

PROSPECTS AND CHALLENGES OF NUCLEAR POWER AND SMALL MODULAR REACTORS IN INDONESIA



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I. INTRODUCTION

This essay, and the accompanying research study co-published by the Nautilus Institute and the Indonesian Institute for Energy Economics titled *Nuclear Power and Small Modular Reactors in Indonesia: Potential and Challenges*, survey and synthesize the historical and contemporary factors affecting nuclear power in Indonesia, specifically for small modular reactor development. Despite support for SMR construction in some parts of Indonesian government and society, significant challenges include the absence of tested SMR designs, regulatory requirements for use of proven technology, the higher electricity generation costs associated with SMR technology, and public opposition and lack of support at higher levels of government. The authors conclude that the construction of SMRs is unlikely, especially in large enough numbers to make a sizeable contribution to Indonesia's electricity generation.

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II. POLICY FORUM by Bernadette K. Cogswell, Nataliawati Siahaan, Friga Siera R, M. V. Ramana, and Richard Tanter

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Indonesia has been interested in building nuclear power plants since the late 1950s under the aegis of Badan Tenaga Nuklir Nasional (BATAN, the National Nuclear Energy Agency). Since the turn of the century, BATAN has been actively interested in a new class of nuclear power plants, small modular reactors (SMRs), that are being designed, developed, and advocated by some sections of the nuclear power industry as a way to address some of the challenges confronting the expansion of the technology.[\[1\]](#)

BATAN's interest in SMRs is propelled by reasons that pertain to nuclear power in general, such as low levels of electricity consumption among the population of Indonesia, growing energy needs, and claims about a lack of alternate means to meet these needs, and reasons that are specific to SMRs, such as the presence of remote areas and small islands that do not have the demand level to support construction of a large nuclear reactor, and the lower financial cost of SMRs. BATAN has explored a number of possibilities, including importing a small floating power plant from Russia, an SMR from Korea that can also desalinate ocean water, and a high temperature gas cooled reactor from Russia.

BATAN has conducted a number of nuclear power plant siting studies, including follow-up technical and economic feasibility studies in some cases. These studies have also included some SMR possibilities in much greater detail. But apart from an experimental power reactor (EPR), none of the other proposals has advanced towards actual construction.

Indonesia has an extensive network of government agencies involved in the energy sector and, hence, holding a stake in the nuclear power debate, as well as an extensive body of laws and regulations that could affect the eventual implementation of commercial nuclear power. The potential for adoption of SMRs in Indonesia is affected by a number of regulations, including the requirement that locally made components or services conducted by domestic providers have to be used in energy infrastructure, the requirement that only reactors based on "proven technology" will be licensed, and a requirement that reactors be sited only on land.

Another reason that Indonesia might not choose to construct an SMR is that, as we show through calculations, the cost of generating electricity using SMRs will likely be greater than large nuclear power plants as well as solar photovoltaic plants. Studies testify to the large potential of solar energy in Indonesia and the government has been adopting policies that promise to accelerate the construction of significant amounts of solar capacity. Because SMRs have lower power capacity, producing the same amount of electricity using these as opposed to large reactors would require

dealing with public resistance at many more sites.

Public opposition has played a major role in stopping construction of nuclear power plants so far. The Indonesian nuclear establishment has been trying to set up nuclear power plants since the 1970s but has so far not managed to persuade government leaders. Indeed, in December 2015, then Energy and Mineral Resources Minister Sudirman Said announced publicly that the government had concluded that “this is not the time to build up nuclear power capacity. We still have many alternatives and we do not need to raise any controversies”.^[2] Although this decision might be revised in the future, it testifies to lack of broad-based political support. Given this context, those advocating constructing SMRs in a country like Indonesia that has no nuclear power capacity face the basic conundrum: building untested nuclear technologies that might lead to higher electricity generation costs is going to be more of a political challenge than constructing nuclear reactor designs that have been operated in other countries.

As a result of all these factors, it would seem that the construction of SMRs is unlikely, especially in large enough numbers to make a sizeable contribution to Indonesia’s electricity generation.

III. REFERENCES

^[1] Bernadette K. Cogswell, Nataliawati Siahaan, Friga Siera R, M. V. Ramana, and Richard Tanter, *Nuclear Power and Small Modular Reactors in Indonesia: Potential and Challenges*, Indonesian Institute for Energy Economics, Nautilus Institute Special Report, XX April 2017, at XXXXXX.

^[2] JG, “Indonesia Vows No Nuclear Power Until 2050,” *Jakarta Globe*, December 12, 2015, at <http://jakartaglobe.beritasatu.com/business/indonesia-vows-no-nuclear-power-2050/>.

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