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# **The Muria peninsula nuclear power proposal: state of play**

## **Introduction**

Richard Tanter and Arabella Imhoff from Nautilus Institute at RMIT University write that the Indonesian government proposal to build a large nuclear power station on the north coast of Central Java on the Muria Peninsula gave rise to considerable local opposition on the basis of concerns about unacknowledged seismic and volcanic risk, a lack of financial transparency, and corruption in the nuclear regulatory agency. In 2008 National Atomic Energy Agency (BATAN) responded publicly by claiming to consider alternative sites in Java and Kalimantan. Tanter and Imhoff conclude that "there is good reason to doubt that BATAN has in fact abandoned its long-held plans, and that the issue has just been removed from the public agenda for the duration of the election campaigns. While the case for a nuclear response to Indonesia's electricity requirements is a weak one, the social forces backing nuclear power inside the country and abroad remain powerful."

## **The Muria peninsula nuclear power proposal: state of play**

There are presently serious proposals for three separate nuclear power projects in Indonesia, one of them well advanced with serious implications for human security and possibly military security in the region. Two are as yet poorly developed ideas, with little likelihood of moving forward in the near future. One plan, backed by local politicians and Russian nuclear plant vendor Rosatom, proposes a small Russian-built floating nuclear power plant to supply electricity to Sulawesi from Gorontalo province. The other, which has strong IAEA support, proposes a nuclear powered desalination plant on Madura that would also co-generate electricity for the Java-Madura-Bali (Jamali) electricity grid. Neither of these plans is progressing quickly.

The most important Indonesian nuclear power possibility involves a revival of a longstanding National Atomic Energy Agency (BATAN) plan to build a major nuclear electricity generating station on the north coast of Central Java on the Muria Peninsula. BATAN's proposal is to build the first of

four 1,000 MW pressurised water reactors (PWR) at Ujung Lemahabang in the village of Balong, about 20 kms northeast of Jepara. This article is an update of the state of play of this project, and concludes that despite setbacks, a decision on whether or not to proceed will be on the agenda of the new Indonesian administration that will emerge from the July 2009 election. [\[i\]](#)

This proposal is the agency's third substantial attempt at getting government commitment to a nuclear plant on the Muria peninsula since the early 1980s. The first, strongly supported by then Minister for Research and Technology B.J.Habibie, was thwarted in the late 1980s by opposition from the World Bank and the Ministry of Finance, combined with the then dominant military's visceral dislike of Habibie. The second attempt in the mid-1990s ended with the Asian financial crisis of 1997 and the subsequent fall of the New Order.

The latest version of the Muria proposal emerged in 2002-3, and gathered strength in the following years, fed by three sets of pressures. The first driver, in Indonesia, as in other countries once again contemplating nuclear power for electricity, was the argument that nuclear power could alleviate concerns about the greenhouse gas emissions of the coal-fired electricity plants on which Indonesia presently relies. The second was the notorious inadequacy of the existing electricity supply in Java, and especially in the industrialised region around Jakarta, even after an attempted "crash program" from 2006 to expand the number of coal-fired stations. The third driver was the hunger of Japanese, Korean, and French nuclear power plant manufacturers - and their governments - to find export markets to underwrite the costs of domestic production.

By 2007, BATAN had reason to feel reasonably confident that they might be lucky the third time around. In 2004-5 BATAN had once more begun to publicly press the case for nuclear energy, and nuclear energy was authorised as part of the nation's planned energy mix for the following decade. In January 2006 a presidential decision by President Susilo Bambang Yudhuyono determined that "new" energy sources, including nuclear power, would make up five per cent of the nation's electricity supply by 2025. BATAN announced that it expected to be calling for tenders for the first Muria plant in 2010, with construction to begin two years later, aiming for a completion date of 2016.



Plantation view, looking east  
Source: Richard Tanter, September 2007.

However, BATAN, and its close ally on this issue, the Ministry of Research and Technology, are but one part of the Indonesian government, and relatively small players at that. BATAN's widely-reported announcements and plans do not in themselves amount to an actual government commitment to build a power plant. While the 2006 Presidential Decision mandates the development of nuclear power, a further presidential decision, as well as formal parliamentary budgetary and legislative authorisation, are still required before the construction of a nuclear power plant could go ahead.

In Indonesia, as in other countries, until bids are called for construction tenders, financing is guaranteed, and contracts for construction actually signed, international nuclear industry watchers treat the enthusiastic pronouncements of nuclear planning agencies with weary scepticism. In making these apparently certain announcements of timelines for letting tenders, starting construction, and plants coming online, national nuclear energy agencies like BATAN are in fact lobbying gatekeepers in their own governments and potential foreign corporate and government suppliers of capital and technology.

By early 2008, BATAN's optimism appeared to have faded, at least in public. The single most important contributor to this apparent slowdown in BATAN's plans was the wide publicity that followed the September 2007 decision by a gathering of Islamic teachers (ulama) in Jepara to declare the Indonesian government's plans to build a nuclear power station on the Muria peninsula *haram* forbidden according to Islamic jurisprudence. [ii] The Nahdlatul Ulama *bahtsul masa'il* of more than a hundred ulamas heard from ministers and government advisors, and scientists supporting and opposing the Muria proposal, and ruled strongly but carefully that the negatives of this particular project outweighed the undoubted positive aspects.

The fatwa commented on four particular concerns: the question of long-term safe disposal and storage of radioactive waste; the potential local and regional environmental consequences of the plant's operation (for example the impact on heated cooling water on local fishing grounds); the lack of financial clarity about the project, and in particular future potential costs; and problems of foreign technological and fuel dependence.

The issuing of the fatwa by the Jepara branch and Central Java division of NU, amidst undoubtedly great local support, was constructed carefully to avoid the possibility of repudiation on procedural grounds by higher levels of the organisation, and despite criticism from the national leadership of NU closer to the government, was not overturned.

With the emergence of strong local opposition to the Ujung Lemahabang site and continuing potent scientific criticism of the appropriateness of the site, representatives of BATAN and the Ministry of Research and Technology began in early 2008 to say that the Ujung Lemahabang site choice was in fact not yet final, and that other sites in Java and even Kalimantan would be considered.

## **The path to the Muria choice**

Yet all is not as it seems with this suggested shift away from the Muria peninsula choice. To fully understand the possibilities and limitations of this apparent change of direction, it is important to go back over the process that led to the choice of the Muria peninsula as the government's long-preferred site.

Since the mid-1980s, BATAN's preferred nuclear power plant site has been located on the Muria peninsula on the northern coast of Central Java. Since at least 1996, the preferred site on the peninsula has been Ujung Lemahabang in the village of Balong. However, the process of searching for and deciding on an appropriate site for Indonesia's first nuclear powered electricity generating plant commenced in the early 1970s. Fourteen sites were proposed in 1975 by the Location Subcommittee of Nuclear Power Plant Construction Preparation Committee, of which five were selected in the Karangkrates workshop in the same year. Sites mentioned in Java to this point included Pasuruan and Bondowoso in East Java, Lasem in Central Java, just east of the three Muria peninsula sites of Ujung Grengganan, Ujung Watu and Ujung Lemahabang, Tanjung Pujut in Banten, and on the south coast of Java, Ujung Genteng, Pangandaran dan Malang Selatan. [iii]



### [Sites considered as possible candidate nuclear power plant locations from 1974 to 2008.](#)

A joint BATAN-NIRA Indonesian-Italian feasibility study selected the Muria peninsula as its preferred location in 1983. The subsequent NEWJEC Japanese feasibility study over 1991 - 1996 focused on three sites on the north coast of the Muria peninsula regarded as suitable - Ujung Lemahabang and Ujung Grengganan in the village of Balong, and Ujung Watu, a few kilometers east. Ujung Lemahabang emerged as the preferred site according to BATAN, because apart from other

advantages in terms of land and sea access, relatively low population density and location, and ground characteristics, of all possible sites in Java Ujung Lemahabang had the most favourable ranking in terms of volcanic and seismic hazards. This was despite serious criticism of the seismic hazards of the site given its proximity to major fault lines and poor soil structure, and proximity to the Muria volcanic complex 25 kilometers away, which IAEA geologists and volcanologists regarded as still capable of erupting in the expected life time of the plant. [\[iv\]](#)

In fact, the three Muria sites emerged early and remained as the preferred sites mainly because, despite their volcanic and seismic problems, they were the least bad option in the one of the most seismically and volcanically active areas of the world. Put simply, there are no good sites for nuclear power stations on Java.

## **An alternative to the Muria site?**

Ujung Lemahabang remained BATAN's publicly preferred site until mid- 2008 when BATAN and the Ministry of Research and Technology began to throw doubt on the certainty of the site selection because of the level of public opposition and scientific criticism. In June the head of BATAN said that the Muria site was not the government's final choice, and that other sites were now being considered. In mid-2008 both the head of BATAN and the Minister of Research and Technology proposed new possible sites in West Java, including Pulau Panjang and the large seaport project town of Bojonegara in Banten, and unspecified sites in Kalimantan. [\[v\]](#)



### Cilegon regional map

Source: Bojonegara Port Development (Phase 1), Directorate General of Sea Communication, Ministry of Communications, Project Summary, Jakarta, January 2005.

To facilitate the emergence of an alternative to the troublesome Jepara site, BATAN and the Ministry of Minerals and Natural Resources announced they would consider offering financial incentives for regions willing to host a nuclear power plant. Even an important critic of the Muria proposal, former president Abdurrachman Wahid, suggested relocating the planned Muria reactor to the island group of Karimunjawa, some 80 kms north of the Muria peninsula, though BATAN can have taken little joy from the suggestion to locate a nuclear plant within a famous marine national park and up-market tourist destination. [\[vi\]](#)

Yet while the governor of Banten indicated in August 2008 that he would be open to deepening the burgeoning industrial development of the region with government investment in a nuclear power plant, this would have to be preceded by a "deep and comprehensive study". [\[vii\]](#) In fact, public opposition began to emerge almost immediately in both Banten and Kalimantan. In Cilegon, the closest major city to the proposed Banten sites, the city administration rejected the idea of a nuclear power plant both because this "steel city" already had adequate power sources, and because it was concerned about unrest that would follow such a move. [\[viii\]](#) The Kalimantan proposal was most likely never to be taken seriously, because of the distance the power would have to be transmitted to reach the Jamali power grid which consumes the great bulk of Indonesia's electricity. The two "new" Banten candidate sites at the head of the Sunda Straits at Pulau Panjang and Bojonegara are in fact close to the long-rejected site Tanjung Pujut - barely 70 kms from Anak Krakatau, and seismically even more dangerous than the Muria sites.

Any shift away from the Muria region to an as yet undetermined new location will set the already overdue BATAN building schedule back by many years. The Muria site itself, which has been studied in depth for almost two decades, will in any case require an almost completely new feasibility study

in any case, since so much has changed in both nuclear technology and seismic assessment knowledge and guidelines since the NewJEC study in the early 1990s. Meanwhile, BATAN evidently retains a strong interest in the Muria site. The agency's "sosialisasi" activities or top-down version of cultivation of community acceptance in the Muria region continues, and has in fact expanded.

## **Nuclear power blocked by the financial crisis?**

The cost of paying for nuclear power, or any other sort of large-scale power infrastructure is a major problem for government in Indonesia. The capital costs of even the first of the four 1,000 MW nuclear power stations that BATAN has planned for the Muria peninsula will be, according to BATAN, between at least US \$1.5 billion and \$2 billion. Based on the experience of recent nuclear plant construction in other parts of the world, final costs, should the project go ahead, are certain to be a great deal higher. Current US utilities estimates are close to US\$6,000 - \$7,000 per kilowatt of installed capacity, compared with BATAN's figures of US\$1,500-1,800 per kilowatt. [ix] Indonesia has already had serious difficulty attracting foreign investment in major infrastructure projects. The 2005 and 2006 infrastructure investment summits called for more than \$5 billion in electricity infrastructure investment - to no avail. Against a backdrop of longstanding dissatisfaction with laws governing mining and foreign investment generally, foreign investors showed even less enthusiasm for these power generation projects, discouraged by the government's political inability to raise heavily subsidised electricity tariffs to approach the costs of production. [x]

To the extent that it is true that there is a "nuclear renaissance" motivated by concerns about oil shortages and climate change, nuclear plant manufacturers are more interested in concentrating on markets in north America and Europe, and even in those regions, construction is not proceeding as rapidly as is often suggested by the "nuclear renaissance" phrase. Moreover, where possible, nuclear plant manufacturers would always prefer to invest the considerable corporate resources required just to bid for a nuclear plant tender, even before construction is commenced, in countries with more stable and reliable political, regulatory and economic environments than those like Indonesia. [xi] One key unresolved issue for any would-be vendor is that of liability in the event of a nuclear accident in Indonesia. The global financial and credit crises will only exacerbate all of these issues.

However, important as these financial factors militating against an Indonesian nuclear power decision undoubtedly are, there is another set of financial considerations likely to have even more influence, and in the other direction. This is the fact that both of the likely nuclear power plant providers favoured to win a contract to build a plant on Muria - Japan's Mitsubishi Heavy Industry (MHI) and Korea's Korean Hydro Nuclear Power (KHNP) - will be strongly backed by their government's export credit banks, thus to some extent obviating purely commercial financial concerns. KHNP is a subsidiary of the Korean government monopoly Korea Electric Power Corporation, with strong government financial support for its export efforts. The main Japanese contender, Mitsubishi Heavy Industry, one of Japan's largest companies, [xii] will be able to rely on the Nuclear Energy Policy of the Ministry of Economy, Trade and Industry (METI) which requires the Japan Bank for International Cooperation (JBIC) and Nippon Export and Investment Insurance (NEXI) to provide export credits for nuclear exports. [xiii] In the current climate, longterm loans from Korean and Japanese government sources will be a key weapon in the arsenal of the two big Korean and Japanese companies facing off in the race, both even more anxious than ever to secure a big nuclear construction contract on the Muria peninsula.

## **Is the Muria plan dead?**

2009 is an election year in Indonesia: parliamentary elections take place in April and the presidential

election in July. Nuclear power plans are opposed at the local level by almost every major political group in Jepara, and are not going to win votes. Consequently it is not surprising that BATAN has begun to publicly backpedal on the Muria proposal. On the other hand, the next administration will be under great pressure to address the question of unmet electricity demand seriously – either by expanding generation or, less likely, by pressing the cause of increasing efficiency and energy conservation,

The question is whether BATAN's apparent loss of public enthusiasm for the Ujung Lemahabang site amounts to the third time its proposal has been defeated in two decades. In fact, there is good reason to doubt that BATAN has in fact abandoned its long-held plans, and that the issue has just been removed from the public agenda for the duration of the election campaigns. While the case for a nuclear response to Indonesia's electricity requirements is a weak one, with serious volcanic-seismic risk, regulatory risk, and financial risk, the social forces backing nuclear power inside the country and abroad are powerful. Korean Hydro Nuclear Power and Mitsubishi Heavy Industries and their governments remain convinced that the issue is alive, and merely in suspended animation. The key will be the attitude of the incoming administration power-brokers – in particular in the Ministry of Energy and Natural Resources and the presidential palace.

## References

[i] This article derives from a wider project on the intersection of Indonesian nuclear power proposals, climate change as a security issue, and Australia-Indonesia security dynamics. [Reframing Australia-Indonesia security](#) is a Nautilus Institute project in collaboration with Indonesian partner organisations through shared work on global problems: in particular climate change and energy insecurity. This includes the influence of climate change concerns on nuclear energy planning in the two countries, and the possible misperceptions deriving from both current nuclear planning and past nuclear proliferation attempts.

Forthcoming studies will deal specifically with volcanic and seismic hazards, financial and regulatory risk, nuclear vendor corporate-government relations, the salience of climate change to energy policy, political aspects of energy decision-making in Indonesia, proliferation risks, and consequences for Indonesian foreign relations. See [Reframing initiative - publications and media](#), Reframing Australia-Indonesia security project, Nautilus Institute.

Detailed documentation of Indonesian nuclear power planning is at [Indonesian nuclear power proposals](#), Reframing Australia-Indonesia security project, Nautilus Institute [frequently updated].

[ii] For the decision by the Jepara Nahdatul Ulama *bahtsul masa'il*, see Richard Tanter, [“Nuclear fatwa: Islamic jurisprudence and the Muria nuclear power station proposal”](#), *Austral Policy Forum*, 13 December 2007, 07-25A and Richard Tanter, [Muria nuclear power plant fatwa documents - English translations](#), Reframing Australia-Indonesia security project, Nautilus Institute, November 2007.

[iii] See [Site selection history](#), *Indonesian Nuclear Power Proposals: Muria*, Reframing Australia-Indonesia security project, Nautilus Institute.

[iv] For a full discussion of publicly available evidence and scientific assessments of volcanic and seismic issues, and an annotated guide to sources, see Richard Tanter, [Volcanic and seismic hazards](#), *Indonesian Nuclear Power Proposals: Muria*, Reframing Australia-Indonesia security

project, Nautilus Institute.

[v] See [Contemporary alternative site proposals](#), *Indonesian Nuclear Power Proposals: Muria*, Reframing Australia-Indonesia security project, Nautilus Institute.

[vi] Gus Dur Minta PLTN Muria dipindahkan ke Pulau Karimunjawa [Gus Dur requests that the Muria NPP be moved to Karimunjawa], *Media Indonesia*, 31 January 2008.

[vii] PLTN Akan Dibangun di Pantura Banten [Nuclear Power Plant to be Built in the Northern Coastal Region of Banten], *Kompas*, 5 August 2008.

[viii] Cilegon Tolak PLTN [Cilegon Opposes nuclear power station], *Sinar Harapan*, 05 Agustus 2008.

[ix] See, for example, [Power market developments: How much?](#), *Nuclear Engineering International*, 20 November 2007.

[x] See for example, Dionisius A. Narjoko and Frank Jotzo, Survey of recent developments, *Bulletin of Indonesian Economic Studies*, 43:2, (2007) pp. 161ff.

[xi] Vendors' relative risk rising in new nuclear power markets, Mark Hibbs and Ann MacLachlan, *Nucleonics week*, Vol. 48 No. 3, January 18, 2007.

[xii] See [Mitsubishi Heavy Industries](#), *Indonesian Nuclear Power Proposals: Muria*, Reframing Australia-Indonesia security project, Nautilus Institute.

[xiii] The Challenges and Directions for Nuclear Energy Policy in Japan: Japan's Nuclear Energy National Plan, Nuclear Energy Policy Planning Division, Ministry of Economy, Trade and Industry (METI), December 2006.

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Other policy forums by Richard Tanter:

- [East Timor: the crisis beyond the coup attempt](#), Richard Tanter, *Austral Policy Forum* 08-01A, 11

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- [Nuclear fatwa: Islamic jurisprudence and the Muria nuclear power station proposal](#), Austral Policy Forum, 13 December 2007, 07-25A
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