

## Summary Minutes of the

U.S. Department of Energy (DOE)  
Secretary of Energy Advisory Board  
Public Meeting

Committee Members: William Perry, Chair; Nicholas Donofrio, Co-Chair; Michael McQuade; Arthur Rosenfeld; Steven Westly

Date and Time: 9:00 AM- 3:30 PM, April 17, 2012

Location: Argonne National Laboratory  
9700 S. Cass Avenue  
Lemont, IL 60439

Purpose: Meeting of the Secretary of Energy Advisory Board

SEAB Staff: Alyssa Morrissey, Deputy Designated Federal Officer

DOE Staff: Secretary Steven Chu; Renee Stone, Senior Advisor

Argonne Staff: Eric Isaacs, Director of Argonne National Laboratory; Peter Littlewood, Associate Laboratory Director; Don Hillebrand, Energy Systems Interim Director; Ian Foster, Computation Institute Director; Mark Peters, Deputy Laboratory Director for Programs

### Meeting Summary

The discussion followed the issues and timing as presented in the meeting agenda.

### Opening of Public Meeting

Chairman Perry thanked the Secretary for his leadership and dedication to the Advisory Board. He noted the current Presidential term is coming to an end and with a new term, there could be changes to SEAB. He asked that the Committee keep this in mind and put all of its energy into making useful and complete recommendations by the end of this first term with the hope of carrying on the work over the next year. The Chairman noted a need for a summing up of what the Committee has done and what it is that can still be achieved to leave a legacy that the Committee, the Secretary, and the country can be proud of.

The Chairman highlighted three areas he felt were important for the Committee to address and what the Committee had already done in these areas. The first is reducing the demand for energy. The second is increasing the supply. And the third is a systems analysis of how U.S. energy strategy affects important national goals: security, economy, and the global environment.

### *Reducing Energy Demand*

There is a Subcommittee on Buildings Energy Efficiency that is currently examining advances through the improved design and efficiency of buildings. The Chairman notes that there is potential for huge payoff in this area that has only been partially realized to date.

The Committee has not specifically looked at improved design and efficiency of transportation. This may not be necessary, but perhaps it is worth looking at and considering what is already being studied on this. The Committee has heard presentations on hybrid electric, diesel, and natural gas applications. Can these be accelerated and extended to beneficially affect the economy and our global environment?

The Committee has also not specifically looked specifically at the social aspects of energy use: What can be done to educate and incentivize individuals to reduce the use of energy?

#### *Increasing Energy Supply*

The second area is increasing the supply of energy by means other than buying oil from other countries – reducing our dependence on imported oil. Nuclear energy is one answer – for a variety of reasons, the nuclear industry in the U.S. stalled about 30 years ago. About 5-6 years ago, there was talk of a nuclear renaissance, but after Fukushima, this has slowed or stopped due to real concerns about safety, security, and economy. The SEAB Small Modular Reactors Subcommittee addresses this issue.

The country has seen a renaissance in natural gas through sophisticated technology to develop gas fields that were not previously economically attainable. There has been a dramatic decrease in the price of natural gas. SEAB had a detailed study at the President and Secretary's request, which reaffirmed the high importance of this asset and considered the environmental issues. The Chairman believes the Committee's duties on this topic will continue.

Biofuels is another area that the Committee has not considered where there is great potential for advances in areas such as making ethanol and other advanced fuels from agricultural waste and cellulosic materials. DOE has done a great deal of research and development on this. The Chairman believes we are near a solution to that problem and will find a way to develop advanced biofuels economically soon.

#### *Energy Strategy Systems Analysis*

The final issue is completing a systems analysis of U.S. energy strategy dealing with security, economy, and environment. Energy independence is not a new concept – President Eisenhower touted the idea. The good news is that in the last few years, the percentage of oil imports has gone down below 50%. The other good news is that a significant percentage of that oil is coming from Canada and this sets us up for achieving North American energy independence – the Chairman believes we can achieve this in a decade or less.

#### *Comments from the Co-Chair*

Co-Chair Nick Donofrio commended the Chairman on his summary and echoed the sentiments about the Secretary's leadership and involvement with the Secretary.

#### Comments from the Secretary

The Secretary's comments focused on advances in natural gas and transportation technologies.

He noted that previous DOE investments contributed to the current boom in shale gas – as early as 1978 and up through the early 1990s. Fracking has led to an increase in domestic oil production. Because shale gas and shale oil appear to be located in a number of areas of the world, it is important to develop this resource safely on a global level. Whenever there is a disaster in energy, there are ramifications worldwide.

The Department is also doing research on methane hydrates: methane embedded in ice. Carbon dioxide displaces the methane such that you sequester the CO<sub>2</sub> and get the methane out.

The Secretary believes natural gas is a good transition fuel. Because natural gas is so plentiful, people are looking for outputs other than electricity. As there are more petitions to build liquefied natural gas distribution points, there are tough questions dealing with global prices merging.

With regard to natural gas for transportation, several companies are running long haul trucks on natural gas with a payback period of about four years. While diesel prices are more likely to go up than down, natural gas prices are dependent on supply and fracking technology has enabled us to get more resources. DOE is looking at natural gas applications for trains as well. If natural gas makes a dent in transportation, it will change the geopolitical energy landscape of the world because many more areas have natural gas resources than oil resources.

Electrification and biofuels are other areas DOE is looking into. DOE is funding companies doing battery research and some of these companies are making great advances in improving the energy intensity of current lithium ion batteries. Because of the decreased cost to fuel, a \$20,000 to \$25,000 thousand car that gets equivalent to 100 miles per gallon will pay for itself over an \$18,000 conventional car.

With regard to biofuels, algae has great promise. The algae-based biofuels production goal is \$5 per gallon within less than a decade. A photosynthetic bacteria research project is ongoing but needs to get more efficient.

The Secretary supplemented his presentation with slides – please see these slides for more information on the topics discussed.

#### Transformative Role of Computation and Big Data – Ian Foster

Dr. Foster discussed the intersection of increased computing speed and the availability of data. Computers have been getting faster, not just incrementally, but by a factor of ten over the past six years. There are large numbers of sequencing machines throughout the world, and their prominence is amplified by increased use. Close to a billion pages of scientific articles are online – there is a need for integration and automation. The Computation Institute was established to bring together interdisciplinary groups to tackle this type of issue.

Advanced computing takes a great deal of power – a new computer at Argonne will use 8MB and it is incredibly efficient. If we become a supercomputing nation, it will be a national issue to provide power for data centers.

Dr. Foster's slides provide more information.

#### Transportation Technology R&D – Don Hillebrand

Argonne is working on all transportation sectors including air, heavy trucks, light trucks, cars, and rail. Most inefficiencies are in cars and light trucks. It is important to keep government R&D going even when oil price drops – when there is private investment goes when price is high, private industry loses money when the price goes down again.

Argonne interacts with automobile and battery companies to design batteries with systems containment and components that can be taken out and reused in other applications. The lab explores these topics with battery systems manufacturers to think longer-term and consider how to recycle the materials.

Argonne's Advanced Powertrain Research Facility takes in vehicles to be tested, benchmarked, taken apart, analyzed, and reverse engineered where possible. This facility mirrors what the industry already has but the personnel is different and focused on solving common problems for the industry. Tests analyze fuel economy, emissions, and other features such as performance in high and low temperatures.

Charging infrastructure is incredibly important in advanced vehicle technologies and is important to consider. BEVs require much more electricity to charge than PHEVs.

The goal for the U.S. should be to take battery chemistries and develop and scale them in the U.S. rather than manufacturing them abroad as has usually been the case. Having a manufacturing infrastructure in place for the processes is one of the reasons that companies take the manufacturing abroad. Also, capital costs are low.

Dr. Hillebrand's slides contain additional background on this subject.

#### Materials Solutions for the Energy Economy – Peter Littlewood

Dr. Littlewood gave a presentation on transformative materials technologies for the electrified economy. We need a roadmap for materials development that enables us to escape primitive technologies and have a predictable path forward. The challenge is to learn how to construct functional materials whose properties are defined by precisely controlled interfaces on the nanoscale that can be manufactured at low cost in enormous volume.

See Dr. Littlewood's slides for full information on this topic.

#### Update on Small Modular Reactors Subcommittee – Nick Donofrio

SMR Subcommittee Chairman Nick Donofrio noted that nearly all members attended the first meeting and that the next meeting will be at the end of May. The Subcommittee has decided to make the next meeting public and is in the process of inviting stakeholders. The Subcommittee hopes to finish collecting input in the June/July range and then aims to write its report by October. The SEAB members and industry representatives that form the Subcommittee have risen to the occasion and Subcommittee Chairman Donofrio is pleased with the progress made thus far.

#### Buildings Subcommittee Report – Steve Westly, Michael McQuade, Art Rosenfeld

Subcommittee Chairman Steve Westly applauded the work of the Subcommittee, particularly Maxine Savitz. He also thanked Joel Berman, who has been coordinating on a staff level. He

announced that the Subcommittee has completed a first draft of its report and expects to have it ready to discuss with the full committee by the next scheduled meeting.

General observations of the Subcommittee have been that a revolution in building energy efficiency is possible since there has been very little change over the past several decades. Areas of particular interest are windows and skins of buildings, components within buildings, and controls and management systems. DOE has an opportunity to be a leader in setting standards, promoting best practices, making advances in the funding process, and coordinating amongst other government agencies.

Michael McQuade added that the Subcommittee started with more of a focus on the technology side and is now looking at integrating across DOE on the deployment encouragement side. He noted that the report may include comments about the Hub and DOE's technical programs.

Art Rosenfeld noted that the Subcommittee experience increased his awareness of the interaction between government and the private sector. One example of an interaction in this area is the Roof Top Unit (RTU) Alliance, which he finds to be an interesting approach to deploying efficient equipment and appliances.

#### Shale Gas Subcommittee Update – Renee Stone

As a reminder, the Subcommittee reported out in November with final recommendations and disbanded after the issuance of the report. Subcommittee members continue to speak and write on the subject in their individual capacities and meet with stakeholders regarding implementation of the recommendations.

There have been several steps taken to implement the Subcommittee's recommendations.

The President issued an executive order instructing agencies to work together to ensure that shale gas is developed in as safe and expeditious a manner as possible. A similar lower-level initiative has been ongoing among the agencies for a longer time period. DOE, EPA, and DOI agreed on an interagency R&D protocol for a total of \$45 million in research funding approved last year (\$13 million of which is DOE funding). The agreement instructs agencies to work together to do research in the most effective way possible without redundancies. These actions are consistent with the recommendations of the SEAB committee.

The final report did not attempt to resolve regulatory policy questions, but pointed out areas where regulatory infrastructure is weak and encouraged addressing that. EPA has issued regulations to address some aspects of air pollution from oil and gas production operations. EPA is also undertaking a long term study of water pollution impacts to be published in 2014 with draft at the end of this year. Because the Department of the Interior regulates drilling on Federal lands, it is working on proposed regulations that would set standards for well integrity and waste water disposal and disclosure of fracking chemicals.

With regard to some of the report's minor recommendations: The White House Office of Science and Technology Policy is taking the lead on establishing a public website as an information clearinghouse. Minor funding has been awarded to support a disclosure database with the Ground Water Protection Council.

Some of the other recommendations are beyond the control of the Federal government, like putting together a multi-stakeholder standard-setting organization to set standards for production and safety. There are recommendations on how to do that but no initiatives from industry yet.

Public Comment

No individuals signed up for public comment.

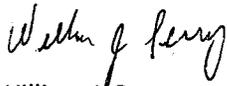
Chair Wrap-Up

Chairman Perry adjourned the meeting with a note that the next meeting is planned to be held in Washington, DC.

Respectfully Submitted:

Alyssa Morrissey  
Deputy Designated Federal Officer

I hereby certify these minutes of the January 31, 2012, SEAB meeting are true and correct to the best of my knowledge.



William J. Perry  
Chair