

**NUCLEAR ENERGY INNOVATION AND THE NATIONAL LABS
HEARING**

**BEFORE THE SUBCOMMITTEE ON
ENERGY
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
UNITED STATES HOUSE OF REPRESENTATIVES**

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Testimony of Mr. Frank Batten, Jr. on Behalf of The Landmark Foundation

Chairman Weber, Ranking Member Grayson and other members of the Subcommittee. Good morning. My name is Frank Batten and I am Chairman and Chief Executive Officer of Landmark Media Enterprises, LLC, and also President of The Landmark Foundation. Landmark Media Enterprises is a diversified media and business services company providing print newspapers, classified advertising websites, software and data center services.

Our company funded The Landmark Foundation as a private foundation that supports educational, environmental, and human service organizations mostly in the Norfolk area, and I am here today on its behalf. I greatly appreciate the opportunity to testify before this Subcommittee, and I am honored to be part of this distinguished panel.

I am testifying today about public-private partnerships with the federal government, and in particular, a positive example of a cooperative research and development effort between The Landmark Foundation and a U.S. Department of Energy (DOE) National Laboratory. I am here to discuss The Landmark Foundation's near-completed Cooperative Research and Development Agreement, or "CRADA," with the DOE's Argonne National Laboratory (Argonne) relating to what we believe should be an important component of our Country's national energy policy: in

particular, the recycling of used nuclear fuel through a demonstrated U.S. technology called “pyroprocessing.”

Mr. Chairman, before I begin my testimony I would like to commend the Committee for its efforts on H.R. 1158, the Department of Energy Laboratory Modernization and Technology Transfer Act and in particular Section 104, Nuclear Energy Innovation. I believe this type of legislation will help to maintain the focus of the Department of Energy on nuclear energy technologies and to identify the opportunities for cooperative research and development projects with the private sector.

The Landmark Foundation has *no* commercial interest in this area – in other words, we have no financial “agenda” in promoting this nuclear fuel recycling technology. But we believe that the United States—as a country—can significantly benefit from recycling used nuclear fuel through pyroprocessing. While private industry can and should play a role, federal government research and development (R&D) funds, at least in the near and intermediate term, are essential if the benefits of this technology are to be realized.

Pyroprocessing of used nuclear fuel has been the subject of federal R&D for many years. DOE’s Argonne National Laboratory has led the way with, among other things, its pioneering development of a first-of-a-kind pyroprocessing facility for used metallic fuel from its Experimental Breeder Reactor II (EBR-II). Argonne has treated more than four metric tons of used fuel using pyroprocessing. The technology is now capable of recycling used nuclear fuel from the country’s nuclear power plants. This technology can and should be employed to beneficially re-use the existing U.S. inventory of commercial light-water reactor used fuel. Once the fuel is recycled, it can then be used again as fuel to generate electricity in advanced reactors.

This approach could result in a continued public-private partnership related to pyroprocessing for decades into the future.

Pyroprocessing technology development is good energy policy, environmentally sound, promotes effective use of resources, can contribute to addressing climate change, and holds the promise of significantly mitigating the used nuclear fuel disposition issue that currently confronts this Country.

I would like to cover two general but related topics today: (1) first, I will briefly describe the success story of our public/private partnership with Argonne, its general status, and the anticipated successful conclusion. Second, I will generally brief the Subcommittee on the benefits we see being derived from this technology when it is employed at full scale, based upon an analysis undertaken by Energy Resources International, Inc. (ERI). ERI is a highly-regarded, international consulting firm specializing in, among other things, independent resource, technology and market analyses; economic consulting; and strategic planning and procurement associated with the nuclear fuel cycle. The Landmark Foundation commissioned and funded the ERI analysis outside of the CRADA. The ERI report analyzes the costs and benefits of using pyroprocessing and advanced reactors on a commercial scale. I have attached a copy of the ERI Report to my testimony and ask that it be included in the hearing record.

The Landmark/Argonne CRADA

The Landmark Foundation entered into the CRADA with Argonne over two years ago, in March 2013. The CRADA involves a public/private cost sharing arrangement and use of Argonne's extensive technical expertise and resources. Landmark invested \$5 million and the federal government contributed \$1 million to the CRADA.

The purpose of the CRADA is to develop the conceptual design and a robust cost estimate for a *pilot scale* pyroprocessing demonstration facility for converting used commercial reactor fuel into a form that can be re-used as fuel in an advanced reactor. The pilot plant would be designed to recycle up to 100 metric tons per year. The basic technology was developed at Argonne and the conceptual design is based on the work previously performed at Argonne. Under the CRADA, Argonne's work includes developing process descriptions and requirements, equipment conceptual designs, facility layout, a safety assessment strategy, and cost and schedule estimates.

We feel that our CRADA with Argonne is a particularly good use of the public/private partnership concept. It leverages prior government-funded work, takes that work to the "next level," begins to evaluate regulatory options to make this effort a reality rather than just another academic exercise, and builds a bridge for the U.S. Government to move forward with the detailed design for the pilot facility. All of this, we hope, will spur additional federal funding for a pilot facility.

The CRADA is on budget and very close to completion.

Conclusions of the ERI Analysis

I also would like to discuss the ERI Report that we funded, which provides a detailed assessment of the costs and technical factors associated with a realistic "fuel cycle" using pyroprocessing and advanced reactors. Among other things, the ERI analysis concluded that the potential exists to reduce the volume of used commercial light water reactor fuel requiring permanent disposal by 50% or more, avoiding the need for a second geologic repository in the United States. As you may know, the Nuclear Waste Policy Act limits the capacity for a first permanent geologic repository to 70,000 metric tons. However, even if no new reactors are built

in the United States, the existing fleet is projected to generate twice that amount, or 140,000 metric tons. Avoiding a second repository would save the U.S. Government tens of billions of dollars, and indeed, that avoided cost could “pay” for a pyroprocessing/advanced reactor fuel cycle.

According to ERI, re-use of pyroprocessed fuel also would simplify the design of a first geologic repository, as a result of an order of magnitude reduction in the radiotoxicity of the resulting waste product. At 1,000 years after discharge from a reactor and pyroprocessing, the waste to be disposed of would contain only 1% of the activity found in waste from the current once-through fuel cycle. The volume of repository space needed also could be reduced by over 50%. This would significantly contribute to reducing the federal government’s financial liability associated with its obligation to receive the used fuel from its utility standard contract holders.

Let me conclude by quoting a summary conclusion from the ERI Report:

There are significant potential cost savings and technical benefits associated with recycling nuclear fuel (*i.e.*, developing pyroprocessing and IFRs), compared to the current once-through fuel cycle. Key among these is eliminating the need for a second geologic repository at a cost savings in the range of \$12 to \$96 billion.

However, adequate research and development funding, and deploying a pilot facility to demonstrate pyroprocessing in the U.S. is an important step in resolving remaining technical challenges prior to scaling up the technology to a commercial scale. Expanded research, development, and demonstration of pyroprocessing and IFR technology should continue in the U.S. to provide a sustainable alternative program for long-term waste management and nuclear power deployment.

As I said earlier, I am pleased to be here today to talk both about the success of our partnership with Argonne and the underlying benefits that can be derived if the technology that is the focus of that partnership is given the opportunity for further development. Thank you for

your time and attention. While I am hardly the technical expert on this panel, I would be pleased to answer any questions you may have.