Chapter Four

Innovation in the Energy Economy: An Imperative for Transatlantic Cooperation

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The world has an insatiable appetite for energy. The IEA forecasts energy demand to increase 36% between 2008 and 2035, which will require the utilization of all economically available energy resources for many decades.[1] $38 trillion of investment will be required simply to meet the projected energy demand.[2] The global economic crisis and accompanying economic downturn have made meeting this challenge exceedingly difficult.

In a carbon-constrained world, new technologies will be needed to facilitate a transformation of the energy industry to meet higher environmental standards. Restructuring current energy systems toward a far greater reliance on technologies with low or no carbon dioxide emissions is an immense challenge. Fossil fuels such as oil, coal, and natural gas together satisfy 81% of global energy demand and generate 69% of global anthropogenic greenhouse gas emissions.[3] Moreover, fossil fuels are expected to remain dominant in the global energy mix with a share of 74% of worldwide demand for energy in 2035.[4]

Energy poverty remains prevalent throughout much of the developing world. If we are to live in a 21st century more prone to peace than violence, the developed countries must move expeditiously to address the developing countries' needs for energy.[5] The availability,

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[1] International Energy Agency, *Key World Energy Statistics: 2010.*

[2] International Energy Agency, "Cumulative investment in energy infrastructure, 2011-2035," available at http://www.iea.org/weo/Files/2011_EBC_Ministerial_Press.pdf

[3] International Energy Agency, *Key World Energy Statistics: 2010.*

[4] Ibid.

[5] CNA Corporation, "National Security and the Threat of Climate Change," 2007,

accessibility and affordability of energy is vital to the economic development that is required to alleviate global poverty, to reduce global tensions, and to address global environmental degradation. Without a radical change in policies in the developing and the industrialized countries, there will be about the same number of people without access to electricity (1.3 billion) or relying on non-commercial biomass fuels (2.7 billion) in 2030 as today. Furthermore, it will be so despite a relatively rapid growth in energy consumption in the developing world.[6]

The challenges of energy security, climate change and energy poverty are immediate and vast. As such, to ensure a sustainable energy future a dramatic transformation of the world's energy supplies and consumption patterns is required. This transformation will affect virtually all economic sectors, as the energy systems that power them still rely heavily on carbon-intensive fossil fuels. The development and deployment of a portfolio of low-carbon technologies is an essential component of the needed energy industry modernization and restructuring. This will necessarily involve greater utilization of non-carbon based energy as well as reduction of carbon dioxide (CO_2) emissions from fossil fuels. New technologies are also essential to managing the forecasted costs and ensuring reliability.[7]

While much of the world's expertise on the clean-energy technologies needed to address these challenges currently lies within the U.S. and the EU, neither Europe nor the U.S. will be capable of meeting these challenges in isolation. The transatlantic community has an opportunity to work together to foster innovation to revitalize languishing industries, accelerate the development of advanced technologies, and become an example for countries struggling to develop and implement appropriate policies that support and accelerate innova-

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available at http://www.cna.org/sites/default/files/news/FlipBooks/Climate%20Change%20web/flipviewerxpress.html.

[6] International Energy Agency, "Energy for All: Financing Access for the Poor," Special early excerpt of the *World Energy Outlook*, *October 2011*, Available at http://www.iea.org/papers/2011/weo2011_energy_for_all.pdf.

[7] Richard Lawson, John Lyman, Mihaela Carstei, "A Shared Vision for Energy and Climate Change: Establishing a Common Transatlantic Agenda," The Atlantic Council of the United States, 2010.

tion. The world is looking to the developed countries to lead, and leadership by the transatlantic community is crucial.

Current Conditions Impacting Energy Innovation

On both sides of the Atlantic today there common agreement on the need to create a "global revolution"[8] in energy production and use. Various groups and individuals, including leading business and national security figures, political leaders and international organizations have all called for significant changes in energy production and consumption to meet the goals of sufficient, reasonably priced, and sustainable energy. Efficient and effective technologies, policies and regulations will be required to sustain economic growth throughout the world. This will not occur unless the transatlantic community moves in concert to increase the efficiency of energy use, and to develop and deploy the technologies required to meet the needs of both the developed and developing countries.[9]

Government policies and energy prices have an important impact on the pace of development and deployment of new technologies.[10] While all energy technologies must compete in the marketplace in terms of cost, reliability and ability to attract capital, the recent financial crisis and economic downturn, coupled with a number of key energy sector developments, has dramatically changed the investment landscape. The current global financial crisis has created significant constraints from which the U.S. and European energy industries are not immune. Money is exceptionally tight, and will likely remain so for several years. As a result, overall momentum and public and private

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[8] International Energy Agency, "Energy Technology Perspectives 2008: Scenarios and Strategies to 2050," Paris, available at http://www.iea.org/w/bookshop/add.aspx?id=330.

[9] Franklin Kramer, John Lyman, "Transatlantic Cooperation for Sustainable Energy Security: A report of the Global Dialogue between the European Union and the United States," The CSIS Press, 2009.

[10] Laura Diaz Anadon, Kelly Sims Gallagher, Matthew Bunn, and Charles Jones, "Tackling US Energy Challenges and Opportunities: Preliminary Policy Recommendations for Enhancing Energy Innovation in the United States," Cambridge, Mass: Energy Research, Development, Demonstration & Deployment Policy Project, Energy Technology Innovation Policy Group, Harvard University, February 2009.

investments in new research and development projects are slowing. This will dramatically inhibit the pace at which the U.S. and European energy industries can be transformed.

Although tentative signs of recovery from the global financial and economic crisis are gaining strength, policymakers around the world are still grappling with the effects of the crisis on the real economy. In the United States, unemployment is still historically high and credit is still constrained. The International Labor Organization predicts that employment levels in those countries with a high gross domestic product (GDP) per capita will not return to pre-crisis levels before 2013.[11] Furthermore, poor economic conditions are now recalibrating constituents' concerns. For instance, a majority of Americans recently told the Gallup Poll, for the first time in Gallup's twenty-five year history of asking the question, that economic growth should be given priority over environmental protection, even if the environment suffers to some extent.[12] A Pew Research Center survey of the public's priorities reports that global warming is now in last place, having dropped 10 percentage points, to 28%, from 2007.[13] Unless the measures to mitigate climate change, such as investments in energy innovation, are tied to and determined by more pragmatic approaches, such as energy security and job creation, economic conditions will be shaping public concerns.

While billions were spent on *green* investments on both sides of the Atlantic as part of the stimulus packages created in response to the economic crisis, domestic short-term efforts will not be enough to generate long term technological innovation.[14] The need to rethink the prevailing paradigm for economic growth in the wake of the recent financial crisis has presented an opportunity to forge policies

[11]International Labor Organization, *World of Work Report 2009: The Global Jobs Crisis and Beyond* (Geneva, 2009).

[12]Frank Newport, "Americans: Economy Takes Precedence over Environment," Gallup Poll, March 19, 2009.

[13]Pew Research Center for the People and the Press, "Public's Priorities for 2010: Economy, Jobs, Terrorism," January 25, 2010.

[14]Nick Robins and Robert Clover, "A Climate for Recovery: The Colour of Stimulus Goes Green," HSBC Global Research, February 16, 2009.

that at once meet urgent economic and social needs while finding a new, low-carbon path to prosperity and growth.

Using current technologies, the investments needed simply to meet projected increases in energy demand by 2035 is a staggering $38 trillion.[15] Furthermore, without significant innovation in the underlying technologies, models of a cost-effective global climate mitigation policy[16] suggest that the cost of greenhouse gas mitigation through 2050 would require additional trillions or tens of trillions of dollars.[17] The enormous magnitude of the costs imposed on the global economy creates an immediate imperative for innovation in the energy sector.

Any investment, even more so the high level of investment required by the energy industry, requires a clear and predictable regulatory environment. Currently, the energy industry operates in an environment that lacks a definitive clean energy standard, and this policy uncertainty increases risks for clean energy projects.[18] Price signals on carbon have the ability to release a wave of innovation and investment in green energy that will be needed to make clean technology cost-competitive and sustainable well into the future.[19] Yet, the last comprehensive legislation in the U.S., The American Power Act, is now history and there is no other viable initiative for the foreseeable future.[20] While the EU has some of the highest environment standards in the world, it is still confronted with similar roadblocks in pro-

[15]International Energy Agency, "Cumulative investment in energy infrastructure, 2011-2035," Available at http://www.iea.org/weo/Files/2011_EBC_Ministerial_Press.pdf.

[16]For atmospheric stabilization targets in the range of 450–550 parts per million CO_2.

[17]K. Gillingham, R.G. Newell, W.A. Pizer, "Modeling endogenous technological change for climate policy analysis," *Energy Economics*, vol. 30 no. 6, November, 2008, pp. 2734-2753.

[18]Kira R. Fabrizio, "Investments Under Regulatory Uncertainty: Evidence from Renewable Energy Generation,"Fuqua School of Business, Available at http://faculty.fuqua.duke.edu/bio/fabrizio/papers/pdfs/InvestUnderUncertainty_Fabrizio.pdf.

[19]World Economic Forum, "The Green Investing: Towards a Clean Energy Infrastructure," January 2009, Available at https://members.weforum.org/pdf/climate/Green.pdf.

[20]The political divide is so great on these issues that there is significant opposition even to the 2011 EPA initiative on emissions standards for power plants, designed in the interest of something more politically palatable such as public health.

viding clear market signals. The recent European debate over raising the greenhouse gas emissions reductions target to 30% of 1990 levels by 2020, from the previously established 20%[21], reflects the same policy uncertainty that discourages the much-needed investments in research, development and deployment on clean energy technologies.

The current global economic crisis, the shifting perceptions of the threat of climate change and the lack of a clear regulatory environment act as constraining factors in the development of energy innovation. Thus, it is even more critical for resources to be applied to the most promising technologies and that the most efficient policies, programs and regulations are effectively implemented. Extensive transatlantic cooperation is required to create vigorous distribution of ideas and experiences if financial and technical knowledge are to be used most effectively.[22]

The Role of Transatlantic Cooperation in Energy Innovation

New technologies need to be developed to increase supply options and to improve efficiency of demand as well as of production. Solutions to energy needs require both the U.S. and the EU to deal with many of the same issues:

First, planning and executing a plan to address the resources, technologies, and human capabilities needed to build the required infrastructure entails very long lead times. Additionally, the need exists to develop the institutional, structural and professional capabilities that will enable the continued acceleration of technological developments and will result in long-term sustainable growth.[23] This process will usu-

[21]Nigel Purvis, "Weathering the Transatlantic Climate Policy Recession," German Marshall Fund of the United States, March 2011, Available at http://www.gmfus.org/publications/publication_view?publication.id=1610.

[22]Franklin Kramer, John Lyman, "Transatlantic Cooperation for Sustainable Energy Security: A report of the Global Dialogue between the European Union and the United States," The CSIS Press, 2009.

[23]Richard G. Newell, "A US Innovation Strategy for Climate Change Mitigation,", A Hamilton Project Discussion Paper, The Brookings Institution, December 2008, Available at http://www.brookings.edu/papers/2008/12_climate_change_newell.aspx.

ally transcend several changes in governments and administrations over many years, and therefore must involve long-term commitments.[24]

Second, matching the availability of energy supplies with demand while reducing emissions will involve cultural and lifestyle changes that may be very difficult to achieve in the political realm. Thus, the rationale for such changes and the benefits of new technology options must be compelling and well understood by the governments and populations affected.[25]

Third, the factors that constrain the development of energy innovation call for the following major issues to be addressed: insufficient financial resources; inadequate institutional arrangements;[26] lack of sector coordination and lack of long term political commitment; insufficient information and communication;[27] and inadequate human resources.

While the responses of individual countries to these challenges are vital and cannot afford to be curbed, without a high degree of transatlantic cooperation these objectives and the policies designed to meet them will not be sufficiently resilient to weather volatile economic conditions and changing political currents.

Furthermore, the borders of an energy innovation system do not coincide with national borders. Countries can exploit the new energy technologies and knowledge originating from energy R&D that other countries have developed via international trade, multinationals and

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[24]Charles W. Wessner, "New Vistas in Transatlantic Science and Technology Cooperation," Board on Science, Technology, and Economic Policy, National Research Council, 1999, Available at http://www.nap.edu/catalog/9455.html.

[25]Rebecca M. Henderson, Richard G. Newell, ed., *Accelerating Energy Innovation: Insights from Multiple Sectors*, University of Chicago Press, pg. 1–23.

[26]Michael Mehling, Aaron Best, Dominic Marcellino, Michael Perry, Katharina Umpfenbach, "Transforming Economies through Green Investment: Needs, Progress and Policies," German Marshall Fund of the Unites States, January 2010, Available at http://www.gmfus.org/galleries/ct_publication_attachments/GMFEcologicTransformingEconomies.pdf.

[27]Bracken Hendricks, Sean Pool, Lisbeth Kaufman, "Low-carbon Innovation: A Uniquely American Strategy for Industrial Renewal," Center for American Progress, May 2011, Pg. 33-34, available at http://www.americanprogress.org/issues/2011/05/pdf/gcn_low_carbon.pdf.

international knowledge spillovers.[28] The potential for a free rider scenario to occur creates incentives for pooling knowledge, technological and financial resources across borders and strengthens the case for international cooperation in energy R&D.[29]

Since much of the needed technology is not yet available, sustained and substantial research, development and demonstration will be required to bring it to market. The capital requirements will be significantly larger than what private industry can currently support and there is a definite role for government support. However, in an environment where appropriate policies are lacking, energy producers and users will not fully adopt the new energy technologies, because by using existing technologies they can avoid bearing the entire environmental costs they create.[30] This well-known problem is caused by the public good nature of the benefits that these technologies generally engender. To address this market failure a portfolio of policies is needed that combines government support, technological standards, financial penalties and awards with market based instruments. In addition, the benefit for sustained research, development and demonstration will be the design of more cost effective solutions and the avoidance of the inherent costs associated with poor policy decisions.[31]

While it is important to create domestic regulations and incentives for innovation, without cooperation there is a danger that the transatlantic community may create unnecessary differences in implementation that will stifle trade and reduce the potential to achieve economies of scale.[32] Moreover, the lessons learned from the experi-

[28]Valentina Bosetti, Carlo Carraro, Emanuele Massetti, Massimo Tavoni, "International energy R&D spillovers and the economics of greenhouse gas atmospheric stabilization," *Energy Economics*, 30, 2008, 2912-2929.

[29]David Popp, "Innovation and Climate Policy," NBER Working Paper No. 15673, January 2010.

[30]Rebecca M. Henderson, Richard G. Newell, ed., *Accelerating Energy Innovation: Insights from Multiple Sectors*, University of Chicago Press, pp. 1–23.

[31]Richard Lawson, John Lyman, Mihaela Carstei, "A Shared Vision for Energy and Climate Change: Establishing a Common Transatlantic Agenda," The Atlantic Council of the United States, 2010.

[32]Franklin Kramer, John Lyman, "Transatlantic Cooperation for Sustainable Energy Security: A report of the Global Dialogue between the European Union and the United States," The CSIS Press, 2009.

ence of U.S. state regulators and European national regulators in regulating similar issues can provide opportunities to design more effective policies and incentives. Transatlantic cooperation will also make it easier to obtain international consensus on establishing technical standards and benchmarking of industries.[33]

Cross-border trade is a significant channel for knowledge flows and R&D spillovers, and international investment both, spurs the development and introduction of new technologies and business methods, and provides for healthy competition that fosters innovation. As the U.S. and EU have the most advanced economic relationship on the planet and trade between the two markets is key to businesses on both sides of the Atlantic, encouraging transatlantic investment is a crucial part of fighting the effects of global economic crisis and increasing potential economic growth with new and innovative technology.[34] The deep economic integration between the U.S. and EU can also accelerate the return to economic growth in both areas. Furthermore, the large multinational companies that expand operations to the other side of the Atlantic include some of the most innovative and technologically forward-looking companies in both the U.S. and Europe. Transatlantic cooperation is thus essential in creating an environment conducive to cross-border investments that lead to innovation as well as relieves some of the current global economic pressures.[35] Through cooperation the transatlantic community can share the costs, risks, and resources required for basic scientific research and long-term propositions; reduce the costs of emerging technologies through accelerated learning; share costs for research and development on technologies that are expected to provide public benefits; promote the development

[33]Richard Lawson, John Lyman, Mihaela Carstei, "A Shared Vision for Energy and Climate Change: Establishing a Common Transatlantic Agenda," The Atlantic Council of the United States, 2010.

[34]Transatlantic Business Dialogue, "Accelerating the Transatlantic Innovation Economy: 10 Innovation Policy Principles & Recommendations to Strengthen Collaboration across the Atlantic", October 2010. http://www.tabd.com/index.php?option=com_content&view=section&layout=blog&id=8&Itemid=11.

[35]Ibid.

of innovative capabilities at home and abroad to promote long-term competitiveness; and develop mutually acceptable solutions to common problems.[36]

The importance of transatlantic cooperation is difficult to dismiss. The urgency and scale of needs creates an imperative for the U.S. and EU jointly to develop solutions to the current and future technological, financial and social challenges. The cost of developing new technologies places a tremendous strain on any single economy and innovation in the energy sector has wide ramifications throughout the economy, impacting trade and economic growth. Nonetheless, without significant technological progress to address climate change, the UNEP estimates that global economic cost could amount to 5-10% of global domestic product.[37] Accelerating innovation and technology adoption in energy is thus crucial to meeting greenhouse gas mitigation goals. Thus, the objectives of achieving secure and affordable energy that fosters economic prosperity will not be attainable in the absence of transatlantic cooperation.

Policy Recommendations for Transatlantic Cooperation

The transatlantic community is uniquely positioned to develop the technology, financing, and legislative and regulatory developments necessary to advance energy security. Further, there is growing recognition throughout the transatlantic community that the energy sector needs to be radically transformed in order to achieve energy security and to reduce the impact of climate change while ensuring economic prosperity. Thus, pursuing an interrelated set of strategic objectives will ultimately require similar structural changes in the way energy is

[36]Laura Diaz Anadon, Kelly Sims Gallagher, Matthew Bunn, and Charles Jones. *Tackling US Energy Challenges and Opportunities: Preliminary Policy Recommendations for Enhancing Energy Innovation in the United States.* Cambridge, Mass: Energy Research, Development, Demonstration & Deployment Policy Project, Energy Technology Innovation Policy Group, Harvard University, February 2009.

[37]Edward B. Barbier, "Rethinking the Economic Recovery: A Global Green New Deal," Report prepared for Economics and Trade Branch, Division of Technology, Industry, and Economics, United Nations Environment Program, April 2009, available at http://www.unep.org/greeneconomy/GlobalGreenNewDeal/tabid/1371/language/en-US/Default.aspx.

supplied and used throughout the transatlantic community. Moreover, the transformation of the energy sector will entail considerable analysis of new policies, regulations and enforcement mechanisms, as well as the deployment of many new technologies that are promising, but not yet proven. The foundation for transatlantic energy security will be the establishment of common, compatible and complementary strategies that allow for enhanced innovation.[38]

Existing cooperation on subjects ranging from climate change to R&D cooperation on specific technologies is essential but not sufficient. The range of organizations focusing on advancing energy innovation is encouraging. Institutions such as the EU-US Energy Council, the Transatlantic Business Dialogue, and the U.S. Chamber of Commerce as well as other international organizations, private industries, universities, and nongovernmental organizations are developing initiatives that have the potential to significantly strengthen the understanding of issues, broaden the political will, and provide the transatlantic community with useful information related to the feasibility and implementation issues involved in transforming the energy economy. However, these initiatives are not sufficient by themselves to drive nations on both sides of the Atlantic to undertake the radical transformations deemed necessary to address climate and energy security concerns.[39]

The needed changes in the energy sector will potentially result in a complete reorganization of our society. Thus, the framework for transatlantic cooperation needs a broader focus on innovation as it permeates throughout the different economic sectors and on areas of cooperation which will charge the bureaucracy on both sides of the Atlantic towards clearly defined goals.[40]

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[38]Franklin Kramer, John Lyman, "Transatlantic Cooperation for Sustainable Energy Security: A report of the Global Dialogue between the European Union and the United States," The CSIS Press, 2009.

[39]Nigel Purvis, "Weathering the Transatlantic Climate Policy Recession," German Marshall Fund of the United States, March 2011, Available at http://www.gmfus.org/publications/publication_view?publication.id=1610.

[40]Richard Lawson, John Lyman, Mihaela Carstei, "A Shared Vision for Energy and Climate Change: Establishing a Common Transatlantic Agenda," The Atlantic Council of the United States, 2010.

Policies aimed at accelerating deployment of energy technologies are often decoupled from key energy policy goals and poorly linked with policies for research, development and deployment.[41] The U.S. and the EU should target and coordinate incentives for large-scale deployment of energy technologies as key elements of a comprehensive energy innovation strategy. Furthermore, policy makers on both sides of the Atlantic should take advantage of the increasingly collaborative and cross border nature of innovation to create a foundation for transatlantic harmonization of innovation policies on a broader scale. While greater focus is needed on both policy and technical challenges that new technologies will face as they enter the market, many of the challenges to innovation result from existing competition and entrenched political interests.[42] For example, one of the most effective ways to encourage development and deployment of new technologies is to set a price on carbon; yet, the political will to pass enabling regulation is nonexistent in the U.S. for the foreseeable future.

Nonetheless, while many issues between the U.S. and EU are highly technical and are best dealt with at the working level, high-level working agendas should address broad areas for enhanced cooperation in which clear goals for action are established. They should:

Develop and support transatlantic public research initiatives that are tightly linked to the private sector and acknowledge and respond to non-technical challenges to innovation. Policy makers on both sides of the Atlantic should create effective regulatory frameworks and long-term incentives for public-private partnerships. These would necessarily include: developing new models for the funding, commercialization and deployment of new innovative advances; funding for precompetitive research that can aid in bringing technologies their commercial stage;[43] building human capital and knowledge stocks by increasing

[41]Charles Weiss, William B. Bonvillian, "Structuring an Energy Technology Revolution," The MIT Press, pg. 1-11, Available at http://mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=11808.

[42]Clean Air Task Force, "Four Policy Principles for Energy Innovation & Climate Change: A Synthesis," June 2010, Available at http://www.catf.us/resources/publications/view/125.

[43]Transatlantic Business Dialogue, "Accelerating the Transatlantic Innovation Economy: 10 Innovation Policy Principles & Recommendations to Strengthen Collaboration across the Atlantic", October 2010. http://www.tabd.com/index.php?option=com_content&view=section&layout=blog&id=8&Itemid=11.

the availability of transatlantic scholarships and other financial support for the science fields;[44] support the use of performance based technology regulation and standards; promote the creation of a robust information technology infrastructure; and encourage investment in innovative technologies. This mix would allow for public sector investments to fully leverage private capital at scale as well as for private resources to capitalize on public expenditures.

Create a competitive market for transatlantic energy innovation. A key policy mechanism to encourage and promote innovation in the development and deployment of energy technologies is the removal of trade and investment barriers. A transatlantic commitment to promote open investment policies, avoid new trade restrictions, and aim to eliminate existing barriers is an acknowledgement that innovation is fundamental to our shared prosperity and creates an attractive environment for much needed capital flows.[45]

Create common transatlantic intellectual property and standards policies that promote vigorous competition. Policies to reward and protect innovation are equally important. The transatlantic community should aim to develop complementary competition and property laws that encourage innovation while enhancing economic efficiency and consumer welfare.[46] Furthermore, policy makers should establish a framework that allows for the rights to intellectual property to be shared appropriately and emphasizes the commitment of governments on both sides of the Atlantic to ensuring consistent and effective enforcement.[47]

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[44]Richard Lawson, John Lyman, Mihaela Carstei, "A Shared Vision for Energy and Climate Change: Establishing a Common Transatlantic Agenda," The Atlantic Council of the United States, 2010.

[45]Transatlantic Business Dialogue, "Accelerating the Transatlantic Innovation Economy: 10 Innovation Policy Principles & Recommendations to Strengthen Collaboration across the Atlantic", October 2010. http://www.tabd.com/index.php?option=com_content&view=section&layout=blog&id=8&Itemid=11.

[46]Franklin Kramer, John Lyman, "Transatlantic Cooperation for Sustainable Energy Security: A report of the Global Dialogue between the European Union and the United States," The CSIS Press, 2009.

[47]Transatlantic Business Dialogue, "Accelerating the Transatlantic Innovation Economy: 10 Innovation Policy Principles & Recommendations to Strengthen Collaboration across the Atlantic", October 2010. http://www.tabd.com/index.php?option=com_content&view=section&layout=blog&id=8&Itemid=11.

The energy and economic challenges facing the transatlantic community, as well as the world, are daunting. More effective transatlantic cooperation in energy technologies, to reduce the costs and risks of energy innovation and to increase the pace of cost reductions through expanded learning and deployment, can help ensure a future that meets the goals of energy security, environmental responsibility and economic prosperity. Furthermore, by creating a comprehensive transatlantic strategy for and investment in energy innovation, and by identifying new approaches and policies for bringing new technologies to market, the transatlantic alliance can meet these challenges and renew and restore innovation leadership within the global community.