

LD 343 - An Act to direct the Maine Public Utilities Commission to seek informational bids to regarding small modular reactors in the State.

Maine stands at a crossroads of energy generation. Maine, the way life should be, needs clean, reliable low-cost energy. Maine must have an energy policy that sets the State up for growth and delivers a clean energy future that promises lower costs. Today the State has a cost of living 115% higher than the national average, the 11<sup>th</sup> highest in the country. Maines property tax burden ranks among the highest in the nation. Mainers must plan on keeping their homes heated from October 1 to April 3<sup>th</sup>, one of the longest heating seasons in the country. With these facts, the State faces the critical question of how to deliver power.

Nuclear power, while technically not a renewable energy source, shares several key characteristics with renewable energy like wind and solar power, making it a vital component of the transition to a low-carbon energy future.

First and foremost, nuclear power generates electricity without emitting greenhouse gases during operation. Like wind and solar, it provides a clean energy solution that helps combat climate change by reducing reliance on fossil fuels such as coal, oil, and natural gas. This environmental benefit aligns nuclear power with the broader goals of renewable energy sources.

Second, nuclear energy provides a stable and reliable supply of electricity, complementing the intermittent nature of wind and solar power. While the availability of wind and sunlight can vary due to weather or time of day, nuclear reactors operate consistently, producing large amounts of electricity 24/7. This reliability is crucial for maintaining a stable energy grid, particularly when integrating higher shares of renewable energy.

Additionally, nuclear power has a long-term resource base, as uranium supplies can be extended through advanced technologies like breeder reactors and recycling spent fuel. This extends the lifespan of nuclear fuel and creates a system more akin to sustainability, a hallmark of renewable energy systems.

Finally, nuclear and renewable energies share a common goal of reducing environmental impacts. By integrating nuclear alongside renewables like wind and solar, societies can create a diversified, low-carbon energy mix capable of meeting growing global energy demands while mitigating the effects of climate change.

Since the days of Maine Yankee, nuclear power technology has changed with significant advancements. Pebble Bed Nuclear Reactors (PBNRs) represent a significant advancement in nuclear technology, addressing one of the most critical safety concerns in traditional reactors: the risk of meltdown. These reactors are inherently safe due to their innovative design and fuel structure.

At the core of PBNR safety is the use of small, spherical fuel pebbles composed of uranium fuel particles encased in multiple layers of heat-resistant ceramic material. These pebbles are designed to withstand extremely high temperatures, far beyond the operational range of the reactor. This high-temperature resilience ensures that even in the absence of active cooling, the fuel will not melt or release radioactive materials.

Another key safety feature is the reactor's reliance on passive cooling mechanisms. PBNRs use helium gas as a coolant, which is chemically inert and does not react with the reactor components. Additionally, the reactor is designed to dissipate heat naturally through conduction, radiation, and convection, eliminating the need for complex, active cooling systems that are vulnerable to failure.

PBNRs also operate at lower power densities compared to traditional reactors, reducing the amount of heat generated in the core. This, combined with the reactor's strong negative temperature coefficient—where the nuclear reaction slows down as temperatures rise—makes it inherently self-regulating. If the reactor overheats, the nuclear reaction naturally diminishes without human intervention or mechanical systems.

By addressing the primary risks of overheating and meltdown through passive safety and advanced materials, Pebble Bed Nuclear Reactors represent a safer and more sustainable approach to nuclear energy.

Off-grid High-Temperature Gas Reactors (HTGRs) combined with standardized designs offer a transformative solution for lowering costs and accelerating the deployment of nuclear power, particularly in remote areas and industrial applications. These compact reactors are designed for flexibility, safety, and efficiency, enabling widespread adoption at a fraction of the cost and time required for traditional nuclear plants.

A key advantage of HTGRs is their modular, standardized design. By creating reactors with uniform specifications, manufacturers can streamline production, reducing costs through economies of scale. Standardization also simplifies regulatory approval processes, as each new installation uses a pre-approved design, minimizing delays typically associated with licensing and construction. This approach mirrors the efficiency seen in industries like aerospace, where standardized components have dramatically lowered costs.

HTGRs are particularly suited for off-grid applications because they are compact, self-contained, and require minimal external infrastructure. They can operate in remote areas without connection to a central power grid, making them ideal for mining operations, isolated communities, or disaster relief scenarios. Their high-temperature output also supports industrial processes like hydrogen production and desalination, adding economic value beyond electricity generation.

These reactors are inherently safe, using passive cooling and advanced materials to eliminate meltdown risks, reducing the need for costly safety systems. Furthermore,

their modular construction allows for faster assembly and deployment, cutting project timelines from decades to just a few years.

By combining standardized designs with off-grid capabilities, HTGRs provide a cost-effective, scalable solution for clean energy, enabling faster progress toward global decarbonization goals.

Legislation that makes nuclear power a factor in Maine's future will deliver the promise of low cost, clean reliable power.