Opinion

Wishful thinking about nuclear energy won't get us to net zero

The climate problem is too serious to engage in unrealistic modelling exercises.

M.V. Ramana & Susan O'Donnell

Opinion

On June 20, the Canada Energy Regulator (CER) released its 2023 Canada's Energy Future report, developing scenarios for a path to net zero by 2050. These scenarios project roughly a tripling of nuclear energy generation capacity in Canada by 2050, seemingly reinforcing then-natural resources minister Seamus O'Regan's statement in 2020 that there is "no path to net zero without nuclear."

However, underlying both the scenarios and O'Regan's contention is wishful thinking about the economics of nuclear energy, and how fast nuclear power can be scaled up.

The new nuclear capacity the report envisions consists of so-called small modular nuclear reactors (SMRs), which have so far not been built in Canada. Aside from refurbishing existing CANDU reactors, the CER does not think any more standard sized nuclear reactors will be built in Canada. Most of this buildup is to happen between 2035-2050, meaning that nuclear power will not help meet the government's stated goal of decarbonizing the electricity grid by 2035.

But can SMRs be built rapidly after 2035? Only two Crown companies in the business of generating electricity for the grid have proposed to build SMRs: NB Power in New Brunswick, and Ontario Power Generation (OPG).

The reactor designs proposed for New Brunswick are cooled by molten salts and liquid sodium metal. Despite decades of development work and billions of dollars invested, major technical challenges have prevented molten salt reactors and sodium-cooled reactors from commercial viability, making it highly unlikely that the New Brunswick designs can be rapidly deployed in the time frame envisioned by the CER.

Assuming that OPG's chosen design—the 300-megawatt BWRX-300—is the one to be deployed widely, then around 70 SMR units would need to be built and operating effectively on the grid between 2030-2050. The BWRX-300 design is yet to be approved by any safety regulator anywhere in the world.

But the report has an even more serious problem: economics. Nuclear power cannot compete economically, which is why its share of global electricity generation has declined from 17.5 per cent in 1996 to 9.2 per cent in 2022. Because SMRs lose out on economies of scale, they will produce even more expensive electricity.

The CER's scenarios for nuclear power are based on the Electricity Supply Model, meant to calculate "the most efficient and cost-effective way to meet electricity demand in each region." Such models are widely used in energy analysis and policymaking, but their utility depends on the validity of the assumptions used; garbage in, garbage out.

Two key parameters underlie the report's scenarios: the capital cost of an SMR, and how that cost evolves with time. The CER's assumptions in the two net-zero scenarios are that a SMR costs $9,262 per kilowatt in 2020, falling to $8,348 per kW by 2030, and to $6,519 per kW by 2050. Both these assumptions are ridiculously out of touch with the real world.

Consider the CAREM-25 SMR designed to feed 25 megawatts of electricity into the grid, being built in Argentina since 2014. Its original cost estimate in 2014 of US$446-million has escalated significantly since then, but even using these original costs, the project costs nearly $30,000 per kilowatt in 2022 Canadian dollars.

The NuScale design, arguably the closest to deployment in the United States, has been in development since 2007 with the build not yet begun. The January 2023 cost estimate for six NuScale SMRs with a total capacity of 462 megawatts is $9.3-billion, or over $26,000 per kilowatt in Canadian dollars.

Finally, the cost of the five-megawatt Micro Modular Reactor Project at Chalk River, Ont., was estimated by the proponent in May 2020 to be between $100- and $200-million. In 2022's Canadian dollars, that works out to $22,000 to $44,000 per kilowatt.

In other words, the CER's cost assumptions are wild underestimates, two-and-a-half to four times lower than the current evidence.

The second incorrect assumption is that costs will decrease with time. Both in the United States and France, the countries with the highest number of nuclear plants, the trend was the opposite: costs went up—not down—as more reactors were built. In both countries, the estimated construction cost of the most recent reactors being built—Vogtle in the United States and Flamanville-3 in France—have broken new records.

We need government organizations to do better. The climate problem is too serious for such unrealistic modelling exercises. Wishful thinking will only thwart our ability to act meaningfully to lower emissions rapidly.

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The Hill Times

Comment

Pushed by Prigozhin, Putin remains the devil we know

Vladimir Putin may be a madman, but Yevgeny Prigozhin is a ruthless lunatic who was never advocating for a peaceful resolution to the war in Ukraine.

Scott Taylor

Inside Defence

It does not take much imagination to ponder what would have happened if Wagner Group head Yevgeny Prigozhin had succeeded in ousting Russian President Vladimir Putin, writes Scott Taylor. *Screenshot courtesy of CNN*

OTTAWA—The war in Ukraine took a bizarre and alarming twist with the armed showdown between the Wagner Group mercenaries and Russian President Vladimir Putin's regime. When the news first broke on June 24 that Wagner troops were driving on Moscow, western media outlets scrambled to make sense of the unfolding drama.

Thrust into the international spotlight was Wagner's founder, the outspoken Yevgeny Prigozhin, who proclaimed his soldiers were targeting the Russian military's senior leadership: namely Defence Minister Sergei Shoigu and top general Valery Gerasimov.

For those who closely follow global security issues, Prigozhin and his Wagner group are well-known entities. However, for casual observers, the apparent open revolt by a private army inside Russia came as a bit of a shock.

Prigozhin began his career as a petty-turned-violent criminal and spent some time in jail. As a result, he avoided conscripted service in Afghanistan during the Soviet occupation.

Prigozhin became a hot-dog vendor before elevating himself into a proprietorship of several fine dining establishments in Saint Petersburg.

In this post-Soviet era, Prigozhin hitched his wagon to a former KGB chief turned politician named Vladimir Putin.

Soon nicknamed "Putin's chef," Prigozhin expanded his enterprise with a catering contract to feed Russia's massive military.

In 2014, Russia wanted to create a private military force that it could employ to do its bidding without formal involvement by the state.

Although he had no military experience, Prigozhin was a ruthless businessman and a loyal ally of Putin.

Thus, the Russian state funded and equipped what was called the Wagner Group.

It was Prigozhin's employees who were described as "the little green men" when they entered and occupied Crimea in 2014.

By employing Wagner mercenaries, Russia could dubiously claim that its military was not actively engaged in the pro-Russian separatist movement in the Donbas region of Ukraine.

We now know, from public admissions by Putin, that Wagner was paid billions of dollars to wage Russia's proxy wars around the globe.

Earlier this year, a video surfaced showing Prigozhin recruiting volunteers at a Russian prison with the promise of a pardon for those who complete a six-month tour of duty on the frontlines of Ukraine.

There is no doubt that many of those convicts failed to earn that pardon as the Wagner group suffered horrific casualties in the meat grinder battle for the city of Bakhmut.

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