OHIO HOUSE OF REPRESENTATIVES

Energy and Natural Resources Committee

HOUSE BILL 104

Advanced Nuclear Technology Helping Energize Mankind (ANTHEM)

TESTIMONY TYPE: Proponent

TESTIMONY DATE: October 16th, 2019

PROPONENT NAME: Jon Paul Morrow

PROPONENT ORGANIZATION: eGeneration Economic Development Corporation

TESTIMONY:

Dear Chairman Vitale, Vice Chair Kick, ranking member Denson, and the rest of the committee,

I thank you for the opportunity to provide testimony on HB104.

In an effort of full disclosure, I am a paid consultant to the eGeneration Foundation. The eGeneration Foundation is an IRS 501(C)3 non-profit organization mentioned in HB104 and if passed, eGeneration will initially act as an agent to market the State initiated for-profit Public Benefits corporation created by the legislation. For this marketing effort eGeneration will receive compensation. I potentially stand to benefit from the passage of this legislation. Although, I am here today testifying on behalf of eGeneration Foundation's 501(C)4 sister organization the eGeneration Economic Development Corporation which is not mentioned in the legislation.

I am an economist and have acted as a consultant to a range of energy companies and military contractors. Primarily the energy companies I have worked for have been natural gas and oil companies that provide infrastructure to the oil and gas industry. I do not - and have not ever worked for a company that is in the nuclear industry. I want it to be explicitly clear that I have never been paid by First Energy, or any of its subsidiaries, such as First Energy Solutions or First Energy Nuclear Operating Company.

You may ask what is my interest in HB104? Am I simply being paid by eGeneration to act as a professional lobbyist? I am not a lobbyist - I am an educator and an advocate. I am very

passionate about developing a Molten Salt Reactor to produce radioisotopes for targeted alpha therapy treatments which can be a miracle drug for those with terminal cancer.
I watched as my fiancé died fighting brain cancer and then I fought cancer -twice - including pancreatic cancer. I know the pain of loss and I know the crushing debt that comes with aggressive and terminal cancers. Molten Salt Reactors (MSRs) have the potential to not only treat terminal stage IV cancers - but have the potential to do so very cheaply. This is the reason why I am an advocate and it is the reason why I hold in contempt anti-nuclear advocates that reject all science and just make stuff up - to further their goals in stopping all nuclear development.

Due to the false propaganda put out by anti-nuclear organizations - a case can be made that they have killed millions of people by slowing the progress of cancer research and development. I take nuclear development very personally.

As an advocate of nuclear research and development and as a policy professional I have advocated for this type of legislation for the last few years. After speaking with officials in the present administration and realizing there was an interest in expanding the role of the United States Department of Energy (DOE) in developing nuclear technology - HB104 seems to be a no brainer. Clearly, there seems to be a want for a pathway for the DOE having a collaborative development agreement with a State such as Ohio.

IS HB104 PUTTING THE CART BEFORE THE HORSE?

The first question I am asked by Ohio legislators about HB104 is *"Why should Ohio pass HB104 when the DOE has not promulgated new rules that would allow States to sign a Cooperative Research And Development Agreement (CRADA) with the DOE?"* The answer to this simpler than what one might suspect.

The DOE will be in no hurry to promulgate new rules for doing business with a State entity to collaboratively develop new nuclear technology **until such an entity exists**. While the 1954 Atomic Energy Act clearly provides for States and the Federal entities to work together in creating new nuclear technologies - no States have created an entity to facilitate such collaboration. HB104 creates a State (entity) authority, the first of its kind, that is authorized to sign such a collaborative agreement with the federal government.

WHAT ABOUT THE TECHNOLOGY INVESTMENT TAX CREDIT?

Historically, venture capitalists have loved the Technology Investment Tax Credit (TITC). The TITC has never failed to deliver investment from venture capitalists at a rate and an amount amount greater than anticipated. The problem has always been - after an issuance of the TITC the tax base is reduced the following year and balancing the budget becomes problematic for the governor and legislators. The problem, simply put, is matching inflows (increased receipts created by investment) to outflows (tax credits - a reduction of taxes taken in) so as to not impact balancing the budget so dramatically.

Originally, Ohio determined what businesses and technologies it wanted to develop through panels of experts. Companies would then apply to an Edison Center to qualify to be a selected company. Once approved - those that purchased stock in these approved companies would qualify for a 25% tax credit that could be used to reduce any Ohio taxes.

HB104 reintroduces the TITC as a Deferred and Accruing Technology Investment Tax Credit (DATITC).

A DATITC would be available to those that invest in the State Initiated For-Profit Public Benefits Corporation known as the Ohio Nuclear Development Consortium created by HB104. The DATITC differs significantly from the TITC. First, the payout for the tax credit is deferred for the first five years. Secondly, the tax credit is 10% and increases 2.5% per year over the following 10 years. The credit must be claimed in the 15th year and will not exceed 35% of the original investment. The credit is also transferable - unlike it was in the past.

This allows the taxation from new economic activity created by the passage of HB104 to more closely match the tax credits and reduce the problem of trying to balance Ohio's budget. Additionally, the state could in an emergency, issue technology development bonds to pay down the loss of tax revenue and amortize that cost over a 30 year period making it much easier to balance the budget. I don't recommend that - but that could be an option.

The Initial Public Offering for the Ohio Nuclear Consortium is 20 million shares of stock at $50 each. This equates to a $1 billion dollar issuance. That equates to a maximum of $350 million in reduced taxes due to the DATITC. Over a 15 year period that averages to $23.3 million per year.

To put this in perspective. The Ohio Third Frontier Fund - launched to aid in developing technologies and attracting new technology companies to Ohio - obligated Ohioans to a $1.6 billion bond issuance. Here, panels of experts determined what areas and technologies they would invest money in. This equated to an average of $140 million per year over the last 10

years. Many of those funds were used to invest into technologies such as wind and solar companies and into companies such as Xunlight that either went bankrupt or moved out of Ohio. The Ohio Nuclear Development Consortium would be prevented by law from moving out of Ohio. To be fair - the Ohio Third Frontier program has had many successes and has benefitted Ohio.

As a tax credit, rather than as a bond issuance in the case of the Ohio Third Frontier program, this type of investment offers a number of notable differences. First, no one is obligated (forced) to pay back a bond. Investment into the Ohio Nuclear Consortium is completely voluntary - this diminishes the effects of the government bastardizing the free-market. A tax credit does not obligate the state to any debt - it reduces the amount of taxes it takes in by letting Ohioans and individuals and companies outside of Ohio - that pay Ohio tax - keep more of their money. This tax credit would equate to only 17% annually of what was spent over the last 10 years by the Third Frontier program.

As a State Initiated For-Profit Public Benefit Corporation the Ohio Nuclear Development Corporation is barred from ever leaving the State of Ohio.

This type of investment would seem to be much less risky deal for the State of Ohio and Ohioans. If the Consortium receives no investment and goes belly up within the first 5 years - the State of Ohio is out nothing.

HB104 codifies the DATITC for use by other State Initiated For-Profit Public Benefits Corporation. This makes the Consortium a "class" of organization so that it is not granted exclusive rights

HOW WILL PASSAGE OF HB104 EFFECT THE FREE-MARKET?

WON'T HB104 GIVE NUCLEAR TECHNOLOGY AN UNFAIR ADVANTAGE? To say that virtually anything that governments do doesn't somehow affect the free-market would be to ignore the fundamental laws of economics and human behavior. As an economist that promotes "freedom of choice" and very much believes in Adam Smith's invisible hand of the market (our choices) - I only advocate for government policies that minimize the bastardization of the free-market.

Incentives such as tax credits can bastardize the free-market as can negative and false propaganda and cost-prohibitive regulations.

It is challenging to find a technology saddled with more harmful and erroneous propaganda that has led to more costly-prohibitive regulations than the nuclear industry. Perhaps, the pharmaceutical industry might be a candidate. Unlike most other industries where technologies are developed first and regulations later - nuclear is saddled with cost-prohibitive regulations throughout its research and development phases. Worse yet, for the nuclear industry, they have to pay for their own regulation. Whereas, almost all other industries (with the possible exception of the FDA) the government uses tax dollars to pay for their regulation. This cost has led to government effectively having a monopoly on nuclear research and development.

To de-bastardize the effects imposed by the federal government through cost-prohibitive regulations and erroneous propaganda - a balancing force can be a tax incentive. This can help spark economic growth within the State of Ohio despite federal and special interest bastardization efforts.

Most of America's fleet of nuclear reactors were built before the creation of the NRC and operated without incident. America's only substantial nuclear incident (Three Mile Island) occurred after the creation of the NRC and rising regulation costs. Three Mile Island was built in 1968 and the Nuclear Regulatory Commission was created in 1975 and the Three Mile Island accident occurred in 1979. Ironically, well after new costly safety regulations were imposed.

Additionally, HB104 does not force Ohioans to invest into the Ohio Nuclear Development Consortium - nor does the Ohio Nuclear Development Authority use Ohio tax-dollars to fund itself. The effort is a completely voluntary one and if legislators choose to sweeten the pot by allowing Ohioans to keep more of their own money through a tax credit - that is done voluntarily as well.

MACRO AND MICRO MARKETS

It is important to see markets for what they are and how they naturally evolved. While many only see the competition in their local marketplace - there is industrial competitiveness between States and between Nations.

We can see in many places where the Chinese government has a stated goal of using government resources to dominate areas in global trade. This is especially true in steel, aerospace, consumer electronics, plastics, and energy. Rather than acting as a regulating entity - China like many other countries has decided to proactively bastardize global markets. Other countries can take a hands off approach and be dominated by China or countries and states can choose to counter this bastardization. While countries have always chose to bastardize markets - China took market

bastardization to a whole new level. The effects that macro-markets have on micro-markets is more important than ever.

Technologies that are complex, immense in size and scope, and require great coordination between many entities, over long time periods of time - these endeavors normally, historically, and naturally evolve from our local markets in the micro sense - to a State or National market in a macro sense. This is not a recent phenomena. Even in the days of old things such as ports were normally built by a government to facilitate trade. They were large and costly projects that were very complex and very few businesses could afford to develop their own ports back then.

THE EVOLUTION OF MARKETS

When Edison and Tesla were looking to provide electricity to many markets and across state lines - they ran into a problem. No banks would fund the infrastructure needed to generate and transmit electricity.

Our first electrical grids had many problems with brown-outs, blackouts, overpower and overload situations, frequency control issues, and reactive power problems. People liked electrical power and wanted it to be more predictable and reliable. This meant coordinating the complexities of a massive electrical energy grid while paying for it over a long period of time and granting monopolies so that future innovation would not prevent investors from making their money back. The free-market at the micro level however was too risk averse to invest into the technology. The technology was developing so rapidly - no one wanted to make a large scale long-term capital commitment for fear of the technology becoming obsolete before their investment was paid back. So, State legislatures - seeing the market potential that electricity could bring to their State - particularly in industry and manufacturing - started issuing bonds and financing electrical generation and granting monopolies for their State. The States took on the risk and reaped the rewards for good decisions and felt the pain of bad decision-making. The free-market was very much at play, just at a more macro-level. States competed against each other to provide what the market wanted at the lowest possible cost - reliable electricity. This was a natural and beneficial evolution of the free-market at the microlevel to the macrolevel.

Consequently, deregulation - which was not a natural evolution of Ohio's energy markets - has not worked out well for Ohioans when compared to other similar States. Our cost of energy has dramatically increased as energy inputs have fallen dramatically (natural gas, coal, uranium). Other regulated States such as Tennessee and Oklahoma have seen very little rise in their cost of energy that could be attributed to anything other than natural inflation.

The same type of marco-level development is a natural evolution of the free-market for nuclear research and development. Much of this technology is developed by our nation at a macro-level

due to its development costs and long time frames. I will argue that this development is too far up the ladder on the macro-development spectrum. States can provide beneficial competition to spur nuclear technology growth - it is just that no State has taken advantage of this opportunity.

The Federal government determines its development pathways and its development partners. While the intention is to be as fair as possible the system still lacks internal competition. The States that reap the benefits are the ones most open and accepting of nuclear technology - this is true. Although, this tends to be focused exclusively around States with National Laboratories that perform nuclear activities and to a lesser degree Universities that can perform nuclear research.

Even with Ohio's storied history with the Manhattan project and nuclear energy - Ohio does not have a national laboratory. The top two Ohio candidates Mound Laboratory and NASA Glenn Research Center did not make the cut to become a national laboratory. As such - without a nuclear laboratory in size and scope to a national laboratory - there is not much chance that Ohio will dominate in the new nuclear renaissance. Certainly we can play a part - but wouldn't you like to dominate? Ohio once secretly dominated nuclear development due to the research it conducted for our military - with those sources no longer performing the robust research it once did - Ohio is very much in danger of losing much of its nuclear supply chain and industries over the coming decades. Even BWXT in Barberton (once Babcock and Wilcox) that produces large nuclear components for our Nuclear Navy has been expanding a tremendous amount of its activities outside of Ohio.

The intent of the 1954 Atomic Energy Act - that is the basis for our laws and regulations regarding the civilian nuclear industry - was not to prevent states from competing to develop new nuclear technology. It was quite clear that President Eisenhower wanted our States and allies to benefit from nuclear energy and research and development for peaceful purposes. Due to a learning curve - the federal government retained exclusive control of nuclear research and development. As time passed and education progressed - States were envisioned to be granted more autonomy to develop nuclear technologies.

While, our allies took advantage of the development of new nuclear technologies - few states did. The Atomic Energy Commission at the time was rapidly building out nuclear power plants in States across our nation much more quickly than what states ever could. Now that there is renewed interest in nuclear energy - using a State to aid in the formation of a nuclear development consortium could allow a State like Ohio to challenge other nations in dominating the nuclear space like what was envisioned in 1954 by Eisenhower.

It is natural and beneficial for nuclear research and development to be done at a macro-level at this time. I believe that there are synergies of this happening at a State and Federal level. This would include providing stability to the market by diluting the effects of changing Presidential

Administrations or Congress' that ping-pong between being anti-nuclear and pro-nuclear. States can act as a stabilizing force, provide competition, and provide diversity in development pathways, as well as encourage cooperation and capital investment.

Like China, Ohio should set goals and work with the within the free-market to create an environment to develop those goals. Whether that is at the micro or macro-level.

WILL OHIOANS SAFETY BE COMPROMISED

HB104 facilitates a CRADA (Cooperative Research and Development Agreement) between the State of Ohio with a federal agency such as the DOE. The State of Ohio will have to work under the rules provided by the DOE or other federal agency.

The federal agencies that work with nuclear all work closely with the Nuclear Regulatory Commission to develop rules to keep the public safe.

The advantage to working under a federal agencies authority is to provide an accelerated pathway and less costly pathway. Litigation and public comment periods are greatly reduced.

The federal government has many pathways to choose to develop new nuclear technologies. It cannot follow them all. With a CRADA agreement a State may choose to pursue a pathway that the federal government has not gotten to or is not a priority.

OHIO'S NUCLEAR WASTE

HB104 grants that the Ohio Nuclear Development Consortium shall be solely responsible for the internment and long-term sequestration of high-level nuclear waste, or its destruction and/or its reduction, that is produced in the state - if the Federal government defaults on its obligation to dispose of or store Ohio produced high-level nuclear waste.

The consortium may seek funds of the United States department of energy to develop alternative technologies to store, reduce, or consume Ohio's high-level nuclear waste. The consortium shall have legal standing to represent the state if the Federal government fails in its obligation to provide a viable repository for the state's high-level nuclear waste.

The Nuclear Waste Management fund is currently valued at $43 Billion dollars. If the federal government defaults on its responsibilities - States will sue for a piece of this $43 billion. The Ohio Nuclear Consortium will take ownership of this material and arrange for its storage, use, or destruction. If the Ohio Nuclear Development Consortium can demonstrate that it can greatly

reduce or destroy high-level nuclear waste it is very likely that Congress will re-appropriate these funds to expand this technology.

BUSINESS MODEL

Every successful business needs a good business model. There is a natural business model for developing Molten Salt Reactors. Small test and research reactors were historically prohibited from being a commercially entity and producing profit. That ended with the passage of the 2012 American Medical Isotope Production Act.

We know from Oak Ridge National Laboratory's now decommissioned Molten Salt Reactor experiment that a very small MSR can produce commercial quantities of medical isotopes. MSRs - especially fast spectrum MSRs - can not only produce commercial quantities of medical isotopes - it can do so more cheaply than accelerator driven processes and more cheaply than low-enriched uranium reactors. This would allow MSR technology to potentially dominate in delivering medical and industrial isotopes - even in the research phase of their development.

Additionally, the potential to consume high-level nuclear waste not only solves a number of environmental issues but can transform a cost center into a profit center. There is a tremendous amount of nuclear fuel left in our high-level nuclear reactor waste. Successful commercialization of MSR technology that consumes high-level nuclear waste instantly transforms this waste into fuel and from a cost center into a profit center.

The MSR is a demonstrated technology. Unlike many other energy technologies - it is not pie-in -the-sky technology.

While there are significant hurdles to overcome to license and commercialize this technology - although, the technology hurdles are not a high hill to climb.

PHASE 1

The consortium would most likely develop several small reactors and study them rigorously while they produce commercial quantities of medical and industrial isotopes. This in itself is a multi-billion dollar industry.

PHASE 2

The consortium would use the knowledge gained from the small reactors to produce a demonstration size reactor - most likely for the United States military and placed on Department

of Defense Property. This reactor would be heavily studied to develop commercial license regulations and best operational and safety practices. Wright Patterson AFB, if agreeable, might be the perfect place for a demonstration reactor. This would be accomplished with a long-term power purchase agreement. Alternatively, Ohio's Piketon Gaseous Diffusion Facility is another potential facility.

PHASE 3

The consortium would ideally build a full scale commercial reactor at one of Ohio's nuclear reactor facilities. This would allow the company to build a full scale model and refine the techniques needed for assembly-line construction and licensing.

PHASE 4

Build a full-scale production plant capable of producing full-scale reactors and shipping them across the United States and to all parts of the world.

Multiple U.S. companies are working to develop MSR technology and countries like China are racing toward rapid deployment as well. The State of Ohio can assist the free-market by incubating a consortium to bring industry together to counter the Chinese industrial threat. This can be done at little cost and with little risk to the State of Ohio.

THE USE OF EMINENT DOMAIN

HB104 grants the Ohio Nuclear Development Authority the use of Ohio's eminent domain. The consortium does not have use of eminent domain. There is little chance of this power being abused.

Federal law determines where nuclear can be sited. The use of eminent domain, if used would most likely only apply to current or past licensed nuclear sites. Getting site approval for a new nuclear facility is costly and time consuming. The use of eminent domain would likely only be used by the authority as a measure of last resort. It would be much easier for the consortium to buy land that was unlicensed and then go through the licensing process with the NRC as normal rather than trying to take the land through hostile means. There are a number of sites around Ohio that the consortium would naturally be interested in.

1. The Piketon Gaseous Diffusion plant near Portsmouth, OH
2. The Fernald Feed Materials Production Center in Hamilton County, OH
3. Wright Patterson AFB in Dayton, OH

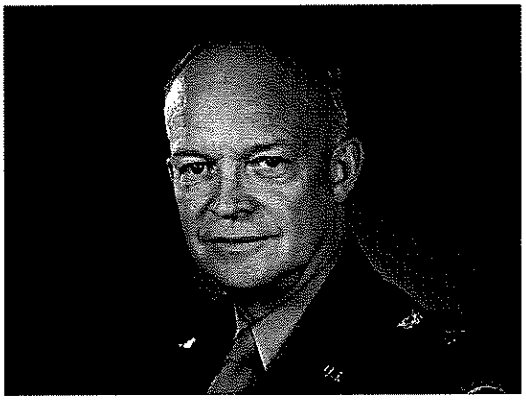
4. Davis Besse Nuclear Power Plant in Ottawa County, OH
5. Perry Nuclear Power Plant in North Perry, OH
6. NASA Plum Brook Station in Sandusky, OH
7. Ohio State University Test Reactor in Columbus, OH
8. Battelle Laboratories - West Jefferson Plutonium Facilities in West Jefferson, OH

CONCLUSIONS

With tremendous benefits and little risk - as a cancer survivor and as a free-market economist, I emphatically encourage you support the passage of this bill.

APPENDIX

AMERICA FIRST *in* NUCLEAR INITIATIVE



President Dwight Eisenhower was a tremendous proponent of nuclear energy. In 1954 he set about expanding nuclear research and development to the States and beyond. The 1954 Atomic Energy Act amended the 1946 Atomic Energy Act with Title 42 , section 2013 and 2021 found in the U.S. Code of Federal Regulations to ensure the federal government would assist other organizations such as states in the research and development of nuclear technology.

Due to the split of the Atomic Enegy Commission into the Department of Energy and into the Nuclear Regulatory Commission the responsibility of recognizing the interests of the states in developing nuclear technology falls most squarely to the Department of Energy.

The Department of Energy can accomplish its Congressional responsibilities through collaborative agreements with states to develop nuclear technology. In this way the Department of Energy can recognize the interests of states, provide for a program of maximum development, provide for widespread participation among the states, and provide for a program of administration consistent with international arrangement and agreements for cooperation that preserves safety.

§ 2013. Purpose of chapter

It is the purpose of this chapter to effectuate the policies set forth above by providing for—

(a) a program of conducting, assisting, and fostering research and development in order to encourage maximum scientific and industrial progress;

(b) a program for the dissemination of unclassified scientific and technical information and for the control, dissemination, and declassification of Restricted Data, subject to appropriate safeguards, so as to encourage scientific and industrial progress;

(c) a program for Government control of the possession, use, and production of atomic energy and special nuclear material, whether owned by the Government or others, so directed as to make the maximum contribution to the common defense and security and the national welfare, and to provide continued assurance of the Government's ability to enter into and enforce agreements with nations or groups of nations for the control of special nuclear materials and atomic weapons;

(d) a program to encourage widespread participation in the development and utilization of atomic energy for peaceful purposes to the maximum extent consistent with the common defense and security and with the health and safety of the public;

(e) a program of international cooperation to promote the common defense and security and to make available to cooperating nations the benefits of peaceful applications of atomic energy as widely as expanding technology and considerations of the common defense and security will permit; and

(f) a program of administration which will be consistent with the foregoing policies and programs, with international arrangements, and with agreements for cooperation, which will enable the Congress to be currently informed so as to take further legislative action as may be appropriate.

§ 2021. Cooperation with States

(a) Purpose

It is the purpose of this section—

(1) to recognize the interests of the States in the peaceful uses of atomic energy, and to clarify the respective responsibilities under this chapter of the States and the Commission with respect to the regulation of byproduct, source, and special nuclear materials;

(2) to promote an orderly regulatory pattern between the Commission and State governments with respect to nuclear development and use and regulation of byproduct, source, and special nuclear materials;

Four Provisions of the 1954 Atomic Energy ACT

"as the States improve their capabilities to regulate effectively [radioactive] *materials,* ***additional legislation may be desirable****"*

"provide for a program of conducting, assisting, and fostering research and development in order to ***encourage maximum scientific and industrial progress****"*

"to promote an orderly regulatory pattern between the Commission and State governments with respect to **nuclear development** and use and regulation of byproduct, source, and special nuclear materials"

"to encourage widespread participation in the development and utilization of atomic energy for peaceful purposes ***to the maximum extent consistent with the common defense and security and with the health and safety of the public****"*