Global Energy Future: Indonesian Perspective

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Rector of the University of Indonesia

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Current Energy Issues in Indonesia

- An emerging market economy with 240 million people. Future economic growth will require more energy.
- More than 60,000 villages across 17,000 islands, in which many still have no access to electricity.
- Indonesia have relied on non-renewables for electricity generation: 95% fossil fuels (50% oil, 30% gas, 15% coal); 5% renewables.
- Domestic fuel consumption still receive government subsidies, while fiscal incentives and R&D to develop renewables are lacking.
- Indonesia still produces GHG emissions from wet land farming and deforestation activities.
SHARE OF PRIMARY ENERGY CONSUMPTION IN INDONESIA

Current National (Primary) Energy Mix
- Oil: 51.66%
- Coal: 15.34%
- Natural Gas: 28.57%
- Hydro Power: 3.11%
- Geothermal: 1.32%

Energy Elasticity = 1.8

2025 National (Primary) Energy Mix
- Coal: 33%
- Gas: 30%
- Oil: 20%
- Renewable Energy (RE): 17%

Energy Elasticity < 1.0
ENERGY DIVERSIFICATION TARGET OF 2010

Household and Commercial 2007
- Electricity: 37.2%
- LPG: 10.5%
- Briquet Coal: 0.2%
- Biofuel (Bio-oil): 2.2%
- Natural Gas: 1.8%
- Oil: 47.8%
- CNG: 0.4%

Transportation 2007
- Gasoline: 53.5%
- Automotive Diesel Oil: 43.5%
- Biofuel (Bio-Ethanol): 0.3%
- Biofuel (Bio-Diesel): 0.4%
- Biofuel (Bio-Oil): 2.0%
- Electricity: 0.0%
- Natural Gas: 0.5%

Household and Commercial 2010
- Electricity: 40.1%
- LPG: 19.0%
- Briquet Coal: 1.2%
- Biofuel (Bio-oil): 3.7%
- Natural Gas: 6.4%
- Oil: 28.1%
- CNG: 1.5%

Transportation 2010
- Gasoline: 46.5%
- Automotive Diesel Oil: 42.3%
- Biofuel (Bio-Ethanol): 7.6%
- Biofuel (Bio-Diesel): 0.4%
- Biofuel (Bio-Oil): 1.9%
- Electricity: 0.0%
- Natural Gas: 1.4%
ENERGY DIVERSIFICATION TARGET OF 2010 (cont’d)

Industry 2007
- Coal: 22.5%
- Oil: 43.8%
- Gas: 19.6%
- LPG: 1.1%

Power Plant 2007
- Coal: 48.8%
- Gas: 17.0%
- Oil: 11.4%
- Biofuel: 4.8%
- Geothermal: 6.1%
- Hydro: 9.1%

Industry 2010
- Coal: 34.9%
- Oil: 27.8%
- Gas: 20.4%
- Electricity: 12.4%

Power Plant 2010
- Coal: 71.4%
- Gas: 8.3%
- Oil: 2.7%
- Biofuel: 0.8%
- Geothermal: 6.8%
- Hydro: 7.8%

*) through 10,000 MW Program
Challenges to Meet Future Energy Demand

• How to ensure energy security for future increases in domestic demand
• How to diversify energy consumption from non-renewables to renewables
• How to reduce greenhouse gas (GHG) emissions to address the vital issue of global warming
INDONESIA ENERGY POLICY

SUPPLY SIDE POLICY
- SECURITY OF SUPPLY
  - EXPLORATION PRODUCTION
  - CONSERVATION (PRODUCTION OPTIMIZATION)

DEMAND SIDE POLICY
- ENERGY PRICE
  - DIRECT SUBSIDY
  - DIVERSIFICATION
  - CONSERVATION (EFFICIENCY)

COMMUNITY AWARENESS

SHIFTING PARADIGM

ENERGY SUSTAINABILITY
ENERGY DEVELOPMENT IN INDONESIA

Oil
Gas
Coal
Oil (Projection)
Gas (Projection)
Coal (Projection)
New and Renewable Energy
New and Renewable Energy (Projection)
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*S* = Subsidized

NS = Non Subsidized

*) Application plan for Control Card and substitution to LPG
Future Threats from Global Warming

• Up to 2,000 low-lying islands will be inundated and half a million hectares of coastal land will be lost due to rising sea levels
• The number of people experiencing ‘water stress’ will increase
• The area of arable, productive land will shrink
• Agricultural crop yields will fall, jeopardizing food security and reducing export revenues
• Industrial production, income generating and human livelihood activities will be severely impacted
• Vector-borne diseases such as malaria will spread into new unaffected areas
Key Policy Initiatives

• Government plans to raise the proportion of renewable energy by 2025
  – Renewable energy will rise from 5% to 17% of total energy use
  – Coal will increase from 15% to 33%
  – Natural gas will stay at close to 30%
  – Crude oil will decrease from 51% to 20%

• Indonesia is committed to reducing GHG emissions by 26% from a business-as-usual scenario with 5-6% of the reduction from energy sector

• To focus on REDD+ readiness, Indonesia is developing National Carbon Accounting System (INCAS) and Forest Resource Information System (FRIS)
Research, Education and Practice at the University of Indonesia

• Research Center
  – Climate Change Center that focuses on policy, REDD+ readiness, ecosystem-based adaptation combining cultural, economic and natural science perspectives, and sustainable financing

• Study Programs
  – Electric Power and Energy Studies (EPES) that focuses on energy and the environment, and climate change and policy
  – The Renewable Energy and Microgrids (REM) focuses on the applicability of renewable sources of energy for Indonesia particularly in rural areas
  – Environmental Engineering Program in the Faculty of Engineering

• Conferences on Energy and the Environment
  – The Workshop on Vulnerability to Climate Change: Adaptation, Conservation and Livelihoods in Indonesia (February 2009)
  – The International Workshop on Climate Change Mitigation and Adaptation Strategies (March 2010)

• Other Initiatives
  – **UI Green Campus Initiative**
    – UI Green Metric World University Ranking
UNIVERSITAS INDONESIA

UI Green Campus Initiative

- 43,000 students
- 6,000 faculty members (full and part time faculty)
- 320 hectares of greenary space
- 13 Schools/Faculties

- Veritas – Probitas – Iustitia
  - founded since 1849
  - (Doktersdjawa School Bearing The Name of Universitas Indonesia since 1950)
MAIN CAMPUS AREA

– Depok campus

– One of the most Beautiful campus in the world
- UNIVERSITY LIBRARY

-(31.000 M2, 6 MILLIONS BOOKS COLLECTION)

-UNLIMITED DIGITAL ACCESS)
UNIVERSITY LIBRARY

- Green building of 33,000 m² with 6 millions collection
- Serve as the ‘meeting point’ for academic activities
ARTS AND CULTURAL CENTER

24,000 m²

Art performance studios, classes, theatre and gallery. Modern but elegance open air theatre that protruded over the lake
ARTS AND CULTURAL CENTER
ARTS AND CULTURAL CENTER
Partnerships and Funding

• Development of activated carbon from low-rank coal with NUS, Singapore
• Development of environmentally friendly refrigerant with Auckland University, New Zealand
• Development of high efficiency refrigeration technology with micro channel, Chonnam National University Korea
• Prediction and prevention of spontaneous combustion of coal with Leeds University, UK
• Remote sensing of hot spot development in forest fires with a university in Japan
• Development of high yield coal gasification with reduced tar with UTM Malaysia
• Utilization of fly ash for fire-proof geopolymer resin with Washington University at St. Louis, USA
• Funding for Climate Change Policy and Research comes from national and regional government budgets, international development partners (UNFCCC mechanism or bilateral/multilateral), and private sources (PPP and CSR programs)
Priority Areas for Energy and Climate Change
Activities at University of Indonesia

- Establish a research center that involves many disciplines to combat climate change and introduce new forms of energy
- Cooperation and partnerships with government, research institutions, universities and private sector
  - To produce solutions to climate change such as development of renewable energy sources
  - To save threatened forest
  - To restore degraded lands
- Raise public awareness of the links between land use change and climate change, particularly the role of deforestation as a large source of emissions, and help communities to prepare for the impacts of climate change.
Potential Areas for Future Research Collaboration

• Energy modeling for decision making and policy development
• Extending and testing the INOSYD energy model developed by the Center for Energy Studies
• Renewable energy for transportation
• Battery/energy storage technology for electric vehicles
• Renewable energy provision for outlying islands and remote rural areas currently off-grid
• CO2 capture and storage technology
• Performance-based design of high efficiency buildings for the tropical environment
• Green campus initiative
• Financing green technology: development and application
• Human resource development for local government decision making
• Socio-cultural aspects of energy conservation initiatives
• Advanced coal combustion technology for low quality coal
• Emissions reduction in forestry sector
National environmental action program of tree planting

- A tree planted every year for every person in the country for a total of ten years
- Involves people’s feelings. What is it like to plant a tree as part of a movement?
- UI helps by working with experts to create a film that contains real and computer generated images of many issues such as global warming, habitat destruction, mangrove retention and so on
- University of Indonesia shows this all over the country in schools
Conclusions

• Climate change is the greatest long-term threat to human health and security, and biodiversity
• To address climate change, we must stabilize average surface temperature and GHG concentrations
• Adaptation and mitigation responses are needed now, such as endorsing more REDD projects
• UI has an important role to play in helping government understand the dangers inherent in inaction
• We need to demonstrate empirically and communicate clearly how “green growth” is the best option in the long run for food security, social welfare, job creation and the eradication of poverty
• Indonesia is not willing to compromise its long term development, competitiveness and survival by not taking action in the short and medium term to combat climate change
Thank You

www.ui.ac.id