Small Modular Reactors (SMRs) are part of a new group of power plant designs being planned for deployment around the world. The concept is to provide a reliable, cost-effective electric power plant that can replace the use of coal and natural gas power plant in practice today. The plants are defined as having and electrical output of less than 300 megawatts and can be constructed at a central factory and brought to a site fully built ("Small Nuclear"). In order to effectively discuss the role of SMRs in developing nations, it is important to clearly define the parts of the world's population to truly benefits from the generation and distribution of electrical and other forms of energy.

According to estimates published by the United Nations and more recently by the Economist Magazine, over 1.5 billion people have no access to electricity, and one billion more have only an unreliable and intermittent supply ("Power to"). Of the people without electricity, 85 percent live in rural areas or on the fringes of cities ("Power to"). The primary energy need of these people is to provide heat for cooking and shelter. These needs are largely met by burning traditional fuels such as wood, crop residues, coal and animal dung in either open pits, stone hearths or inefficient stoves that emit harmful air emissions (Goldemberg, Reddy, Smith and Williams). In regions such as this, the current focus of governments and aid agencies is to create an infrastructure that allows these people to switch over to cleaner burning petroleum based liquid and gas fuels using stoves, lanterns and furnaces that burn more efficiently and are better for the environment. Creating a reliable electrical distribution system in these areas is expensive. The United Nations estimates that an average of $35 billion-40 billion a year needs to be invested until 2030, so everyone on the planet can cook heat and light their homes, and have energy for productive uses such as schooling ("Power to"). On the basis of this, the short term sensibleness of deploying SMRs to these regions of the world does not seem practical.

People living in concentrated urban areas of developing nations are dependent on a commercial electrical power supply not only for basic personal needs, but also to support industry that drives the economic survival of a country. Studies have shown that there is a growing need in these developing nations for clean and reliable sources of electrical power. An estimate by the International Energy Agency (IEA), concluded that world energy needs were projected to increase over 50 percent from 2009 to 2035. During this same period, global electricity demand is projected to nearly double, with more than 80 percent of the increased energy demand coming from developing countries, led by China and India. In 2009, coal-fired generation accounted for 41 percent of world electricity supply; in 2035, its share is projected to rise to 43 percent. During the same period, coal's share of carbon dioxide emissions is projected to rise from 43 to 45 percent, a scenario that is seen by some scientists as environmentally unsustainable (Kessides and Kuznetsov). Pressures to restrict carbon dioxide emissions from coal-fired electricity generation have escalated sharply. Governments must decide on how to develop reliable ways to generate electrical energy in urban areas scattered about in largely undeveloped nations and do so in a way that relies less on the consumption of coal and to a lesser extent, natural gas. Failure to meet the increasing energy requirements of these developing countries will negatively impact economic growth and delay improvements in living standards. SMRs may also be particularly suitable for non-electrical applications such as producing drinking and irrigation water in arid locations near the ocean, to provide process heat for industrial uses or for hydrogen production to be used in fuel cells and automobiles (Kessides and Kuznetsov).

Nuclear energy represents a technology for generating heat and electricity in these developing nations and can do so with the important benefit of very low greenhouse gas emissions. The use of such technology however, can only be easily applied in areas of the world that would support the construction, operation and maintenance of such technology. The success of nuclear power technology demands that a stable form of government exists in that will support such a facility to be built, including the understanding that the intellectual rights of companies that created these reactors must not be copied and sold to others, and the government must assure the safety of skilled workers coming from other nations to install and maintain the equipment. Control and disposal of spent fuel is also a major issue that would need to be worked out ahead of time to insure such material does not get into the hands of terrorist organizations. A discussion of the major benefits to the application of SMRs in these countries is below.

The application of SMRs in such developing countries can reap many major benefits and is a popular type of future reactor design. The existing power grids in many developing countries that distribute energy from existing fossil fuel technology could convert over to a SMR power plant that is sized to the existing needs of the developed city or region that is developed and truly in need of electrical power. Additional plants can be added as the cities or regions grow in electrical demand (Kessides and Kuznetsov). Since the reactors are much smaller in size, it is natural to assume that each unit is substantially less expensive to build and install compared to a large central reactor such as in wide use in the United States today. The smaller cost may be attractive to countries or private investors to go out and pioneer this technology. If the project proves to be successful, more plants could then be ordered for installation (Kessides and Kuznetsov). Construction of the SMRs at a central factory will lessen the number of skilled workers needed to install the power plant. It is difficult and expensive to relocate highly skilled construction and engineering personnel to remote parts of the world. Pre-construction of complex equipment may allow less skilled local workers to get a higher percentage of work during construction and generate good will within the community. If the reactors can be standardized, people can be trained on a specific design and move across the country to train new workers as plants expand. Many SMRs have "passive" safety features that can maintain control of the nuclear material with a minimum of human intervention (Cunningham). This could reduce the number of trained personnel needed to operate the plant and reduce the amount of training and certification the operators may need to have to maintain plant safety. Several of the reactor designs allow for the plant to be placed underground. This would be a good feature to protect the plant from terrorism or earthquakes. Some of the SMR designs in consideration only requiring refueling every 10 to 15 years, again minimizing the need for a large group of skilled workers to come into country to perform work (Cunningham).

In conclusion, Small Modular Reactors present a real opportunity to provide reliable electrical and heat energy for densely populated locations in developing nations that already have an electrical grid and possess a stable political and economic climate. The use of this technology represents a real opportunity to reduce the dependence of these nations on coal fired and natural gas power plants which, as a result, will reduce greenhouse gas emissions.

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