

Written Testimony on Maine H.P. 242: “An Act to Include Nuclear Power in the State's Renewable Portfolio Standard”

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Thank you, Chair Lawerence and Chair Sachs, and members of the Committee. My name is Dr. Patrick White, and I am the Research Director at the Nuclear Innovation Alliance – an independent non-profit, non-partisan think-and-do-tank focused on creating the conditions for success for advanced nuclear energy as a climate solution. I have an M.S. and PhD. in Nuclear Science and Engineering with a focus on safety, licensing, and design of fission and fusion power plants. I appreciate the opportunity to provide comments on bill H.P. 242 before the Committee today.

At the Nuclear Innovation Alliance, we focus on how nuclear energy can help meet our national and global need for affordable, reliable, and clean energy. As Maine seeks to achieve 80% renewable electricity generation by 2030 and aspires to achieve 100% clean electricity generation by 2040, it's important that we discuss the challenges of deep decarbonization. The primary challenge of any electricity system is to balance the constantly varying electricity demand and electricity supply for every minute of every hour of every day of every year. Historically this balancing act was made possible by burning natural gas to produce the on-demand electricity needed. As we look toward 100% clean electricity generation, however, we need to look at how to create affordable and reliable energy without relying on natural gas.

The challenge with operating a 100% clean electricity using only solar power and wind power is that they are variable generation sources – they will only produce electricity when the sun is shining or the wind is blowing. While we can use energy storage to capture excess solar and wind energy for use later, we would need to generate and store unprecedented amounts of energy to provide for predictable periods of reduced generation or increased demand – for example less sun and higher heating demands during the winter months – and unpredictable periods of reduced generation or increased demand – for example during periods of extreme weather. Studies have shown that while running a 100% clean electricity system entirely on solar power, wind power, and energy storage may be possible, it can be quite costly and challenging to operate. If, however, you include other clean energy sources that produce energy on-demand, the system becomes much easier to manage and can be deployed and operated at a much lower cost.

Dispatchable, on-demand sources of electricity are termed “firm” generation and strongly compliment solar and wind generation. Firm clean energy sources enable you to build large amounts of low cost solar and wind generation to provide a bulk of energy production, but can balance supply and generation when those resources aren't available without the need for significant amounts of excess energy production and energy storage. Studies by MIT, Princeton, and others have shown that while you can affordably and reliably achieve 80%-90% clean electricity with solar, wind, and energy storage alone, electricity costs rise exponentially as you try to achieve a 100% clean electricity system. If you include firm clean energy generation with solar, wind, and energy storage, however, you can create 100% clean electricity systems that are both affordable and reliable.

There are several key energy sources that can provide firm and clean electricity generation including hydroelectric generation, geothermal electricity generation, and nuclear energy. Maine already includes both hydroelectric and geothermal installations as clean energy sources under the Class I definitions for renewable resources. These definitions have enabled Maine to make progress towards its goals of 100% clean energy, but continued progress may be challenging. New large hydroelectric installation may be challenging to site and construct due to the environmental impact of dams and limited size of facilities that can meet all state and federal fish passage requirements. While advancements are being made on new geothermal technology, it's not yet clear if that technology will be commercially deployable in Maine to provide firm clean energy at scale. Maine will need hydroelectric, geothermal, and other additional firm clean energy sources to provide 100% clean energy by 2040 that is both affordable and reliable.

Nuclear energy can help play a key role in future 100% clean energy systems in Maine and around the U.S and world as a firm, clean energy source. Existing nuclear power plants provide about 45% of the clean electricity in the United States¹ and about 60% of the clean electricity in New England². New nuclear energy can provide additional firm, clean generation that would complement and increase the value of existing and new clean generation sources by creating a more balance and flexible electricity grid. While nuclear energy has been historically characterized as a “baseload” and inflexible source of electricity, existing nuclear power plants are capable of load following and new nuclear power plants, such as the TerraPower Sodium reactor, are being design with load following and thermal energy storage capabilities to provide even greater generating flexibility.

Including nuclear energy as a Class I renewable energy source under the renewable resource portfolio standards could enable commercial development and investment of new nuclear energy projects as firm clean energy generation. The change of definition would acknowledge how nuclear energy, along with other clean firm sources like hydroelectric and geothermal, can complement large amounts of solar, wind, and energy storage to achieve affordable and reliable clean electricity systems.

Passing this bill will not commit Maine to new nuclear power plants but will enable the state to more seriously consider the role new nuclear energy can play in helping meet its clean energy targets. Maine is a leader in clean energy generation through its investments in solar, wind, and hydroelectric energy but system modeling shows that reaching 100% clean energy that is affordable and reliable with these resources alone will be challenging. Passing this bill to including nuclear energy as a Class I renewable energy source under the renewable resource portfolio standards will create more options for Mainers as they lead the nation in creating energy systems that provide affordable, reliable, and clean electricity.

¹ [Electricity in the U.S. - U.S. Energy Information Administration \(EIA\)](#)

² [New England Resource Mix | ISO New England \(ISO-NE\)](#)