

# The Role of Small Modular Reactors in Developing Countries

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Nuclear power is the best future energy source. Small modular reactors are the most versatile source of nuclear power and the most viable source of nuclear power for developing nations. Small modular reactors are ideal for use in developing countries, because of their unique capabilities and attributes. Developing nations need sources of power that are reliable, safe, and easy to build. Small modular reactor nuclear power fulfills all of the necessary criteria of developing nations and the power capacity of plants can be scaled to fulfill growing demand.

Nuclear power is the key to a sustainable energy future. Nuclear has a low operating cost, low environmental impact, and high electrical power output for a relatively small fuel source and little land usage. “Nuclear energy is not subject to unreliable weather or climate conditions, unpredictable cost fluctuations, or dependence on foreign suppliers;” factors that hold many other energy sources hostage (NEI). Through the development of nuclear, there are many opportunities to expand nuclear beyond the technologies widely utilized in the past. The last nuclear boom in the United States built, “the 104 nuclear plants operating in 31 states [which] produce 19.2 percent of our nation's electricity” (NEI). Nuclear power supplies a large percentage of electric power in America and needs to be utilized to expand the base load capacity to counteract growth in demand, while maintaining safety and promoting clean energy. Nuclear power has the potential to greatly affect the energy landscape across the world.

While nuclear power production has great positive aspects, there are also negative aspects. Nuclear power production produces radioactive waste that must be stored for thousands of years. In addition to the long-term effects, “Nuclear projects are

notorious for running late and over budget” (Wald para. 8). Nuclear plants have very substantial startup and construction costs, which are overcome by their lower priced power output. Nuclear construction also frequently runs behind schedule. Nuclear power has its flaws; however, small modular reactors provide a solution for many of the shortcomings of large-scale nuclear plants, while retaining the benefits of nuclear power.

Small modular reactors are the future of nuclear, and their compact and mobile designs solve many of the problems of the large nuclear power plant. By building small modular reactors in an off-site fabrication facility and assembling them, construction costs are reduced substantially. According to Matthew Wald, “The idea is to build a reactor that can be assembled at a factory and shipped nearly complete on a barge or a rail car, incorporating in one 83-foot-high package components that are usually [shipped] separate and assembled in the field.” (Wald para 3) The prefabrication methods that lessen the building costs also help to improve the quality of work. Because of the predictable conditions and environment, “factory fabrication will lower costs and improve quality” (Wald para 6). Small modular reactors and the innovation they provide will change the landscape of nuclear power production.

Small modular reactors have many other advantages as well. They can run on uranium that is enriched to a lower degree (Small para 12) than large power reactors. Lowering the enrichment levels of uranium enables cheaper production of the fuel. This aspect of the small modular reactors again allows for their lower cost than large nuclear plants. It also lowers the associated nuclear proliferation risk.

The lower cost is one of the many attributes that make small modular reactors the ideal energy source for developing countries. Because developing countries, as well as smaller electrical utilities, do not have the financial resources to support a full scale nuclear reactor construction project, small modular reactors enable them by lowering the cost of entry. Additionally, the small modular reactors allow the majority of the power plant to be transported from an off-site assembly location, at a lower cost than building from the ground up on-site. This also requires a lower number of skilled workers at the construction site. The lessened financial commitment also enables less affluent nations to complement their power generation with nuclear, but in “bite sized” amounts (Silversteen para 6). Developing nations could see the greatest impact from small modular reactors.

Small modular reactors are ideal for developing nations because they solve many of the problems that these countries face. Large nuclear power plants require a large infrastructure of power lines to transfer electricity long distances to the demand centers, such as cities. Developing countries do not have a large electrical demand and their electrical transmission network is not capable of supporting a large power producer. Because these countries have less demand, small reactors are “right-sized” and will not overload weak power grids (Silversteen para 18). The smaller capacity of small modular reactors allows their use in a greater range of applications.

Small modular reactors allow for scalable production of power. Nuclear reactors many times must be built with surplus capacity and allow demand to catch up; however, small modular reactors do not have this problem. Small modular reactors can utilize “plug and play” ability (Energy para 5). Because developing countries are doing just

that, developing, their energy demand will grow significantly, as they modernize. Easy growth of electrical capacity is a significant gain attained by small modular reactors because additional packaged units can be added where and when they are needed.

In developing countries, small modular reactors have another advantage. They have the ability to operate in completely new places. The military has been experimenting with using small modular reactors to power advanced bases. This same concept translates to developing nations. Small reactors have demonstrated safe operation in remote locations. In Siberia, a cluster of four small reactors has provided power for a remote region since 1976, with cost benefits over fossil fuels (Small para 17). While these reactors are not the modern small modular reactors that are proposed, they prove that small reactors can be cost effective and safe. The small modular reactors, not only provide smaller initial amounts of power, but also can allow for the growth of demand in a region.

Developing nations have growing demands for energy, but their power infrastructure is behind. Small modular reactors provide a solution to both of these obstacles. They provide a small enough volume not to overload current supply lines, but they can be supplemented as demand rises. Small modular reactors can also be operated closer to the demand than many fossil fuel plants that are sited based on the logistics associated with their individual fuel source. Small modular reactors will help ease the financial burden of a full sized nuclear plant but retain the benefits, will play an integral role in the growth and development of developing nations, and advance these nations modernizing their standards of living.

## Works Cited

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