DGA Policy Series

Opportunities to Increase and Diversify Domestic Energy Resources: A Path Forward for States to Create and Retain Jobs

September 8, 2012

DGA
DEMOCRATIC GOVERNORS ASSOCIATION
Jobs. Opportunity. Now.

CENTER FOR INNOVATIVE POLICY

www.DemocraticGovernors.org

Opportunities to Increase and Diversify Domestic Energy Resources: A Path Forward for States to Create and Retain Jobs

Contents

Preface

Opportunities to Increase and Diversify Domestic Energy Resources: A Path Forward for States to Create and Retain Jobs is a white paper produced by the Democratic Governors Association as part of its Policy Series. Multiple energy partner organizations contributed to the content of the paper with production assistance provided by My Campaign Group. The white paper serves to highlight critical energy issues facing the nation and defines roles that states could play to address these issues, while also benefitting economically. The issues include; diversifying energy sources used to produce electricity (natural gas, coal, nuclear and renewables); ensuring affordable and reliable energy for manufacturing; increasing domestic production of transportation fuels (oil, natural gas, electricity and biofuels); and improving environmental sustainability of oil and natural gas extraction for domestic use and export.

Democratic governors know it's important to increase and diversify domestic energy resources in order to maintain reliability, reduce energy costs and promote economic growth. To that end, Democratic governors have made noteworthy advancements to grow their state economies by diversifying electricity generation and transportation fuel options, increasing natural gas and renewable production and maximizing energy efficiency all while reducing the impacts on the environment.

- **Maryland Governor O'Malley** proposed legislation to make offshore wind a viable energy source for Maryland, and called for an offshore wind renewable energy credit allowing companies to earn certificates for demonstrating that they are using offshore wind as a certain percentage of their total energy generation to comply with the state's Renewable Portfolio Standard (RPS). The Governor also signed legislation last year to move waste-to-energy from Tier II to Tier I in the state's RPS, as a way to stimulate domestic energy production and create jobs.

- **Colorado Governor Hickenlooper** signed a bill to ensure the state's continued investment and research in Colorado's energy industry by refocusing the Colorado Energy Office to build on the state's national reputation as a leader in clean energy and energy innovation, and to enhance the office's ability to support private sector job creation in renewable energy and natural gas industries.

- **Connecticut Governor Malloy** eliminated the system of providing renewable energy credits for specific technologies, and instead established a "Green Bank" that leverages public funds to augment private investments in renewable energy and energy efficiency technologies as well as created a unique "reverse auction" system for utility customers to bid on alternative power.

- **Montana Governor Schweitzer** hosted the Western Wind and Transmission Leadership Summit comprised of industry and governmental leaders to build on

Montana's success as having one of the highest growth rates in wind energy in the nation. Montana had just 1 megawatt (MW) of wind power online in January 2005. By the end of 2012, Montana expects to exceed 600 MW of wind power with another 409 MW (more than $600 million) in wind projects in the pipe.

- **New York Governor Cuomo** launched an energy plan designed to spur economic growth through an emphasis on renewable energy programs and the development of long-term energy infrastructure modernization. Recharge New York provides businesses the ability to buy low-cost sustainable hydropower and spend the savings on retaining and creating jobs. NY-Sun Initiative will double the amount of customer-sited solar power installed annually in New York, and quadruples that amount by 2013.

- **California Governor Brown** signed a bill requiring one-third of the state's electricity to come from renewable sources. The legislation increases California's current 20 percent RPS target in 2010 to a 33 percent RPS by December 31, 2020. Governor Brown has also set a goal of 12,000 MW of small-scale distributed generation, such as rooftop solar, throughout the state. California has also set aggressive energy efficiency requirements and electric vehicle infrastructure goals, as well as biofuel and biogas standards and goals, all designed to increase California's domestic power generation as the state increases efficiency.

- **North Carolina Governor Perdue** has been a driving force in the Carolinas' emergence as a premier international nuclear industry hub, with total nuclear employment of nearly 40,000, collaborating with industry to spur a high-wage, knowledge-based workforce through Job Development Investment Grants and other tools, and through establishment of the Energy Production and Infrastructure Center at University of North Carolina (UNC) Charlotte.

- **Minnesota Governor Dayton** signed an executive order directing state agencies to identify and make cost-effective energy improvements in state facilities; setting a goal of a 20 percent reduction in state energy consumption and providing necessary technical support to local governments and school districts to make energy efficiency and renewable energy improvements in their buildings.

- **Oregon Governor Kitzhaber** developed the first ten-year energy action plan to provide a clear pathway forward to meet the state's greenhouse gas reduction goal. The plan focuses on three integrated core strategies: maximizing energy efficiency and demand management, building out a clean energy infrastructure and cutting carbon emissions in the transportation sector through land use planning and advanced deployment of clean fuel vehicles and infrastructure. The ten-year energy action plan includes streamlining the energy facility siting process, developing a landscape level plan and mitigation bank, protecting the state's renewable energy standard (RES), full implementation of the Clean Fuels Program and a reduction of energy consumption in state buildings by 20 percent, to name a few.

- **West Virginia Governor Tomblin** established the Natural Gas Vehicle Task Force to study whether the state can save money and reduce its reliance on foreign oil by converting strategic portions of its fleet to vehicles fueled by natural gas.

- **New Hampshire Governor Lynch** passed legislation that adds thermal renewable energy to the state's RPS – becoming the first state to fully incorporate the technology into its program.

- **Hawaii Governor Abercrombie** has made deployment of renewable energy infrastructure the cornerstone of his vision for exceeding the state's 40 percent RPS requirements by 2030. During the 2012 Legislative session, Governor Abercrombie proposed two measures that were passed to enable higher concentrations of renewable energy. Act 165 supports the development of an undersea cable network linking the islands with an integrated statewide broadband and energy grid best able to accept and distribute utility-scale renewable energy and hold energy costs constant over time. The Governor also signed legislation that creates an Energy Reliability Administrator under the Public Utilities Commission to make determinations on new renewable energy project approvals. Hawaii's plan will result in fewer foreign oil imports and a more robust environment for attracting innovative products and services into the state.

In light of these achievements, the ability exists for states to bolster energy production, diversify energy sources and increase energy efficiency. As states look to maximize finite natural resources through new and expanded technologies, businesses will expand and emerge, generating positive economic gains in the form of more jobs and added government revenues. U.S. electricity demand is projected to be 22 percent higher in 2035 than it was in 2010,[1] and U.S. demand for petroleum and other liquids, including both fossil fuels and other biofuels, is projected to reach 19.9 million barrels per day in 2035.[2] With many states still in the midst of a post-recession economic recovery, the time to act is now.

Introduction

Why energy? Why now?

Energy is an important issue now and will continue to be in the near future. Demand for energy, both electricity and other energy sources, is growing in the U.S. In addition to rising environmental compliance costs and the need for new infrastructure, we can anticipate long-term price increases that will also reflect increasing demand.

[1] U.S. Energy Information Administration (EIA), Annual Energy Outlook 2012, http://www.eia.gov/forecasts/aeo/pdf/0383(2012)
[2] Ibid.

States should act now to grow and further diversify their energy resources so that individuals and businesses will prosper and as a nation we can remain globally competitive. For example, the Mid-Atlantic States need to replace old and inefficient power plants, many of which are slated for retirement, with new state-of-the-art power generation technology that stands to create thousands of jobs and billions of dollars in construction wages and tax revenue.

The transportation fuels sector is also primed for major economic development. Promoting positive steps, such as greater refining capacity, increasing the Corporate Average Fuel Economy (CAFE) standards and incentivizing hybrid and alternative fuels, will increase domestic need for oil and natural gas. Conversely, if every state halted hydraulic fracturing and horizontal drilling used to extract shale gas and oil, the country would forfeit 45 percent of domestic natural gas production and 17 percent of oil production in a span of just 5 years.[3] Because we need every fuel source, it's critically important that each one plays a role in a more balanced energy future.

Regardless of the policy paths we select going forward, it's also critical to remain ever-aware of utilities' need for cost recovery. This country's utilities were largely created in a framework of traditional cost-based regulation in which needed infrastructure and technology investments were undertaken as they were required and appointed or elected state utility commissions approved cost recovery for those investments, passing costs along to consumers. Even in the 16 states that have moved to competitive energy markets, very little of our energy infrastructure is owned by merchant providers that are not in need of cost recovery for investments. For instance, 70 percent of the electric industry, representing about 3 percent of the nation's gross national product, is comprised of shareholder owned electric companies.[4]

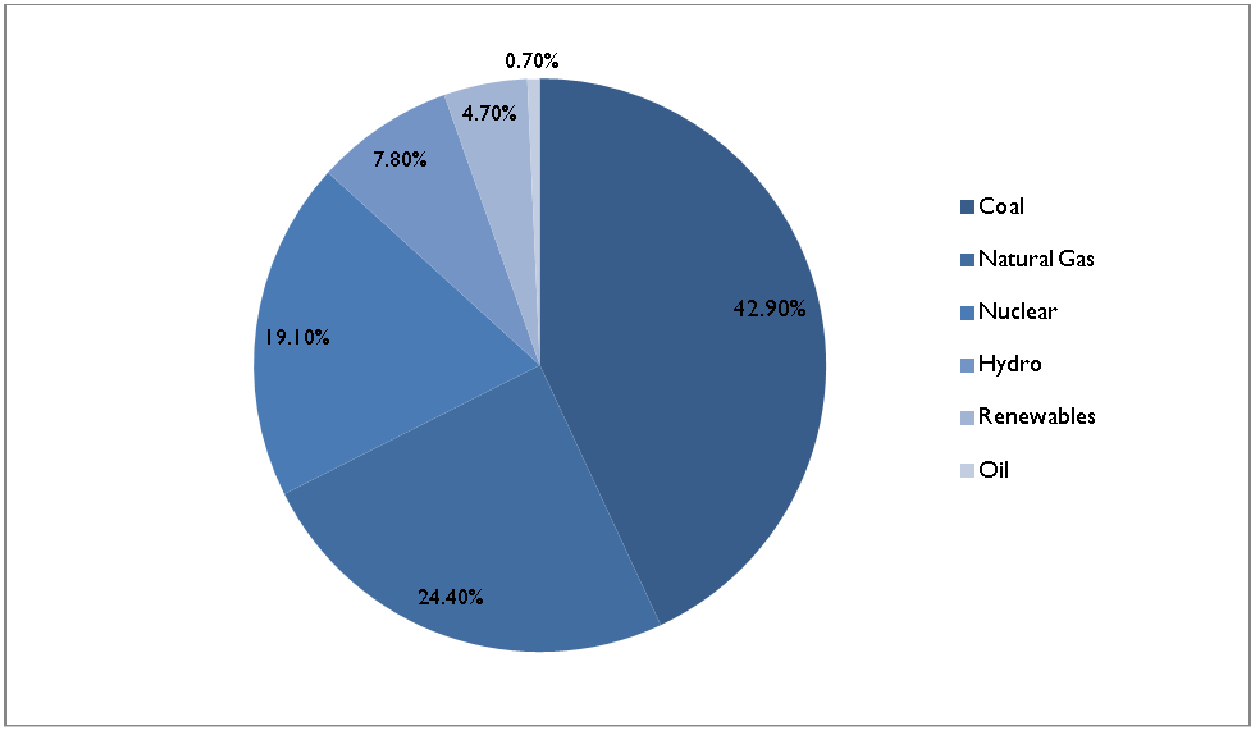
Opportunities in the Traditional Electricity Sector

Electricity is a domestic energy source. In the U.S., electricity generation is fueled by coal, natural gas, nuclear, hydro, renewables and oil. Chart 1 provides a breakout of the percentage that each fuel source provides to generation nationally, as of 2011.

[3] American Petroleum Institute, 2012 Energy in Charts (chart 13), http://www.api.org/policy-and-issues/policy-items/american-energy/~/media/files/policy/american-energy/energy-in-charts-2012_hires_final.ashx

[4] Edison Electric Institute, http://www.eei.org/whoweare/AboutIndustry/Pages/default.aspx

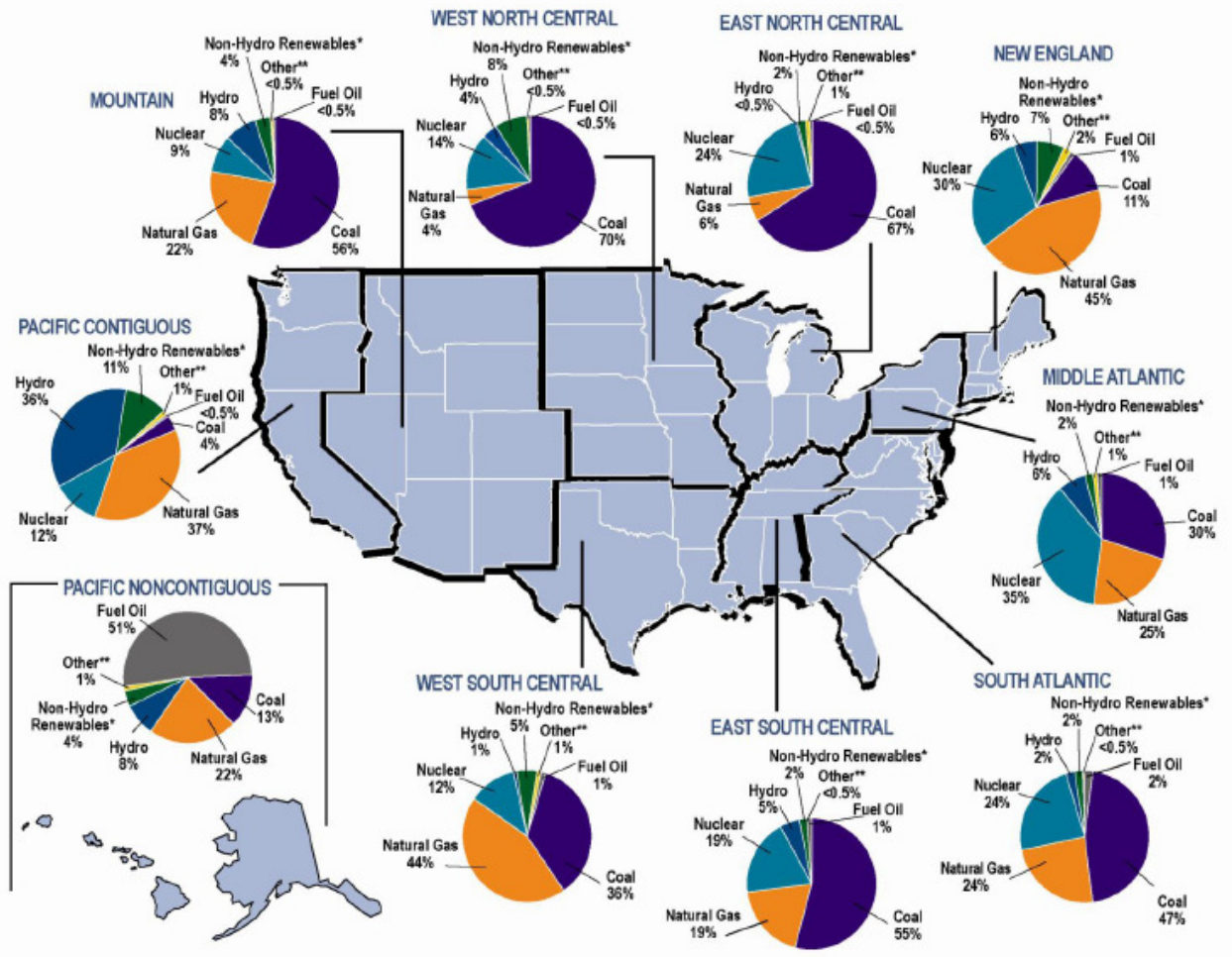
Chart 1: Fuel Sources for Electric Generation for 2011



Source: Department of Energy (DOE), Energy Information Administration (EIA)

Regionally, fuel mixes vary based on the natural resources available. Chart 2 provides a snapshot of regional fuel mixes.

Chart 2: Different Regions of the U.S. Use Different Fuel Mixes to Generate Electricity



Source: (DOE), (EIA) and Edison Electric Institute (EEI)

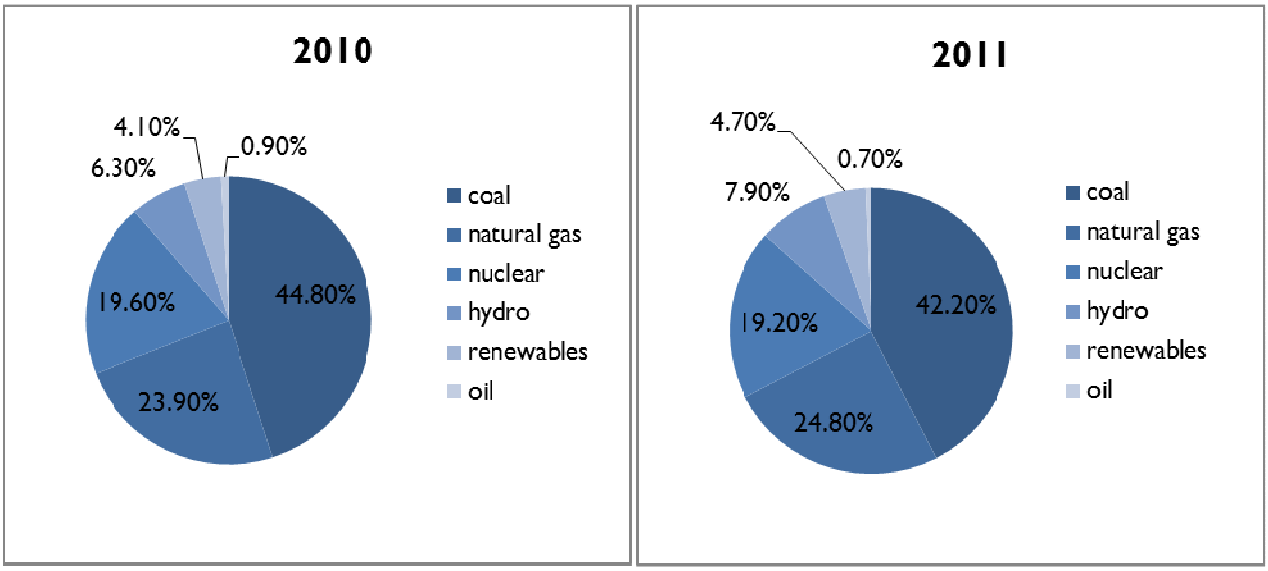
As our country begins to transition to a more environmentally sustainable and more diversified electricity portfolio, the importance of fuel diversity for maintaining reliability and affordability cannot be overstated. For example, as noted in Chart 3, the share of total electricity production from coal decreased from 2010 to 2011, while the share of natural gas grew, as production increased and gas prices declined.[5] This trend has continued, with coal and natural gas each providing about 32 percent of generated electricity in April 2012. This is the first time in our nation's history that monthly coal-fired and natural-gas fired electricity were equal.[6] The average cost of electricity is closely aligned with the progression of fuel prices. As a result, the

[5] EEI, Generation Fuels: 2010-2011 Markets, February 2012.

[6] EIA, *Today in Energy*, "Monthly Coal-and Natural-Gas Fired Generation Equal for First Time in April," July 6, 2012, http://www.eia.gov/todayinenergy/detail.cfm?id=6990

more diverse and balanced our energy sources; the smaller the impact price increases and unpredictability will have on our economy.

Chart 3: U.S. Electric Generation Fuel Mix: 2010 and 2011



Source: DOE, EIA

Value of Electricity

Electricity powers American manufacturing. As the availability of domestic energy resources for electricity generation increase and become more diverse, businesses may benefit from lower operating costs that may lead employers to hire more employees. Energy exploration, production and development have already created a wealth of jobs across the energy industry with the potential for more. The supply chain includes miners, geologists, hydrogeologists, welders, rail and barge conductors, engineers, technicians, line-workers, truck drivers, mechanics, welders, office workers and other skilled employees, among other professions, which in turn, helps spur economic development inclusive of vendors and material suppliers. While new jobs are being created in some areas, the nation can anticipate seeing other jobs disappear as a result of EPA regulations and other efforts to close down coal plants.

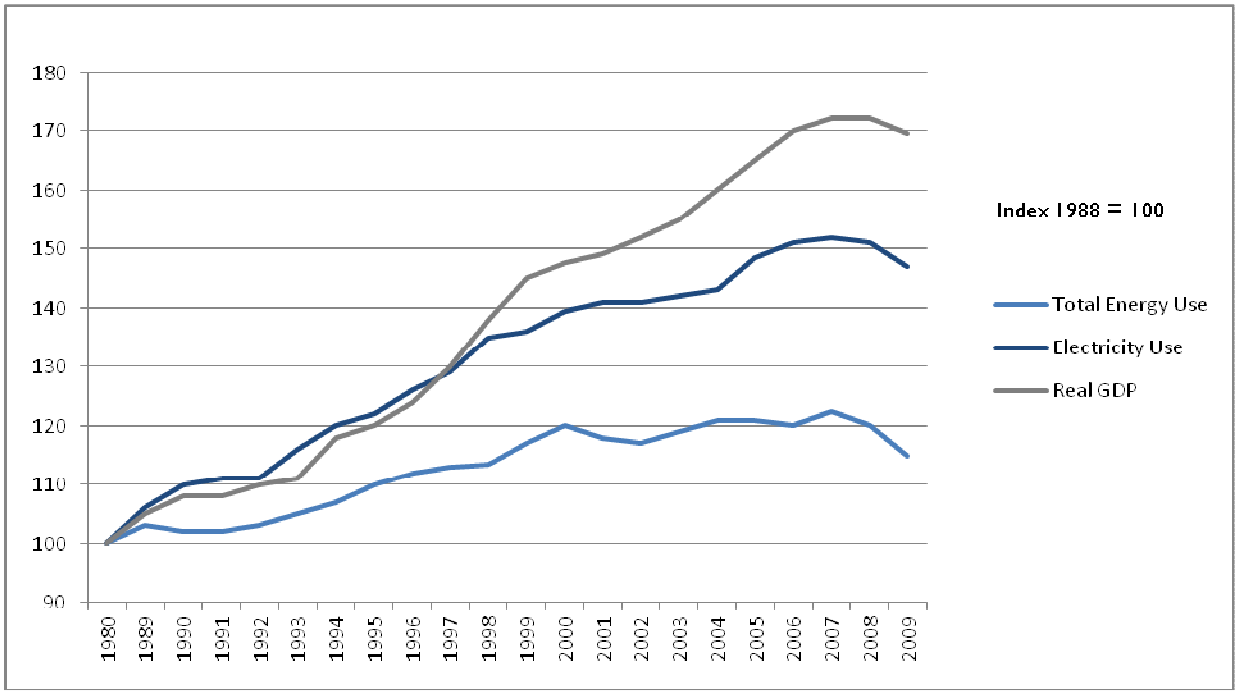
Economic Impact of Electricity

The electric utility industry is projected to spend a record $94.7 billion on capital expenditures this year, which translates into job creating projects all across the country.[7] Chart 4 illustrates the strong relationship between electricity growth and economic growth. Ensuring that these job creators have adequate access to capital by maintaining the current dividend tax rate,

[7] Industry Capital Expenditures Slide, U.S. Shareholder-Owned Electric Utilities, 2003-2014 projections (Original source: EEI Finance Department, company reports, SNL Financial, June 2012)

among other actions, is critical, so electric utilities can make investments that maximize job creation in a struggling economy.

Chart 4: Electricity Growth Is Linked to U.S. Economic Growth



Note: 1998 represents the base year – graphic depicts increases or decreases from the base year

Source: DOE, EIA

Tax Code

Changes in tax code that specifically increase dividend tax rates above those of capital gains stand to decrease companies' access to capital, limiting the amount of money these companies can invest in infrastructure projects. Low dividend tax rates are a key way for many companies and industries to provide return on capital to investors and to attract new shareholders. Capital is used to fund major infrastructure projects, including clean energy projects, smart grid development, environmental controls and other investments that offer an important source of much-needed, high-quality job creation in many states.[8]

It's critical that Congress keep dividend tax rates low and on par with the tax rates for capital gains. Under current law, the top tax rate on both dividends and capital gains is 15 percent.[9] If these rates expire, the top tax rate on dividends will increase to 43.4 percent, while the top tax rate on capital gains will increase to 23.8 percent.[10] Furthermore, if tax policy favors capital

[8] The Beneficiaries of the Dividend Tax Rate Reduction: A Profile of Qualified Dividend Shareholders, Ernst & Young, May 2012.
[9] Defend My Dividend, http://www.defendmydividend.org
[10] Ibid.

gains over dividends, investors are likely to retreat from stocks that pay dividends in favor of other investments with a lower tax burden. As values of stocks drop, there will be an adverse impact on investors and on state pension funds as well as the valuation of these companies. This could spark a new wave of volatility in the financial markets at a time when we should be working together to build economic stability.[11] Ultimately, such events result in higher costs to customers, as projects cost more due to increased cost of capital, etc.

Issues related to energy provisions in the tax code are among those currently being reviewed by Congress. On the fuel side of electricity, there are two provisions that could affect the fuel mix for utilities. As this paper is being drafted, Congress has under consideration extending or extending while phasing out the production tax credit for wind energy that will otherwise expire at the end of 2012. Failing to extend this credit will have dramatic consequences for wind turbine manufacturing and every other element of the wind energy industry. The expensing of intangible drilling costs for natural gas production, which is particularly important to independent gas producers, is another provision also potentially on the table, and repealing it could profoundly impact the production, prices and supply of natural gas.

New Power Plant Construction

Recent studies by the PJM interconnect, a regional transmission organization (RTO) serving the 13 Mid-Atlantic States and the District of Columbia, forecast that as many as 24,000 MWs of power generation facilities, primarily old and inefficient coal, oil and natural gas burners, will retire in the next 3 to 5 years.[12] In PJM's reports, they indicate that 14,000 MWs have announced retirement by June 2015, with another 4,000 MWs expected to retire by 2018.[13]

Retirements of this magnitude represent an unprecedented opportunity to rebuild our energy infrastructure with state-of-the-art generation. This opportunity will create jobs to help fill vacancies from retired plants, infuse the economy with billions of dollars in tax revenue and facilitate further integration of variable renewable resources into our electric grid.[14] For example, the average nameplate capacity of a new natural gas-fired combined cycle plant within the PJM footprint currently under construction or built since 2002 is between 500-700 MW.[15] This creates the potential for approximately 37 new natural gas-fired combined cycle power plants to replace all 24,000 MWs of retirements, which could also present a large-scale opportunity for the construction trades.[16] At the same time, some communities with retiring coal plants will be subject to employment and other negative economic impacts caused by these retirements.

The multi-year construction period associated with these projects offers an immediate economic impact, particularly in labor states, when one conservatively assumes that the average

[11] Ibid.
[12] Credit Suisse, "Implications of EPA Policy," April 26, 2011.
[13] GO Response to EPA Rules Summary Update, PJM MC Webinar, April 23, 2012.
[14] MIT Energy Initiatives Symposium on Managing Large Scale Penetration of Intermittent Renewables April 2011, pages 10-11.
[15] "Cost of New Entry Estimates for Combustion Turbine and Combined Cycle Plants in PJM" The Brattle Group August 24, 2011, pages 8-9.
[16] Ibid.

Project Labor Agreement (PLA) could roughly equal $60-$100 million per project and each project creates up to approximately 600 jobs at the peak of construction.[17] While each project represents a substantial economic booster for local labor forces, the total potential for organized labor associated with the fleet of new generation projects to backfill the void left by retirements could be a staggering $2.2-$3.7 billion in direct economic benefits to a workforce of 22,200.[18]

In addition to the retirement replacements, the retrofit projects will also require significant capital outlays, which translate into investments for labor and materials to make the remaining coal plants compliant with the EPA Mercury and Air Toxics Standards (MATS) regulation. Midwest Independent System Operators (MISO) has reported that over 36,000 MWs of coal units will need some form of retrofit work.[19] Although PJM has not posted a comparable number, it would be reasonable to say that the number of MWs impacted by retrofits in PJM would be similar to MISO.

An ongoing concern, as we watch for such development, however, is the costs borne by customers as these projects ensue, especially the impacts of higher electricity prices on energy-intensive manufacturers and lower income households.[20] Balance will be essential going forward. The Colorado Clean Air-Clean Jobs Act is an example of how one state is addressing this concern (See the following box).

In addition to retrofit work on power plants, transmission upgrades are necessary in order to accommodate the impacts to reliability and load flow pattern changes created by the EPA compliance work. Transmission upgrades range from substation construction to the laying of new transmission lines over several miles of new right-of-way. In addition, considerable investments in infrastructure will be necessary if the electric sector substantially increases its reliance on natural gas.[21]

[17] The jobs estimate, at the height of construction, is derived from a survey of recent press releases about combined cycle projects under development or construction in the Mid-Atlantic region.
[18] The Green Economy, Aggressive Deadline for Power Plants to Reduce Emissions, http://www.thegreeneconomy.com/aggressive-deadline-for-power-plants-to-reduce-emissions/
[19] MISO EPA Survey Update, June 27, 2012, https://www.midwestiso.org/Library/Repository/Meeting%20Material/Stakeholder/PAC/2012/20120627/20120627%20PAC%20Item%2006%20EPA%20Survey%20Update.pdf
[20] "Energy Cost Impacts on American Families, 2001-2012," Eugene M. Trisko, February 2012, http://www.americaspower.org/
[21] Aspen Environmental Group, "Gas Storage Needed to Support Electricity Generation," June 2012.

Snapshot of the Colorado Clean Air-Clean Jobs Act

During Colorado Governor Ritter's tenure (2007-2011), he sought legislation to balance the state's need for reliable, affordable energy, while ensuring that communities comply with present and future air quality rules through the Colorado Clean Air-Clean Jobs Act. The Act allows the state to devise a comprehensive solution to minimize the costs associated with meeting more stringent federal regulations to reduce emissions from coal-fired electric generation that the U.S. Environmental Protection Agency (EPA) plans to establish over the next several years. It requires Xcel Energy and Black Hills Energy, leading energy providers, to reduce emissions by 2018 or sooner by retrofitting certain coal plants with emission control equipment or retiring and replacing them with facilities fueled by natural gas and other lower- or non-emitting energy sources.

Compared to the traditional approach of retrofitting plants on a piecemeal basis, a comprehensive approach to controlling emissions:

- Saves consumers as much as $225 million in long-term costs;
- Allows Colorado to maintain other viable resources, while retiring aging coal plants;
- Adds cleaner natural gas-fired generation and promotes use of Colorado gas;
- Creates potential for increased use of wind and solar power and energy efficiency; and
- Protects electric system reliability, among other benefits

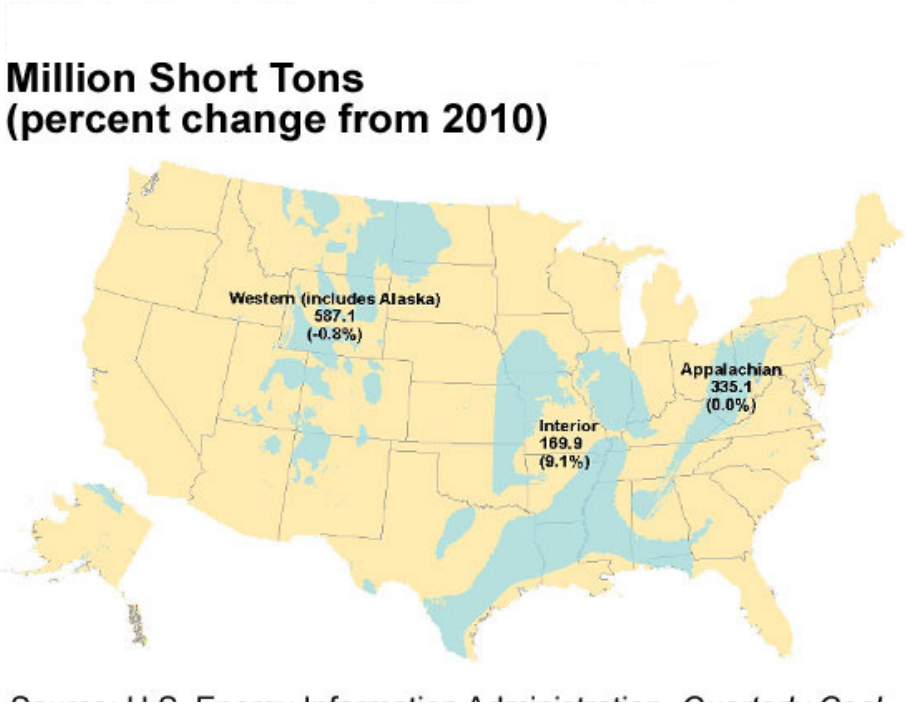
Although the Act is just the first step of a long process, it was achieved with support from state lawmakers, energy companies, electric utilities and environmentalists – and serves as a model for other states.

Coal

According to the EIA, the U.S. has the world's largest coal reserves,[22] with recoverable reserves totaling nearly 260 million tons.[23] Chart 5 illustrates the nation's coal reserves by region. At current production rates, this equates to well over 200 years of coal supply for domestic use.[24] Coal is mined in 25 states and is responsible for over 550,000 U.S. jobs.[25] In addition, U.S. exports of coal are projected to grow by 34 percent above 2010 levels by 2015 and by 40 percent by 2030.[26]

[22] EIA, Coal (various charts and graphs), http://www.eia.gov/coal
[23] U.S. Energy Information Administration (EIA), December 6, 2011.
[24] EIA, "Annual Energy Review 2011."
[25] EIA; Pricewaterhouse Coopers for the National Mining Association, "The Economic Contributions of U.S. Mining in 2008," October 2010,
[26] EIA, "Annual Energy Outlook 2012," June 2012.

Chart 5: Coal Production by Region



Source: EIA, Quarterly Coal Report, October-December 2011 (April 2012), preliminary 2011 data. Production does not include refuse recovery.

Currently, more than 90 percent of U.S. coal production is used in domestic electric power generation to provide affordably priced electricity.[27] Forty-eight states depend on coal for electricity generation.[28] Moreover, the coal-fueled electricity industry has taken substantial steps to improve air quality. For example, coal-fueled electric plants have invested almost $100 billion so far to reduce emissions of major air pollutants by nearly 90 percent per unit of electricity generated.[29] Additional investments in clean coal technologies, totaling an additional $100 billion, are expected in order to comply with new EPA regulations.[30]

Historically, coal has been the dominant fuel source for electric power generation in the U.S., supplying nearly half of electricity demand as recently as 2005.[31] While the recent trend in low natural gas prices, as well as new EPA regulations, have caused a decline in coal's share of

[27] EIA, "Coal Explained: Use of Coal," April 19, 2012, http://www.eia.gov/energyexplained/index.cfm?page=coal_use
[28] EIA, Electric Power Monthly, February 2012, http://www.eia.gov/electricity/monthly/current_year/february2012.pdf
[29] EIA, Annual Energy Review 2011. EPA National Air Pollutant Emission Trends, 1970-2011, Fuel Combustion Electric Utilities. "Coal-Fired Power Investment in Emission Controls," Energy Ventures Analysis, December 2010.
[30] EPA, "Regulatory Impact Analysis for the Final Transport Rule," June, 2011, and "Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards," December 2011.
[31] EIA, "Annual Energy Outlook 2012," June 2012.

electric power generation, EIA projects that coal will remain the dominant fuel source for electric generation in the U.S. through 2035.[32]

In 2010, the domestic coal fleet was comprised of over 300,000 MWs of electric generating capacity.[33] EIA projects that some 49,000 MWs of coal capacity will retire by 2035.[34] Two new EPA regulations – the Cross-State Air Pollution Rule (CSAPR) and the MATS regulation – play a role in these retirements, as EIA points out.[35] Other pending EPA regulations that will affect coal-fueled power plants include coal ash regulations, cooling water rules, new source performance standards for greenhouse gas emissions, changes to EPA's national ambient air quality standards and regional haze requirements.

Key Proposals and Actions States Could Take to Support the Continued Use of Coal Generation

- **Ensure adequate time to comply with EPA regulations**, including the CSAPR and MATS rules to ensure electric grid reliability.

- **States should work with EPA and power plant operators to provide maximum flexibility in the design and implementation of EPA rules** in order to minimize the impacts of EPA rules on electric consumers and the U.S. economy.

Natural Gas

Due to several states' abundance of shale gas deposits and improved technologies to extract them from the earth, the U.S. is now the largest producer of natural gas in the world.[36] In addition, natural gas is currently at record low prices and is predicted to remain so for the foreseeable future. (See also: What Could Shale Gas Production Mean for Your State?)[37]

States looking to utilize this low-cost, clean and plentiful domestic resource to build new plants and replace coal-fired plants with more efficient and lower-emitting natural gas-fueled electric plants need to address two primary impediments currently preventing immediate boosts to our recovering economy.

1. **Pipeline Infrastructure:** Although the U.S. already consumes more natural gas for power generation than for residential consumption (the residential and commercial sector combined use only slightly more gas than the power sector), new infrastructure will likely be required. Historically, the natural gas industry has shown a tremendous

[32] Ibid.
[33] Ibid.
[34] Ibid.
[35] Ibid.
[36] EIA, International Energy Statistics, (See chart on production for calendar year 2009) http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=3&pid=26&aid=1
[37] American Chemistry Council, Shale Gas Fact Sheets: What Could Shale Gas Production Mean for Your State? http://chemistrytoenergy.com/shale-gas-resources

capacity to add new pipeline infrastructure, as needed. However, the current pricing system that regulates how infrastructure investments are made is not adequate and not appropriately structured to support this needed infrastructure.

2. **Long-Term Price Signals:** Due to the high capital costs of state-of-the-art electricity generation plants, generators require long-term price signals and long-term commitments from the market to support these private investments. The eastern wholesale energy markets do not have established structures to adequately support new energy generation.[38] A robust long-term capacity market with discoverable pricing would help developers and banks feel more comfortable with additional forward investment in new capacity structures.

However, an alternative approach could be to review the existing market structures and their appropriateness to expanded use of natural gas and electricity.

In Maryland, Governor O'Malley's Public Service Commission (PSC) ran a competitive and transparent solicitation for new electricity generation with which the state's utilities were required to contract. These long-term contracts give the projects the long-term market signals necessary to bring the major economic benefits to a struggling workforce, increase electrical reliability and save ratepayers money. While the competitive and transparent process was met with considerable opposition from the incumbent market participants, and considered outside of current PJM structures, the state-administered long-term contract process is a proven path to jump starting state economies, and putting our hard-working men and women back to work.

Key Proposals and Actions States Could Take to Support the Development of Natural Gas

- **Avoid implementing policies that undermine the availability of domestic natural gas**.

Nuclear

The U.S. is among world leaders in the design, engineering and manufacturing of nuclear technology and facilities. Yet regulatory inefficiency and uncertainty constrain the full potential and deployment of these attributes to the benefit of our citizens. Nuclear energy is a safe producer of round-the-clock, baseload energy with near-zero emissions. Currently, there are 104 operable commercial nuclear reactors at 65 nuclear power plants in 31 states with more than 100,000 workers contributing to production.[39] Since 1990, the share of the nation's electricity supply provided by nuclear power generation has averaged about 20 percent.[40] Over the last decade, these plants have operated at roughly 90 percent capacity, providing steady,

[38] PJM, How RTOs Establish Spot Market Prices (And How This Helps To Keep The Lights On), http://www.pjm.com/~/media/documents/reports/spot-market-prices-j-chandley.ashx
[39] World Nuclear Association, Nuclear Power in the USA, June 2012, http://www.world-nuclear.org/info/inf41.html
[40] Ibid.

clean baseload electricity to Americans.[41] Although the potential is there to increase the generation of nuclear power by building more nuclear reactors, falling gas prices have called into question the practicality of the expansion at this time. Despite this, the economic and clean air benefits to states to expand nuclear technology should not be overlooked.

The Nuclear Energy Institute (NEI) estimates that private investment in new nuclear power plants has created in excess of 15,000 new U.S. jobs since 2005.[42] The Nuclear Regulatory Commission (NRC) is reviewing license application from 10 companies and groups of companies to build 16 new reactors.[43] It's estimated that the construction of each new nuclear power plant represents up to 3,500 jobs alone and once complete will generate thousands more jobs in nuclear energy production.[44]

Additionally, the new, NRC certified, passive safety reactor designs, both "traditional" large and the newly emerging, and potentially multi-use, Small Modular Reactors, demonstrate the continuing value of nuclear through continual learning, technology advancement with high capacity and reliability.

Although nuclear technology is advancing, used fuel handling and disposal must be based upon sound science, and requires leadership from the federal government in order for states to take action. The federal government must discharge its statutory and legal obligation to create and implement a program to manage used nuclear fuel. The President's Blue Ribbon Commission on America's Nuclear Future recommends the program consist of several elements:

- Development of consolidated storage facilities, in cooperation with states and local communities;

- Creation of a new entity outside the DOE to manage the program, thereby insulating it from political interference;

- A guarantee that the $750 million collected annually from electricity consumers for the program will actually be spent for the purpose intended; and

- A technology research and development program to develop the technologies necessary to recycle used nuclear fuel, thereby extracting additional energy from it and reducing the volume and toxicity of waste by-products requiring permanent disposal.

This integrated approach is consistent with the policy recommendations of many state and local organizations representing elected officials.

---

[41] Ibid.
[42] Ibid.
[43] Nuclear Energy Institute, New Nuclear Plant Status, Updated May 2012, http://www.nrc.gov/reactors/new-reactors/col.html
[44] Nuclear Energy's Economic Benefits – Current and Future, Nuclear Energy Institute, April 2011, http://www.nei.org/resourcesandstats/documentlibrary/newplants/whitepaper/jobs

Governors have also recommended new approaches for existing and developing nuclear waste facilities, which can only succeed if, among other stipulations, they are "governed by consent-based partnership arrangements or legally-enforceable agreements with host states, tribes and local communities." Governors O'Malley and Shumlin have already publicly called on Congress to implement the Blue Ribbon Commission's recommendations, as have several state legislative bodies and the presidents of 7 organizations representing minority elected officials at the state and local levels of government.

We note that some communities are stepping forward and expressing serious interest in hosting such facilities.

Recent advances in reactor and fuel cycle technology, along with safety and performance improvements, provide the opportunity to reshape the future of nuclear energy in the U.S. International cooperation on nuclear energy and efforts to ensure safety and non-proliferation are inseparable from nuclear development domestically. We should continue to recognize the importance of creating entities, such as the International Atomic Energy Agency's (IAEA) global nuclear fuel bank, and encourage our domestic agencies and plant operators to adopt best-practices based on lessons learned from international incidents, such as Fukushima.

Key Proposals and Actions States Could Take to Support the Development of Nuclear Energy

- **Establish a regulatory and/or legislative environment conducive to development of nuclear power,** as an emission-free baseload generation. NEI has developed an extremely good catalogue of beneficial legislation from around the country that states should consider to support this fuel source.[45] Essentially, the laws work to speed approval processes and reduce costs. Whether or not a state chooses to model legislation on these states' laws, policymakers should consider including the following key provisions in whatever law passed:
    - Recovery of pre-construction costs, including licensing
    - Construction Work In Progress (CWIP)
    - Recovery of expenditures if plant is prudently cancelled
    - Recovery of transmission costs to serve new nuke plants
    - Tax abatements
    - Enhanced return on equity (based on increased risk of the project)

[45] State Legislation and Regulations Supporting Nuclear Energy, Nuclear Energy Institute, April 2011, www.nei.org Note: Laws adopted in Florida (SB 1544) and Georgia (SB 31) are favored by industry leaders.

- Expedited permitting for generation facilities

- Recognition of the potential deployment opportunities for Small Modular Reactors and incentivize accordingly

- **Continue looking at how to work in partnerships to cut significant costs from new nuclear construction,** as some states have done. Since financing new nuclear energy facilities is a major challenge, states should partner with the federal government and private organizations to address these funding challenges.

- **Continue to pursue consensus-based efforts to develop one or more consolidated interim storage facilities for used nuclear fuel in willing host communities and states,** as a possible solution for nuclear waste disposal. Ratepayer dollars go into a Nuclear Waste Trust Fund to cover disposal issues. To-date, the fund contains more than $35 billion for the sole purpose of nuclear waste disposal that could cover the costs associated with this effort**.**

- **Integrate state and federal government support into a seamless mechanism that includes coordinating nuclear trade policy, creating bilateral agreements, exporting control reform and enhancing export financing** to bolster U.S. manufacturers and nuclear technology innovators' share of this emerging worldwide market, which is estimated to approach between $500 and $740 billion over the next decade.[46] New direct and indirect jobs associated with the five new U.S. reactors alone will exceed 25,000.[47]

Key Proposals and Actions States Could Take to Support Opportunities in the Traditional Electricity Sector

- **Create policies and regulations based on a legitimate cost-benefit analysis and implementation timelines** that consider economic impacts and resource availability. In conducting cost-benefit analyses, uncertainties in both costs and benefits should be acknowledged and taken into account in shaping regulations. Moreover, compliance deadlines should provide sufficient time to avoid unnecessary costs and prevent other problems, such as threats to electric reliability.

- **Eliminate regulatory lag and regulatory uncertainty for new technology and create a regulatory environment conducive to its widespread use**. Nowadays,

[46]International Trade Administration, Civil Nuclear Trade Initiative, David Kincaid, December 2011, http://www.nuclearinfrastructure.org/resources/2011-12-05%20U%20S%20%20Civil%20Nuclear%20Trade%20Presentation%20to%20Nuclear%20Infrastructure%20Council.pdf

[47] Southern Company, Southern Company Media Relations, Southern Company subsidiary receives historic license approval for new Vogtle units, full construction set to begin, February 9,2012, http://www.southerncompany.com/nuclearenergy/presskit/docs/COL_press_release.pdf

price tags for new infrastructure, transmission or electricity generation are significant. Permitting and other delays mean infrastructure takes years to construct. Utilities need to begin recovering costs as early as possible, and ideally, when available, will file for CWIP, essentially a mechanism allowing them to begin recovering at least a portion of the costs before the plant is in use. Speeding the permitting process and allowing for CWIP sooner can alleviate both the regulatory lag and regulatory uncertainty utilities now face, reducing their costs and decreasing the overall cost of the project.

- **Provide a catalyst to spur investment in new generation assets**. The absence of a stable long-term revenue stream is the largest obstacle to investment in new, capital intensive generation projects in organized markets overseen by RTOs. While the year-to-year price commitment of those markets can retain older, existing resources, it does not provide sufficient revenue predictability to attract the debt or equity financing necessary to construct new generation resources with useful lives of 30 or more years. States must act now to ensure that new resources are online where and when they are needed.

- **Avoid stranded investment**. For states with traditionally regulated utilities, cost recovery is critical to development of new technologies. Most often, expenses for cleaner technologies are not recoverable unless mandated by law. First implementers can anticipate higher costs, because new technologies are constructed one-off rather than assembly line production. For example, in a traditionally regulated environment, utilities must ask permission from their state commissions to engage in new capital expenditures. In general, policymakers are conceptually enthused about new, cleaner technologies at least until they see the price tags. In these cases, even when projects are stopped in early stages, the utility is left with significant expenditures they cannot recover, known as stranded investment. Working in partnership with government organizations to encourage state investment in these areas may help policymakers take the leap of faith in order to see a new technology from conception through to full development.

- **Authorize utilities commissions to develop alliances with neighboring states to promote development of transmission to facilitate new generation**, looking beyond their own state borders.

- **Work with other states and the federal government to maintain a diversity of energy supply** to guard against disruptions of any one source, especially for electricity generation.

- **Encourage investment in technology** that seeks to expand domestic energy choices for manufacturing, electricity generation and transportation and strengthen our energy security as long as technologies are developed in a way that is economical for consumers and taxpayers.

- **Help develop an "all of the above" energy strategy**. Our nation's energy policy should harness all domestic energy sources. Policymakers could help develop a national energy strategy that maximizes a diverse range of sources, including renewables, coal, nuclear, energy recovery for electricity production and oil and natural gas production, particularly from revolutionary new shale finds for use in manufacturing, transportation and electricity production.

Renewables: Becoming a Global Leader

Renewables are a growing and important part of America's energy mix, and while each renewable is essential; this discussion about renewables is not meant to be comprehensive. Renewables reduce our dependence on fossil fuels, blunt the economic exposure to fluctuating commodity prices and reduce emissions. They also provide an important economic resource for rural communities and landowners, and a technological leadership and export opportunity for the U.S. Given that some of them depend on natural occurrences, however – the wind blowing or the sun shining, for example – major technological advances in storage are necessary before renewables can be considered a wholesale replacement for conventional generation resources. In the meantime, with the right policies in place, renewable prices will continue to fall – already, with tax credits, wind is at near-parity with other conventional resources. They should continue to be one component of a diverse energy portfolio in the short-term, and as technology advances and prices continue to fall; a growing part of the overall solution in the long-term. As these considerations are taken into account, renewables are an emerging sector with the potential for economic growth that leads to jobs for states investing in this area.

States use a RPS to increase renewable energy generation. Its purpose is to stimulate the addition of existing renewable technologies into the electricity generating mix. Depending on how a state designs an RPS, it may either require or voluntarily request electric utilities and retail electric providers to supply a defined minimum amount of consumer electricity with renewable sources. The use of an RPS to date is continuing to increase the role of renewable energy in the electricity mix.

Wind

Since the federal PTC became available in 1992 – along with state energy standards, the main driver of wind energy development –50 gigawatts (GW) of wind generation have been installed in the U.S.[48] The U.S. wind industry has added over 35 percent of all new domestic generating capacity over the last 4 years; only second to natural gas and more than coal and nuclear combined.[49] The wind industry has invested $10-20 billion of capital in each of the last 3 years

[48] American Wind Energy Association (AWEA), AWEA U.S. Wind Industry Annual Market Report, Year Ending 2011, http://www.awea.org/suite/suite.cfm?CFID=206017489&CFTOKEN=43985358&jsessionid=78302413b40373f88763682f232b5722116c and Clean Technica, US Reaches 50 GW of Wind Energy Capacity in Q2 of 2012, http://cleantechnica.com/2012/08/10/us-reaches-50-gw-of-wind-energy-capacity-in-q2-of-2012/ and Market Watch, U.S. wind power now equals 11 nuke plants: study, August 8, 2012 http://stream.marketwatch.com/story/markets/SS-4-4/SS-4-8834/

[49] Ibid.

and supports 75,000 direct jobs in all 50 states, including manufacturing jobs at over 400 facilities.[50] Yet with the PTC set to expire at the end of 2012, the credit's end is already causing jobs losses. Almost no installations are planned for 2013, which means domestic manufacturing output will decrease until it's eventually phased-out through 2012. Technology and efficiency improvements have consistently lowered the cost of wind generation even as raw materials have increased in price. In states with significant wind generation, electricity prices have actually decreased as the percentage of wind generation has increased.[51]

Waste-to-Energy

Thanks to new technologies, material waste that cannot be recycled is being recovered in a process that converts waste-to-energy (WtE), rather than having the waste deposited in landfills. Municipal solid waste (MSW) is already converted into energy at facilities throughout the U.S. and serves as a sustainable baseload renewable energy resource, adding to our fuel diversity. Advances in technology are also being developed or piloted to convert non-recycled plastics into solid, liquid and gaseous fuels and chemicals and raw material feedstocks used to manufacture other products.

WtE often brings greenhouse gas mitigating, baseload renewable energy and significant jobs through both the construction and operation of plants. For example, a study of the impacts of waste management in the European Union (EU) determined that raising the level of the waste management sector to full compliance, characterized by: A 48 percent reduction in the amount of material waste landfilled or incinerated without energy recovery; a 72 percent increase in recycling; and a 112 percent increase in waste energy over the existing baseline, would create about 400,000 jobs.[52]

Closer to home, job creation effects from energy recovery facilities can also be recognized. For example, the expansion of HPOWER, a WtE facility in Hawaii owned by the City and County of Honolulu, created 400 construction jobs and will employ 34 full-time employees, as well as contribute millions in direct and indirect spending to the local economy.[53] Additionally, Governor Abercrombie was instrumental in the initial development of the facility, the expanded version of which will provide between 7 and 8 percent of the power to businesses and citizens of Oahu – where 80 percent of the state's population resides.[54]

---

[50] Ibid.
[51] Ibid.
[52] European Commission DG ENV, Implementing EU Waste Legislation for Green Growth (Final Report), November 29, 2011.
[53] Honolulu City and County Government Press Release, HPOWER Expansion Hits Half-way Point, May 5, 2011, http://www1.honolulu.gov/refs/csd/publiccom/honnews11/hpoweresxpansion.htm and Government Press Release, City's H-Power Plant Wins Top Award, June 26, 2012, http://www1.honolulu.gov/csd/publiccom/honnews12/HPowerWinsTopAward26June12.htm and Government Press Release, Mayor Breaks Ground on HPOWER Expansion, December 21, 2009, http://www1.honolulu.gov/refs/csd/publiccom/honnews09/HPowerExpansionProject.htm
[54] Ibid and KHON2, H-Power expansion earns more money for the city, June 26, 2012, http://www.khon2.com/news/local/story/H-Power-expansion-earns-more-money-for-the-city/A40JPnhAYUyA56GFcoNlcQ.cspx

Key Proposals and Actions States Could Take to Support the Development of Renewable Energy

- **Broaden definitions of "renewable energy" and "clean energy."** Energy recovery is a form of clean and renewable energy, yet policies often do not define it as such. Clean energy definitions should be broadened to include energy derived from multiple types of fuels and technologies, including clean coal technologies, nuclear, natural gas, hydropower, renewables, municipal solid waste (MSW) and combined heat and power.

- **Simplify state permitting processes and define valuable materials as "fuels."** State environmental permitting of energy recovery facilities is complex, slow and costly – made so by regulators' lack of familiarity with the technology and uncertainty about how to classify it. Permit application and evaluation processes need to be clarified and simplified. Another challenge is that when MSW is used as energy or converted to fuels, feedstocks, or raw materials, it often does not count toward states' mandated recycling and recovery rates. These programs may need to recognize energy recovery. Finally, today policies define MSW used in energy recovery as "solid waste" or "waste disposal," when in fact it is a key energy source. Policies may need to be changed to define non-recycled plastics and other valuable materials as "fuel" rather than "waste."

- **Continue to evaluate clean energy standards for their effectiveness and in comparison to other ways of promoting clean energy solutions**. States should review their clean energy standards every year to determine progress toward meeting targets and the impact on end-user costs. Such programs should also be evaluated (on the basis of relative cost) against other approaches to promoting innovation and clean energy technology development, with a focus on pre-commercial R&D.

Energy Efficiency

> "Creating technologies empowering Americans to increase energy efficiency will make our nation's energy supplies go further, while lowering energy costs for businesses and families."
>
> --American Chemistry Council

Energy efficiency is an emerging sector and critical component of the electricity industry, with potential to create and retain jobs through manufacturing and installation of energy efficiency devices for home and business use.

Figures projecting the economic potential that the sector offers may be overly optimistic in certain circumstances. The conundrum occurs when utilities and policymakers work to control electricity costs for all, which diminishes the average consumer's incentive to conserve.

Some alternative ratemaking and regulatory frameworks can further incent consumer participation in energy efficiency.

Decoupling is among the most known alternative ratemaking models that can compensate for the throughput disincentive. It allows a utility to recover its fixed costs and a return on those fixed costs based on a calculation that is independent of the utility's sales volume. A downside to decoupling is that it caps a utility's ability to earn when it sells more energy. For some members of the electric industry, especially those who are seeing sales growth, there may be more attractive alternatives to decoupling to encourage energy efficiency.

An example of an alternative is a Lost Revenue Adjustment Mechanism (LRAM). LRAM allows utilities to identify sales revenues lost specifically, because of energy efficiency programs and to factor those into their rates. This more targeted compensatory mechanism is aimed at keeping companies whole within the scope of the energy efficient programs they are sponsoring. Restricting scope is important, because otherwise companies could unfairly benefit financially from reduced consumption due to a struggling economy or a mild winter. And keeping companies whole matters, because reduced revenues can lead to lower bond ratings, higher costs of capital and other financial situations that ultimately result in customers paying more.

Other regulatory mechanisms are available to deal with the lost revenue problem associated with energy efficiency programs. Such mechanisms used should be tailored to the specific circumstances within individual states, and states should encourage utilities to promote energy efficiency where it is the best option for consumers.

Voluntary programs with reasonable efficiency goals for utilities and consumers are preferred to mandated program participation.

Property Assessed Clean Energy Programs

State governments could also support Property Assessed Clean Energy or PACE programs. PACE is a bipartisan, local government initiative that allows property owners to finance energy efficiency and renewable energy projects for their homes and commercial buildings, without taxpayer subsidies.[55]

PACE is a voluntary program: Interested property owners can opt-in to receive funds for energy efficiency improvements that they then repay through an assessment on their property taxes for up to 20 years. Because the assessment is attached to the property, the repayment obligation automatically transfers to the next property owner – who is reaping the benefits of lower energy costs – when the building is sold.[56]

[55] PACE Now, PACE One Page Summary, http://pacenow.org/blog/pace-one-page-primer/
[56] Ibid.

PACE addresses the two key barriers preventing broader adoption of energy efficiency measures: cost and ensuring the person subsidizing improvements benefits from reduced energy costs. The upfront cost barrier is eliminated by the long-term financing. The assessment on property tax ensures that the person getting the benefit of the energy efficiency improvement is also paying for it. To-date, 28 states have adopted PACE programs.[57]

Key Proposals and Actions States Could Take to Enhance Energy Efficiency

- **Make energy efficiency a higher priority**. Advances in efficiency will curb demand growth if we enable people to do the same – or more – with less energy. For example, without improvements in efficiency, it's estimated that the demand for energy will double nationally by 2040.[58] States could emphasize polices that promote lower-energy-use appliances, more fuel efficient or alternative-fueled vehicles and increased use of technologies to produce and distribute electricity more efficiently.

- **Impose a three-year review cycle to update energy efficient building codes to ensure they represent the most current practices**. The U.S. Department of Energy estimates that 40 percent of energy is consumed by homes and businesses.[59] The Building Code Assistance Project (BCAP), a joint initiative of the Alliance to Save Energy, the Natural Resources Defense Council and the American Council for an Energy-Efficient Economy, estimates that states, like New York, could save an estimated $178 million in yearly utility cost savings for homeowners and businesses by 2020 if it updated its building codes.[60]

- **Support cost-effective combined heat and power (CHP), also known as cogeneration, at industrial facilities where appropriate**. CHP generates both power and thermal energy from a one fuel source, such as a heat engine or power station, which increases a facility's operation efficiency, while also decreasing its energy costs. It's estimated that high-efficiency CHP could provide as much as 20 percent of energy generating capacity nationally by 2030.[61]

- **Establish efficiency standards and demand-side management policies that are unique to a state's demographic and economic makeup**.

---

[57] PACE Now, Financing Energy Efficiency, http://pacenow.org/blog/
[58] ExxonMobil, 2012 The Outlook for Energy: A View to 2040 – U.S. Edition http://www.exxonmobil.com/energyoutlook
[59] New York Building Code: Real Savings for N.Y. Homeowners & Businesses (Fact Sheet) provided by the American Chemistry Council.
[60] Ibid.
[61] American Chemistry Council: http://chemistrytoenergy.com/sites/chemistrytoenergy.com/files/Energy_Efficiency_Fact_Sheet.pdf

Smart Grid Investments

"Electric efficiency programs saved enough energy in 2010 to power over 9.7 million U.S. homes for one year, and avoided the generation of 78 million metric tons of carbon dioxide."

-- Edison Foundation, Summary of Ratepayer-Funded Electric Efficiency Impacts, Budgets and Expenditures, IEE Brief, January 2012

Utilities in partnership with a number of state regulators have developed successful smart grid programs, which create greater opportunities for energy efficiency through increased access to data for customers.

Smart grid investments allow utilities to better manage demand for electricity; eventually lower operating costs and improve reliability and efficiency of the grid itself. States with regulatory frameworks that support utilities in their efforts to pursue electric efficiency as a sustainable business tend to be leaders in annual electric efficiency expenditures and budgets.[62]

In 2011, U.S. ratepayer-funded electric efficiency budgets totaled over $6.8 billion – an increase of 25 percent from 2010 levels.[63] Electric utilities are by far the largest providers of energy efficiency in the U.S., with utility budgets comprising 84 percent of the total ratepayer-funded electric efficiency budget nationwide.[64] Given that state energy efficiency resource standards are established in half of all U.S. states, covering two-thirds of the nation's population, and that several of these standards have scheduled increases, ratepayer-funded electric efficiency budgets are highly likely to exceed the Lawrence Berkeley National Laboratory's (LBNL) projection of $12 billion by 2020 based on at least one company's analysis.[65]

The 2011 budgets for five states and the District of Columbia are more than double their 2010 budgets – Indiana, North Dakota, South Dakota, Virginia and West Virginia. Over the next 10 years, as different states develop new and, in some cases, first-time programs, we can expect many new states to become leaders in energy efficiency.[66]

Key Proposals and Actions States Could Take to Support the Development of a Smart Grid

- **Conduct more educational outreach and promotional programs** with the public to better explain the usefulness of smart grid investments, especially smart metering.

[62] Ibid.
[63] Edison Foundation, Summary of Ratepayer-Funded Electric Efficiency Impacts, Budgets, and Expenditures, IEE Brief, January 2012, http://www.edisonfoundation.net/iee/Documents/IEE_CEE2011_FINAL_update.pdf
[64] Ibid.
[65] Ibid.
[66] Ibid.

Electric Vehicles

A new generation of plug-in electric vehicles (PEVs) will help our country enter an era of clean transportation; reduce our dependence on foreign oil and create new, high-quality American jobs.

The first round of PEVs began arriving in several U.S. markets at the end of 2010, and the rollout will continue over the next few years. These PEVs will deliver important benefits over standard vehicles and traditional hybrids.

PEV Technology

The development of PEV technology results from extensive collaboration among electric power companies, the Electric Power Research Institute (EPRI), universities, automobile manufacturers, battery and component manufacturers, national laboratories and research institutes. Like current hybrids, PEVs use battery power, in addition to an internal combustion engine. However, unlike traditional hybrids, PEVs do not depend on gasoline to recharge their batteries. Instead, PEVs are plugged in to the existing electricity system, using a standard electrical outlet to recharge the car batteries. Owners can recharge their batteries overnight, using lower-cost, off-peak electricity. Under this scenario, the cost of an equivalent electric-gallon of gasoline could be less than $1.00.

Benefits of PEVs

- **Environmental Benefits:** PEVs use significantly less gasoline than both current hybrids and standard vehicles—and, therefore, release fewer emissions. In fact, battery-powered PEVs produce just one-third of the greenhouse gases emitted by gasoline-fueled vehicles.

  Widespread adoption of PEVs could reduce greenhouse gas (GHG) emissions from vehicles by more than 450 million metric tons annually in 2050—that's the equivalent of taking 82.5 million passenger cars off the road.[67]

- **Economic Benefits:** While PEVs have an initially higher cost when compared to most hybrid and non-hybrid vehicles, PEVs should be able to handle the daily driving needs of most Americans using battery power, and will significantly decrease gasoline costs for their owners.

- **Job Creation:** From manufacturing batteries to building the necessary electricity infrastructure, PEVs will create high-quality job opportunities throughout the country.

[67] Electric Power Research Institute and Natural Resources Defense Council, Environmental Assessment of Plug-In Hybrid Electric Vehicles, Volume 1: Nationwide Greenhouse Gas Emissions, July 2007.

- **Energy Security:** PEVs are powered by electricity made from domestic energy sources and will help our country reduce its dependence on foreign oil.

Addressing the Challenges Ahead

- **Affordability:** High battery costs for manufacturers increase the retail price of PEVs and remain a significant hurdle to bringing PEVs to the market. However, efforts to develop more efficient and affordable batteries should help to lower prices.

- **Charging Infrastructure:** Building the recharging infrastructure for PEVs in homes, businesses and public areas raises several challenges that must be addressed to ensure the widespread adoption of PEVs.

- **Electricity Infrastructure:** Strengthening our nation's electricity infrastructure with smart grid technology is a key component for large-scale commercialization of PEVs. The electric power industry is focused on developing a smart grid that will deliver significant benefits, such as improving electric system efficiency, utilizing more renewable energy, empowering customers to make smart choices about their energy usage and using electricity as a fuel for vehicles.

Key Proposals and Actions States Could Take to Support the Development of Electric Vehicles

- **Consider policies that would reduce registration fees, tolls and sales taxes on electric vehicles**.

- **Support preferential financing for electric vehicles (EV)**.

- **Help municipalities streamline the permitting process for EV charging stations and encourage cities to include EV infrastructure considerations into urban planning and building codes**.

- **Support the development of state and regional EV charging station maps**.

Promote Research & Development for All Energy Resources

The importance of state government and the private sector working together to promote research and development (R&D) when it comes to increasing and diversifying domestic energy resources cannot be overstated. Private-public partnerships can be an effective means for states to promote the development of new technologies as long as they are organized in a technology neutral way. While it behooves companies to work together, such as utilities working in partnership with vendors on research efforts, government initiatives that strongly

favor one technology over another may inadvertently eliminate promising new technology options.

Promoting R&D as a means of job creation is a policy strongly embraced in many European countries and holds great potential for states in the U.S. The Institute for Prospective Technological Studies has developed a white paper on corporate R&D and innovation that provides good insight into the results in European countries that may provide opportunities for states to also consider.[68]

Key Proposals and Actions States Could Take to Promote R&D for All Energy Resources

- **Create refundable or tradable tax credits to incent certain electricity generation resources**. Making credits refundable or tradable is the best way for a state to differentiate itself from others and put it at the forefront of innovation.

- **Create a R&D consortium** that may include state land grant universities and other research institutions as well as utilities and their supplies, such as manufacturers.
- **Provide tax incentives for private R&D efforts that provide tangible economic development benefits to communities,** while also ensuring that no one technology benefits at the expense of another.

- **Establish regulatory certainty and cost recovery for technological development and/or R&D**.

- **Establish a long-term cost recovery mechanism** for the development of new clean, affordable electricity generation facilities.

Oil and Natural Gas

"Increased access to and the safe and responsible development of America's energy resources has the potential to create as many as 1.1 million new jobs nationally."

--Wood Mackenzie Energy Consulting for the American Petroleum Institute 2012 Energy in Charts

The U.S. needs more energy of all types; projections by the federal government indicate that oil and natural gas supply most of the energy used now and will continue to do so for

[68] IPTS Working Paper on Corporate R&D and Innovation – No. 04/2010, The Job Creation Effect of R&D Expenditures, Francesco Bogliacino and Marco Vivarelli, www.iri.jrc.es/papers/2010_JRC57646_WP4.pdf

generations.[69] It's important to acknowledge this energy reality, and make choices that will lead to a greater energy future with more jobs, more economic growth, higher government revenues and greater energy security.

Economic Impact of Oil

According to the Congressional Research Service (CRS), the U.S. has 145.5 billion barrels of recoverable oil.[70] This number does not even take into account domestic oil shale reserves, which the United States Geological Survey (USGS) estimates could exceed 1.5 trillion barrels of oil – five times larger than Saudi Arabia's proven reserves.[71]

The recent increases in domestic oil production that reversed a twenty-year decline are a welcomed trend with positive impacts for the employment, the economy and government revenues. Domestic annual oil production has increased just under 15 percent from 4,950 thousand barrels per day in 2008 to 5,676 thousand barrels per day in 2011.[72] Substantial increases have come from areas producing tight oil from low permeability rocks. This trend of growing domestic production, due to tight oil is forecast to continue, according to EIA's 2012 Annual Energy Outlook, with tight oil supplies expanding more than five-fold from 250 thousand barrels per day in 2009 to 1320 barrels per day in 2030.[73]

Low-Carbon Fuel Standards

Low-Carbon Fuel Standards (LCFS) have been contemplated in many jurisdictions throughout North America as part of a comprehensive approach to achieving GHG emissions reduction targets.[74] While states vary on where to set emissions targets, generally the recommendation for a national LCFS would require GHG emissions reductions of 10-15 percent by 2030.[75] LCFS are intended to encourage refiners to choose the lowest carbon intensive fuels to meet emissions targets. Yet this also requires them to adopt a common set of boundaries to measure carbon output. For example, Wells-to-Tank (WTT) measures the carbon emissions of

---

[69] API, Newsroom, Jack Gerard's report to the Platform Committees, May 15, 2012, http://www.api.org/news-and-media/~/link.aspx?_id=C60E3EFB0BD74018802FF7F7BEA94DE6&_z=z or http://energytomorrow.org/SOAE2012/

[70] Congressional Research Service, U.S. Fossil Fuel Resources: Terminology, Reporting, Summary: http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore+id=04212e22-c1b3-41f2-b0ba-0da5eaea952

[71] USGS, http://pubs.usgs.gov/fs/2010/3041/pdf/FS10-3041.pdf

[72] Federal data from the EIA, http://www.eia.gov/dnav/pet/pet_crd_crpdn_adc_mbblpd_a.htm

[73] EIA, 2012 Annual Energy Outlook, http://www.eia.gov/forecasts/aeo/index.cfm

[74] The New York Times, "Study: Low-Carbon Fuel Standards Are Unlikely to Reduce Warming," Kate Galbraith, April 3, 2009, http://green.blogs.nytimes.com/2009/04/03/study-low-carbon-fuel-standards-are-unlikely-to-reduce-warming/

[75] National Low-Carbon Fuel Standard, Policy Design Recommendations, A Collaborative Study by the Institute of Transportation Studies, University of California, Davis; Department of Agricultural and Consumer Economics and Energy Biosciences Institute, University of Illinois, Urbana-Champaign; Margaret Chase Smith Policy Center and School of Economics, University of Maine; Environmental Sciences Division, Oak Ridge National Laboratory; International Food Policy Research Institute; and Green Design Institute of Carnegie Mellon University, July 19, 2012, http://nationallcfsproject.ucdavis.edu/files/pdf/2012-07-nlcfs-policy-design-recommendations.pdf

a petroleum-based transportation fuel from the point of extraction until the fuel reaches a consumer, but it does not measure the carbon released during fuel consumption.[76] Conversely, Wells-to-Wheels (WTW) assesses a fuel based on its life cycle from extraction, transport and crude oil refinement to retail markets; to its combustion in end-use vehicles.[77] Consequently, the WTT assessment represents only a relatively small portion, about 15-20 percent, of a fuel's entire life cycle, whereas WTW is a more comprehensive measure.[78] Additionally, there are other issues with developing and implementing a true LCFS, including:

1. **Assessing the carbon footprint of feedstocks through to their resultant transportation fuels is a complex issue**. For any standard to be fair and transparent a scientific approach must be taken yet the science is complex and the methodologies for estimating the carbon intensity of transportation fuels vary in their results significantly. This introduces significant uncertainty and variability in outcomes.[79]

2. **Input data to any current modeling is not consistent or transparent**.

    - Emissions data from the production phase is comprehensively collected and publically reported in several North American and European jurisdictions, but not available from most other areas of the supply throughout the world.[80]

    - Refining models are proprietary and refinery configurations are intended to allow variability in end product production. Therefore, publically available models are lacking in their ability to access GHG emissions from the refining stage or the end products manufactured.[81]

    This variation in input data makes it difficult for any jurisdiction to properly establish current baseline information from which to judge the future reductions as well as the ability to calculate progress against targets.

3. **The treatment of electricity cogeneration is variable across studies and the amount of co-produced power is not consistent from production or refinery site-to-site**. As discussed earlier in this White Paper, the value of cogeneration should

[76] "Canadian Oil Sands: Life-Cycle Assessments of Greenhouse Gas Emissions," CRS Report, Richard Lattanzio, June 18, 2012 http://www.fas.org/sgp/crs/misc/R42537.pdf
[77] Ibid.
[78] Jacobs Consultancy Study, Life Cycle Well to Wheels Assessment of GHG Emissions from North American and Imported Crude Oils, Ian Moore, March 21, 2011 (see page 7) http://www.ceps.eu/system/files/article/2011/03/Jacobs%20Consultancy%20LCA%20Meeting%20March%2021.pdf
[79] Ibid.
[80] *Upstream greenhouse gas (GHG) emissions from Canadian oil sands as a feedstock for European refineries*, Adam Brandt, Stanford University, January 18, 2011, https://circabc.europa.eu/d/d/workspace/SpacesStore/db806977-6418-44db-a464-20267139b34d/Brandt_Oil_Sands_GHGs_Final.pdf
[81] Ibid.

not be underestimated both for the value of the fuel being produced and the overall reduction in environmental harm that cogeneration provides.

Key Proposals and Actions States Should Take Prior to Proceeding with a LCFS

- **Establish a scientifically-based methodology for measuring a fuel's carbon intensity,** including the independent verification of input data into any regulatory models.

- **Allow for a methodology that includes cogeneration benefits** when considering the overall carbon intensity of a specific fuel stock.

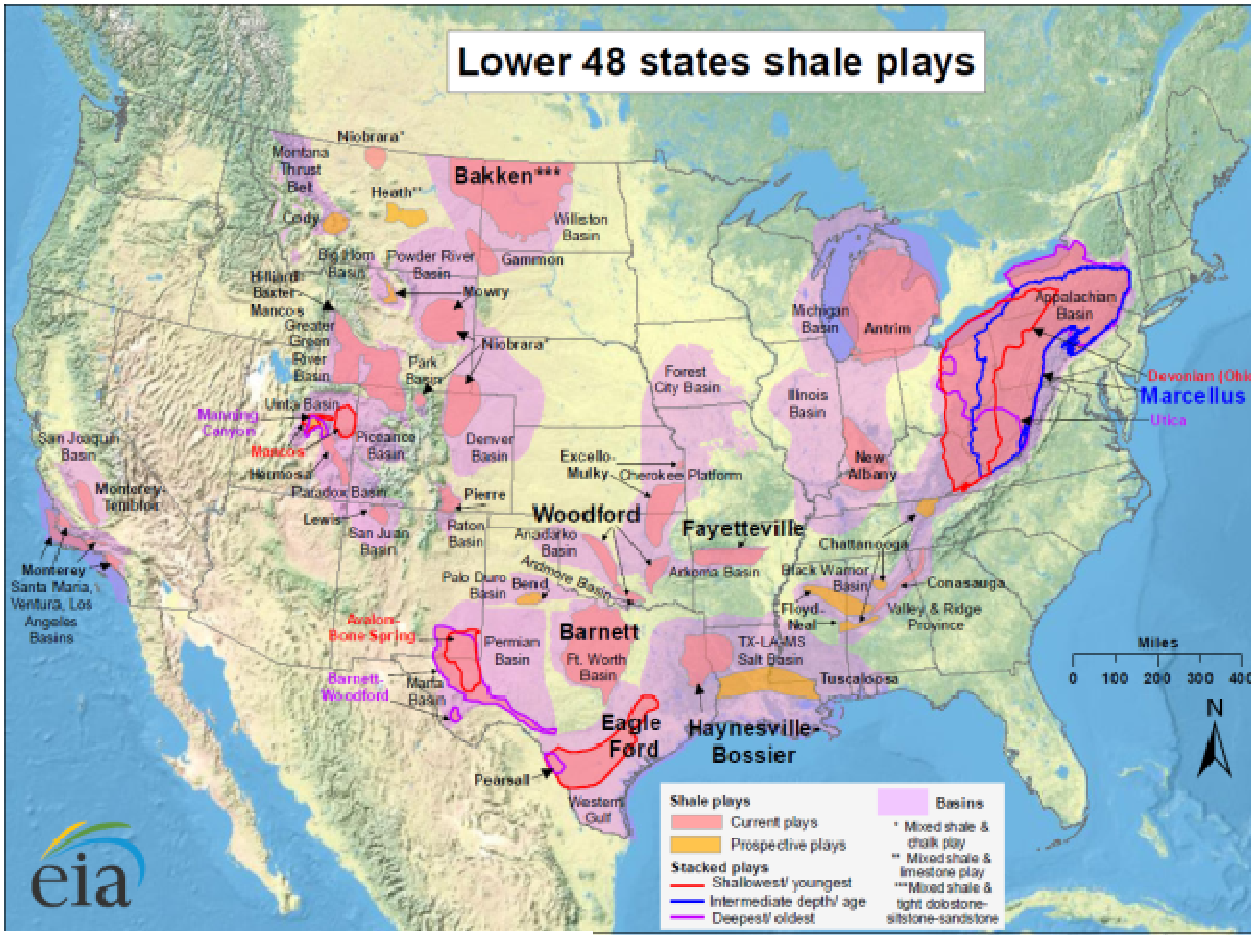
- **Ensure a non-discriminatory approach to all fuel stocks**.

- **Work with industry to understand the competitive implications of the introduction of any LCFS,** as the potentially higher costs of lighter crudes in specific markets could lead to overall higher energy costs.

Economic Impact of Natural Gas

Many energy experts believe natural gas is poised to transform transportation and domestic energy generation sectors, as a lower carbon fuel source. Potential shale gas plays are distributed throughout the U.S., as Chart 6 shows.

Chart 6: Shale Gas Deposits



Source: EIA based on data from various published studies,
Updated May 9, 2011

However, as shale gas extraction best practices are developing and due to opposition from some environmental groups, the transition to broader use of domestic natural gas must be managed responsibly. Both industry and government can play a role by communicating effectively about technologies used, operational practices and sound regulatory structures that ensure safety and responsible development. As this energy resource continues to be integrated in our electric generation lexicon, it may not only help to reduce electricity prices nationally, but also may create thousands of jobs for states with communities that continue to be economically challenged.

Background Information

Maintaining growth in domestic oil production requires access to more of the recoverable resource endowment, including on federal lands and waters. States must continue to play their historical and primary role with respect to industry regulation of onshore and near shore oil

drilling and production. The importance of ongoing inter-state coordination is recognized and occurs partly through organizations, such as the Interstate Oil and Gas Compact Commission (IOGCC), the Ground Water Protection Commission (GWPC) and the National Association of State Energy Officials (NASEO).

Offshore production also continues to be a crucial part of future domestic oil supply, with the resource potential for these areas often being understated by very old data, which misses several generations of technology evolution in exploring the subsurface geology. The 2012-2017 five-year Outer Continental Shelf (OCS) leasing plan does not open any offshore areas that have not been previously leased and omits access to 85 percent of the U.S. OCS. No other country currently denies itself access to its own oil and gas resource on such a scale. Now is the time to take a careful assessment of the economic, energy security and employment costs of such a limited access policy and explore and develop more of our own hydrocarbon resources.

Increasing domestic onshore oil production is also important to future domestic energy supplies. For example, gas prices have been strongly affected by the rising cost of crude oil.[82] Together, the price refiners pay on the world market for crude plus gasoline taxes accounts for over $3.00 – or about 84 percent – of what people are paying at the pump today.[83] The U.S. should develop more of its ample crude oil resources. Developing U.S. shale plays containing oil could create well-paying jobs for Americans and should help lower both crude oil costs and gasoline prices. We also need policies that add critical infrastructure to increase our oil supply.

Shale gas energy development has important economic impacts for the chemical and manufacturing sectors. The chemical and manufacturing industries are eager for shale gas energy development, because they depend on natural gas not only as fuel, but also as a raw material (ethane). About 96 percent of U.S. manufactured goods are touched by chemistry, and the chemical industry uses ethane.[84] Due to the increase in domestic shale gas production, U.S. manufacturers have an advantage over foreign competitors who use an oil-based raw material rather than ethane. The American Chemistry Council (ACC) determined that a 25 percent increase in the supply of ethane (derived from shale gas) could add over 400,000 jobs across the economy, provide over $4.4 billion annually in new federal, state and local tax revenue, and spur $16.2 billion in capital investment by the chemical industry.[85] The ACC also notes that the relatively low price of domestically-produced ethane would give U.S. manufacturers an essential advantage over many global competitors. Similarly, the National Association of Manufacturers (NAM) estimated that lower natural gas prices will help U.S. manufacturers create 1,000,000

[82] API, Newsroom, John Felmy speaks at press briefing teleconference on gasoline prices, February 22, 2012, http://www.api.org/news-and-media/testimony-speeches/2012/john-felmy-press-briefing-teleconference-gasoline-prices-feb22.aspx
[83] Ibid.
[84] American Chemistry Council, Shale Gas, http://chemistrytoenergy.com/sites/chemistrytoenergy.com/files/Shale_Gas_Fact_Sheet.pdf
[85] American Chemistry Council, "Shale Gas and New Petrochemicals Investment: Benefits for the Economy, Jobs, and U.S. Manufacturing," March 2011.

new jobs by 2025, while lower feedstock and energy costs could help U.S. manufacturers reduce energy expenditures by as much as $11.6 billion by 2025.[86]

Transportation

The options and opportunities for improvements in transportation energy use extend beyond the use of electric vehicles discussed earlier. A broad policy review should not overly emphasize one vehicle type over another, because it would be a disservice to the range of potential options and the ability of markets to bring forth the most competitive options. Furthermore, an unbalanced approach to transportation energy use could have a negative impact on the range of solutions that develops. For example, increases in petroleum engines and fuel efficiency are reducing costs and energy use.[87] Also, the use of natural gas vehicles (NGV) in certain fleet environments is providing cleaner transportation, and research continues in the areas of biofuels.[88] For example, several states, including Colorado, Kentucky and West Virginia, are coordinating efforts to attract automobile manufacturers in the U.S. to develop a functional and affordable original equipment manufacturer (OEM) fleet NGV that will meet public demand, because they recognize the opportunity that compressed natural gas (CNG) has to save taxpayer dollars, while also utilizing domestic energy resources to fuel our nation's transportation needs.[89]

Promote Research & Development

A 2011 study by Wood Mackenzie found that U.S. policies facilitating the development of new and existing resources could support an additional 1.4 million American jobs, produce an additional 10 million barrels of oil equivalent per day and provide $100 billion per year in additional government revenues by 2030.[90] Policies considered by Wood Mackenzie include expanding leasing in federal resource areas, the commencement of Marcellus shale gas development in New York, approval of the Keystone pipeline and increased permitting in the Gulf of Mexico.

Key Proposals and Actions States Could Take to Support the Development of Domestic Oil and Natural Gas Resources

- **Maintain regulatory structures for oil and gas exploration, including shale gas, that operate transparently with public input and based on sound science and good public policy**. A 2012 Executive Order by the Obama Administration said

[86] PriceWaterhouseCoopers for the National Association of Manufacturers, "A Renaissance in Shale Gas?" December 2011.
[87] U.S. Department of Energy, http://www.fueleconomy.gov/feg/oildep.shtml
[88] Ibid.
[89] Memorandum of Understanding: http://www.ok.gov/governor/documents/Oklahoma-Colorado%20NGV%20MOU.pdf
[90] Wood Mackenzie, "U.S. Supply Forecast and Potential Jobs and Economic Impacts (2012-2030)," http://www.api.org/~/media/files/policy/jobs/api-us_suplly_economic_forecast.ashx

that "states are the primary regulators of onshore oil and gas activities."[91] In fact, many states are paving the way in developing robust regulations. Some states have implemented a mandatory disclosure system to disclose relevant information, while protecting confidential business information (CBI).[92] The full potential from shale gas will only be realized with sound state regulatory policies that allow for aggressive production in an environmentally responsible way.

- **Continue to explore opportunities to encourage domestic energy production** with timely, responsible development of oil for use in transportation and manufacturing and natural gas and coal for electricity generation and exportation.

- **Encourage responsible shale production**.

    - Develop unconventional resources safely and responsibly. Responsible industry practices exist. However, the industry is highly diverse with many companies large and small, so the exercise of state regulatory authority is necessary not only to encourage, but also to ensure universal application of responsible development rules.

    - Virtually every state with viable unconventional gas and oil resources has already taken action to revise and update their oil and gas regulations to account for the new growth of unconventional resource development. Such adjustments will continue in the years to come, as markets and industries continue to evolve.

    - Inter-state groups of regulatory agents, such as the GWPC and the IOGCC, are experienced and knowledgeable in establishing strong regulatory and enforcement systems facilitating cross-state coordination.

- **Maintain authorities to oversee oil and gas development** so that important state and local considerations can be considered, including local geology and hydrology.

    - The states have historically regulated oil and gas drilling and production operations, and this system has served the nation well. States have the best knowledge of local conditions – geology, hydrology, etc., which oil and gas operations affect, so states are best positioned to design appropriate regulatory programs.

    - Additionally, successfully realizing the economic and jobs potential of the states' environmental protection occurs in a manner that maintains the economic

[91] The White House, Office of the Press Secretary, Executive Order -- Supporting Safe and Responsible Development of Unconventional Domestic Natural Gas Resources, April 13, 2012, http://www.whitehouse.gov/the-press-office/2012/04/13/executive-order-supporting-safe-and-responsible-development-unconvention

[92] *The New York Times*, "Seeking Disclosure on Fracking," Kate Galbraith, May 30, 2012, http://www.nytimes.com/2012/05/31/business/energy-environment/seeking-disclosure-on-fracking.html

viability of resource development. Additional layers of federal regulations that serve no true risk management or protective purpose will only limit the benefits that states stand to gain from resource development within their borders.

- **Ensure that the use of various products of chemistry is transparent,** while protecting proprietary information.

    - The GWPC and IOGCC have established the FracFocus online registry into which the industry voluntarily submits the chemical makeup of the hydraulic fracturing liquids being used, on a well-by-well basis.[93]

    - A number of states have acted to make disclosure of additives to fracturing fluid a mandatory requirement. Since the establishment of the FracFocus registry, several states have allowed their mandatory requirement to be satisfied through disclosure to FraFocus.

- **Consider infrastructure accessibility and affordability.** Natural gas fueling corridors make fueling more accessible. State policies can help create more of these corridors through grants and incentives that cover a portion of the construction or reconstruction costs or the expense of acquiring a facility to store, compress or dispense alternative fuels.

- **Create vehicle fleet conversion requirements**. Converting fleets to natural gas can result in cost savings and improve local air quality. Many fleets see a 15 percent to 28 percent fuel savings compared to diesel fleets.[94] At least 37 states and the District of Columbia require certain government agencies to retrofit current vehicles or to purchase NGVs. See page 26 of the National Conference of State Legislatures (NCSL) Transportation Energy for the Future report for examples.[95]

- **Provide tax incentives, rebate programs and high-occupancy vehicle lane exemptions**. Policymakers can encourage natural gas vehicle deployment by creating a variety of incentives. At least 25 states provide tax credits, exemptions or refunds for alternative fuel use, fuel production or infrastructure.[96] Fifteen states have loan or lease programs, 10 have implemented rebate programs and 17 states and the District of Columbia have high-occupancy vehicle (HOV) lane or emission inspection exemptions for natural gas vehicles. Of the states providing incentives, 36 and the District of Columbia provide them for vehicle owners and 36 have them for alternative fuel purchasers, sellers or producers.[97]

---

[93] Frac Focus: http://fracfocus.org/
[94] NCSL, Transportation Energy for the Future, March 2012, http://www.ncsl.org/documents/energy/tranenergyfuture.pdf
[95] Ibid.
[96] Ibid.
[97] Ibid.

Conclusion

Increasing and diversifying energy resources clearly holds much promise for states to grow their economies and create jobs. Over time, technological advancements will continue to make resource development cheaper, more practical and safer. Each state has a role to play in expanding the supply of energy that draws upon their unique natural assets. As states set out to grow their energy industries, it will be important to pursue an "all of the above" energy strategy that takes into account diversity and security, not just cost and establishes policies and programs that support this approach. Without policies that provide for the "all of the above" strategy, certain technologies and energy resources will never reach their full potential. States should be proactive in how they develop energy policy so not to limit future availability or diminish the economic benefits they provide.