

PERSPECTIVES ON ENERGY POLICY



PERSPECTIVES ON ENERGY POLICY:

Security, Economics, and the Environment

March 18 and 19, 2009
University of California, San Diego
San Diego, California



ORGANIZING COMMITTEE

Sandia National Laboratories

Marjorie Tatro
 Dawn Manley
 Marianne Walck
 Ben Cipiti
 Ron Stoltz

University of California, San Diego

Lisa Shaffer
 Charles Kennel

Viewpoint Learning

Heidi Gantwerk

Public Conversations Project

Meenakshi Chakraverti

PARTICIPANTS

Charles Kennel, University of California, San Diego
 Les Shephard, Sandia National Laboratories
 Michael Aimone, United States Air Force
 Shad Balch, General Motors
 Dave Barthmuss, General Motors
 Richard Carson, University of California, San Diego
 Linda Cohen, University of California, Irvine
 Bob Conn, Kavli Foundation
 Susan Hackwood, California Council on Science and
 Technology
 Robert Harriss, Houston Advanced Research Center
 Winston Hickox, California Strategies
 Martha Krebs, California Energy Commission
 Joel Kurtzman, Milken Institute
 Barbara Lee, Viewpoint Learning
 Jane Long, Lawrence Livermore National
 Laboratory
 Lisa Margonelli, New America Foundation
 Richard Matthew, University of California, Irvine
 Terry Michalske, Sandia National Laboratories
 Granger Morgan, Carnegie Mellon University
 Bill Reinert, Toyota
 Susan Rochford, Council on Competitiveness
 Maxine Savitz, National Academy of Engineering
 Alison Silverstein, Consultant
 Arnie Vedlitz, Texas A&M
 Pat Windham, Stanford University
 R. James Woolsey, VantagePoint Venture Partners
 Daniel Yankelovich, Viewpoint Learning

AUTHORS

Dawn Manley
Heidi Gantwerk
Meenakshi Chakraverti
Marianne Walck
Lisa Shaffer
Charles Kennel
Marjorie Tatro
Ben Cipiti
Ron Stoltz

For more information, contact:

Dawn Manley
Sandia National Laboratories
P.O. Box 969, MS 9406
Livermore, CA 94551
(925) 294-4589
dmanley@sandia.gov

SPECIAL ASSISTANCE

UCSD Student Notetakers:

Meagan Moore
Sheila Walsh
Krystal Tribbett
Melanie Zauscher
Shannon Pallone
Sandra Kirtland
William Gorham, Jr.
David Almeida

Administrative:

Lisa Shannon, Sandia National Laboratories
Jennifer Contreras-Bamberger, Sandia National
Laboratories
Deborah Marchand, Sandia National Laboratories
Michelle Session, University of California,
San Diego
Reagan Espino, Viewpoint Learning

Publication:

Holly Larsen, Sandia National Laboratories
Michael Vittitow, Sandia National Laboratories
Mona Aragon, Sandia National Laboratories

Photography:

Keino McWhinney, Viewpoint Learning

CONTENTS

Executive Summary.....	6
Themes.....	6
Issues and Recommendations.....	7
Section 1 – Introduction: Goals, Framing, and Perspectives.....	9
Framing the Dialogue.....	9
Presentations.....	10
Reflections.....	11
Challenges and Opportunities.....	11
Section 2 – A Shift to Action.....	13
Setting Strategic Goals.....	13
Recommended Steps.....	15
Address International Linkages.....	16
Enhance Education.....	17
Reshape Cars/Transportation.....	18
Strengthen Policy and Leadership.....	19
Incentivize Energy Efficiency.....	20
Section 3 – Recommendations.....	21
Section 4 – Themes.....	23
Section 5 – Next Steps.....	25
Appendix: Perspectives on Energy Policy Workshop Agenda.....	26

EXECUTIVE SUMMARY

On March 18 and 19, 2009, Sandia National Laboratories and the University of California San Diego (UCSD) Sustainability Solutions Institute (SSI) brought together 27 leaders from academia, government, and the private sector to discuss key energy policy issues and proposed values- and outcomes-based approaches to energy policy. The goal of the workshop was to bring together leaders from diverse backgrounds to identify promising areas for energy policy, based on the understanding of intersecting issues, assumptions, and priorities from the national security, economic, and environmental perspectives.

Over the two days of the workshop, participants identified and proposed initiatives in five areas:

- Development of global linkages between national security, economics, and environmental concerns;
- Education to create the workforce needed for the next generation of energy technologies and deepen the public's understanding of their energy choices;
- New approaches to cars and transportation;
- Leadership that focuses on long-term outcomes rather than short-term solutions; and
- Incentives and goals for energy efficiency.

By workshop end, participants underscored one central point:

Decisions about energy and energy policy are inextricably linked to economic, environmental, and national security considerations, and have significant consequences in all three areas.

Themes

Throughout the interactive “trialogue,” several major themes emerged:

- **Linkages.** The overwhelming acceptance of the link between energy and the three perspectives—economic, environmental, and national security—by such a diverse group was fundamental and not to be taken for granted. Acceptance of these links, and particularly the inclusion of national security, departs significantly from much of today's thinking.
- **Values.** Also woven throughout the workshop was a high-level consideration of values and of energy policy as value-driven. All stakeholders in energy decisions—technical experts and scientists, decision-makers, the private sector, and the public—start from a set of core values. Considering energy policy as values-driven is a shift, and points to clear steps that will be essential in achieving radical transformation of our energy policy.
- **Public engagement.** Every strategic goal and action plan discussed during the workshop took into account the critical role of the public. Effectively raising public awareness and helping the public work through difficult tradeoffs will require leaders to think beyond traditional energy-related institutions and frameworks. Organizations and institutions that reach great numbers of the American public (such as the American Association of Retired Persons and the American Automobile Association) should take on energy issues as central to their mission and communicate the choices and tradeoffs to their membership.
- **Rethinking the consumer understanding of green.** For consumers struggling to make ends meet, buying green—typically seen as spending more to gain environmental benefits—is an unaffordable luxury. The government and the private

sector must find ways to appeal to the core values of Americans beyond their desire for a cleaner environment and tap into their need for quality products at affordable costs, their desire for increased national security, and their support for economic growth and job creation.

- **Elevating the stature of the mundane.** Distributed generation does not make newspaper headlines. But a well-planned distributed power-generation network could significantly improve the nation's ability to provide reliable and efficient electricity. It will be important to encourage policy makers to support solutions based on their potential impact and not solely on their potential to make headlines.
- **New voices.** Too often, energy discussions involve the same relatively small group of players. Bringing new voices into the dialogue is essential. In particular, an intergenerational approach is needed, with young people fully engaged and acknowledged as stakeholders in every energy decision.
- **Rethinking education.** The education system was seen as lacking the tools and curricula needed to position the United States to create the next-generation green workforce. Major enhancements to the primary, secondary, and post-secondary education systems are key to building future scientists, decision-makers, and a public capable of addressing energy challenges.

Issues and Recommendations

Several key issues and recommendations for action surfaced during workshop discussions:

- **Focus policy on outcomes and values rather than on mandating specific technical solutions.** Current energy policy often mandates solutions, such as specifying the market penetration level for a particular technology. Policy based on outcomes places the emphasis on the impact of solutions rather than a particular technology. For example, setting overall targets for transportation emissions rather than specifying the number of zero emissions vehicles or amount of biofuels sold could enable new paradigms for transportation that consider vehicles and fuels as a system.
- **Consider long-term outcomes when making energy decisions.** Policies created in response to shocks or crises may have unforeseen long-term implications. Policies must shift to a long-term, outcomes-based framework that includes systems-level analysis of the impacts of policy decisions. Approaches such as forward-looking, transparent systems modeling and analyses that explore a range of factors would allow better understanding of the broader impact of particular actions and enable better long-term decisions.
- **Conduct an assessment of the nation's energy security status comparable to those for environmental and economic security.** The United States conducts an annual inventory of its greenhouse gas emissions and sinks using methodologies consistent with those recommended by the International Panel on Climate Change guidelines.¹ Moreover, the economic impacts of energy are often quantified in terms that relate energy use to Gross Domestic Product (GDP), such as energy consumed per dollar of GDP.² Measuring energy security has proven to be more elusive. Developing a recognized process for conducting an energy security review similar to the established environmental and economic assessments would facilitate placing security considerations alongside environmental and economic considerations when setting energy policy.
- **Create a distinguished, high-level independent council, patterned after the Council on Foreign Relations, that could act as a forum for analyzing and communicating critical issues to energy policy makers and the public.** The Council on Foreign Relations (CFR) is an independent, non-

¹ Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007.

² International Energy Authority Report No. DOE/EIA-0384 (2008), Annual Energy Review 2008.

partisan membership organization, think tank, and publisher that serves as a resource on the foreign policy choices facing the United States and other countries.³ A similar Council that provides an independent venue for addressing energy policy options would help deepen the nation's understanding of how security, economics, and environmental considerations come together and thus inform energy policy decisions.

■ **Develop educational curricula that addresses energy and sustainability suitable for all levels.**

Preparing for the 21st century workforce requires new approaches to education at all levels. For example, K–12 curricula are needed to create an informed public. Community college and vocational training in new energy technologies and systems will provide technicians to install and maintain new and expanded energy technologies. In addition, an initiative similar to the Land-Grant College Act of 1862, which established agricultural colleges throughout the country but focused on university-based sustainability solutions centers of excellence, would provide a nation-wide educational focus on energy and sustainability throughout the university system. This would accelerate the development of the next-generation technologies and workforce.

- **Develop tangible messages that engage the broad public to think about their energy choices and make informed decisions.** Providing clear information can help individuals make smart choices to minimize their energy use. Information sites like those of the California Energy Commission's Consumer Energy Center⁴ and standards such as the Energy Star⁵ product rating system provide consumers with transparent information about the energy impact of their purchases or behaviors. Expanded messages and explicit choices that are accessible across socioeconomic levels are needed to engage the public to make smart energy choices.

Participants closed the workshop with enthusiasm for taking actions to move toward the recommendations discussed above. They agreed that increased understanding of the three-way linkages among economic, environmental, and national security is necessary, both for addressing the impact of each perspective on energy policy, and also for the implications that policy choices have on the nation's energy picture. In particular, the participants agreed that in many high-level energy policy conversations to date, the national security perspective has been neglected or underrepresented. An intense focus on the three-way linkages will be a guiding principle in future discussions and actions.



³ Council on Foreign Relations, <http://www.cfr.org>.

⁴ See <http://www.consumerenergycenter.org>.

⁵ See <http://www.energystar.gov>.

SECTION 1 – INTRODUCTION: GOALS, FRAMING, AND PERSPECTIVES

The *Perspectives on Energy Policy* workshop, held March 18 and 19, 2009, at the University of California, San Diego (UCSD), brought together leaders from diverse backgrounds to explore intersecting issues, assumptions, and priorities around energy from the national security, economic, and environmental perspectives.

The design and facilitation team from Viewpoint Learning and the Public Conversations Project worked with the organizers, Sandia National Laboratories and UCSD’s Sustainability Solutions Institute (SSI), and other stakeholders to create an agenda that gave participants opportunities to probe beyond seemingly competing priorities and to collaborate substantively across their different perspectives and areas of expertise. On the first day, participants brainstormed and discussed broad goals, and then shifted toward strategic thinking. These activities laid the groundwork for specific goal setting and action planning on the second day. The proceedings culminated with recommendations about messaging and actions. Throughout the workshop, reflective sessions created a forum for continued questioning and for dissenting voices. The workshop agenda is provided in the Appendix.

The 27 workshop participants—which included people working in military and security organizations, scientists, energy policy experts, automotive industry executives, representatives of federal and state agencies, public opinion polling and public engagement experts, economists, and academics—represented a wide range of backgrounds and expertise. Through outreach and follow-up activities,

organizers will focus on increasing representation from additional sectors, such as the fossil fuels industry, consumer groups, and environmental advocacy organizations.

Framing the Dialogue

Les Shephard, Sandia’s Vice President for Energy, Security, and Defense Technologies, and Charles Kennel, founding Director of SSI, framed the working agenda in terms of discovering ways to balance and connect urgent national and global priorities.



Les Shephard, Sandia National Laboratories

Noting that the policy frameworks of national security, economic stability and growth, and environmental sustainability often compete with one another, Shephard called for a better balancing of goals and policies among these three perspectives. “Outcomes should lead to limits on the strategic value of imported oil, a transition to a carbon-efficient economy, and investment in low-carbon sources,

including nuclear,” he stated. He also introduced a thread developed throughout the workshop: high public awareness of the stakes involved in energy choices and policy has created a unique opportunity for action.



Charles Kennel, University of California, San Diego

Kennel underscored the need for a systems approach to technology and policy. “Connectedness is one of the reasons we are having this workshop. To what extent will the things that improve the security of our energy supply, or relieve pressure on resource prices, materially address the climate problem? To what extent will dealing with climate at scale restructure the global economy and international relations, and change the rules of the game for economic and national security concerns?”

Three speakers then addressed energy from different perspectives:

- Granger Morgan, of Carnegie Mellon University, discussed energy from an environmental perspective.
- Susan Rochford, of the Council on Competitiveness, approached energy from an economic perspective.
- R. James Woolsey, of VantagePoint Venture Partners, examined energy from a national security perspective.

Presentations

Energy and the Environment, Granger Morgan, Carnegie Mellon University

Morgan focused on the environmental challenges posed by climate change and called for an 80% reduction in CO₂ emissions, noted that achieving this “will take everything we’ve got.” In addition to cap-and-trade, Morgan highlighted four technology streams as key to reducing CO₂ emissions:

- Demand-side energy efficiency
- Intermittent and distributed electricity generation
- Carbon capture with deep geological sequestration
- Plug-in electric vehicles

To put the magnitude of the challenge into perspective, Morgan said that decarbonizing the U.S. electricity system—assuming all new electricity generation installed were carbon-free from this point on and the country doubled the rate of new construction—would take about 50 years and cost as much as it cost industry to comply with the Clean Air Act.

Energy and Economics, Susan Rochford, Council on Competitiveness

Rochford highlighted energy policy’s impact on the U.S. economy, productivity, and ability to compete



Susan Rochford, Council on Competitiveness

globally. She noted risks to U.S. competitiveness in the current environment, in which energy is a significant cost factor in production with high price instability. These risks include de-leveraging, which puts a scarcity value on capital, and the lower market acceptance of carbon-intensive fuels. Companies increasingly see energy management as a path to competitive advantage, allowing them to access affordable and reliable energy sources, manage risk, respond to stakeholder pressure, and take advantage of new market opportunities. Rochford called for smart energy policy that would enhance energy productivity, build new domestic and international markets for U.S. energy technologies, lower trade deficits, create new jobs, develop needed workforce competencies, and improve quality of life.



R. James Woolsey, VantagePoint Venture Partners

Energy and National Security, R. James Woolsey, VantagePoint Venture Partners

Woolsey focused on the national security challenges raised by the two largest energy systems in the United States: transportation and electricity. The transportation system is highly dependent on imported oil and vulnerable to supply security problems. The electricity sector is less vulnerable to supply disruptions but increasingly susceptible to cyber attacks. Grid and cyber security for electrical systems is

critical, as is the need to reduce the strategic importance of oil by moving towards energy efficiency and alternative fuels. He concluded that national security and environmental security advocates are likely to find common solutions if they work together on substance, stating “A hawk and a hippie, one only interested in terrorism, the other only interested in carbon, but virtually all of what they want to do for different reasons overlap.” Such strange bedfellows, he said, could both support a host of specific measures, including increased energy efficiency, local micro-grids, combined heat and power, distributed generation, and biofuels.

Reflections

Initial reflections from the workshop participants highlighted several themes:

- The urgency of climate issues and ways to accelerate the timetable of decision-making
- The feasibility of reducing the strategic value of oil by taxing carbon, especially given “climate fatigue” among some sectors of the population and the complicated political process
- The potential to do things locally without waiting for federal policies
- Unintended consequences of policies on different regions and subregions
- The role of China in the energy economy of the future
- The need for building a distributed generation system
- The need to engage the public and the challenges that entails

Challenges and Opportunities

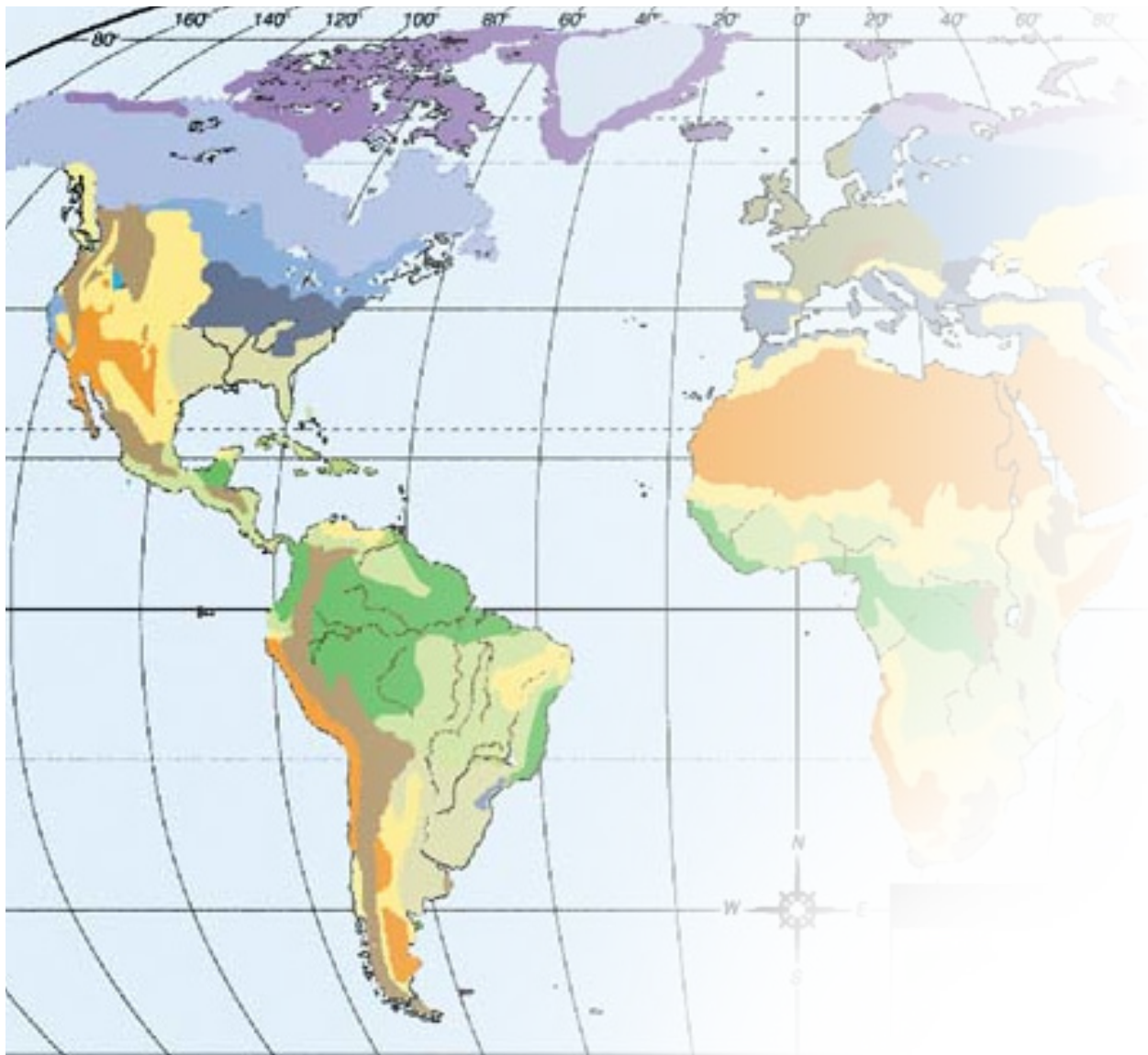
Participants worked in small groups to discuss challenges and opportunities in energy policy as well as the assumptions underlying their thinking. Several key elements emerged from these small group dis-

cussions that participants would return to repeatedly over the remainder of the workshop:

- **A new kind of leadership.** Participants envisioned leadership that outlives political administrations and that can galvanize communities while avoiding polarization and litigiousness. This leadership would ideally seek transparency and public support and would adopt a global perspective, including focusing attention on nuclear energy in other countries and the connection between energy policy and global food security.
- **Outcome-focused coalitions.** Participants especially wanted to see coalitions spanning partisan

divides and industries. In practical terms, these would take advantage of leverage points in the policy infrastructure at the national level, at the level of governors' associations, and at the governance level of large cities.

- **Time scale questions.** Linking the core economic, environmental, and national security perspectives, participants examined time-scale questions. These included the opportunity and challenges posed by the intense short-term investments made under the American Reinvestment and Recovery Act (ARRA) as well as possibilities for prioritizing different interventions.



SECTION 2 - A SHIFT TO ACTION

Setting Strategic Goals

The workshop primarily focused on defining a set of strategic goals—and actions to be taken within the next five years toward those goals—that would move the United States towards an energy policy that takes into account economic, environmental, and national security considerations.

Goal 1: Address International Linkages

Goals in this category focused on the global nature of energy issues, approaches that extend beyond U.S. borders, and the need for an infrastructure for international dialogue and decision-making.

- Address global linkages between national security, environment, and economics, with the United States and China taking the lead in the dialogue and structuring the engagement
- Create and implement an international agreement for monitoring regulated CO₂ emissions



Alison Silverstein, Consultant



Maxine Savitz, National Academy of Engineering

- Create an agreement to accept reciprocal carbon pricing across countries
- Design a global architecture for dialogue on the relationship between energy, economic development, and security

Goal 2: Enhance Education

These initiatives cover the U.S. educational system (K–12, university, and beyond), as well as educating the public. Participants saw a great need to develop a workforce much more comfortable with science and ready to work in energy-related fields. Messaging for the public would require a significant education outreach effort. This effort should focus on the complex tradeoffs involved in shifting to a more balanced energy policy and encourage needed changes in behavior and social norms.

- Institute a federally sponsored program for explaining energy issues and promoting energy literacy in K–12

- Develop programs to enable a green workforce through a revised education system that includes vocational and technical training in community colleges
- Restructure how the public is educated on energy issues; create a values-based framework to communicate with the public about choices and tradeoffs
- Establish a Sustainability Solutions Institute at a major university in every state, supported by long-term federal funding
- Build acceptance towards taxing carbon output

Goal 3: Reshape Cars/Transportation

Any workable energy policy will need to radically reshape transportation policy and, ultimately, behaviors regarding transportation, especially in the automotive sector.

- Change the model of buying and selling cars to integrate cars and energy sources into a single system (modeled after cell phone contracts)



Dave Barthmuss, General Motors, left; Bill Reinert, Toyota

- Encourage increased market penetration of plug-in hybrids
- Create a constituency for a higher gas tax; set a fuel floor price, and then return revenues to consumers through production of more efficient cars
- Explore ways to reduce the strategic value of oil via alternatives such as biofuels
- Integrate tailpipe emissions requirements with fuel standards

Goal 4: Strengthen Policy and Leadership

Many goals listed under the policy/leadership umbrella cut across the other areas. However, this area merits its own goal because the mechanisms necessary for leadership on energy policy—especially policy built on the intersection of national, economic, and environmental security—do not currently exist.



Daniel Yankelovich, Viewpoint Learning

The goals are focused on establishing a leadership infrastructure that could review and oversee critical policy changes that work to balance these three priorities.

- Initiate a strong program of performance-based regulation, based on outcome-focused policies not linked to specific technologies
- Change tax policy to end oil subsidies
- Implement key electrical energy policy changes, especially around microgrids and feed-in tariffs
- Engage the public in education and federal agenda setting via a cross-sector, blue-ribbon commission

Goal 5: Incentivize Energy Efficiency

Participants identified numerous initiatives that could improve multiple aspects of energy efficiency—such as in appliances, buildings, and residential and corporate use—and looked for opportunities to assess, regulate, and dramatically improve U.S. energy efficiency in 10 years.

- Establish a major policy/technology initiative for building retrofits
- Develop an annual energy assessment that measures progress against measures of national, environmental, and economic security
- By 2020, give U.S. public utilities a greater incentive to promote conservation by decoupling utility rates and profits from the volume of energy sold
- By 2020, increase energy efficiency in all sectors so that total energy use remains constant at today's levels despite population growth
- By 2020, implement a national policy to improve energy efficiency by 20% in the transportation sector, among end users, and on the power grid

These five strategic goals formed the framework for the remainder of the workshop.⁶

Recommended Steps

Participants divided into planning groups and drafted sets of steps that could move the United

States towards the identified goals. These groups considered several key questions in their discussions:

- What needs to be known and what needs to be learned to accomplish this goal? What do we know already that will be especially helpful?
- What are the key obstacles, and how can they be overcome?
- What points and important questions do dissenting voices raise?
- Who are the key influencers/deciders, and who would need to do what (and by when) to move toward this goal?
- What are the key indicators of success?
- What are key intersections and tradeoffs with other important goals?
- What are the implications for state energy policy?



Clockwise from bottom left: Ben Cipiti - Sandia National Laboratories, R. James Woolsey - VantagePoint Venture Partners, Lisa Margonelli - New America Foundation, Jane Long - Lawrence Livermore National Laboratory, Dawn Manley - Sandia National Laboratories, Dave Barthmuss - General Motors, Bill Reinert - Toyota

⁶Participants also identified a sixth goal: Develop new projects and research initiatives. Some thought it was critical to invest immediately in large-scale research, development, and construction of new technologies. The goals grouped together in this category looked both at specific projects, such as building and testing several different commercial-scale carbon capture and storage plants in the next five years, and a more global need for major investment in research.

Address International Linkages

The United States needs to view itself as part of a larger system, better understand linkages on multiple fronts, and be conscious of how U.S. actions impact others in the international community. In particular, consider the links between food, water, migration, trade, international law and treaties, and energy policy.

Communicating these complex issues clearly across national and other boundaries will take skill, practice, and professional advice and involvement.

Recommended steps

- Build broader understanding of global interconnections between energy, security, wealth, and climate.
 - Create venues to explain relationships to leaders, the public, and other stakeholders.
 - Link impacts to values and concerns of different regions, nations, and people.
- Frame and inform dialogue among people and nations:
 - How do my priorities affect climate change?
 - How does climate change affect my priorities?
 - How will that affect me?
- Convene a two-year, internationally sponsored project that creates international dialogue to define concrete and measurable ways to link the national security, economic, and environmental perspectives.
 - Identify focused audience targets: international community, national decision-makers, and influencers.
 - Create, compile, and improve the existing knowledge base on impacts and linkages.
 - Create tools and products for local, national, and global use that assess and communicate impacts and linkages.
 - Create a global implementation plan for dialogue and use of assessment tools.

Enhance Education

Two broad categories of education need to be addressed: 1) creating curricula and training programs for green jobs and 2) framing and communicating the complexity of energy-related issues for the general public. Culture change is needed in both educational institutions (defined broadly to include K–12, universities, and online programs) and in leadership and civic culture. The discussion around energy choices needs to be reframed and elevated in the eyes of decision-makers and the public.

Recommended steps

- Develop and deploy vocational and technical instructional programs for green jobs.
 - Develop training initiatives in community colleges.
 - Provide work training programs for inmates in prisons.
 - Use the GI bill as a model to direct military enlistees into green job training.
 - Create undergraduate and graduate education opportunities and advocate for them, developing a role for industry engagement.
 - Create “Sustainability Solutions Institutes” in all 50 states, similar to the land grant program, possibly focusing institutes’ research and curriculum on different sectors of the larger energy/climate theme.
 - Enable an extension-type program that bridges between universities, industry, and national laboratories.
 - Develop new or best practice curriculum models and industry outreach/engagement models.

Obstacles: *Gaining the political will and capital to implement the idea on a large scale, finding instructors, and ensuring jobs are available for students.*

- Create a Blue-Ribbon Commission on energy and sustainability to inform and engage the public.
 - Integrate and frame existing information; frame policy options for decision-makers and the public agenda.
 - Create regional and national dialogues.
 - Make Commission’s activities transparent.
 - Ensure that results are available and accessible to more than just elites; create a “Pabst Blue Ribbon” approach that engages ordinary Americans.

Obstacles: *Garnering buy-in of key stakeholders in the face of likely skepticism, gaining attention for reports and recommendations, and addressing the lack of a track record of tangible change for blue-ribbon commissions.*

Reshape Cars/Transportation

In order to transform the transportation fleet to be more efficient and reduce dependence on fossil fuels, sound systems-level analysis is needed to help identify technological initiatives that increase the likelihood of stepping stone technologies and minimize technological dead ends.

Long-term policy is necessary to focus industry on innovative, game-changing technologies rather than reacting to constantly shifting priorities.

Recommended steps

- Conduct life-cycle assessments that explore multiple pathways for vehicles and energy sources as a system.
- Consider the currently unknown impacts of future technologies. For example, emissions and resource limitations are known challenges for petroleum-based fuels. Identify and study aspects of future technologies, such as material requirements for batteries in future electric vehicles, that may affect the feasibility of technological solutions.
- Create of a national fuel standard that considers resource requirements and emissions.
- Create incentive structures to promote less carbon-intensive solutions.
- Tie regional solutions to transportation needs. For example, battery exchange stations or charging infrastructure may make sense in dense urban areas, whereas biofuels may be appropriate in agricultural regions.
- Consider new models for selling cars in combination with their energy source as a system, analogous to bundled mobile phone and service contracts.
- Expand upon and develop new models—such as the multiple-user citycar/zipcar model—for automobile use.
- Develop best practices for urban and transportation planning that systematically include energy as part of the decision tree.
- Foster collaboration because the capabilities needed for developing solutions are much broader than those of any single entity. Provide incentives and venues for cooperation among industry, national laboratories, and universities.

Strengthen Policy and Leadership

The United States was built around the promise of relatively cheap energy, and many of the public have built their lives around the promise of cheap gas.

Changing this dynamic will require adjusting the price of energy to drive new behaviors and shift the social contract.

Leaders who understand the interdependencies between security, economic, and environmental issues are needed to change this dynamic. They must effectively communicate the nature of the problem and potential solutions, get beyond public mistrust, and tap into a larger sense of shared purpose and common good, especially during the current economic crisis. Finding those leaders is a primary challenge and an essential step in making transformational change.

Recommended steps

- Advance the public's learning curve to better understand the linkages among the economic, environmental, and security aspects of energy issues.
 - Raise consciousness by increasing awareness and understanding of the complexity and urgency of the issue.
 - Confront wishful thinking; move past the belief that technology will solve the problem without policy or behavioral change.
 - Achieve cognitive and emotional resolution; come to terms with solutions and their implications.
- Develop leadership goals for government officials and beyond.
 - Convince the public that the cheapest way to reduce dependence on fossil fuels is to raise fuel prices.
 - Focus on coming to terms with hard choices and tradeoffs.
 - Acknowledge that a change in the social contract is required: cheap energy is no longer a birthright.
 - Help the public navigate this change; anticipate and prepare for public outrage.
- Create shock waves needed to change public perceptions and values.
 - Develop clear choices for the public to consider.
 - Establish a national commission charged with developing the choices and engaging the public around them.
 - Navigate a change in the social contract.
- Articulate the means to achieve goals.
 - Offer values-based choices.
 - Counter the misperceptions that more domestic drilling will solve all U.S. energy problems and that "clean coal" means no negative environmental impact.
 - Foster organic, bottom-up, and top-down change, drawing on national organizations like AAA and AARP.
 - Target younger generations through new media, such as Facebook and video games.

Incentivize Energy Efficiency

A major goal is to keep energy consumption flat over the next ten years. While useful, regulation is not the entire answer.

Changing behaviors and achieving dramatic increases in efficiency will require broad-based culture change, including wide acceptance of guiding principles and broad public willingness to voluntarily monitor and account for its energy use.

Efficiency should be framed as a compelling national need to motivate people to conserve. Getting rid of inefficient equipment currently in use is just as important as inventing new technologies and should not be overlooked in any major push to improve efficiency on a national scale.

Recommended steps

- Reward optimizing energy efficiency.
 - Provide economic rewards.
 - Affirm American core values of thrift and self-sufficiency.
 - Promote positive contribution to quality of life and comfort.
 - Enable positive change.
 - Decouple electricity company pricing and profits from volume of energy sold.
 - Develop standards and regulations for efficiency (including appliances and equipment).
 - Reward new energy efficient construction.
 - Create and institutionalize tools that measure, encourage, and provide feedback on efficiency.
 - Provide labeling on all products to indicate the product's energy profile (label should include cradle-to-grave energy effects).
 - Develop metrics to assess the effect of products and behaviors on economic, environmental, and national security aspects.
 - Ensure the accessibility and availability of reliable energy information.
- Offer financial incentives for conservation and efficiency.
- Encourage the development of needed technologies.
 - Foster R&D of smart meters coupled with home area networks and best-in-class products.
 - Implement product recognition programs.

Obstacles: *Competition for capital and lack of up-front financing, lack of good information.*

SECTION 3 - RECOMMENDATIONS

The workshop participants converged upon several high-level recommendations for action across the economic, environmental, and national security perspectives. Several of these were drawn directly from the small group work, but others emerged through ideas generated during workshop sessions devoted to broader reflection and synthesis of discussions across the two days.



Arnie Vedlitz, Texas A&M

- Focus policy on outcomes and values rather than on mandating specific technical solutions.** Current energy policy often mandates solutions, such as specifying the market penetration level for a particular technology. Policy based on outcomes places the emphasis on the impact of solutions rather than a particular technology. For example, setting overall targets for transportation emissions rather than specifying the number of zero emissions vehicles or amount of biofuels sold could

enable new paradigms for transportation that consider vehicles and fuels as a system.

- Consider long-term outcomes when making energy decisions.** Policies created in response to shocks or crises may have unforeseen long-term implications. Policies must shift to a long-term, outcomes-based framework that includes systems-level analysis of the impacts of policy decisions. Approaches such as forward-looking, transparent systems modeling and analyses that explore a range of factors would allow better understanding of the broader impact of particular actions and enable better long-term decisions.
- Conduct an assessment of the nation's energy security status comparable to those for environmental and economic security.** The United States conducts an annual inventory of its greenhouse gas emissions and sinks using methodologies consistent with those recommended by the International Panel on Climate Change guidelines.⁷ Moreover, the economic impacts of energy are often quantified in terms that relate energy use to Gross Domestic Product (GDP), such as energy consumed per dollar of GDP.⁸ Measuring energy security has proven to be more elusive. Developing a recognized process for conducting an energy security review similar to the established environmental and economic assessments would facilitate placing security considerations alongside environmental and economic considerations when setting energy policy.

⁷Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007.

⁸International Energy Authority Report No. DOE/EIA-0384 (2008), Annual Energy Review 2008.

- **Create a distinguished, high-level independent council, patterned after the Council on Foreign Relations, that could act as a forum for analyzing and communicating critical issues to energy policy makers and the public.** The Council on Foreign Relations (CFR) is an independent, non-partisan membership organization, think tank, and publisher that serves as a resource on the foreign policy choices facing the United States and other countries.⁹ A similar Council that provides an independent venue for addressing energy policy options would help deepen the nation's understanding of how security, economics, and environmental considerations come together and thus inform energy policy decisions.
- **Develop educational curricula that addresses energy and sustainability suitable for all levels.** Preparing for the 21st century workforce requires new approaches to education at all levels. For example, K–12 curricula are needed to create an informed public. Community college and vocational training in new energy technologies and systems will provide technicians to install and maintain new and expanded energy technologies.

In addition, an initiative similar to the Land-Grant College Act of 1862, which established agricultural colleges throughout the country, but focused on university-based sustainability solutions centers of excellence, would provide a nation-wide educational focus on energy and sustainability throughout the university system. This would accelerate the development of the next generation technologies and workforce.

- **Develop tangible messages that engage the broad public to think about their energy choices and make informed decisions.** Providing clear information can help individuals make smart choices to minimize their energy use. Information sites like those of the California Energy Commission's Consumer Energy Center¹⁰ and standards such as the Energy Star¹¹ product rating system provide consumers with transparent information about the energy impact of their purchases or behaviors. Expanded messages and explicit choices that are accessible across socioeconomic levels are needed to engage the public to make smart energy choices.

⁹ Council on Foreign Relations, <http://www.cfr.org>.

¹⁰ See <http://www.consumerenergycenter.org>.

¹¹ See <http://www.energystar.gov>.

SECTION 4 - THEMES

THEMES

Several themes emerged across all workshop discussions as critical to future energy policy discussions.

- **Linkages.** The overwhelming acceptance of the link between energy and the three perspectives—economic, environmental, and national security—by such a diverse group was fundamental and not to be taken for granted. Acceptance of these links, and particularly the inclusion of national security, departs significantly from much of today’s thinking.
- **Values.** Also woven throughout the workshop was a high-level consideration of values and of energy policy as value-driven. All stakeholders in energy decisions—technical experts and scientists, decision-makers, the private sector, and the public—start from a set of core values. Considering energy policy as values-driven is a shift, and points to clear steps that will be essential in achieving radical transformation of our energy policy.
- **Public engagement.** Every strategic goal and action plan discussed during the workshop took into account the critical role of the public. Effectively raising public awareness and helping the public work through difficult tradeoffs will require leaders to think beyond traditional energy-related institutions and frameworks. Organizations and institutions that reach great numbers of the American public (such as the American Association of Retired Persons and the American Automobile Association) should take on energy issues as central to their mission and communicate the choices and tradeoffs to their membership.



Lisa Margonelli, New America Foundation

- **Rethinking the consumer understanding of green.** For consumers struggling to make ends meet, buying green—typically seen as spending more to gain environmental benefits—is an unaffordable luxury. The government and the private sector must find ways to appeal to the core values of Americans beyond their desire for a cleaner environment and tap into their need for quality products at affordable costs, their desire for increased national security, and their support for economic growth and job creation.
- **Elevating the stature of the mundane.** Distributed generation does not make newspaper headlines. But a well-planned distributed power-generation network could significantly improve the nation’s ability to provide reliable and efficient electricity. It will be important to encourage policy makers to support solutions based on their potential impact and not solely on their potential to make headlines.

- **New voices.** Too often, energy discussions involve the same relatively small group of players. Bringing new voices into the dialogue is essential. In particular, an intergenerational approach is needed, with young people fully engaged and acknowledged as stakeholders in every energy decision.
- **Rethinking education.** The education system was seen as lacking the tools and curricula needed to position the United States to create the next-generation green workforce. Major enhancements to the primary, secondary, and post-secondary education systems are key to building future scientists, decision-makers, and a public capable of addressing energy challenges.

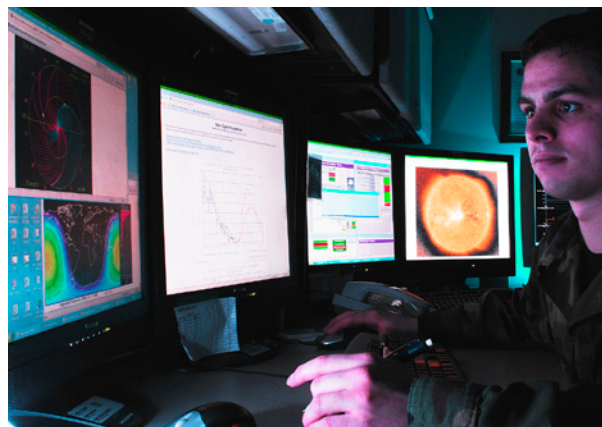
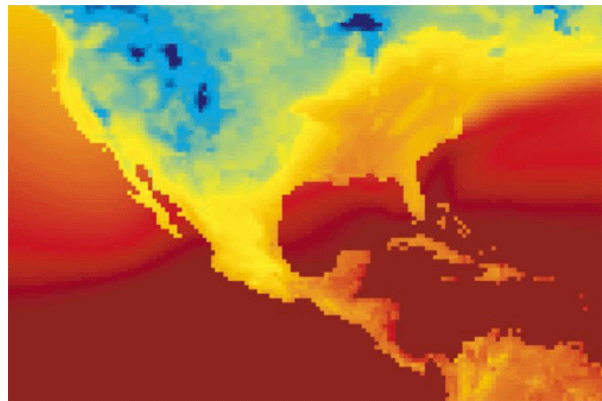


SECTION 5 - NEXT STEPS

At workshop end, participants identified tangible steps they deemed achievable and important to building momentum toward larger initiatives:

- Create a national carbon fuel standard, possibly certified by an offshoot of this group or by the national laboratories
- Initiate a concerted effort to engage young people
- Develop systems-level simulations and modeling capabilities for decision-makers
- Implement regional impact assessments using a newly created set of analytical tools that reveal and assess the linkages between economic, environmental, and climate security
- Assess existing curricula around sustainability and related issues, adopting successful models and designing additional curricula to fill the gaps
- Convene an event to discuss the idea of a national council and integrating an international perspective into those efforts

The participants then considered the purpose and function of this group going forward. One priority crystallized with particular urgency: workshop communication must emphasize **the broad agreement that decisions about energy and energy policy are inextricably linked to economic, environmental, and national security policy, and have significant consequences in all three areas.** Further, future discussions must include the perspectives of young people: those who would be dealing with the consequences of today's decisions in the decades to come.



APPENDIX: PERSPECTIVES ON ENERGY POLICY WORKSHOP AGENDA

Wednesday, March 18, 2009

- 10:00 – 10:30 Opening Comments and welcome from co-conveners (plenary)
- 10:30 – 11:15 Introductions and Opening Comments from participants (plenary)
- 11:15 – 12:00 Framing talks: Overviews on energy from the perspectives of national security, economic security and environmental and climate security (plenary)
 Environmental Security: Granger Morgan, Carnegie Mellon University
 Economic Security: Susan Rochford, Council on Competitiveness
 National Security: R. James Woolsey, VantagePoint Venture Partners
- 12:00 – 1:00 Lunch
- 1:00 – 1:30 Discussion on framing talks (plenary)
- 1:30 – 3:30 Small group dialogue:
 - Opportunities and challenges in U.S. energy policy
 - Reflections on current policy and emerging trends
 - Surfacing key assumptions
- 3:30 – 3:45 Break
- 3:45 – 4:30 Keep/Drop/Create: Brainstorming session to identify range of ideas and perspectives around what is necessary to meet national, economic, and environmental security needs (plenary)
- 4:30 – 6:00 Identify up to four bold initiatives/strategic goals that would do the most to move the U.S. towards an integrated energy policy (in pairs and in plenary)
- 6:00 Reception and dinner

Thursday, March 19, 2009

- 8:00 – 8:30 Review and recap previous day’s discussion (plenary)
- 8:30 – 10:00 Further develop ideas and begin action planning to advance identified strategic goals/bold initiatives (small group discussions)
- 10:00 – 10:30 Report back and group discussion of initial action planning
- 10:30 - 10:45 Break, opportunity for cross-group discussion
- 10:45 – 11:15 Reflection on opportunities to reconcile competing priorities, remaining roadblocks, and outstanding questions (small group discussion)
- 11:15 – 12:00 Continue small group discussions: action planning around strategic goals/bold initiatives
- 12:00 – 1:00 Lunch
- 1:00 – 2:00 Report back and group discussion of action planning, next steps as necessary (plenary)
- 2:00 – 3:40 Creating a summary statement: Key messages emerging from this gathering (small group and plenary)
- 3:40 – 4:00 Closing reflections from participants and co-conveners (plenary)



PERSPECTIVES ON ENERGY POLICY:

Security, Economics, and the Environment



Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. SAND No. 2009-5233P

