

Anthem Bill HB 104

Sponsor Testimony

Advanced Nuclear Technology Helping Energize Mankind

Dick Stein—June 18, 2019

**Slide 1**

It is with great pleasure that I have the opportunity to share my vision with you, of a cleaner and more powerful future for Ohio and the United States.

Last year, this body swiftly adopted House Resolution 518 which petitioned the United States Dept. of Energy to create programs allowing for the development of advanced nuclear technologies, prototype reactors, nuclear and non-nuclear laboratories, and any other authorities the agency delegates.

I am happy to report that those rules were recently approved by the Nuclear Regulatory Commission and await a public comment period. We are engaged with many industry and academic groups who will be offering their comments and support.

**Slide 2**

The development of a civilian nuclear fleet quickly followed its military applications.

Of the 98 nuclear reactor operating in the United States, all of them are Generation II—Pressurized Water Reactors like Perry, and Boiling Water Reactors like Davis-Besse.

House Bill 104 looks forward, to break the light-water reactor mold and free the market to realize our energy future.

### **Slide 3**

The first graph highlights global nuclear electricity production from 1970 to 2015. The world's 448 nuclear reactors online produce just shy of 2,500 Terra Watt hours of carbon-free electricity each year.

The second graph shows new reactor construction. It is interesting to note which regions are investing in nuclear, but also which countries are building those reactors.

Of the 59 reactors under construction globally, China leads 18. The growing strength of China's domestic nuclear industry is supporting the active promotion of its technology and services overseas. China has entered cooperative agreements with France, Kenya, Saudi Arabia, Brazil, Pakistan, Vietnam, and Argentina.

Russia is also actively promoting its nuclear fleet in Bangladesh, Belarus, Hungary, India, Turkey, and Iran.

I am inclined to believe these nations are not embracing nuclear for its progressive environmental benefits. But that, until recently, these states lacked the economic or technological capacity to make their dreams of reliable power a reality.

### **Slide 4**

In 2018, Bill Gates spoke on the future of energy saying, "Nuclear is ideal for dealing with climate change, because it is the only carbon-free, scalable energy source that's available 24 hours a day."

\*\*Ball and Soda Can Prop\*\*

What does energy density mean on a unit scale? A kilo of coal can generate 12 kilowatt hours of electricity, enough to power your home for about 10 hours.

As we all know, nuclear reactors do not use coal, but rather Uranium-235. Can anyone guess the potential energy a kilo of U-235 holds? Well it could power your block for a couple hundred...years with 24 million kilowatt hours stored.

Admittedly, light-water reactors are only capable of tapping into 5-10% of the fuel rod's energy. That means upwards of 90% of that energy potential remains, stored safely, on-site, as waste fuel; waiting for its second life.

### **Slide 5**

I was dismayed to learn of efficient, passively safe, and viable reactor types that were abandoned during the Cold War due to their non-proliferating nature; a quality that is now the standard. Instead, the reactor we chose, a light-water reactor, is inherently volatile and requires literally billions of dollars of safety redundancies.

Companies like Westinghouse and NuScale recognize the appeal of a distributed energy system with their Small Modular Reactor design. This cut-away depicts a site housing several SMRs.

In 2017, addressing students at an MIT climate change forum, former Secretary of State John Kerry said, "Given this challenge we face today, and given the progress of fourth generation nuclear: go for it. No other alternative, zero emissions."

### **Slide 6**

The ANTHEM Act will signal the start of a nuclear renaissance and technological era in Ohio.

\*\*Refer to the ANTHEM.pdf\*\*

## **Slide 7**

History shows that periods of rapid economic development quickly follow the discovery of a cheaper, more efficient energy source. Few things provide more hope for a brighter future, for a higher standard of living, than an abundance of clean, safe, and affordable energy.

Nuclear innovation has deep roots in Ohio, touching all corners of the state.

Our state is uniquely suited for the research and development of advanced nuclear technologies. Ohio boasts an advanced manufacturing capacity and a specialized faculty at The Ohio State University in nuclear engineering. Our state ranks number two in the nation for providing nuclear components and services to the military and industry.

These are some of the companies with headquarters in Ohio who are actively engaged in these supply streams.

## **Slide 8**

The United States is home to the best talent and the brightest minds. Here's a sampling of American companies involved in advanced reactor design and engineering. These companies are severely limited in what technologies can be pursued stateside and are often forced to relocate to more favorable environments.

Technologies may include:

- Molten Salt Reactor
- Traveling Wave Reactor
- Fusion Reactor
- Fast Neutron Reactor

Later slides include a few reactor designs in greater detail.

## **Slide 9, 10, 11**

With your help, we can lead the nation and the world by creating an environment for companies to develop their reactor designs here in Ohio. This year will mark my third visit to the Molten Salt Conference at Oak Ridge National Laboratory in Tennessee. Here, renowned scientists discuss the progress being made in cutting edge nuclear science and the difficulty moving these technologies forward.

Ironically, it is not for lack of concept that stifles design, but the economic and regulatory uncertainty accompanied, for private investment to make these reactors a reality. House Bill 104 seeks to bridge that gap by providing a framework for regulation, and an incubator for development—in an Authority and a Consortium respectively.

Under the direct delegated authority of the Dept. of Energy, a non-profit Authority would serve as a government-appointed intermediary overseeing arrangements for nuclear R&D. Its mission would be to make Ohio a leader in the development and construction of new-type advanced nuclear reactors, the commercial production of isotopes, and nuclear waste reduction. The Authority would seat members representing Safety, Industry, and Engineering R&D.

A public benefit Consortium would be created to foster economic support for the research and development activities its member wish to pursue. The concept is similar to how the Transportation Research Center in East Liberty operates a clearinghouse for federal test standards of the National Highway Transportation Safety Administration.

## Slide 12

Nuclear medicine was developed in the 1950's by using Iodine-131 to treat thyroid disease. According to the World Nuclear Association, nuclear medicine is used in roughly 40 million medical procedures each year. The United States is by far the majority user of these products, with nearly 50,000 diagnostic imaging scans performed daily.

One of the largest radio-pharmacy networks is managed by Cardinal Health, based here in Dublin, Ohio. During a recent facility tour, I was informed that nuclear medicine is one of their fastest growing sectors. That is a pretty astonishing statement, when you consider that the United States has virtually no production of radioisotopes. In 2016, the global radioisotope market was valued at \$9.6 Billion and is set to boom as more treatments are approved.

The discovery and availability of alpha-emitting therapies has the ability to save countless lives affected by cancer. Alpha-emitting isotopes have very low penetrating power, and incredibly high ionizing power. This allows for guided therapies without subjecting the patient to rounds of radiation exposure.

Three international sites, including Oak Ridge National Lab, collectively produce the world's supply of Actinium-225—enough to treat fewer than 100 patients, let alone run any clinical trials for new therapies. The parent isotope Actinium-225 has a half-life of 10 days and decays into the daughter isotope Bismuth-213 whose half-life is less than an hour. Bismuth-213 has proved an effective treatment for late stage prostate cancer.

### **Slide 13**

Fortunately, there is movement. The Dept. of Energy looks to invest in a nuclear fuel reprocessing facility. The narrative is changing for the nuclear energy industry in the media.

**\*\*Reference Narrative Attachment\*\***

In April 2018, Dave Roberts wrote for Vox news, a piece about PJM and its potential nuclear retirements saying, “If climate change is indeed an existential threat...isn’t the loss of 40TWh a year of carbon-free energy a four-alarm emergency?”

Recently, Senator Lisa Murkowski of Alaska and 13 bipartisan colleagues reintroduced the Nuclear Energy Leadership Act, “to boost nuclear energy innovation and ensure advanced reactors can provide clean, safe, affordable, reliable power to meet the national and global energy needs.”

America needs to regain its position and strength in the nuclear arena.