

# Workshop on Nuclear Energy and Nuclear Safety

20 April 2012  
Singapore

Organised by



**Konrad  
Adenauer  
Stiftung**

In partnership with



**Centre in Singapore**

# Workshop on Nuclear Energy and Nuclear Safety

## WORKSHOP REPORT

Organised by



In partnership with



20 APRIL 2012  
SINGAPORE

Copyright © 2012 EU Centre in Singapore  
All rights reserved  
Published May 2012

*This report summarises the proceedings of the workshop as interpreted by the rapporteurs and editors of the EU Centre in Singapore.*

## TABLE OF CONTENTS

<b>Executive Summary</b>	4
<b>Introduction</b>	5
<b>Session 1 – Debate on Nuclear Energy</b>	7
<b>Session 2 – Different Dimensions of Nuclear Safety</b>	11
<b>Session 3 – Regulatory Environment</b>	16

## Executive Summary

Despite Fukushima, several countries in Asia like China, Vietnam and India have pushed forward their nuclear energy programme. This, in some way, is understandable as the demand for energy is growing rapidly in these developing economies. With regard to energy policy to cater to the increased demand for electricity, there is no 'one-size-fits-all' solution. There is an understanding that each country has different needs, and the energy mix for each country is shaped by its available indigenous energy sources, historical, socioeconomic and political circumstances.

It is also generally agreed that overreliance on any one energy source is dangerous; a diversified energy mix is an important and wise strategy to undertake. Countries considering developing nuclear energy capabilities in Asia see it as a path toward energy independence as it provides security for long-term energy demand. It is an important alternative when weighing the considerations of climate change and the need to reduce greenhouse gas emissions.

Transparency in decision-making on the building and operation of nuclear plants, for instance, on where they should be sited, and genuine dialogue on related safety and regulatory issues are most important for public acceptance of nuclear energy since concerns over safety are paramount.

The decision on energy mixes is a political issue. Whether one chooses renewable energy over nuclear energy, there are massive upfront investment and risks. Governments therefore need to take a long-term view and show real commitment to address issues of political risks and uncertainty so as to allow industry players and markets to make sound investment decisions. For instance, if governments want to drive investment into research into renewables, perhaps a global agreement to provide a framework for industry to invest in green energy can be considered to reduce the uncertainty.

By changing the paradigm that energy is approached, from being a national issue to one that is regional in nature would open up genuine opportunities for greater regional and inter-regional cooperation. Multilateral dialogue is also necessary as any radioactive release (or nuclear fallout) may have significant cross-border consequences and impact neighbouring countries. Northeast Asia, alongside Western Europe, as regions with high concentrations of nuclear power plants has great potential for closer cooperation.

Capacity building, instilling a safety culture and having a sound regulatory environment are all important in the pursuit of nuclear energy, and there is great scope for cooperation between Asia and more experienced operators in Europe, particularly in the area of safety.

## Introduction

The Fukushima Daiichi nuclear disaster has had evident and significant consequences for the ongoing debate on the use of nuclear power, highlighted by the decision of numerous countries to halt or review the development of their own nuclear industry, as the public became more critical of its use to generate electricity. With Asia moving ahead with large-scale nuclear power plant building programmes, the debate continues between its proponents who point to nuclear power as a sustainable energy source that reduces carbon emissions and provides for long-term energy security and its critics which point to nuclear power's less than stellar operational safety record – while accidents are relatively less frequent, their consequences are significant. This is alongside the high costs of construction and decommissioning of nuclear power plants, the radioactive nuclear waste generated and its effects on the environment, and last and certainly not least, the risks to human health.

The audience was reminded of the milestones in the history of nuclear energy. In most fields, historical milestones are inventions and innovations. But in the public imagination, the history of nuclear energy is told as a series of accidents, the first major one being the incident at Three Mile Island, Pennsylvania in 1979 that raised safety concerns in relation to the nuclear industry. The next, the Chernobyl disaster of 1986, claimed about 40 direct casualties, and many more its aftermath

as a result of significant radiation exposure, which affected individuals in a number of European countries, highlighting the safety and cross-border dimension of issues associated with nuclear energy. The most recent milestone is the Fukushima Daiichi nuclear disaster that followed the Tōhoku earthquake and tsunami in March 2011. While devastating in terms of costs to human life and environmental damage, these events all heralded significant turning points in the global development of nuclear power. More significant is that despite a number of serious accidents, nuclear power production has continued, as we once again observe following Fukushima.

In Europe, the picture is mixed as a consequence of the distrust following the Fukushima accident. With nuclear power in the public eye again, Germany has decided to close its nuclear power plants by 2022, while Italy renewed its commitment against nuclear power. Switzerland has also decided on a phase out of nuclear energy. In Europe, the rapid expansion in the use of nuclear energy has slowed down (France and Russia are exceptions). Active players today in Europe include Finland, which is building its fifth reactor and is planning to have two more, and the United Kingdom (UK), the Czech Republic, Slovakia, Poland, Romania, and Bulgaria.

It was noted that while the Fukushima Daiichi nuclear accident prompted a rethink toward nuclear energy in a few of the Western countries,

some states in Asia are still continuing with their plans to develop nuclear power and no major change is forthcoming in view of the rapid development and growing need for electricity in many Asian countries. The dependence on foreign imports of energy have implications for Asia's development and its fast-growing economies, as energy importing nations will be most affected by price volatility in the global energy markets, not to mention the uncertain long-term supply of oil. China and India, the countries with the largest nuclear power projects in Asia, have not expressed any doubt, and plans remain on course for the construction of 120 more nuclear reactors in China, while Vietnam, for example, has signed two major agreements with Russia and Japan, and remains fully committed to the construction of its own nuclear reactors, which will be the first in Southeast Asia (excluding the Bataan power station in the Philippines, which never went online).

In Asia, where energy supply is primarily derived from fossil fuels, there is a need to diversify energy sources, especially in view of supply concerns with respect to the long-term supply of crude oil to the region. There is also a growing urgency to shift away from carbon-intensive fossil fuels to meet climate change targets. Despite the significant investment commitment necessary - its long lead time in terms of planning and construction, and long payback period, nuclear energy is seen as part of the solution, though its viability for each country varies. As Asian countries continue with their plans for nuclear power, there is a need for greater regional cooperation on issues such as Environmental Impact Assessment and safety standards, particularly for Southeast Asian countries that are building plants for the first time.

## Session 1 – Debate on Nuclear Energy

Two central issues that were discussed during this session were if nuclear energy is a suitable and necessary part of one's energy mix, and the possibility of achieving climate change commitments without resorting to nuclear energy.

The period between the 1950s to the 1970s is often described as nuclear energy's 'golden age'. This was clearly evident in Western Europe, as there was great expansion in the use of nuclear energy as a substitute for fossil fuel. Public perception and acceptance is of utmost importance. For example, in Germany, any mention of the word "nuclear" originally had negative connotations after World War II, as the public tended to associate it with the development of nuclear arms and war. That said, in the 1960s, there was a time when nuclear energy was seen as the future, as this was the time of the German economic miracle, the *Wirtschaftswunder*. Concerns that the rapidly-growing economy might come to a halt were first raised during the oil crisis of 1973 because of the rising price of oil and overreliance on energy imports. Nuclear energy was seen then as the future. But over time the promise of the future nuclear energy would bring slowly faded, and its popularity waned. This marked the beginning of a split within German society between those who saw nuclear energy as a way to avoid being dependent on imports and those who advocated a radical change of lifestyle, such as the

Green Party, and the beginning of the environmental movement.

The use of nuclear energy became a mainstream issue following the Chernobyl accident. The "green thinking" was developing and began to make its way also into the agenda of traditional political parties. The issue of acid rain, even if not always a direct consequence of the use of nuclear energy, further reinforced ecologically-minded thinking in Germany.

As the Green party entered the German government, the decision was made to gradually phase-out nuclear plants. The government of Angela Merkel decided to change the phase-out decision and to extend the active period of the existing nuclear plants, but following the Fukushima accident, her government reversed this yet again and even accelerated phase-out plans, with the immediate closure of some plants and the remaining ones due to go offline by 2022. Germans were more alarmed by the accident at Fukushima than Chernobyl. The disaster at Chernobyl was generally attributed to poor construction and human failure on the part of the Russians, rather than a systemic issue of nuclear safety. But Germans have long viewed the Japanese as competitors, and regard Japanese expertise as equal to their own. As Angela Merkel pointed out, "we admired and feared the Japanese engineering. If it can happen in Japan, it can happen in Germany" (though it should be pointed out that experts say that the



reactors did very well, given what they has to withstand and the lack of coolant water for such a long period of time). Even more than before, the decision was backed by the population, and support for phasing out nuclear energy rose to 80 per cent.

Over the last year, the use of renewable energy, such as wind energy has been expanding greatly. Today, renewable energies account for around 22 per cent of the German energy mix. It is often said that the decision to develop renewable energy is a political and not an economic decision; renewable energy is not feasible without government subsidies. But the same criticism is valid for nuclear energy, as massive upfront investments are necessary for nuclear energy as well. The development of nuclear energy comes with risks not covered by insurance, and issues such as high decommissioning costs. Nuclear energy is dependent on political will, but as Germany demonstrates, politics can change, though there is concern in some quarters has always been that the country's economic miracle might stop if nuclear power were discontinued.

Another problem is the lack of time. Developing countries need energy now and cannot wait for the renewable energy miracle to happen. Nuclear power offers a way around these problems. An example of the Indian situation, which is similar to that of many other Asian and Southeast Asian countries, was offered. There, the fear is not whether the economic miracle will continue, but whether it will ever begin without an ample and reliable supply of energy,

which nuclear power can provide, as the current supply of energy lags far behind demand. In India, nuclear energy also appears necessary in the urgent context of climate change with the need to generate power free of carbon constraints. Aside from the need to supply India's growing industries, the provision of electricity to India's rural population is a key political imperative. Currently coal-fired power plants provide some 52 per cent of India's electricity, but there are fears that coal reserves will only sustain India for the next 30-40 years. There are also environmental and governance issues surrounding coal mining in India. In terms of other fossil fuels, India's domestic oil and gas reserves are limited, requiring imports. Renewable energy use has also not been popular in India, making up only 3 per cent of India's energy mix. There are also concerns about hydropower leading to the displacement of people.

Given India's situation, nuclear energy seems like a viable choice, generally accepted by the population. India's nuclear programme is also a symbol of great national pride for the country, as it was mostly domestically developed. But even with this support for nuclear energy, several problems exist: local opposition to the opening up of uranium mines is growing and a great deal of infrastructural development is necessary. Besides production of electricity, one also needs to look at its distribution, which is particularly problematic in relatively less-developed Asian countries that are without secure electricity delivery infrastructure.

Meanwhile, South Korea, a country with no coal resources, is currently the world's second largest importer of coal. Officially, nuclear energy is seen as the cheapest energy source available to South Korea, the most cost-effective per kWh, while the most expensive is solar power (this is also the case even for countries close to the equator). Nuclear power is thus similarly seen as important and necessary for the country's development. South Korea was one of the world's least developed countries when it adopted nuclear energy, but today has the second-highest concentration of operational nuclear power plants in Asia, behind Japan. Nuclear reactors have enabled the country to supply high quality and reliable electricity required for development and for industry, especially energy-intensive ones such as steel, shipbuilding and automobile manufacturing.

Vietnam is moving rapidly towards nuclear energy. The country's leaders feel that nuclear energy is necessary to meet projected electricity demands. Vietnam's population is expected to increase from 87.8 million in 2011 to over 100 million by 2030. Without aggressive development of new power plants, the country could face a shortfall between demand and generation of over 300 billion kWh, though this figure can certainly be reduced with increased energy efficiency and hydro power generated from the Mekong. Thus the country aims to generate some 8 per cent of its electricity from nuclear energy by 2030. Deals have been signed with Russia and Japan, and

the first plants are scheduled to start construction soon.

The view from Asia is far from homogenous though. The Philippines had considered rehabilitating the existing Bataan nuclear reactor, which was built in the 1970s, but never operated due to concerns over its construction and vulnerability to natural disasters. The idea was shelved after Fukushima. Indonesia, Malaysia and Thailand still officially have nuclear power plans, but Thailand has postponed making a final decision by two years. Malaysia has been similarly circumspect, and debate in Indonesia has increased also owing to Indonesia's similar vulnerability to earthquakes and tsunamis as Japan. Meanwhile, Japan itself is now without nuclear energy for the first time in over 50 years; the last of the country's nuclear reactors was shut down in early May 2012. Japan's nuclear reactors were taken offline as part of routine maintenance, but opposition from local authorities has prevented them from being restarted. However, many expect Japan will have no other option but to restart the plants in the long term, or face electricity shortages.

A diverse and reliable energy mix will come from a range of different sources, though this mix will probably differ from country to country depending on the availability of resources, level of technological development and ambition of the country in question. Some participants questioned whether it is possible to address both climate change concerns and energy demands without resorting to nuclear power. For instance, the reality for Germany is that much of its

electricity in the near term will have to come from coal, or from France. Wind and solar power is dependent on weather conditions; in particular, Germany only has 900 hours of good sunshine a year, furthermore, while a local solar energy generator can do quite well with this amount of sunshine, storage of this energy remains a problem. Natural gas, which is competitively priced and in adequate supply in the long-term is another option many nations are taking, though it still contributes to climate change. However, some participants argued that in many Southeast Asian countries, including those considering the nuclear option, there is great potential for renewable energy which has not been explored fully. For instance, Indonesia may have untapped potential for geothermal power.

There are significant advantages to renewable sources over nuclear energy. Renewable energy technology is constantly being updated, and it is easy to replace. For instance, wind turbines are 90 per cent recyclable. Operating costs are comparably low, and renewable energy should become more cost-effective over time, for instance because it has no fuel costs after start up. However, committing to expand the use of renewable energy requires much political courage, alongside considerable research and development. The scope for the expansion of renewable energy can be developed further, but this does not preclude the use of nuclear power. Renewable technologies are still in their infancy, and many governments are reluctant to put their faith solely in

renewables over nuclear energy, especially as renewable cannot as yet provide sufficient baseload power.

Some participants from countries with mature nuclear energy industries argued that nuclear energy is one of the cheapest energy sources available and produces the least carbon emissions. However, sceptics who pointed out that running and back end costs, though low, only make up a small fraction of the total costs involved, and reminded others to not only focus on the monetary costs. Over a longer time horizon, policymakers must look at both the long-term effects of developing nuclear energy, and its costs to the environment. It was also stressed that there is a need for transparency regarding the massive subsidies that different sources of energy receive.

In addition, investment security is crucial, and there is a need to offer a long term perspective to investors. In the nuclear industry, there is considerable investment risk, but investors are also reluctant to invest in renewables. Some sense of security must be provided for the private sector to drive investment into research in renewables. One possibility is for a global agreement to provide a framework for industry to invest in green energy. Policymakers have also expressed their frustrations at the constraints surrounding the nuclear energy debate, as on many occasions, it is not a simple yes or no answer, and the implementation and distribution stage provides even more obstacles. It is difficult to make a comprehensive decision – people just want cheap and available energy. Furthermore, it should be noted that not

all countries need nuclear power in their energy mix, while some might not need to produce their own power and can rely on

imported electricity. The success of the adoption of nuclear energy also depends on the states' ability to manage it too.

## Session 2 - Different dimensions of nuclear safety

The main issues addressed during this session were on the different aspects of nuclear safety, and lessons Southeast Asia can learn from their more experienced counterparts in Europe. The session was rounded off with a short discussion on the building of trust and managing public opinion toward nuclear power.

To begin with, an industry perspective towards nuclear safety issues was offered, and it was highlighted that while choosing technology with the highest levels of safety is important, safety is not only a technological issue. Many people think of safety as only a technical problem, but the presence of a strong safety culture is paramount, and is a national responsibility requiring national ownership and national commitment. The development of such a safety culture essentially means creating and implementing a culture across every organisation involved in the nuclear power programme, from policy to operations, that, as an overriding priority, put “safety first”. In that context, countries interested in developing nuclear power for the first time can ask for support from more experienced countries that have “best practices” in safety culture.

However, there is also need to be aware that there may be specific national or cultural issues that may have to be overcome in inculcating a safety culture, hence, for example, instead of a “blame culture” which led individuals not to report safety issues for fear of being blamed, the norms that have to be

inculcated is to make it unacceptable not to report a safety issue. An equally crucial aspect of ensuring nuclear safety is the setting up of a competent and independent safety regulator, which is legally guaranteed to have the independence and freedom to make regulatory decisions solely in relation to maintaining nuclear safety without pressure from those who either promote nuclear power or oppose its use (see next section on the regulatory environment).

One positive development in the immediate post-Fukushima period is that there are signs that we are moving toward a global consensus on nuclear safety issues, and safety upgrades are in the process of being implemented, with short and long-term improvements and large amounts of investment in upgrading existing nuclear power plants and the many safety reviews and stress tests that are currently being undertaken. New plants being built are also more technologically advanced and robust reactors (Gen III+) built to seismic and tsunami-resistant criteria. Before Fukushima, the adoption of Gen III+ standards was already beginning, for instance, in Europe and the United States, and there was political will to transition towards this in China. But there were other countries that were satisfied with Gen II safety features. After Fukushima, there is now more push for the adoption and implementation of higher safety standards. It was emphasised that the safety assessment of a given nuclear power plant at a given site is the

responsibility of the national safety regulator, and that there are many site-specific issues that have an impact on the safety assessment.

The need for deeper regional cooperation was echoed and emphasised by participants from different parts of Asia. In Northeast Asia, the mature nuclear power countries of Japan, South Korea and China cooperate in information sharing, sharing of spare parts and components, joint research and manpower exchange, and regional preparedness initiatives. Such regional cooperation is a good example for Southeast Asian countries building their first nuclear plants, and should complement International Atomic Energy Agency (IAEA) missions in the region. It was noted though, that the IAEA's potential role is limited. Currently, it can only offer guidance, and its safety recommendations are non-binding. There is thus a pressing need for more formal bilateral and regional cooperation on nuclear safety issues.

In Europe, the European Commission and national nuclear safety regulators have agreed on stress tests to assess the impact of natural disasters such as floods and earthquakes, and man-made incidents such as airplane crashes and acts of terrorism, and will review 147 nuclear plants in 15 EU member states, as well as the 15 reactors in Ukraine and five in Switzerland. Participants of the workshop agreed that in theory there would be a need to have an independent regional safety authority overseeing, coordinating and implementing cross-border regulation, but this will also need to be

complemented with strong national authorities and regulators, as safety remains a national responsibility. In the EU, national regulators are grouped together under the European Nuclear Safety Regulators Group (ENSREG) and the Western European Nuclear Regulators Association (WENRA), in order to encourage and ensure cross-border cooperation, and it was mentioned that these associations could be a potential model for a regional cooperation network under the Association of Southeast Asian Nations (ASEAN) in nuclear safety.

In the discussions surrounding aspects of nuclear safety, the issues of waste management, of the issue of the decommissioning of the nuclear plants, and the costs this entailed were repeatedly raised. A major legacy of the golden age of nuclear energy that was highlighted in this session was the ongoing costs of managing radioactive waste in the UK. The UK made several mistakes while establishing its nuclear industry, for instance, pressing ahead with their own reactor designs, while the rest of the world had standardised on pressurised water reactors, due to too many competing industry groups and interests. It also did not pay enough attention to waste management and decommissioning aspects in the early stages of its nuclear power programme. The nuclear power programme was also designed around fuel reprocessing, on the assumption that there would be a future shortage of uranium. Fuel reprocessing has turned out to be very costly for the UK, resulting in fuel unsuitable for long-term storage, though it was pointed out

that much of this is due to 'legacy' waste from military, not civil applications.

The discussions during this session revealed that there is no easy solution to the management of radioactive waste, and that the reprocessing of nuclear fuel, in particular, needs careful consideration. It was also pointed out that nuclear power plants are highly complex and as such, cannot be deemed failure-proof. Thus careful consideration needs to be taken to determine if the risks associated with developing nuclear power might be too big. All forms of electricity generation have environmental risks, but with nuclear energy the potential impact of accidents is particularly catastrophic. It is impossible to absolutely guarantee that there will be no accidents. Thus if countries are still intent on pressing ahead with nuclear energy, there is a need to continue to develop technology and procedures to ensure plants are as safe as possible and that the waste question is handled seriously. Finland and Sweden are planning to start the final disposal of the spent fuel in the early 2020s and the other countries with nuclear power should follow that example.

The UK saw a long gap in nuclear projects, partially due to safety concerns after Three Mile Island and Chernobyl. But more importantly, there was less impetus to build nuclear plants due to the discovery of gas in the North Sea and the general international availability of cheap gas supplies. Improvements in gas power technology also made it more efficient. But now the UK is turning toward nuclear energy again, in order to meet tough greenhouse emission targets (an 80 per

cent reduction in emissions by 2050, and a 90 per cent reduction in emissions from power stations by 2030). Nuclear energy is not seen as a cheap option per se, but it is viewed as an important element of a diversified low-carbon strategy, competitive in cost with renewables. In addition, the UK's gas production is falling, and existing fossil fuel stations are coming to the end of their lifespan. Nuclear energy is seen as making up this shortfall, and public opinion in the UK is reasonably supportive of new nuclear power stations, at least to replace the older stations that are due to be decommissioned over the next 10 to 15 years. The lesson to be learnt from the UK's experience is that it is important to focus on radioactive waste management and decommissioning of nuclear power plants right from the outset. In addition, discussions on a country's energy future and the prospect of nuclear power must be conducted in an open and transparent fashion.

It was agreed that nuclear energy development is a global issue and there is always a potential risk in adopting this technology. As such, the decision to develop nuclear energy in this region should be looked at from both a regional ASEAN perspective and connected to the global level. Energy policy and regulatory frameworks should similarly be considered at the regional level fully cognizant of global developments and standards. A higher level of transparency and more in-depth regional dialogue is certainly necessary because nuclear safety is not only a national problem but an issue for all neighbouring countries due to the

trans-boundary consequences of a potential nuclear accident. Safety needs to be guaranteed as far as possible, especially when considering the many information gaps in the nuclear energy industry. Countries considering exploring nuclear power options must take this into consideration. It was concluded that regional stability is essential for a successful energy policy.

The next issue that was discussed was the need for transparency and dialogue with the local population on the issue of nuclear energy. As the public becomes more aware of the risks associated with nuclear energy, it is important that a larger debate takes place on the decision to pursue nuclear energy and on the conditions necessary to develop a nuclear industry. Particular risks are associated with the nuclear energy but an intelligent and transparent debate is still lacking in many Asian nations. It was broadly agreed that any decision to develop a nuclear sector would need to be debated with the population, which will need to be well informed about the pros and cons of such a choice to be able to make a reasoned decision for or against nuclear energy. Proponents of nuclear energy should not see public mistrust simply as a hurdle they need to overcome as citizens need, and should have a right to know how safe plants are.

The issue of developing nuclear power is also often conflated with other issues. As one participant noted, local communities may be convinced to support the construction of nuclear power plants in their area due to the infrastructural developments that come

with the plant, such as roads. Governments sometimes also try to link the development of a nuclear sector with national pride, arguing that the development of a nuclear industry will boost scientific and technological development. However, the full extent of the risks and trade-offs and options may not have been fully conveyed to the public. Participants therefore urged for genuine dialogue and public engagement. As a civil society representative stressed, currently the public in many Southeast Asian nations is not sufficiently informed about the risks associated with the development of a nuclear industry. An example from Indonesia was offered, where debates revolve around the country's power and energy needs, but not on the nuclear issue itself, and communities are not sufficiently informed about the risks of nuclear energy.

The importance of public attitudes and perceptions towards nuclear power was highlighted, with transparency being the most important factor for public acceptance, especially in the context of official responses to accidents and emergencies. With public mistrust rising as a result of Fukushima, concrete information should be given across the board about potential risks and impact of disasters. The biggest public relations disaster for governments and the builders and operators of nuclear power plants is to be (seen as) secretive, whether in the context of Fukushima, or in non-crisis contexts, such as the building of nuclear power plants in the UK. This secrecy is often due to a certain arrogance on the part of nuclear scientists and policy



experts, who may believe that ordinary people will never be able to understand nuclear energy. However, the public is often intuitive enough to sense when authorities are being vague and opaque; often resulting then in distrust and a backlash.

A successful and safe development of a nuclear sector also requires a strong leadership, as illustrated in the South Korean experience. Other participants also mentioned the necessity of a stable social, economic and political environment to ensure the safe development of a nuclear sector. Lastly, the issues of non-proliferation and nuclear security were not developed in length, but are equally important factors to consider in the development of nuclear power.

### Session 3: Regulatory environment

Enhancing competency in nuclear safety and regulatory control was deemed to be paramount, while limitations with regard to the regulatory environment were cited. Concerns about nuclear safety from a legal perspective were also raised. Beyond the national level, more attention also needs to be paid to developing international and regional standards. It was agreed that creating a regulatory environment is not just about establishing institutions, but should revolve around building capacity and a culture of compliance and implementation.

Capacity building in renewable energy technologies for developing countries is necessary to mitigate climate change, and for the successful employment of nuclear energy technology as well. This is done for example, through technology transfer, training, public education and research and through the exploration and development of renewable energy sources specific to each country. The UNDP and other international agencies have played a major role in the infrastructural development of developing countries to transition to renewable energy, and in the area of nuclear energy, the IAEA has contributed much, especially in the early stages of energy projects, and in terms of financing and quality control. The IAEA also plays a significant role in the formulation of international agreements, though its guidelines are not legally binding.

The building up of information and knowledge networks and the facilitation

of a speedy technology transfer present the best ways to facilitate capacity building, especially in the context of meeting international climate change targets: towards such ends, the involvement of more experienced countries is important. The role played by the IAEA and other nuclear equipment and service providers for specialised training and education is also essential and it is important that they are involved from the outset. All this however, only serves to highlight the dominance of industry-led capacity building and the risk of industry-led legislation being passed, undermining the political process and control.

There is a different approach to selling the idea of nuclear energy in Southeast Asia compared to Europe, as developing and less developed nations require the necessary infrastructure and not just the technology. The balance between industry and buyers of technology is also very important – it was pointed out that with certain exceptions, every segment of the nuclear industry is dominated by a few state-owned major players, from power plant construction to uranium mining, and that these corporations are mostly from the OECD countries. With only a few players in the nuclear energy market, these companies hence occupy a strong position, and often have even heads of state from their home countries involved in signing deals with developing countries. In this way, deals to build nuclear power plants have

sometimes been reached without any transparent bidding process.

As a result, the acquisition of nuclear power technology has become a balancing game for developing countries in this context, once again underlining the importance of multilateral discussions and regional cooperation. Many present at the workshop agreed that the nuclear industry has political overtones. This situation will not change, but it must be balanced. Thus, the regulatory environment also needs to be developed, and rules need to be better enforced to regulate the bidding process and the operations of the nuclear industry. The big nuclear countries need to abide by ethical codes of conduct, and NGOs in these countries can play a role in pushing their firms to higher standards. Buyers of nuclear power plants need to be more intelligently informed, to be able to make the right demands and exact appropriate guarantees from suppliers. As small countries may lack the capacity and expertise to deal with big vendors, countries – particularly in ASEAN – could work together as a buyers' pool to balance the political influence of big national companies.

There must be a political decision to develop the legislative and regulatory capacity to deal with the nuclear industry, and national governments which want to develop a nuclear industry need to make a long-term commitment towards this. This includes setting-up the adequate regulatory environment, which was also identified as an area where countries more experienced with nuclear power can provide support. Participants repeatedly

emphasised the need to have an independent and competent nuclear regulatory authority. Participants agreed that the establishment of an independent regulatory body was crucial to the long-term nuclear energy project, which would also have the effect of increasing public confidence, safety, and credibility. In Japan, the situation has been described as a “nuclear village”, where operators and regulators were effectively the same community. This arrangement has come under harsh scrutiny since the Fukushima accident.

That said, several participants noted that while setting up an independent regulatory body is good in principle, in practice it is very difficult to do so, as establishing such a body requires developing the necessary human resources with the capacity to do so. One possible model discussed was the example of Finland, where the Finnish Radiation and Nuclear Safety Authority (STUK) is an independent body, but linked administratively with the Ministry for Social Affairs and Health and funded from the annual state budget (the nuclear power companies bear the cost of nuclear regulation).

While there have been efforts to building up national legislative and regulatory frameworks, much can be done regionally in terms of harmonization of instruments, and the application of safety standards. It was stressed that neighbouring countries should also be consulted on proposals, as they would also be impacted in case of an accident. The development of regulatory frameworks can also take place through

international cooperation. In this case, the EU provides a good example of how regional agreements can frame national legislation in this field. For the EU, the landmark began with the Euratom Treaty (1957) that established the European Atomic Energy Community and paved the way for regional cooperation in this field. Examples were given on acts of binding EU legislation in this area, including the Radioactive Waste Directive (Council Directive 2011/70/Euratom) and the Council Directive 2009/71/Euratom, that establish a community framework for the nuclear safety of nuclear installations.

In Finland, the Environmental Impact Assessment (EIA) process includes the consultation of neighbouring countries on a large scale (the so-called Espoo process, under the umbrella of the United Nations). For instance, Austria, which is critical of nuclear energy, has become voluntarily involved in Finland's nuclear plans, sending three missions to

Finland. This may be a constraining process, but this is very important and brings added value to the process; in the end, Finnish officials see the Austrian involvement as helping Finland, as the Austrians have correctly challenged them. In this context, the question was raised as to whether ASEAN should also be involved in such a process, and in particular whether neighbouring countries should be consulted when an ASEAN member state decides to adopt nuclear energy.

The need to reconceptualise the discussion on energy issues as a regional development issue was clear. If countries can change the mindset that energy is purely a national issue, and move away from national-centric policy-making with regard to the nuclear energy debate, it will open up more scope for cross-border and regional cooperation. It will also raise the potential for real solutions, especially with regard to implementing regulations and harmonising safety at a high standard.



# EU Centre in Singapore

EU Centre in Singapore  
11, Slim Barracks Rise  
(off North Buona Vista Road)  
#06-01 Executive Centre  
NTU@one-north campus  
Singapore 1388664

Tel: +65-65132007  
Fax: +65-67741445  
Web: [www.eucentre.sg](http://www.eucentre.sg)

EU Centre in Singapore is a partnership of

