

Energy Security

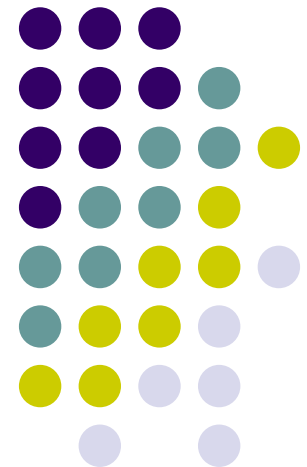
The challenges for Indonesia and opportunities for regional cooperation

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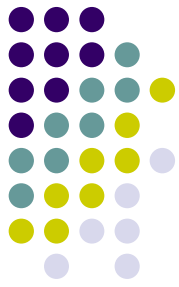
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Energy for Sustainable Development



- History has demonstrated that economic development to **combat poverty** & improve **standards of living** depends on the reliable and affordable delivery of sufficient amount of energy
- A global need for **much more energy** if people in the developing countries are **to improve their standards of living**. A large part for this increase will be **electricity**
- The growth in demand for primary energy in East Asia to 2010 is likely to be 5% per year and that for electricity 7-8% per year
- In China, power generation requirements are expected to be almost double from 1994-2010 which much of this being nuclear*

Source: T Mukaiyama JIAF JLO, BAPETEN WORKSHOP

Food for thought-Economic Epoch in Energy History



History seem to occurred at the time when society starts to use high grade energy resource:

- Switch from hunting to farming, which created the great ancient civilizations of Egypt and Mesopotamia
- England switch from wood to coal in the 18th Century which resulted industrial revolution
- US switch from coal to oil in the 20th Century , which created modern mobility identified as 2nd industrial revolution
- All of these were **change to higher grade of resources**
- **Now, Was it the time to change from fossil fuel to:**
 - Biomass?
 - Nuclear?
 - Other Renewable Energy?



Primary Energy

- Indonesia rely more on fossil fuel as its major source energy; 54% fuel oil, 26.5% gas and 14% coal
- Other source Geo-thermal, Hydro Power on limited capacity although Indonesia has potential resources of Geothermal equivalent to 27,000 MW (eq. 11 B barrel) and hydro equivalent to 76,000 MW

Renewable energy

- Wind; generating capacity of wind energy still limited
- Tide & Wave still unexplored
- Solar are not in commercial application. Price of solar cell must continue to fall in order to compete with coal.
 - Solar primarily installed in rural and remote area to provide off grid network
- Bio fuel



Demand for Primary Energy

- To fuel economic activities:
 - Premium 17 mio kl
 - Kerosene 9.9 mio kl
 - Diesel 11 mio kl
 - Total Government subsidies 37.9 mio kl
- To fuel secondary energy:
 - Oil 6.17 mio kl
 - Gas 491 bcf
 - Coal 29.13 mio ton
- Total GOI subsidy closed to US\$ 10 Bio in year 2007

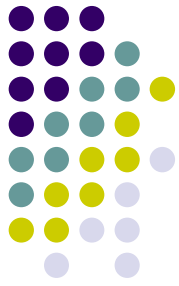
Source: Indonesian Government Budget and RUPTL PLN 2006-2015

Secondary Energy



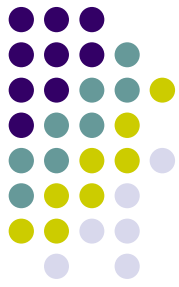
- Electricity as key economic driver highly dependent on:
 - Source of its primary energy
 - Load factor
- Load composition:
 - Base Load-low ramping rate: Coal PP, Geo thermal PP, Hydro PP “run off river”
 - Mid or in line with the load, higher ramping rate: Gas PP, Diesel PP, Oil PP , Hydro PP
 - Peak Load, higher ramping rate with limited period of time: Gas PP, Diesel PP and Hydro PP

Energy policy



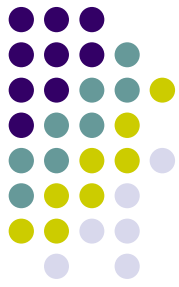
- Main objective to provide not only availability energy but affordability, deliverability and accessibility energy
- Conservation energy
- Diversification of primary energy
 - Biomass
 - National Standard for B 100, B 10, E 10 and E 100
 - Capacity 620,000 kl by 2008
 - Road Map for Nuclear Power Plant 2017 in Muria, Central Java
- Regional tariff policy based on geographic area, market segment and people capabilities
- Private-public partnership to built additional 10,000 M Watt Coal Fired PP
- Small scale PP for urban development
- Substitute domestic requirement of kerosene with LPG
- Reduction of government subsidy by means of technology

Affordability and Accessibility Energy is key issue

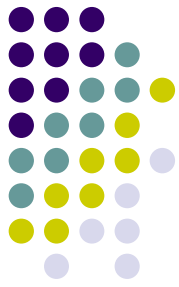


Balance Sheet

State Electricity Capacity GWh



- Energy Mix of Power Plant generating capabilities:
 - Oil based PP 28,009 GWh
 - Coal PP 54,659 GWh
 - Natural Gas PP 27,063 GWh
 - Hydro PP 12,153 GWh
 - Geothermal PP 6,539 GWh
- Java-Bali the largest energy consumer, most of its generating PP still heavily dependent on oil.
- Developing infrastructure pipes or NGL carrier will bring the Gas rich region in East Kalimantan and South Sumatra to the needy consumer
- Demand in Java-Bali 89,895 GWh, outside Java-Bali 23,865 GWh
- In year 2010 will increased to 121,650 GWh in Java-Bali and other will be increased to 36,395 GWh

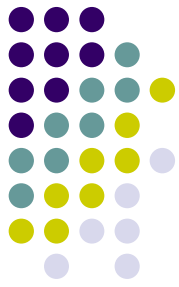


Variable Cost

- High speed diesel
 - $0,3 \times \text{Rp } 5.000$ (diesel price/l) = Rp 1,500/kwh
- Gas and diesel
 - $0.45 \times \text{Rp } 5.000$ (diesel price/l) = Rp 2,250/kwh
- Gas Steam and diesel
 - $0.4 \times \text{Rp } 5.000$ = Rp 2,000/kwh
- Gas
 - $0.01 \times \text{US\$ } 3$ (gas price/mmbtu) = Rp 300/kwh
- Coal
 - $0.5 \times \text{Rp } 400$ (coal price/kg) = Rp 200/kwh

It's obvious GOI is aiming to shift it's expensive fuel power plant to gas and coal fired power plant

Source: Simulation cost "*Energi dan Ketenagalistrikan*"
1 US\$ equal to Rp 9200,-



Electricity Cost per kwh

- Indonesia is an archipelago with 2/3rd of its area covered by water therefore the cost to produce electricity is vary from island to island
- In year 2007 with 6,12% growth
 - National average : Rp 890.41 /kwh
 - The lowest - West Java : Rp 670.91 /kwh
 - The highest – Mollucas : Rp 2.669.84 /kwh

Source: PLN

Indonesia

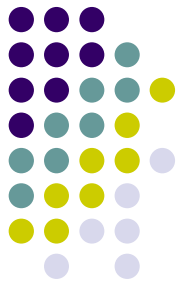
Target Energy Mix 2025



- Oil based 20 %
- Gas 30 %
- coal 33 %
- Biofuels > 5%
- Geothermal 5%
- New & Renewable Energy: Nuclear, Mini hydro, Solar, Wind 5%
- Coal to liquefaction 2%

Source: Kebijakan Energi Nasional

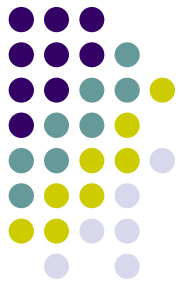
Biofuels double edge program



- The program is aim to tackle energy issues as well as employment creation to alleviate poverty
- Bio-Oil and Bio-Ethanol development
- Small scale Biofuels for utilities or urban development
- Special Biofuels Zone-area required and GOI target:
 - Palm Oil 1.5 mio Hectare
 - Jatropha 1.5 mio Hectare
 - Cassava 1.5 mio Hectare
 - Sugar Cane 0.75 mio Hectare
- Plantation worker as a job opportunity for most of Indonesian labor force

Source: Tim Nasional Pengembangan Bahan Bakar Nabati

Biofuel



- Two type Biofuel:
 - Bio-Oil: Pure Plantation Oil or straight vegetable oil i.e. :
Refine – bleached-deodorized Palm Oil or Straight Jatropha Oil
 - As substitute if IDO up to 15% + 85% diesel
 - As substitute of Kerosene up to 20% + 80% diesel
 - As substitute of MFO up to 100%
 - Cost to produce= Price of bio-oil plus Rp 300/liter
 - Bio-Ethanol: anhydrous alcohol- fermentation process from Molasses, Cassava, Corn or “Sago”
 - Max 15% without any engine modification
 - Cost to produce= Price bio-oil plus Rp 1.500/liter



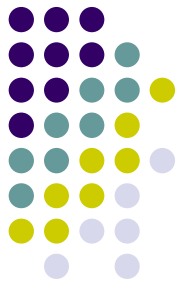
Biofuels Investment

Investment committed for year 2007:

- Government budget;
 - Interest subsidy Rp 1 trillion (US\$ 0.11 B)
 - Infrastructure Rp 10 trillion (US\$ 1.1 B)
 - Seed Capital Rp 2 trillion (US\$ 0.2 B)
- Capital Market US\$ 110 million
- FDI US\$ 20 million

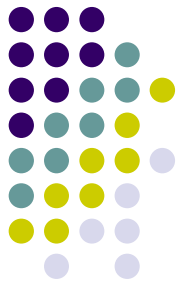
Source: Tim Nasional Pengembangan Bahan Bakar Nabati

Biofuels market and commerce



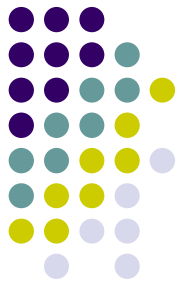
- Government off take guarantee through Public service Obligation
 - Pertamina as standby buyer for Bio-Diesel and Bio-Ethanol with price formula MOPS plus alpha
 - PLN standby buyer of Bio Oil at the market price
- The challenges will be the strategic intent to increased the percentage of bio fuel to substitute traditional fossil fuel.

Energy legal framework

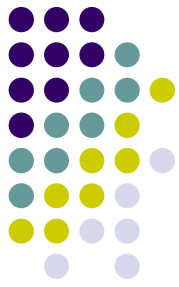


- Draft of Energy Law schedule to be approved by 1st Quarter 2007
- Draft of Electricity Law schedule to be approved 2nd Quarter 2007
- Draft Coal and Mineral Law schedule to be approved 2nd Quarter 2007
- Amendment of Oil and Gas Law 22 year 2001 schedule to be approved 2nd Quarter 2007

Scope for Regional Cooperation



- Primary Energy export market: i.e. gas, coal
- Investment for bio-fuel, as commitment to diversified energy
- Regional transportation or distribution of primary energy (Trans ASEAN Gas Pipe Line) and secondary energy (ASEAN Power Grid)
- Develop cooperation for enhancing engineering capabilities in developing efficient and cost effective energy technology for ASEAN region
- Regional library for energy and technology policy as regional “brain server” for region energy sustainability
- Bring rationale to human value in developing clean and renewable energy



**Engineers bring
human value and
creating welfare for
the needy**

Thank You

