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Creating Better Social Acceptance for Electric Power Infrastructure

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List of Abbreviations

AEC	ASEAN Economic Community
APEC	Asia Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
BREFs	Best Available Techniques Reference Documents
CO_2	Carbon dioxide
CPP	Coal-fired power plant
EAS	East Asia Summit
EGAT	Electricity Generation Authority of Thailand
EPPO	Energy Policy and Planning Office
EHIA	Environmental and Health Impact Assessment
EIA	Environmental Impact Assessment
EMC	Environmental Monitoring Committee
EPA	Environment Protection Authority
EU	European Union
FGD	Fuel gas desulfurization
HCTISN	High-level Committee for Transparency and Information on Nuclear Security
IPP	Independent Power Producers
IEA	International Energy Agency
IEEJ	Institute of Energy Economics, Japan
KKG	Kernkraftwerk Gösgen
KNEF	Korea Nuclear Energy Foundation
LCLC	Local Community Liaison Council
CLI	Local Information Commission
CLIS	Local Information Follow-Up Commission [*Commission Locale d'information et de surveillance]*
LLC	Local Liaison Committee
MOE	Ministry of Energy
NOx	Nitrogen oxides
NGO	Non-governmental organizations
NDA	Nuclear Decommissioning Authority
NIC	Nuclear Industry Council
NSSC	Nuclear Safety & Security Commission

ONEP	Office of Natural Resources and Environmental Planning
NEA	Organisation for Economic Co-operation and Development Nuclear Energy Agency (OECD/NEA)
PM	Particulate matter
PDP	Power Development Plan
SPP	Small Power Producers
SO_2	Sulphur dioxide
SOx	Sulphur Oxide
SSG	Site Stakeholder Group
SSM	Swedish Radiation Safety Authority
ENSI	Swiss Federal Nuclear Safety Inspectorate
USC	Ultra supercritical
WEPT	Work and Environment-Related Patient Network of Thailand

Executive Summary

This project aims to improve social acceptance of the electric power infrastructure in Thailand.

Main Argument

This study comprehensively evaluates issues related to public acceptance of coal-fired power plants in Thailand to derive policy implications on how to mitigate public protests and prevent movements that oppose coal power plants; and to achieve better public acceptance of any electric power infrastructure with potential risks. An intensive survey of the energy system and case studies of coal-fired power plants in Thailand has been conducted. Accumulated experience and knowledge in advanced European countries and in international organizations regarding the social acceptance and public involvement issues have been thoroughly reviewed.

Through the survey, the research identified five major factors behind the strong opposition to the construction of coal power plants in Thailand, especially in the southern part (e.g. Krabi, Suratthani, Thepa). These are:

1. Technical issue: emission of sulphur oxide, nitrogen oxides, dust;
2. Personal beliefs and prejudices: 'coal is dirty', 'coal is dangerous', etc.;
3. Political or business interests: e.g. movement leaders have political ambitions;
4. Role of religion: especially in regions with large religious groups;
5. Funding by international/local environmental organizations.

The political/business issues as well as the funding issues are the dominant factors and should, therefore, be carefully monitored. Specifically, in the following cases, strong protests could be especially incentivised:

1. Some local and national political leaders have businesses in renewable energies. Because of their positions in public offices, these political leaders have the power to push for funding for projects in their preferred energy sectors and, conversely, to stop coal projects so as to improve the environment for their businesses.
2. The competitors of coal power plants—namely, natural gas-fired power plants and biomass plants—are mostly operated by private investors in Thailand. It will be to their advantage if the Electricity Generation Authority of Thailand (EGAT), the body promoting coal-fired power plants (CPPs), could not develop new coal projects.

3. Certain key players in these protest movements join to create a name for themselves as part of their ambition to get themselves elected to public office.

Based on the results of this study as well as of the seminar on 26 June 2017 in Bangkok, four recommendations on how to improve the public's acceptance of coal power plants are proposed.

RECOMMENDATION 1: Enlighten people with correct and fair information and knowledge

It should be noted that not everyone is correctly informed and educated on coal power plants' engineering issues. Therefore, such must be addressed if the prejudices against coal are to be dispelled. Correct information disclosure and education would be the solution to the first factor behind protests (i.e. technical issues), and a partial solution to the second factor (i.e. personal beliefs and prejudices) mentioned above.

Some protests against CPPs either hone in on environmental concerns or fully neglect other important elements of an energy policy—i.e. the need to balance energy security, economic efficiency, and environmental sustainability. Therefore, this is where discourses that highlight the importance of balancing the essential elements and focus on the facts of the case are important.

The EGAT has already held large-scale public hearings and conferences, where participants were reported to have gained a better understanding of the scientific facts on coal power plants. These must, however, be further supplemented by nationwide symposiums, workshops, TV programs, and internet videos. While such efforts will hardly gain immediate or short-term results, continuing the public education campaign is a must as it is a precondition to improved public acceptance.

Also, holding a 'public open day' —i.e. opening the power facility to visitors—may be a good opportunity for people to learn about the actual state of CPPs, and consequently help elicit their trust. On the part of the CPP operator, this may be an opportunity to understand the locals' actual thoughts and sentiments and gain insights on how to better address the public's issues on CPPs.

RECOMMENDATION 2: Increase confidence in the CPP and its operator

To gain social acceptance, the CPP and its operator must first win the public's confidence. One way to achieve this is to apply internationally authorized/recognized guidelines on the design, construction, and operation of CPPs in Thailand. For instance, the Asia Pacific Economic

Cooperation (APEC) (where Thailand is a member) has developed the 'APEC Guideline for Quality Electric Power Infrastructure' in 2016, which suggests considerations and standards for power plants from planning to operation.

Because environmental concerns are the biggest reason for protests against CPPs, improving the environmental management mechanism can help gain public acceptance. This study suggests measures that are all meant to demonstrate the standard of construction and operation of a CPP in a transparent manner. These measures can be the following:

- Emission from CPPs must be continuously measured and such measured data transmitted to the local government in real time. Subsequently, the data must be opened to the public (for instance, via the local government's website).

The Ministry of Environment must evaluate, grade and publish environmental management results on each CPP every year.

RECOMMENDATION 3: Provide financial and political incentives

While there are parties who fully understand the technical facts behind CPPs, they continue to protest because they either have politically motivated reasons or are swayed by international/local environmental organizations' negative campaigns.

For concerns that are mainly for political or business reasons, an option is to provide financial benefits to locals within a specific geographical location. Such option has, in fact, been done for residents within 5 kilometres from a power station in Thailand. However, the protesting movements have reportedly expanded beyond the 5-kilometre radius. One can expect geographically wider acceptance if the area eligible for financial support is expanded, although it is clearly unsustainable to have a too-broad eligible area. In Japan, for instance, what its government has done is to define the area eligible for financial support based on the administrative district (e.g. city, town) where a power plant is located. Such definition can help get the support of local politicians since the financial benefit will be distributed to, for instance, their city as a whole.

Although the Japan model will incur bigger financial costs than Thailand's existing 5-kilometre radius scheme, it may still be worth it to consider expanding the eligible area to cover an administrative district.

Another solution is to incentivize stakeholders who can positively contribute to a coal power project throughout the lifetime of the station—from planning, construction, license, operation,

and decommissioning. The following measures may potentially work as financial/political incentives:

- Call a meeting with interested parties during the planning stage and engage them in the development of plans for the operation of the power station. The aim is to allow the locals to take ownership over the success of the CPP project and realize the impact of such on their lives and economy. The key here is to get stakeholders involved during the earliest stages of the project as possible.
- Provide job opportunities for locals. Job creation (or employment) is always of interest to residents as well as politicians. Therefore, jobs with attractive packages (e.g. those that are long-term, offer appropriate pay, provide good family benefits) will be a major incentive to accept the CPP in the locality.
- Invite critical persons from international/domestic environmental organizations (who fund protest activities in Thailand) to public meetings to discuss financial support schemes—for example, subsidies for the installation of specific advanced technologies such as ultra supercritical-CPPs, so that they will change the focus of their funding from protest activities to promotional activities).

RECOMMENDATION 4: Strengthen role of the central government

The Thai government's role and leadership in the electric power industry should be reinforced. The Ministry of Energy—i.e. its Energy Policy and Planning Office—is responsible for planning and procuring the country's long-term energy, including electrical power. Meanwhile, there is no direct department or government agency within the MOE or other ministries that is responsible for looking after coal power plants. The sole national electric utility, EGAT, works as a conduit with the locals (instead of with governmental agencies) regarding protest movements against coal power plants.

Meanwhile, the central government, whose primary objective is to protect the nation's collective interests, can participate by setting the ground for constructive discussions. In particular, it can play a bigger role by holding dialogues with each municipal government, rather than direct talks with the residents. This way, municipal governments become strong supporters of the central government's program, while EGAT continues to improve CPP acceptance from residents since it already has direct communication lines with locals. For this approach, an integrated agency from several ministries of the government (e.g. Ministry of Energy, Ministry of Natural Resources and Environment, Ministry of Public Health, and Ministry of Education) must comprehensively manage the development of environment-friendly energy infrastructure.

RECOMMENDATION 5: Utilize international advocates

International non-governmental organizations count among the protesters against CPPs. In this case, international advocates can help deal with such organizations. Thailand is a member of the East Asia Summit and the Asia Pacific Economic Cooperation. Also, the International Energy Agency (IEA) is an example of a highly recognized international organization in the energy field. Thailand must lead discussions among such international organizations to form a consensus on the necessity of CPPs, and disseminate its stand to stakeholders inside/outside of Thailand through declarations, reports, and presentations. Although it may be impossible to eliminate dissenting voices, this tactic might at least be able to initiate more open and fair discussions on CPPs.

Introduction

The East Asia Summit (EAS) region needs to develop every kind of power facility for its future demand for electricity. Of these facilities, those on coal, nuclear, grid, and in some cases, even renewable energy such as wind are facing protests from the locals or non-governmental organizations (NGOs) from the start of an infrastructure's construction. Therefore, it is crucial to enhance social acceptance for electric energy if a nation is to achieve a stable electricity supply and a well-balanced power supply mix.

Thus, the previous study on social acceptance on nuclear power plants stemmed from an organized symposium attended by experts from energy businesses and the academe. The seminar acknowledged that the need for such power sources as coal and nuclear energy is not fully accepted by the public, and it is incumbent upon the government and power companies to explain the importance of these power sources as well as their safety and environmental impact. In FY 2016, the study focuses on a case study in Thailand where conflict continues between advocates and opponents of coal-fired power plants (CPPs). The study tries to develop a consensus-based process that reflects and takes into consideration Thailand's unique conditions. As the issues raised on Thailand's CPPs are the same ones tackled elsewhere, the findings from this study can be disseminated among the Association of Southeast Asian Nations (ASEAN) members.

The focus of the study is aligned with the various strategic themes in the ASEAN Economic Community Blue Print 2025 and its subordinate paper, APAEC 2016-2025 phase 1, such as the 'ASEAN power grid', 'Coal and Clean Coal Technology', 'Energy Efficiency and Conservation', 'Renewable Energy', and 'Civilian Nuclear Energy', and is anticipated to contribute to the discussion.

In addition, the study is consistent with the goal of creating a resilient society as described in the ASEAN Socio-Cultural Community Blueprint 2025, particularly with regard to the principle of ensuring 'availability and accessibility of affordable energy services'. In this context, this project aims to improve social acceptance of electric power infrastructure.

This project has three methodologies:

1. It conducted a case study on social acceptance for CPPs in Thailand, with the cooperation of local energy experts. Currently, the government promotes CPP from the energy security perspective, in the midst of protests over CPPs because of past experiences. The result of the case study may be useful to other ASEAN member countries that face the same kind of conflict. The analysis considered the following points:

- Summary of issues raised by advocates and opponents
- Essentials in improving social acceptance
- Formation of a consensus-based process that takes into consideration the above findings
- Information sharing and further discussion through workshops

2. It reviewed cases on public involvement in large energy infrastructure projects from developed countries as a reference. The study analysed the influences of policy and policymakers' decisions and by learning from their cases, found ways to drive public dialogues in Asian countries.

3. Based on the above-mentioned methodologies, the study delivered two kinds of policy recommendations: one for the EAS region in general, and another specifically for Thailand.

This study highlights policy implications on how to mitigate public protests and prevent delays in electric power infrastructure projects in the region. It also raises the crucial issues that can affect public acceptance of electric power infrastructure with potential risks. Direct public involvement would be one of the important measures for social acceptance and political decision-making; however, whether it is valid in other Asian countries should be carefully examined.

The CPP case study in Thailand delivers two kinds of policy recommendations. The first kind provides lessons learned and highlights crucial conditions that must be in place before proceeding with large and risky infrastructure projects in Asian countries. The second suggests an alternative measure for constructing public consensus on general issues, which may be useful information for stakeholders in other Asian countries.

Chapter 1

Coal-fired Power Plants in Thailand

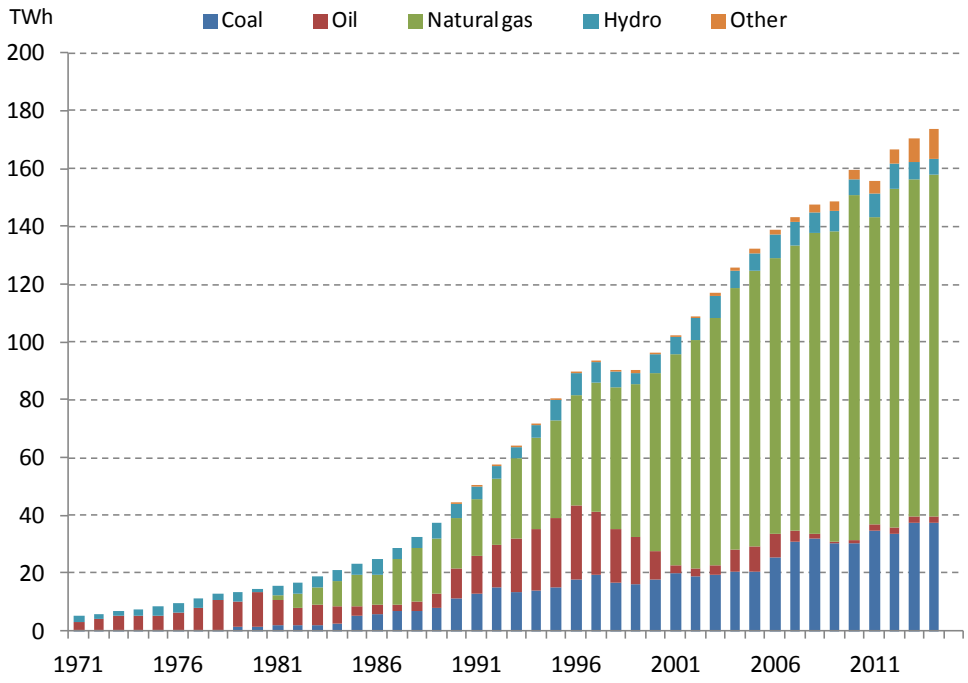
1.1 Coal-Fired Power Plant Development in Thailand

1) Brief Review of Thailand's Energy Status

Figure 1-1 shows how the electricity output in Thailand from 1971 to 2014 has been growing, especially starting from the late 1980s. Of the power sources available, Thailand highly depends on natural gas and coal.

Natural gas has mainly driven the growth in the country's electricity output. Its share in total electricity output is as high as 68% in 2014. Coal has the second largest share of the electricity output (22%).

Figure 1-1. Electricity Output in Thailand

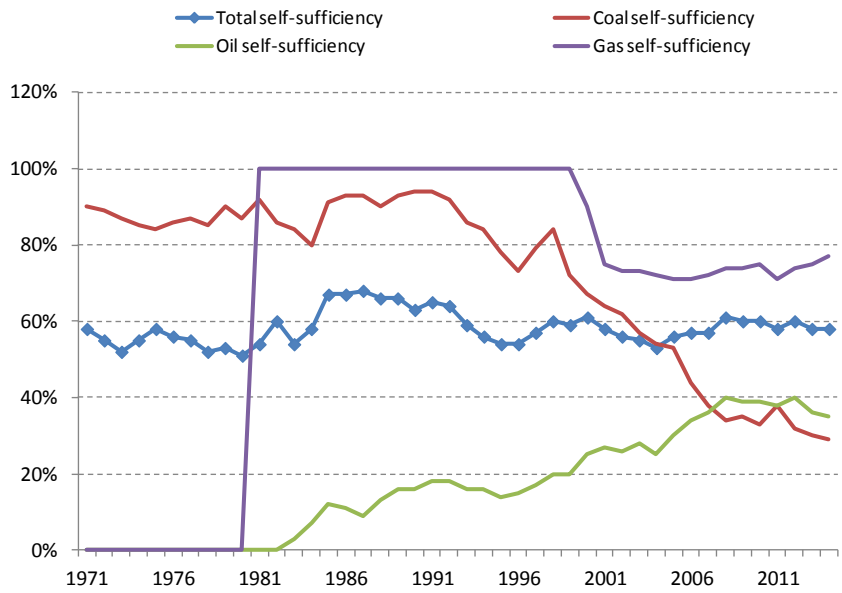


Source: International Energy Agency, World Energy Balance 2016.

Figure 1-2 shows the self-sufficiency rate of Thailand. Natural gas was started to be produced domestically in the 1980s and since then has greatly contributed to the country's stable self-

sufficiency rate (around 60%). However, according to the *BP Statistical Review of World Energy* (Table 1-1), the reserves-to-production ratio of Thailand's natural gas is only 5.5 years. On the other hand, coal has significantly more reserves (81.8 years). How to shift from domestic natural gas to other energy sources, which include domestic coal, is one of the biggest issues in Thailand's energy security.

Figure 1-2. Self-sufficiency Rate of Thailand



Source: International Energy Agency, World Energy Balance 2016.

Table 1-1. Reserves-to-Production Ratio

Resource	Reserves-to-production ratio (in years)
Oil	2.3
Natural gas	5.5
Coal	81.8

Source: BP Statistical Review of World Energy, June 2016.

2) Coal-Fired Power Plants Developed by EGAT

a. Krabi lignite mine and power plant development

Krabi is the first lignite mine developed to fuel a lignite-fired power plant. Located near the mine in Klong Pakasai, Krabi Province, south of Thailand, the Krabi power plant consisted of three units with 20 MW each. It was constructed in 1961 and started commercial operation in 1964. It supplied electricity in the South for almost 31 years before it was decommissioned in 1995 (Note: unit 2 was decommissioned in 1986) and converted to fuel with heavy oil (Table 1-2).

Table 1-2. Krabi Lignite Power Plant

Unit	Capacity (MW)	Commercial Operation	Note
1	20	1964	Decommissioned in 1995
2	20	1964	Decommissioned in 1986
3	20	1964	Decommissioned in 1995

Source: Electricity Generation Authority of Thailand.

b. Mae Moh Lignite-fired power plant

The Mae Moh lignite-fired power plant was part of a national energy development strategy of reducing the country's high dependency on imported oil by developing indigenous energy resources such as natural gas, lignite, and hydropower. The Mae Moh lignite open pit mining and power stations complex, both owned by the Electricity Generating Authority of Thailand (EGAT), are located in Lampang Province in Northern Thailand.

The first Mae Moh lignite-fired power plant with 75 MW began construction in 1975 and was completed in 1978. The next 2 x 75 MW units started commercial operation in 1979 and 1981, respectively.

The 4 x 150 MW plant started commercial operation from 1984 to 1985. Power plant units 8-13 (with 300 MW each) were constructed and commissioned from 1989 to 1995.

In 1999, the facility's unit 3 was decommissioned, while units 1 and 2 were retired in 2000.

Today, the plant has a total of 2,400 MW generating capacity in operation (Table 1-3).

Table 1-3. Mae Moh Power Plants: 225 + 2,400 MW (Fuel: Lignite)

Unit	Capacity (MW)	Commercial Operation	Note
1	75	1978	Decommissioned in 2000
2	75	1979	Decommissioned in 1999
3	75	1981	Decommissioned in 2000
4	150	1984	
5	150	1984	
6	150	1985	
7	150	1985	
8	300	1989	Total 2,400 MW
9	300	1990	
10	300	1991	
11	300	1992	
12	300	1995	
13	300	1995	

Source: Electricity Generation Authority of Thailand.

3) Coal-Fired Power Plants Developed by Independent Power Producers

The Thai government initiated the Independent Power Producers (IPP) and Small Power Producers (SPP) programs with three goals in mind: (i) to attract private capital so as to meet demand growth in power generation; (ii) to encourage the introduction of new technology; and (iii) to capitalize a more efficient, better managed and more competitive electricity market.

Private power plant developers were responsible for the development, construction and operation of the power project with their rights and power to delegate the sale of electricity in power purchasing agreements (PPAs).

The first awarded group of IPPs developed seven projects. Three out of the seven projects were proposed to import coal as fuel.

Table 1-4. Projects Proposed To Use Imported Coal As Fuel

Project	Capacity (MW)	Proposed Location	Note
BLCP	2 x 673.25	Map Ta Phut, Rayong	
Gulf Power	2 x 367	Bo Nok, Prachuapkhirikhan	Changes to natural gas
Union Power	2 x 700	Hin Krut, Prachuapkhirikhan	Changes to natural gas

Source: Electricity Generation Authority of Thailand.

In late 1997, when the financial crisis swept over Thailand, only two of the original seven projects had signed PPAs with EGAT. Additionally, two coal-fired projects represented one-third of the awarded IPP capacity. Gulf Electric/Bo Nok (now Khang Koi II and relocated) and Union Power (now Ratchaburi Power and relocated) were delayed and marred with violent protests from anti-coal non-governmental organizations (NGOs), local villagers as well as opposition groups.

Each plant has subsequently been moved to a new location and converted to natural gas. During the period, EGAT cancelled the construction of the 2,000-MW Thap Sakae power plant, also located in Prajuapkhirikhan. Table 1-5 shows the list of SPP and IPP coal-fired power plants where EGAT had purchased power from since 1999.

Table 1-5. SPP/IPP Power Plants

SPP/IPP	Unit No.	Capacity (MW)	Commercial Operation	Note
Glow	1	160	1999	PPA: 90 MW sold to EGAT
	2	160	1999	PPA: 90 MW sold to EGAT
BLCP Power	1	717	2006	PPA: 673.25 MW sold to EGAT
Co. Ltd	2	717	2007	PPA: 673.25 MW sold to EGAT
GHECO-ONE Co. Ltd	1	700	2012	PPA: 660 MW sold to EGAT

Source: Electricity Generation Authority of Thailand.

4) Environmental Laws and Regulations Concerned in Coal-Fired Development

In 2007, section 67 of the Constitution of the Kingdom of Thailand stated that 'Any project or activities which may seriously affect the community with respect to the quality of the environment, natural resources and health shall not be permitted, unless prior to the operation thereof its impact on the quality of the environment and the public health have been studied and assessed and/on public hearing process having been conducted for consulting the public as well as interested persons and there has been an opinion of an independent organization consisting of representatives from private organizations in the field of environment and health and from higher education institutions providing in the field of the environment, natural resources or health.'

The National Health Act 2007 further protects the rights of individuals or groups by requesting an assessment and participation in the assessment of the health impact of a public policy.

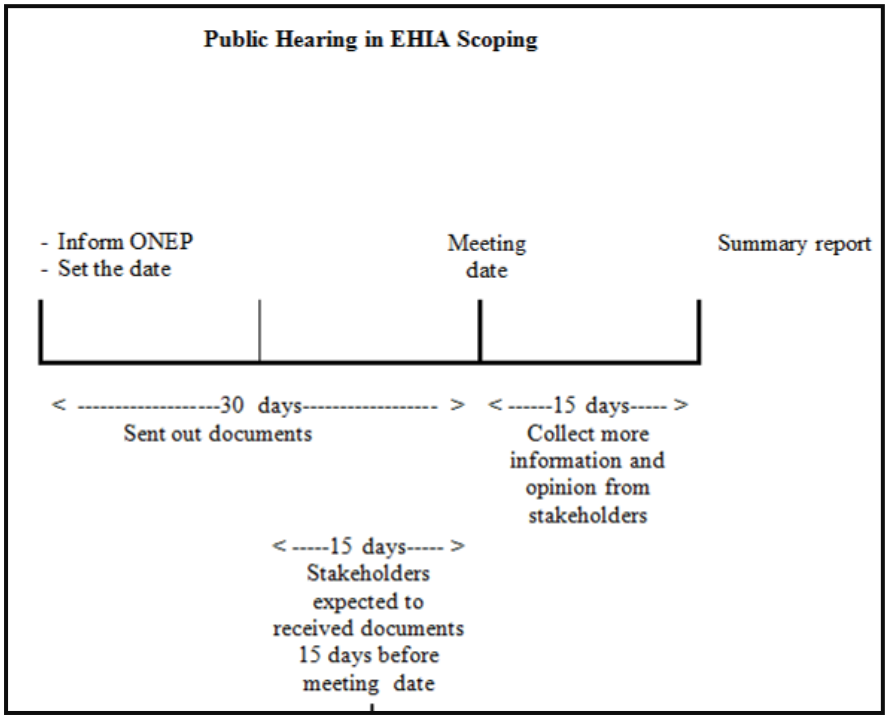
According to the ministerial regulations under the Ministry of Natural Resources and Environment, new coal-fired power plants with capacity of more than 100 MW and coalmines are required to undertake an Environmental and Health Impact Assessment (EHIA). The full EHIA includes a public hearing.

There are six steps for EHIA preparation, each requiring the participation of stakeholders. The steps and the responsible team/agency are:

- **Screening**: Project proponent/ Office of Natural Resources and Environmental Planning (ONEP)
- **Public scoping** (in which the study team or consultant company must allow the public to express concerns on potential impacts): EHIA consultant/ Project proponent/ONEP
- **Assessment or appraisal**: EHIA consultant
- **Public review**: EHIA consultant/ Project proponent/ONEP
- **Decision making**: ONEP/National Environment Board/Cabinet
- **Monitoring**: Project proponent/ONEP

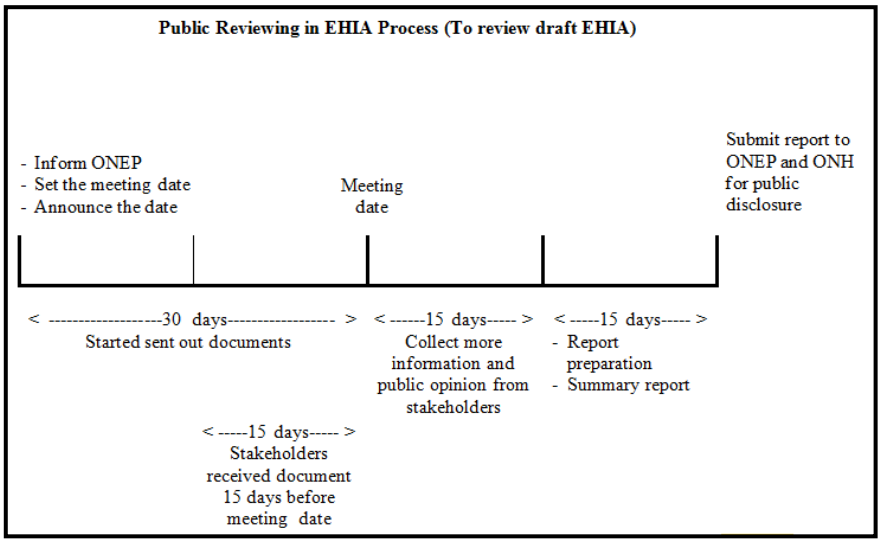
The following figures explain the Public Scoping, Public Review, and Decision-Making processes.

Figure 1-3. Public Hearing on EHIA Scoping



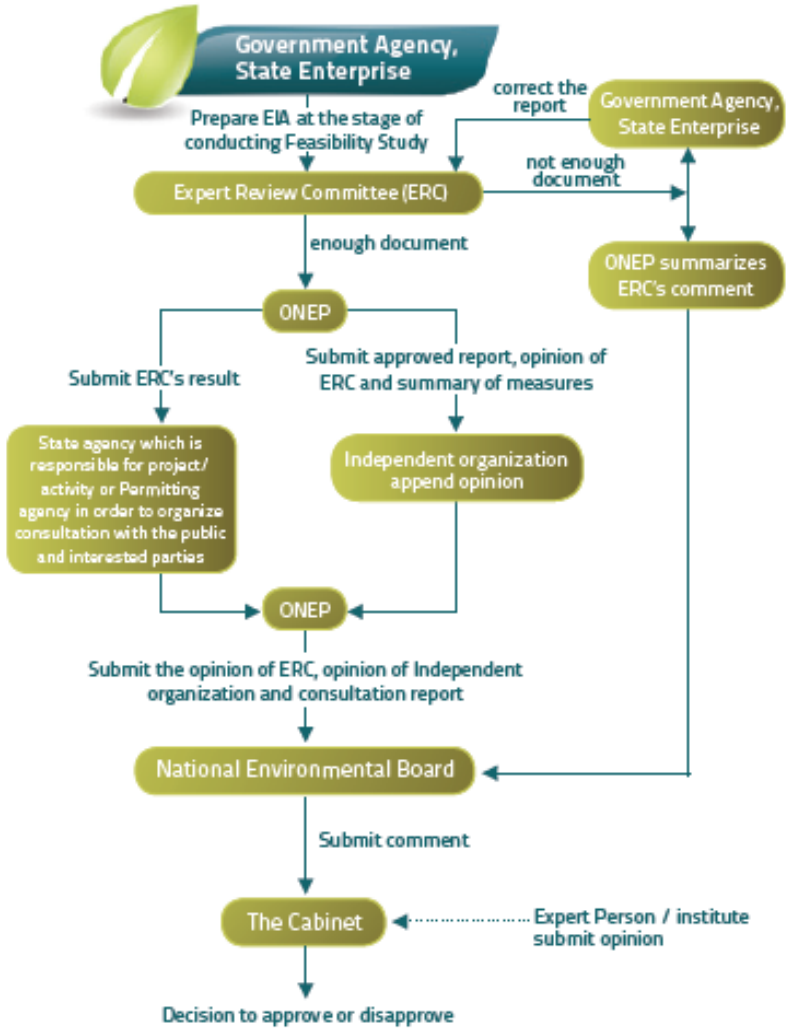
Note: ONEP = Office of Natural Resources and Environmental Planning.
Source: Environmental Impact Assessment in Thailand, Office of Natural Resources and Environmental Policy and Planning, May 2012.

Figure 1-4. Public Review on EHIA Process



Source: Environmental Impact Assessment in Thailand, Office of Natural Resources and Environmental Policy and Planning, May 2012.

Figure 1-5. Approval Process For Projects/Activities* That May Seriously Affect A Community's Environment, Natural Resources, and Health



*Note: Such activities require the approval of the Thai Cabinet.
Source: Environmental Impact Assessment in Thailand, Office of Natural Resources and Environmental Policy and Planning, May 2012.

5) Air Emission Standards

The current air emission standards for new coal-fired power plants are relevant for all plant generators.

The regulated limits for new coal-fired plants are shown in Table 1-6.

Table 1-6. Limits for New Coal-Fired Plants

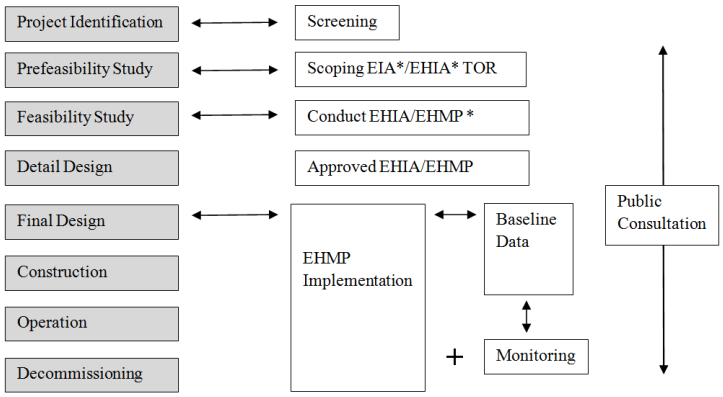
Capacity (MW)	SO_2 (ppm)	NO_X (as NO_2) (ppm)	Particulate Matter (mg/m^3)
≤ 50	360	200	80
> 50	180	200	80

SO_2 = sulphur dioxide; NOx = nitrogen oxide.
Note: Reference conditions are 25°C at 101.3 KPa (1 atm) or 760 mm/Hg on a dry fuel gas basis with 50% of excess air or 7% O_2 during combustion.
Source: Pollution Control Department.

6) Procedure for Commission of Coal Power Plants

While EGAT has long been the main player in the development and construction of power plants, IPPs started to play a key role in the development of power plants from 1997. Figure 1-6 lists the procedure that all developers have to consider.

Figure 1-6. Project Feasibility Versus Environmental and Health Impact Assessment Interaction



EIA = Environmental Impact Assessment; EHIA = Environmental and Health Impact Assessment; EHMP = Environmental and Health Mitigation Plan
Source: Graphic designed by Kitti Kumpeera.

7) Review of Major Players, Regulators, Licensees, And Vendors

The term 'stakeholder' may be understood as any actor—an institution, group or individual—with an interest or a role to play in a societal decision-making process. Stakeholders in coal-fired power plant development and operation from the public sector fall under one of these four groups :

- Power Policy and Planning Agency and Regulator
- National Policy Agency
- Implementation Agency
- Environmental and Health Agency

Table 1-7. Key Players in Power Plant Development

Power Planning and Regulating Agency	National Policy Agency	Implementation Agency	Environmental and Health Agency
Ministry of Energy -Energy Policy and Planning Office -Office of Energy Regulatory Council	National Economic and Social Development Board	Electricity Generation Authority of Thailand Independent Power Producers, and Small Power Producers	Ministry of Natural Resources and Environment -Office of Natural Resources and Environmental Planning Ministry of Public Health

Source: Adapted from the Energy Regulatory Council.

The Energy Policy and Planning Office (EPPO) under the Ministry of Energy (MOE) is responsible for planning and procuring the country's long-term energy, including electrical power. Yet, there is no direct department or government agency—whether within the MOE or in other ministries—that is in charge of looking after coal plants specifically. Thus, the role of providing information or educating the general public rests with the MOE. Meanwhile, the EGAT, a state enterprise that follows the directives from the MOE, is the implementer of the country's power generation plan.

It seems that the MOE is currently doing very little in preparing the groundwork for a new power plant, regardless of the type of energy source. The role of educating the public is pushed to EGAT; thus, EGAT is now taking both the tasks of educating the public and building a new power plant. These roles sometimes are seen to put EGAT in a bind: That is, EGAT's main mandate is to set up new power plants for the power generation sector. Thus, when EGAT tries to proceed to enlighten the public with correct and fair information and knowledge, the target audience would tend to assume that this is merely an action to protect its own interests and thus, does not believe what EGAT says.

The Prime Minister has instructed EGAT to come up with an understanding with the people living close to the coal power plants. Unfortunately, there is little mention of MOE's role in such process.

1.2 Role of CPPs in the Power Development Plan (PDP)

1) The Plan

a. Thailand energy policies

The Thailand Power Development Plan 2015-2036 (PDP2015) is the key energy policy of Thailand that aims to achieve a sustainable and well-balanced energy mix for the future. The PDP2015's framework, which was formulated in line with the Energy Efficiency Development Plan and the Alternative Energy Development Plan, was approved by the National Energy Policy Council on 17 December 2014. The policy includes the following:

- **Energy Security**: Dealing with an increase in power demand by taking into account fuel diversification to lessen the dependency on one particular fuel.
- **Economy**: Maintaining an appropriate cost of power generation and implementing energy efficiency.
- **Ecology:** Reducing environmental and social impacts by lessening carbon dioxide intensity in power generation.

The PDP2015 was formulated in line with social and economic development directions from the office of National Economic and Social Development Board. The Board estimates that the average growth of projected long-term Thai Gross Domestic Products (GDP) was 3.94%. With the PDP2015 and the Energy Efficiency Development Plan's energy efficiency directions, the

expected energy savings would be 89,672 GWh in the year 2036. Moreover, renewable energy—for instance, municipal waste, biomass, biogas, wind, and solar power generation—will be encouraged, according to the Alternative Energy Development Plan. Investments in a transmission and distribution system will accommodate renewable energy and smart-grid development.

b. Power demand forecast

Thailand's new Power Demand Forecast was calculated using the average long-term GDP growth in 2014-2036 at 3.94% by the National Economic and Social Development Board. The average population growth was estimated at 0.03%. In addition, the energy savings target from the Energy Efficiency Development Plan accounts for 89,672 GWh, while the renewable energy development target from the Alternative Energy Development Plan was set at 19,634.4 MW for the year 2036.

Thailand's new Power Demand Forecast would grow 2.67% annually from the year 2014 to the year 2036. By 2036, the expected energy and power demand would be 326,119 GWh and 49,655 MW, respectively.

The Power Demand Forecast of the PDP2010 Revision 3 and the PDP2015 are compared as follows:

Figure 1-7. Power Demand Forecast of the PDP2010 Revision 3 and the PDP2015

Year	PDP2010 Rev3		PDP2015		Change (%)	
	Peak (MW)	Energy (GWh)	Peak (MW)	Energy (GWh)	Peak (MW)	Energy (GWh)
2016	31,809	210,619	30,218	197,891	-1,591	-12,728
2026	46,003	304,548	40,791	267,629	-5,212	-36,919
2030	52,256	346,767	44,424	291,519	-7,832	-55,248
2036	-	-	49,655	326,119	-	-

PDP = Power Development Plan.
Source: PDP2015.

The point here is that although PDP2015 includes more energy savings than PDP2010 Revision 3, power demand is estimated to grow significantly (around 65% by 2036). How to expand its power generation capacity is still the main challenge to Thailand's energy sector.

c. Key assumptions and frameworks

On 15 August 2014, the National Energy Policy Council approved the following assumptions and frameworks for PDP2015:

- Ensure power system reliability of subsystem areas in power generation, transmission, and distribution.
- Focus on fuel diversification so as to lessen the dependence on one particular fuel:
  - Reduce natural gas power generation
  - Increase coal power generation via clean coal technology
  - Purchase power supply from neighbouring countries at not more than 20% of the total capacity
  - Encourage renewable power generation
  - Maintain nuclear power plants at the end of the plan.
- Ensure an appropriate level of reserve margin of not less than 15% of the peak power demand.
- Maintain committed IPPs and SPPs according to the PPAs.

d. Generating capacity

Given the above-mentioned assumptions and frameworks, the PDP2015 can be summarized as follows: In 2036, the total capacity will be 70,335 MW, comprising of an existing capacity of 37,612 MW (as of December 2014); new capacity of 57,459 MW; and retired capacity during 2015-2036 of 24,736 MW (Figure 1-8).

Figure 1-8. Generating Capacity in the PDP2015

Generating capacity during 2015 - 2036

- Existing capacity as of December 2014	37,612	MW
- New capacity during 2015-2036	57,459	MW
- Retired capacity during 2015-2036	-24,736	MW
- Total capacity in 2036	70,335	MW

New capacity added during 2015-2036 of 57,459 MW can be classified as follows:

Renewable power plant	**21,648**	**MW**
- Domestic	12,105	MW
- Power purchase from neighboring countries	9,543	MW
Pump-storage hydro power plant	**2,101**	**MW**
Cogeneration power plant	**4,119**	**MW**
Combined cycle power plant	**17,478**	**MW**
Thermal power plant	**12,113**	**MW**
- Coal/Lignite power plant	7,390	MW
- Nuclear power plant	2,000	MW
Gas turbine power plant	1,250	MW
Power purchase from neighboring countries	1,473	MW
Total	57,459	MW

Source: PDP2015.

Consequently, Figure 1-9 shows the estimated fuel requirements for PDP2015.

Figure 1-9. Estimated Fuel Mix for PDP2015

Fuel	Percentage in 2014	Percentage in 2026	Percentage in 2036
Imported hydro power	7	10 - 15	15 – 20
Clean coal including lignite	20	20 - 25	20 – 25
Renewable energy including hydro	8	10 - 20	15 – 20
Natural gas	64	45 - 50	30 – 40
Nuclear	-	-	0 – 5
Diesel/Fuel oil	1	-	-

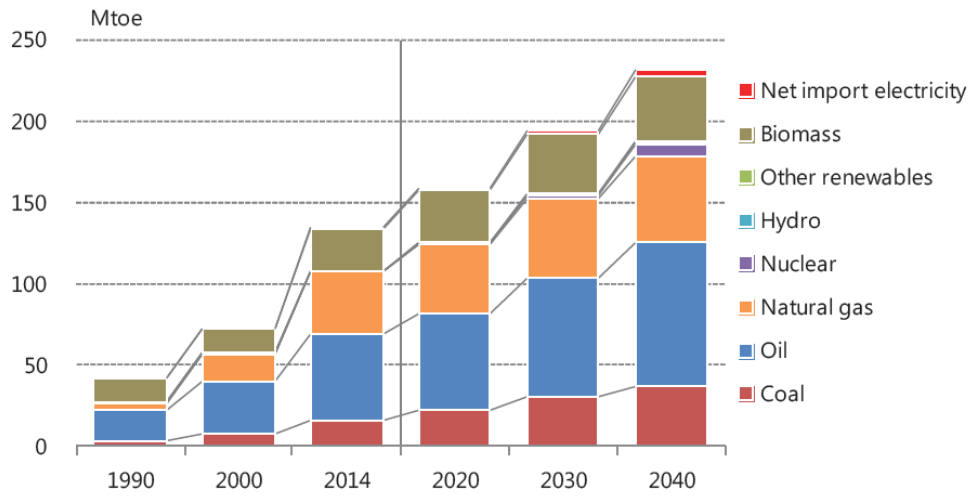
Source: PDP2015.

Encouraging renewable power generation is the main point of PDP2015. Renewable power generation is estimated to grow the most among all power sources during 2015-2036. However, clean coal, including lignite, is still expected to grow by around 7 GW and to keep its place as the second largest share in the energy mix next to natural gas. This statistics highlights the importance of coal generation in achieving a sustainable and well-balanced energy mix in Thailand.

2) Reference: IEEJ's *Asia / World Energy Outlook 2016*

The Institute of Energy Economics, Japan (IEEJ) publishes the *Asia/World Energy Outlook* every year to analyse and show trends and the latest information on future world energy supply and demand. One of the topics of the 2016 edition is the ASEAN energy market, including Thailand's energy market.

Figure 1-10. Outlook of Thailand's Primary Energy Consumption (Reference Scenario)



Source: *Asia /World Energy Outlook 2016*.

Figure 1-10 shows that Thailand's primary energy consumption will increase 1.7-fold by 2040. All the energy sources, including coal, will expand to meet the country's growing energy demand. The IEEJ also estimates that electricity demand will double and one-third of the growth will be covered by coal-fired power plants. It expects more growth in coal compared with the target in PDP2015.

Both PDP2015 and IEEJ's *Asia/World Energy Outlook 2016* demonstrate that coal will sustain or even expand its importance in Thailand's energy mix. Along with the promotion of domestic

renewable power generation, importation of hydro power, and energy conservation, efforts should focus on gaining traction in terms of public acceptance of coal energy, to pave the way for the expansion of its capacity.

Chapter 2

Public Acceptance of Coal-Fired Power Plants

2.1. Impressions and public survey results on Coal-Fired Power Plants

The World Energy Council/World Energy Resources 2016 enumerates the following facts about coal in electricity generation worldwide:

- Coal is the second most important energy source, covering 30% of the global primary energy consumption.
- Coal (hard coal and lignite) is the leading energy source in power generation. About 40% of the globally generated power relies on coal.
- 75% of coal plants worldwide utilize subcritical technology. An increase in the efficiency of coal-fired power plants throughout the world from today's average of 33% to 40% could cut global dioxide emission by 1.7 billion tons each year.
- The United States is closing or replacing coal with gas in power plants (more stringent environmental regulations).
- Coal power in Western European is facing considerable opposition as the public's current concern is how to mitigate climate change.

1) The Trend in Thailand

In Thailand, people often have a negative opinion towards coal-fired power plants because they have been taught that 'coal has the most contaminating power plants' from their elementary to their college years and beyond. Hence, the general public trusts neither the government nor coal plant operators. City dwellers, including intellectuals, who were exposed to the air pollution caused by the coal-fired power plant in Mae Moh were some of those who joined the oppositionist movements. Also, one of the major reasons for the rise of such movements is the argumentative nature of Thais.

The movement against coal-fired power plants could have strong political undertones. Opposition parties, for example, want to differentiate themselves from the ruling parties and

therefore, have to naturally 'oppose' coal-fired power plants. The ruling parties in Thailand have promoted coal-fired power plants, whereas the opposition such as the Democrat Party, Thai Nation Development Party, and Rak Thailand Party opposed the construction of new coal-fired power plants.[1] The Democrat Party leader even announced in February 2017 that if the party wins the next general election, it would ban new coal-fired power plants and instead promote the use of liquefied natural gas and renewable energies for power generation. However, they have no objections to existing coal power stations.

In addition, the different culture between the southern regions and urban areas of Thailand cause differing opinions. In the southern part of Thailand, it is the NGOs—not the locals—who protest for political reasons. Locals who do not consume as much electricity as those were were willing to proceed with the construction of new power plants, do not want any disruption in their current lifestyle, which depends entirely on the Mekong River. Biomass and biogas are energy sources derived from locally produced raw materials such as wood and are, therefore, easily accessible to the locals. Meanwhile, these residents strongly oppose CPPs as they believe these will contaminate the seawater and air.

It is important to set the provincial agencies of the central government's ministries apart from the elected local district governments that rely on popular support from the locals. That is, provincial government agencies show no explicit resistance against coal power plants. On the other hand, local/district governments can resist the establishment of coal power plants depending on the information they receive. The dissemination of inaccurate information regarding coal is more prevalent in the southern provinces of Thailand.

The trends in either the views on or actual constraints to coal power plant development in Thailand are summarized as follows:

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[1] On 4 February 2017, Democrat Party leader Abhisit Vejjajiva said that if his party becomes the coalition leader, he will cancel the Krabi power plant project in the South and suggested that the government should focus instead on alternative sources of energy (*The Nation, 5* February 2017). On 19 February 2017, Democratic Party delegates led by Mr Korn Chatikavanij called on the government to scrap its coal-fired power plant projects in the Songkhla and Krabi provinces for fear that these will severely damage the environment and affect the residents' livelihoods.
Mr Thavorn Sennien, former Democrat MP, noted how the air pollution near the Mae Moh coal-fired power plant in Lampang, Northern Thailand in the 1990s caused the local community to be sick (PressReader-www.PressReader.com, 19 February 2017).

- More stringent environment standards, which include
  - Air emission (i.e. SO_2, NO_x, particulates and other toxic heavy metals)

	Before Mae Moh Incident	Today
SO_2 (ppm)	320	180
NO_x (ppm)	500	200
TSP (mg/m3)	120	80

  - Ambient Air Quality Standard for SO_2 (particularly after the Mae Moh incident)

	1-hr Avg	24-hr Avg	Annual Avg
Before 2000 (ug/m3)	1300	300	100
After 2000 (ug/m3)	780	300	100

- The coal-fired development project requires undertaking an EHIA, which includes public hearing and public involvement in the process. The recent EHIA on the Krabi and Thepa development projects found that the projects lacked (i) adequate data; (ii) meaningful participation; and (iii) transparency in the process (ONEP, n.d.).
- Coal-fired development is often a major project; it will change the way of life of the local community.
- Coal-fired development impacts the tourism industry.
- Electricity generation from coal produces huge CO_2 emission and contributes to global climate change.
- Coal-fired power plants affect marine ecosystems and fisheries.

The Mae Moh sulphur dioxide (SO_2) incident caused the anti-coal-fired power plant movement to spread throughout the region. This gave Thais a permanently negative impression on coal plants.

Figure 2-1. Past and Ongoing Projects

Project	Capacity (MW)	Location	Year	Note
Thap Sakae (EGAT)	700	Thap Sakae, Prachuapkhirikhan	1995	- Opposed by local communities and NGOs.
Gulf Power	2x367	Bo Nok, Prachuapkhirikhan	1997	- Opposed by local communities, local NGOs, and Greenpeace. - Shifted to natural gas. - Relocated to another site.
Union Power	2x700	Hin Krut, Prachuapkhirikhan	1997	- Opposed by local communities, local NGOs, and Greenpeace. - Shifted to natural gas. - Relocated to another site.
Tha Sala (EGAT)	1,000	Tha Sala, Nakhon sit thammrat	2012-2013	- Opposed by local communities, local and International NGOs - Cancelled
Si Chol (EGAT)	1,000	Si Chol, Nakhon sit thammrat	2012-2013	- Opposed by local communities, local and International NGOs - Cancelled
Krabi	800	Klong Pakasia, Krabi	Present	- EHIA Stage
Thepa	2x1,000	Thepa, Songkla	Present	- EHIA Stage

Source: Electricity Generating Authority of Thailand.

2) Opinion Poll on Coal-fired Power Plants

During its presentation on the power development plan of Thailand 2015–2036 (PDP2015), the subcommittee on Electricity Forecast and Power Development Plan noted that the electricity consumption in Southern Thailand has been increasing at about 3% per year. Thus, there is a need to construct three additional coal-fired power plants: These are the Krabi coal-fired power plant with a capacity of 800 MW in 2019; and Thepha coal-fired power plant Unit 1 with a capacity of 1,000 MW by 2021 and Unit 2 with a capacity of 1,000 MW in 2024, for a total capacity of 2,800 MW.

The Cabinet and National Energy Policy Council approved the PDP2015 on 30 June 2015. However, the public opposed the coal fuel construction in Southern Thailand. The representative from the Protect Andaman from Coal Network, an NGO in Southern Thailand that previously staged a lengthy protest against these projects at Government House in Bangkok, proposed three courses of actions: (i)cancellation of Environmental Impact Assessment (EIA) and EHIA of coal-

fired power plants and coal transportation ports; (ii) cessation of an auction of coal-fired power plants; and (iii) establishment of a committee to consider the network's proposal. Initially, the government accepted the proposal to establish a committee consisting of representatives from three groups of stakeholders and unless EIA and EHIA have been complied with, the coal-fired power plant cannot be constructed anywhere in Thailand.

On 18 August 2015, the National Reform Council organized a public hearing forum entitled, 'Suitable and Sustainable Power Production in Southern Thailand'. It consisted of the academe, EGAT representatives, the president of the tourism industry of Krabi province, and representatives from biomass power plant owners. There were 269 participants from the members of the committee and subcommittee of National Reform Council, the public and private sectors, the press, people's networks from 14 Southern Thailand provinces, and residents from Bangkok and nearby provinces. The questionnaire survey conducted at the end of the seminar gathered 132 respondents.

A. Basic information on respondents

a. Sex

Male	57 Respondents	or	43.94 %
Female	66 Respondents	or	50 %
Not identify	8 Respondents	or	6.06 %

b. Age

20-30 years old	24 Respondents	or	18.15 %
31-40 years old	25 Respondents	or	18.94 %
41-50 years old	45 Respondents	or	34.09 %
51-60 years old	17 Respondents	or	12.88 %
61- years old	15 Respondents	or	11.36 %
No response	6 Respondents	or	5.55 %

B. Development of Thailand's Power Sector

a. Decrease reliance on natural gas as fuel

Agree	48 Respondents	or	36.36 %
Not agree	71 Respondents	or	53.79 %
No answer	13 Respondents	or	9.85 %

b. Increase proportion of clean coal technology in electricity production

Agree	12 Respondents	or	9.09 %
Not agree	113 Respondents	or	84.85 %
No answer	8 Respondents	or	6.06 %

c. Purchase electricity from neighbouring country

Agree	11 Respondents	or	8.33 %
Not agree	107 Respondents	or	81.06 %
No answer	14 Respondents	or	10.61 %

d. Increase proportion of renewable energy

Agree	104 Respondents	or	78.79 %

Not agree	20 Respondents	or	15.15 %
No answer	8 Respondents	or	6.06 %

e. Include number of nuclear power plants in PDP2015

Agree	9 Respondents	or	6.52 %
Not agree	119 Respondents	or	89.3 %
No answer	5 Respondents	or	3.79 %

C. Do you agree to build coal-fired power plant in the South?

Agree	12 Respondents	or	9.09 %
Not agree	117 Respondents	or	88.64 %
No answer	3 Respondents	or	2.27 %

D. Why do you agree to have a coal-fired power plant in the South? (multiple answers)

System security	8.33 %
Improvement of regional economy	53.33 %
Lower electricity price	6.82 %
Using environment-friendly technology	8.33 %
No response	71.97 %

E. Why do you not agree to have coal-fired power plant in the South? (multiple answers)

Affects the environment	90.91%
Affects tourism	88.87 %
Using renewable energy	65.61 %
Do not trust the Ministry of Energy to manage coal-fired power plant	N.A.
No answer	3.39 %

F. Renewable energy development in the South (multiple answers)

Wind energy	66.67 %
Hydropower	53.03 %
Solar energy	77.77 %
Municipal solid waste to energy	54.55 %
Biomass	66.67 %
No answer	1.51 %

G. Recommendations

Conduct meaningful public participation
Elicit public involvement in EIA and EHIA
Improve the PDP preparation process

3) Public Attitude on Coal-Fired Power Plants

On 20-26 March 2017, a TV program broadcasted on Thai Rath TV (Channel 32) featured the coal-fired power plants in Southern Thailand. Moderated by Mr. Suparp Klikajai, the program had two invited guests: Pinyo Meechamni, Ph.D., a professor on clean coal technology from Chulalongkorn University, representing the affirmative side on the coal-fired power plant issue;

and Renu Vecharatpimol, Ph.D., professor at the Department of Biologyat Silapakorn University, representing the negative side of the topic.

The discussion covered the Power Development Plan, state of the electricity industry in the South, sources of electricity, the need for a new power plant in the South and the type of power plant, the location, environmental impact, and the coal versus renewable energy comparison.

The program offered viewers all over the country a chance to vote based on the question, 'Should government proceed to construct the coal-fired power plant in Southern Thailand'? Results of the survey, collected via the Thai Rath Facebook Page, were (Figure 2-2):

- Support coal-fired power plant 17,390 votes
- Do not support coal-fired power plant 3,795 votes

Note that the voting results showed the people's sentiment at that specific time, and it is difficult to conclude that this is representative of the opinion of the whole population in Thailand.

Figure 2-2. TV Viewers* Vote on the Coal-fired Power Plant in the South (top)

Results: 17,390 for 'support' and 3,795 for 'do not support' (bottom)

Source: Thai Rath TV Channel 32 (26 March 2017).

*Note: There are 36 digital TV channels in Thailand. Channels 4-9 and 11-12 are still in the bidding process, and channels 15 and 17 have been off the air due to financial problems. The rest continue to broadcast nationwide. Table 2-1 shows the top 10 TV ratings during primetime as culled from a poll done during the broadcast of a program on coal-fired power plants. The viewers were considered to be from the educated class and know how to use Facebook.

Table 2-1. Average TV Ratings – Primetime (18.00-22.30) (1-30 April 2017)

Nationwide			Bangkok		
Rank	**Channel**	**Rating**	**Rank**	**Channel**	**Rating**
1	7	5.65	1	23	4.573
2	23	3,623	2	3 HD	4.216
3	3	3.281	3	7	4.206
4	31	1.536	4	29	1.407
5	29	1.406	5	31	1.343
6	8	1.271	6	34	1.042
7	34	0.871	7	8	0.624
8	32 Thai Rath	0.643	8	32 Thai Rath	0.695
9	3 HD	0.586	9	3 HD	0.496
10	26	0.533	10	36	0.484

Source: www.llcdtvthailand.com.

2.2. Movements against Coal-Fired Power Plants

1) Case Study 1: The Mae Moh Power Plant

The Mae Moh coal-fired power plant is located in the Mae Moh valley of the Mae Moh district in Lampang province, Northern Thailand. The fuel source for its power plant is lignite, a low-grade coal, from a lignite mine located near the plant. The power plant consists of 13 generating units, has a capacity of 2,625 MW, and is owned and managed by EGAT.

a. Effect of the Mae Moh power plant

The increase in electricity demand in the early 1980s resulted in plants expanding towards local villages. These structures are situated 800 metres only from at least one of 16 communities. According to the Mine Master Plan, the expansion of the Mae Moh mine supported the power plants, and this resulted in more than 30,000 villagers being evacuated to a resettlement site.

In October 1992, air emission from stacks from the Mae Moh power plant was trapped due to inversion conditions, resulting in a large amount of SO_2 accumulating from the south of the power plant. There had been reports that more than a thousand villagers living within 7 kilometres of the plant suffered from respiratory irritation, aside from effects on their plants and livestock.

The power plant had to take immediate measures to improve the air condition. It installed fuel gas desulphurization (FGD) equipment with 98% efficiency for Units 4-13 as well as a continuous emission monitoring system in all generating units.

To ensure the air quality around Mae Moh, EGAT established an ambient air quality monitoring network and disclosed the results to the public.

The second incident at the Mae Moh Power Plant occurred because the FGD system had not been installed in all units. Also, two units continued to operate despite having FGD systems that were out of service. This led to an abrupt change in the atmospheric conditions (i.e. temperature inversion). Thus, a high hourly concentration of SO_2 was observed and in fact affected human health, crops, and livestock in the area.

By February 2000, the installation of the last FGD system was completed. The SO_2 emission was reduced, and ambient SO_2 concentration was gradually lowered to the acceptable level.

However, the villagers still claimed that they had suffered from respiratory diseases.

In an attempt to deal with the problems caused by the pollution, local activists, with the support of an occupational health specialist from Bangkok, organized the Network of Occupational Health Sufferers of the Mae Moh Power Plant in 2002 to assist those negatively affected by the plant's operations.

b. Villagers' lawsuit against EGAT

Because of the air pollution incidents, the residents of Mae Moh starting a legal battle against EGAT in 2003. They asserted that the power plant used low quality lignite in its production of electricity and neglected to treat the emission before it gets into the atmosphere. They claimed damages for the decline of their health, both physical and mental, and demanded compensation for medical expenditures and damaged farm crops.

In May 2004, EGAT was ordered by the Thai province court to pay the villagers approximate ฿5.7 million for the crops destroyed by the power plant.

Consequently, in March 2009, the Chiang Mai Province Administrative Court decided on the 35 lawsuits filed by residents in 2004 with the assistance of the council of Work and Environment-Related Patient Network of Thailand. It ordered EGAT to compensate 130 Mae Moh villagers who had suffered severe health distress due to the toxic emission from the lignite-fired power plant.

In its decision, the court considered the air quality report by the Pollution Control Department from November 1992 to August 1998, which showed that the level of SO_2 emitted by the power plant exceeded the legal standard.

The court ordered EGAT to rehabilitate the environment around the power plant and pay each affected family about ฿246,100. It also ordered EGAT to relocate 400 affected families to at least five kilometres away from the power plant and provide each family with a house and farm land. Electricity Generation Authority of Thailand appealed the case at the Highest Administrative Court for consideration.

The crisis faced by the Mae Moh residents captured the nation's attention because of Greenpeace's involvement when it published information on the hazards of coal fuel. The Greenpeace also asked the Asian Development Bank (ADB) to exercise caution in financing EGAT for projects that severely impact people's health and the environment.

The crisis also paved the way for government agencies to set more stringent environmental standards as well to recognize the importance of community involvement, good governance, and effective communication with the public.

2) Case Study 2: Bo Nok Coal-Fired Power Plant

a. Background and outline

The Bo Nok power plant was the first project developed by a private entity under the IPP program in 1997, and not by EGAT. It was supposed to have a generation capacity of 700 MW of electricity and covered 162 hectares along the coast of the Bo Bok Sub-district, Meung District, Prachuapkhirikhan province. It used to be owned by Gulf Power Generation Co. Ltd, an entity shared with Gulf Power Generation Co, Ltd (60%) and Edison Mission Energy (40%).

The Union Power of EGAT started to purchase a large piece of land along the beach in Bo Nok. It went through the process of informing local communities, conducting a project feasibility and environmental impact assessment and started a public involvement program.

However, when large parts of the land started changing hands in 1995, the locals were told that the developers were planning a new golf course and resort. At around the same time, residents started hearing about plans for a coal-fired power plant on the same site. They immediately

became suspicious of the project, having heard horror stories about the Mae Moh incidents in 1992 and 1998.

b. Incorrect perception

The villagers in Bo Nok believed that the coal-fired power plant project and the power plant itself have negative effects on their community, such as:

- Pollution from a coal-fired power plant, especially SO_2 and particulates will impact health, livestock, and crops.
- Threats to the local fishery and coastal biodiversity
- Threats to the breeding grounds of whales and dolphins, which are considered endangered species
- Creation of acid rain
- Global climate change
- Effect on the tourism industry in Prachuapkhirikhan province
- Destruction of the villagers' livelihood

The villagers thus formed the 'Love Bo Nok' group to oppose the coal-fired power plant. They were well supported by Greenpeace, the academe, national NGOs, and students. The series of protests as well as the government shifts in policies that ensued in 1995-2004 are as follows (Greenpeace, 2002) :

- **1995** - The first protest against the emerging threat of power plants draws 4,000 people.
- **1997** - Love Bo Nok, a grassroots power plant opposition group is formed after getting confirmation that a coal-fired power plant, instead of a golf course, would be built in the area.
- **May 1997** - The Thai Government approves Gulf Power group's EIA despite the latter's major shortcomings.
- **June 1997** - Villagers gather at a local Buddhist temple to protest the project.
- **20 August 1997** - Opponents file a complaint with the Human Rights Committee of Thailand's House of Representatives.

- **8 December 1988** - Thousands block Thailand's south highway in protest against the power plant.
- **February 1999** - Gulf Power runs the first of many full-page ads in a Thai newspaper aimed at improving its image.
- **10-12 September 1999** - the first public hearing on the Prachuapkhirikhan province plants are held a year after they were approved. Opponents boycott the hearing, demanding that the government revoke the plant's approval and make the power purchase agreement.
- **7 December 2001** - Greenpeace urges the government to pull the plug on the proposed coal-fired power plant in Prachuapkhirikhan province and to instead direct the country's attention towards clean energy sources.
- **January 2002** - Five hundred and thirty-three academics sign a petition that calls on the government to review the contracts on the Prachuapkhirikhan province plants.
- **April 2002** - the government allows developers to relocate the plants and shift to natural gas.

3) Observations on the Project Implementation Process

- Project implementation was not carried out with sufficient transparency.
- Local villagers were not involved during the early stage—e.g. during deliberations on site selection.
- Less effective public information disclosure, especially about the project.
- Local villagers lack knowledge—e.g. on project development cycle, the content of the EIA study, etc.
- Ineffective communication among stakeholders, especially power developers, government agencies, and villagers.
- Inadequate public participation.
- Anti-coal-fired power plant movements were gradually formed by local villagers and supported by international and national NGOs, academic professors, and the general public.

a. A look at the opposing organizations and individuals

The anti-coal-fired power plant movement can be divided into two groups; (i) organizations; and (ii) individuals. Organizations consist of active and well-known international and regional groups such as

At the international level:

- Greenpeace International, USA (operating activities worldwide)
- Greenpeace Southeast Asia (head office in Thailand for operating activities in Southeast Asia)

At the national level:

- Greenpeace Thailand (with its head office in Bangkok for activities in Thailand)
- Environmentalist groups in universities and colleges
- Foundations based in Bangkok such as the Healthy Public Policy Foundation
- Other national NGOs

At the local level:

The anti-coal-fired power plant movements at the local level mostly stem from local communities that have common concerns on sustainability and environmental impact. Some local anti-coal-fired power plant groups are the Mae Moh anti-coal power movement, Love Hin Krut, Love Bo Nok, Love Tha Sala, and Save Pakasai groups. The anti-coal power plant network is actively against the Krabi project.

Members of the Protect Krabi Network include: (i)The Protected Krabi Network; (ii) Love Lanta Group; (iii) Lanta Island Tourism Association; (iv) Hotel Association of Koh Lanta; (v) Andaman Foundation; (vi) Center of Ecological Building Awareness; (vii) Greenpeace Southeast Asia; (viii) Association of Thailand Small scale Fisher-folks Federation; (ix) NGOs – Coordination Southern Region; (x) Food Security Network – Southern Region; (xi) Protect Trung Group; (xii) Save Andaman Network; (xiii) Pakasai Environmental Network Protection; (xiv) Public Health Volunteer Krabi; (xv) Krabi Fisherfolks Network; (xvi) Andaman Organization for Participatory; (xvii) Restoration of Natural Resources; (xviii) Phang-nga Fisher folks of Andaman Network; (xix) Mae Moh Anti-coal Movement; (xx) Khoa Hin Son Anti-coal Movement; (xxi) Thailand Coal

Network; (xxii) Healthy Public Policy Foundation; (xxiii) Southeast Asia Coal Network; (xxiv) EIA/EHIA Watch Thailand; (xxv) Rak Lae Krabi Association; (xxvi) Wetland Foundation; and (xxvii) Ban Koh Klang Environmental Group.

The Network of People formed against Thailand's PDP2015 consists of: (i) Save Andaman from Coal Network; (ii) Krabi Sea Loving People Association; (iii) Prathew Conservation Network; (iv) Bang Son Conservation Network; (v) Lamae Conservation Network; (vi) Network of Songkla-Pattani Against Coal Power Plant; (vii) Traditional Fishing Association-Tha Sala Bay; (viii) Tha Sala Local Conservation Network; (ix) Hua Sai Traditional Fishing Association; (x) Kanab Nak Crab Bank Group; (xi) Bang Saphan Natural Resource and Environmental Network; (xii) Eastern People Network; (xiii) Network to Monitor Impact of Coal Power Plant in Tambon Khoa Hin Son; (xiv) Sanam Chai Khet Organic Farmer Group; (xv) Sustainable and Just Energy Study Group – Ubon Ratchathani; (xvi) Salween Basin Resource Network; (xvii) Network of Thai People in Eight Mekong Provinces; and (xviii) Hug Nam Khong Group.

Meanwhile, the individuals against CPPs are mostly environmental academics from universities, colleges, and institutes in Bangkok and upcountry, as well as national and local politicians. Most of the academic scholars are from the fields of social science, political science, literature, and psychology, and not from engineering or managerial economics.

b. Who oppose and their reasons

As mentioned in an earlier section, the reasons for the public's opposition to coal-fired power plants are:

i. Local coal-fired power plants emit a huge volume of CO_2 to the atmosphere and cause temperatures to rise. Although advanced technologies such as high-efficiency ultra supercritical (USC) boilers that can minimize CO_2 emission by 10% to 20% and the carbon capture storage are being developed, these are expensive options.

ii. Sulphur dioxide, nitrous oxide, carbon dioxide, particles, and heavy metals are air pollutants with negative effects on the environment.

- Mae Moh Lignite power plant in Northern Thailand released a high level of SO_2 and caused the respiratory problem of thousands of people.

- Pollution threatens to destroy local ecosystems and poses risks to public health.

iii. There are adverse effects on the marine ecosystem.

- The RAMSAR site (i.e. Krabi) may affect the breeding ground of endangered species such as whales and dolphins (in Bo Nok and Hin Krut). Cooling water discharges can affect larvae and planktons in the area, too.
- Villagers who rely on fishing for their livelihood worry about the decrease in fish volume.

iv. The plant will decrease the number of tourists to the area.

v. During the project's early stages, the public felt they did not have enough involvement and meaningful participation in such activities as EHIA studies.

The following analysis is provided by one political science expert in Thailand:

There are five major reasons groups are against coal-fired power plants: (i) Technical or complexity factors (i.e. some people have difficulty understanding the technology); (ii) Personal beliefs and prejudices (i.e. some people have their own biases and preferences, possibly due to misinformation from such sources as TVs, newspapers, magazines); (iii) Political (local and national) interests (i.e. some have complex political reasons); (iv) Religious issues (for example, some people, such as Muslims living in the southern regions, have reasons related to their own religions and/or ethnic interests); (v) Organized protests funded by international and local environmental organizations (that is, some parties or individuals are funded by such international NGOs as Greenpeace). However, note that this is not an all-inclusive list. There could be other reasons behind the protest movements.

An expert once said that no other real social groups has more strongly opposed coal power generation than did environmental activist groups. As part of the fifth category mentioned earlier in this study, these groups stage rallies and organize protest activities. They propose the use of renewable sources of energy such as solar, wind, biomass, and even liquefied nitrogen gas. The reasons behind their protests, however, are multi-faceted. Some of these are:

- Stopping coal projects means business opportunities in other alternative sources of energies: liquefied nitrogen gas, solar, wind, and biomass.

- Some local and national political leaders have businesses in renewable energies such as palm oil plantations, and solar and wind power projects. These political leaders may have vested interests in funding the protests against coal energy.
- Other competing power plants (e.g. natural gas, biomass) that are privately invested stand to gain if EGAT cannot develop new coal-fired power plants in Krabi, Thepa, and elsewhere in Thailand. These private investors are waiting to step in and fill the gap in energy supply.
- Key players in these protests hope to make a name for themselves and enter local politics when the opportunities arise.

Most people do not have any interest in global-scale issues such as climate change caused by CO_2. They, however, are very—maybe too—sensitive to issues that will affect their own turfs. The threat of sulphur oxide (SOx) and nitrogen oxides (NOx) in the air is one of such issues. Opposition movements know how to take advantage of such sentiments to pursue their own cause.

c. When the resistance all started

The opposition to the coal project started during the policy, planning and implementation stages. Because the public had limited participation during the policy planning stage, there was a lot of misunderstanding as well as resistance to the plan. For example, the Krabi Network protested against the Power Development Plan 2015 in January 2017, hoping the government would withdraw the plans for the Krabi power plant from PDP2015.

During the project planning and implementation stage, the opposition activities centred on the choice of site, engineering and economic feasibility, EHIA study, engineering detail design, and project approval.

2.3. What Are Power Plant Developers Aware of?

Meanwhile, below is a summary of facts that developers had to deal with:

a. Domestic situation

- The current energy mix in Thailand depends too much on natural gas. Accordingly, increasing the proportion of coal use is vital in securing various sources of energy and advantageous for its low cost.
- The government in the short term wants to spread the use of renewable energy and stabilize the electric power system. Biomass is currently about twice as costly as coal-fired power plants, but its domestic supply sources may reduce its cost in the future. Too great an increase in its use, however, may result in decreased agricultural production. Hence, the government has introduced a 'quota' system to limit the development of biomass power generation. Similar policies have been introduced for solar-power energy, which currently depends mostly on imports from China; and for large-scale hydropower, which may cause environmental destruction.
- The Power Development Plan in Thailand does not have the luxury of time to take on a very lengthy but transparent route.
- Solar panels consume a great amount of energy during their manufacturing process. Placing too many of these in a narrow area will raise the temperature of the surrounding area, too. Moreover, at the end of their lifespan, how to dispose of these panels in an economical and environmentally friendly way is an issue.

Plant developers and owners have disseminated and shared these types of information to the public; unfortunately, their level of success at creating some noise over their concerns was nowhere near the attention that the opposition had attained for their own causes.

b. Advantages of introducing electric power infrastructure

- People living around the gas-fired power plant in Southern Thailand have witnessed an improvement in their quality of life. Even in the Mae Moh region, the site of well-known contamination incidents, the many employment opportunities and new highways in their community allowed the residents to have a more comfortable life.

c. Provision of information

- The EGAT believes that while it has sufficiently provided the general public with information on the effects of power plants on the environment, many have still failed to understand the

project properly.

- Residents from different regions have different requirements. People living in southern regions mainly demand that they be able to continue their livelihood in fishing and agriculture and that the environment be protected.

  In response to such demands, the EGAT has been explaining to residents that not only does a power plant's construction offer various benefits; there is also no risks of environmental contamination. It has assured residents that the government will protect the environment so that locals can maintain their livelihood, and that the power plant is ready to cease operating should there be an event that would put lives at risk. It commits to look after the people's security of tenure. After all, power plants employ more than half of their workers locally.

d. Challenges

- Thailand has a law governing subsidy for residents living within five kilometres of a power plant. Every year, the Energy Regulatory Council evaluates the applications (including the amount and use) of these subsidies and decides who will be the beneficiaries and how much to grant. The amount of funds depends on the type and output of the power plant.
- An expansion of the policy targeting residents within five kilometres of a power plant is now under examination, including the participation criteria, which may be covered by the Energy Regulatory Council's rules and ordinances. Such expansion may be on a case-by-case basis. It should be noted, however, that funds for such purposes may be insufficient. The Energy Regulatory Council, which evaluates and distributes funds to individuals, places the highest priority on improvements in job opportunities and the environment.
- In discussions with locals, it is ideal to ask the residents about the kind of life they want and allow them to consider and make their own choices.
- For the government, an important principle behind their energy policy is the balance among the four *E*s (i.e. Economic, Environment, Energy Security, and Engineering). It is believed that the opposition, who ignore such principle, emphasizes the disadvantages in certain fields and sways a general public that knows little about these movement/s to take up their

cause against power plants.

- Although the general public knows about the Japanese technology used for high-efficiency coal-fired power plants, there is a more fundamental misconception that needs to be corrected. That is, the perception that 'coal-fired power plants are bad' has to first be set straight to pave the way for public acceptance of coal energy. Such public acceptance is crucial in preventing further delays in the CPP's construction.
- If the government wants to proceed to develop the energy sector, it must present a consistent policy to the general public and promote it repeatedly. Currently, the focus of policies tend to swing—for example, from one that aims to enhance the competitiveness of IPPs, to one that focuses on importing electric power from neighbouring countries, etc. Governmental agencies have complex interests in energy, the environment, and public health, etc., which explain the inconsistency in their statements over a certain project. Thus, people have no idea which of these different explanations to trust. All these indicate a need for a strong organization whose role is to align and/or calibrate the interests of various governmental agencies.
- Behind the opposition movements in Thailand are complex and regional characteristics as well as various religions and cultures. Hence, no solution can be achieved by just providing correct and fair information. Rather, it is necessary to first set up a locally based committee with professionals from a various fields and let them hold discussions from a macro-perspective. Such committee is important when dealing with decisions on relevant policies.

2.4. Dealing with Major Opposition Players

1) The Value of Study Trips and Study Visits

Stakeholders who regularly deal with oppositions to certain energy projects are the MOE, EGAT, and the IPPs. Other agencies such as regulators and venders are also involved, but to a lesser degree.

These agencies are responsible for making oppositionists understand and accept the project. Past experiences on coal-fired power plant development in Thailand indicate that power plant

developers:

- Should involve local villagers at an early stage of the project development—e.g. site selection—to help avoid turning the residents into protesters.
- Should provide project information, including a fact sheet with easy-to-understand and consistent information
- Should create effective communication plans on the concerned issues with local villagers and protesters.

Study visits to similar or, better yet, successful power plant projects can help improve visitors' appreciation of coal-fired power plants. The EGAT, in fact, organized a series of study visits to the Mae Moh Lignite coal-fired power plant in Lampang Province, North Thailand. The group included villagers, local governmental officials, representatives of the opposition, and media, all of which participated in a plant tour to learn about the infrastructure's technology, plant operation, air pollution control equipment, and environmental management strategies. The group also met the affected villagers in the Mae Moh vicinity area.

The EGAT, in collaboration with the Ministry of Energy, also organized a study visit to Japan and Germany. The study trip aimed to learn about advanced clean coal technology, and the successful coexistence between power plants and the surrounding community.

In fact, there were a series of trips to Japan organized during the past few years by representatives from the MOE, EGAT, academic professors, villagers from the affected areas, and media.

On 18-23 March 2017, the permanent secretary of the MOE, Areepong Poocha-um, Ph.D., led a delegation that included senior EGAT officials and senior media members, to the Mutsuura power plant in Nagasaki, Japan. The Mutsuura power plant uses imported bituminous and sub-bituminous coal with USC, which is a clean coal technology that can reduce CO_2 emission and other pollutants. This is particularly significant since the USC technology is planned to be adopted for the proposed Krabi power plant.

2) Lessons Learned from Opposition Movements

a. Importance of telling the truth to build trust

Project developers should be upfront about the details of their project. This is because local villagers may quickly lose their trust in a project if they only get to learn about the truth later. A good example is the case of the Bo Nok project, wherein local villagers were initially told that the purchased property was meant to be turned into a golf course but found out later that the land would be the site of a planned coal-fired power plant.

b. Community involvement

Effective communication among stakeholders—especially power developers, local villagers, and protesters—is necessary to avoid conflict. Local residents should be engaged at an early stage of the project's development so as to prevent any misunderstanding about the project.

c. Meaningful public participation

Public participation in project development can usually create mutual understanding among stakeholders during the decision-making process. The public participation process needs to be improved.

d. Failed public hearing: How to avoid

Public hearings on proposed projects must be conducted, per the EHIA regulations. The current public hearing on the Krabi and Thepa projects revealed that there was insufficient consultation done with stakeholders such as the residents. Other hearings failed to resolve disputes between local communities and NGOs on one end, and the project proponent (i.e. EGAT) on the other end. In some cases, NGOs boycotted the meetings, such as those on the Krabi and Thepa projects.

e. Dangers of a growing opposition

The network of opposition groups became more and more influential as it rapidly expanded. More NGO members joined, allowing the network to gain more support from both national and international NGOs.

f. Transparency in project implementation

Project developers must learn how to assure those who resist any new power project that there is transparency in the implementation process.

g. Coal information clearing house needed

There is a need for a clean coal technology centre to be the clearing house for all information on

coal energy. Such information includes sources of coal, coal utilization and its impact, clean coal technology, and coal economics.

3) Working with Communities Around Power Plant Sites

Thailand's economy, which once centred on agriculture, has been industrialized. Its manufacturing sector currently accounts for about 34% of GDP and 90% of the country's exports. On the other hand, agriculture is still an important industry as it employs about a little less than 40% of the workers and is a major trading source. In addition, tourism is now an important industry. Thailand is, thus, in a unique situation: That is, while industrialization and economic growth move forward, it also has to protect the environment, on which the lives of the agricultural and tourism workers depend on.

In general, large-scale infrastructure projects such as nuclear power plants and dams are not unanimously accepted. To get a plan to advance while managing anxieties of those against the project, it is important to disseminate accurate information about the project early on—i.e. before the opposition movement becomes stronger. As described in Chapter 2., it is necessary to identify who is against the project and on what grounds, and find the points where all relevant parties can agree upon. Government and big companies who push for the construction of power plants in a high-handed manner sometimes drive the opposition to take a harder line and to eventually block the project.

a. Selection of site

During site selection, power project proponents must carry out both a thorough environmental and marine impact assessment, and survey of the needs and feelings of the locals.

In the past, there was a case where opposition groups—after the project proponents had already decided on the project's location—came in to request for a safety evaluation against such disasters as earthquakes, tsunami, and fires. To avoid such a scenario, project proponents need to maintain a close partnership with the site's local government so as to understand existing local regulations. Local residents' participation during this stage may prove favourable to the project, too.

b. Identifying who is against

Generally, opposition may be of one of two types: (i) the locals who are against a project; and (ii) citizens' groups and opposition parties not related to the locals but are taking the lead.

Opposition groups that band together can become one large-scale force working against a project, even derailing it. Thus, one needs to understand who are against the project and to take appropriate measures quickly on such opposition.

If a movement is composed mainly of citizens' groups and/or activists who have no relation to the residents, the needs of the locals might be inadvertently disregarded. In such a case, any long and complicated campaign against the project will stop not only the project itself but the residents' sources of income as well, thus increasing the locals' woes. This is further complicated when those who join the fray have either no connection to locals or have no professional knowledge about the opposition movement.

c. Clear understanding of objections

People or organizations oppose a project for any of the following reasons:

- Concerned over the effect on one's livelihood: e.g. the construction of a plant requires residents to relocate; negative effects on agriculture and fishery
- Negative effects on the ecosystem and environment; damage to the landscape
- Health hazards
- Safety issues
- Effect of harmful rumours, resulting in poor sales of agricultural products
- Simply 'taking the oppositionist stand' is the main objective

As a counter measure, the government and investors of a project should tackle the questions and problems raised by those who oppose and find solutions. This shall lessen the anxiety of those who are against the project.

Disseminating accurate information can correct the perception that 'power-plant construction = destruction of nature.' It is possible for power plant construction to take place while conserving

the environment. In the communication process, the key is to divulge to stakeholders—at the most appropriate time—only accurate information (on say, measure and schedules) they are looking for. Providing insufficient or incorrect information only invites distrust; so will sudden changes in initial plans.

There will naturally be differences in opinions and sentiments between residents nearest to the project's location who receive compensation from the project developers, and residents in the peripheral areas who are not covered anymore by such financial support. Arbitrarily setting the compensation, however, will create dissatisfaction among the people. Rates should be as explicable as possible. A compensation set too high, for example, can still impede power projects.

d. Holding an early briefing

Movements that started out as opposition groups could morph into anti-authority protesters. Thus, holding briefings as early into the project as possible can mitigate the growth of any protest movement. In fact, briefings are an avenue to establish a trusting relationship with varied interest parties. Briefing may be about:

- Explaining to interest parties such details as the municipality where the plant will be located, and affected companies.
- Soliciting residents' active participation, where necessary; holding study visits.
- Disclosing information and gathering opinions
- Explaining to media
- Inviting experts to inspect other plants that are smoothly operating.

For mass media to produce accurate and fair reporting, project proponents should inspire media to cover both sides of an issue and to analyse the merits and demerits of arguments put forth by interest groups. Project proponents must also be willing to disclose the bases for decisions on the project and welcome an open discussion. In fact, such discussion is an important part of the policy decision-making process.

Another key strategy for project proponents is to invite local public executives, residents, and the media to inspect other coal-fired power plants. Getting the visitors to listen to local folks talk

about why they support the inspected coal power plant is more effective than listening to individuals who are connected to the facility as investors, administrators, or employees.

e. Points of explanation

The topics to be discussed depend on one's target audience. Nonetheless, in all cases, information provided must be consistent. The topics to cover could include:

- The background and rationale for the choice of site
- The object, implication and necessity for such an infrastructure
- Overview of the power plant, such as its scale
- Schedule for the construction work
- Advantages and disadvantages of a coal-fired power plant
- Effects on the environment
- Effects on local industries such as fisheries and agriculture
- Safety improvements made based on lessons learned from the case of the Mae Moh power plant.

f. Advantages and disadvantages of power plant construction

Power plant construction projects can affect the community's employment, tax revenue, welfare, and regional development. Such positive effects—not just the disadvantages—should be highlighted in discussions. If the concerns centre on emissions in the environment, then demonstrate how various measures are being taken to keep the amount of emissions down to a minimum, and how regular monitoring is being carried out. Show that all these steps are taken to keep the disadvantages at an acceptable level.

When project proponents have been transparent at the onset, interest groups and locals would not feel deceived should some unexpected issue arise during construction. It is necessary, too, to demonstrate that the success of the project is not only an achievement of the public but one that will improve the welfare of the residents in the surrounding area. Finally, project proponents need to make the locals understand that the power plant is not something that is forced onto the populace, but will instead have a symbiotic relationship with the locals.

g. Building trust with the locals

Building the trust of the people requires, first and foremost, that one should never violate any domestic or international laws.

Earning the trust of the locals is a long-term relationship-building process. People tend to gravitate towards an individual who is perceived to be reliable than to some expert who talks in technical jargons most of the time.

The individual who will liaise with key stakeholders must have connections within the locals, the power plant facility itself, the local government, and NGOs. He will be responsible for explaining to residents why the power plant project is necessary; provide an update on the progress; discuss the plant's safety level, etc. Likewise, he should be able to convey the residents' needs or demands to the government.

h. Construction and operation stages

Any problem or accidents during the construction or full-operation stage will result in an outright loss of long-term trust. Prevention of problems/accidents is the highest priority. However, in case a problem/accident does happen, there should be immediate and honest disclosure on the circumstances. Necessary measures should be taken to prevent a recurrence.

Chapter 3
Examples in Other Countries

It will be useful to reference other countries that have a long experience in operating coal-fired power plants, when aiming to gain social acceptance of such facilities. Advanced European nations, for example, have implemented measures to enhance their communicate with the locals on energy infrastructure over the years. Such measures are discussed during meetings of international organizations where these countries are members.

This chapter reviews examples of how communication pertaining to nuclear power facilities works among operators, governments, and the power plant's host community in France, Republic of Korea, Sweden, Switzerland, and the United Kingdom. It also features the case of a movement in India that opposed the installation of a nuclear power plant.

3.1. France

1) Communicating with the Whole Nation on Nuclear Power Generation

In France, an entity called Local Information Commission (*Commission Locale d'Information* or CLI) exists as a forum for communication between operators and residents in areas that host a nuclear facility, although it does not have authority to make a decision on the installation and operation of a facility. In addition, a similar organization called Local Information Follow-Up Commission (*Commission Locale d'information et de surveillance* or CLIS) exists to understand the locals' concerns and perform public relations activities around the installation of a high-level radioactive waste disposal site.

This idea of setting up a commission to improve the flow of information concerning nuclear facilities has been studied in France since the end of the 1970s. In 1981, La Hague Facility Special Permanent Commission (*Commission Spéciale et Permanente d'Information*) was established in the region that hosts the La Hague reprocessing facility. On 15 December 1981, then-French Prime Minister P. Mauroy issued a notice recommending the establishment of a CLI in areas hosting a large-scale energy-related facility such as a power plant with a capacity of 1 million kW or more (regardless of whether it is a nuclear, thermal, or hydroelectric power plant) or a spent fuel reprocessing facility.

In response to the Mauroy notice, CLIs were set up. By 2010, there were about 30 CLIs for civil facilities and 15 CLIs for military facilities throughout France. However, while the Mauroy notice promoted the setup of CLIs, it did not provide legal grounds for their existence nor guaranteed their financial resources.

In June 2006, a law on nuclear transparency and safety (Act No. 2006-686 of 13 June 2006) was enacted. This law obligated the area that hosts a basic nuclear facility to set up a CLI while clarifying the central government's role and responsibility for disclosing information on nuclear facilities and explicitly defining 'continuous evaluation of business activities, communication of information, and consultation over nuclear safety, radiation protection, and influences on the public and environment' as the purposes of a CLI.

The law also prescribed the financial resources of a CLI, its participants, outline of its activities, and its cooperation with relevant institutions. The specific percentage of participants was provided in detail in an ordinance (*décret*) on CLI installation issued on 12 March 2008. The décret stipulated that the form of investment in the CLI's operations should be decided through arrangement among the prefecture hosting the nuclear facility, the central government, and other related municipalities (article 15), and that the representative of the CLI should submit an operation plan (for the next year) and a budget implementation report (of the previous year) to the Nuclear Safety Authority (*Autorité de Sûreté Nucléaire*).

The Act on Transparency and Security in the nuclear field also required that the High-level Committee for Transparency and Information on Nuclear Security (HCTISN) be set up to discuss and supply information on risks of nuclear activities; and on health, environment, and security of nuclear activities. The HCTISN was established with 34 members appointed through a government ordinance issued on 28 February 2008.

The HCTISN is required to

- monitor nuclear activities;
- express its opinion on all related issues;
- handle matters related to access to nuclear safety information;
- propose measures for ensuring and improving transparency in the nuclear field; and
- study issues on all information on nuclear safety and supervision as requested by the nuclear safety minister, chairpersons of the jurisdiction committees of the upper and

lower houses, the scientific and technology selection and evaluation chairperson of the Congress (i.e the *Office Parlementaire D'évaluation des Choix Scientifiques et Technologiques*), CLI chairpersons, and nuclear plant operators.

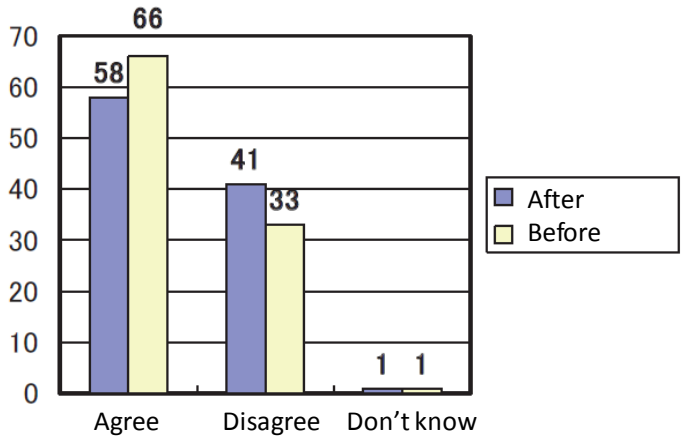
The HCTISN consists of the Congress, CLIs, operators, related institutions, labour unions, representatives of the related departments and bureaus of the central government, and people with relevant knowledge and experience. The chairperson of the Autorité de Sûreté Nucléaire also participates as a member.

France has been promoting a system that will enhance the transparency and fairness of processes such as project planning since the 1990s. In 1995, the National Public Debate Commission (*Commission Nationale du Débat Public*) was established through Act 95-101, which is an act to reinforce environmental considerations of large-scale projects. It gives the Commission Nationale du Débat Public the authority to accept requests to hold public debates. In principle, anyone can participate in the public debate.

2) Public Opinion on Nuclear Power Generation after The Fukushima Accident

In the wake of an accident at the Fukushima Daiichi Nuclear Power Plant, an internet survey was conducted on 23-24 March 2011 among 1,192 respondents. The following were the results (INSS, n.d.):

Figure 3-1. Public Opinion Concerning Nuclear Power Generation in France Before and After the Fukushima Daiichi Power Plant Accident (%)

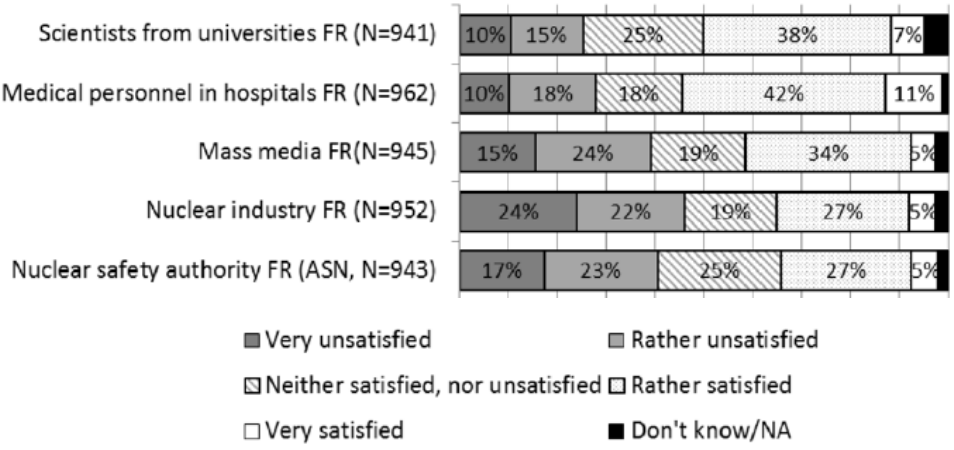


Source:,'A Trend of the Public Opinion concerning Nuclear Power Generation in the United States and Europe after Fukushima Daiichi Power Plant Accident' (Oiso, 2011).

Although majority of the respondents supported the use of nuclear power even after the accident, Figure 3-1 shows that the number of supporters declined nearly 10 points. In a public opinion poll conducted in September 2012 and targeting 1,007 French citizens aged 18 or older, it was reported that 78% of the respondents replied 'Unacceptable' to the question of whether an increase in electricity charge after the cessation of nuclear power generation is acceptable. Meanwhile, 21% responded 'Acceptable' while 1% did not answer the question.

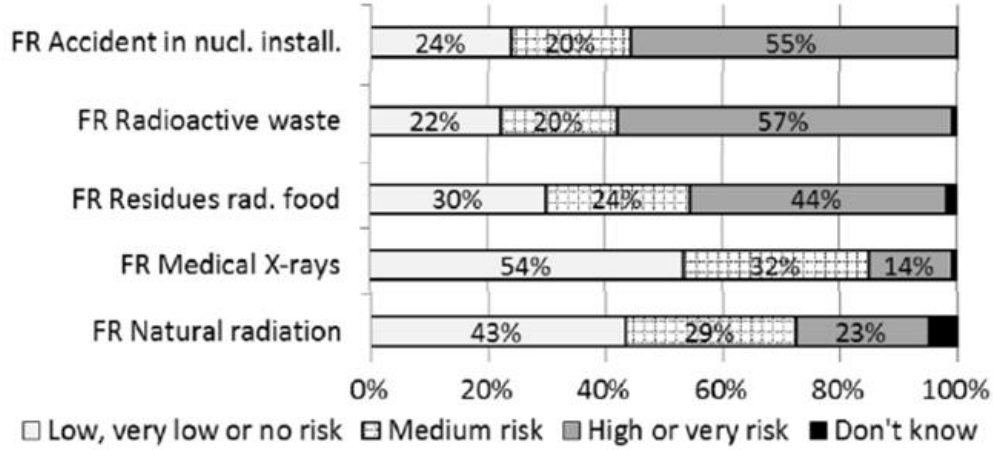
A thesis that appeared in the *Journal of Radiological Protection* in 2016 (Turcanu et al., 2016) carried the results of a survey on the level of satisfaction of French people on information on radiation. Of 966 samples, a result showed that the French people are less satisfied with information supplied by the nuclear power industry than information supplied by medical workers at hospitals and researchers at universities. Majority think that consumption of vegetables harvested around a nuclear power station is not favourable because of the effects of radioactive material. In the meantime, the public trust in authorities who took action to lower risks of accidents and radioactive material exposure at nuclear facilities remains high (Figure 3-4).

Figure 3-2. Satisfaction with Public Information on Ionising Radiation Provided by Different Communicators



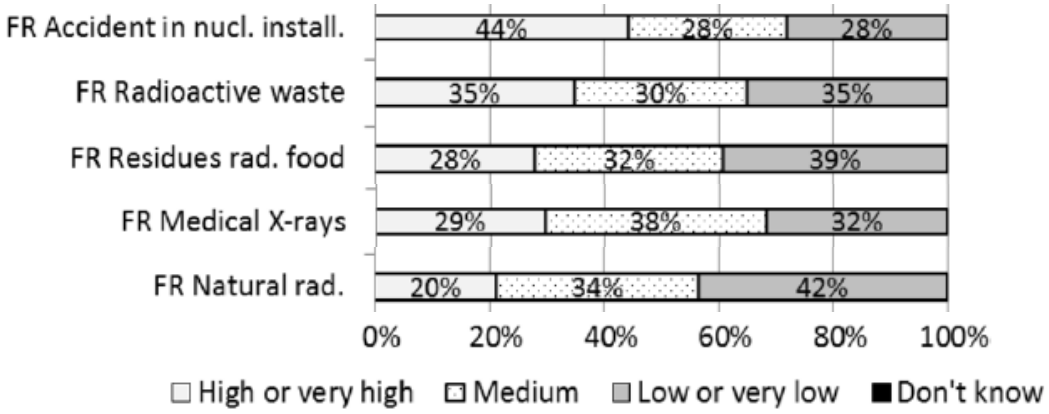
Source: *Journal of Radiological Protection* (2016).

Figure 3-3. Risk Perception on Various Radiological Risks



Source: *Journal of Radiological Protection* (2016).

Figure 3-4. Confidence in Authorities for Various Radiological Risks



Source: *Journal of Radiological Protection* (2016).

According to local risk communication experts interviewed for this study, the people in France began to appreciate the importance of risk communication after the Chernobyl accident happened and it became necessary for children to take iodine tablets. Before that, receptivity to risks was not generally recognized and, as a result, people's tendency to over-react at the sudden presence of risks could not be denied.

As part of the communication strategy with the residents, there is a council (in addition to a CLI) that has member-environmentalists who engage in national debates. This council has been reported to relentlessly express its strong opinions on the performance of operators and publicize the results of its meetings, putting pressure in a good way on these operators. In France, all industrial projects that may have identified public risks—not just nuclear power generation projects—are always publicly debated upon.

Some experts opined that after over 30 years, the CLI has now become an important venue for power plant operators and residents to exchange opinions, and that the influences it exerts on the operators' safety code of conduct is immeasurable. However, there is also another sector that wonders whether a group such as the CLI—one that encourages diverse opinions, including that by environmentalists critical of nuclear power—can take root in Japan.

3.2 South Korea

1) Communicating with Citizens on Nuclear Power Generation

The nuclear industry in South Korea has learned from the accident at Fukushima Daiichi Nuclear Power Plant and from subsequent movements in Japan that maintaining safety is key to the sustainable use of nuclear power. It has also learned the importance of social receptivity. When evaluating power operators, the Nuclear Safety & Security Commission (NSSC), a regulatory body, also takes into consideration which nuclear operators and nuclear power plants are trusted by its citizens.

As a measure of the central government[2], the NSSC set up on 13 September 2013 a Regional Nuclear Safety Council in each area that hosts a nuclear power plant. This council aims to disclose information on the nuclear industry, including the operations of nuclear power stations, radioactive waste, measures for ensuring safety as well as to listen to residents' opinions. The 20-member Regional Nuclear Safety Council consists of NSSC staff, specialists from the Korea Institute of Nuclear Safety (KINS), municipality officials, and outside experts. Members have a two-year term. Many of the outside experts are university professors in fields others than nuclear engineering. Those experts trusted by the locals can serve for two consecutive terms. The safety council sets quarterly meetings, but calls for additional meetings when the NSSC and municipality deem it necessary. During these meetings, measures of power stations and safety regulation activities are outlined. Minutes of the meeting are also disclosed at the request of the municipality or outside experts.

2) Plant Operators' Own Communication Committee and Private Environment Monitoring Organizations

In September 2015, the Korea Hydro & Nuclear Power (KHNP) voluntarily set up a KHNP Nuclear Communication Committee (KNCC) at its headquarters and power plants. The KNCC at the headquarters consists of eight KHNP employees, including its CEO and board members, and outside experts (mainly university professors). Members convene quarterly or when they deem necessary. Outside experts have a one-year term, which may be extended. Fourteen outside

[2] Based on the hearing on the Korea Hydro & Nuclear Power.

members from communities around the power plant's site are respected community residents such as the representative of the region, school teachers, parents, and famous environmental activists.

Meetings held every two months discuss the power plant's detailed operational data (including maintenance and repair of the plant, quantity of waste generated). While not all data are posted on the KHNP website, information disclosed to members participating in the KNCC is available even to non-residents.

In addition, there is the Environmental Monitoring Committee (EMC), an external audit organization wherein KHNP is not (cannot be) involved. This committee regularly sends data on the power plant to the environment monitoring centre of the region, which then analyses the information received. The regional centre can propose corrective steps to the municipality should it find information that may indicate a risk to the region.

The EMC's members are university professors or citizen groups with relevant knowledge and expertise. Officials of the power plant, including the plant superintendent, attend the EMC meetings but only as observers.

The first EMC goes as far back as 1998 in Kori. This was followed by new committees founded in Hanbit in 1999, Hanul in 2003, and Wolseong in 2007. South Koreans have been stricter with power plants since 2011, when the industry lost its credibility following a scandal surrounding a forgery of a warranty document. It is said that since 2012, the NSSC has made a rule not to grant KHNP permission to restart any problematic power plant that had been shut down as a consequence, unless the EMC and KNCC receive some indication that the locals still trust the operator. In addition, in the wake of the accident at the Fukushima Daiichi Nuclear Power Plant, the NSSC decided to use anonymous reports from citizens as bases for entering and inspecting a power plant when they deem necessary.

3) Public Opinions about Nuclear Power Generation

In 2016, the Korea Nuclear Energy Foundation (KNEF) conducted a regular survey on nuclear power, asking 1,009 people for their individual and general evaluation on five aspects: safety; use of nuclear power generation; operation of nuclear power generation; openness to the

prospect, possibility of reception of a power plant in their residential areas; and perceived credibility of nuclear power (KNEA, 2017). Respondents answered questions on a scale of one to five. The perfect score was 100.

a. General evaluation

The general evaluation on nuclear power generation scored 61.5 points, indicating that majority of the respondents supported nuclear power generation. Scores on the evaluation of nuclear power generation on five criteria were: 69.1 points for national interest; 67.8 points for necessity of nuclear power generation; 67.0 points for individual interest; 58.1 points for environmental affinity; and 56.6 points for safety of nuclear power generation. When asked about the most important indicator for evaluation, 55.3% replied 'safety of nuclear power generation' while 30.8% cited 'necessity of nuclear power generation'.

The general receptivity toward nuclear power generation garnered 50.9 points. On the receptivity per aspect, the score for use of nuclear power generation was 63.8 points; operation of nuclear power generation, 47.6 points; and installation of a facility in the area, 37.5 points. Credibility in the technology scored 60.9 points while perceived credibility of operators and the government were at 57.8 and 52.8 points, respectively.

b. Relation between evaluation of nuclear power and attributes of respondents

Based on the study on the correlation between attributes (residential area, academic background, sex, and household income) and respondents' knowledge and assessment of nuclear power, the followed were the findings:

(1) Respondents who were more knowledgeable about nuclear power highly rated nuclear power. The general evaluation score by those knowledgeable in nuclear power was 59.7 points, while that by the rest was 53.2 points.

(2) The study uncovered certain regional differences. While the nationwide general evaluation score was 61.5 points, the average score was 50.9 points in Busan, Ulsan, and Gyeongnam regions; and 48.2 points in Gangwon and Jeju regions.

(3) The higher the household income was, the higher the general evaluation score. Households with an income of less than W2 million gave 56.2 points. Those with W2 million to W2.99 million gave 59.9 points; those with W3 million to W3.99 million, 59.7 points; those with W4 million to W4.99 million, 63.2 points; and those with an income of W5 million or more, 63.3 points.

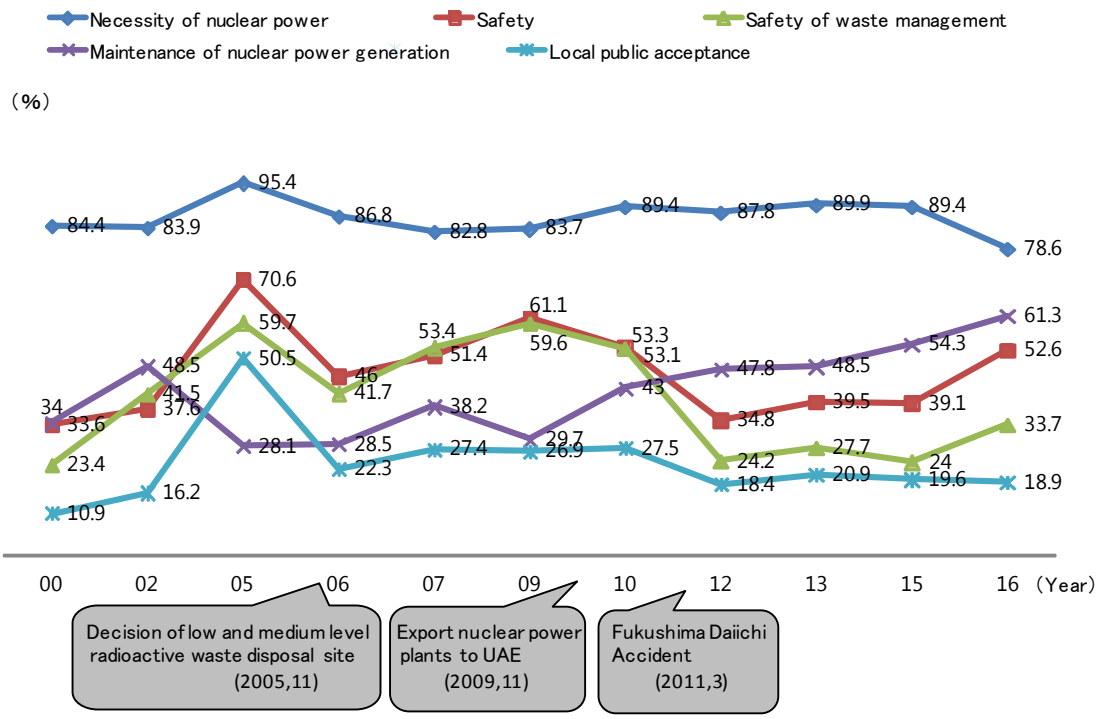
(4) Sex, academic background, and residential area were not highly correlated with the general evaluation of nuclear power although the tendency in responses to five items slightly differed. Environmental affinity got a score of 59.6 points among the males and 56.7 points among the females. National interest earned 70.3 points from the males and 68 points from the females. Thus, males rate these two items slightly higher than females. In addition, national interest, individual interest, and necessity of nuclear power generation were rated higher by people with a higher academic background.

c. Comparison with results of past surveys

The Figure 3-5 shows that while 78.6% favoured nuclear power generation, the possibility of reception of a power plant in their residential areas was at 18.9%. A big difference remained between these two indexes since 2000. Those who affirmed the safety of nuclear power generation reached 52.6%, which is the same level as that in the survey before the accident at the Fukushima Daiichi Nuclear Power Plant in 2011.

In the recent survey, respondents who answered the same question and added that safety level is ‘normal’ accounted for 34.7%, while only 12.7% believed that nuclear power generation was ‘unsafe’. This is a significant improvement from the results of the previous (2015) survey, where 57.9% had replied that nuclear power was ‘unsafe’. Also, safety in waste management was concurred by 33.7% of the respondents—an increase from the 24% recorded in the previous survey (Figure 3-5).

Figure 3-5. Trend of Five Major Barometers

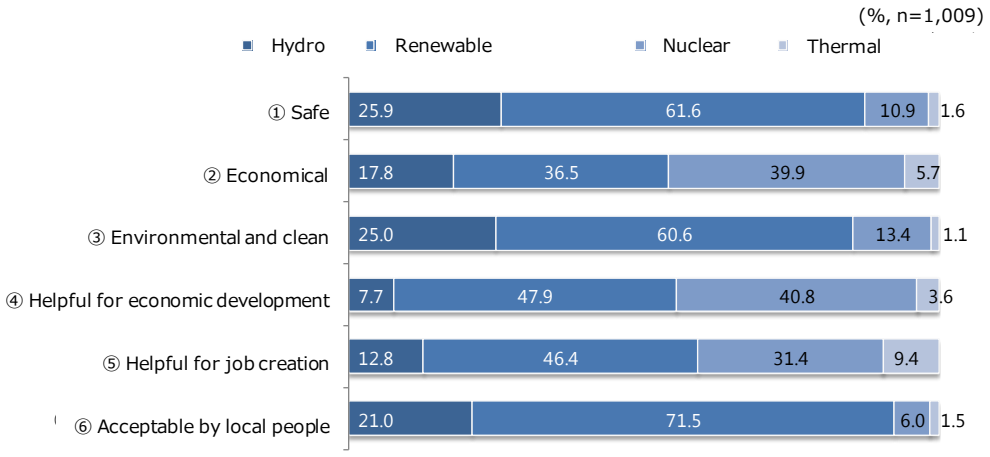


*The responses consist of four phases of evaluations up until 2015 and five phases of evaluations in 2016.
Source: Korea Nuclear Energy Foundation.

d. Evaluation of each power source

Respondents were asked about their most favoured power generation method—e.g. hydroelectric generation, renewable energy, nuclear power, and thermal power—under six evaluation indexes. In general, renewable energy (including hydroelectric) was favoured most, followed by nuclear power and thermal power (Figure 3-6). When asked about the most inexpensive power generation, the size of respondents who gave 'nuclear power' and 'renewable energy' as answers was close at 39.9% and 36.5%, respectively.

Figure 3-6. Which Power Generating System Is the most Preferred Among ① to ⑥?



Source: Korea Nuclear Energy Foundation.

e. Others

Findings on the rest of the questions are as follows:

- The level of knowledge on nuclear power generation tends to be high among males, or those with a high academic background or income. Many male respondents correctly answered all four questions about nuclear power generation. Those with a high academic background or income and those who were office managers or specialists correctly answered the questions relative to those from other educational background or income groups. On the other hand, many females and elderly housewives failed to choose the correct answers to all four questions.

- Renewable energy was believed to be the 'most inexpensive power generation method' by 36.5% of respondents, showing a gap between fact and perception.

- Media often used to gather information on nuclear power generation were television (88.1%), internet news (44.5%), other people (27.2%), and newspapers (17.1%), in that order.

- Respondents who said they had a negative opinion on nuclear power plants after the earthquake that hit southeast of South Korea on 12 September 2016 reached 38.9%. Meanwhile, 16.7% replied that their opinions on nuclear power plants 'changed to positive' after the earthquake and 44.4% did not change their opinions at all.

In regions other than Busan, Ulsan, and Gyeongnam, less than 40% replied that they 'negatively' changed their opinion. Thus, one can consider that the earthquake had little influence on the nationwide perception on nuclear power generation. In Busan, Ulsan, and Gyeongnam, however, 74.1% of respondents expressed their opposition to nuclear power generation after the 2016 earthquake struck South Korea.

Based on the study's results, the KNEF concluded that:

- The general evaluation on nuclear power is 61.5 points, indicating that most have a positive perception';
- 'Safety of nuclear power plants is the topmost concern of the nation; therefore, efforts to supply information on safety should be strengthened'; and
- 'Continuous flow of information is necessary as individuals with a deep knowledge of nuclear power tend to deepen their understanding further. Communication with the Busan, Ulsan, and Gyeongnam regions, where the general evaluation score was low, should be reinforced.'

f. What the survey result suggests

While results show that safety is a key concern and that communication should be done regularly, KNEF also got other insights on other indicators included in the study. By covering five areas of concern in its survey such as 'national interest', 'individual interest', 'necessity of nuclear power', 'environmental affinity', and 'safety', KNEF was able to identify the levels of importance respondents attach to each. In addition, by studying the perception by respondents' profile (i.e. by level of knowledge on nuclear power, academic background, sex, income, and place of residence), it was able to understand where and how its communication strategy should focus on.

One can further deduce that further analysis of the data through such methods as 'multiple regression' would prove that a uniform communication approach—such as explaining the safety of nuclear power to everyone in the same language or manner—would be ineffective. The KNEF concluded that focusing on Koreans with a low knowledge level (which the survey identified as those with a low academic background or income or are female) and enhancing their knowledge level on nuclear power should take precedence over explaining the safety aspect. Thus, information should be regularly and efficiently communicated through the media that the target audience often use.

3.3 Sweden

1) Communication Effort of Operators and Regulatory Bodies on Nuclear Power Generation

In Sweden, the Swedish Radiation Safety Authority (SSM) is the regulatory authority that regulates, authorizes, supervises, and makes proposals on nuclear safety, radiation protection, and non-proliferation of nuclear power. An example of SSM's role in the field of nuclear safety is its involvement in the decommissioning processes of nuclear facilities. Its interactions in the context of the decommissioning process include consulting with stakeholders in the review process, supervising parties to assure safety, providing input on decommissioning projects, and analysing impact of decisions taken by competent organizations (Carroll, 2016).

- Reporting on key decisions

  In a decommissioning process, the SSM invites opinions from a wide range of stakeholders through dialogues. It allows commentaries on issued primary reports, final reports, and decisions. It likewise reports all its activities and practices that are based on the proposals from the industry.

- Supervisory function

  The SSM supervises activities related to nuclear power to ensure that these are safely carried out. It establishes regulations, ascertains that all parties conform with the regulations and rules of conduct, inspects facilities and their operation, applies process improvements, as well as reports its decisions and proposals to the national government.

- Inputs and advices on external relations activities

  The body starts a dialogue with the plant operator before the operator files an application, reviews the application, offers official advices, including those on court rulings.

- Consideration of external relations activities

  The SSM considers the decisions made by stakeholders, although it need not provide any advice at this stage. Here, it is necessary to analyse the content to be agreed upon during the decision-making process and the implication of other organizations' decisions, since

what comes out of such an activity may have indirect impact on the planning and execution of decommissioning projects.

These SSM activities are performed while communicating to the public its functions as a regulatory body, laws and regulations on public disclosure, and available financial assistance or grants that allow for effective and active participation of stakeholders such as NGOs.

Meanwhile, Vattenfall, a state-owned nuclear power company in Sweden, believes that because it is part of a society, it should involve the participation of its various stakeholders in its daily operations. Such involvement is key to its success as a company (Vattenfall, 2017b).

Vattenfall supplies electricity to households, businesses, industries in cities. Because its operation can affect people and the environment, Vattenfall aims for 'understanding concerns of the people, finding optimum solutions, and interacting with people so that the business is accepted by the people in order to suppress negative influences of the business and maximize its positive influences'. Vattenfall interacts with the following stakeholders:

- **Employees:** All employees, including temporary workers
- **Customers**: Customers in all markets and segments
- **Suppliers:** Mainly primary suppliers, but secondary suppliers are also included
- **Plant owner:** The Ministry of Finance in Sweden
- **Market and investors:** Institutional investors
- **Authorities:** Regulatory and audit authorities
- **NGOs:** Non-governmental organizations concerned with environment and society
- **Large social communities:** Regional communities, universities, policy decisionmakers, etc.

The nuclear power operator sees the benefits of cooperating with regional communities. It understands that it is always responsible for the welfare and safety of its employees, citizens, and other related parties.

In fact, safety is one of Vattenfall's three core values (Vattenfall, 2017c). The operator pays attention to the 'health and safety of the employees, suppliers, and society'. it aims for a healthy

and safe workplace and takes systematic and proactive measures in accordance with OHSAS18001, a behavioural principle that includes awareness of health and safety, leadership, and culture.

Vattenfall stipulates a health and safety guideline as part of its safety measures (Vattenfall, 2016). In the long-term, the guideline aims to bring health risks and accidents in the workplace down to zero. To achieve this goal, Vattenfall requires its employees to be positive role models, fulfil their commitment toward health and safety, temporarily stop their work if in the presence of danger, exchange constructive information with each other, and regulate and report cases of harassment and bullying.

Vattenfall also points out that a clear and powerful leadership, best practice work processes that ensure a healthy lifestyle and safe environment, and abeyance to laws, regulations, and the Golden Rule are necessary. Its guideline identifies four way to ensure one's health and safety: (i) the presence of a nurturing leadership and culture; (ii) clear and consistent communication; (iii) use of a management system; and (iv) establishment and application of safety-related best practices, as well as of behavioural principles aligned with the guideline. Examples of behavioural safety principles are short-/long-term setting of (health) goals, planning and reviewing the goals, reducing risk by reporting occupational hazard incidents, and learning from experience.

2) Public Opinion about Nuclear Power Plants

In Sweden, a plan to gradually phase out nuclear power was formulated in the 1980 national referendum. However, public opinion leaned towards retaining the nuclear power plants. According to a public opinion poll conducted in 2004, only about 17% of the Swedes were in favour of phasing out nuclear power (World Nuclear Association, 2017).

By 2008, 40% of the nation favoured an expansion of the capacity of nuclear power facilities while 42% opposed the installation of new facilities but approved the use of existing ones. A public opinion poll conducted by Liberals in 2010 showed that 72% of the people favoured the government's decision to build a new nuclear reactor, while the remaining 28% opposed the decision. In the poll conducted by Social Democrats in the same year, 66% of the nation supported the new construction of a nuclear reactor. A third survey for that same year this time targeted representatives of industries that consume a large amount of electricity. Results

indicate that 30% was in favour of replacing the nuclear reactors while 22% approved the expansion of the facility's capacity and 45% supported a phase out of nuclear power.

The Novus Poll conducted a poll right after the accident at the Fukushima Daiichi Nuclear Power Plant in 2011. Results indicate that 33% supported the continuation of nuclear reactors' operation and replacement of existing reactors while 36% agreed that the use of existing reactors should continue, and 24% was in favour of phasing out nuclear power. The October 2013 survey conducted by the same company further shows that 35% was in favour of the use of nuclear reactors, including replacement of existing reactors; 33% agree to the simple use of existing reactors; and 22% concurred with the phase-out.

These series of surveys indicate that the gradual phase-out of nuclear power, which was approved by majority during the national referendum in 1980, did not get much support today. Also, those who were in favour of the continuous use of nuclear power—including replacement of existing reactors—prevailed even after the Fukushima Daiichi Nuclear Power Plant accident. While the results of the polls in 2008, 2010, 2011, and later cannot be simply compared because they had different poll questions or covered different populations, the trends in the results were similar. That is, despite the differences in poll choices and populations, results suggest that a broad range of people support the use of nuclear power in Sweden.

3.4 Switzerland

1) Communication on Nuclear Power Generation

In Switzerland, a national referendum seeking 'nuclear moratorium' was adopted in 1990 after the Chernobyl accident, and plans to construct new nuclear power plants were frozen until 2000. When the concern over the shortage of electricity supply rose later, the federal government amended the Nuclear Energy Act in 2005, lifting the indefinite suspension on existing nuclear power plants and the freeze on new construction of nuclear power plants.

After the accident at the Fukushima Daiichi Nuclear Power Plant in 2011, however, new construction of nuclear power plants was frozen because the people wanted lower risks in nuclear energy use. The public again wanted nuclear power abandoned, and the expansion of the use of nuclear power was likewise halted repeatedly.

Nuclear power is an important power source in Switzerland, second only to hydroelectric power. It accounts for 35% of the total electricity domestically generated (2015). The government and operators recognized the importance of nuclear power generation and took significant steps to communicate with the nation on the safety of nuclear power plants in the country. As a result, the Swiss had a higher understanding of nuclear power generation[3].

The nuclear power law of Switzerland requires the Swiss Federal Nuclear Safety Inspectorate (ENSI), the country's regulatory body, to regularly deliver information to the public and accommodate questions on the safety of nuclear power from Congress. Materials prepared by ENSI after 1 June 2006 have been made public, with some exceptions due to security and private information concerns in accordance with the Freedom of Information Act (ENSI, 2016).

The main communication activities are periodic dialogues with stakeholders, press conferences with media and journalists, final nuclear waste disposal site selection events, as well as technical forums on nuclear power plants started by ENSI in 2012. The forum would generally consist of the following:

- Platform for transparent and deep discussion about the technological and safety issues concerning operations of nuclear power plants;
- Participation from owners and plant operators, licensees, states, municipalities, interest groups, experts, and political representatives from Switzerland as well as neighbouring regions such as Germany.

Questions raised at the forum and corresponding answers were shared with the general public as well as the forum participants to aid them in forming their opinions.

The ENSI invites participants to the forum, which happens two or three times a year or upon request.

[3] The Nikkan Kogyo Shinbun, LTD. 'The Nuclear Almanac 2017', etc.

Figure 3-7. The ENSI Technical Forum

Source: ENSI Website

Every power plant and operator also has its own communication activities. For example, in 2015, Kernkraftwerk Gösgen (KKG) and its Gösgen power plant accepted more than 13,000 visitors from 710 groups (KKG, 2017a). By the middle of June that year, KKG held a four-day course on energy topics for school teachers. In December, it updated its brochure, 'Gösgen Nuclear Power Plant – Technology and Operation', and allowed its website visitors to download its French, Italian, and English versions. The KKG also held a periodic deliberation in January and December, inviting representatives from the municipalities of Däniken, Gretzenbach, Obergösgen, and Niedergösgen and providing information on emergency preparedness as well as KGG activities and facilities in Solothurn.

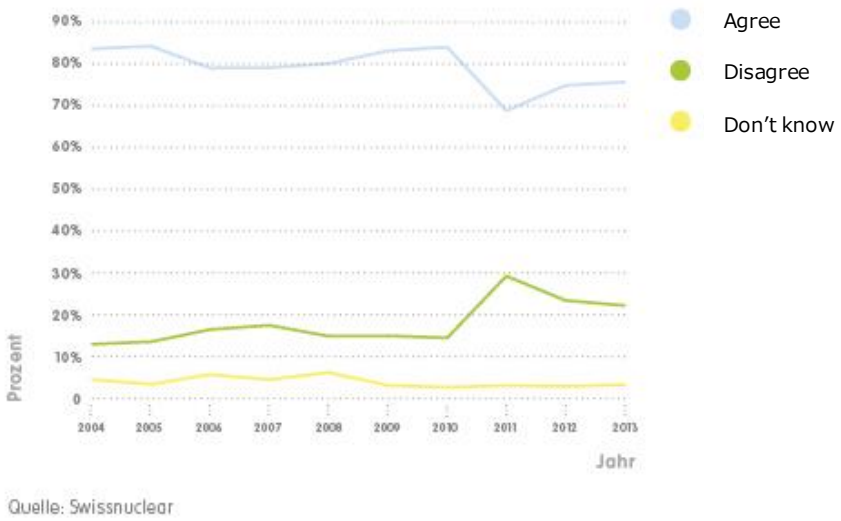
2) Trend of Public Opinion Before and After the Fukushima Daiichi Nuclear Power Plant Accident

Figures 3-8 and 3-9 show the results of a public poll conducted on more than 2,200 participants every year in Switzerland (KKG, 2017b). Figure 3-8 shows respondents' reply when asked whether safety has been enhanced at existing nuclear power plants in Switzerland.

The percentage of 'I don't think so' responses rose by about 15% in 2011 after the accident at the Fukushima Daiichi Nuclear Power Plant took place but declined over the next two years. Such is indicative of KKG's progress in enhancing its target audience's understanding of plants' safety capability after the Fukushima accident. It should be noted that the percentage of 'I think so' responses is as high as about 80%.

Figure 3-9 pertains to the response to a question on the cost of nuclear power generation. The number of respondents who thought it was 'inexpensive' have increased since 2008, exceeding by about 30 points those who thought it was 'expensive' in 2013 (after the Fukushima Daiichi Nuclear Power Plant accident). These results confirm that perceptions about nuclear power's safety capability and economy have not been lost even after the Fukushima accident.

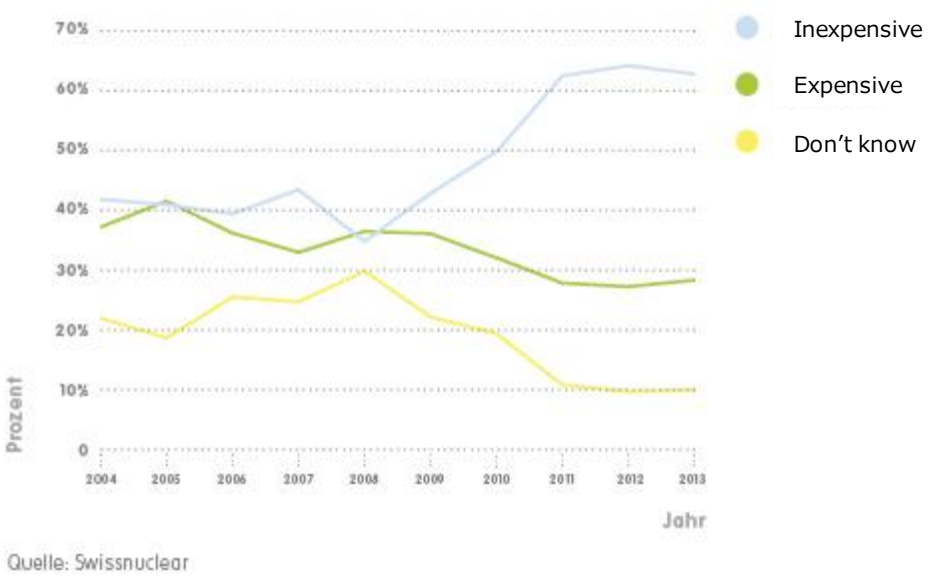
Figure 3-8. Is Safety Enhanced At Existing Nuclear Power Plants in Switzerland?



Quelle: Swissnuclear

Source: Kernkraftwerk Gösgen Website.

Figure 3-9. Is the Cost of Nuclear Power Generation Inexpensive?



Source: Kernkraftwerk Gösgen Website.

3.5 The United Kingdom

1) Communicating with Host Municipality and Residents About Nuclear Power Generation

In the United Kingdom, a stakeholder group meeting is periodically held as a venue for communication between operators of the nuclear power plant and various parties in the municipality.

The Site Stakeholder Group (SSG) is a council called upon to discuss issues on the nuclear power facilities owned by the United Kingdom's Nuclear Decommissioning Authority (NDA). There are 16 SSGs throughout the United Kingdom.

In areas hosting a nuclear power plant run by private operator EDF Energy, a council called a Local Liaison Committee (LLC) or a Local Community Liaison Council (LCLC) is organized. In areas where an NDA site is located side-by-side an EDF site such as in Sizewell (county of Suffolk, England), a common stakeholder group exists (Sugawara, 2013). Some stakeholder groups have sub-groups that discuss in detail such topics as emergency preparedness. For example, the

stakeholder group of Dounreay (2009) has three sub-groups that discuss issues of restoration of the site, business, and social economy.

Table 3-1. Comparison of SSG and LCLC

	SSG	LCLC
Guideline	NDA guideline (No legal obligations)	None in particular
Chairperson	・ Except NDA; Site Licence Company's (employer) employee has no conflict of interest, etc. ・ Mainly, a person from the local government (Person with experience as head of local autonomy)	・ Served by EDF Energy ・ Mainly manager of power facilities
Secretariat	・SLC appoints staffs ・ Tasks: Arranges schedules, drafts minutes, controls budget, manages business trips, manages the website of SSG, etc.	EDF Energy appoints staffs
Members	Environmental groups; local government executives; representatives from commercial and industrial associations, tourism associations, agricultural unions, churches, disaster prevention agency, medical and welfare staff, etc.	
Budget	NDA	EDF Energy
Meeting	Four times a year～＋subcommittee	Twice a year～＋subcommittee
Main Subject	・ Site environment remediation while decommissioning ・ future vision for the region while/after decommissioning	Safety issue during plant operation

Source: Sugawara (2014), 'Involvement of stakeholder at local region – example of overseas', 29th Atomic Energy Commission, 2 September 2014.

a. Outline of stakeholder group meeting

Both SSGs and LCLCs are voluntary organizations that are not obligated by law to be set up but are now present in all nuclear power facilities, including military sites, in the United Kingdom. Their basic functions are: (i) monitoring the safety and environmental impact of the facility on the community; (ii) providing information on the operating conditions of the facility; (iii) consulting with representatives of the host location[4]; and (iv) engaging in discussions on the

[4] The SSG may pursue discussions on policy directions of the government and strategic development of

social and economic situation of the region.

Site Stakeholder Groups are required to follow the guideline from the NDA. This guideline enumerates the main purposes of SSGs: (i) to provide opportunities to direct questions to the plant operator, NDA, and regulatory bodies on behalf of the community; (ii) to offer comments on the operation as well as future plan of the site; and (iii) to echo the opinions of the community, giving advices to the NDA, operator, and regulatory body.

The NDA guideline clearly states that SSGs are not decision-making bodies. The operating costs of SSGs are shouldered by the NDA, while those of LCLCs are borne by EDF Energy.

b. Constituents of stakeholder group meeting

Each SSG, as prescribed by the NDA guideline, consists of members and advisors. Members are representatives from the host region who regularly participate in meetings and have voting rights over decisions on SSG operations. These include politicians, environmental groups, and non-profit organizations in the region. They number from 20 to 30, including the chairperson and vice-chairperson. The chairperson of an SSG must not be an employee of the NDA or operator. Any violation of interests are required to be made public.

Advisors do not hold voting rights. They are stakeholders such as representatives of regulatory bodies and unions who often participate in meetings, representatives of the NDA and the plant operator, and administrative officers of the municipality.

An SSG represents its main constituents: churches, commercial and industrial associations, environmental groups, agricultural unions, tourism associations, and labour unions, etc.

The structure of LCLCs is almost the same as that of SSGs. Both the LCLC chairperson and secretariat are served by the EDF Energy manager. Members participating in a sub-group are flexibly selected, depending on the agenda. If the agenda is on disaster prevention, for example, the members are selected based on the planned range (1 to 3 kilometres in the case of a gas furnace). If it is about local economy, they are selected based on the commutable area (travel-to-work area).

c. Main activities of stakeholder group meeting

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the NDA.

Specific activities of both SSGs and LCLCs include 'regular meetings' and 'consultations'. They may also engage in formulating an emergency plan. The regular meeting of an SSG or LCLC is a venue where a question-and-answer session is held in response to a report by the operator or regulatory body concerning the operating condition or trouble at the facility. A subcommittee may be set up under the management of a committee so as to have intensive discussion on issues the hosting region takes a high interest in. As a channel for consultations, an SSG or LCLC also functions as a venue for the NDA to seek opinions from the host region when deciding on an operational strategy. For instance, the government and the plant operator engage in a dialogue with the host region about nuclear policy measures, and stakeholders participate in the advance evaluation of an operation plan.

Another committee that intensively discusses economic and employment problems is also installed in the plant's host site under the NDA's management. This is because there are many nuclear power plants scheduled to be decommissioned in the United Kingdom. Therefore, the economic impact of decommissioning a nuclear facility are strong concerns in a region affected. It is this same committee that periodically assesses/predicts the economic benefits an existing/new nuclear power facility has brought (will bring) to the host region, and talks about areas where investment is deemed necessary and about specific business operations. In some cases, an SSG requires the input of the plant operator or the NDA when determining the 'benefit packages' of a newly constructed facility.

d. Efforts by industry in coordination with the government

The Nuclear Industry Council (NIC) can be cited as a by-product of the coordination efforts between the British government and the nuclear industry. The council was started in February 2013 as a central concept of the 'Nuclear Industrial Strategy' put forward by the Department of Energy and Climate Change (at that time) so as to supply high-level strategic policies to the British nuclear industry.

The predecessor of the NIC was the Nuclear Development Forum (NDF), which was established to build trust in the construction of new nuclear power plants and to provide an industrial forum that will encourage the British government to implement activities that promote the 2008 White Paper on Nuclear Power. As the NIC started, the activities of the NDF were realigned under the management of the NIC.

The government and industry jointly chair the NIC with senior representatives of the nuclear industry such as developers, vendors, operators, suppliers, contractors, and labour unions as participants. The NIC aims

- to play a leading role as a collaborative organization of the British nuclear industry and government and to supply a forum for dialogues within the industry;
- to formulate and maintain a single and consistent strategy and vision for the British commercial nuclear industry that will guide the government and operators' decisions;
- to agree with, supervise, and implement programs at home and abroad so as to enhance the capability and competitiveness of the British nuclear industry;
- to support actions necessary to operationalize the long-term vision of the industry or the government, in cooperation with research communities and the industry.

In December 2015, the NIC (2005) published the 'Nuclear Energy and Society – A Concordat for Public Engagement', enumerating the commitments of the nuclear department to engage with society over nuclear-related matters under the following four principles:

- **Principle 1: Leadership commitment**

Companies working in the United Kingdom civil nuclear sector recognize the importance of public engagement.

  - "We take the society's attitude towards nuclear energy seriously and give a high priority to public engagement across our organization."
  - "We incorporate public engagement into the strategic or operational plan of our organization."
  - "We encourage our employees to engage with society and supply leadership and resource necessary for them to do so."

- **Principle 2: Best practice**

  Engagement with citizens has the following features:

  - **Dialogue**: "We evaluate bidirectional communication and listen to the voices of the citizen."

- **Trust**: “We express our respect and try to build trust by the citizen by making public and transparent the issues we face and actions we take against them.”
- **Clarity**: “We ensure that public engagement has features of being written or spoken in plain language and having clear and concise information without contradiction.”
- **Consultation**: “We listen to the opinions of communities and proactively consult with the communities (especially when our activities influence their daily lives).”

- **Principle 3: Effective communicators**

  Employees are recognized as ‘ambassadors’ of the sector and that independent experts and leaders of the industry play an important role in communications:

  - “We promote public engagement within our organization and reflect it on our staff policies.”
  - “We support engagement between our employees and the citizen by supplying appropriate training, resource, and opportunities.”
  - “We act to nurture individually and collectively to build understanding and awareness of the positive impact of our sector on society.”

- **Principle 4: Making a Difference**

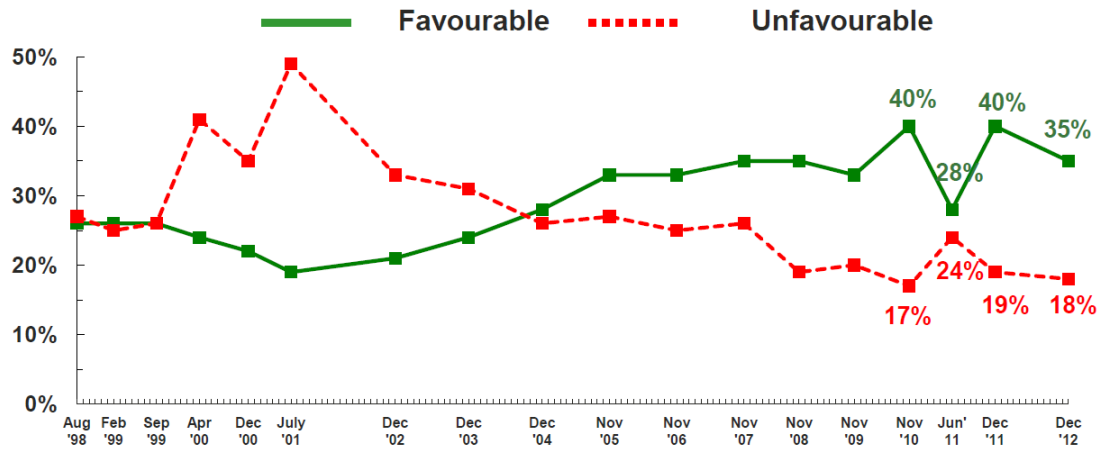
  The nuclear department recognizes the importance of the attitude of the citizen towards nuclear energy and periodically evaluates progress in fostering engagement with society:

  - “We evaluate public opinion surveys relevant to our business and seek to better understand society’s attitude towards civil nuclear energy.”
  - “We review and continuously improve our public engagement programs, building our successes and learning how to be more effectively.”
  - “We work together to collaborate in public engagement and share good practice.”

2) Public Opinion on Nuclear Power Generation

Ipsos MORI, a research company in the United Kingdom, has long been conducting public opinion surveys on the nuclear power industry and nuclear energy in the United Kingdom for the Nuclear Industry Association. On 7-13 December 2012, Ipsos MORI conducted a survey among 1,046 respondents on 126 sampling points (automatically selected) all over the United Kingdom (Ipsos MORI, 2013). Data were weighted to represent the population of 16 years old or older all over the United Kingdom. In its paper published in February 2013, 35% of the respondents who were asked the question, 'How favourable/unfavourable is your overall opinion and impression on the nuclear industry/nuclear energy?[5] were in favour. Meanwhile, 18% were against nuclear energy. Both the size of the affirmative and negative responses declined compared to that of the previous year (Figure 3-10).

Figure 3-10. How Favourable or Unfavourable Are Your Overall Opinions Or Impressions on the Nuclear Industry/Nuclear Energy?



Source: Ipsos MORI, Nuclear Update, December 2012.

A survey done right after the 2011 Fukushima Daiichi Nuclear Power Plant accident showed that

[5] Respondents selected their answers from the following; Very Favourable, Mainly Favourable, Neither Favourable nor Unfavourable, Mainly Unfavourable, Very Unfavourable, and No Opinion. (https://www.ipsos-mori.com/Assets/Docs/Polls/ipsos-mori-nuclear-energy-poll-tables-december-2012.pdf).

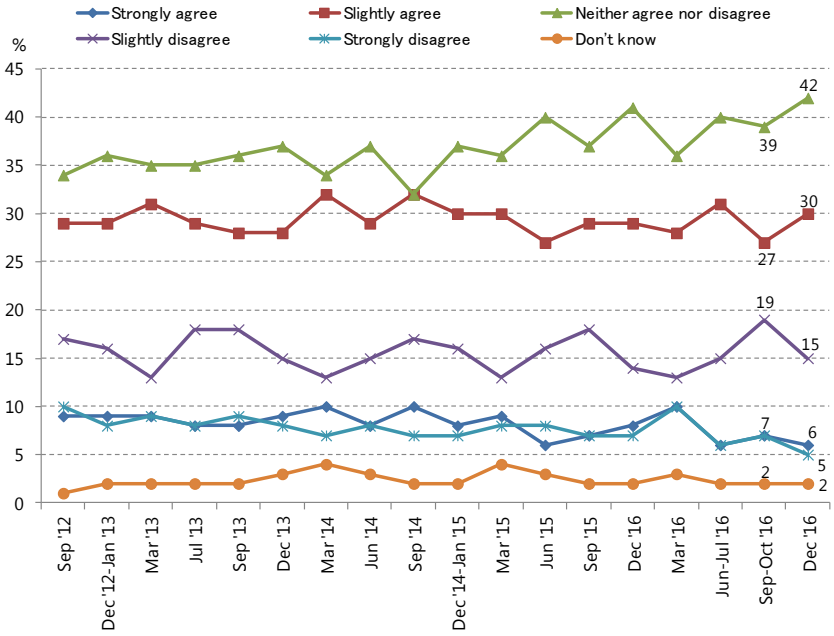
the points of those of gave a 'favourable' reply substantially declined. In December of the same year, however, it should be noted that the percentage recovered to the level before the accident. Although the result of a survey in December 2012 showed that the percentage of 'favourable' replies decreased, the 'unfavourable' response did not increase.

Note that during the periods December 2000 to July 2001, when the 'unfavourable' opinions substantially increased, seven nuclear incidents occurred, all of which were rated Level 1 by the International Nuclear Event Scale (INES) (Office for Nuclear Regulation, 2001). In particular, three nuclear incidents occurred at the Sellafield site of the British Nuclear Fuels (at that time): (i) In October 2000, there was a loss of power supply to major parts of the site due to a defect in a new section of a 11-kV switching equipment; (ii) In March 2001, there was a plutonium contamination in the workplace while gloves were being replaced at the plutonium reprocessing department of the B205 magnox reprocessing plant; and (iii) In June 2001, local flooding with a depth of 10-15 centimetres occurred outside the research facility, with water getting into the premises. These circumstances were considered to have caused the shift in public opinion.

The Department for Business, Energy and Industrial Strategy (2017) also surveyed the public's opinion after the Fukushima Daiichi Nuclear Power plant accident and made its result public (Figure 3-11). This survey was conducted on 14-18 December 2016 among 2,138 respondents 16 years old and above. It used a random sampling method throughout the United Kingdom (weighted data). The survey results, published in February 2017, showed a slight shift in both the affirmative and negative responses to the question, 'Do you support or oppose use of nuclear power generation in the United Kingdom from what you know or have heard of?' but almost no change in the overall trend. The percentage of people who neither support nor oppose the use of nuclear power generation reached the highest level in the past, while 36% approved and 20% opposed. Households with an income of £50,000 or more (43%), male (47%), belonging to social grades[6] A and B (45%), and are 65 years or older (43%) tended to favour the use of nuclear power.

[6] Social Grades by National Readership Survey: A - Higher managerial, administrative and professional; B - Intermediate managerial, administrative and professional; C1 - Supervisory, clerical and junior managerial, administrative and professional; C2 - Skilled manual workers; D - Semi-skilled and unskilled manual workers; E - State pensioners, casual and lowest grade workers, unemployed with state benefits only.

Figure 3-11. Public Opinion Survey by Business, Energy and Industrial Strategy



Source: Institute of Energy Economics, Japan based on the Business, Energy and Industrial Strategy website.

3.6 India

Based on the Russia-India nuclear cooperation agreement, the construction of VVER, which are Russian light water reactors, began in 2002 at the Kudankulam site. Kudankulam Unit No. 1 (1 million kW, VVER) started operating in December 2014. Unit No. 2 (1 million kW, VVER) started generating power in August 2016. Construction of Unit No. 3 and 4 (1 million kW × 2, VVER) started in October 2016. However, the projects encountered hiccups as protest movements rose throughout the construction period of Kudankulam Units No. 1 and 2.

Several months after the Fukushima accident occurred in March 2011, the protest movement led by a strong opposition leader, S.P. Udaykumar, suddenly gathered momentum among local communities in Kudankulam.

Concerned that the protest will escalate similar to the scenario in Jaitapur, India (where protesters clashed with the police, with one protest leader dying in the process), the Indian government commenced investigation on the source of the Kudankulam projects' funds. Additionally, the local municipality of Kudankulam decided to suspend the construction work

until the Indian government could explain the safety of the plant, which irritated Russia and led the Indian government to find the source of the protests. In an interview with the scientific journal *Science* in February 2012, India's Prime Minister Manmohan Singh said, 'There are NGOs, often funded from the United States and Scandinavian countries, which are not fully appreciative of the development challenges that our country faces.'[7]

In a way, these protest movements produced some positive effects. Because of the strong protest movement at Kudankulam, pro-nuclear advocates in India started serious discussions and began to recognize the need for credible public opinion surveys.

Some knowledgeable sources point to political interests as the cause of anti-nuclear activities at Kudankulam. Dr. Sitakanta Mishra, who teaches International Relations at the Pandit Deendayal Petroleum University, stated in a 25 January 2017 article in the *Russia & India Report*:

> Evidently, sporadic opposition to nuclear projects and its politicization started in 1988 when the local population and environmental groups opposed the Kaiga project in Karnataka. […] Pockets of resistance, and futile attempts to paint nuclear projects with political color, are nothing new in India. What is annoying is the self-proclamation of sporadic opposition as the 'anti-nuclear movement of India' when there is no pan-Indian movement at all. Neither is there any visible 'green politics' in the Indian political mainstream, unlike in Europe. What is unfolding rather is the deliberate attempt by domestic disgruntled groups to shackle India's upswing nuclear energy drive when the Indo-U.S. nuclear deal has unshackled it from the global technology denial regimes.'

In 1989, Dr. Shivaram Karanth, the protest leader, stood as a candidate in the parliamentary election but was eventually defeated. Later, S.P. Udaykumar, the Kudankulam protest leader, also ran during the parliamentary election as an Aam Admi Party candidate. However, Udaykumar later quit the party because Aam Admi Party Leader Arvind Kejriwal allegedly told him that 'the middle class may not support you if you take a stand against the nuclear plant since they see these as employment opportunities for their children.' Udaykumar then launched his own political party named *Pachai Tamizhagam* (Green Tamil Nadu) and started political activities

[7] As reported in the *World Nuclear News*, 'Singh: Foreign groups behind anti-nuclear protest', 24 February 2012.

using the anti-nuclear policy as its platform.

While there are others like Arvind Kejriwal who believe that most Indians are not against nuclear energy, there is a deliberate attempt by domestic disgruntled groups to 'shackle India's upswing nuclear energy drive', and the Russian-built Kudankulam Nuclear Power Project is bearing the brunt of this negative campaign.

India's case is interesting as it demonstrates how protest activities against nuclear facilities can be affected by largely political issues rather than by lack of information or communication among stakeholders.

3.7 Organisation for Economic Co-operation and Development and Nuclear Energy Agency

Aside from the country initiatives, international organizations have their own experiences on how to gain public acceptance for nuclear power projects.

1) Study on General Public and Stakeholder Involvement in the Management of Radioactive Waste

The Organisation for Economic Co-operation and Development Nuclear Energy Agency (OECD/NEA) conducted a study on stakeholder involvement in the radioactive waste management and released the report, 'Stakeholder Involvement in Decision Making: A Short Guide to Issues, Approaches and Resources' (hereinafter referred to as the SI Report). The SI Report aims to support practitioners of stakeholder involvement, outlining the steps and issues associated with the process.

a. Necessity of stakeholder involvement

Radioactive waste management issues are embedded in societal issues such as the environment, risk management, sustainability, energy, and health policy. In all these fields, there is an increasing demand for stakeholder involvement, participation and engagement by sharing information, consulting, engaging in dialogues, or deliberating on decisions. Stakeholder involvement should always be seen as a meaningful part of formulating and implementing good

public policy. Its approaches should not be viewed as convenient tools for public relations, image building, or winning acceptance for a decision taken behind closed doors.

When convening a stakeholder involvement initiative, it is usually necessary to identify the right target population. This target population may be very broad in the early stages of decision-making but could be narrowed down as projects progress. Stakeholders have different contributions to make and different involvement needs at each stage of a decision-making process. The definition of 'community' could include different criteria such as spatial or geographic, political, economic, cultural and emotional criteria. When considering which stakeholders to engage with, the planner should, at the minimum, identify institutions or groups where the organization has legal, financial or operational responsibilities.

Not all forms of participation are alike. Different levels of stakeholder participation or involvement are offered through different approaches. One simple approach may be to transmit information to a passive stakeholder audience; another approach may significantly empower stakeholders within the decision-making process. There is a clear trend towards higher levels of engagement by organizations seeking win-win outcomes with a diverse set of stakeholders. Table 3-2 describes how a given level of involvement may be chosen according to the situation or to the objectives sought.

Table 3-2. A Public Involvement Continuum, the Level of Expected Outcomes, and the 'Promise' Made by the Convener

Low level of public involvement or influence		Mid-level	High level of public involvement or influence	
Inform	**Consult**	**Engage**	**Collaborate**	**Partnering**
Inform, educate, share or disseminate information	Gather information, views	Promote two-way dialogue	Commit to frame issues and debate options together	Partner in selecting and implementing solutions
Increasing literacy; inducing behavioural changes	Modifying policies in accordance with public preferences and/or reaching an informed consent		Obtaining the self-commitment of each participant as well as contributions that may result in binding processes and decisions	
"We will keep you informed"	"We will keep you informed, listen to you, and provide feedback on how your input influenced the decision"	"We will work with you to ensure your concerns are considered and reflected in the alternatives, and provide feedback on how your input influenced the decision"	"We will incorporate your advice and recommendations to the maximum extent possible"	"We will implement what we decided together"

Source: Organisation for Economic Co-operation and Development Nuclear Energy Agency, 'Stakeholder Involvement in Decision Making'.

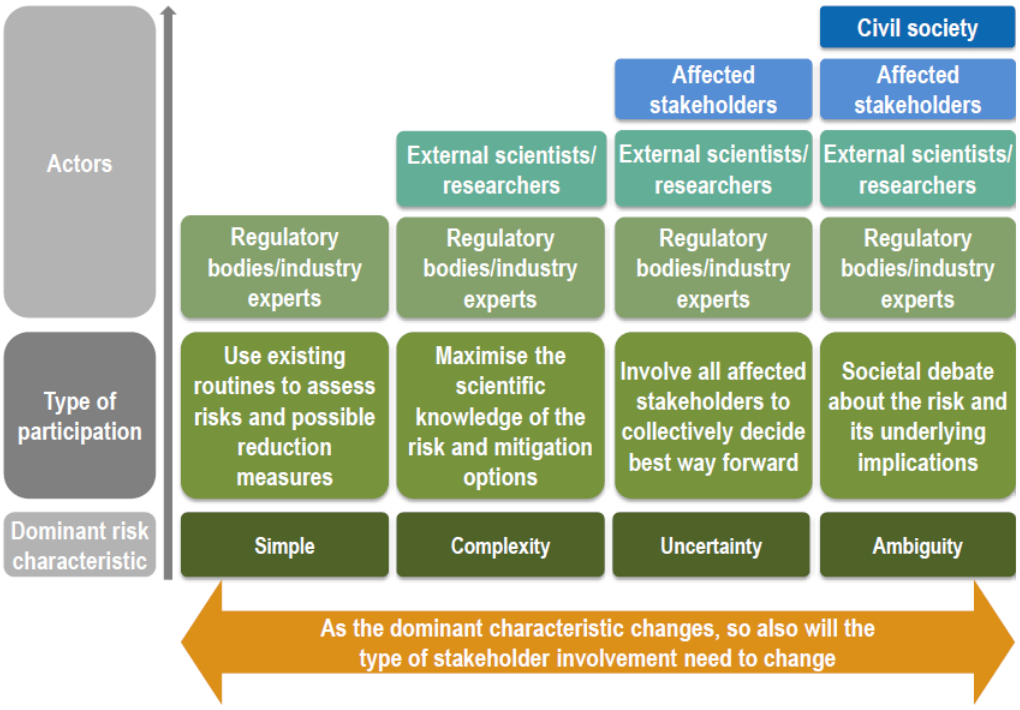
According to international guidance and best practice publications, stakeholders should be involved early on to ensure the effectiveness and validity of process. 'Early' here means the upstream principle stage that serves as the foundation for framing the issues and considering individual tasks, while options are still wide open. Early involvement also means engaging a wide range of interested and affected parties in formulating the issues for consultation, evaluation, or decision, to the extent possible in a given context. Today, even high-level intergovernmental processes are influenced by broad-based stakeholder input at an early stage.

Planners should be aware that stakeholders may desire, expect or be entitled to a particular level of involvement. Preliminary discussion will help determine the appropriate level. How much involvement the organization may make, how information obtained from the engagements affects the decision-making process, and what can be constraints in doing so, must be clearly defined. In statutory processes, such as those conducted under the Aarhus Convention, accountability is an important requirement. The convener is accountable—i.e. is required to

show how the input has influenced the decision-making process—and stakeholders have a right to verify this information.

Figure 3-12 shows how stakeholders participating in risk management or the method of participation changes according to the characteristics of dominant risks. The figure indicates that a different set of procedures and a larger set of actors are needed to respond as dominant risks become more complex or uncertain. For 'ambiguous' issues, broader as well as higher-level involvement is justified, so as to reveal the competing perspectives and concerns.

Figure 3-12. The Risk Management Escalator



Source: Organisation for Economic Co-operation and Development Nuclear Energy Agency, 'Stakeholder Involvement in Decision Making'.

b. Planning the stakeholder involvement process

In planning, executing and evaluating a stakeholder involvement initiative, a cycle of effective engagement that moves from strategic thinking; analysis and planning; strengthening engagement capacities; designing the process and engaging stakeholders; and finally acting,

reviewing and reporting, is used (Figure 3-13). This reflects the fact that radioactive waste management is a long-term endeavour, and that there is that possibility of needing to overturn or agilely correct decisions at any point of the engagement framework.

Figure 3-13. Five-stage Stakeholder Engagement Framework

Source: Organisation for Economic Co-operation and Development Nuclear Energy Agency, 'Stakeholder Involvement in Decision Making'.

Stakeholder involvement approaches vary. No particular approach can be considered superior to another. To select the appropriate stakeholder involvement approach and be able to evaluate whether the selection was appropriate after executing the engagement plan, the convener must specify first the overall objective of its initiative and the selection criteria. Handbooks and online platforms have resources that can help the convener match approaches to the basic selection criteria identified by the organization.

These approaches on stakeholder involvement are listed below, with those at the bottom generally requiring higher involvement. Note though that this list is by no means exhaustive. In addition, regardless of the characteristics of the approach, each needs to be adapted, in practice, to given circumstances.

- Public hearings
- Deliberative polling
- Focus groups
- Nominal group process
- Delphi process
- Charrette
- Citizen advisory groups
- Consultative groups
- Multi-actor policy workshops
- Round tables
- Citizen task forces
- Study circles
- Co-research groups
- Scenario workshop
- Referendum
- Consensus conferences
- Citizens' juries
- Citizens' panels
- Local monitoring, oversight and information committees
- Partnership arrangement for participatory site selection

Approaches that are more appropriate for 'alternative dispute resolution' or for cases where discussions involve competing interests include:

- Policy dialogues
- Regulatory negotiation or negotiated rule making

c. Implementation and assessment of involvement

Guides on how to effectively implement include 'best practice' tips, flow charts, and worksheets that can be printed. Discussions on actual use cases are, however, beyond the scope of this short guide. In general, the tasks involved in the implementation stage include sending invitations to stakeholders, setting the venue and time, preparing pre-event information, building participants' capabilities on the complex decision-making processes, checking travel routes and logistics, setting basic house rules and work procedures for participants, facilitating the proceedings on the day itself, recording the event, and applying quality assurance.

Post-hoc assessment of initiatives on stakeholder involvement is essential to improve the next initiatives. Goals and outcomes should be measurable or at least listed and clarified so that the different participants (stakeholders and conveners alike) can assess the process. Also, goals and outcomes largely vary depending on the expected effects on the stakeholders' interest or involvement. The criteria for success need to be specified within a given range. Examples of criteria are: whether compliance with statutory requirements was achieved; whether the decision-making process gained credibility; whether input from stakeholders was of high quality; or whether some democratic process in the deliberations was put in place.

d. Area for future development

- The new media context

Recent international events have proven that social media is changing the communication and participation context, especially among the younger generation. The process of involving stakeholders has, in fact, already leveraged on these developments in the way it informs and consults. The next steps would be to use social media so as to attain a higher degree of involvement in the decision-making process. Relevant institutions need to monitor evolutions, and learn to reason and respond in new ways.

- The evolving participation context

Traditionally, public participation has been viewed as an institutional process following a subscribed procedure during a limited window of time. On the other hand, the Aarhus Convention has introduced participation as a continuous process—which now sets new demands on relevant organizations. At the same time, civil society is gaining autonomy and coming forward to propose its involvement in issues it deems important. In the future, stakeholder engagement will probably need to push for a solid democratic culture among the populace and to support civil society representatives in ongoing knowledge-, competency- and capacity-building initiatives.

- The increasing importance of political commitment, innovation, and advocacy

In today's societies, merely changing scientific variables in public policy-making does not have the power to make the necessary changes. Nowadays, political deliberation and democratic interaction are key to a truly successful decision-making process.

- Continued relevance and recognition of ethical dimensions

On radioactive waste as a problem, legitimate and defensible policies must take into account important ethical issues, along with stakeholders' interests and scientific and technical solutions.

- Addressing participants' varied standards of accountability

In a participation process, stakeholders may differ in their standards on responsibility and accountability. For instance, one national institution may be expected to hold to a very high standard the principles of truth, accuracy, and verifiability of information in an engagement process. In contrast, non-institutional stakeholders participating in an open consultation are not required by any regulatory body to apply the same standards.

Another example is when some participants in the engagement process take advantage of the platforms available at their disposal, particularly new media, to broadcast their own interpretations of a circumstance and in the process, swaying other participants toward their side of the issue.

In such circumstances, the participatory processes and approaches must be combined so as to filter varied voices on the same issue and slowly direct the validated information and points to the actual decisionmakers. Where facts are disputed and subject to a high level of uncertainty, the decision-making process will need to benefit from processes that validate the facts and reduce uncertainty. Stakeholders should welcome such activities, which are served, for example, by participative technology assessment methods.

2) Workshop on General Public and Stakeholder Involvement in Nuclear Decision-making

a. Overview of the workshop

On 17-19 January 2017, the OECD/NEA held the NEA Workshop on Stakeholder Involvement in Nuclear Decision-Making (hereinafter referred to as the 'NEA Workshop') under six main topics:

- Various levels of stakeholder involvement, the terms and their meanings;
- Aspects of/factors in effective and ineffective involvement of stakeholders;
- Respective roles in effective stakeholder participation practices;
- Factual accuracy while encouraging differing positions and information;
- Approaches to enable trust and well-informed decisions; and
- The interrelationships between different areas of expert domains.

The NEA Workshop asked the Radioactive Waste Management Committee, the Committee on Radiological Protection and Public Health, the Committee on the Nuclear Regulatory Activities, the Nuclear Law Committee and the Committee for Technical and Economic Studies on Nuclear Energy Development, and the Fuel Cycle of OECD/NEA to share perspectives and document best practices. Table 3-3 shows the NEA Workshop's program.

Table 3-3. The Program of the NEA Workshop

Day 1 – Tuesday, 17 January 2017	
Registration	
Welcome and opening remarks	
Keynote speech	
Setting the scene for the workshop: Objectives and structures	
Session 1.	Legal frameworks and international conventions
Session 2.	Regulatory perspectives
Session 3.	Radiological protection
Day 2 – Wednesday, 18 January 2017	
Moderator: Opening and reflection on the previous day's discussions	
The overall policy perspective on stakeholder involvement and public debate	
Session 4.	Radioactive waste management
Group dialogue session A	
Session 5.	New nuclear facilities
Session 6.	Extended operations of nuclear facilities
Day 3 – Thursday, 19 January 2017	
Moderator: Opening	
Governmental perspective on stakeholder involvement	
Session 7.	Stakeholder involvement in other sectors
Session 8.	Media and stakeholder involvement
Group dialogue session B	
Closing session **Closing remarks**	

Source: Institute of Energy Economics, Japan based on the Organisation for Economic Co-operation and Development Nuclear Energy Agency website.

b. Common lessons from the NEA Workshop

Common lessons from the NEA Workshop were summarized and published by Ann MacLachlan, a journalist who served as the NEA Workshop moderator. These lessons are as follows:

- There is no one-approach-fits-all: The stakeholder involvement process needs to be adapted by country-specific context, although some effective practices seem to have universal applications, such as face-to-face meetings/personal engagement/local engagement;
- The process must be inclusive of all stakeholders. Even in public engagements, a bottom-up approach has proven successful in many countries and circumstances;

- Take the time to engage and debate. Start very early in the process. It will be time and resources well spent;
- Younger generations must be included early in the process to ensure a sustainable dialogue with the public. When it comes to nuclear activities, stakeholder education can be part of the long-term process.
- Stakeholder Involvement is not static. The world is evolving and innovation is needed to adapt and improve: e.g. adapting international methods to home country context, or learning to use new tools such as social media;
- There is a need for common understanding of terms: Know the broad range of meanings associated with basic terms such as Stakeholder, Public, Affected, Concerned, Involvement, Engagement, Confidence, Trust. When in doubt, seek for clarification.
- Agree on the objective of the stakeholder involvement: Stakeholder involvement is more than public consultation or public engagement. Take all stakeholders into account. This improves the quality of the decisions and the project's success;
- There are some engagement approaches that have universal application: Face-to-face/personal interaction/learning how to listen are useful traits at all times; and
- There is already a vast body of experience in terms of best practices and concepts. There is no need to re-invent the wheel. Engage those with long NEA experience in areas of waste and radiation protection.

3.8 World Nuclear Association

1) Communication Initiatives of an International Industry Organization

The World Nuclear Association (WNA) is the international organization that represents the global nuclear industry. Its mission is to 'promote a wider understanding of nuclear energy among key international influencers by producing authoritative information, developing common industry positions, and contributing to the energy debate'. The WNA is the only industry organization with a global mandate to communicate about nuclear energy, working alongside related international organizations and other regional and national nuclear associations around the world.

Believing that there ought to be a balanced energy mix, including nuclear, to support both economic progress and environmental conservation such as mitigating global warming, the WNA established a long-term objective of providing '25% or more of electricity by nuclear power in 2050'. Based on this concept, it has developed its own vision called Harmony Programme, and communicated such to its partners. The content of the Harmony Programme is described below.

a. Problem awareness in the Harmony Programme

When constructing any long-term outlook on energy, being able to have a 'stable supply of electricity' is the most important, albeit challenging, task. There still are some parts of the world where people cannot use electricity where and when needed. There continues to be a growing demand for electricity among two-thirds of the world's population.

In response to this challenge, the closest-to-the-best method is to establish a balanced mix of multiple general technologies while taking into consideration the balance between the various energy needs of people in the world and environmental restrictions. Lobbyists pushing for '100% renewables' seem to dominate energy policy discussions these days. Unfortunately, these lobbyists make no practical attempt to address all competing factors required for the energy mix.

b. Necessity of expanded use of nuclear energy

Fossil fuels have played major roles across all sectors—electricity, transport and heating—since the industrial revolution started. However, burning fossil fuels releases greenhouse gases, which contribute to an accelerated and dangerous rate of global warming. The scientific community's consensus is that within a few decades, there will be a rise in the world average temperature of greater than two degrees Celsius unless countries reduce their share in the energy mix to lessen their greenhouse gas emissions. Decarbonization is an urgent task for the energy system, and this massive endeavour requires the expanded use of all currently available low-carbon technologies.

Nuclear power generation has many merits as a low-carbon technology. In the IEA's two-degree Celsius scenario, nuclear energy has the largest single role to play. Expanding the supply of electricity by roughly 17% by 2050 requires 'substantial increase in capacity—far beyond the rate of new build seen in the Western world today'. The World Nuclear Association (n.d.) further states: 'Here, it is worth noting that while nuclear energy is a technology proven at almost any scale in a system we still don't know if large-scale intermittent renewable deployment, energy

storage or carbon capture storage will turn out to be technically or economically viable. In addition, the electricity demand may surpass the forecast if urbanization or electrification of transportation advances rapidly. This motivates the case for raising the target for future nuclear energy deployment even beyond the one indicated by the International Energy Agency.

'Based on the International Energy Agency's two-degree scenario, the WNA has developed its own vision for the future of electricity - *Harmony*. In this, nuclear energy expands to supply 25% of electricity by 2050 and forms part of a diverse mix of available low-carbon generating technologies, which are deployed in such a manner that the benefits of each are maximized while the negative impacts are minimized. That is, renewables, nuclear and a greatly reduced level of fossil fuel work together in harmony to ensure a reliable, affordable and clean energy supply. In this optimized energy system the needs for societal development and prosperity are finely balanced against those of the natural environment' (WNA, n.d.).

c. Targets for expended use of nuclear energy

According to leading nuclear industry figures, an increase in nuclear energy from 11% of global electricity today to 25% by 2050 is equivalent to roughly 1000 GWe of new nuclear capacity to be constructed (Note: This varies depending on other factors such as reactor retirements and electricity demand growth).

It is a fact that the rates at which new reactors must be constructed in order to meet the targets are no higher than has been achieved historically. However, the unfamiliar challenges arise from the difficulties in new site locations and the modern landscape of social and economic issues. To achieve the goals, the global nuclear community must work together to make solution-oriented responses. Here WNA is keen to lead the way.

In expanding the use of nuclear energy, it is vital to identify and demolish the real barriers to growth, rather than focusing purely on technology. The WNA (n.d.) has determined the following international objectives as key to achieving the Harmony Programme's goals:

- '**Establishing a level playing field for low-carbon technologies -** Countries stipulate technology-neutral, healthy market rules and establish frameworks that value not only

levelised costs but also system reliability and environmental benefits, to facilitate healthy competition in the development of low-carbon technologies.

- **Realizing efficient regulatory processes -** So that flow-on efficiencies can be achieved with global codes and standards, and efficient licensing of current and new technology.
- **An effect-focused safety paradigm -** This should increase genuine public well-being by reducing emissions from polluting sources, and ensuring that high nuclear safety standards are met'.

3.9 International Energy Agency

1) Study on Social Acceptance for Energy Technologies with Risk

International Energy Agency established a working group called Wind Task 28 and conducted a study on social acceptance for wind power generation as an energy technology with risk. In August 2010, the Wind Task 28 released a compilation of study results and potential future issues on the subject. Based on previous studies on social acceptance for wind energy in various countries and the latest trend of wind farm development, the report provides a complete picture of today's knowledge, narrowing down the topics into three aspects:

- *What do we know about social acceptance?*
- *What do we need to know?*
- *Which areas require more research or implementation efforts?*

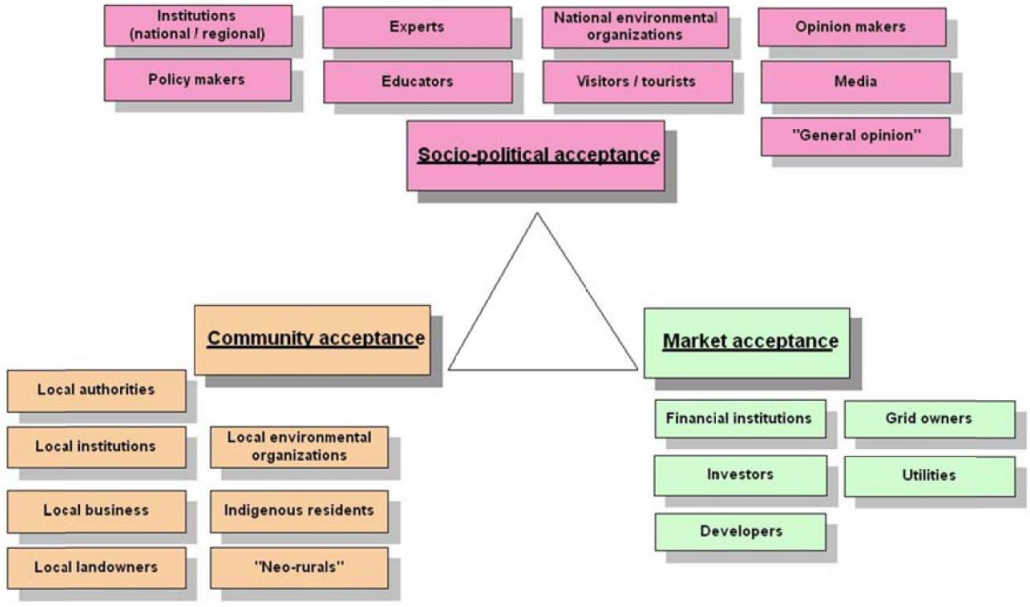
The report indicates that the ability to generalize the statements in the report is restricted because the resource studies mostly originate from highly industrialized countries such as Australia, Canada, Europe, Japan and the United States.

2) Three Concepts of Social Acceptance

The IEA Wind Task 28 uses the three concepts of social acceptance in Figure 3-14.

Figure 3-14. The Three-Dimensional Concept of Social Acceptance and Stakeholder Framework

Category	Concept
Socio-political acceptance	The most general dimension of acceptance and refers to the attitude of the public, key stakeholders, and policymakers.
Community acceptance	Related to acceptance by local stakeholders and stakeholder framework regarding siting decisions and renewable energy projects. Often, concerns of procedural and distributional justice as well as questions of trust arise at this level.
Market acceptance	Involves both consumers and investors and refers to the process of how the market adopts and deals with innovations.



Source: International Energy Agency Wind Task 28 'Social Acceptance of Wind Energy'.

a. Social acceptance of wind energy projects

Knowledge on social acceptance of energy technologies, including wind energy, has been accumulating for decades. Experience has shown that there are real concerns to be taken into account; emotions and values are various, and every situation is different because there are local structures, characteristics, and histories to respect.

Some of the key issues for social acceptance of wind energy projects discovered to-date are listed in Table 3-4.

Table 3-4. Some Key Issues in Social Acceptance of Wind Energy Projects

Category	Area	Issue
Socio-political acceptance	Policy and regulation	Wind energy policy, renewable energy strategies, spatial planning, siting decisions, and financial incentive programs can have direct and indirect effects on social acceptance and are influenced by socio-political acceptance discussions as well.
	Wind energy in forests	Discussions on the acceptance of wind farms in forests have become more prominent recently. There is no consensus yet about what wind development is acceptable in forests, taking into account the value of forests in the different countries.
	Transmission lines and grid expansion	Transmission lines and other infrastructure questions are not separable from wind power deployment. Awareness of this connection must be raised, but it seems that benefits distribution is more difficult for transmission lines than for the wind farms.
Community acceptance	Quality of life	Concerns over negative health impacts due to annoyance and stress related to noise, low-frequency sound, shadow flicker, or obstruction markings for the people living in areas surrounding the turbines have raised vivid debates about wind farm planning.
	Standard of living and property values	There are concerns over negative impacts on real estate values. On the other hand, there are positive effects on regional development, such as additional income and jobs created in the region.
	Landscape and ecosystem	While wind power does help to reduce CO_2 emissions and to diversify the energy mix, changes in the landscape and effects on the local ecosystems have to be openly discussed, weighed, and minimized. Issues of landscape and ecosystems are discussed for onshore as well as offshore but with varying characteristics and argumentations.
Market acceptance	Distributional and procedural justice	Opposition should not be discarded as stupid, bad or wrong, and information and consultation should not be handled carelessly. Developers, planners, and investors should, on the contrary, incorporate the locals and create win-win-situations to prevent a deepening of conflicts.

Source: International Energy Agency Wind Task 28, 'Social Acceptance of Wind Energy'.

- Success factors for social acceptance of wind energy projects

Success factors for wind energy projects in terms of social acceptance have been distilled by analysing case studies. Best-practice guidelines for the industry or for authorities have incorporated aspects of

communication and consultation in the different stages of project management. Some of these guidelines highlight ways to deal with quality of life issues or concerns in the planning, building, and operation of a wind farm.

- Socio-political acceptance

Opinions on renewable energies and wind energy, as proven by polls and surveys, are generally positive. Results confirm that many acknowledge the need to invest in renewable energy technologies. However, this understanding has to evolve into broader involvement of the affected public and the different authorities in the planning and decision-making process.

Policymakers have to realize that their task is not fulfilled by setting targets and quotas. Social acceptance needs a follow-up and has to pervade various institutions at each stage of the wind energy project.

Media's predilection for scenarios where conflicts and arguments abound makes it easy for those who oppose wind projects to catch the attention of journalists. Their media-focused activities have generated a lot of noise.

In addition, because of advances in information technology, anyone can freely broadcast his opinion. In this milieu, trust and credibility have become a precious good. These have to be sought and won in the social media space, which increases the value of social networks and personal contacts.

- Community acceptance

Discussions on wind energy projects at the local level are often complex. The community consists of different interest groups and each location has its own story, structure, experiences, deep emotions and values attached to the sea, landscape, and the ecosystems.

With today's knowledge and technologies, much of the historical impacts of wind development on quality of life as well as on the environment can be minimized and mitigated. However, perceptions of annoyance and the emotions attached to the landscape have a psychological component that cannot be neglected.

The benefits and gains of a wind farm are often not obvious. This is because these benefits accrue indirectly, or because they matter more on a national or international scale, such as the reduction of CO_2 emissions. Such positive impact ought to be communicated as broadly as possible. Locals, particularly the affected residents, must be brought into the planning and decision-making processes as well as into financial participation opportunities as soon as possible so that their inputs and concerns are heard.

- Market acceptance

Developers and planners deal directly with different interest groups—the institutions, the community, and environmental organizations. In certain cases, however, weaknesses in these developers and project managers' behaviour during the participation process could have hampered the social acceptance process around wind energy projects. For instance, a condescending treatment of the opposition and a careless handling of information can provoke the opposition to retain their hardline stance and thus deepen the conflict.

The opposition should not be dismissed as stupid, bad or wrong. As wind farms bring change to the living environment of people, the locals have a right to air their opinion on the project. Legitimate arguments and constructive inputs should instead be pursued to find ways to improve a project for everyone's long-term benefit. In sum, the participation process is not just about planning and technology; it is about sensitivity and intuition among the collaborators as well as the ability to create win-win-situations and to achieve a fair balance of interests.

In other countries, utilities have taken on various roles. Acceptance in the utility sector therefore is often important in developing wind energy through feed-in tariffs and policies to promote renewable energy technologies.

Financial institutions, too, are involved in stakeholder engagements, as in the case in some countries such as Japan or Germany. Meanwhile, in other nations such as Canada or Switzerland, factors such as risks or their economic performance have limited the role of their financial institutions. In other words, factors such as the nation's regulatory framework and the stability of the market affect financial institutions' level of engagement.

b. Lessons from preceding studies: Communication strategies

The report of Wind Task 28 points out well-being, distributional justice, procedural design, and implementation strategies as variables that influence social acceptance.

- **Well-being**: Addressing and communicating negative and positive impacts of wind energy on people, valuation of ecosystems
- **Distributional justice**: Wind energy costs, perceived transfers of wealth, burden sharing, impact on the local economy, possible ownership models, and financial participation opportunities
- **Procedural design**: Participation, public consultation, respect of cultural relationship, and local context
- **Implementation strategies**: Communication, guidelines, practical application of scientific results

Furthermore, below are some lessons on implementation strategies in the area of communication:

- If a communication strategy of the government/operator can connect the benefits of wind turbines to significant topics such as climate change and air pollution, the wind energy project can easily turn into a topic of conversations in the community and bring environmental awareness to residents.
- Start the discussion with generalities and important points and add details gradually.
- Community contact persons, such as the neutral intermediary, should be established as an important communication strategy.
- Some technology cooperation consisting of public-private partnerships, which includes those from the academe, has been most effective in eliciting social acceptance. Consistent and rigorous communication boost social acceptance further.
- Providing the public with vital information on the benefits and flaws of wind power technology compared with other energy production technologies and acknowledging the possible positive impact on the host communities could help locals come to an informed decision. Trusted messengers such as friends and neighbours who will not be paid for their opinion play an important role in this context.
- Switzerland started a project where a 'code of conduct' on how to proceed and interact was created for investors, developers, and environmental organizations in the wind energy sector. It also has a similar code of conduct for the same stakeholders, this time at the project level.
- An important issue in the future is careful press coordination, not only with traditional media such as print or TV, but also concerning internet articles and platforms such as Facebook and Twitter. In the United States, some organizations have set up a system of 'messengers'. In public forums, the messengers get information about economic benefits, costs and liabilities and then pass the knowledge to people in their communities.
- Many authors have cited the need for education in preceding studies, and efforts are ongoing in many participating countries. Some examples are:
  - In the United States, the Wind for Schools Project installs small wind turbines in rural and elementary schools to provide a concrete and practical demonstration of wind energy; to allow students to integrate data from the turbine into their theoretical understanding of how it works; to provide students a 'hands-on' experience; and to offset the schools' electricity demands.
  - In Canada, the project Gen E by Enmax offers educational resources and has installed alternative sources of energy in some schools. The program is intended to be expanded to the entire province.
  - In Germany, the projects 'powerado' and 'powerado-plus' aim to create effective communication and education tools for renewable energies promotion to children, adolescents, teachers, etc.

c. Future tasks

There are many knowledge resources on how to deal with social acceptance questions within the wind industry. However, it is not always easy to obtain such knowledge. Enhanced exchange between social scientists on one hand and developers, planners, and engineers on the other side will provide useful insights. Social scientists need to formulate their findings in a language other disciplines may be able to appreciate so that the latter can use the study and even get the financial resources to do so.

Developers, investors, policymakers, and authorities on the other hand have to accept the findings from social scientists even if this signify additional time and effort for the projects. It is important to seek ways of integrating these findings into the work of developers, policymakers, etc.

New approaches could be developed to strengthen and link the people supporting wind energy, therefore avoiding the focus on the opposition only and their arguments and broadening the involvement. Also, there is the need for more democratic processes—the balance between top-down and bottom-up; and between hierarchical and decentralized planning.

Participation of ordinary citizens as financial investors is one way of achieving involvement and influence, although this is getting more difficult due to the trend towards large-scale wind developments. Hybrid ownership models have to be developed and a decrease in transaction costs has to be achieved to encourage a sense of identification with and ownership of even large-scale projects and offshore developments.

There already exist guidelines and manuals on how to set up a wind farm, often including aspects of social acceptance, as well as those specifically on wind power. However, in-depth manuals on consensus building and training geared for the people working at the forefront are rare. In addition, how these guidelines were implemented has not been assessed yet.

Knowledge gaps still exist on the impact of wind farms on the quality of life—for example, on noise and sound, long-term exposure, impacts on sleep physiology, or the efficacy of setbacks. The same gap is observed in terms of the environmental impact on specific species and their changed behaviour, and on the ecosystem as a whole.

d. Conclusions

The general acceptance of wind energy is rather high, which is mirrored in the growth of the wind industry and the increase in installed capacity in most countries. But social acceptance issues have to be considered with care. Otherwise, a lack of social acceptance has the potential to protract the realization times for projects and increase wind energy development costs.

Past experience demonstrates that it is not possible to achieve a 100% social acceptance. There will

always be people who oppose specific projects. Therefore, the goal shall be set to 'win hearts and minds' and 'turn affected people into involved parties' so as to get as much public support as possible by open dialogue, more democratic processes, and honest involvement. This requires developers and proponents to commit to accept inputs and criticisms as a way of improving the project and to adapt the project to the surrounding landscape, the environment, and the people living alongside the turbines.

3.10 Comprehensive Framework

As demonstrated in the sections above, the stakeholder involvement process needs to be adapted to a country-specific context, and there is no comprehensive framework that can be adopted for all situations. However, some of the universal lessons here are:

- Regulatory body and operators should build on the locals' trust.
- Some practices seem to have universal application, such as face-to-face meetings/personal engagement/local engagement. Meetings meant primarily to share information among attendees are held in most countries. These may be coordinated by the regulatory body or local government or operator. Attendees may or may not have voting rights. Even in meetings without any decision-making agenda, it is still worthy to listen to the voices of members of the community and simply interact.
- The interaction process must be inclusive of all stakeholders. Take the time to engage and debate. Start very early in the process. It will be time and resources well-spent. This improves the quality of decision-making and improves chances for success of a project.
- Younger generations must be included early in the process to ensure a sustainable dialogue with a cross-section of the community.
- Information should be provided continuously. It should be clear, timely, concise and accurate. Opposition should not be dismissed as stupid as any differences in opinions or sides to an issue can potentially improve a project for everyone's long-term benefit. The participation process is, after all, about sensitivity and intuition as well as knowledge to create win-win-situations and to achieve a fair balancing of interests.
- Respondents more knowledgeable about nuclear power gave high ratings on nuclear power. Providing accurate information is the basic rule when exchanging opinions with someone who takes the other side of an issue.
- Taking a uniform communication approach across all segments of the general public is ineffective.

- It is important to provide information regularly and efficiently through social media.
- Opposition tends to increase after a plant accident, even though the accident is unrelated to the project in one's locality. It is therefore good practice for plant operators to vigilantly monitor their plant's operations so as to avoid accidents.
- It is improbable to achieve a 100% social acceptance for wind energy, despite it's already high acceptance level. There will always be people who oppose specific projects. The more practical goal, therefore, shall be set to 'win hearts and minds' and 'turn affected people into involved parties' to get as much public support as possible by open dialogue, more democratic processes, and honest involvement.

3.11. Seminar on 'Create a Better Social Acceptance for Electric Power Infrastructure'

On 26 June 2017, the seminar on 'Create a Better Social Acceptance for Electric Power Infrastructure – Coal-fired Power Plant' was held at the Grande Centre Point Ratchadamri, Bangkok, Thailand. This section is devoted to a summary of the findings on social acceptance from the event.

At the second session of the event, various country efforts to create better social acceptance for electric power infrastructure, including coal-fired power plants, were introduced. The input came from the panellists representing the companies PT Indonesia Power, Indonesia; Electric Power Development Co., Ltd. (J-POWER), Japan; Philippine Coal Plant User's Group (PCPUG), the Philippines; and Power Engineering Consulting Joint Stock Company 2 (PECC2), Viet Nam.

In Indonesia, the Ministry of Environment developed the corporate performance assessment program on environmental management called 'PROPER' in 1995. The program evaluates the maturity of the environmental management of each company, including electric utilities, based on five ranks: gold, green, blue, red, and black. Companies that comply with all the requirements of environmental management are awarded the blue grade. However, to attain the upper ranks (gold or green), companies have to do other corporate social responsibility activities such as wildlife conservation.

Since the outcome of the assessment is announced in newspapers, the program managed to encourage companies to improve their environmental management activities. The corporate performance assessment program and corporate social responsibility activities mentioned above may not lead directly and immediately to better social acceptance, but they are indicative of a company's trustworthiness and pursuit to embrace environmentalism.

In Japan, emission standards applied to coal-fired power stations vary based on each plant's

commercial operation date, location, and municipal government. In the case of the Isogo coal-fired power station of J-POWER, the local government of Yokohama City required the company to comply with emission standards that were stricter than those of the central government.

The Isogo power station is also equipped with an emission monitoring system, which transmits data to the city in real time. This system enables the company to gain the trust of the local government by ensuring transparency.

In addition, electric companies in Japan have events that invite the public to their stations. The Isogo power station itself accepts about 6,000 visitors yearly and holds an 'Annual Open Day', where visitors are given a site tour as well as enjoy fun events designed for families.

Electricity companies also avoid making decisions in silos. They consult the local government as well as the local public regularly for every decision and adjust plans collaboratively. They consider it important to comply with the local government's environmental requirements.

In the Philippines, the Department of Energy has a financial program for the host communities of coal-fired power plants. Host communities are entitled to one centavo per kilowatt-hour of the electricity sales of the generation facilities and/or energy resource development projects located in all *barangays*,[8] municipalities, cities, provinces, and regions. The program's main policy objective is to recognize and recompense for the contribution made by the host local government units or municipality. The funds will be used for such projects as electrification (50%), education and livelihood (25%), and reforestation, health, and environmental enhancement (25%). This financial program of the government contributes to better acceptance by local communities.

In Viet Nam, serious environmental incidents had occurred in two CPPs recently: Vinh Tan 2 had a fly ash incident in May 2015, while Formosa had discharged untreated chemical waste water into the sea in April 2016. Local residents reacted by protesting against the CPPs. The local governments and related authorities, on their part, grew wary and took a longer time to review and approve new CPPs, for instance.

This experience demonstrates again that while it takes a long time for companies to gain the trust and acceptance of both the local government and people, losing them is easy and immediate. Both electric companies and regulatory agencies have to bear in mind that compliance with the environmental protection law and other legal regulations during the construction and operations stage of a plant is one of the most crucial steps towards gaining social acceptance.

[8] The smallest territorial and administrative unit of the local government.

Chapter 4

Monitoring Emissions from CPPs: A Review

4.1 Japan

The national legislation that regulates air pollutant emission is the Air Pollution Control Act, which includes relevant Cabinet orders and ordinances on the environment. To avoid redundant regulations, CPPs, which have an authorization under the Electricity Business Act (Ministry of Economy, Trade and Industry), are partly exempted from the Air Pollution Control Act. However, the same level of emission standard is required.

The Air Pollution Control Act allows local governments to set their own emission standards (which are, in general, more stringent than that of the central government) and establish necessary regulations relating to air pollutant emissions. Local governments can establish their own ordinance. Thus, while they do not have any direct regulatory control over CPPs, such laws can potentially limit air emission levels from CPPs. For instance, Yokohama City, where the Isogo coal plant is located, establishes ordinances on the living environment in the city.

Regulated pollutants relating to coal-fired power plants under the Air Pollution Control Act are sulphur dioxide (SO_2), nitrogen oxides (NOx), and particulate matter (PM). In addition, Yokohama City ordinance relating to the living environment regulates the following pollutants:

- Cadmium/ Cadmium compound
- Chlorine/ Hydrogen Chloride
- Fluorine/ Hydrogen Fluoride/ Silicon Fluoride
- Lead/ Lead compound
- Ammonia
- Cyanogen compound
- NO_2
- SO_2
- Hydrogen Sulfide

The legally mandated emission standards for major pollutants are:

- SOx

  [Air Pollution Control Act]

  $q = K * 10^{-3} * He^2$

  q: Maximum permissible limit of SOx (Nm^3/h)

  He: Adjusted height of the Outlet (m)

  He = Ho+0.65 (Hm+Ht)

  Hm = 0.795√($Q*V$) /{1+(2.58/V)}

  Ht = $2.01*10^{-3}*Q*(T-288))*\{2.30\log J+(1/J)-1\}$

  J = (1/√($Q*V$))[1460-296*{V/(T-288)}]+1

  He: Adjusted height of the Outlet (m)

  Ho: Actual height of the Outlet (m)

  Q: Quantity of emission at 15 Celsius degree (m^3/s)

  V: Discharge rate of emission (m/s)

  T: Temperature of emission (absolute temperature)

  K: Area of classification

  General regulation K: from 3.0 to 17.5

  Special regulation (new construction, specified area) K: from 1.17 to 2.34

  [Ordinance on Conservation of Living Environment (Yokohama City)]

Sulphur content in emission: 4 SO_2 equivalent grams/1 fuel oil equivalent kg combustion

- NOx

  [Air Pollution Control Act]

  200ppm (O_2: 6%)

[Ordinance on Conservation of Living Environment (Yokohama City)]

NO_2: 100ppm

NOx: 200ppm

- PM

[Air Pollution Control Act]

100mg/ Nm^3 (O_2: 6%)

[Ordinance on Conservation of Living Environment (Yokohama City)]

0.05g/Nm^3

There are also more stringent agreements signed voluntarily by local governments and power plant operators. Moreover, power plants' own operational standards set more stringent internal targets.

The Air Pollution Control Act stipulates that prefectural governors shall set standards for controlling the total emissions in an area where there is a concentration of factories or workplaces.

Coal-fired power plants shall share the following information with the prefectural governor:

- Name and address
- Location
- Type of air pollutant
- Structure of facilities
- Way of disposing of air pollutants, etc.

The prefectural governor has the power to order emitters to temporarily suspend their facilities' operation when they violate the regulations and to order improvements if the CPP continuously emits more than the regulated limit. Based on an agreement between the local government and the CPP operator, once the CPP has been found to commit violations, the local government can

delay the lift on the suspension until the CPP has made satisfactory improvements. This mechanism obligates the CPP operator to comply with the voluntary targets to avoid receiving orders for improvement from the local government.

The CPP operator shall measure the quantity or concentration of air pollutants, and keep records.

- Frequency of measuring:

  SOx, NOx: more than every two months (Total emission controlling area: continuously)

  PM: more than every two months

- Measuring methods are stipulated in Law.

The CPPs set observation stations—for example, 10 kilometres, 20 kilometres, 30 kilometres away from the CPP—to monitor the emission continuously. Data is automatically transmitted to the local government through a telemeter.

The Ministry of Environment or prefecture governor may require the CPP operator to report the status of air pollutant emissions. The Ministry conducts integrated surveys of the quantity of air pollutant emission every three years. According to an agreement between the CPP operator and the local government, an operator submits the report to the local government every month generally, although the CPP automatically and continuously sends data through a telemeter.

The Ministry of Environment or a prefectural governor may conduct an official inspection.

- On-site inspection by METI: On an irregular basis, every five or six years
- On-site inspection by local government: Depends on the agreement between the CPP operator and the local government: once a year generally, typically during Environment Month.

Although the archive requirement is three years, most CPP operators keep data permanently.

Prefectural governors shall make the status of air pollution within the prefecture available to the public. Local governments collect environmental data from various facilities and publish the status of air pollution on a screen monitor in their city hall. Everyone can see the situation at any given time. Local governments also publish environmental reports periodically. In case of an accident, CPP operators publish the status of air pollutant emissions through press releases.

If a CPP operator violates the Air Pollution Control Act, the name of the operator is disclosed.

Punishment includes imprisonment and fines. Operators have strict liability to compensate for damage and losses.

The Air Pollution Control Act stipulates that the central government shall endeavour to provide financial assistance, technical advice, and other assistance. The Ministry of Environment, in collaboration with the Ministry of Economy, Trade and Industry in some cases, convenes explanatory meetings for CPP operators when the law is amended. Likewise, local governments convene their own explanatory meetings. The Ministry of Environment and local governments post explanatory documents and application/report forms on their website and allow these to be downloaded from the site.

The technical capability of officers in local governments is high. Measurement experts are based in local governments. The Air Pollution Control Act does not require an independent inspector. If a CPP has ISO 14001 certification, the plant is audited every year.

The Air Pollution Control Act does not require periodical meetings with the local community. Another law requires companies to hold a meeting with residents and explain and discuss issues when they apply for an EIA for the construction of a new CPP.

4.2 Australia

The national environment legislations in Australia are the National Environment Protection (National Pollutant Inventory) Measure 1998 and National Environment Protection (Ambient Air Quality) Measure. In addition, each state establishes environmental legislation. Procedures vary from state to state.

Regulated pollutants relating to CPPs are SO_2, NO_2, PM10, and PM2.5. Emission standards are presented in Table 4-1.

Table 4-1. Standards for Pollutants

Pollutant	Averaging period	Maximum concentration standard	Maximum allowable exceedances
NO_2	1 hour	0.12 ppm	1 day a year
	1 year	0.03 ppm	None
SO_2	1 hour	0.20 ppm	1 day a year
	1 day	0.08 ppm	1 day a year
	1 year	0.02 ppm	None
PM10	1 day	50 μg/m^3	None
	1 year	25 μg/m^3	None
PM2.5	1 day	25 μg/m^3	None
	1 year	8 μg/m^3	None

Source: National Environment Protection (Ambient Air Quality) Measure.

Table 4-2. Goal for Particles as PM2.5 by 2025

Pollutant	Averaging period	Maximum concentration
NO2.5	1 day	20 μg/m^3 by 2025
	1 year	7 μg/m^3 by 2025

Source: National Environment Protection (Ambient Air Quality) Measure.

The individual who is in occupation or control of the facility, whether or not the owner of the facility, is required to provide information. Under the Protection of the Environment Operations Act 1997 in New South Wales, for example, clean-up notices, prevention notices, and prohibition notices are the environment protection notices provided for under the legislation. Only the minister can issue a prohibition notice, on the recommendation of the Environment Protection Authority (EPA).

The law requires monitoring stations to be installed in areas with populations greater than 25,000. In New South Wales, the Office of Environment and Heritage operates a comprehensive air quality monitoring network to provide the community with accurate and up-to-date information about air quality. In 2010, it established the Upper Hunter Air Quality Monitoring

Network, in partnership with the Upper Hunter coal and power industries. Data from the monitoring network are presented online as ambient concentrations and air quality index values and updated hourly and stored in a searchable database.

The law in New South Wales does not require licensees to report periodically emission data to EPA. Instead of reporting, the law requires licensees to publish pollution monitoring data.

This goes without saying that the facilities must notify authorities on pollution incidents. The Protection of the Environment Operations Act provides that mandatory audits may be required as a condition for a licence if the EPA reasonably suspects that the licensee is responsible for the pollution. Authorized officers have powers to require information or records, powers of entry and search of premises, powers to question and identify persons, powers to disable intruder alarms, and powers concerning vehicles and vessels.

Pollution monitoring data that must be collected as a pre-condition to a licence must be published by the licensee. Penalties are imposed on such offences as failure to publish monitoring data and publication of false or misleading data. New South Wales' EPA publishes the current situation of air quality on its website.

Meanwhile, the EPA offers a two-day course designed to equip authorized officers in local governments with the necessary competencies to fulfil their responsibilities as outlined in the Protection of the Environment Operations Act 1997. The law in New South Wales does not require a periodical meeting with local community and independent inspectors.

4.3 Germany

Germany is a Federal Republic with 16 federal states whose competent authorities may differ since each federal state has its own laws regulating the administration. As a rule, the mid-level administrative bodies of the federal states (*Landramtsamt* or *Regierungspräsidium*) have permitting authority. The most relevant relation between local and national authorities takes place at the measurement and monitoring stage, which gathers data from local *Länder* and German Federal Environment Agency monitoring networks. Independent inspections are not required.

German regulations on air quality are all aligned with provisions adopted by the European Union (EU) air quality legislation. Current standards are contained in the Directive 2008/50/EC (European Parliament (EP) & Council of European Union (CEU), 11 June 2008) on ambient air quality and cleaner air for Europe, and the Fourth Daughter Directive 2004/107/EC (EP & CEU,

2004), relating to arsenic, cadmium, mercury, nickel, and polycyclic aromatic hydrocarbons in ambient air.

Industrial emissions within the EU are regulated under the Industrial Emissions Directive (Directive 2010/75/EU), which aims to reduce harmful industrial emissions across the EU through application of Best Available Techniques. Enforced on 6 January 2011 (and was supposed to be adopted in member states' national legislations by 7 January 2013), the directive provides an integrated permitting procedure (covering also issues related to water, soil, waste management, energy efficiency, and accident prevention). According to this directive, member states may choose to grant a permit to one responsible operator for each installation or to split the responsibility amongst several operators of different parts of an installation. The provision of emission permits depends on the evaluation of plants based on Best Available Techniques.

The Federal Emission Control Act (*Bundes-Immissionsschutzgesetz* [BImSchG]; Long title: 'Act on Prevention of Harmful Effects on the Environment Caused by Air Pollution' as amended and promulgated on 14 May 1990 and as last amended by Art. 1 of the Act of 3 May 2000) has four strategies to control emissions:

- Laying down environmental quality standards;
- Emission reduction requirements according to the Best Available Techniques;
- Product regulations;
- Laying down emission ceilings.

In addition to the BImSchG, there are also provisions on air quality control at the Federal States' levels, which represent the local enforcement of the BImSchG legal measures.

Regulated pollutants and their target values are also established by Industrial Emissions Directive 2010/75/EU. The directive notes that different approaches of controlling emissions into air, water, or soil separately may encourage the shifting of pollution from one environmental medium to another. Thus, the Industrial Emissions Directive favours an integrated approach to prevent and control pollutants, including substances affecting water.

According to the Industrial Emissions Directive, competent authorities in the member states shall review installations and are authorized to grant permits. Such permits must take into account the entire environmental performance of the plant, in accordance with the Industrial Emissions Directive's integrated approach.

Inspections are done at the Federal government level, with the consent of the *Bundesrat*. Each inspection plan shall include a general assessment of relevant significant environmental issues, the geographical area covered by the inspection plan, a register of the installations covered by the plan, procedures for drawing up programs for routine environmental inspections, procedures for non-routine environmental inspections, and provisions on the cooperation between different inspection authorities.

Before starting any operation of an installation, operators are required to submit a baseline report to the competent authority. The report shall contain the information necessary to

determine the state of soil and groundwater contamination. Permit conditions are based on Best Available Techniques as defined by the Best Available Techniques Reference Documents (BREFs). The conclusions reached in the BREFs—which included input from experts from member states, industries, and environmental organizations—have been adopted as implementing decisions and constitute the reference for setting permits conditions.

Meanwhile, existing installations are required by the Industrial Emissions Directive to furnish their competent authority regularly—at least annually—with their emission monitoring results (measurement methodology, frequency and evaluation procedure) in order to enable the authority to verify compliance with permit conditions.

In case of non-compliance with requirements, operators are required to suspend operations. According to BImSchG, Art. 20, the competent authority may decide to suspend activities of a plant in whole or in part. The same authority shall also order the closure of an installation that was built without necessary authorization or cannot guarantee the adequate protection of the neighbouring environment.

Cleanup of soil, water or damaged goods can be requested if there is a causal connection between the air pollution and the damage. If the responsible party is unwilling or unable to execute the cleanup, the authorities can do so at the polluter's cost. Severe cases of non-compliance can result in criminal liability. Criminal sanctions include imprisonment and fines (up to €50,000).

Establishing the emission limit values (mg/ Nm^3) are necessary as it ensures that, under normal conditions, emissions levels do not exceed those associated with the Best Available Techniques. The limit values are determined through standards stipulated in the European air pollution control directives and then transposed into German law. Such values shall apply at the point where the emissions leave the installation, and any dilution prior shall be disregarded. Alternatively, different emission limits, in terms of values, periods of time and reference conditions, can be set.

The Technical Instructions on Air Quality Control (*Technische Anleitung zur Reinhaltung der Luft* [TA Luft]) lay down requirements for calculations, which are based on the Lagrangian particle dispersion model and computed through a computer programme called AUSTAL2000. The analytical methods used are standardized internationally, with air quality data gathered by international data centres and used for computer modelling. The Federal Republic of Germany cooperates with other countries under the Convention on Long-range Trans-boundary Air Pollution framework. The international control instrument under this framework is the European Monitoring and Evaluation Program, which measures trans-boundary air pollution from 25 countries.

If continuous measurements are required, compliance depends on:

- No validated monthly average exceeding limit values;
- No validated daily average exceeding 110% of limit values;

- In case of combustion plants using coal with a total rated thermal input below 50 MW, no validated daily average exceeding 150% of limit values; and
- 95% of all the validated hourly average values over the year not exceeding 200% of limit values.

If continuous measurements are not required, the results of each of the series of measurements shall not exceed the limit values. The concentrations of SO_2, NOx, and dust shall be measured continuously. The German Federal Environment and the Agency German's Länder monitoring networks (Länder) measure data on ambient air quality several times a day.

According to the Industrial Emissions Directive (Part 6), sampling and analyses of all polluting substances, including dioxins and furans, as well as the quality assurance of automated measuring systems and reference measurement methods to calibrate them, shall be carried out according to CEN-standards. If CEN standards are not available, International Standards Organization ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality shall apply. German air monitoring networks are operated by the German Federal Environment Agency (*Umweltbundesamt*) and Länder. The data from the agency and the Länder provide the foundation for the presentation of the country's air quality. They are gathered in the centre of the air monitoring network in Langen (Hesse), near Frankfurt/Main.

All data on air quality is published on the internet shortly after being gathered in Langen. In particular, when a decision on permits is made, all data are made available to the public to ensure that the public can participate in the decision-making process and be informed of its consequences by having access to permit applications, permits, and results of the monitoring of releases. Also, there is the EU Pollutant Release and the Transfer Register, which is a public register that provides environmental information on main industrial activities, including data on emissions as reported by member states. It implements for the EU Community the UN/ECE PRTR Protocol to the Aarhus Convention on Access to Information, Public Participation on Decision-making and Access to Justice in Environmental Matters.

4.4 United States

The Unites States' national legislation is the Clean Air Act, which consists of the following stipulations, among others:

- Section 108 (Air quality criteria and control techniques)

  National Ambient Air Quality Standards

  EPA Regulation: 40 CFR part 50

- Section 111 (Standards of performance for new stationary sources)

  New Source Performance Standards

EPA Regulation: 40 CFR part 60 subpart Da

Standards of Performance for Electric Utility Steam Generating Units

- Section 112 (Hazardous air pollutants)

National Emission Standards for Hazardous Air Pollutants

EPA Regulation: 40 CFR part 63

Regulations on pollutants regarding CPPs are described below:

- Section 108

Six 'criteria' of air pollutants: CO, Lead, NO_2, O_3, PM and SO_2.

- Section 111

§60.42Da Standards for PM

§60.43Da Standards for SO_2

§60.44Da Standards for NOx

- Section 112, Clean Air Act

Currently 189 pollutants

EPA's latest regulation: mainly on mercury

Title V of the Clean Air Act requires facilities that are major sources of air pollutants to obtain and operate under a permit. Sources with these 'title V permits' are required to be compliance certified at least annually.

The measurement of emission by an operator is stipulated in one of the Code of Federal Regulations, 40 CFR part 60, subpart Da. The stipulation requires that the owner or operator of an affected facility install, calibrate, maintain, and operate an Opacity Monitoring System; and record the output of the system to measure the opacity of emissions. For instance, an owner or operator of a facility affected with PM must monitor the opacity of its emissions discharged to the atmosphere.

For SO_2, NOX, PM, and NOX plus CO emissions, the performance test data from the initial and subsequent performance tests and the performance evaluation of the continuous monitors (including the transmissometer) must be reported to the administrator. The owner or operator of the affected facility shall submit a signed statement.

The EPA's audit policy entitled, 'Incentives for Self-Policing: Discovery, Disclosure, Correction and Prevention of Violations,' provides several major incentives for regulated facilities to fix voluntarily their violations of federal environmental laws and regulations. Meanwhile, to monitor compliance, EPA's own inspection process may be in the form of on-site visits, civil investigations, record reviews, and information requests. Results of compliance monitoring are announced to the public.

Environmental civil liability is strictly applied when there is an environmental violation. There is liability regardless of whether or not a party knew about the law/regulation they violated. Meanwhile, environmental criminal liability is triggered when there is some level of intent.

If a civil defendant is found liable or agrees to a settlement, the consequences can be in the form of:

- a monetary penalty;
- injunctive relief (actions required to correct the violation and come into compliance, e.g., install pollution control equipment); and/or
- additional actions taken to improve the state of the environment.

If a criminal defendant is convicted or pleads guilty, the consequences can be:

- a monetary fine paid to the US Treasury; and/or
- restitution (reimbursing the government for the cost of cleanup or response; compensating for the harm caused by the violation, e.g. paying for medical testing for people exposed to asbestos);
- incarceration.

The New Source Review and Prevention of Significant Deterioration, both of which are permitting processes, require large industrial facilities to install state-of-the-art air pollution controls when they build new facilities or make modifications to existing facilities. On the EPA

homepage, investigations of the CPP sector have identified a high rate of non-compliance with the New Source Review or Prevention of Significant Deterioration when old plants are renovated or upgraded. The Clean Air Act (Section 108) requires EPA to develop information on pollution control techniques.

The EPA regulation does not require periodical meetings with the local community and independent inspectors.

Chapter 5

Conclusions and Policy Implications

This study aims to review issues related to public acceptance of CPPs in Thailand and derive policy implications on how (i) to mitigate public protests; (ii) to manage opposing movements against coal power plants; and (iii) to achieve better public acceptance for any electric power infrastructure with potential risks. An intensive survey of the energy sector in Thailand and case studies on its CPPs were conducted. These were supplemented by a thorough review of the experiences and knowledge acquired by advanced countries in Europe and by international organizations on social acceptance and public involvement issues.

This research showed that there are five major factors behind the intense opposition to the construction of coal power plants in Thailand, particularly in Krabi, Suratthani, Thepa, and the rest of Southern Thailand. These factors are:

- Technical issues – emission of SOx, NOx, dust
- Personal beliefs and prejudices – 'coal is dirty'; 'coal is dangerous,' etc.
- Political or business interests – e.g. political ambitions of opposition leaders, etc.
- Role of religion – especially in regions with large religious groups
- Funding by international/local environmental organizations.

The political/business as well as funding issues are the most dominant factors and should be carefully monitored. Specifically, in the following cases, strong protests persist because of certain incentives:

- Some local and national political leaders have businesses in renewable energies. These political leaders may also be investing in such projects; therefore, a roadblock on coal projects could mean a business opportunity for other energy sources.
- The competitors of coal power plants—namely, natural gas-fired power plants and biomass plants—are mostly operated by private investors in Thailand. It would be to their advantage if EGAT, the body promoting coal-fired plants, cannot develop new coal projects.
- Some key personalities in these protests hope to make a name in the local political scene and are just waiting for the right time—e.g. an upcoming election—to jump on the political bandwagon.

1) Outcome of the Seminar

This study also initiated a seminar on social acceptance entitled, 'Create a Better Social Acceptance for Electric Power Infrastructure – Coal-fired Power Plant' on 26 June 2017, at the Grande Centre Point Ratchadamri, in Bangkok, Thailand. Its panel included energy sector

resource persons from Viet Nam, the Philippines, Indonesia, and Japan. The seminar highlighted the differences in these nations' policies, strategies, programs on enhancing social acceptance for CPPs and reinforced the benefits of sharing information and experience in the area of social acceptance.

Most of all, the gathering showed how various communication approaches that engage both local governments and the public in the decision-making process on CPPs could produce win-win solutions. For one, it will give the locals a better appreciation of CPPs since they now know both the upside and downside of such facility in their community. Consequently, the locals now need not rely wholly on the perspectives of opposing NGOs, experts, and politicians for their decisions.

Based on the results of the seminar, this study recommends that the Thai government and/or operators of CPPs consider and conduct the following measures:

At the planning/construction stage

- For government agencies/operators: Consult the local government and locals as much as necessary before making any investment decisions and collaborate with them on the plans as stakeholders.
- For operators: Equip CPPs with emission monitoring systems and share data transparently to gain the trust of the municipality and its people in the operation of CPPs.
- For the government: Review the current financial support programs for communities that host the CPPs and modify them where necessary to ascertain that these communities are properly compensated.

At the operational stage

- For the government: Introduce a transparent corporate performance assessment program on environmental management similar to Indonesia's 'PROPER' to enhance the local municipality and residents' confidence in the operations of CPPs.
- For operators: Conduct various Corporate Social Responsibility activities as these are ways to improve one's trustworthiness and sincerity in embracing environmentalism.
- For operators: Invite the local community into the facility and hold events such as the 'Annual Open Day' to give them a better understanding of CPPs as well as to directly interact with them.

Moreover, the following are recommendations on how 'to mitigate public protests and achieve better acceptance for coal power plants.'

RECOMMENDATION 1: Enlighten people with correct and fair information and knowledge

Not everyone is correctly informed about coal power plants. For one, there are many prejudices

and misconceptions about CPPs that still go around. The solution to these is two-pronged: By providing accurate information in one's disclosures; and by educating people.

Debates and protest messages against CPPs either focus on environmental issues or fully neglect an important element in energy policies: the need to balanced energy security, economic efficiency, and environmental sustainability. Only when there is accurate information can one be able to balance all these issues when dealing with CPPs.

The EGAT had held large-scale public hearings and conferences, where participants reportedly have gained an adequate understanding of the technical aspect of CPPs. A nationwide education campaign consisting of symposiums, workshops, TV programs, and internet videos could reinforce the initial work done by EGAT.

For locals to better understanding their CPP, a 'public open day' is a good opportunity for visitors to learn about the state of the CPP first-hand, hence improving their confidence in its operations. On the part of the operator, this is also a venue to hear the locals' thoughts and reactions towards the facility, which should then be part of the bases for more effective approaches towards the project's social acceptance.

RECOMMENDATION 2: Increase the public's confidence in the CPP and operator

Social acceptance cannot be attained if there is no confidence in the CPP and operator. This calls for a review of how to enhance a CPP regarding the design, construction, and operation. Thailand can pick up some ideas from the 2016 'APEC Guideline for Quality Electric Power Infrastructure,' which suggests certain considerations and standards for power plants from planning to operation stages.

Because environmental concerns remain the biggest reason behind anti-CPP protests, improving a facility's environmental management mechanism is one option to elicit social acceptance. Thus, below are recommended measures that must be taken so that operators can transparently show the standards of their facilities and operation:

- Regularly measure emissions from CPPs and transmit the data to local governments in real time. Share the data with the public, too, by uploading them to the local government's official website.
- Allow the Ministry of Environment to evaluate, grade and publish (and even recognize) environmental management results of each CPP yearly.

RECOMMENDATION 3: Provide financial and political incentives

There is also a section of society who already have a clear understanding of the technical issues behind CPPs but continue to protest against coal power. These protesters do so either for business, political or cultural reasons, or have funded protest movements themselves for reasons of their own.

For locals who protest because of the anticipated impact on their livelihood, one option is for government to recognize and provide compensation for the contribution provided by the local community to the project. In Thailand, the government has given financial benefits to residents within 5 kilometres from a power station. However, reports indicated that most of the protests occurred outside of the 5-kilometre radius. In this scenario, while one can expect geographically wider acceptance if the coverage area for the financial benefit is expanded, it is unsustainable to have a broad coverage.

In Japan, meanwhile, the eligible area for financial support is defined as the administrative district (e.g. city, town) where a power plant is located. This definition can help CPPs gain support from more local politicians whose territories will be covered by the financial benefit. Although the financial cost will be larger than the existing 5-kilometre radius scheme, it is still worth redefining the eligibility coverage based on the administrative district.

Another solution is to incentivize stakeholders who want to be involved in the coal power projects throughout the lifetime of the station—from planning, construction, licencing, operation, and decommissioning. These measures below could work as financial/political incentives:

- During the project's planning stage, call for interested participants to help develop plans for the power station's operation. Locals who are engaged will eventually have some sense of ownership over the CPP project when they know that they contributed to the plans, which could improve the quality of their lives and that of the community. The key here is to involve those stakeholders at the earliest stage of the project as possible.
- Provide job opportunities within the facility to locals. Employment is always the top concern of households as well as the top agenda of politicians. An attractive compensation package (long-term, appropriate pay, good family benefit) can be a good incentive to accept the presence of a CPP.
- Invite key persons within international/domestic environmental organizations (that fund protest activities in Thailand) to public meetings to discuss financial support schemes—for example, subsidies for the installation of specific advanced technologies such as USC-carbon capture storage, so that they could consider redirecting their investment from protest activities to promotion activities.

RECOMMENDATION 4: Strengthen role of the central government

The role and the leadership of the government should also be revisited and reinforced. The MOE—i.e. the EPPO—is responsible for planning and procuring the country's long-term energy, including electrical power. There is no direct department or government agency within the MOE or other ministries that looks after coal power plants. The sole national electric utility, EGAT, currently communicates more with the locals, rather than with governmental agencies, regarding protest movements against coal power plants.

Meanwhile, the central government, whose primary objective is to look after the common

interest of its citizens, can participate by cultivating constructive discussions. The central government can play a bigger role by holding dialogues with municipal governments, instead of one-on-one talks with residents. This way, the municipal government becomes a strong supporter of the central government's programs, while EGAT can focus on gaining more grounds in terms of acceptance from residents since there is already an existing communication line with locals. Finally, an integrated agency consisting of several ministries of the government (such as the Ministry of Energy, Ministry of Natural Resources and Environment, Ministry of Public Health, and Ministry of Education) may be created to focus on managing the comprehensive development of environment-friendly energy infrastructure.

RECOMMENDATION 5: Tap international advocates

International NGOs count among the protesters against CPPs. This study suggests utilizing international advocates as part of the solution. As a member of the East Asia Summit and Asia Pacific Economic Cooperation, Thailand can lead discussions with these international organizations and with energy-related entities such as the International Energy Agency; come up with a consensus on the use of CPPs; and present its stand to other organizations inside and outside of Thailand through declarations, reports, and presentations. Although it may be impossible to eliminate dissenting voices, one can at least expect more open and fair discussion on such platforms.

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Appendix. Outcomes of the Seminar

The Seminar on

'Create a Better Social Acceptance for Electric Power Infrastructure – Coal-fired Power Plant'

26 June 2017

Grande Centre Point Ratchadamri, Bangkok, Thailand

08:00 - *Registration and Welcome*

09:10 - 09:20 Opening Session

Opening Remarks

*By **Mr. Shigeru Kimura**, Special Advisor to President for Energy Affairs, Energy Unit, Research Department, Economic Research Institute for ASEAN and East Asia (ERIA)*

Key messages of the session:

- Coal is currently one of the main power sources in the East Asia Summit region. In its Energy Outlook 2016, ERIA forecasts that coal power generation will still be dominant in the EAS region through 2040. While this power source is expected to contribute to the '3 E's' (Energy security, Economy, and Ecology) in each country's energy mix, it should be used in a clean manner.
- Today's seminar will be a good opportunity to consider not only ways to improve social acceptance of coal-fired plants but also the best energy mix for each country.

09:20 - 09:25 Welcome Remarks and Keynote Speech

*by **Dr. Twarath Sutabutr**, Director-General, Energy Policy and Planning Office (EPPO), Ministry of Energy (MOEN), Thailand*

Key messages of the session:

- Today's seminar will have presentations of panelists from Indonesia, Japan, the Philippines, and Viet Nam. Each of these countries is doing its utmost to achieve the best energy mix by satisfying the 3 E's. Thailand appreciates the opportunity to share information and experiences with the panelists.

09:25 - 09:30 *Group Photo*

09:30 - 10:05 Session 1: Coal Policy in Thailand

- Policy, trend and role of coal

Presentation 20 min. + Q&A

*by **Dr. Prasert Sinsukprasert,** Deputy Director-General, EPPO, MOEN, Thailand*

Key messages of the session:

- Thailand revised its Power Development Plan (PDP) in 2015 with the purpose of building an optimal energy mix. The principles behind the plan were: enhancement of reserve margin, promotion of power system infrastructure investment projects, integration with the Energy Efficiency Development Plan, the Alternative Energy Development Plan and fuel diversification.
- Reduction of fuel dependency on natural gas is one of the most important issues in the PDP. In addition to renewable and nuclear energy, clean coal is expected to contribute to fuel diversification.
- Of the total new installed capacity of around 57 GW, nine clean coal-fired power plants with a total capacity of around 7 GW are projected to be installed by 2036. Today, new coal-fired power plant (CPP) projects such as Krabi and Thepa are facing some difficulties. The government of Thailand has exerted every effort to increase acceptance of CPPs and responses from various sectors have been encouraging, with

the notable exception of those from some international non-governmental organizations and political interest groups.

10:05 - 10:25 *Coffee Break*

10:25 - 12:35 Session 2: Sharing Experiences in Asian Countries

- How are emissions from CPPs controlled and managed?

- How are stakeholders involved?

- What role does the government play?

Moderator: ***Dr. Yanfei Li****, Energy Economist, Energy Unit, Research Department, ERIA*

Presentation 20 min. each + Q&A

by ***Dr. Eri Prabowo****, Director Operation I, PT. Indonesia Power, Indonesia*

by ***Mr. Motohisa Sakurai****, Manager, Engineering Office, International Business Development Department, Electric Power Development Co., Ltd. (J-POWER), Japan*

by ***Mr. Edgardo Cruz****, President, Philippine Coal Plant Users' Group (PCPUG), Philippines*

by ***Mr. Vu Viet Dung,*** *Deputy Director of Thermal and Nuclear Power Engineering Center, Power Engineering Consulting Joint Stock Company 2 (PECC2), Viet Nam*

Key messages of the session:

- In Indonesia, though, continuous emission monitoring systems (CEMS) and electrostatic precipitators (ESP) have been installed in all coal-fired plants, only a few of these plants are equipped with flue gas desulphurization systems (FGD) due to their high cost. Fly ash and bottom ash from coal-fired power plants are recycled by transforming them into concrete, paving blocks, and cement.

- The government of Indonesia has the corporate performance assessment program in environmental management called 'PROPER', which has been developed by the Ministry of Environment in 1995. In the program, the maturity of the environmental management schemes of each company (including electric utilities) is evaluated according to five grades: gold, green, blue, red, and black. Companies that comply with all the requirements of environmental management are awarded the blue grade.
- However, to gain the higher grades (gold or green), companies have to undertake other Corporate Social Responsibility activities such as wildlife conservation. Results of the assessment are regularly announced in newspapers.
- In Japan, emission standards applied to coal-fired power stations vary based on each plant's commercial operation date, location, and municipal government. In the case of the replacement of the Isogo coal-fired power station of J-POWER, the local government of Yokohama City asked the company to comply with emission standards that were as strict as the standards set for the gas-fired power plant located next to the coal-fired power station.
- Data from the emission monitoring system at the Isogo power station are transmitted to Yokohama City in real time for monitoring. The transparency that this system provides allows the company to gain the local government's trust.
- The Isogo power station also accepts about 6,000 visitors and holds an 'Annual Open Day' every year. The site tour and family events organized by the facility help foster good relationships with the locals.
- In the Philippines, the law provides that the private sector meet the environmental standards set by various government agencies, including the Department of Environment and Natural Resources.
- In addition to the environmental standards, the Department of Energy has a financial program for host communities of the coal-fired power plants. The host communities are entitled to one centavo per kilowatt-hour of the electricity sales of the generation facilities and/or energy resource development projects located in all *barangays*, municipalities, cities, provinces, and regions.

The main objective of the program is to recognize and provide recompense for the contribution made by the host local government units or municipality. The funds will be used for such projects as electrification (50%), education and livelihood (25%), and reforestation, health, and environmental enhancement (25%).

- In Viet Nam, EVN power plants make up as much as 60% of the country's total power capacity, including the coal-fired power stations using subcritical and supercritical technology such as Duyen Hai and Vinh Tan.
- However, some coal-fired power plants had serious environmental incidents recently: Vinh Tan 2 had a fly ash incident in May 2015, and Formosa had polluted the waters by discharging untreated chemical waste water into the sea in April 2016. The incidents caused a shift in residents and governmental authorities' sentiments toward CPPs. Locals protested while local governments and other authorities spent a longer time reviewing and approving new CPPs.
- This experience clearly shows that compliance with the environmental protection law and other regulations during the construction and operation of a plant is one of the most important factors that can enhance social acceptance.

12:35 - 12:40 Closing Remarks

*by **Mr. Ichiro Kutani**, Sub-Leader of the Project, Senior Economist, Manager of Global Energy Group 1, Assistant to Managing Director, Strategy Research Unit, The Institute of Energy Economics, Japan (IEEJ), Japan*

Key messages of the session:

- The importance of coal-fired power in each country's energy mix was validated by today's seminar. Sharing information and experiences with other countries, too, is one way to improve social acceptance of CPPs.