Fossil Fuel Option and Japan-US Cooperation

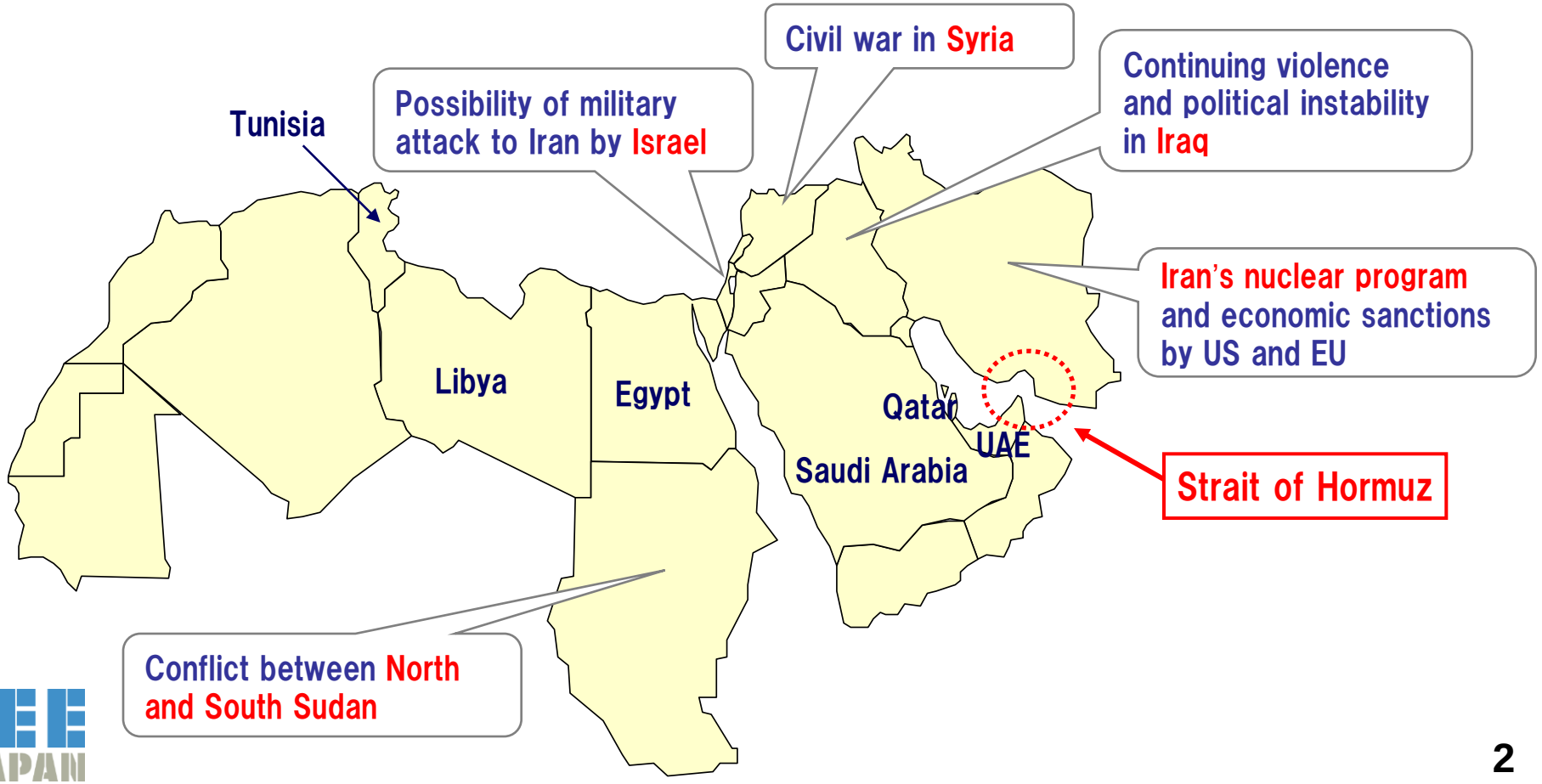
SPF-WWC Joint Seminar
31 October, 2012

Tsutomu Toichi
The Institute of Energy Economics, Japan (IEEJ)

Geopolitical Risks in the Middle East

Higher Uncertainties of Oil & Gas Supply from the Middle East

- –Spreading of "Arab Spring" from North Africa to the Middle East
- –Qatar has become the world's top LNG exporter
- –Increasing geopolitical risks due to the Iran's nuclear crisis

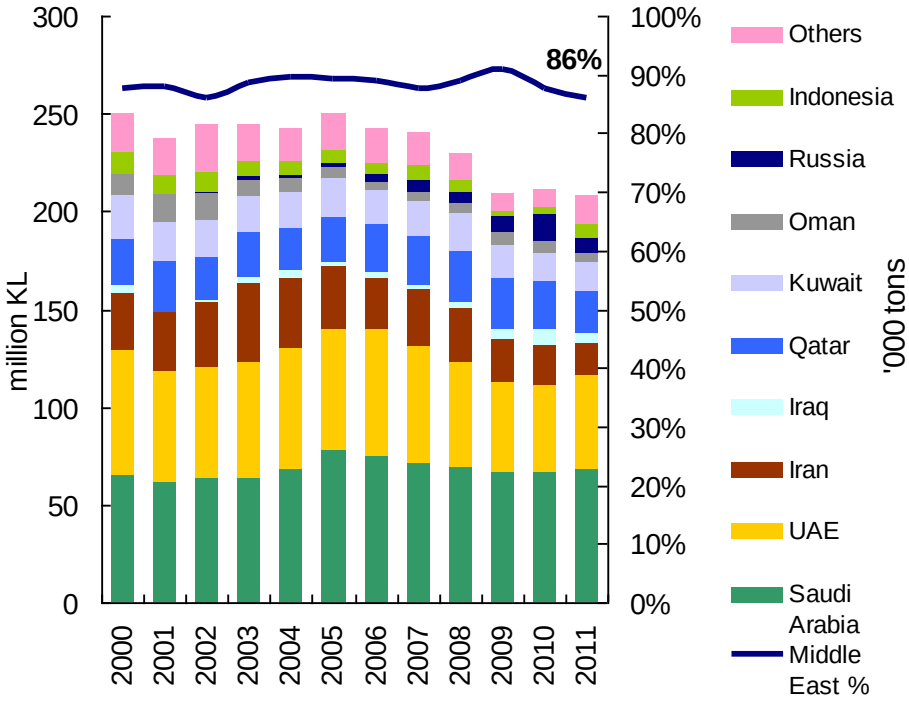


Japan's Fossil Fuel Dependence on Middle East

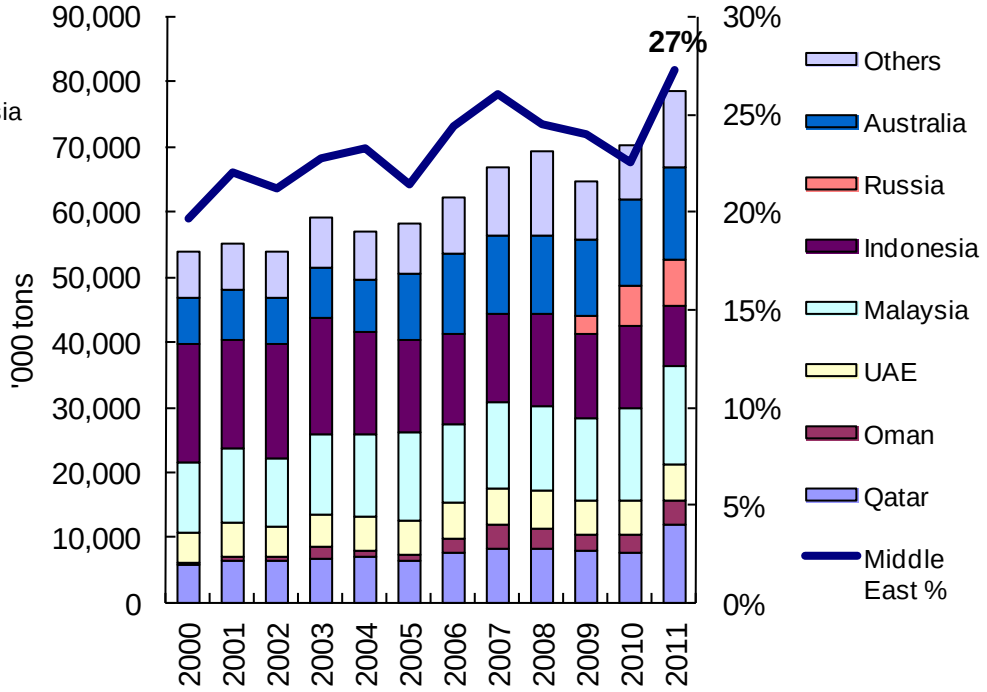
The share of Middle Eastern oil remains high at above 80%.

Middle Eastern LNG supply has significantly increased last year to make up for the lost nuclear power generation.

Japan's crude oil imports by country

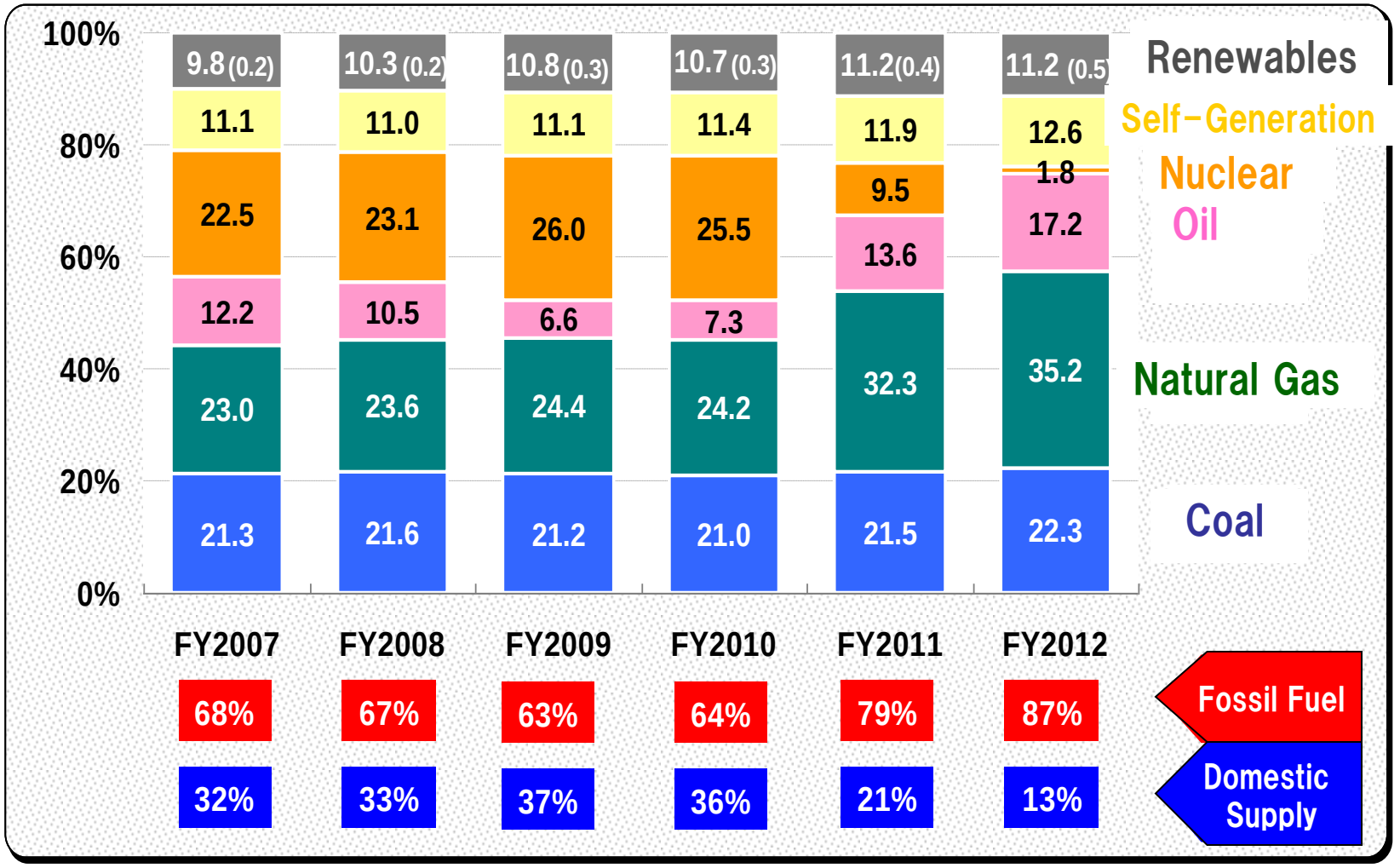


Japan's LNG imports by country



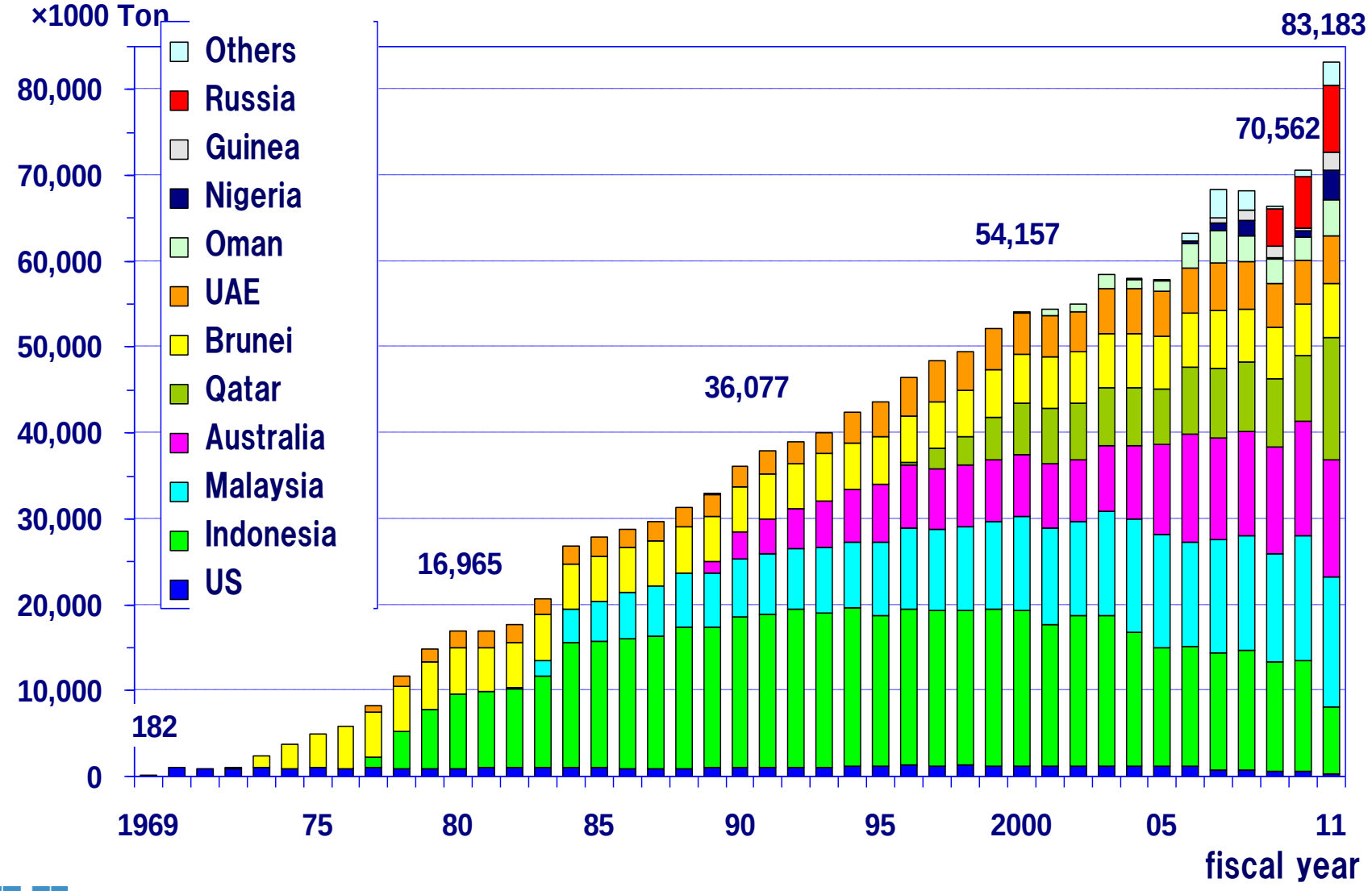
Source: METI; IEEJ

Japan's Power Generation by Supply Sources



Source: IEEJ, July 2012

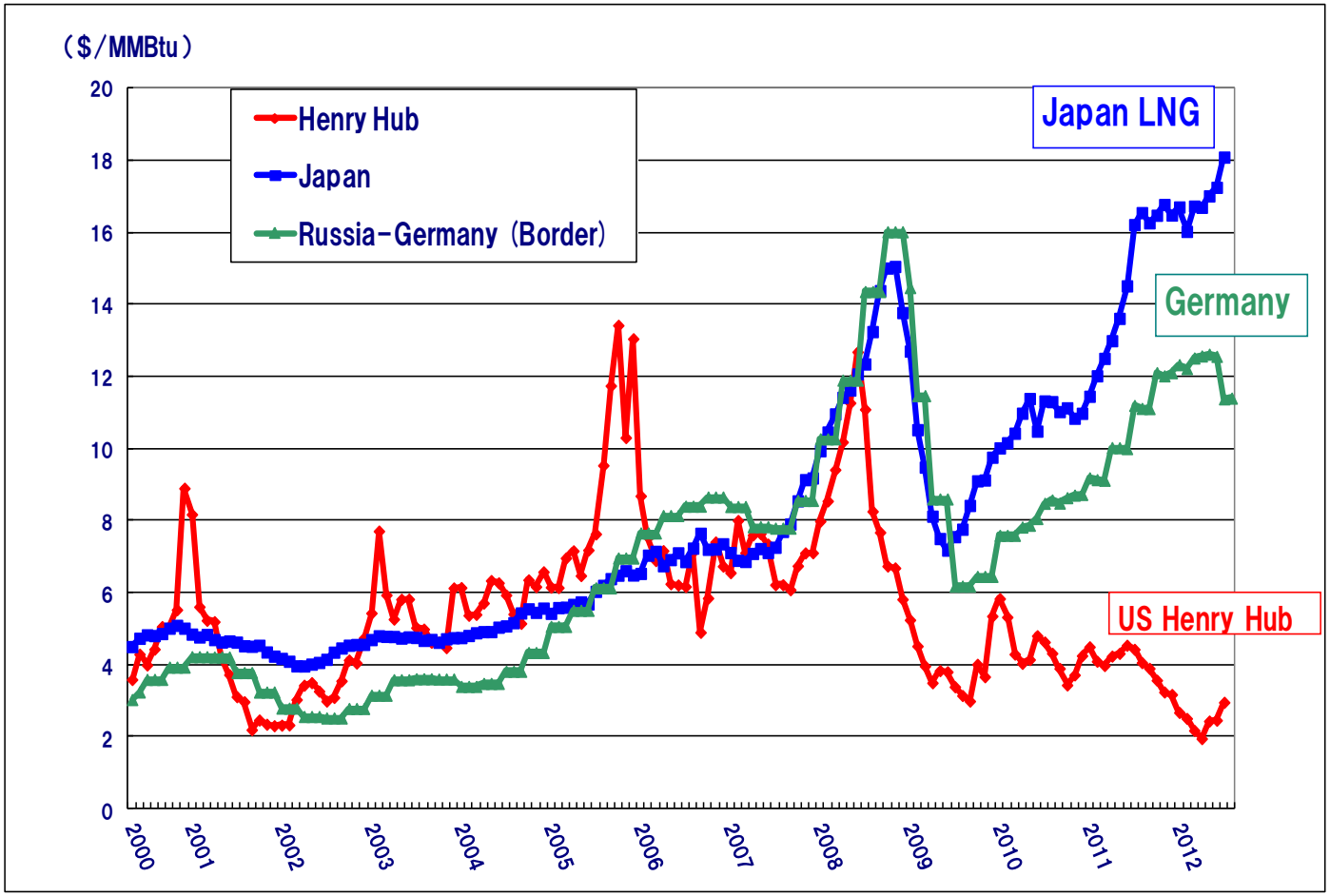
Historical Trend of Japan's LNG Imports by Country



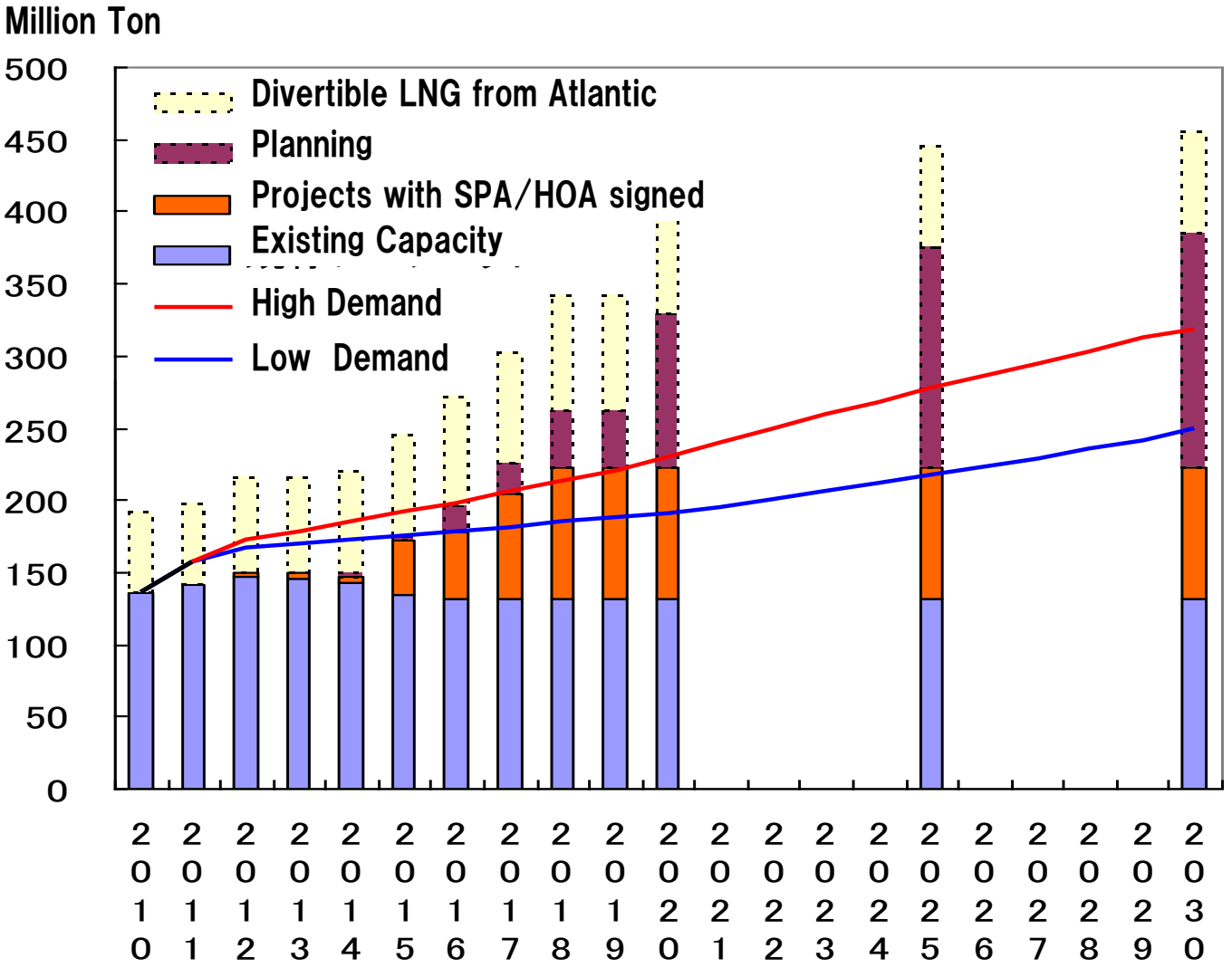
Note: LNG imports in 2012 is estimated to be about 88 million ton by IEEJ.

Natural Gas Prices in Japan, EU and US

- Japan: LNG imported prices are linked to the Japan crude cocktail
- Germany: Border gas price from Russia is linked to prices of heating oil and heavy fuel
- US: Spot prices at the Henry Hub in the Gulf coast

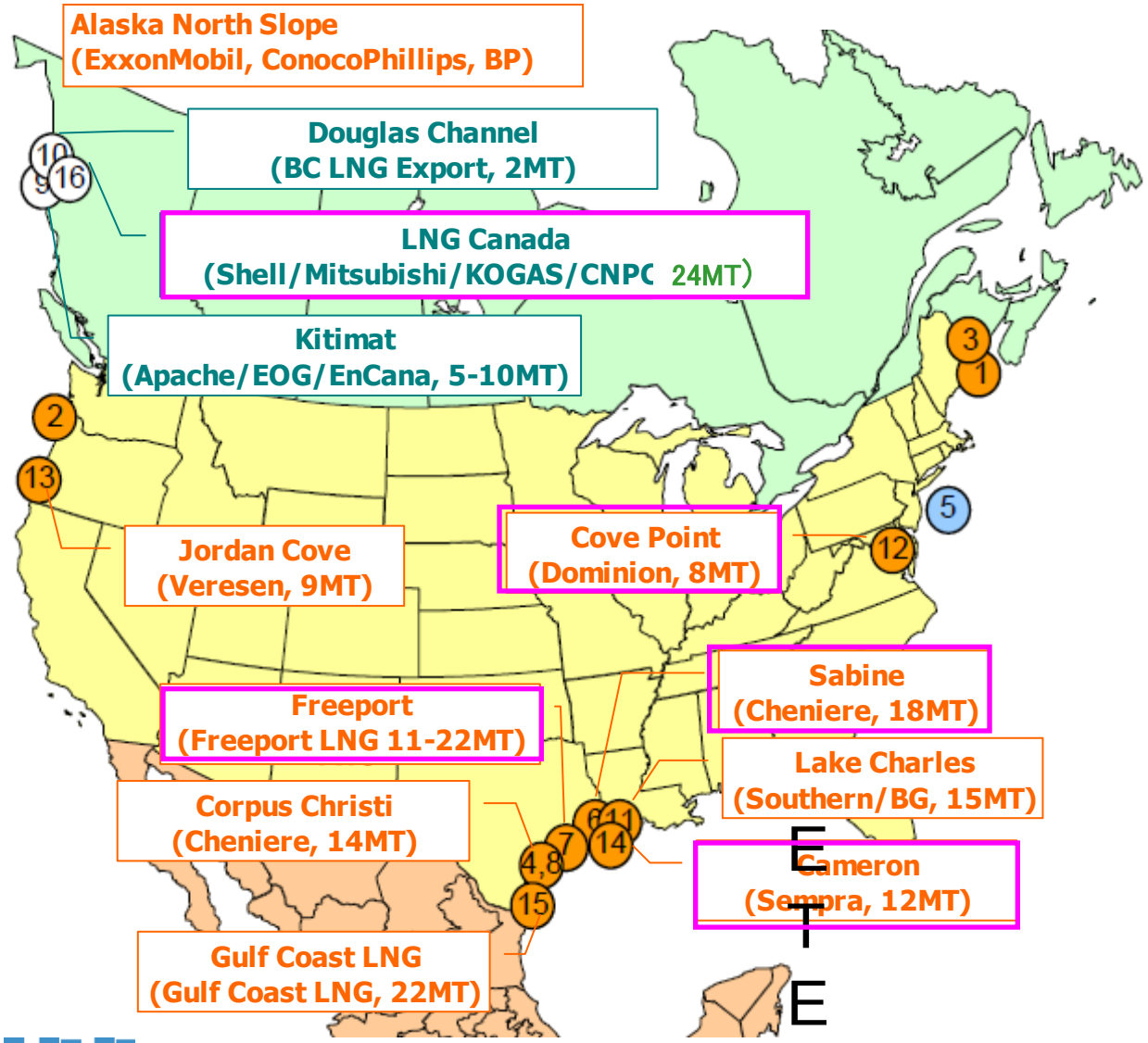


LNG Outlook in Asia and Middle East



Source: IEEJ

North American LNG Exports to Asia



- Export Potential of over 100 MT/year
- Asian market targeted due to price difference
- Export authorization as an uncertainty

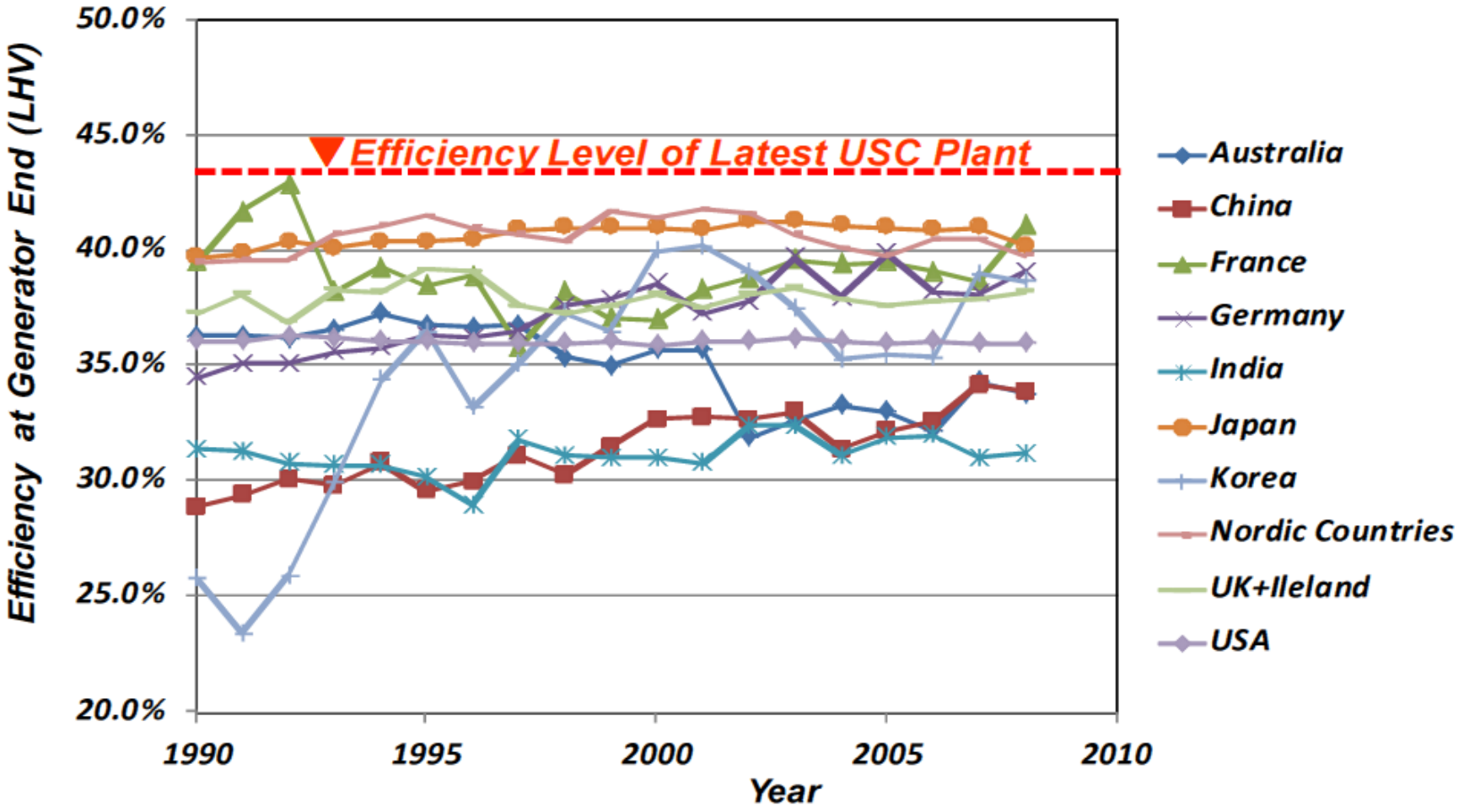
Project participated by Japanese companies

Measures for LNG supply security with affordable costs

1. Diversification of supply sources
   - Traditional suppliers: ASEAN, Australia and Middle East
   - North America: New business model for LNG imports
   - Russia: LNG and pipeline gas in the long run
   - Africa: New projects from East Africa
2. Diversification of fuels for power generation
   - Coal use with Clean Coal Technologies
   - Restart of nuclear plants under the new safety regulation
3. Market reform of the electric power industry
   - More competition by unbundling the power system
   - Investment in power plants by LNG suppliers of NOCs/IOCs

Efficiency of Existing Coal-fired Power Plants

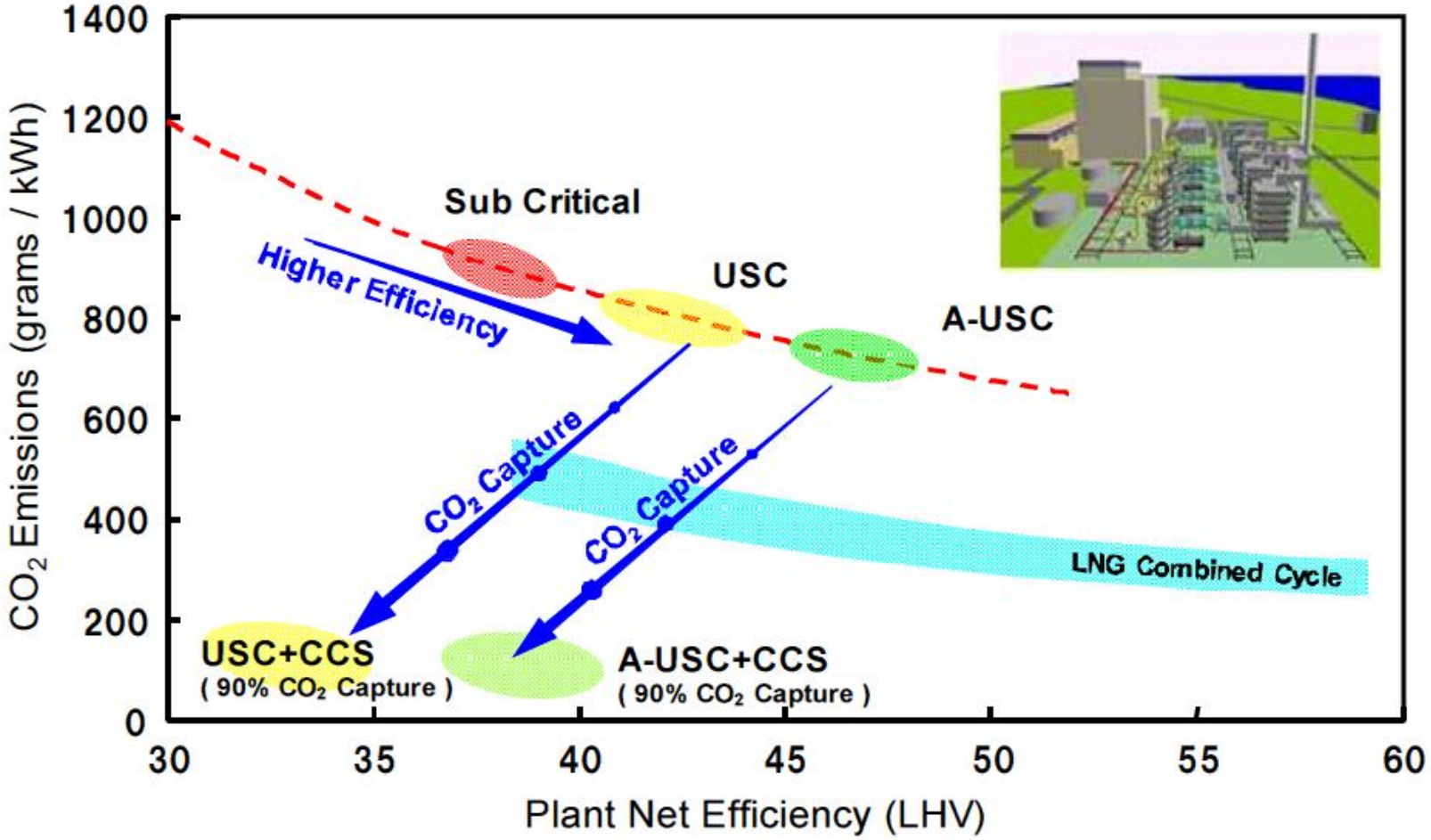
•Averaged efficiency of coal fired power plats are still lower in many countries.



Source: Ecofys International Comparison of Fossil Power Efficiency and CO2 Intensity 2011

IEE JAPAN

CO_2 Reduction in Thermal Power Plants



Substantial CO_2 reduction is realized by Integration and Optimization of both High efficiency Turbine Cycles and CCS technology

Source: Kensuke Suzuki "Toshiba's Activity in Clean Coal and Carbon Capture Technology for Thermal Power Plants" presented at the APEC Clean Fossil Energy Technical and Policy Seminar, February, 2012

Energy Security and Japan-US Cooperation

1. Recent developments in the Middle East causes additional risks to Japan's energy security. Both countries should prepare how to respond to oil and LNG supply disruption.

2. Post-Fukushima Japan will depend more on gas, at least for the short/medium-term. US DOE approval of LNG export to Japan is very useful for strengthening the natural resource alliance of both countries.

3. Diffusion of Clean Coal Technologies to Asian countries are effective to reduce CO2 emissions as well as to improve energy security in Asia. Two countries could cooperate to introduce the "Bilateral Offset Credit Mechanism".

IEE JAPAN