Chapter 3

Social Acceptance of Coal Power

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Chapter 3

Social Acceptance of Coal Power

In Chapter 2, we will focus on the social acceptance of coal power generation in the viewpoint of energy security, technological development status and the environmental concerns of its specific feature. The international conference held in Bangkok in November 2015 has significantly contributed to the research. The speakers in this conference were all related parties in coal power generation business in East and Southeast Asian countries and some important implications have been pointed out.

3.1. Energy Security and the Role of Coal Power in East Asia

1) The importance of power supply mix on energy security and sustainable development

There are some countries which consume a substantial amount of energy in East Asia and the Association of Southeast Asian Nations (ASEAN) area where coal is originally a main energy source. In Alternative Policy Scenario (APS) by ERIA (2015), it is estimated that fossil fuel consumption is considerably suppressed by the large expansion of renewable and nuclear energy while in the electricity sector, the share of coal will increase along with renewables and nuclear energy in the ASEAN.

On pushing forward the development of power resources in East Asia, the power supply infrastructure – particularly the expansion of the international grid – needs to be efficiently maintained and that some kind of mechanism for investment promotion be built. Since there is no absolutely reliable source, it is important to gradually push forward energy situation improvement by developing clean coal technology (CCT), renewable energy, and various energy technologies on a multilateral arrangement.

Figure 3-1. Power Supply Mix in the East Asian Summit Countries

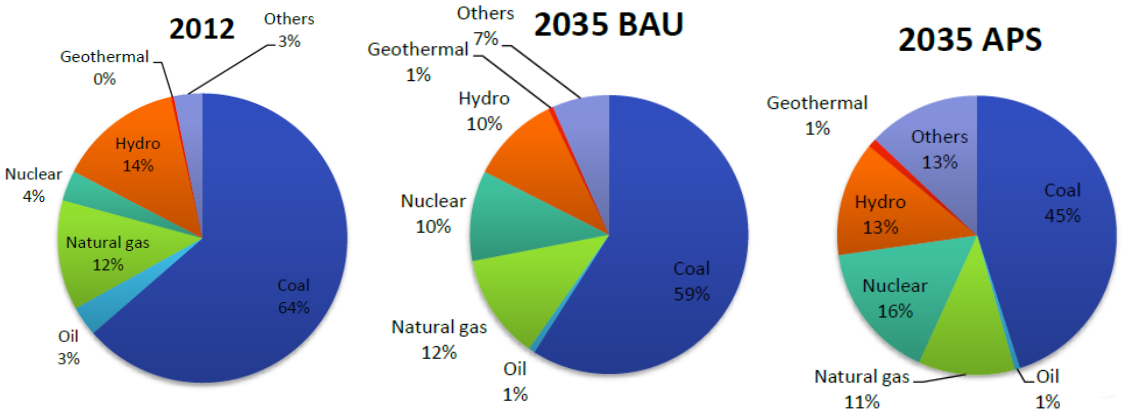
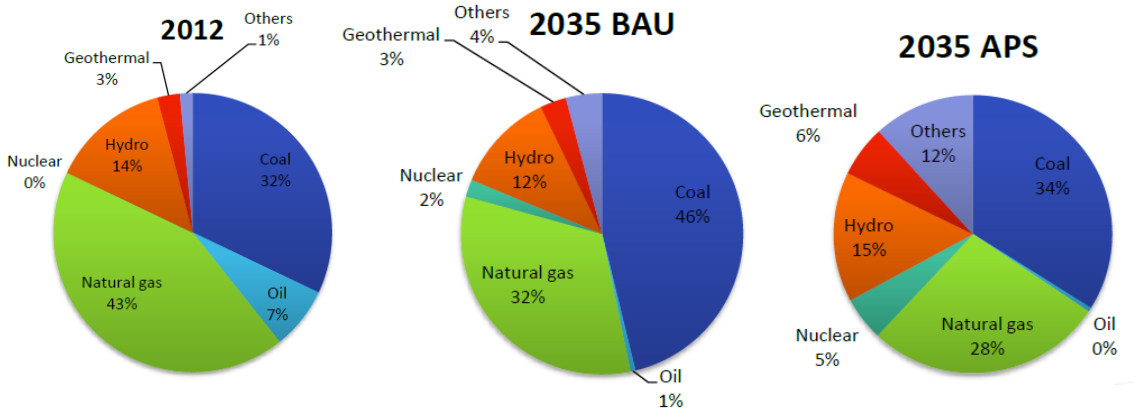


Figure 3-2. Power Supply Mix in ASEAN



ASEAN = Association of Southeast Asian Nations; APS — Alternative Policy Scenario; BAU = Business as Usual Scenario.

Source: ERIA (2015）.

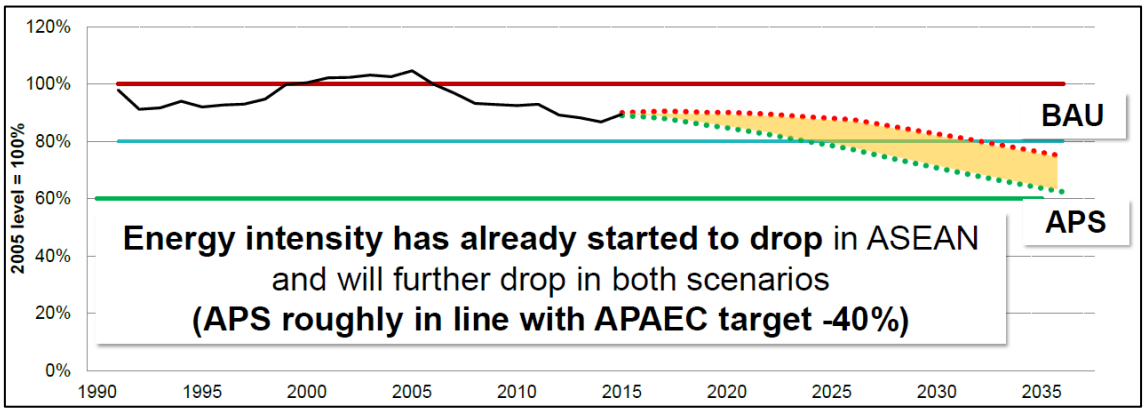
2) The 4th ASEAN Energy Outlook

The 4th ASEAN energy outlook published by ASEAN Centre for Energy (ACE) is comprised of two scenarios: Business as Usual Scenario (BAU) and Advanced Policy Scenario (APS). Apparently, APS is desirable from the viewpoint of energy supply, power consumption, coal demand, and trade in the area. As a result of energy efficiency examinations according to each scenario, APS can achieve -40 percent of the regional target. It is estimated that an industrial sector powered by the advanced use of coal, and energy saving measures in the transportation sector through the

introduction of bio-fuels have proven effective in terms of final energy consumption by sector according to each scenario.

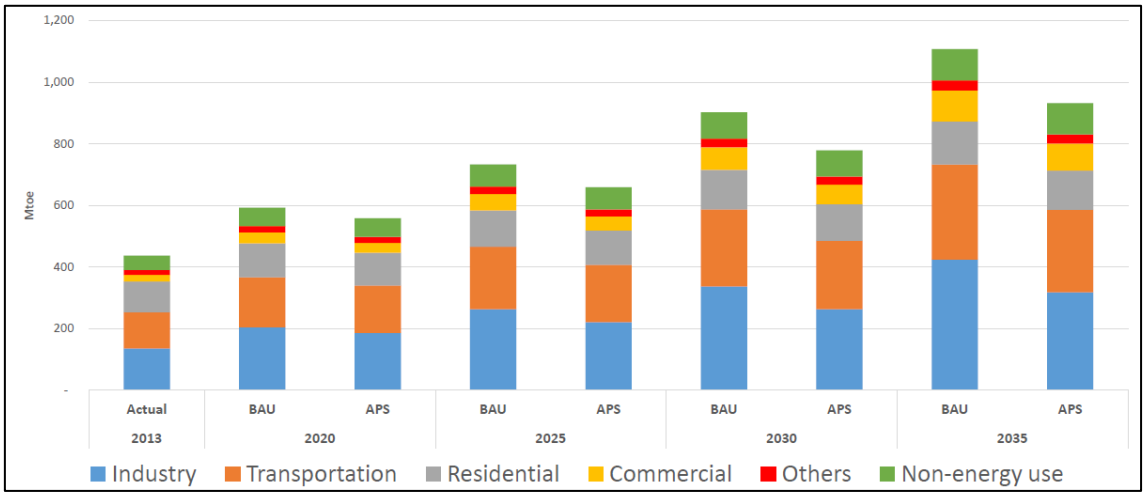
There are many challenges. For instance, restraining coal consumption due to environmental concerns will lead to an inevitable increase in consumption of oil and gas. How will the capital investment adequately be implemented in response to rapidly increasing electricity demand? No one has the correct answer now.

Figure 3-3. Energy Intensity in the 4th ASEAN Energy Outlook



Source: 4th ASEAN Energy Outlook.

Figure 3-4. Final Energy Consumption in the 4th ASEAN Energy Outlook



Source: 4th ASEAN Energy Outlook.

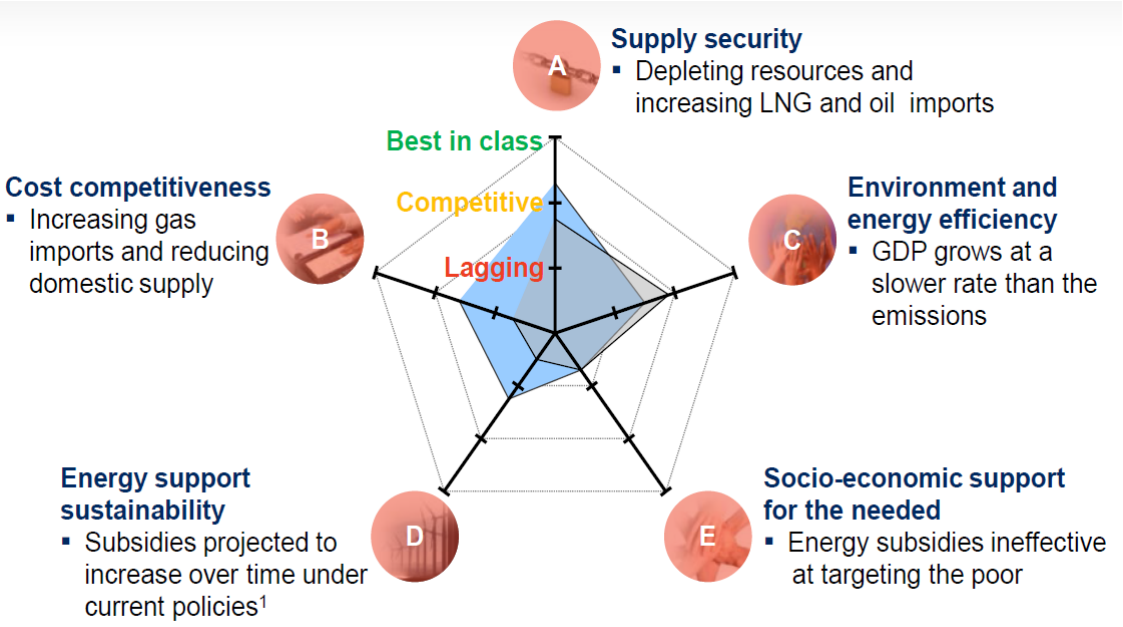
3) Overview of Thailand Integrated Energy Blueprint

The energy policy of Thailand consisted of three pillars: power development; energy efficiency; and alternative energy. Recently, the gas and oil roadmap to develop resources has been added to the policies. They are now the five pillars supporting three major policy targets: energy security; economic efficiency; and environment.

According to an assessment of Thailand's current energy status compared to international benchmarks, Thailand is superior in terms of economic rationality and subsidies, but needs improvement in environmental suitability and social acceptability. It is necessary to achieve a balanced energy system in these fields. Thailand needs to develop an alternative energy and establish an efficient energy market as well as develop international collaboration with neighbour countries. Thailand considers innovative coal fired technologies as alternatives and will learn a lot from the experiences of Malaysia, Indonesia, and Japan.

The specific energy target is as follows: achieve 30 percent energy intensity reduction; reach 30 percent coal in power mix and 20 percent clean coal; use biofuels for 20 percent substitution in transport; and so on. In the Power Development Plan 2015 (PDP, 2015), Thailand aims at a large reduction of energy demand versus BAU by saving energy. On the other hand, Thailand plans a lower gas dependency and large expansion of renewable energy for diversity of energy sources. Keeping energy cost at current levels (or slight increase) needs efforts towards technology development. It is expected that the carbon emission is held in check to a considerable degree from BAU by energy saving progress.

Figure 3-5. Assessment of Thailand's Current Energy Status and Evolution Trajectory Relative to International Benchmarks



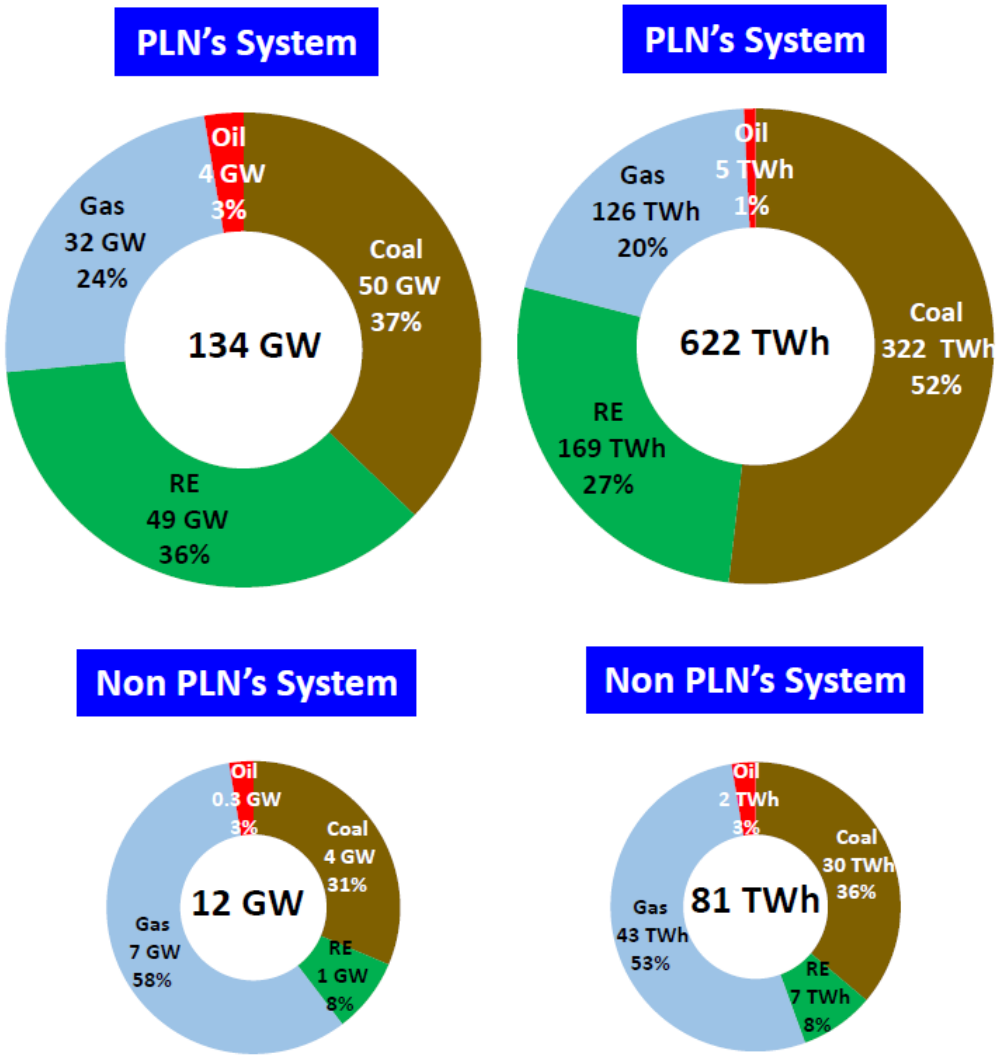
Source: Energy Policy and Planning Office, Ministry of Energy, presentation in the workshop

4) Power Policy and National Development Plan in Indonesia

In Indonesia, the '35,000MW Program' is being pushed forward to achieve an electrification ratio of 97.35 percent and electricity demand growth of 8.7 percent over the next 5 years. In the long term, Indonesia aims to reduce the ratio of Perusahaan Listrik Negara (PLN), utilise independent power producers, reduce coal dependence, and increase the ratio of alternative energies. In case it is difficult to accomplish the electrification target through renewable energy by 2025, nuclear energy will substitute as part of renewable energy, and Indonesia will also achieve the carbon emission abatement.

The aim of CCT in Indonesia is to reduce carbon emission. In addition to existing supercritical steam generation, Indonesia will introduce ultra-supercritical steam generation in 2020 and integrated coal gasification combined cycle in 2025.

Figure 3-6. Projection of Power Generation Capacity and Energy Mix 2025 in Thailand



Source: Ministry of Energy and Mineral Resources, Republic of Indonesia, presentation in the workshop

Since coal power is base load electricity in Indonesia, technology development of highly efficient coal power generation is crucial, and public acceptance of coal power is important as well.

5) Power Policy and National Development Plan in Malaysia

Malaysia is a country consisting of the Malay Peninsula and Borneo Island, and 90 percent of the electricity demand concentrates on the peninsula, occupying 40 percent of the area. There are

oil and gas resources in the country, however, Malaysia aims to keep these domestic resources and instead promoted renewable energy since 2001 and introduced FIT (Feed-in Tariff System) since 2010.

Malaysia's goal is economic rationality while it aims at the import of coal and the expansion of nuclear and renewables in preparation for stoppage of gas. With many problems that include reinforcement of industrial structure, governance, and the tolerance of price fluctuations, Malaysia introduced unbundling and competition in the generation section as a business structure switch from the first quarter in 2016. It is also aiming at the construction of the ASEAN Power Grid in the long term. The 11th Malaysia Plan, which is led by the prime minister, encourages sustainable energy use and steady supply of effective and cheap electricity, and aims at mutual cooperation between players in the energy sector and at energy-saving realisation involving end users.

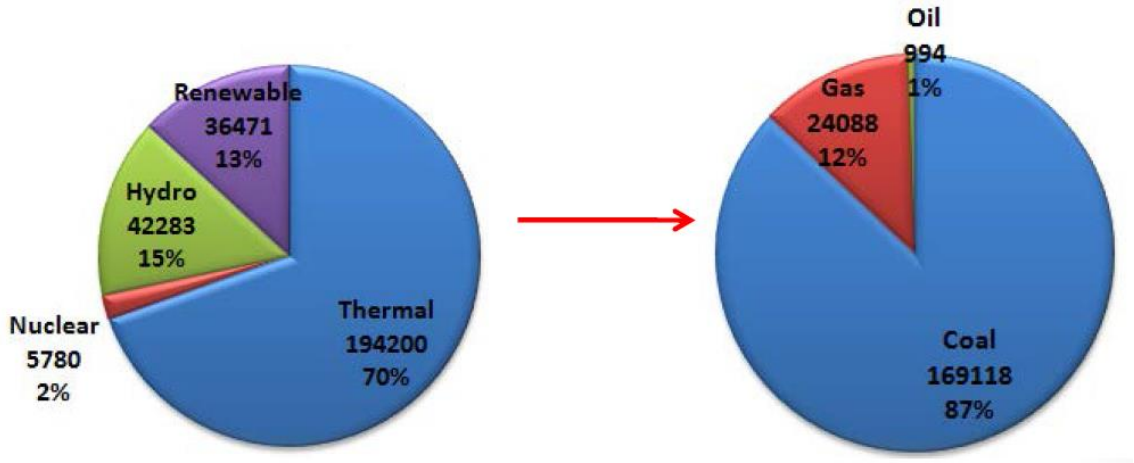
Today, coal is not largely consumed in Malaysia, but remains an open option as one of the alternatives. It would be necessary to watch the technological development and the international cooperation on CCT and public concern on coal power.

6) Coal Power Generation in India and its Role in Economic Efficiency

In India, thermal based power accounts for 70 percent of total generation and coal accounts for more than 80 percent of thermal mix. Because electricity consumption per person is still low, the potential for an increase in electricity in the future is high. India pushes forward the Ultra Mega Power Projects to cope with an increase in electricity demand. Sixteen plans were proposed so far, but only four were awarded by 2006 due to delays in land acquisition and foreseen policy changes.

Coal will continue to have maximum share towards installed capacity for power generation in India. CCTs such as supercritical, ultra-supercritical, and advanced ultra-supercritical system will be the focus in future power projects. More suitable to handle Indian coal are 800-1000MW unit plants, but technology cooperation with international manufacturers will be highly appreciated.

Figure 3-7. Potential Investment Benefits in India



Source: Prosanto Pal, The Energy and Resources Institute, India, presentation in the workshop.

3.2. Clean Coal Technology Development Status

1) Economic benefits of introducing CCT in the East Asian Summit (EAS) region

The use of coal is strictly limited by environmental factors in Europe, US, and other developed countries, but effective utilisation of coal is required in Asia. It is necessary to maintain and promote technologies with high efficiency, low emissions, yet competitive and low cost.

Future increases in energy consumption and electricity generation by fuel are calculated based on assumptions for economic growth, population, and crude oil price using the coal demand prediction model operated by ERIA (2015) for the EAS area.

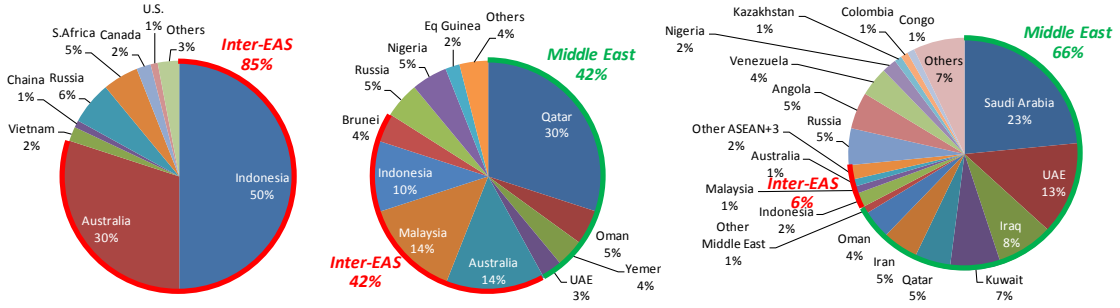
While the total electricity demand in 2035 will be twice that of 2012, coal demand will increase due to its cost competitiveness while its share in the power sector will be around 60 percent in 2035. Particularly, the increase in China is remarkable, and approximately 60 percent of coal consumption in the EAS area is by China.

Most gas is imported from the offshore areas of the Middle East whereas coal is almost always

locally produced for local consumption. The main coal supplier in the area is Indonesia, and the main offshore supplier is Australia.

Installation of facilities for environmental protection such as desulphurisation plants in conventional coal fired power plants is essential although it accounts for more than 20 percent of total construction costs. The efficiency is improved in integrated gasification combined cycle (IGCC) which is state-of-the-art and it releases little toxic substance. Furthermore, it can save considerable coal resources by improving thermal efficiency. CCT is high-cost, but it is desirable to invest in it positively because it is an appealing technology.

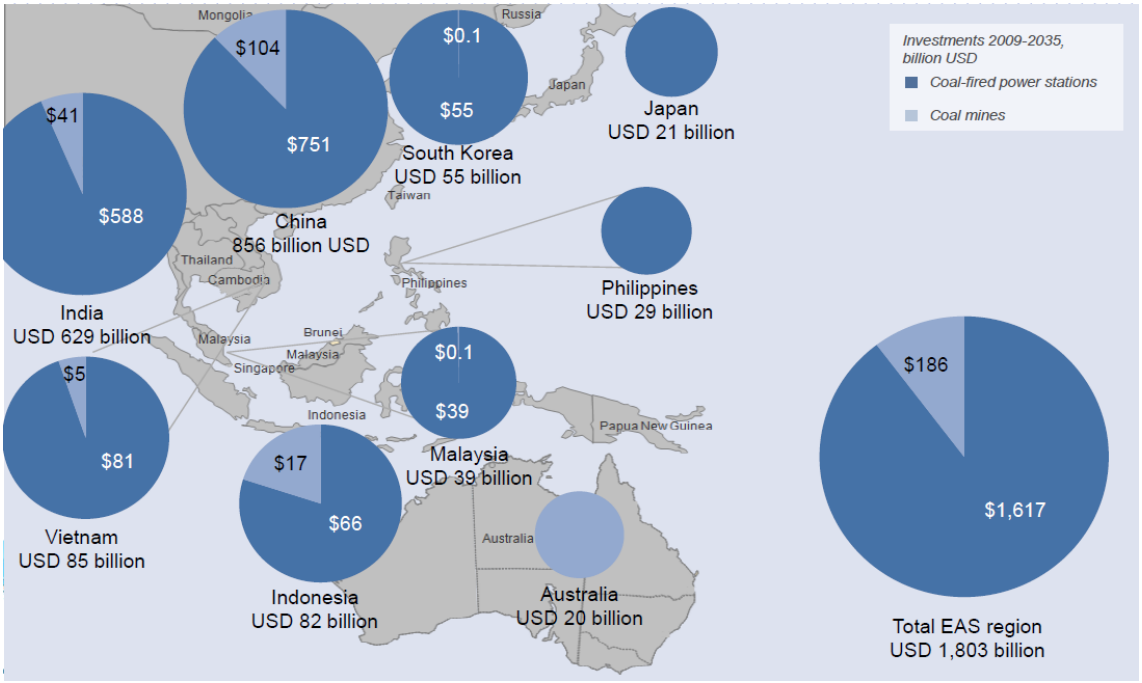
Figure 3-8. Origin of Primary Energy Imports



Coal import origins EAS (2013) LNG import origins ASEAN+3 (2013) Crude oil import origins EAS (2013)

Source: ERIA (2015）.

Figure 3-9. Potential Investment Benefits



Source: ERIA (2015).

2) Clean technology and Thailand's coal-fired power plant pollution control policy

The government of Thailand has carried out the environmental assessment of the thermal power plant through the Environmental Impact Assessment and the Environmental Health Impact Assessment. It also required detailed measures to prevent large scale pollution due to coal-fired power plants and coal mine utilities. For example, release of NOX from a newly built coal fired power plant is limited to less than 200ppm. Other than the official regulation, the industry introduced their voluntary standard and the effort along the industrial standard is required mainly for small coal-fired power plants.

Recommendations by the Government of Thailand include: 1) disposing coal combustion residuals by effective management and utilisation of coal ash as raw material for other industries; 2) value-added products and applications of fly ash and bottom ash; 3) applying green supply chain management for coal transportation; and 4) applying the best available technique for all industries using coal as fuels.

Figure 3-10. Emission Standards for New Power Plants in Thailand

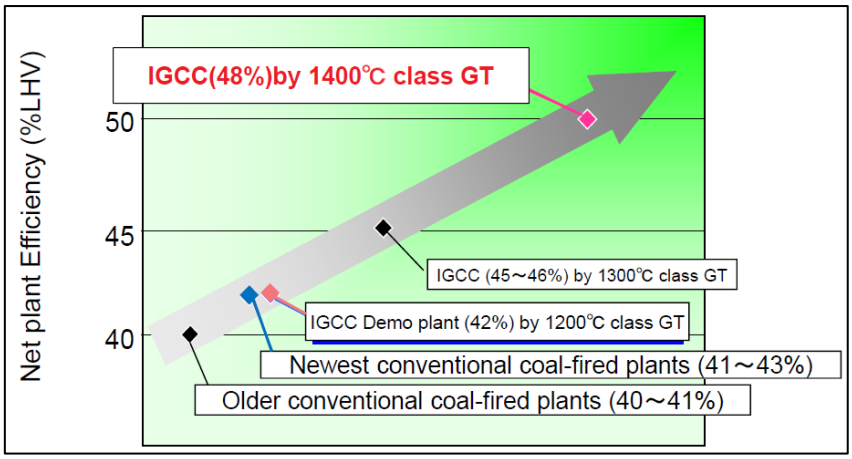
Power Plant type (size and fuel type)	TSP (mg/m^3)	SO_2 (ppm)	NO_x (ppm)
Coal			
❑ Power Plant Size ≤ 50 MW	80	360	200
❑ Power Plant Size > 50 MW	80	180	200
Oil	120	260	180
Natural gas	60	20	120
Biomass	120	60	200

Source: Thailand's Pollution Control Department, presentation in the workshop

3) Achievements and future activities in operation of clean coal technology

Aside from technology development of high efficiency coal-fired power plants and IGCC, efforts such as clearing a severe environmental standard, providing the environment data, and taking communication has been done by Tokyo Electric Power Company (TEPCO). The state-of-the-art IGCC can achieve 48 percent of thermal efficiency, and further improvement by reduction of coal ash and oxygen-blown technology is pushed forward. TEPCO achieved target performance over the longest time in the world at the IGCC proof plant of Nakoso with air-blown technology. TEPCO's CCT will make electricity infrastructure in Asia more efficient.

Figure 3-11. Efficiency Improvement with Increase in Gas Turbine Temperature



Source: Tokyo Electric Power Company, presentation in the workshop

3.3. Social Aspects of Coal Power

Though the role of coal power has been recognised by governmental officials and related business parties, this question still remains: How can we tell people the importance of base load power? Asian countries could learn something from the experience and the intelligence of European countries with a long history of coal and nuclear power utilisation, and of dialogues between government officials and the public.

1) Public acceptability on nuclear and coal power in European countries

Some cases in European countries would be of some help for Asian countries which are planning to introduce or expand the use of coal power plants.

Sweden thinks that crucial conditions for a power portfolio in the future are acceptability including safety, profitability, and capability in terms of technological readiness. Liberalisation in Nordic areas has led the countries to the ‘unified’ market. In Sweden, people accept nuclear power due to its low generation cost.

Germany has developed nuclear power since 1960s, but there are differences about coal resources between the northern and southern areas. There are political hurdles and business risks for power plant projects. Furthermore, Germany aims for very challenging targets in ‘Energiewende. It may lead to exporting volatile generation with low prices.

In Switzerland, renewables with zero marginal costs such as wind and solar, have pushed coal and gas out of the competitive market. The public generally accepts nuclear power and puts reliance on nuclear safety, and highly educated people are more pro-nuclear. Switzerland suggests that real merits (low electricity tariff and emissions) should be most effective in getting the public accept nuclear power.

France had developed and commercialised nuclear power since the 1950s. In the early stage, people were not ‘educated’ enough about the risks of atomic energy and merely believed that nuclear energy can solve every problem. After the Chernobyl accident in the former Union of Soviet Socialist Republics (USSR), the public lost their trust on the officials and the operators. Soon after, a ‘la commission locale d'information’ (CLI), an independent communication body, was established. The law ‘energy transition’ places the obligation on operators to disclose information to local residents through CLIs. Today, all kinds of information can be accessed via the web – a crucial platform that provides accurate and timely information whenever necessary.

As described in the previous chapter, the UK has projects led by Sciencewise, which is the national centre in the UK for public dialogues in policymaking involving science and technology issues. For example, a public dialogue on the GDA of new reactor designs are ongoing in the UK. Cost effectiveness as well as safety should also be reviewed in the UK.

Figure 3-12. Energy and Nuclear/Coal Policy in Major Countries

Country	Energy policy	Nuclear Development	Coal Development
Sweden 	Sustainability/ Carbon neutral	Suspending / decreasing (43% -> ?)	Little (2% -> ?)
Germany 	Zero Emission/ Anti-nuclear	Phasing out (16% -> 0%@2022)	None (without CCS) (45% -> ?)
Switzerland 	Ecology/ Environment compatibility	Transient (38% -> 0%@?)	None (without CCS) (- -> ?)
France 	Security / Sufficiency	Decreasing (78% -> 50%)	Little (2% -> ?)
UK 	Security / Low carbon economy	New builds for replacement (19% -> ?)	None (without CCS) (30% -> ?)

Source: The Institute of Energy Economics, Japan, presentation in the workshop.

Public communication by institutional bodies has faced big struggles during these decades. Even in USA or UK, it can be argued that such processes are extending the construction phase of nuclear projects significantly and putting substantial pressure on the operators during the operation phase. In developing countries, it must be said that public communication is viewed as a necessary tool and sometimes required by the financial community to justify the early investment. But fundamentally, most of the citizens of such countries do not participate and are not using the information for their own benefit. So in summary, these public communication bodies are failing.

Prompt and correct information sharing is a top priority. Independent communicating organisations with professional communication officers would be important. Providing benefits being brought by nuclear energy would be effective in increasing acceptability of nuclear power, rather than arguing about risks. It is really important for the nuclear industry to be accepted by the community and would allow penetration of coal power in East Asian countries.

2) Public concerns on coal/nuclear power and risk communications

Thailand has experienced growing public protests against largescale generation technologies. Although they are still to be strengthened, provisions in their laws and Constitution have established provisions for environmental impact assessments and health impact assessments, and increased the opportunity for public participation.

The ‘public’ means one or more natural or legal persons, a collection of numerous and continually shifting interests and alliances, which may be in conflict with each other. It may also be a catch-all to describe those with an interest in a decision other than a proponent, operator, or responsible authority. The individuals making up a public may be involved as individuals or as members of organisations. They may become involved due to their proximity, economics, social, or environmental issues, values, etc. A person doesn’t have to be a citizen to be a member of the public.

Studies indicate a serious gap in understanding and trust between stakeholders. Existing decision-making structures are often based on either the traditional DAD (Decide, Announce, and Defend) or DEAD (Decide, Educate, Announce, and Defend) methods, and can be seen as one source of gap in trust.

3) Public communication and public acceptance on coal power plant

Most hot issues come from the accusation of nongovernment organisations or academics who want to build their reputations by creating panic in the community and society by raising environmental and health issues. The resolution is to answer all the accusations by using scientific data, hence the need for it.

Accusation topics include contamination of heavy metals from coal burning, acid rain, respiratory impact to communities, coal dust dispersion, ash dispersion, and cooling water problems.

The major causes of the projects' failure are as follows:

- The community has not received the disclosed information on the project.
- The communities do not have any decisive participation from the beginning.
- There exist bad impressions from coal fire power plants in the past.
- NGOs oppose the project.
- The communities do not get any benefits from the project.

Developing large projects requires acceptance from the community surrounding the plant. Recognition by communities consists of two parts. One is that the communities trust that the plant will take care of the environment as a commitment. The other is how the communities will receive the benefits when the project starts. It takes time to create trust and acceptance from communities.