Paradigma: Jurnal Masalah Sosial, Politik, dan Kebijakan
http://jurnal.upnyk.ac.id/index.php/paradigma/index
P-ISSN: 1410-3133. E-ISSN: 2829-1778
Vol 27, No 2 (2023)
https://doi.org/10.31315/

WHY DID INDONESIA FAIL TO BUILD ITS FIRST NUCLEAR POWER PLANT IN MURIA, JEPARA?

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Abstract

In order to achieve net zero emission and national energy resilience BAPETEN has announced that the Indonesian government plans to build a new nuclear power plant by 2039. While the new plans to build a new nuclear power plant by 2039 remains to be seen, this article aims at revisiting the question of why did Indonesia, under President Yudhoyono administration fail to build its first nuclear power plant in Muria, Jepara. This article argues the failure to build the first nuclear power plant was caused by strong resistance to the nuclear power plant from the civil society movements due to the lack of trust towards the government in handling the risks of nuclear. The political atmosphere that surrounds the failure to build nuclear power plant in Jepara was marked by risks and benefits trade-offs. The government and the public could not balance the benefits and the risks of nuclear power plant as possible solution to energy scarcity and energy security and various risks, including the fears of disastrous impacts of nuclear power plant.

Keywords: *Nuclear Power Plant, Jepara, Indonesia*

Abstrak

Dalam rangka mencapai *net zero emission* dan ketahanan energi nasional, BAPETEN telah mengumumkan bahwa pemerintah Indonesia berencana untuk membangun pembangkit listrik tenaga nuklir baru pada tahun 2039. Sementara waktu akan membuktikan tentang rencana baru untuk membangun pembangkit listrik tenaga nuklir baru tersebut, artikel ini bertujuan untuk meninjau kembali pertanyaan mengapa Indonesia, di bawah pemerintahan Presiden Yudhoyono, gagal membangun pembangkit listrik tenaga nuklir pertamanya di Muria, Jepara. Artikel ini berpendapat bahwa kegagalan membangun pembangkit listrik tenaga nuklir pertama disebabkan oleh resistensi yang kuat terhadap pembangkit listrik tenaga nuklir dari gerakan masyarakat sipil, karena kurangnya kepercayaan terhadap pemerintah dalam menangani risiko nuklir. Atmosfir politik yang melingkupi kegagalan pembangunan pembangkit tenaga nuklir ditandai dengan trade-off antara keuntungan dan resiko energi nuklir. Pemerintah dan masyarakat tidak bisa mencapai keseimbangan antara potensi keuntungan dan resiko pembangkit listrik energi nuklir sebagai solusi yang niscaya bagi kelangkaan energi dan keamanan energi dengan berbagai resiko, termasuk kekhawatiran bencana yang bisa diakibatkan oleh pembangkit listrik energi nuklir

Kata Kunci: Pembangkit Reaktor Nuklir, Jepara, Indonesia

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Introduction

In a bid to achieve net zero emission and national energy resilience, the Indonesia's Nuclear Energy Control Agency (*Badan Pengawas Tenaga Nuklir* BAPETEN) has announced that the Indonesian government plans to build a new nuclear power plant by 2039. BAPETEN has also pronounced that it has equipped with a series of regulations on nuclear safety infrastructure, including evaluation of the planned location for the nuclear power plant due to the seismic risks in Indonesia, and its construction to its trial operation (*https://en.antaranews.com/news/263791/govt-targets-to-build-nuclear-power-plant-in-2039-bapeten*).

While the new plans to build a new nuclear power plant by 2039 remains to be seen, this article aims at revisiting the question of why Indonesia under President Yudhoyono administration failed to build its first nuclear power plant in Muria, Jepara. Nuclear power program had become one important among many options to meet the Indonesia's sustainable power demand as has been mandated by the Presidential Decree No. 5/ 2006 on National Energy Policy. In the National Energy Policy, Yudhoyono administration intended to apply a new national energy mix comprising a new and renewable including biomass, nuclear, hydro, solar, and wind to reach more than 5 percent in the year 2025 (*https://jdih.kemenkeu.go.id/fulltext/2006/5TAHUN2006PERPRES.HTM)*. Furthermore, as mandated by the Law No. 17/ 2007 on National Long-Term Development Planning year 2005-2025, nuclear electricity generation should be operated in Indonesia between years 2015-2019 (*https://peraturan.bpk.go.id/Home/Details/39830*). According to the plan, while licensing and permitting take several years, the construction of the first nuclear power plant should be started in 2010.

In 2006, the Minister of Energy and Mineral Resources, Purnomo Yusgiantoro had announced Indonesia's plan to build a nuclear power plant to meet soaring demands for electricity. The Indonesian government has given responsibility to *Badan Tenaga Nuklir Nasional* (National Nuclear Power Agency, BATAN) and BAPETEN to formulate a comprehensive plan for the nuclear power plan. Three sites are being considered for Indonesia nuclear plant: Muria peninsula (central Java), Banten (west Java) and Bangka Island (off southern Sumatra).

For the first nuclear plant, Muria peninsula in Jepara district on north coast of Central Java was chosen as the first priority. According to Government Regulation no 43/ 2006 on Nuclear Reactors Admission, the project will be implemented by independent power producer. The call for tenders for construction was planned in 2008 for two 1,000 MW units of Muria 1 and 2 and expected to operate commercially in 2016, while the Muria unit 3 and 4 are expected to be tendered in 2016 and operated from 2023 (*http://www.world-nuclear.org/info/inf102.html*). Muria nuclear power plant is targeted to serve Java-Bali grids which represent 75 percent of Indonesia's electricity demand.

With the approval from the Commission VII of Indonesian Parliament, the crash program for socialisation was conducted in the early 2007 to acquire public support to smooth the way to nuclear power. The socialisation particularly was addressed to the local resident in Jepara district where the

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Muria Nuclear Plant will be constructed. However, instead of amassing support, the plan to build a Muria nuclear power plant in Jepara encountered adverse opposition from antinuclear alliance consist of multiple groups from local residents, NGO activist, artists, students and surprisingly local bureaucrats. In 12 June 2007, more than 5,000 people rallied in Kudus (a district near Jepara district) and send the message to the central government that local community rejects the nuclear power plant to be erected in Muria Peninsula (*http://antinuklirjepara.blogspot.com/2008/04/demo-anti-pltn-merambat-ke-kudus.html)*.

Following the growing stronger of antinuclear movement, President Yudhoyono delayed his approval to form a nuclear power task force and reluctant to proceed further construction of Muria nuclear power plant. Consequently, the whole planning of the nuclear power program has to find another scenario relating to other potential sites and has to be rescheduled although it does not guarantee to less resistance from the civil society.

This article argues the failure to build the first nuclear power plant was caused by strong resistance to the nuclear power plant from the civil society movements due to the lack of trust towards the government in handling the risk of nuclear. To substantiate the argument, it is organised in four parts. The first part will trace back the history of nuclear aspiration in Indonesia. The second part will discuss the impact of energy crisis to the growing support of nuclear energy. The third part will discuss the impact of democratization to the growing resistance to nuclear power plant. The last part will capture the remnants of the ongoing debate.

Theoretical Framework and Methodology

The benefits and the risks are two sides of the same coin of the use of nuclear power. Although nuclear power has been adopted in more than 50 countries and contributing to nearly 10% of the world electricity, the use of nuclear power still remains a subject of intense debates (The World Nuclear Association, 2020). The proponents of nuclear energy consider it as instrumental to address the soaring energy demand and as a possible solution to energy security as well as climate change risks (for example, Bickerstaff, et.al, 2008). The opponents of nuclear energy, on the other hand, view it from safety concern, due to the risks of accident, and hazardous effects to the environment caused by nuclear energy waste. The nuclear disaster of Fukushima in 2011 in Japan, caused by the earthquake and tsunami is a constant remainder of potentially disastrous effect of a nuclear power plant (Fauzan & Schiller, 2011). Unsurprisingly, the use nuclear power is a complex and yet controversial issue for both government and the public due to the perceived advantages and dangers.

Several important studies have put forward the role of social movement in challenging the establishment of nuclear power plant in Indonesia. Amir (2009; 2010) has argued that Indonesian government's plan to adopt nuclear power has faced resistance from social movements due to lack of trust to the government, rather than the fears of immediate nuclear accidents. He states, 'the rise of such an organized resistance by civil society groups is forged less by immediate fears of nuclear

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accidents than by distrust of the government's ability to handle high risk technology (Amir 2010; 267). Study by Fauzan dan Schiller (2011), on the other hand argues that the fears of immediate disastrous effect of nuclear power plant, particularly after the Fukushima nuclear disaster in Japan in March 2011 have huge impacts to the rise and continuity of nuclear power resistance both at national and local level in post-authoritarian Indonesia. They maintain that 'coverage on Fukushima provided a platform which a diverse array of voice (of anti-nuclear movement) could be heard… meanwhile friction among decision makers at national level has also become more apparent… (Fauzan dan Schiller, 2011; 24-25).

While corroborating the above arguments, this study seeks to add the discussion by forwarding the concept of benefits and risk trade-offs. On their study on the risk perception of nuclear power plant in Taiwan, Qi Bian (et.al, 2021) find that despite Taiwan is a country that prone with natural disaster risks, similar to Fukushima, the public deliberately balances between advantages and risks of nuclear power as the island is confronting the adverse effects of climate change. It is indicated by the vote in which 59,5% of the public supported the maintenance of nuclear power plants and jettison the previous decision to end the nuclear power in 2025 (Qi Bian, *et.al*, 202i; 2). In the case of Taiwan, as the writers maintain the trade-off between risk and benefits has change into the trade-off between risk and risk, in particular between nuclear energy and climate change. As they opine, 'the general public and their governments have to balance the benefits and risks of nuclear power or the various risks that have trade-off effects, such as nuclear power plants and climate change (*ibid*, 3).

Adapting the studies above to the context of Indonesia, it seems that the political atmosphere that surrounds the failure to build nuclear power plant in Jepara was marked by risks and benefits trade-offs. The government and the public could not balance the benefits and the risks of nuclear power plant as possible solution to energy scarcity and energy security and various risks, including the fears of disastrous impacts of nuclear power plant. The public, in this case is the anti-nuclear movements perceived that various risks of the nuclear power plant could not be overcome by its potential benefits. This negative public perception was significantly influenced by the low of trust towards the government not only in managing the risks of nuclear power plant, but also the overall distrust towards the government in disaster management and other policies, due to rampant corruption.

In advancing the analysis, this study uses historical approach which concentrates on the description and interpretation of the events. The historical narrative is also employed to explain the background of Indonesia's nuclear power aspiration from Sukarno to Susilo Bambang Yudhoyono government. Data for this study has been collected from variety of library resources.

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Long Way to Nuclear Power

Since the late 1950s, the first President of Indonesia, Sukarno had an ambitious vision to possess nuclear capacity. Sukarno had made great efforts to prepare the capacity to develop nuclear. A National Committee for the investigation of Radioactivity was established in 1954. Indonesia then became a member of the International Atomic Energy Agency (IAEA) in 1957. On 5 December 1958, the Indonesian government created an Institute of Atomic Energy (or *Lembaga Tenaga Atom*, LTA), which later became the National Agency for Atomic Power (*Badan Tenaga Atom Nasional,* BATAN) to supervise nuclear research and develop atomic. It followed by the construction of the first nuclear research reactor (TRIGA Mark II) in Bandung in 1961. The TRIGA-Mark II is a small 250-kilowatt reactor was purchased from the United States under bilateral agreement of Atom for Peace between Indonesia and United States in 1960. However, the successful of China's first atom bomb experiment in October 1964 and the rising tension with Malaysia pushed Sukarno to promulgate a presidential law in November 1964 to switch the objective of the nuclear program and start an atomic bomb project (Cornejo, 2000; 32-33). Unfortunately, Sukarno was ousted by Suharto who later established the New Order regime.

From the beginning, the New Order regime was aware on the importance of continuing the nuclear program for its political prestige. It was affected by nationalistic vision among the New Order elite such as Habibie (Minister for Research and Technology) that sought to place high technology acquisition as the means to gain independence and sustainability economy. That is why BATAN was granted with considerable space and fund to bring about nuclear research infrastructure and upgrade its expertise in nuclear technology. For that purpose, BATAN upgraded the 250-kilowatt TRIGA-MARK II research reactor into 1 Megawatt in 1971. Furthermore, BATAN constructed two additional research reactors, a 100 kilowatt in Yogyakarta in the late 1970s and 30 megawatts in Serpong in the late 1980s. Another research facility also was built in Pasar Jumat Jakarta.

To proceed the mastering of nuclear technology, Indonesia signed agreements for major research facilities project with Canada, France, Germany and United States in the mid 1980s. Cooperation with Germany implemented in construction of Serpong reactor, while cooperation with Italy conducted in a pre-feasibility study during 1978-79 and found that a location in Ujung Watu on Mount Muria Peninsula, Jepara could be a possible reactor site. For additional studies to look into the possibility of developing nuclear power, Indonesia worked together with International Atomic Energy Agency (IAEA), the United States government, the French government and the Italian government (Schlapfer, 1996).

Despite the nuclear power plant feasibility study was completed in 1996 and the Act No. 10/ 1997 on nuclear power was enacted, the nuclear power was not easily to be materialised. The implementation of nuclear power plant could not be separated from the changing landscape of political regime in last decade of the New Order. In the first and second decade of New Order's rule, political regime in Indonesia was best described as authoritarian-bureaucratic or authoritarian

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corporatism, in which political stage was dominated by the alliance of military and bureaucracy at the expense of civil liberty. The growing importance of conglomerate and politico-business class shifted the political alliance in the last decade of the New Order tenure, which turned into oligarchy alliance (Robison, 2004). The high-technology project such as nuclear power was capital intensive and infrastructure project that associated with it was very lucrative. That is why the construction and infrastructure projects of the nuclear power program were prone to corruption, collusion and nepotism. It was evident in the involvement of the sons of the director-general of BATAN in 1990s, who directly linked to a company that engaged in sterilization process using radiation (Schlapfer, 1996; 10-11).

Another obstacle that blocked the nuclear power plant was the growing critics within the government. Legislators from various factions in the parliament and member of cabinet such as Minister for the Environment, Sarwono Kusumaatmaja began to questioning the safety aspect of the nuclear program and urged the nuclear proponents in the government agency to conduct public discussion. The military was also unhappy with the growing role of Habibie, the central figure of nuclear project, that built the Muslim Intellectual's Organisation (*Ikatan Cendekiawan Muslim Indonesia*, ICMI) as the ultimate New Order support base that reduce the influence of military in front of Suharto. No doubt, many factions of the military were opposing nuclear project for political reasons (Schlapfer, 1996; 15-17). The disagreement within the government and the oil-based politics of energy obstructed the aspiration to construct the first nuclear power plant in Indonesia until economic crisis ousted Suharto from his throne in 1998.

Energy Predicament and the Revival of Nuclear Energy

Despite the impact of economic crisis and the regime change suspended the nuclear power program the ambition for nuclear program did not come to an end. Indonesia in post New Order era has to deal with energy predicament caused by the curse of oil. The success of the New Order regime in holding power for more than three decades was heavily supported by its abundance of oil. The monopoly of oil production through state-owned company PERTAMINA particularly in the oil boom event in 1973 and in 1978-1979 gave Suharto discretionary resources to build political network based on patron-client and rent.

Oil revenues also spent to build modern infrastructure, including mega-nationalistic projects such as IPTN and nuclear power. The oil boom also enables the New Order regime to build alliances with powerful social group and to make significant concessions to those groups in return to their support to keep the power in hand (Smith, 2007). To win the heart of majority people, the New Order regime from the outset subsidised the price of oil product and electricity to keep them affordable. When the economic crisis swept across Indonesia, the IMF would give standby loan with some conditions mainly the government has to withdraw subsidies including oil and electricity to cut the government expenses. The decision to reduce the amount of oil subsidy instantly triggered protests

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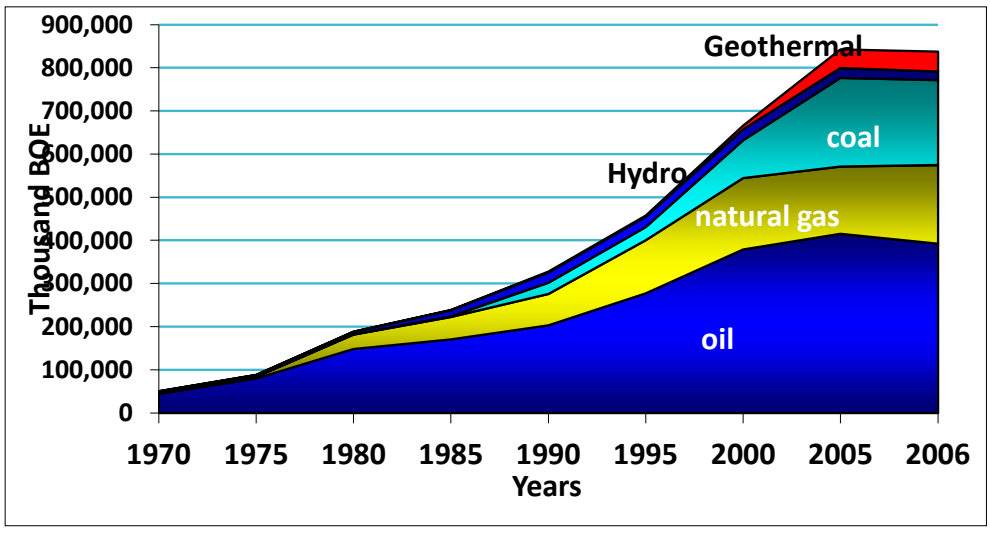
around the country. The protests sparked the following demonstrations and riots that broke out in May 1998 that pushed Suharto to step down (Siegel, 1998).

Suharto's legacy of mismanagement oil-based resources and reckless energy policy left many troubles to the new democratic regime economically and politically. An immediate dilemma was the big amount of oil subsidies that burden the state budget. President Abdurrahman Wahid and his predecessor President Megawati were not dare enough to cut the oil subsidy due to retain their popularity for the election in 2004.

When Yudhoyono won the Presidential election in 2004, the problem of energy was getting worse since Indonesia began import more oil than oil exported. Indonesia then became a net importer of oil and in May 2008, Indonesia government decided to withdraw from OPEC membership. The fact that Indonesia imported oil from 2004 is making oil subsidy unbearable. With Indonesia recovery from financial crisis, energy consumption increased rapidly at 5.2 percent per year (APEC Energy Demand and Supply Outlook 2006; 33). Until 2006, almost 50% of total energy consumed come from oil (see figure 1)

Figure. 1. Primary Energy Consumption



1970
Oil: 88%
Natural gas: 6%
Coal: 1%
Hydro: 5%
Geothermal: 0%

2007
Oil: 49.7%
Natural gas:19.2%
Coal: 27%
Hydro: 3%
Geothermal: 1.2%

Source: Ministry of Energy and Mineral Resources, *Handbook of energy and Economic Statistic of Indonesia*, 2008.

Unfortunately, oil production in Indonesia had declined steadily due to natural decline in currently producing fields and decreased exploration efforts. Oil production in Indonesia has fallen from 517 to 345 million barrels per annum during years 2000-09. While proven oil reserve was around 3.7 thousand million barrels, government efforts to attract investor interest stumbled by ongoing bad

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investment climate due to corruption, decentralisation and the rise of resource nationalism (Boyd, *et. al*, 2010).

When the price of crude oil hiked reached $ 57 a barrel in the late of 2004, while the state budged oil price assumption was $35 a barrel, Yudhoyono government decided to reduce oil subsidies and raise oil price at average of 29%. This measure was taken to save state budget from intolerable adjustment. The rise of oil price sparked protest from the oppositions in the parliament who threat to impeach Yudhoyono. Thanks to Vice President Jusuf Kalla's party of Golkar that block the impeachment attempt. With the strong support from Golkar, Yudhoyono government once more raised the oil price by more than 100% in the late of 2005. To mitigate the economic and social impacts of the rising price of oil, the government provided cash transfer program to compensate the inflation while maintaining the considerable level of domestic consumption, which became the important strategy to economic growth. Until the end period of Yudhoyono government, the state budget for oil subsidies remains huge at around 10-20 percent or more than $150 million (Nugroho, 2010).

The rise of oil price caused energy unavailability. From 2006 fuel scarcity and electricity blackout in various regions has been rising the symptom of energy insecurity. The disruption of oil fuel supplies resulted from limited supplies, technical problems, illegal activities, and bad weather. While electricity blackouts were resulted by the rising demand for electricity power that outnumbers the capacity of power plants and distribution infrastructure (Indriyanto,*et. al*, 2007). Moreover, the disruption of oil supplies badly affected the electric power grid since majority of power grid depends on oil fueled generator.

The Indonesia's energy predicament in post Suharto era led the way to the revival of BATAN's nuclear power program. To develop an energy security policy, BATAN and interdepartmental taskforce conducted a study with assistance from IAEA, following the lobby from Mohammad El Baradai, the then director general of IAEA. The study produced a report entitled "Comprehensive Assessment of Different Energy Resources (CADES)". The report had estimated the overall energy production that needed for Indonesia's energy security in the long run.

The report of the study then had been transformed into a decision issued by Ministry of Energy and Mineral Resources, Purnomo Yusgiantoro that called as *Kebijakan Energy Nasional 2004* (2004 National Energy Policy). The ministerial decision of National Energy Policy underlines the importance of energy diversity to reduce the overreliance on fossil energy. The National Energy Policy basically was a revision of the General Policy on Energy Sector (*Kebijakan Umum Bidang Energy*) that announced in 1998 (Amir, 2010; 265-286). In the new policy the government admitted that Indonesia should harness the nuclear power since it was economically competitive and low carbon emission to sustain electricity supply.

President Yudhoyono soon issued a Presidential Decree No.5/ 2006 in January 2006 that intended to apply optimum energy mix from all prospective resources included 2% contribution from

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nuclear. The decree reinforced the existing law and regulation and officially acknowledged the importance of nuclear power as a part of energy security. According to Presidential Decree No. 5/ 2006, national energy mix in the year 2025 consists of oil: 20%, coal: 33%, gas 30% and renewable energy 17%. Renewable energy consists of biofuel: 5%, Geothermal: 5%, biomass, nuclear, hydro, solar energy, wind power: 5% and coal liquefaction: 2% (*https://jdih.kemenkeu.go.id/fulltext/2006/5TAHUN2006PERPRES.HTM*). Previously, the Law no. 10/ 1997 on nuclear energy gave guidance on the commercial construction, operation and decommissioning of nuclear power plant. Furthermore, in 2007 the law No. 17/ 2007 on National Long-term Development Planning 2005-2025 was promulgated, which stipulated that nuclear power operations should commence in Indonesia between years 2015-2019 (*https://peraturan.bpk.go.id/Home/Details/39830*). Although nuclear power only projected in small percentage, the inclusion of nuclear power as part of energy resources in the future symbolised the revival of nuclear power dream.

After securing supports from the existing legislations, BATAN then developed a detail roadmap to materialise the nuclear power plant. In the roadmap, BATAN projected to establish four reactors to produced 4,000 megawatts by 2025 in Muria Peninsula in Jepara as the first nuclear power plant. The ownership designation and construction bidding was planned in 2008 for two 1,000 MW units and expected to operate commercially in 2016, while the Muria unit 3 and 4 are expected to be tendered in 2016 and operated from 2023 (*http://www.world-nuclear.org/info/inf102.html*) Overall Muria nuclear power plant is targeted to serve over 2% of Java-Bali grids or around 75 percent Indonesia's electricity demand.

The infrastructures to build the first nuclear power plant had been meticulously prepared. Economic and financial aspects, regulation aspects, technology and human resources were already on place, only wait the decision of the government to start to 'go nuclear'. BATAN had advised that the first reactor chosen should be of the Pressurised Water Reactor (PWR) that already used in Japan, Korea and China. The international support also has been obtained. BATAN had produced the guidance for safety and security aspects of nuclear production to conform the IAEA regulations.

Different from the Suharto era, the revival of nuclear power program gained supports from state elites, both in executive and legislative body. The Ministry of Research and Technology and the Ministry of Energy and Mineral Resources were the most important promoter of nuclear option, along with BATAN and The National Development Planning Agency (*Badan Perencanaan Pembanguna Nasional*, BAPPENAS). The advocacy of those departments and government agencies convicted the parliament. The Indonesian Parliament (*Dewan Perwakilan Rakyat*, DPR), that hold political supremacy following the democratization process, gave support and commitment to the program. It is showed by the approval of Commission VII of DPR that responsible to control the policies on energy, technology and environment, to funding the realisation of Muria Plant. The DPR approved

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to the allocation of $550,000 to the Ministry of Research and Technology, and $ 20.9 million to BATAN and BAPPENAS to conduct socialization program.

Another additional budget of more than $ 50 million was disbursed to arrange the basic infrastructure document to facilitate the nuclear power plant program (Amir, 2010; 277). It is interesting to observe the endorsement of the parliament to nuclear power plant program. As showed by Amir, the support to realise the nuclear program was not solely a matter of economic factor but also nationalist sentiment and national pride (Amir, 2010; 278). Finally, in the speech in BATAN's reactor Serpong July 2007, Presiden Yudhoyono signaled his support and commitment to nuclear program realisation as he remarked that nuclear research is very important to solve various problems from energy crisis, food crisis, health and global warming.

Resistance from Anti-Nuclear Movement

Although a bunch of preparation is already in hand such as all regulatory papers, guidance on safety, executive and legislative body and necessary international support, the nuclear power plant encountered strong public resistance. Historically, the embryo of nuclear resistance was rooted in the Suharto government era. During the period, students, activist in major cities in Indonesia formed the Indonesia Antinuclear Society (*Masyarakat Anti Nuklir Indonesia*, MANUSIA). Among other important central figures of MANUSIA were George Junus Aditjondro and Arief Budiman, two dissenters' academician from Satyawacana University, Salatiga central Java. When the nuclear power plant program was shelved in 1997 the antinuclear movement also dwindled.

The resurgence of nuclear program in the National Energy Policy in 2004 reawakened the antinuclear movement. The antinuclear movement in new democratic Indonesia has been able to organise a wide scale of diversity groups and high-level mobilization. There are three civil society groups that organised resistance to nuclear program. The first group is *Wahana Lingkungan Hidup* (WALHI). Founded in 1980, WALHI built a broad network for environmental activists to advocate environmental damages caused by development process in Suharto era. This organization also linked globally with Friends of the Earth. The second group is Greenpeace Indonesia. Like its chief organization, Green Peace Indonesia mostly deals with numerous environmental issues and committed to keeping away nuclear power from Indonesia. The third organization is Indonesian Antinuclear Society (MANUSIA) that involved the professionals and academicians.

The activities of the antinuclear movement took several important forms. The first activities are conducting research on the assessment of nuclear risk from different aspects, social, economic, political, and environmental (Amir, 2009; 343-366). The research supported by a network of academician from prominent university in Indonesia such as University of Indonesia and Bandung Institute for Technology. The result of the research was published in various websites, seminars, and public audience to enhance public awareness on nuclear risk. The other activity took form in street activity and occasional rally to steal the attention of public to the danger of nuclear program. The

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movement also gained publicity from the open mass media and the wide spread of internet technology, so that it could extend the idea dissemination to the public (Schlapfer, 1996). All these activities became a counterbalance to the socialisation program conducted by BATAN.

Despite coming from different organisational backgrounds, the engagement of these groups to organise resistance against nuclear was fundamentally driven by several factors. The first factor is the public anxiety on the risk of nuclear power. The notion of nuclear power is double edges of swords of energy purposes and potential risk. The real risks of a nuclear reactor are difficult to measure, due to the fact of long-term effects of radiation, especially the low-level effects of radiation to human and the environment. Nevertheless, the risks of nuclear power plant are always associated with the accident in Chernobyl on 26 April 1986. The public fear of nuclear catastrophe even growing stronger knowing that Indonesia sits on "the Ring of Fire" (an area of frequent earthquakes and volcanic eruptions encircling the pacific basin) increases the public concern of the safety of Muria Power Plant (Tanter, Imhoff, von Hippel, 2009). According to Schapel's estimation, if a nuclear accident as big as Chernobyl happened in Java it would potentially cause radioactive pollution over an area more than 100,000 Km^2 and more than 75 percent of total land mass of Java would be contaminated. Moreover, Indonesia's population would be affected by the contamination of its major source of food (rice), since Java is the biggest producer of rice in Indonesia (Schlapfer, 1996; 26). The catastrophe image of Chernobyl as imminent risks of nuclear cemented the antinuclear movement to continue stand in the frontline to challenge the nuclear power.

Responding to the questions on the safety of nuclear power plant, BATAN argues that Indonesia has passed the nuclear safety standard under IAEA auspice. Japan often cited by BATAN to show the successful of the country prone to earthquake but almost 40% electricity supply is produced by more than 50 nuclear power reactors. Moreover, BATAN also convinced that BATAN has operated three research reactors safely without significant issues from earthquake. For those reasons, BATAN preferred to duplicate Japanese Pressurized Water Reactor technology to minimize the risk. In the socialization program BATAN implemented a variety of activities such as seminars, public discussions, and demonstrations of safety aspects of nuclear.

The antinuclear movement was also united due to lack of public trust to the government's agencies in handling the safety of great risks of nuclear. It symbolises the growing deterioration of general public trust to the government credibility in public service management and disaster management (Amir, 2009; 351-353). During the period of nuclear power plant proposed construction, the government agencies showed their incapacity to handle safety and security of the public such as transportation accident tragedy and disaster management. The most shocking example is two transportation accidents in a row. The first accident is Senopati Boat that carries more than 200 passengers in sea of Java on the early 2007 followed by the tragedy of Adam Air from Surabaya to Manado crashed on unknown place around Sulawesi Sea. The two accidents were caused by the weak regulation reinforcement by the government agencies to control the public transportation sector.

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http://jurnal.upnyk.ac.id/index.php/paradigma/index
P-ISSN: 1410-3133. E-ISSN: 2829-1778
Vol 27, No 2 (2023)
https://doi.org/10.31315/

Another big airplane crashes at that period were Lion Air in Surakarta and the Garuda accident in Yogyakarta that killed almost 40 people. Following the series of air crashes in Indonesia, the European Union banned the Garuda Flight until the government improves the flight safety system. Public also doubt the government capability to handle disaster management following the tsunami disaster in Aceh 2004, earthquake in Yogyakarta 2006. On both disasters, the government showed their failure to improve national disaster management. The most striking disaster is Lapindo mud disaster in Sidoarjo, east Java. The government seems reluctant to take a necessary step to investigate the cause of the disaster and prosecute the Lapindo Brantas the company who drilled the gas. The ongoing unresolved the compensation process to displaced people showed that the government failed to make an effective solution in handling disaster. All those images represent the constant distrust of the public to the government public service and safety.

Public distrust also further worsened by the corruption reputation in the Indonesian bureaucracy. Despite of anti-corruption campaign led by President Yudhoyono, the extensive corruption and impunity of many political elites raised public concerns. The advance technology and expertise capacity of the proponents of nuclear program in government agencies was undermined by the arrest and conviction of two senior BAPETEN officers and a well-known member of DPR on charges of bribery and corruption. BAPETEN is an independent regulatory body that should supervise the activity of BATAN. The corruption case becomes precedence of the fragility and ineffectiveness of the nuclear regulatory body (Tanter, Imhoff, von Hippel, 2009; 12). The fear of nuclear catastrophe and the lack of trust to the government become the justification of the antinuclear movement to reject the presence of nuclear in Indonesia.

The resistance to nuclear power plant also grew at local level (Amir, 2009; 357-362). Local organization Preserve the Earth Society (*Masyarakat Reksa Bumi,* MAREM) in Jepara is in the front line of the opposition against planned nuclear power in Jepara. From the outset this organization paid concern on the deforestation and environmental degradation around Jepara district due to the fast-growing furniture industry. When the government announced the reopen of nuclear power program, MAREM's priority agenda shifted to mobilize resistance against the plan to build nuclear power plant in Muria. Another local resistance is religious group opposition. Local religious leader of *Nahdatul Ulama*, the biggest traditional Muslim group in Indonesia, declared that nuclear power plant in Muria could be considered as *haram* (forbidden) according to Islam faith since it would bring more harm than advantage to local people. In overall, antinuclear movement even getting bigger and wider embracing all segments of civil society.

The antinuclear movement was proven effective in influencing the government decision on Muria plant. In the middle of the battle to win the public opinion, Presiden Yudhoyono shocked the proponents of nuclear power program by saying that the government would not build nuclear plant in the areas, which confronted by the opposition (Wirakusuma, 2009). He also said that Indonesia will not take nuclear as long as there are still other alternatives, as in June 2010 Yudhoyono said,

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"One of these days Indonesians may finally be able to welcome the use of nuclear energy and see it as a solution to our energy problems. In this case I'm sure that the future government… will start the project carefully" (Lee, 2010).

The Continuing Benefit-Risk Trade-offs after Muria Fiasco

Following the defeated attempts at Muria Peninsula, nuclear power program did not totally end. BATAN announced that it was looking for locations in Bangka Island to build large nuclear power plant worth $6 billion. The two nuclear plants in Bangka are expected to produce 10,000 megawatt from plant in west Bangka and 8,000 megawatt from plant in south Bangka (*http://www.thejakartaglobe.com/bisindonesia/indonesian-government-eyeing-bangka-island-for-2-nuclear-power-plants/403789*). Previously, the provincial government of East and South Kalimantan officially requested the government to build nuclear power plant in their provinces due to the severe lack electricity in the Kalimantan Island (*Koran Tempo* February 9. 2010). BATAN also conducted a joint survey with the University of Indonesia's School of Social and Political Sciences in May and June 2010 to find out the public acceptance on nuclear power plant. Surprisingly, the survey found that 57.6 percent of respondents could accept nuclear power plant, and only 24.6 percent of the respondents were against the program (*The Jakarta Post*, August 24, 2010). The survey result become new ammunition for the nuclear proponents for no longer delays its plan to build nuclear power plant.

Despite endowed with considerable energy resources both fossil and renewable Indonesia is shadowed by energy security (Tumiwa, 2008). As one of the biggest exporters of coal and LNG it was ironic that energy situation in Indonesia was not secure. It is because the abundant fossil resources were mainly exporting commodity to gain national revenues. Meanwhile the percentage of households connected to electricity was remain 64 percent, with more than 10,000 villages were still waiting for electricity (*http://www.powergenworldwide.com/index/display/articledisplay/0493388766/articles/power-engineering-international/volume-18/issue-9/power-report/indonesia-wrestles-with-its-chronic-electricity-crisis.htm*). Moreover, Indonesia energy per capita consumption was very low since an average Indonesian consumes only 0.5 tons of oil equivalents per year (Atje& Hapsari, 2008).

The other challenges of energy security Indonesia were the energy capped price and the huge amount of state's subsidy that mostly enjoyed by middle income people and concentrated in Java Island. Finally, energy provision was also hampered by lack of infrastructure that could not compete with the energy demand growth.

For the proponents of nuclear power program, the nuclear program should be proceeded as important means of energy security. Nuclear power is the most available option, particularly for Java that consumes the biggest percentage of energy and off course gets the biggest portion of state subsidies on energy (Nugroho, 2010). Another proponent of nuclear energy warned the government that Indonesia will be lacked behind from other countries in Southeast Asia four countries such as Malaysia, Thailand, Vietnam and the Philippines were indicated to operate nuclear power around year 2020. As basically Southeast Asia countries were in competition to prepare their infrastructures

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Vol 27, No 2 (2023)
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to draw the interest of foreign investors, such indication could touch the old sense of nationalism (Rustam, 2010).

Responding the survey result the environmental and antinuclear activist warned the danger of the use of nuclear energy as a measure to meet the national energy mix policy. While Renewable energy covers six types of sources: geothermal, bioenergy, hydro, solar, wind, and ocean (tidal, wave, and ocean thermal energy), nuclear energy should be totally wipe off from the option (*The Jakarta Post,* August 11, 2010,).

For the antinuclear groups, since Indonesia is made up by separate islands, these groups advocated the use of sustainable, locally resourced and low risks energy option, for instance micro hydro system. These groups initiated the project of micro scale hydro system organised independently by rural community. These alternative energy powers are considered well-suited to Indonesian geographic, particularly for remote villages, that characterised by abundant small rivers flowing through hilly land. Thus, both camps develop their own agenda to find the way to energy security. As Amir had argued that there had been a wide epistemological gap between the proponents and the opponents of nuclear energy. The proponent of nuclear energy use their expertise and their belief on science and technology, while the opponents use civic epistemology using comprehensive dimension such as political, cultural, environmental and religious considerations to overlook the BATAN positivist arguments on benefits and risks of nuclear energy (Amir, 2009).

Conclusion

Indonesia has been toying for decades with the idea of nuclear power plant. From the outset, nuclear power has become a political issue ranging from nuclear proliferation ambitions in Sukarno era to national prestige in Suharto era. The revival of nuclear power in the post-Suharto gained its momentum with the decline of Indonesia's fossil fuel production and growing concern of energy insecurity. Moreover, the long experience of handling nuclear technology promises the better provision of energy to respond the growth of electricity demand. While all the legal papers and international support are on hand the nuclear commitment of the Yudhoyono government was contested by the growing resistance of antinuclear movements in the civil society. Rooted in the New Order era, the movements were even growing stronger due to the changing political context in Indonesia.

The spectre of catastrophic risks of nuclear energy and the lack of trust to the government in handling potential nuclear disaster are among the biggest concern of the resistance movements. Although BATAN has already guarantee the standard of safety based on IAEA regulation, this not convincing enough for the opponents of nuclear power, particularly the local residents. The lack of trust to the government on nuclear program has its source from the overall image of bad reputation of public services provision. Plague by corruption the government proven incapable to handle public service management and disaster management. Therefore, regarding the nuclear program, the public concern is not about the benefits of nuclear energy, the energy security or even the national pride. It

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Vol 27, No 2 (2023)
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is about the bad perception of the public to the government capacity to handle high-risk of nuclear technology. The influence of these movements mounted in the delay of Muria nuclear power plant, and probably any plans to construct the same power plants in other areas in Indonesia.

The lesson that can be drawn from the case above, if anything, is that any plans to build nuclear power plant in Indonesia, the government and the public have to balance between advantages and risks of nuclear power or the various risks that have trade-off effects. Learning from the case of Taiwan, the issue of adverse effects of climate change could be used to change the situation into risk-risk trade-offs, between living in energy security while facing the impacts of climate change and the risk of nuclear disaster.

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