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Energy is Life: The Manufacturers' Perspective

Good morning, Chairman Vitali, Chairman Rader, and members of the committee. I am David N. Taylor, President & CEO of the Pennsylvania Manufacturers' Association, the statewide non-profit trade organization representing the people who make things here in the commonwealth.

In every way that matters, energy is life. The manufacturing sector, which directly employs well over a half-million Pennsylvanians and generates $110 billion in value every year, depends on REAL energy – reliable, efficient, affordable, local. No matter what is being made, manufacturers take raw materials or component parts and undertake a multi-stage process to yield a finished good. At every step of production, large amounts of energy are deployed, which is why our industry requires REAL energy to be competitive. Energy costs are a large expense for almost all manufacturers, with many firms having energy as their largest expense.

Pennsylvania's energy resources are, can be, and should be a great strength for our industrial economy, which is why PMA supports a pro-production agenda for domestic energy in a competitive marketplace. Pennsylvania generates 6% of America's electricity and is the nation's top exporter. Annual Pennsylvania electricity production is 223,400,000.000,000 watt hours (223.4 TWh).

Current Competitive Markets: Working for Prices and Environment

Our current competitive markets are working for both prices and the environment. When Governor Ridge and the legislature passed and enacted the Electricity Generation Customer Choice and Competition Act of 1996 he said, "Low-cost electricity is an enormously powerful economic development tool. I have heard it time and time again from some of our largest employers – and I've heard it from some employers who have looked to Pennsylvania as a place to do business." And it worked.

Before 1996, Pennsylvania's electricity rates were steadily 20% above the national average. As of the latest EIA report, in February 2025, Pennsylvania's residential rates were less than a bit more than a percentage point above the national average and were more a full percent below the national average for commercial and industrial users.[1] However, it is concerning that both Ohio and West Virginia have substantially lower residential and commercial prices.

From an environmental standpoint and according to DEP's own reporting[2], from 2005-2020, Pennsylvania's electric generation sector has cut greenhouse gas emissions by 44.4%. This is proof that competitive markets are working for the consumer and the environment.

While competitive markets are working, there are looming challenges and HB 501 would make these issues worse. In recent testimony before Congress, PJM Interconnection, Pennsylvania's regional transmission organization warned, "PJM's fleet is shifting toward a composition of mostly intermittent renewable generation. These resources do not replace thermal, dispatchable resources one-to-one and also lack essential attributes that help preserve reliability, such as quick, controlled ramp up or down. New generation is also not getting built at the pace required to meet the growing supply/demand imbalance...The less than 4,800 MW of new, mostly solar generation that was added to the system in 2024 is not enough to keep up with the retirements and load growth.”[3]

House Bill 501: The End of Pennsylvania's Competitive Market

House Bill 501, commonly referred to as Governor Shapiro's Pennsylvania Reliable Energy Sustainability Standard or PRESS, represents the end of Pennsylvania's competitive market with more than half of all Pennsylvania electricity generation coming from government mandated sources, including 35% from "Tier I" sources such as wind, solar, and other technologies that do not yet exist. Moreover, this proposal would surely accelerate further retirements of Pennsylvania's thermal, dispatchable, baseload sources that PJM warns is not being replaced fast enough.

The concepts behind House Bill 501 are the anthesis of our current competitive market structure. When each Tier is fully phased in, 50% of electricity sold or delivered in Pennsylvania must come from a combination of Tier 1 (35%), Tier II (10%) and Tier III (5%). In 2023, 96% of Pennsylvania's electric generation came from natural gas (59%), nuclear (32%), and coal (5%). Under the proposed legislation, a combination of electric generation from existing natural gas, nuclear and coal units would be eligible to meet only 50% of Pennsylvania's electricity demand. Given the existence of the federal nuclear production tax credit, as well as the creation of a new Zero Emission Credit subsidy within HB 501, it is reasonable to presume that the existing 32% nuclear generation share in PA's electric power generation portfolio will be preserved. Therefore, natural gas generation will effectively be able to compete for only 18% of Pennsylvania's remaining electricity market share. This represents a reduction of 69% compared to the existing natural gas electric generation.

Unanswered Questions About Energy Sources

This significant shift would prematurely shutter many of the existing coal and natural gas fleets that are currently operating in compliance of all federal and state standards. These premature closures threaten our already fragile grid reliability here in Pennsylvania and throughout the entire Northeast and Mid-Atlantic United States.

When we were here a year ago, I posed a number of questions that must be answered before a proposal such as HB 501 could be considered. These questions have not been answered and in that years' time, much has changed – prompting even more questions.

The most fundamental question is the following:

Which energy sources will provide how much electricity, and by what date?

Boasting of the new sources included in the PRESS plan, Governor Shapiro said: "So not only will it be wind and solar anymore, but it's also going to be methane digesters, new fusion technology, [and] small modular nuclear reactors."

Unfortunately, two of Shapiro's Tier I energy sources — small modular nuclear reactors and fusion reactors — are years if not decades from coming online, if they ever become viable at all. The likelihood of those sources contributing to Pennsylvania's energy production by 2035 is near zero.

Small Modular Nuclear Reactors

In a recent report examining the feasibility, or a lack thereof, it was written, "Utah Associated Municipal Power Systems (UAMPS), a coalition of community-owned power systems in seven western states, withdrew from a deal to build the plant, designed by NuScale Power, because too few members agreed to buy into it. The project, subsidized by the U.S. Department of Energy (DOE), sought to revive the moribund U.S. nuclear industry, but its cost had more than doubled to $9.3 billion."[4]

The report went on to say that "to some observers, the plan's collapse also raises questions about the feasibility of other planned advanced reactors, meant to provide clean energy with fewer drawbacks than existing reactors."

The fuels needed for such a project as this are not commercially available or viable. Originally, projects to bring small nuclear reactors online were ambitiously aimed at 2030, but this most recent failure will ensure that will not happen, and to think it will be ready to scale by 2035 is extremely unrealistic.

The United States imports more than 95 percent of uranium concentrate used in nuclear fuel rods. These materials come mainly from Canada, Kazakhstan, Australia, Uzbekistan, and until 2024 when import bans were established, Russia.[5] Therefore, this proposed increased nuclear capacity also raises new, additional questions such as:

- **Do you support new domestic uranium mining and processing capacity?**
- **What are the environmental impacts of uranium mining and processing?**
- **What environmental impacts and expenses will be realized with the increased need to store spent nuclear fuel rods?**

Fusion Technology

The other mandated source is fusion technology, which is even less realistic. In reports published in January of 2024 it was stated, "Fusion power has been one of those things that's been 'only 20 years away' for about 50 years now." Scientific American Journal cited a study and research where even a leader at the National Ignition Facility, where fusion research is being developed, stated, "it's (fusion) not going to be viable in the next 10 to 20 years, so we need other solutions." The article goes on to say any fusion generation will be unlikely before 2050.[6] The additional questions regarding this source are obvious:

- **What percentage of the grid will need to be powered by fusion technology to meet this government mandate?**
- **What is the date when fusion technology will be commercially viable?**
- **Where will the fuel sources come from?**
- **How quickly can this technology be scaled to meet market demands and government mandates?**
- **If this technology cannot be achieved, what Tier I source will fill the shortfall?**

Environmental Impact of Solar Mandate

In the absence of new electricity from fusion and small modular nuclear reactors, only solar power will be marginally viable to generate the 35% Tier I mandate. The questions we posed last year were:

- **How many acres of land will be consumed by solar panels and where will they be located?**

- **What remediation plans will be enacted to address water runoff, soil erosion, and loss of habitat to wildlife caused by building solar arrays and windmills?**

- **What remediation plans will be enacted to protect birds and bats that will be endangered by incineration by solar arrays and bludgeoning deaths by windmills?**

We searched for our own answers and on these questions, a state mandate essentially requiring 35% of all electricity be produced by solar panels would be an environmental disaster because the low yield, intermittency, and fragility of that technology would require an impossibly large footprint that would destroy natural habitat, threaten groundwater with excessive runoff, and cause an environmental crisis.

In 2022, Pennsylvanians used 245,935,000 MWH (megawatt hours) of electricity, 35% of which would be 86,077,250 MWH or 86,077 GWH (gigawatt hours). According to Freeing Energy, it takes 2.97 acres to host enough solar panels to generate 1 GWH of electricity. [7] Therefore Governor Shapiro's PRESS plan would necessitate building 255,648 acres of solar panels. However, solar has a capacity generation factor of, at best, 25%[8], meaning that you must build four times as many solar arrays, totaling 1,022,594 acres, to actually generate 35% solar. Converting acres to square miles, 1,022,594 acres equals 1,597 square miles covered in solar panels necessary to meet a 35% solar mandate.

Chester County is 759 square miles; Montgomery, 483; Lehigh, 345. These three counties combined total 1,587 square miles. We would need to clear cut and put a solar panel on every inch of all three counties and still be 10 square miles short. As another option, Pennsylvania has approximately 6,960 square miles of state forest land. To meet this mandate, it would be the equivalent of clear cutting and installing solar panels on almost a quarter of all our state forests.

Paving this massive amount of land mass would devastate wildlife of all kinds. Adding wind power to the mix not only requires a large amount of landmass, but also would impact aerial species such as birds and bats. In a 2020 study it was published that, “Wind energy offers substantial environmental benefits, but wind facilities can negatively impact wildlife, including birds and bats…Forty-four wind facilities reported 2,039 bird fatalities spanning 128 species and 22 facilities reported 418 bat fatalities spanning five species.”[9]

Often, environmental extremists have forcefully opposed pipeline and transmission line construction. Given the environmental challenges this proposal faces, and the massive land and air use this proposal would have it begs yet another new question:

- **Will environmental activists oppose massive land-use projects in the same way as traditional energy projects?**

Supply Chain and National Security Concerns

Since last year, the global trade markets have shifted significantly. In order to produce a solar panel, the following elements and critical minerals are needed: large amounts of copper, aluminum, and silicon, as well as cobalt, nickel, lithium, chromium, zinc, plus 17 different identified rare earth elements. The dictatorship in Beijing dominates the refining of many of these elements.

China's journey to rare earth supremacy began in the 1980s, when then-leader Deng Xiaoping famously stated, "The Middle East has oil; China has rare earths."[10] Recognizing the strategic importance of these metals, China began heavily subsidizing its rare earth mining and processing industries. This allowed Chinese producers to undercut international competitors, driving many mining operations in the U.S., Australia, and elsewhere out of business.[11] China refines more than 90 percent of the rare earth minerals, meaning even if these minerals are mined in other countries, they must be shipped to China for refinement and in hopes that perhaps they will sell it back.

Human Rights Concerns

Beijing dominates global mining operations, especially in Africa, particularly in the Democratic Republic of the Congo (DRC). It's been reported, "In a survey, World Vision also found that 19 percent of miners have witnessed a child die at a mining site, 67 percent reported frequent or persistent coughing, and several girls had genital infections after working waist-deep in acidic water. In addition, up to 2,000 people die from cobalt mining accidents in the DRC every year. Miners also face sexual assault and forced evictions."[12]

Slave Labor in Supply Chains

For all of the differences between Democrats and Republicans, liberals and conservatives, labor and business, I hope we could agree on this much: No American worker should ever have to compete with slave labor and no American consumer should ever be exposed to slave-made goods in the U.S. marketplace.

At this moment, in occupied East Turkestan (which the Chinese Communist Party calls “Xinjiang”), more than two million prisoners of the Uigur ethnic group are being held in concentration camps where they are subjected to forced labor. Beijing holds prisoners of conscience and executes them to harvest their internal organs for transplant.[13] Anyone who is paying attention has seen how Hong Kong’s civil society has been systematically dismantled by Beijing. The same fate awaits us if we give them the chance.

According to Jenny Chase, head of solar analysis at Bloomberg New Energy Finance, “Nearly every silicon-based solar module—at least 95% of the market—is likely to have some Xinjiang silicon in it.”[14] Perhaps the most important product in solar panel manufacturing is polysilicon. According to a recently published report, “China's polysilicon production capacity surged from 116.3 million tons at the end of 2022 to 210 million tons, accounting for about 93% of global capacity, making it the world's largest polysilicon producer.”[15]

Supply Chain and National Security Concerns, cont.

National Security Risks

Of further concern is the national security implications of sabotage inside the United States. Just last week, Reuters reported that Chinese made solar inverters contained "rogue" communications devices that skirt firewalls and could switch off inverters remotely or change their settings. The report went on to say that "this could destabilize power grids, damage energy infrastructure, and trigger widespread blackouts."[16] Growing dependence on Chinese-based technologies and supplies only expands out exposure.

Knowing this, we have the following additional questions:

- **Do you support child and slave labor imports to our commonwealth?**
- **How can it be ensured that imports to achieve Tier I source compliance are child and slave labor free?**
- **Do you support expanding mining operations in Pennsylvania for any or all of the aforementioned elements?**
- **Do you support building refineries in Pennsylvania for any or all of the aforementioned elements?**
- **What strategic minerals are present in Pennsylvania and in what recoverable quantities?**
- **How long would it take for these facilities to become operational and with enough supply to meet government mandated totals?**
- **Have there been disruptions or outages with these technologies in the past and if so, what can be done to prevent this from happening in the future?**
- **What safeguards would be necessary to ensure the security and integrity of the grid and energy assets?**

Battery Storage Challenges

Because of the intermittent nature of solar and wind energy, a massive number of batteries will be needed to sustain any kind of baseload capacity needed for grid stability. Even the left-leaning publication Vox has published articles stating, "few expect it to be by 2030,"[17] when it comes to affordable battery technologies that can provide any kind of baseload capacity.

Much like the inputs for solar panels, China dominates the global supply chain for batteries and component minerals. Any policy mandating or incentivizing the need for these batteries jeopardizes U.S. energy security to China's advantage and is subject to the same critiques. Handing control of our energy production to a hostile foreign power is foolhardy in the extreme.

But examining this even further, what is in an "affordable" battery? Components of batteries include many of the same refined minerals such as lithium, nickel, cobalt, graphite, magnesium, vanadium, and others, but in even larger quantities. Therefore, in addition to the aforementioned questions, we would also pose:

How much battery supply would be needed to generate equivalent baseload capacity to maintain the demands in the PJM grid?

What infrastructure upgrades would be needed to place these battery operations into existing systems?

Where would these battery systems be located and what environmental risks exist?

The supply chains for solar panels, batteries, and their inputs are contaminated by slave labor and related human rights atrocities. Common decency requires us to not abet or reward these practices.

End-of-Life Waste Management Issues

The useful life of solar panels is roughly 20-30 years,[18] after which they become toxic garbage. Currently, about 90% of end-of-life or defective solar panels also end up in landfills, largely because it costs far less to dump them than to recycle them.[19] According to a study in the journal Renewable Energy, "Between 2030 and 2060, roughly 9.8 million metric tons of solar panel waste are expected to accumulate."[20] Wind turbines often see the same fate, and experts have calculated that the waste total will amass to 2.2 million metric tons in our landfills by 2050.[21]

The Institute for Energy Research published a study stating, "Solar panels contain lead, cadmium, and other toxic chemicals that cannot be removed without breaking apart the entire panel. While disposal of solar panels has taken place in regular landfills, it is not recommended because the modules can break and toxic materials can leach into the soil, causing problems with drinking water."[22]

This is an issue that state and international governments are facing and so far there have not been viable, cost-effective options. Government mandates and subsidies will make this mounting problem even worse. A year ago, we posed the question:

What remediation plans will be enacted to dispose of untold millions of tons of dead solar panels and windmill blades in the 2040s and 50s?

To date, this question, nor any of the very serious questions posed throughout this testimony have been answered.

Conclusion: The Cost of Abandoning Competitive Markets

In conclusion, Pennsylvania is America's number one exporter of electricity, second largest producer of natural gas, and third largest producer of coal. These are domestic energy sources produced by Pennsylvania workers under DEP, OSHA, L&I, and USDOL rules. Upending competitive markets on Pennsylvania-generated electricity is an insult to consumers and a death wish for our economy.

AEPS mandates cost ratepayers, through the purchasing of credits, $528 million in the reporting year of 2022-23, but generated less than 1.5% of Pennsylvania's electricity. This is not just disastrous energy policy, it's expensively disastrous energy policy – and it's every single consumer in Pennsylvania who is fronting the bill. The cost burden under the proposed PRESS mandate could increase the Tier I ratepayer costs to as much as $6 billion over 5 years when fully implemented.

$528M

Current AEPS Cost

Annual cost to ratepayers for less than **1.5% of electricity**

$6B

Potential PRESS Cost

Estimated 5-year cost when fully implemented

44.4%

Emissions Reduction

GHG reduction from 2005-2020 under current competitive market system

For these reasons and more we, the Pennsylvania Manufacturers' Association, oppose any expansions to the Alternative Energy Portfolio Standards Act, including House Bill 501, seeking to implement Governor Shapiro's PRESS plan.

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