soak Ginseng rootlets for one hour and steam them together with fresh chicken legs in soup stock on a deep plate for about an hour. Add oil, salt and soya sauce to taste. A sweet and bitter delicacy that is soothing to the throat and body.

## Dried Day Lily Flower (Jin Zhen)

Made from the flower bud of Day lily flower, this plant is found in temperate countries, and also tropical highlands such as our local Cameron and Genting Highlands. It is rich in minerals and vitamins, and is a highly nutritious food. It helps stop bleeding, relieve piles and constipation, and prevent insomnia.

*Food for thought : Steamed day lily with chicken/ear fungus*

Dried Day Lily must be soaked to soften it. But avoid keeping it in the water too long or its taste will be gone. Cut chicken into pieces, add in soaked day lily, ear fungus and mushroom. Add soy sauce and oyster sauce and oil to taste. Add some wine and steam until done. Serve while hot. A nutritious food which helps you to sleep better.

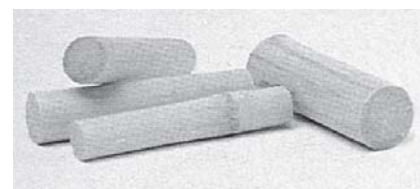


## Sugar Cane

This sugar cane is a different cultivar from that used for making sugar cane drink sold in the market. It is smaller and its colours range from pale green to purple. It helps moisturise the internal organs and improve urination. With a high sugar content, it can provide some good calories. However, its sweetness might cause irritation to the throat, and might not be good for those with throat problems, such as cough or bronchitis. Cold, it is a wonderful thirst quencher.

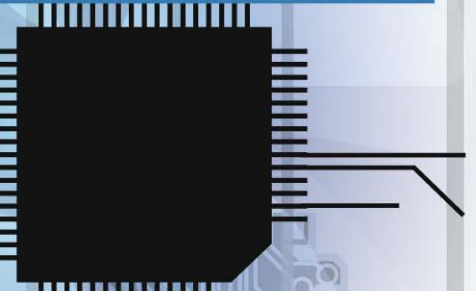
*Food for thought : Sugar cane drink*

Cut sugar cane into lengths of about 6 inches. Crush them with hammer. Boil in a lot of water for two hours. Add dried lalang roots and dried sweetened wax gourds to enhance the taste. A wonderful thirst quencher for the family.





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## Ginger

Besides being an important seasoning ingredient, ginger has been used for centuries for treating stomach ache, nausea, rheumatism and many other ailments. Its efficacy in removing gases in the digestive system is well known. Being cheap and effective, it is a pity that its use is never that popular.

*Food for thought : Ginger drink*

Boil crushed ginger or slices of ginger for several minutes to bring out its taste. Add rock sugar to taste. A wonderful drink to eliminate the unwanted gas in the stomach, and a perfect drink to warm up a cold body.



## He Shou Wu

The Chinese name of this herb speaks for itself – it is meant to blacken the hair. Like many other Chinese herbs, it can be a culinary ingredient, or used as a herb, whose main functions are improving the bowel movement, cleaning the digestive channel, strengthen the liver and kidneys. Recent research shows that it can also help normalise blood pressure by reducing the cholesterol level.

*Food for thought : He shou wu and black sesame broth*

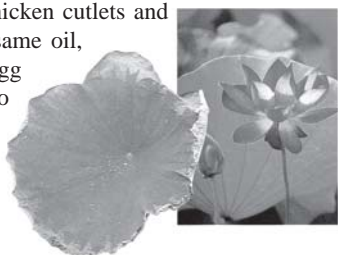
These two ingredients are known to nourish the hair, making it dark and shiny. First boil He Shou Wu for one hour. Remove the residue. Fried black sesame until fragrant (without using oil) and pour in He Shou Wu concentrate. Add more water and slow boil for half an hour. Add rock sugar and corn starch to thicken the mixture. Consume while warm.



## Lotus Leaves

Lotus is a common plant but it is rarely used for medication. In Malaysia, the leaves are sometimes used as food wrappers. Its dried form is available in Chinese medical shops, and it is used as a heat quencher and diuretic. It also strengthens the digestive system, moisturises the organs and stops vomiting and diarrhea.

*Food for thought : Marinated chicken cutlets and lean meat with oyster sauce, sesame oil, white pepper powder, sugar and egg white for one hour. Divide into several portions and wrapped in lotus leaves. Steam for 20 – 30 minutes. A mouth-watering delicacy which helps to suppress your internal heatiness.*



## Hua Jiao

Commonly known as Chinese Prickly Ash, it is a pepper-like spicy herb which is rich in Fagarine and Xanthoxin, two vital ingredients which strengthen the stomach and digestive system. Its other benefits include getting rid of worms in the intestines, improve urination, reducing joint pains, etc.

*Food for thought : Hua jiao stomach soup*

Clean stomach (preferably pig) thoroughly to remove the stench (quite a tedious process, ask the meat sellers for advice). Cut it into slices and slow boil with Hua Jiao and several whole garlic for three hours. Salt to taste.



## Hui Xiang (Fennel or aniseed)

Originated from the Mediterranean, it is now cultivated worldwide and used extensively in food preparation. This herb helps warm up the body, especially when the weather is cold. It also removes gases from the stomach, improves appetite and prevents flu.



*Food for thought : Fried fennel prawn*

Remove shells of medium size prawns, except the tails. Dip in a paste prepared from fennel, wine, ginger juice, flour and eggs, and fried over low heat. Savour with lettuce or other vegetable salads.

## Shou Di

This herb is the processed version of Shen Di, with a varied herbal and culinary property. Rich in iron and other ingredients, it is beneficial to the nervous system, anaemia and irregular menstrual discharge.

*Food for thought : Fried shou di and meat*



This sweetened herb can be made into a dish, by frying it with meat shreds, carrots, onion and ginger. Add sauce and other taste enhancers to your liking. It benefits the blood and general body well-being.

## White Pepper

Originate from India, this plant is now widely grown in China and Southeast Asia. There are two types of pepper, the white type, and the black type made from the former.

The white pepper is milder and more fragrant than the black one. It stimulates the stomach and improve the appetite.

*Food for thought : White pepper chicken soup*

Slow boil crushed white pepper (sealed in a cloth bag) and whole chicken for three hours. Add red dates to enhance the taste. Effective in getting rid of excessive gas in the body, and 'warms' up the stomach (a 'cold' stomach tends to get sick easily).

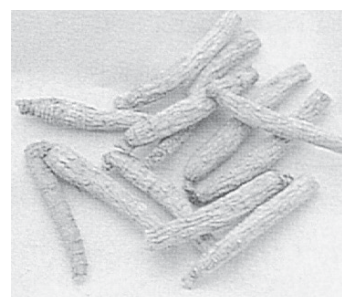


## American Ginseng

It is so-named as most of them are cultivated in America and Canada. This popular mild tonic herb is an excellent herb for getting rid of the heat in the body, and has proven to be a wonderful product for general healthcare, if consumed regularly.

*Food for thought : American ginseng chicken soup*

Boiled a whole chicken (skin removed) for two hours. Remove the meat and add in slices of American Ginseng. Double boil the mixture for more than an hour. An excellent chicken essence for the whole family.



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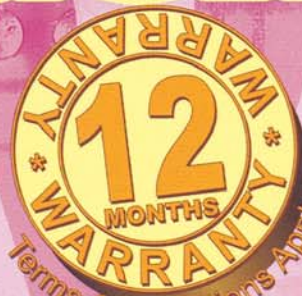
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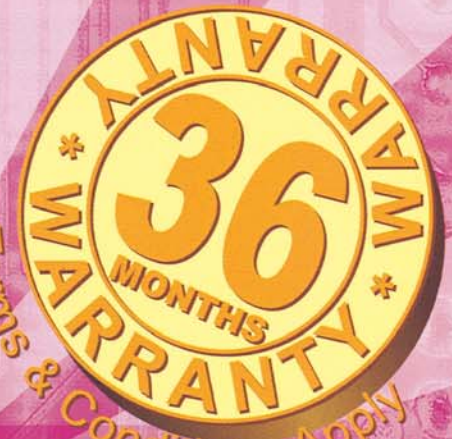
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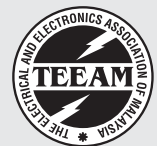
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The programme is organised by TEEAM in collaboration with the Association for Overseas Technical Scholarship (AOTS), Japan. AOTS Japan is a semi-government agency that promotes human resource development in developing countries. AOTS subsidised the course fees and travel expenses as well as providing meals and accommodation during the training period.

**Objectives**

The training programme aimed to share current practices of environment management in Japan's factories/buildings; to educate trainees on efficient use of energy; how to improve efficiency; to identify the renewal energy available; and to promote renewal energy usage.

**Content**

- Environment management of Japanese companies
- Steps to promote energy efficiency
- Techniques for energy efficiency at production site
- New types of energy (solar)
- Roles of managers in promoting energy efficiency
- Presentation by each participant on energy management plan at their respective company

- Opportunity to visit Japanese factories to obtain first hand information on their environmental management and energy efficiency activities.

**Training Expenses**

The expenses to be borne by each participant is approximately RM 6,500.00 which includes air ticket, course fees, accommodation and meals. Participants may apply to HRDF for subsidy for those who qualify.

**How to Apply**

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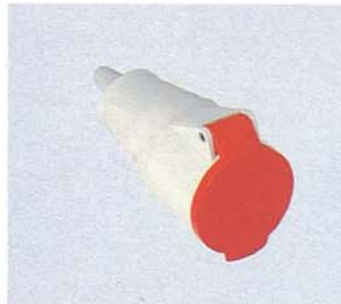
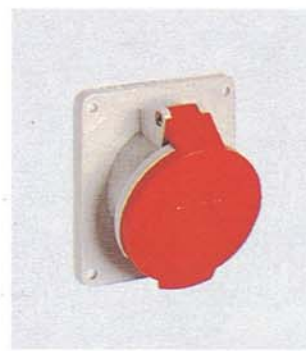
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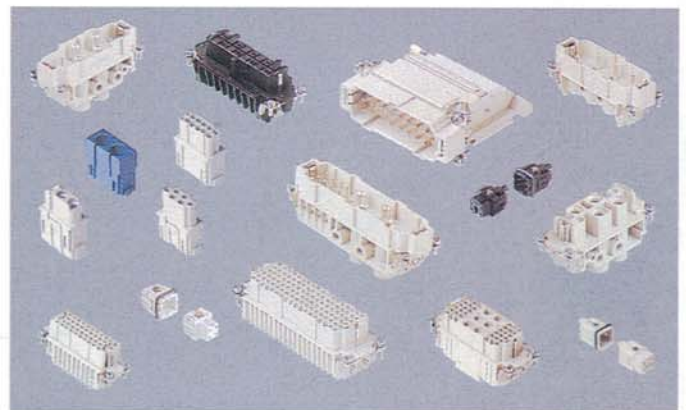




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