Southwest Virginians' Statement on Small Modular (nuclear) Reactors

Summary

The Southwest Virginia "coalfields" have been targeted for nuclear energy development by government officials and special interests. This white paper is a rebuttal to their unsubstantiated promises of jobs and tax revenues while failing to address the safety and environmental concerns of local residents, who have been left uninformed and ignored.

Nuclear energy developments and operations are a money pit. Nuclear energy is the most costly source for producing electricity, a cost which is passed on to ratepayers. Billions of taxpayer dollars already subsidize nuclear power plants and more are being handed to companies to design and develop versions of nuclear reactors called SMRs, Small Modular (nuclear) Reactors.

The nuclear industry is promoting the SMnR as clean energy when all nuclear energy production creates radioactive waste, which is associated with increased cancer deaths, is stored on site, and exists for up to 250,000 year - an environmental disaster we are passing on to our children for generations to come.

The facts are that no SMnRs are commercially operating anywhere in the world. NuScale, the only company to receive a design permit from the Nuclear Regulatory Commission, has had its first project collapse due to rising costs. The earliest these SMnRs would be operational is a decade or more, therefore having little effect on reducing carbon emissions and addressing climate change. Solar and wind are available now to provide clean, renewable energy sources. Investment needs to focus on battery storage.

This document was prepared by five environmental justice, grassroots organizations raising public awareness and calling for transparency and accountability: **Alliance for Appalachia, Appalachian Peace Education Center, Southern Appalachian Mountain Stewards, The Clinch Coalition, and Virginia Organizing – Wise County Chapter.** We call on our local and state political leaders to include affected residents when planning major economic and construction projects and to avoid technologies which primarily benefit outside investors while threatening our communities' health and safety. Date: *December 11, 2023*

Governor wants small modular reactors in Southwest Virginia

In October, 2022, Gov. Youngkin touted Small Modular [nuclear] Reactors as a key part of his new Virginia energy plan. He exclaimed, "A growing Virginia must have ***reliable, affordable*** **and** ***clean*** energy for Virginia's families and businesses." A media report stated, "Gov. Glenn Youngkin said … that Virginia must be "all in" on nuclear energy and he wants to deploy a small modular nuclear reactor somewhere in Southwest Virginia within ten years."

SMnRs fail to meet every one of the Governor's own three criteria:

- **SMnRs cannot be reliable** - They can't reliably be built and brought on line in a predictable and timely fashion to generate baseload power or affect climate change.
- **SMnRs cannot be affordable** – Nuclear energy is the most expensive way to generate commercial electric power and customers pay for the higher cost.
- **SMnRs cannot be clean** - They produce high and low-level radioactive waste, along with risks associated with accidental radioactive releases, transportation, and storage.

*Note: SMnR is an editorial correction to make it transparent that we are talking about **nuclear** energy.*

Short-Circuiting Public Involvement and Environmental Justice

On November 1st, 2023, Governor Youngkin announced an "agreement establishing a public-private framework to transform up to 65,000 acres of previously-mined coal properties in Southwest Virginia to harness natural gas, nuclear, renewables, and other emerging energy sources." This action appropriates approximately **one-quarter of Wise County's land area without a single public hearing**.

This peremptory act and other SMnR policy developments have not been equitable for Southwest Virginians**.** As verified by both the Virginia Department of Environmental Quality and UC-Berkeley's Mapping for Environmental Justice Initiative, the majority of the Southwest Virginia coalfield's localities are environmental justice communities. This designation means these communities disproportionately suffer from environmental and social costs related to the historical development of the coal industry, which was and still is largely operated by absentee corporations based outside of the region.

A core principle for maximizing equitability for environmental justice communities is incorporating broad, inclusive input from those communities into the planning processes for policies which impact underserved residents. SMnR planning for the region failed to follow these best practices and has actively excluded Southwest Virginia residents' input for more than a year after officials' initial announcements promoting SMnRs. An exclusive group, composed mostly of political and industry officials, are making policy decisions for local residents without meeting and listening to residents express their specific needs and concerns.

Environmental justice concerns are heightened by officials' proposals to locate SMnRs on Southwest Virginia's former surface mines, replete with known and well-documented environmental liabilities. Liabilities include, but are not limited to, stability concerns related to future construction, and significant water quality issues. These lands are also overwhelmingly located in close proximity to private households, schools, churches, and other critical infrastructure, with most proposed in low-income neighborhoods. Southwest Virginia's most vulnerable households should not be learning

about proposals to build nuclear plants in their neighborhoods through surprise press releases and infrequent visits by officials from Richmond. Those officials should be involving the residents of our communities in SMnR and all other emerging energy projects' planning and policy discussions NOW – not actively excluding us from the process.

How reliably can SMnRs be brought on line?

1. No commercial SMnR has been successfully built in the world! "The project meant to debut small modular reactors, the technology the nuclear energy industry hopes will spur a renaissance of atomic power construction, collapsed on November 8th, amid mounting financial troubles." *The U.S. Project Meant To Debut Revolutionary Nuclear Reactors Just Fell Apart*
2. The Governor is opting for new technology SMnR designs. History reveals a clear correlation between all nuclear facility cost projections and far higher actual cost of reactors brought into service, along with a project cancellation rate of nearly 50%. New project designs spawn even greater project delays and larger cost increases.
3. Competition with cheaper green power alternatives will likely result in project cancellation. "If SMRs are not ready to deploy in the next ten years, what are the implications?" says former Nuclear Regulatory Commission (NRC) Chair Allison McFarlane. "… if, as a recent study showed, that SMRs will be significantly more expensive than solar photovoltaic (PV) and on-shore wind, and even geothermal, what will the marketplace look like in 20 or 30 years, when renewables will presumably be even cheaper?"
4. Unlike nuclear, solar farms, complemented with energy storage, do not experience scheduled or unscheduled outages, which belie the 24/7 reliability claims of nuclear promoters. More importantly, without certainty that SMnRs can be brought on-line in a predictable, cost effective manner, 24/7 power reliability assertions of SMnR promoters are merely speculative.
5. Will data center planners want to gamble on SMnRs as a power source for their power-hungry facilities if the design approval, construction and licensing timetable for bringing the reactor online is unreliable or aborted?

Why SMnRs are not and cannot be affordable.

1. At baseline, the nuclear industry already costs federal taxpayers, ratepayers, and communities hundreds of billions of dollars in hidden subsidies, decommissioning, and mitigation costs. Federal subsidies alone, up to 2017, topped $100 billion in 2016 dollars, with more in the pipeline. In the Inflation Reduction Act (IRA), $10 billion funds 30% tax credits for "Advanced Energy Projects, including nuclear.
2. At utility scale, the electricity energy standard, Lazard's Levelized Cost of Energy-2023 (LCOE), rates nuclear as the most expensive means to generate commercial electric power. According to Lazard, nuclear power is the only

utility-scale generation source that has gone up significantly in price/MWh between 2009 and 2023. In fact, the cost of nuclear per MWh has increased 53% between 2016 and 2023 alone (unsubsidized LCOE analysis - p.9 of Lazard's LCOE, April, 2023).

3. The one SMnR closest to licensing anywhere in the U.S. is NuScale in Idaho. That project dramatically escalated in price, and was canceled on November 8, 2023, because of soaring costs.
4. As noted above, history shows that there is a strong correlation between new designs and cost increases and project delays. Indeed, costs of the latest nuclear project to come online (seven years late and among the first since the Three Mile Island meltdown), Georgia Power's Vogtle Units 3 & 4, exceeded projections by 120%. It's unclear how much of the cost overruns customers will be forced to shell out.
5. The LCOE shows solar and on-shore wind, even inclusive of battery storage, making power available 24/7, are the lowest cost sources of new power generation. Utilities want to win either way by scooping up front-end federal and state subsidies, then forcing ratepayers, as they have in the past, to take the risks and pay even if a nuclear plant is never completed.
6. Nuclear subsidies send utilities and their customers down a costly, 10-year rabbit hole, away from cheaper, market-driven, solar, wind, and battery storage.
7. In sum, as environmental author and climate activist Bill McKibben said a decade ago, "[Nuclear power] is like burning $20 bills to generate electricity." And now, with inflation!

Clean? What about the high-level radioactive waste and contamination risks?

1. Let's be clear, Plutonium 239, the most lethal element in the witch's brew of high-level waste radionuclides, has a half-life of 24,000 years. It's deadly for 250,000 years. There is no permanent storage solution. What a horrifying legacy for our children!
2. A recent Stanford University study concluded "small modular reactors may produce a disproportionately larger amount of nuclear waste than bigger nuclear plants."
3. Last November, Gov. Youngkin said the solution to waste is *"*recycling opportunities for fuel*."* The risk from transporting highly radioactive waste materials over mountain roads and railroads to a reprocessing plant is very significant. Reprocessing presents a myriad of problems.
4. SMnR sites proposed in a LENOWISCO Planning Commission study are largely on disturbed mining land, which presents potential structural hazards affecting stability of nuclear facilities.
5. There are projects in the Nuclear Regulatory Commission pipeline designed to reprocess nuclear waste on site. On-site reprocessing of high-level nuclear waste has never been accomplished or even tried before. Last year, DOE launched the CURIE ("**C**onverting **U**sed Nuclear Fuel **R**adioisotopes **I**nto **E**nergy") program towards developing spent fuel reprocessing and granted a dozen incentive

awards, including two at the Idaho National Lab, where the NuScale SMnR project, which had been considered the vanguard for "advanced" nuclear power, collapsed due to rising costs.

The proximity between these two development projects is not likely by chance. One of these is being developed by Curio Solutions (Curio and NuScale along with Virginia's two major utilities and four universities are members of the nuclear promotion group, Virginia Nuclear Energy Consortium). The other Idaho Falls grantee is Oklo, a micro-reactor contractor, which garnered four grants, including a partnership with Idaho National Laboratories. On July 21, 2023, former NRC Chair Allison MacFarland questioned Okla's competence in "The End of Oppenheimer's Energy Dream: Modular Reactors Are Supported by Ideology Alone," published in IAI News:

> "The Oklo story is intriguing, since its license application to build and operate its Aurora design reactor was outright rejected by the U.S. Nuclear Regulatory Commission, the country's nuclear safety regulator (full disclosure: I was Chairman of the NRC from 2012-2014). And note that such rejection is an accomplishment: the NRC rarely outright rejects an application, instead working with licensees until they either get the application right or decide to walk away. In this case, Oklo refused to fill 'information gaps' related to "safety systems and components."

6. If on-site reprocessing fails to materialize, the fallback reprocessor would be Nuclear Fuel Services (NFS), in Tennessee near the border with Virginia, which is owned by BWX Technologies of Lynchburg, VA. At NFS the high-level waste becomes feedstock for nuclear bombs - an issue too vast for us to consider here. (NFS is seeking a permit from the Nuclear Regulatory Commission to take over that job from the Y-12 plant in Oak Ridge, TN.) NFS has slipshod safety practices. Plutonium 239, the most lethal element in high-level nuclear waste, has a half-life of 24,000 years. Dr. Michael Ketterer documented traces of Plutonium 239 and other radioactive nuclides 95 miles down the Nolichucky River from the NFS plant. A public health study documents dramatic health consequences for nearby residents: increases in the Unicoi County, TN cancer death rate (from below the national average to +39% above U.S. rate) and premature death rate (+61% above 1990 county levels).
7. Just because we have stored nuclear waste at reactor sites for 70 years doesn't mean human beings can or should be expected to do so for 250,000 years - for scale, that's about three quarters of the time *Homo sapiens* have inhabited the planet.
8. SM[n]Rs may become potential targets for domestic or foreign terrorism. Homegrown vigilantes have attacked electrical infrastructure in recent years.
9. Nuclear safety is being compromised by regulatory capture of the Nuclear Regulatory Commission (NRC). The nuclear industry sees SMnRs as its ticket to a revitalized, subsidized, streamlined NRC regulation future. As detailed below, the bipartisan 2023 ADVANCE Act, passed by the Senate in late July, greases the wheels for "regulatory capture" of the NRC by utilities and industry supporters. The bill would streamline licensing and "advance" the NRC even

further by promoting the industry, like a lap dog, rather than the nuclear regulatory watchdog we so obviously need.

Serious concerns about nuclear energy in our region and governmental actions are not limited to the Governor's failed criteria.

The bi-partisan ADVANCE Act , S.1111, passed by the U.S. Senate on July 27, as part of the National Defense Appropriation Act, is sponsored by WV Sen. Shelley Moore Capito and co-sponsored by VA Sen. Mark Warner among others. This legislation would further dictate significant energy policy and risks on communities, without citizen input. Sen. Capito spelled out how her bill would impact communities, which have already experienced environmental exploitation. Capito explained her ADVANCE Act:

1. "Creates a prize to incentivize the successful deployment of next-generation nuclear reactor technologies." A prize?
2. "Reduces regulatory costs for companies seeking to license advanced nuclear reactor technologies."
3. "Requires the NRC to develop a pathway to enable the timely licensing of nuclear facilities at brownfield sites." This item raises an environmental justice issue. Should communities, long suffering from mining or other environmental devastation, be first in line for exposure to the kinds of risks listed in the sections above?
4. "Extends [by 20 years] a long-established, indemnification policy necessary to enable the continued operation of today's reactors and give certainty for capital investments in building new reactors." This item renews portions of the 1957 Price-Anderson Act, which socialized the cost of insurance for coverage of a catastrophic nuclear accident and was deemed at the time a temporary measure, lapsing once nuclear power established a record of safety.

Is there an employment tradeoff as there was in the coal industry - jobs in exchange for personal and environmental risk and loss?

No! There would be little job dividend because Southwest Virginia SMnR and data center employment is mostly a mirage, especially high-skill jobs the Governor is touting in related nuclear education bills:

1. SMnR are modules, which means they would be produced in a factory and arrive on a truck bed. Then a specialized itinerant crew would assemble the reactor. Consequently, no local employment will accrue from manufacture of the facility and very little construction employment beyond site preparation.
2. SMnRs are being designed to have multiple reactors controlled from a single site as a cost-saving measure. "NuScale's flagship VOYGR-12 power plant design can accomodate up to 12 NPMs (Nuclear Power Modules or SMRS). All high-value technology jobs would be elsewhere, NOT here. What's left would be jobs tending to scheduled and forced reactor outages, that is, security, mowing the grass, and likely occasional cleanup work during fueling and shut-down.

3. We are told by Governor Youngkin's November 1, 2023, announcement of a "Landmark Land Development Agreement to Transform Southwest Virginia" the development projects have the potential for bringing communities "1,650 new high-paying jobs." Since SMnRs will offer negligible local employment, the Governor may be thinking of jobs in the job-rich renewable energy sector, since job sources are not revealed.
4. The Governor's announcement pairs SMnRs with high energy-consuming data centers. Data centers apparently fail to offer much local employment: "In Boydton, VA, profiled in the New York Times, Microsoft recently built a large data center housing thousands of computer servers. "People thought when Microsoft came in it would create jobs, but that's just not the case," said E.W. Gregory, the head of the local International Brotherhood of Electrical Workers union. Instead, they brought in outside technicians to do most of the work, he added. About 25 local residents got jobs, primarily as administrative assistants or janitorial staff."

5. Taxpayers end up with the tab: "'The underlying issue is that the state and local governments provide incentives such as tax breaks, land, infrastructure, and services, usually in a competitive bidding process with other governments trying to land the data center,' Todd Cherry, Center for Economic Research and Policy Analysis at Appalachian State University, said. "The incentive packages can be quite outlandish–far exceeding any reasonable economic justification. This is a form of what we call 'the winner's curse.' When governments engage in a competitive bidding process over an uncertain benefit, the one that wins is the one that overestimates the benefit.' This kind of competitive bidding to attract companies often becomes more of a political game than an economic development strategy, Cherry said."

Might Uranium mining become part of a Virginia-based nuclear fuel cycle hub?

1. Last fall, Canada's Consolidated Uranium purchased rights to the uranium deposit at Coles Hill, north of Danville, VA. Coles Hill is the largest untapped source of uranium in North America. Why would an international company buy a resource that's been under a 40-year state mining moratorium?
2. The U.S. currently imports the vast majority of its uranium ore. Kazakhstan, Uzbekistan, and Russia account for nearly half of those imports. A stable source of uranium is a matter of national security. Coles Hill could meet that need.
3. It's admittedly speculation, but should the moratorium be broken, mining uranium in a wet, populated, eastern location invites disaster.
4. BWX Technologies in Lynchburg may someday process Coles Hill uranium into reactor fuel (like they already do from imported sources for the U.S. Navy). A Virginia-centric nuclear fuel cycle presents significantly greater safety, high-level nuclear waste production, and nuclear terrorism risks.

SM[n]Rs are a Climate Change shell game.

Nuclear power in 10 years (even if successful) is not a realistic Climate Change solution. We must be adding zero-carbon power generating solutions NOW, not in 10-15 years if we plan to avoid catastrophic climate change.

SMRs are not likely to help cut emissions, wrote former NRC Chair Allison MacFarlane in the July 21, 2023, issue of IAI News. "In the nuclear celebratory mood of the moment, there is little patience or political will for sober voices to discuss the reality that new nuclear power is actually many decades away from having any measurable impact on climate change – if at all."

This June 12th Chicago Sun-Times op-ed piece by Ben Jealous, Executive Director of the Sierra Club also demythologizes SMnR proponents' claim that these facilities are a climate solution. While Southwest Virginia power generating systems amount to a tiny portion of the earth's carbon burden, every energy resource plan, everywhere, must prioritize accelerated carbon reduction if we are to address this great existential threat to future life on our planet. We simply can't wait 10 years.

SMnRs draw financial resources away from solar and energy efficiency opportunities.

The onrush to obtain federal and state funding for nuclear and related developments takes away from local and regional renewable energy initiatives to build solar farms on unreclaimed mining sites, instead of forest and farmland, as well as resources and pursuit of subsidies designed to create new battery storage development.

Some final words:

"Nuclear electric power is like cutting butter with a chainsaw." That's how energy guru Amory Lovins (author, physicist, and former chairman/chief scientist of the Rocky Mountain Institute) once described the nuclear reaction to boil water to generate power. "Advanced" nuclear proposals haven't persuaded Lovins, who maintains nuclear power is the **least efficient** design of all approaches, with energy efficiency (conservation) being the cheapest, most elegant design.

Some observers think the nuclear industry and government's promotion of "advanced" nuclear energy is trumped up just to enrich powerful corporations. Stephanie Cooke, former editor of *Nuclear Intelligence Weekly,* takes that position in an opinion piece in the July, 2023, edition of industry journal, *Fortune*: "There's no such thing as a new nuclear golden age–just old industry hands trying to make a buck."