

Our Observation on Energy Efficiency Potential and Future Potential Cooperation in South Africa

January 27, 2009

**The Institute of Energy Economics, Japan
(JICA Study Team)
Takeo SUZUKI**

Contents

1. Background and circumstance
2. Objectives
3. Meetings/ Interviews
4. Observations: Energy Supply/Demand
5. Energy Efficiency Potential Cooperation :
Supply/Demand

Notes on JICA, IEEJ, and TEPCO?

(1) Background

- Energy relating issues such as the energy price volatility/global warming, are common and important issues to be shared with all over the world. In G8 Hokkaido Toya-ko Summit 2008, this was confirmed and energy /environment topics were focused upon.
- IEEJ collaborating with TEPCO are working on “Research Project of Energy Efficiency Improvement Potential of South Africa and other countries” under JICA ’s sponsorship.

(2) Objectives

1. To grasp the current energy supply/demand situation and analyze the energy balance structure
 2. To search the possible policies/measures to enhance the energy efficiency and conservation
 3. To analyze the impact for the above-mentioned possible policies/measures
 4. To search the possibility for Japanese Potential Cooperation in this energy efficiency increase/conservation field
- Focusing upon industrial (especially, power generation and energy consuming industries), commercial, and residential sectors
 - Looking at South Africa, and other 5 Asian countries of Indonesia, Thai, Philippine, Vietnam, and India

(3) Meetings/ Interviews

(2008/11/17 – 12/4)



We visited governmental offices, business entities including both supply/demand (i.e. seller/buyer) sides, business organizations/associations, etc.

11/17 Mon	<JICA-SA>	11/27 Thu	Department of Trade and Industry (the dti)
11/18 Tue	BTMU-JHB Dept. of Science & Technology (DST) Mitsubishi Corp.-JHB	12/1 Mon	Sasol Technology (Pty) Ltd Eskom
11/19 Wed	Univ. of Pretoria Hitachi-JHB	12/2 Tue	National Energy Regulator of SA (NERSA) The Nuclear Energy Corporation of South Africa (Necsa)
11/20 Thu	City of Johannesburg (incl. City Power) Central Energy Fund	12/3 Wed	Dept. of Minerals and Energy (Plan'g) + the dti +DST Norwegian Embassy Mitsui-JHB
11/21 Fri	Dept. of Minerals and Energy (E.Efficiency) <Japanese Embassy>	12/4 Thu	World Bank (SA Office) <JICA-SA>
11/24 Mon	The South African Bureau of Standards (SABS) Toshiba-JHB		
11/25 Tue	National Business Initiative (NBI) & 20 Energy Efficiency Accord Members/Organizations Sumitomo-JHB The South African Breweries Limited		
11/26 Wed	Dept. of Public Enterprises (DPE)		

Gov. Offices, Public Organizations: 11
Business Entities, Group : 4
University, Donor, etc. : 3
Japanese Firms : 6

Total : 24

5

(4) Observations: Energy Supply

- In South Africa, some of Energy-relating Plans/Strategies have already been established. As for Energy Efficiency Increase, “Energy Efficiency Accord” has been released in Nov., ‘08
- In practical (economical) viewpoint, it is difficult to introduce new kind of primary energy source such as import-dependent natural gas (LNG) etc., since there is rich (and cheap) coal resources in South Africa.
- Regarding the supply diversification, only nuclear and renewables had been pointed out as new supply sources.
 - Eskom will introduce 20 GW of nuclear power plant in next 20 years.
 - Wind and biomass are expected as renewables, however, they seem to be pre-matured as stable supply sources.
 - As solar heating also looks prominent, the application is limited for the residential sector.
- Based on the issues “Until when coal supply mono-culture is allowed?”, the intention to diversify the primary energy supply sources is indicated.
 - There would be a interpretation that the introduction of gas/ fuel conversion, as a result of the diversification, enables to adopt IGCC (Integrated Combined Gas Cycle power generation) to achieve better/increased efficiency, bringing to Energy Efficiency Increase.
- In power generation sector, new boiler introduction or conversion of advanced coal combustion technology which is a part of Clean Coal Technology can be considered.
- As for power distribution part, 12% loss is reported by JHB City Power, which considerable room exist for the improvement. Main reason would be aging of the facilities and stealing/pinching electricity.

(4) Observations: Energy Demand



- Looking at the current energy consuming industries, mining/smelting work is originally utilize much energy in nature.
 - It should be noted that the modernized facility that recently start-up, is on the world front-end design basis, and consequently, almost no room for further energy efficiency increase.
 - However, second-line factories seems to be enough subject to study.
- For process industries such as steel/refinery/chemical etc., world-class companies or its subsidies are operating the plants, and usually access to the information is limited.
 - These companies are tend to own on-site self-generation facility by themselves in response to the recent Eskom's power supply situation.
- In commercial sector, energy saving is not consistent or missing in the range of plan/design, operation/management of lighting and air conditioning in the buildings.
 - There seem to be the room to incorporate Co-Generation system in commercial complex or large-scale housing communities to be planned/built.
- For residential sector, improvement of Geyser or application of solar heat are considered.
 - This is the exact field that Japanese “water heating system with heat pump” (“Eco-cute” in the trade-name) can be adopted.
- Such consumption reduction targets are set as 10% peak-power demand cut till 2009, and 12% energy efficiency improvement by 2015:
 - DSM by Eskom
 - Several measures by DME/NEEA
- Specific scheme/system design for energy efficiency increase, shall be implemented.

(5) Energy Efficiency



Potential Cooperation : Supply (1)

- Efficiency Increase/Fossil Fuel Decrease by Energy Conversion
 - Coal Gasification: IGCC < Power >
 - Nuclear Power Introduction < Power >
 - NG Combined Cycle Gene. Introduction < Power >
 - Renewable Introduction < Residential, Power, Industrial >

(5) Energy Efficiency



Potential Cooperation : Supply (2)

- Energy Efficiency Improvement of Existing Facilities
 - Renovation of existing Coal Power Plant
< Power >
 - Replace by such new technology of Sub- /
Super-critical steam condition boilers <Power >
 - Cogeneration Introduction
< Industrial, Commercial >

(5) Energy Efficiency



Potential Cooperation : Supply (3)

- Energy Efficiency Improvement of Power Distribution
 - Introduction of Loss Minimizing Power Distribution Equipment/ Facilities < Power >
 - Renovation Plan of Power Distribution Equipment/ Facilities taking Efficiency into account < Power >
 - Efforts to decrease Non-technical Loss <Power >

(5) Energy Efficiency



Potential Cooperation :Demand (1)

- Energy Efficiency Improvement in Industrial Sector
 - Introduction of Energy Management System
 - Technical Assistance for small and medium-sized enterprises
 - (Waste) Energy Accommodation among Industries
 - Introduction of Labeling/Standardization System
 - Other Existing countermeasures

(5) Energy Efficiency



Potential Cooperation :Demand (2)

- **Energy Efficiency Improvement in Commercial Sector**
 - Capacity Enhancement of Building Energy Manager
 - Introduction of Labeling/Standardization System
 - Assistance for ESCO Introduction
 - Other Existing countermeasures
- **Energy Efficiency Improvement in Residential Sector**
 - Penetration of High-Efficient Water Heater
 - Introduction of Labeling/Standardization System
 - Other Existing countermeasures

(5) Energy Efficiency



Potential Cooperation :Demand (3)

- Organization Settlement of Energy Efficiency Improvement Enhancement (cross-sectional)
 - Support and Assistance of NEEA
 - Collaboration with Energy Courses in Universities
 - Organizing the Forum on Energy Efficiency Improvement
 - Formulation of Energy Supply/Demand Simulation Model
 - Other Existing countermeasures

Notes:

Japan International Cooperation Agency (JICA)



- Independent governmental agency coordinates ODA for the Japanese government
- Chartered with assisting economic and social growth, and the promotion of international cooperation
- Led by President Sadako Ogata, the former United Nations High Commissioner for Refugees
- Three major ODA components--technical cooperation, grant aid, and concessional loans under JICA

(<http://www.jica.go.jp/english/index.html>)

Notes:

The Institute of Energy Economics, Japan (IEEJ)



- Established in 1966, aspiring to become the “No 1 Think Tank” and the leading voice in Japanese and World energy-related issues and global environmental subjects
- “Considering the Energy-Environmental Issues from a Global Perspective and Proposing Policy Solutions,”
- Research and Study
 - Energy Security and Direction of Japan’s Resource Diplomacy
 - Worsening Global Warming Problems and Japan’s Strategy
 - Supply and Demand in Energy Markets in Japan and the World and Trends in Energy Prices
 - Promotion of Energy Cooperation with Various Countries
- Mission
 - Policy Proposals
 - International Cooperation
 - Public Education

(<http://eneken.ieej.or.jp/en>)

Notes:

The Tokyo Electric Power Company, Inc.



(TEPCO)

- An electric utility servicing Japan's Kantō region, Yamanashi Prefecture, and the eastern portion of Shizuoka Prefecture, including Tokyo
- The largest electric utility in Japan, and the 3rd largest one in the world after ÉdF and E.ON
- Total: 190 power stations / 62.825 million kW - generation capacity

(<http://www.tepco.co.jp/en/index-e.html>)