CONSUMER ENERGY ALLIANCE
THE VOICE OF THE ENERGY CONSUMER

Recommendations for the 115th Congress and Trump Administration

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Letter to the 115th U.S. Congress and the Trump Administration

In the two years following Consumer Energy Alliance's (CEA) *Recommendations for a Balanced Energy Policy: A Briefing Book Presented to the 114th Congress*, the state of our nation's energy landscape has changed.

As the "Voice of the Energy Consumer," CEA and its membership have strongly advocated for expanded U.S. energy development and increased energy efficiency as a means to moderate energy prices and further energy self-sufficiency. Recent federal actions to prohibit access to abundant energy resources on federal lands and waters, coupled with attempts to delay or curtail the transport of fuel supplies have challenged American families' and small businesses' access to reliable, affordable energy.

In this briefing book, we identify policy recommendations that, if enacted, would establish a sensible, balanced energy and environmental policy that supports thoughtful increases in U.S. energy production, improvements in energy transportation, and utilization and advances in energy efficiency. Ultimately, the recommendations provide a blueprint for a sound energy future defined by greater economic opportunity, more resilient energy security and affordable, abundant, diverse energy.

CEA brings together families, farmers, small businesses, producers, distributors, labor, and manufacturers to engage in a meaningful dialogue about America's energy future. Our members represent nearly every sector of the U.S. economy and understand well how energy affects every business, family and sector of our economy. We present these recommendations on behalf of our nearly 300 corporate members and 450,000 individual members with the fundamental belief that a sensible energy policy underpins a healthy economy.

We encourage the 115th Congress and the Trump Administration to work together to effectively implement these recommendations. We also urge federal leaders to engage state policy makers and regulators on decisions affecting their states.

Lastly, but most importantly, all of us at CEA look forward to working with elected officials in Washington and in state houses across the country to advance a balanced energy policy for American consumers.

Sincerely,

David Holt
CEA President

Wayne Zemke
CEA Chair
Caterpillar, Inc.

Chapter 1
IMPORTANCE OF A BALANCED AND DIVERSE ENERGY POLICY

Recommendation:

- Advance a balanced energy policy that:
  - Supports all sectors of the economy, including families and businesses of all sizes;
  - Recognizes any increase in the cost of electricity and transportation fuels functions as a regressive tax on families and businesses, as most demand for energy is inelastic and therefore impacts poorest among us most severely;
  - Facilitates construction of sufficient infrastructure to get American energy products to American markets and beyond and allows the U.S. to continue its trend of relying less and less on foreign powers for its energy; and
  - Acknowledges the fact that coal, oil and gas are important feedstocks in many manufacturing processes for goods including steel, fertilizers and plastics.

The positive impact of a balanced energy policy for the United States would be difficult to understate. A truly balanced energy policy would ensure that every sector of the U.S. economy and every socioeconomic group has access to affordable, reliable energy. It would also allow the energy production industry to continue to be a foundational pillar of the American economy. Finally, it would provide all-important energy security, a strategic and economic layer of protection for American energy consumers.

American energy production, with the advent of the U.S. “energy revolution,” has already demonstrated the power to transform the U.S. economy, empowering the people while creating jobs, cash-flow and additional economic opportunity.

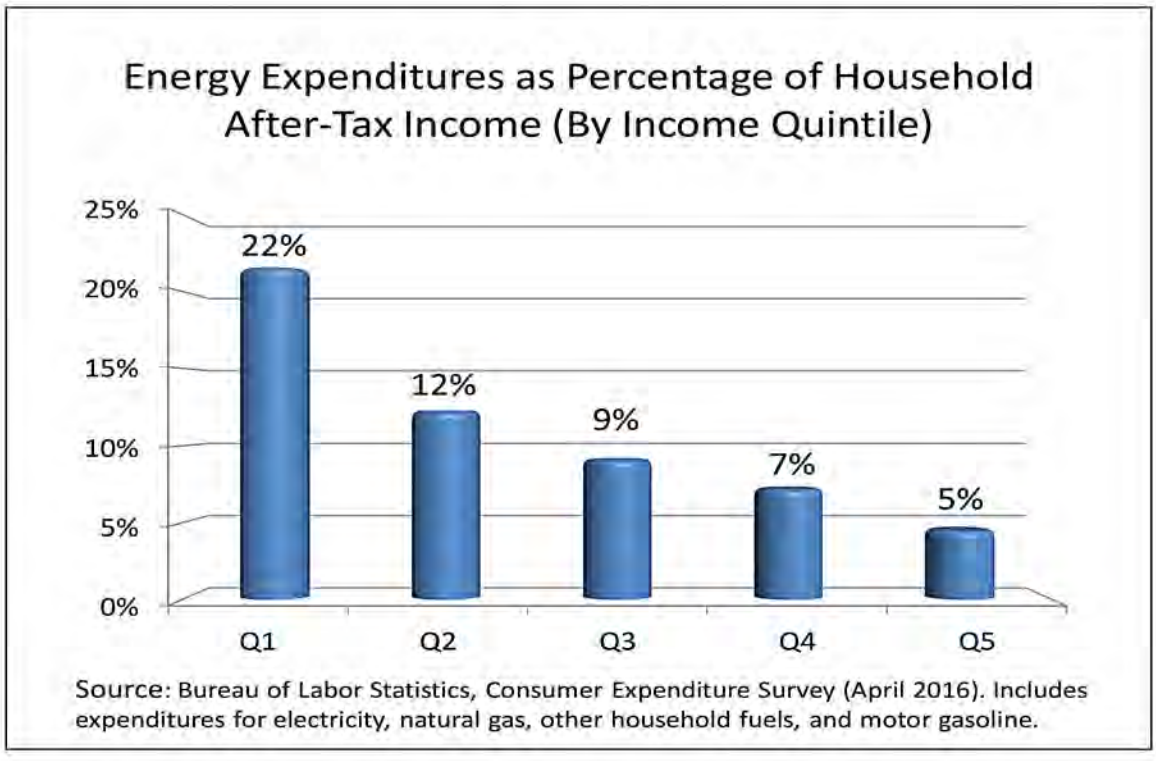
In order to fully realize these benefits, sound policy must diversify our energy portfolio, promote safe energy production and usage, and minimize political impediments to development. Policies must be fit for purpose, providing public safety benefits without handcuffing the ability of industry to innovate and produce. Onerous or redundant regulations, restricted access to supplies of domestic resources, and excessive taxation are a few examples of artificial barriers created by misguided policies that can paralyze energy development and limit America’s energy future.

The recommendations included in this report are designed to help policy makers resolve many of the political hurdles that threaten the short-term and long-term viability of America's energy future. Before examining these policies, it is important to review how energy policy affects consumers.

How Energy Prices Affect Families & Businesses

As everyone seems to understand intuitively (but not always reflected in our policy decisions), a robust U.S. economy depends on access to reliable and affordable energy. Nearly every sector of the U.S. economy relies on energy to transport goods and services, power facilities and manufacture numerous consumer goods. Accordingly, policy makers would be remiss to believe that the energy industry and environmental groups are the only stakeholders deserving of a voice in this discussion. Decisions about energy development and use affect all energy consumers, and CEA and its membership are proud to represent and speak to consumer concerns.

When evaluating the impact of energy policies on families and businesses, policy makers must first consider how prices affect the most vulnerable amongst us: low-income and fixed-income families for whom price increases result in difficult decisions. Not surprisingly, low-income families spend a larger percentage of disposable income on electricity, heating costs and transportation fuels than other income brackets. Unlike other necessities such as housing, food and healthcare, energy consumers often cannot shop around for cheaper resources. In other words, higher energy costs function as a regressive tax on the poorest American families.



SOURCE: www.americaspower.org

To illustrate this point, consider family gasoline expenditures. Gasoline is a good that almost every American family needs, one that is very difficult to cut back on absent significant changes such as place of work, location of home or purchase of a different vehicle, and prices are generally uniform in any given area. In other words, demand for gasoline is largely inelastic, or unchanging, regardless of the price. Not surprisingly, in each of the recessions in the last forty years, high oil prices precipitated contraction of the U.S. economy, as higher gasoline prices immediately and negatively impact Americans' disposable income.[1]

Beyond families, companies are also affected. Slight increases in fuel costs can have a significant impact on the profitability of transportation companies. The trucking industry alone consumes more than 37 billion gallons of diesel fuel annually.[2] Industry wide, a one-cent increase in the average price of diesel costs an additional $350 to $370 million a year in fuel expenses.[3] Similarly, for every dollar-per-barrel increase in the cost of oil, the airline industry's fuel bill increases by $420 million, according to Airlines for America.[4]

In addition to impacting the cost of living and the cost of doing business, high energy costs also affect consumer confidence. According to IHS Global Insight, a 10 percent increase in gasoline prices lowers consumer confidence by about 1.5 percent.[5] Conversely, lower than expected fuel costs can lead to significant savings for families. For the average household, lower transportation fuel costs have increased purchasing power. Beginning in fall 2014, gasoline costs declined dramatically, decreasing by over 40 percent to an average $2.14 per gallon in 2016, which is 12 percent less than the annual average in 2015 and the lowest annual average since 2004.[6] The average U.S. household has saved an estimated $1,300 since mid-2014 due to the fall in gas prices.[7]

1 Bloomberg, "How High Oil Prices Will Permanently Cap Economic Growth." September 23, 2012. http://www.bloomberg.com/news/2012-09-23/how-high-oil-prices-will-permanently-cap-economic-growth.html

2 American Trucking Association, Reports, Trends & Statistics, http://www.trucking.org/News_and_Information_Reports_Energy.aspx.

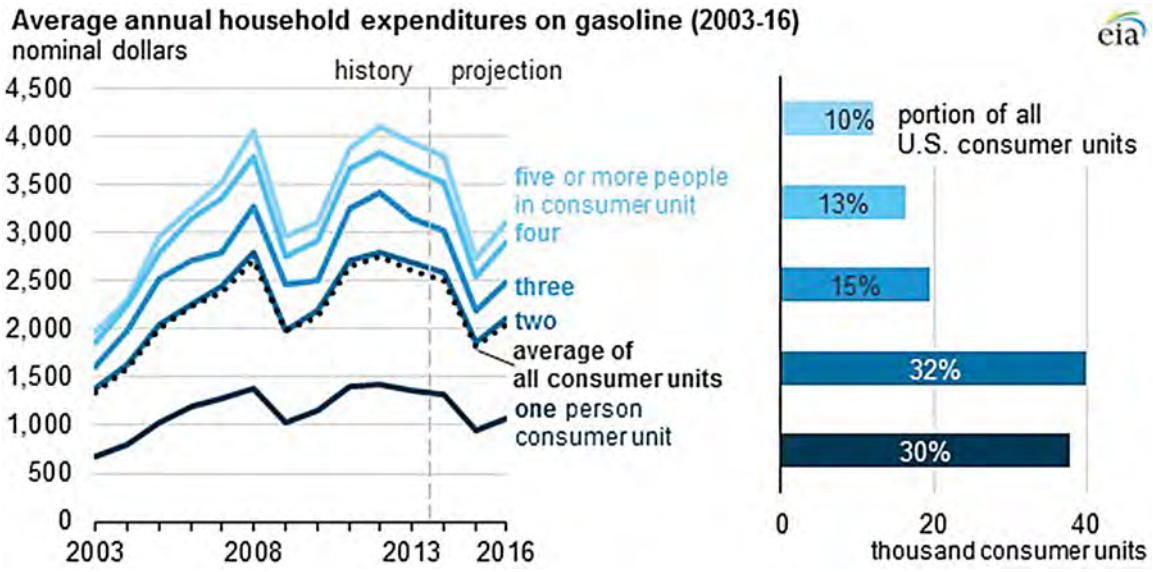
3 Real Clear Policy, "High Fuel Costs Not Just a Drag on Commuters." March 27, 2012. http://www.realclearpolicy.com/articles/2012/03/27/high_fuel_costs_not_just_a_drag_on_commuters_97.html.

4 Ibid.

5 J.P. Morgan Chase & Co. Institute, "How Falling Gas Prices Fuel the Consumer." October 2015. https://www.jpmorganchase.com/content/dam/jpmorganchase/en/legacy/corporate/institute/document/jpmc-institute-gas-report.pdf.

6 Energy Information Administration. "U.S. gasoline prices in 2016 were the lowest since 2004." January 6, 2017. https://www.eia.gov/todayinenergy/detail.php?id=29452.

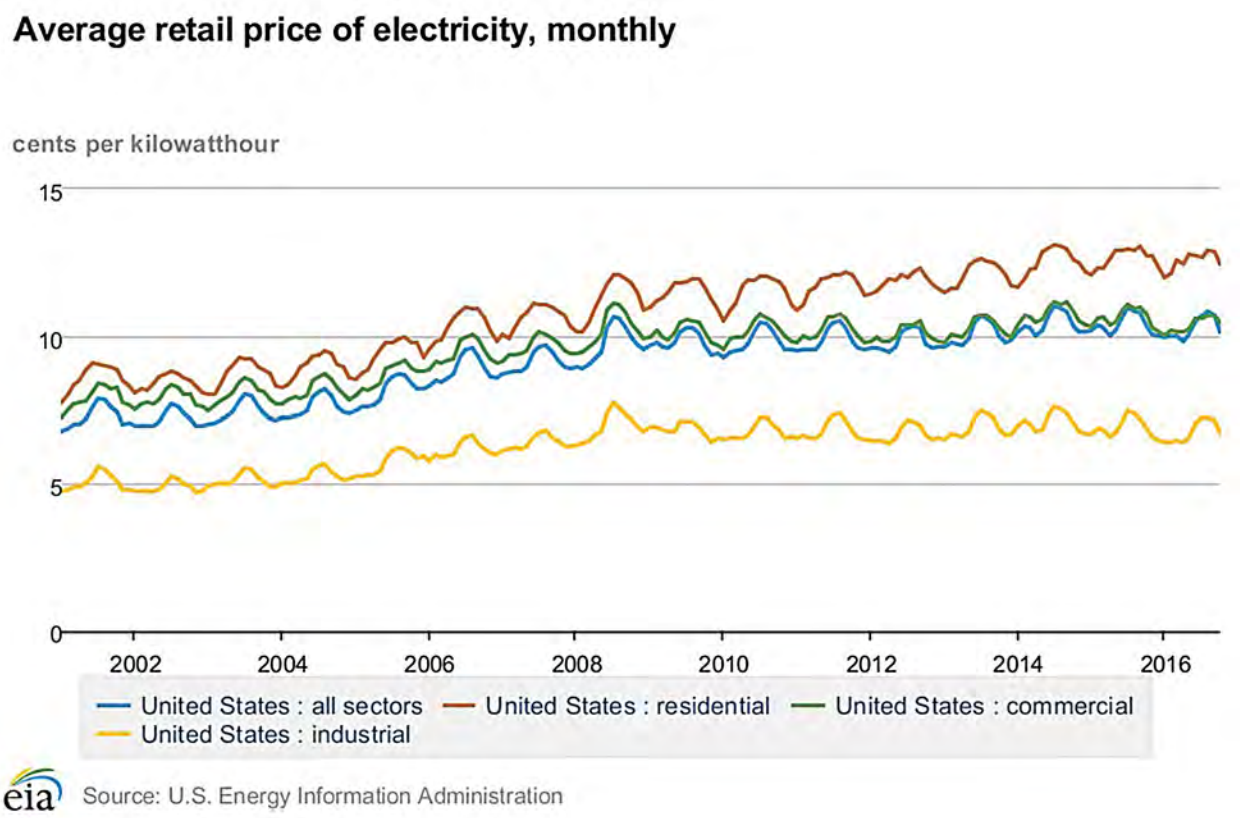
7 Becky Yerak, "Low gas prices have saved the average household about $1,300, Fed chair says." Chicago Tribune. June 6, 2016. http://www.chicagotribune.com/business/ct-gas-prices-yellen-0607-biz-20160606-story.html.



SOURCE: http://www.eia.gov/todayinenergy/detail.php?id=20752

In addition to transportation fuels, electricity, heating and cooling costs affect all sectors of the economy. For electricity consumers, particularly large consumers like hospitals, universities and manufacturers, reliability and cost drive bottom-lines and the ability to plan for the future. While individual retail prices vary greatly depending on provider, regulation, demand and type of fuel utilized, the average U.S. price per kilowatt hour (kWh) rose from about $0.089 in 2006 to a little more than $0.10 in 2016 across the residential, commercial, industrial and transportation sectors.[8]

8 Energy Information Administration. "Average Price of Electricity to UltimateCustomers." December 23, 2016. https://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_3



SOURCE: U.S. Energy Information Administration http://www.eia.gov/electricity/data/browser/#topic/7?agg=0,1&geo=g&end-sec=vg&linechart=ELEC.PRICE.US-ALL.M~ELEC.PRICE.US-RES.M~ELEC.PRICE.US-COM.M~ELEC.PRICE.US-IND.M&column-chart=ELEC.PRICE.US-ALL.M~ELEC.PRICE.US-RES.M~ELEC.PRICE.US-COM.M~ELEC.PRICE.US-IND.M&map=ELEC.PRICE.US-ALL.M&freq=M&start=200101&end=201610&ctype=linechart&ltype=pin&rtype=s&maptype=0&rse=0&pin

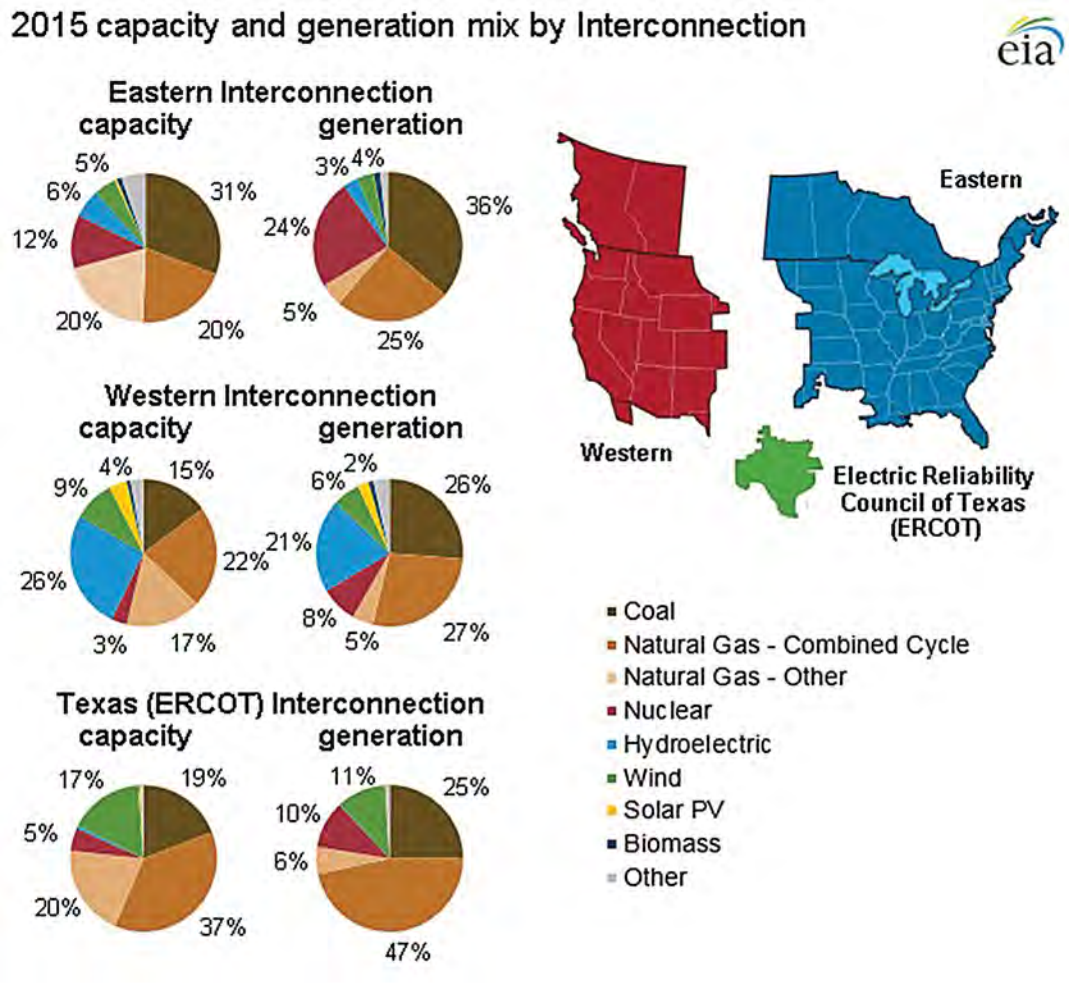
For heating, a majority of U.S. families and businesses utilize natural gas, heating oil, propane or electricity.[9] In fact, nearly half of all U.S. households heat primarily with natural gas.[10] Although it is not the most cost-effective option, the proportion of residences utilizing electricity for heat generation has increased dramatically as populations migrate to the South and West where electricity is the common source of space heating.[11] Among U.S. households, 39 percent rely on electricity – produced in significant portions by coal, natural gas, nuclear, hydroelectric, wind, solar and biomass - as their primary heating source, ranging from 63 percent in the South to 15 percent in the Northeast.[12]

9 Energy Information Administration, "Winter Fuels Outlook", January 25, 2017, https://www.eia.gov/outlooks/steo/report/winterfuels.cfm

10 Energy Information Administration, "Winter Fuels Outlook," January 7, 2017. https://www.eia.gov/outlooks/steo/report/winterfuels.cfm.

11 Energy Information Administration, "Everywhere but Northeast, fewer homes choose natural gas as heating fuel," September 25, 2014. http://www.eia.gov/todayinenergy/detail.cfm?id=18131.

12 Energy Information Administration, "Winter Fuels Outlook." January 10, 2017. https://www.eia.gov/outlooks/steo/report/winterfuels.cfm



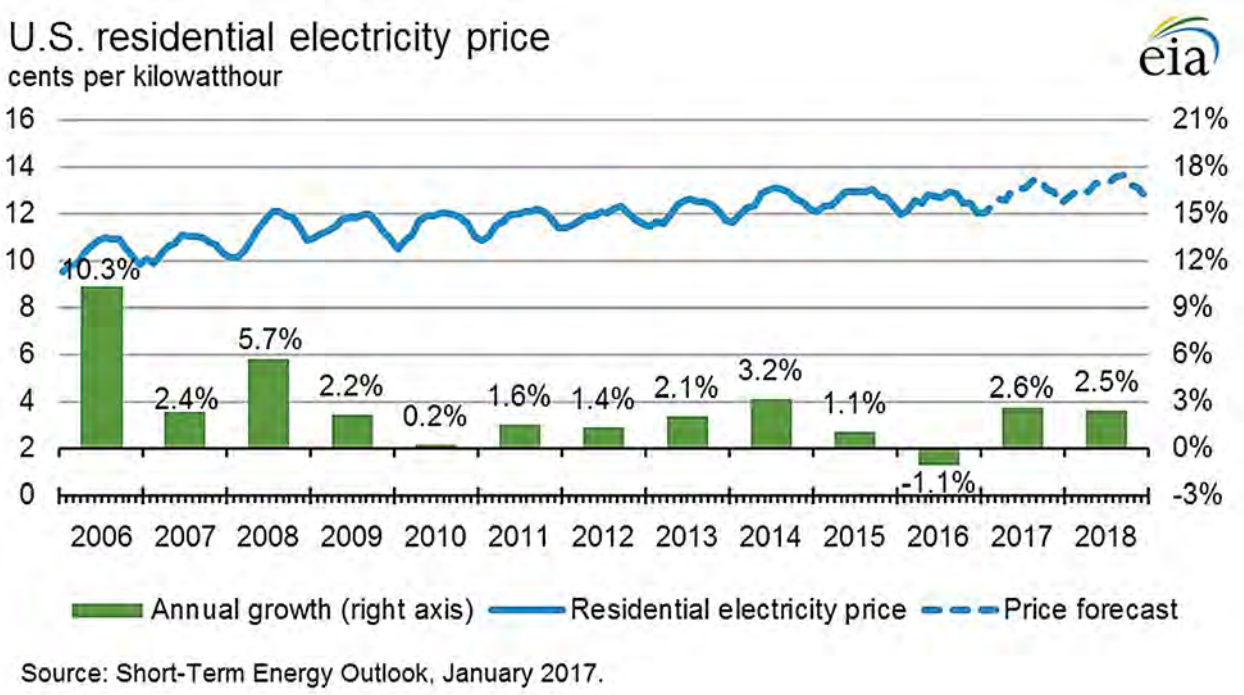
SOURCE: U.S. Energy Information Administration: Electricity Monthly Update, http://www.eia.gov/electricity/monthly/update/archive/october2016/

The Energy Information Administration (EIA) expects household heating fuel expenditures to increase in winter 2016-2017 compared with the previous winter across the most common heat sources. Households heating primarily with natural gas are expected to spend $116 (22 percent) more in winter 2016-2017 compared to the previous winter. The increase in forecasted expenditures is driven by comparatively similar increases in price and consumption.[13] Households heating primarily with heating oil are expected to spend an average of $378 (38 percent) more in winter 2016-2017 due to the increase in crude oil prices, which are forecasted to be 24 percent higher than the previous winter.[14] Finally, households heating primarily with electricity are expected to spend an average of $49 (5 percent) more in winter 2016-2017 as a result of 5 percent higher consumption, including both heating and non-heating uses of electricity, and about 1 percent higher residential electricity prices than the previous winter.[15]

13 Energy Information Administration, "Winter Fuels Outlook," January 10, 2017, https://www.eia.gov/outlooks/steo/report/winterfuels.cfm.

14 Ibid.

15 Ibid.

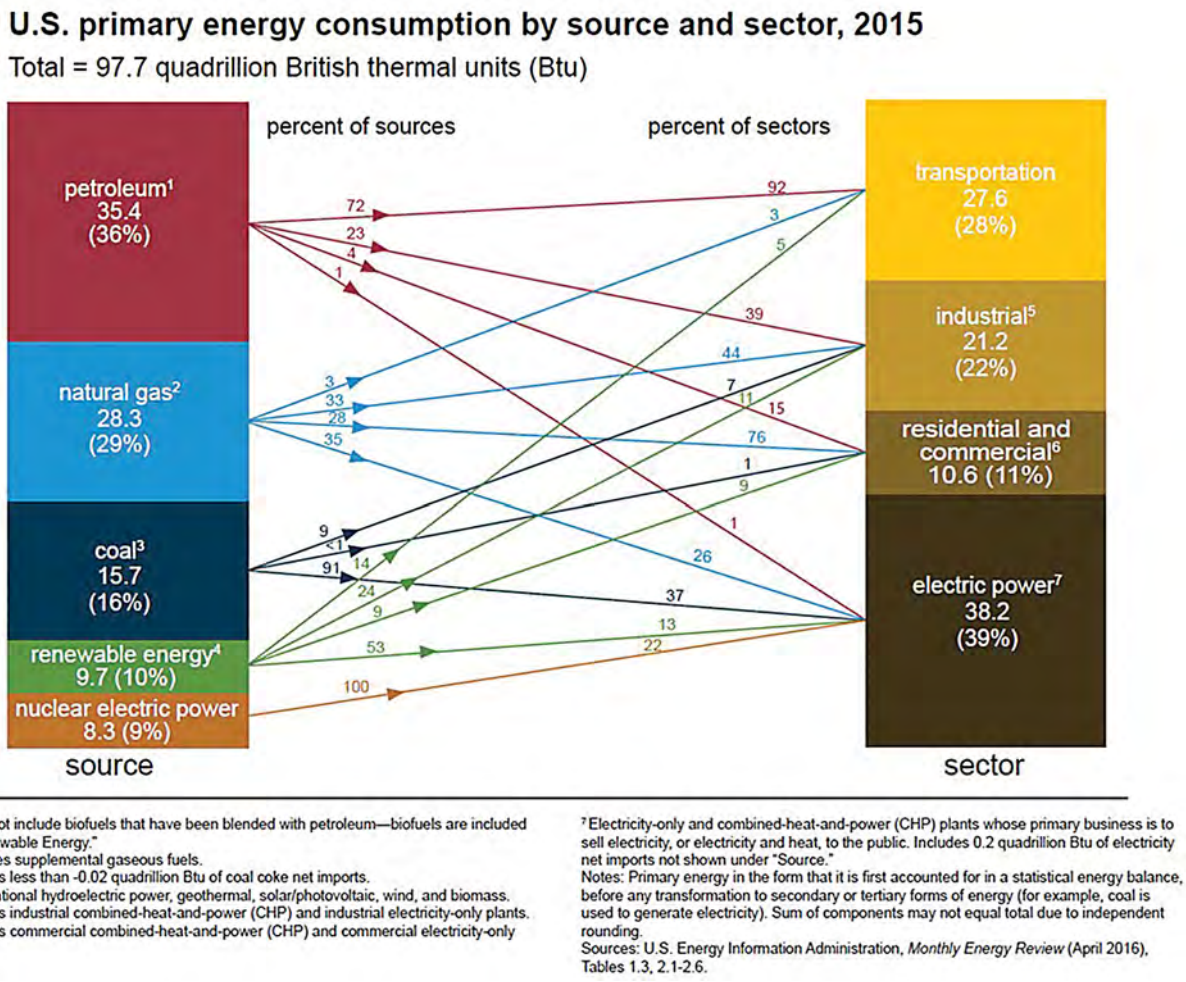


SOURCE: U.S. Energy Information Administration, http://www.eia.gov/outlooks/steo/images/fig24.png

Finally, several energy-intensive manufacturers utilize oil, natural gas and coal as a direct feedstock in order to physically make a wide variety of consumer products, including steel, fertilizer, plastics, medicine and hundreds of other goods. In 2015, industrial energy usage accounted for 22 percent of total energy consumption.[16] Of this amount that was used as inputs to manufacturing processes, petroleum accounted for 39 percent and natural gas accounted for 44 percent.[17] Consequently, increases in the price of oil and natural gas not only affect transportation and electricity costs, but also the cost of most of the manufactured goods families and small business use on a daily basis. Ensuring a transparent regulatory regime that provides for consistent and sustained energy production remains in the nation's best interest.

16 Energy Information Administration, "Americans use many types of energy," June 3, 2016, http://www.eia.gov/energyexplained/?page=us_energy_home.

17 Ibid.



[1] Does not include biofuels that have been blended with petroleum—biofuels are included in "Renewable Energy."
[2] Excludes supplemental gaseous fuels.
[3] Includes less than -0.02 quadrillion Btu of coal coke net imports.
[4] Conventional hydroelectric power, geothermal, solar/photovoltaic, wind, and biomass.
[5] Includes industrial combined-heat-and-power (CHP) and industrial electricity-only plants.
[6] Includes commercial combined-heat-and-power (CHP) and commercial electricity-only plants.
[7] Electricity-only and combined-heat-and-power (CHP) plants whose primary business is to sell electricity, or electricity and heat, to the public. Includes 0.2 quadrillion Btu of electricity net imports not shown under "Source."
Notes: Primary energy in the form that it is first accounted for in a statistical energy balance, before any transformation to secondary or tertiary forms of energy (for example, coal is used to generate electricity). Sum of components may not equal total due to independent rounding.
Sources: U.S. Energy Information Administration, *Monthly Energy Review* (April 2016), Tables 1.3, 2.1-2.6.

SOURCE: U.S. Energy Information Administration, http://www.eia.gov/energyexplained/?page=us_energy_home

Energy touches every aspect of the economy: whether it's powering a factory or a hospital, farming food and fiber or fueling the daily commute, the U.S. economy and the daily lives of every citizen depend on access to affordable energy. Millions of American workers also depend on energy for their livelihood, and all American taxpayers enjoy services paid for by federal and state revenues from energy production.

The U.S. oil and natural gas industry alone directly supports more than 9.8 million American jobs.[18] The nation's electric utilities furthermore employ more than 500,000 people and contribute 2.4 percent to the gross domestic product.[19] Jobs in the energy sector are often well-paying, high-tech positions.

Beyond the direct energy jobs, a robust U.S. energy sector sustains and supports tens of millions of jobs in every economic sector all across the country.

18 American Petroleum Institute, "Energy Tomorrow: The State of American Energy 2015," January 2015. http://www.api.org/~/media/files/policy/soae-2015/api-2015-soae-report.pdf.

19 Edison Electric Institute, "Electricity & the Economy," http://www.eei.org/electricity101/pages/value.aspx.

Expanded North American energy production and particularly oil and natural gas development - if allowed to continue its natural market-driven expansion - will help create millions of jobs and billions in tax revenue. The continuation of the energy revolution in the United States is estimated to generate another 1.8 million jobs by 2025, including more than 500,000 manufacturing jobs that benefit from low-cost energy.[20] These jobs will span from Alaska to Florida and nearly every state in between – even those that do not host traditional energy development and production. Increased energy development indirectly benefits several sectors, including manufacturing, pipefitting, trucking, catering, lodging and other oilfield service providers.

Finally, as Chapter 10 discusses, energy production is one of the nation's largest sources of revenue generation, sending billions annually to federal, state, Native American tribal and local coffers.

Bolstering U.S. Energy Security

Energy security can be defined as the relationship between a country's ability to meet its energy needs and a country's access to affordable supplies of energy. Access to global energy depends on the availability of supply on the global market, the ability to transport energy safely to its import destination and the ability of the importer to receive and distribute the energy to consumers safety and efficiently. Depending on a variety of factors, such as geopolitical relationships, internal politics and technological factors, the landscape of energy security is constantly in flux. Domestic energy, on the other hand, is subject to fewer of these situations that could interrupt reliable supply.

Many of America's energy security concerns stem from geopolitical relationships. For example, the long history of enmity between Iran and Iraq, internal instability in many of the Persian Gulf and West African states and hostilities arising from the Israeli-Palestinian conflict can and have all affected the global supply of oil. When instability inevitably disrupts supply, huge spikes in the price of oil have and will result, compromising America's energy security and threatening the health of the economy.

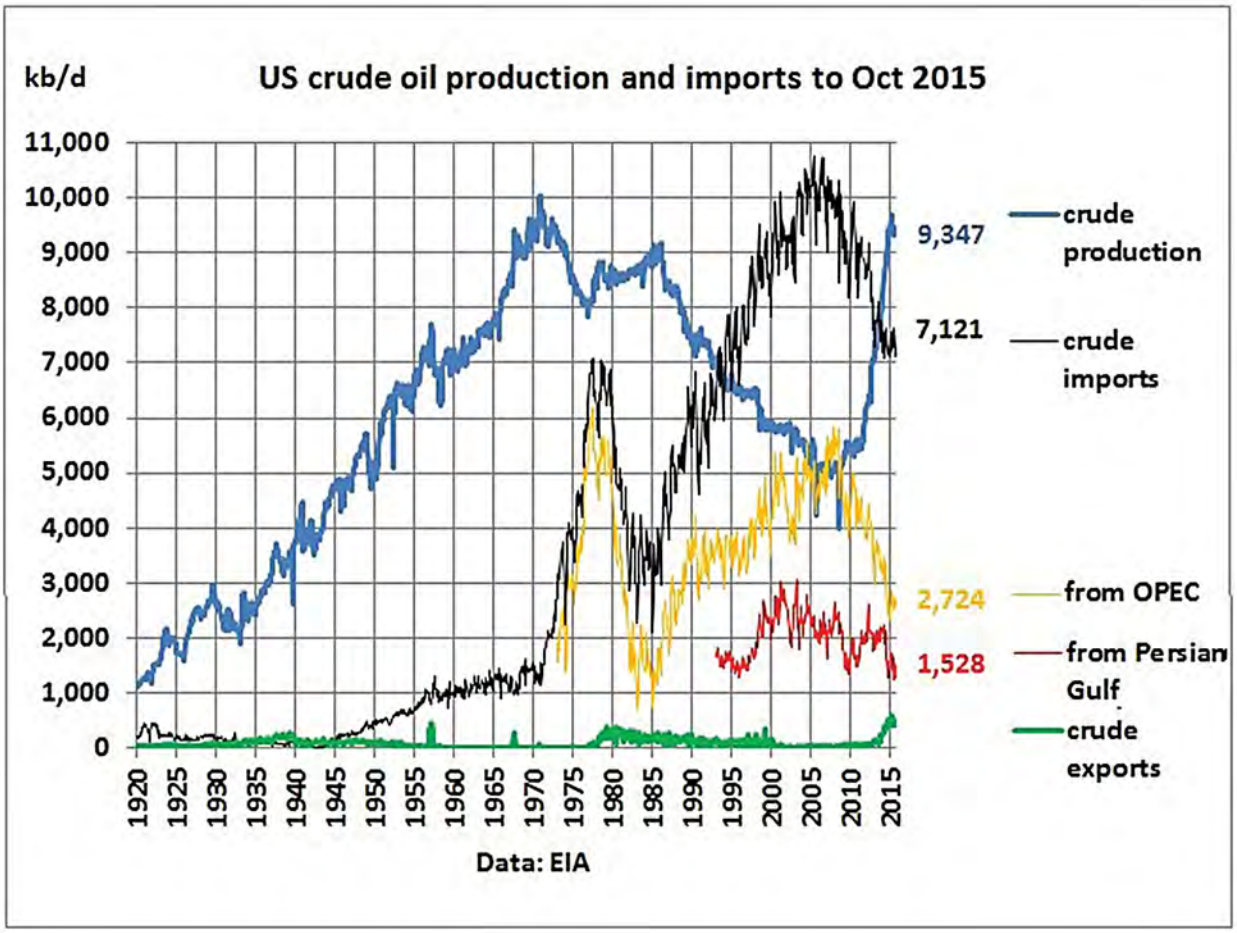
Recognizing the effect of supply and demand on America's energy and economic security, Congress commissioned a study by the Department of Commerce in 1989 called "The Effect on the National Security of Imports of Crude Oil and Refined Petroleum Products." The Department found that reliance on petroleum imports is a threat to national security and recommended a plan to reduce U.S. dependence on foreign oil. This plan urged improving the efficiency of America's national energy system and further recommended preventing disruptions of global energy supplies, following the study's observation that energy security depends on free access to oil at "reasonable and predictable prices."[21] Specifically, the report recommended that the United States expand domestic production of oil, particularly offshore energy development, maintain a tax policy that encourages oil production and increase bilateral energy trade between Canada and the United States.[22] In total, the Department believed these efforts would help better protect the U.S. economy by bolstering U.S. energy security in the short and long-term.

20 Ibid.

21 U.S. Department of Commerce, "The Effect on the National Security of Imports of Crude Oil and Refined Petroleum Products." 1989. http://beta-www.bis.doc.gov/index.php/licensing/forms-documents/doc_view/78-crude-oil-and-petroleum-products-1989.

22 Ibid.

While some of the dynamics of global energy have changed since the 1989 study (including, notably, the U.S. energy revolution), the fundamental issue – access to a resource that is central to the U.S. economy – remains the same. Dependence on unstable nations leaves the United States vulnerable to supply disruptions. The difference now, thanks to increased production of domestic oil and more efficient use of that oil, is that the United States has demonstrated that it has the wherewithal to further decrease its dependence on these inherently unstable sources of oil.



SOURCE: U.S. Energy Information Administration, http://www.eia.gov/dnav/pet/pet_crd_crpdn_adc_mbblpd_a.htm; http://www.eia.gov/dnav/pet/pet_move_impcus_a2_nus_epc0_im0_mbblpd_m.htm

The conditions that make a nation energy secure are not static. Even in the current climate of low-cost oil and natural gas – due primarily to higher U.S. production, the United States must remain vigilant in developing and implementing a long-term approach to meeting its energy needs. Implementing long-term programs to develop all resources, including fossil fuels, nuclear power and renewable energy will bolster long-term energy security and mitigate against unforeseen disruptions.

Chapter 2
ONSHORE OIL AND NATURAL GAS

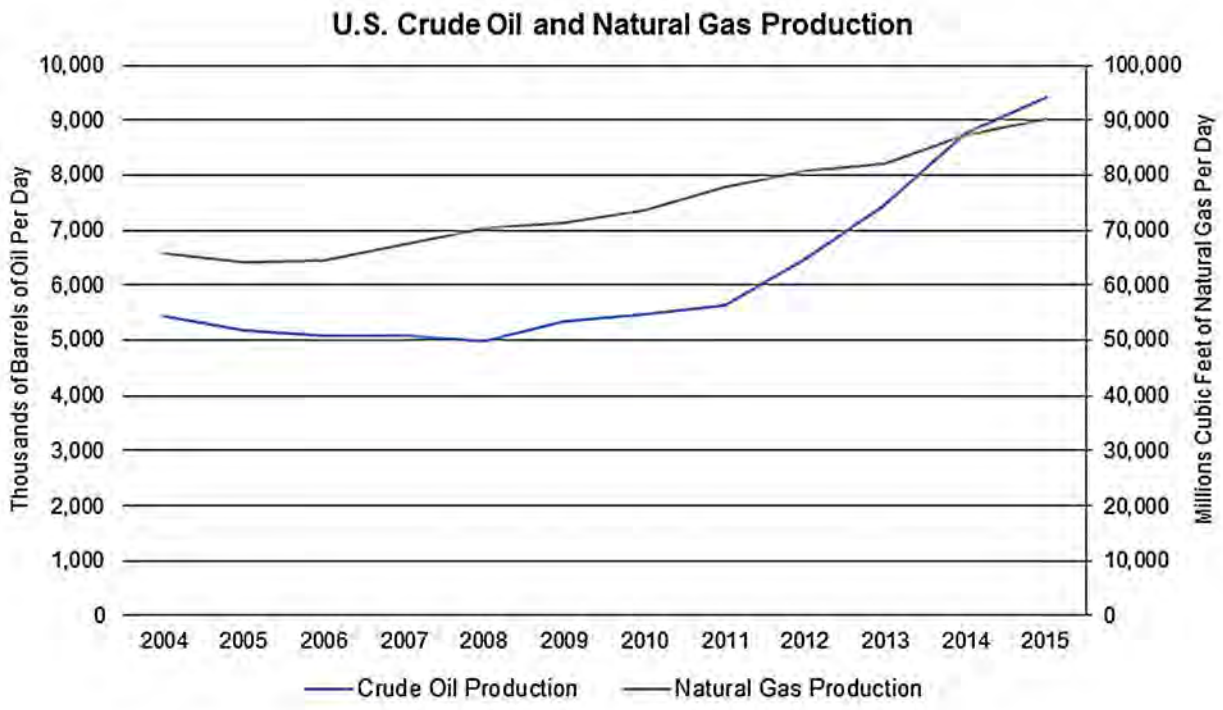
Recommendations:

- Recognize the vast economic and energy security potential that U.S. oil and natural gas resources have for U.S. consumers and ensure both increased access and expanded markets for energy resources to help maintain reasonable energy supplies and stable prices for consumers. To ensure continued supplies of affordable, clean energy, policy makers must permit access to abundant domestic natural resources. At the same time, industry should work with the government to ensure viable markets, while preventing cost disruptions, as this is in the public's interest and could provide benefits to consumers everywhere.
- Encourage regulators to work with industry and state governments to evaluate reasonable measures to protect wildlife and their habitats without needing to impose onerous regulations or close large areas to commercial activity.
- Eliminate restrictions that prohibit access to the vast quantities of clean, affordable energy resources available on federally owned lands.
- Prevent attempts to extend federal regulation of oil and natural gas development on state and private land. State authorities should maintain jurisdiction for energy development on non-federal lands, and federal policy makers must recognize the enormous success that states have demonstrated in managing and regulating these resources.
- Expand leasing of federal land in Alaska to protect the longevity of the Trans-Alaska Pipeline System, to ensure the financial solvency of the State of Alaska and to provide U.S. consumers with a domestic source of fuel, particularly those on the West Coast who rely on Alaska energy resources.

The combination of two established technologies – hydraulic fracturing and horizontal drilling – have expanded onshore opportunities, transformed the world of energy and allowed producers to develop oil and natural gas resources once considered technically and economically unviable. This feat has spawned today's "energy revolution" which is reshaping the geopolitics of energy and helping to spur U.S. economic growth and opportunity.

Tight oil and shale gas reserves have contributed significantly to overall U.S. energy security and been a driving economic force in areas hosting production across the country.

In October 2016, the United States produced 8.8 million barrels of oil per day[23] – 84 percent of which came from onshore reserves – up from 5.7 million barrels per day in 2011.[24] Similarly, shale gas production has increased natural gas development by 4 percent from 2014 through 2016.[25]



SOURCE: U.S.Energy Information Administration

For consumers, decreases in crude oil and natural gas prices have reduced household energy costs. The energy research firm IHS Energy estimated that the expanded use of hydraulic fracturing for production added $1,200 to household incomes due to lower prices and greater economic activity.[26] For energy-intensive manufacturers like fertilizer, steel and petrochemical producers, access to lower cost natural gas has spurred sizeable expansion in America's manufacturing sector.

Natural gas, which is increasingly utilized for electricity generation, home heating fuel and manufacturing, as well as for limited use in the transportation sector, emits significantly lower levels of greenhouse gases, notably carbon dioxide and sulfur dioxide, than other sources of energy. Increased utilization of natural gas for electricity generation resulted in a 27-year low for power sector carbon dioxide emissions in April 2015.[27]

23 Energy Information Administration, "U.S Field Production of Crude Oil," https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=-PET&s=MCRFPUS2&f=M.

24 Energy Information Administration, "Crude Oil Production," https://www.eia.gov/dnav/pet/pet_crd_crpdn_adc_mbblpd_a.htm.

25 Energy Information Administration, "Natural Gas Gross Withdrawals," http://www.eia.gov/dnav/ng/hist/n9010us2m.htm.

26 Jim Efstathiou, Jr., "Fracking Boom Seen Raising Household Incomes by $1,200," Bloomberg, September 4, 2013. http://www.bloomberg.com/news/2013-09-04/fracking-boom-seen-raising-household-incomes-by-1-200.html.

27 Energy Information Administration, "Monthly power sector carbon dioxide emissions reach 27-year low in April," http://www.eia.gov/todayinenergy/detail.php?id=22372&src=email.

For all onshore oil and natural gas producers, a number of policy obstacles can limit development of these resources, including: access to acreage; legal challenges and other delays to permits, plans and environmental reviews; lack of clarity and coordination amongst a host of federal and state agencies with jurisdiction; critical habitat and wilderness designations; public opposition; and other regulatory matters. Of note, some organizations have questioned shale development's potential impacts to drinking water quality, water volume levels, induced seismicity and air quality, particularly methane emissions. In a recent landmark study, the Environmental Protection Agency (EPA) stated that shale production "can" have impacts on drinking water "under some circumstances." However, the agency quickly notes that "data gaps and uncertainties" prevent it from making broad-scale conclusions.[28] Despite these inconclusive findings, opponents continue to advocate for stringent regulations and drilling moratoria at the state and local level.

In May 2016, EPA issued final rules as part of President Obama's Climate Action Plan: Strategy to Cut Methane Emissions to reduce methane emissions from the oil and gas sector by 40 to 45 percent from 2012 levels by 2025. These rules impose increased regulations for new and modified hydraulic fracturing sites. The EPA also announced its first step toward regulating existing sources and distributed an Information Collection Request to oil and gas producers in order to gather extensive data on existing operations.

The Department of the Interior (DOI) also has significant purview over oil and natural gas production through regulation of federal lands, oil and gas lease sales and Endangered Species Act designations. The Bureau of Land Management's Venting and Flaring Rule, finalized November 2016, represents an effort to regulate emissions capture, but is currently being challenged in court as a duplicative regulation in conflict with EPA requirements. The regulation may also be subject to Congressional Review Act resolution, which would effectively repeal the rule. Additionally, operators are challenged by the recent presidential designation of Bears Ears National Monument. This announcement effectively prohibits all future development within the resource-rich region.

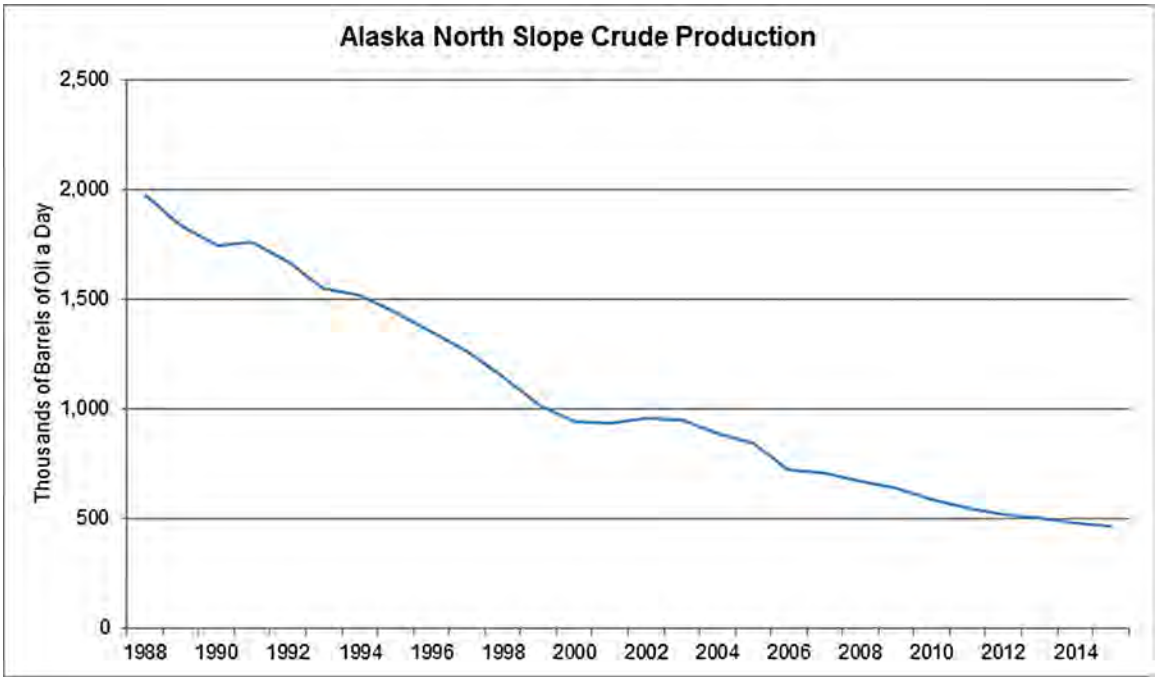
For onshore oil and natural gas production in Alaska, the principle challenge remains access to acreage, specifically in the designated oil-and-gas reserves of the National Petroleum Reserve-Alaska (NPR-A) and the designated area within the Arctic National Wildlife Refuge (ANWR). Limited leasing opportunities in the 23-million-acre NPR-A have produced significant revenues for the State of Alaska and local governments, but ongoing permitting delays and a new integrated land management plan for the petroleum reserve continue to delay production. The Integrated Activity Plan for the NPR-A restricts oil and gas leasing on approximately 30 percent of the reserve and expands designated areas for conservation, which may complicate efforts to develop necessary infrastructure for oil and natural gas development in and in the vicinity of the NPR-A.[29] Increased restrictions could limit the viability of current lessees to develop their tracks and dissuade future investors from developing the petroleum reserve and nearby areas.

28 U.S. Environmental Protection Agency, "Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States (Final Report)," December 2016, https://cfpub.epa.gov/ncea/hfstudy/recordisplay.cfm?deid=332990.

29 U.S. Department of the Interior, "Secretary Salazar Announces Plan for Additional Development, Wildlife Protection in 23 Million Acre National Petroleum Reserve-Alaska." December 19, 2012. http://www.doi.gov/news/pressreleases/secretary-salazar-announces-plan-for-additional-development-wildlife-protection-in-23-million-acre-national-petroleum-reserve-alaska.cfm

With regard to ANWR, the 1.5 million acre part of the refuge known as the "10-02 Area" that was designated by the U.S. Congress for oil and natural gas exploration has not been made available for leasing. Furthermore, the Obama administration announced in January 2015 that it would manage the full reserve as wilderness, prohibiting any opportunities for commercial development.

While the Alaskan residents have consistently and overwhelming supported expanded energy production in ANWR and the NPR-A, the federal government has greatly restricted access to federal areas designated for resource development.[30] If the federal government fails to provide greater access to these resources, the Alaska state government and the broader U.S. economy could suffer significant hardship. Due to natural declines in crude production on Alaska's North Slope, output now equals about one quarter of 1988 peak levels of 2 million barrels a day.[31] As production declines, the volume of oil transported via the Trans-Alaska Pipeline System also declines. Unfortunately, this warm-oil pipeline cannot operate easily at low volumes in part because of the cold climate. With lower volumes, oil idles or debris freezes in the pipeline, causing costly shutdowns. These consequences, which can cause havoc for the pipeline, global oil markets and the environment, could occur unless oil production in the North Slope and in the Alaskan Outer Continental Shelf increases.

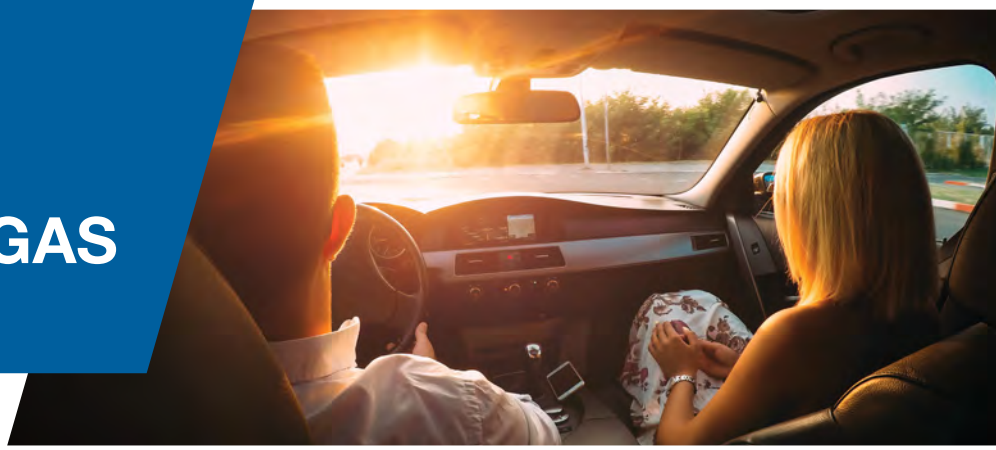


SOURCE: U.S. Energy Information Administration

30 Arctic Power, "Top ten reasons to support ANWR development," http://www.anwr.org/ANWR-Basics/Top-ten-reasons-to-support-ANWR-development.php.

31 U.S. Department of Energy, Energy Information Administration, "Alaska North Slope Crude Oil Production." http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MANFPAK2&f=A

Chapter 3
OFFSHORE OIL AND NATURAL GAS



Recommendations:

- Immediately initiate the development of a new Five-Year Plan that includes lease sales in regions including the Mid-Atlantic and South Atlantic and Alaska's Beaufort and Chukchi Seas, as well as the Gulf of Mexico and Cook Inlet.
- Suspend all pending rulemakings and review all final rules, guidance and policies issued in 2016 to determine whether they will achieve their intended effects, inhibit safety and environmental protections, and provide net benefits to the public.
- Recognize the strategic importance of the Trans-Alaska Pipeline System to the entire nation and the related need to develop Alaskan offshore energy resources to increase the pipeline's throughput and ensure its long-term survival, including by ensuring that Arctic-specific offshore regulations and leasing strategies are reasonable, necessary, based on sound science and not duplicative of existing requirements, and utilizing the U.S. seat on the Arctic Council as a way to promote U.S. jobs, economic growth and security in the region.
- Provide a regulatory environment that allows for the thoughtful and prompt review and approval of the permits necessary to conduct seismic surveys in the Mid and South Atlantic in a manner that will provide industry and policy makers with the data necessary to make well-informed decisions about where to develop offshore energy resources.
- Review and address the National Ocean Policy Executive Order as necessary in order to ensure that policies impacting implementation of a multitude of federal laws concerning ocean and coastal activities emanate from Congress, are transparent and provide sufficient oversight and participation by local and state officials, user groups, and the public. Review related activities such as the Integrated Arctic Management initiative to determine their utility and whether their implementation will create new hurdles for access to offshore energy development and allow for effective congressional oversight and sufficient non-federal government, private sector and public participation. In doing so, establish a process for reviewing the need for and potential benefits and substance of an effective ocean policy that furthers the nation's economic, social and scientific interests.

- In order to ensure that recent executive branch actions are consistent with existing federal law and congressional intent, fully account for all potential impacts, including those related to U.S. energy security, and are sufficiently informed by potentially affected stakeholders, review all executive actions taken since 2009 to withdraw areas from offshore energy leasing and to create or expand marine protected areas where offshore energy development is prohibited or subject to new restrictions, suspend all such pending actions and rescind/end consideration of such actions where necessary.
- Ensure regulatory agencies receive sufficient resources to hire skilled professionals to conduct environmental surveys, regulatory enforcement and leasing and permitting activities, and provide direct funding from existing oil and gas revenues to federal regulatory agencies.

For decades, the U.S. Gulf of Mexico has provided significant oil and natural gas resources for American consumers, today accounting for approximately 18 percent of domestic crude oil production and 4 percent of domestic natural gas production.[32]

Following the 2010 Deepwater Horizon spill and the ensuing temporary moratorium on deepwater drilling, industry and regulators have advanced significant measures to further bolster safety. After subsequent declines in oil production, activity is up and offshore operators in the Gulf of Mexico are approaching record levels of production. Although the number of rigs operating in the region has generally been on a downward trajectory, activity in the U.S. Gulf of Mexico remains robust.[33] Amongst the offshore oil and natural gas fields internationally, the U.S. Gulf of Mexico offers greater predictability, and new technologies allow producers to explore in deeper waters. Production is projected to rise to a record 1.83 million barrels of oil per day as early as Q4 2017.[34]

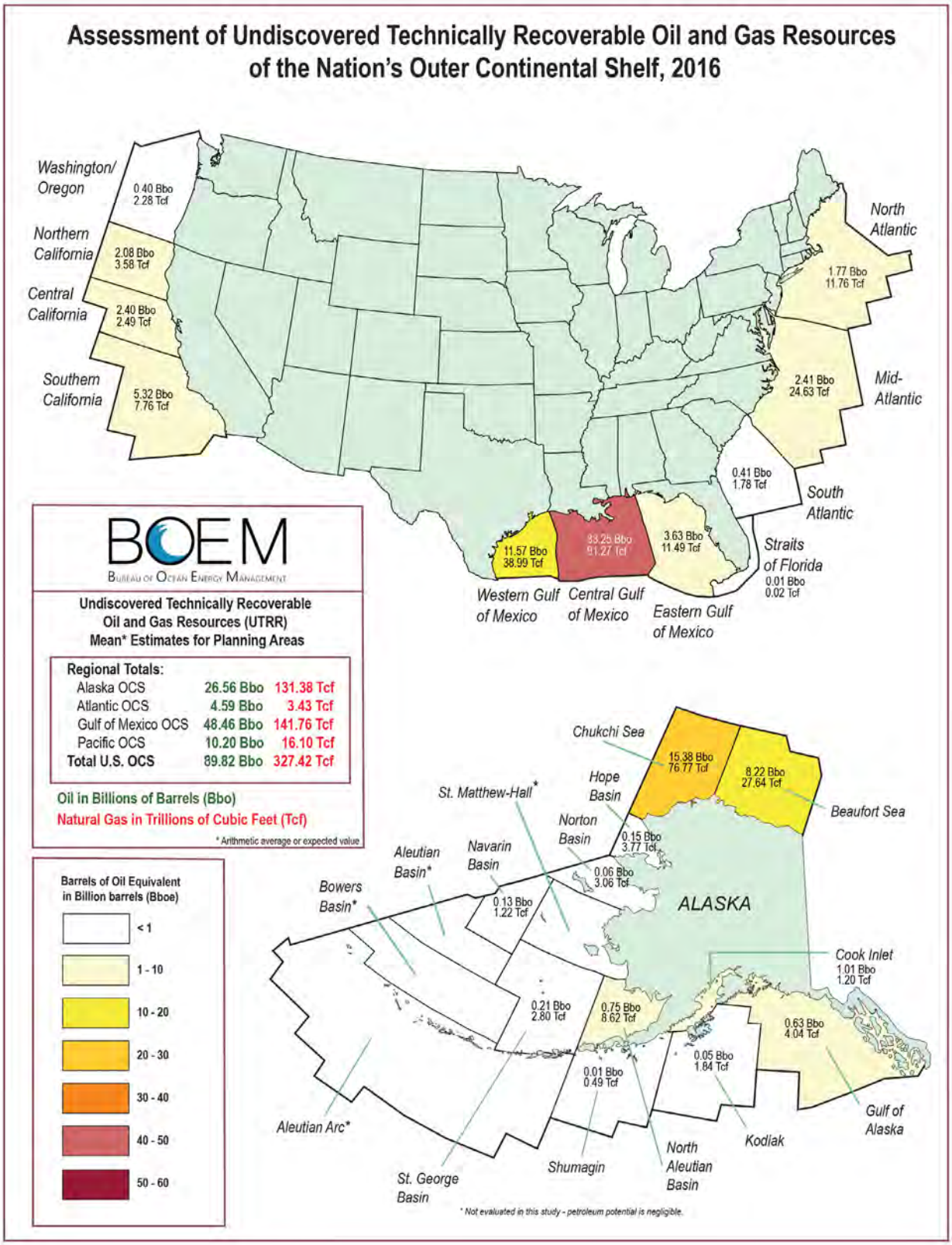
At the same time, the federal government continues to keep potentially prolific areas of the U.S. Outer Continental Shelf (OCS) off-limits to oil and natural gas development. In 2016, the U.S. Bureau of Ocean Energy Management (BOEM) estimated that the federal OCS is home to a mean 89.8 billion barrels of undiscovered technically recoverable oil and 327.5 trillion cubic feet of undiscovered technically recoverable natural gas.[35] As the BOEM image demonstrates, significant oil and natural gas resources lie in areas outside the Western and Central Gulf of Mexico.

32 U.S. Department of Energy, "Monthly Crude Oil and Natural Gas Production," May 2016, http://www.eia.gov/petroleum/production/#oil-tab and http://www.eia.gov/petroleum/production/#ng-tab.

33 U.S. Department of Energy, "Federal Offshore-Gulf of Mexico Field Production of Crude Oil," https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MCRFP3FM2&f=M.

34 U.S. Department of Energy, Short-Term Energy Outlook, December 2016, http://www.eia.gov/forecasts/steo/pdf/steo_full.pdf.

35 U.S. Department of the Interior, Bureau of Ocean Energy Management, "Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Nation's Outer Continental Shelf, 2016." http://www.boem.gov/2016-National-Assessment-Map/.



SOURCE: U.S. Bureau of Ocean Energy Management, http://www.boem.gov/2016-National-Assessment-Map/

Even though more than half of OCS resources exist outside the Western and Central Gulf of Mexico, abundant resources outside this region are not available for new leasing. Under the Interior Department's current 2012-2017 Five-Year Plan for Offshore Oil and Gas Leasing, leasing opportunities are restricted to the Western and Central Gulf, a tiny sliver in the Eastern Gulf, and Alaska's Cook Inlet.[36]

Despite broad public and bipartisan support for expanded offshore access,[37] the Interior Department in March 2016 removed the Mid- and South Atlantic[38] and in November 2016 removed the Beaufort and Chukchi Seas[39] from its proposed Five-Year Plan for 2017-2022. It previously removed the majority of the Eastern Gulf,[40] which is home to an estimated mean of 5.68 billion barrels of undiscovered technically recoverable oil equivalent.[41]

As any areas excluded cannot later be added back in, absent congressional action or the Interior Department's re-development of the Five-Year Plan, left unaddressed these decisions will have lasting impacts well into the next decade and beyond.

In addition to leasing opportunities, operators need greater confidence in the permitting process. Lessees must contend with a labyrinth of regulations, as well as uncertainty regarding recent and ongoing changes to financial liability requirements, safety requirements and other matters. This is particularly true in the U.S. Arctic, a source of one of the country's most abundant, untapped energy reserves but a geopolitically and strategically important region in which an uncertain and ever-changing regulatory environment has contributed to the decisions of some operators to significantly curtail investments in domestic offshore exploration and production.

Due to the nature of offshore drilling – including the technical, environmental and regulatory demands, the offshore production timeline from pre-planning and seismic studies to first production can take up to ten years or longer. As to seismic exploration, the Interior Department's decision in 2014 to issue the framework for receiving and processing permit applications to conduct seismic surveys in the Mid- and South Atlantic seemingly marked an important step toward updating decades-old data on offshore oil and gas resources in the region.[42] Such data would provide valuable information that would help facilitate more informed decisions

36 U.S. Interior Department, Bureau of Ocean Energy Management, 2012-2017 Lease Sale Schedule, http://www.boem.gov/2012-2017-Lease-Sale-Schedule/.

37 Consumer Energy Alliance, "A Hollow Groundswell: Debunking the Myth of Widespread Opposition to Offshore Energy," http://consumerenergyalliance.org/cms/wp-content/uploads/2016/03/CEA-MA-offshore-report-Mar-10-2016-v2.compressed.pdf.

38 U.S. Interior Department, Bureau of Ocean Energy Management, 2017-2022 Outer Continental Shelf Oil and Gas Leasing Proposed Program, http://www.boem.gov/2017-2022-Proposed-Program-Decision/.

39 U.S. Interior Department, Bureau of Ocean Energy Management, 2017-2022 Outer Continental Shelf Oil and Gas Leasing Proposed Final Program, https://www.boem.gov/2017-2022-OCS-Oil-and-Gas-Leasing-PFP/.

40 U.S. Interior Department, Bureau of Ocean Energy Management, 2017-2022 Outer Continental Shelf Oil and Gas Leasing Draft Proposed Program, http://www.boem.gov/2017-2022-DPP/.

41 U.S. Interior Department, Bureau of Ocean Energy Management, "Assessment of Undiscovered Oil and Gas Resources of the Nation's Outer Continental Shelf, 2016, http://www.boem.gov/2016-National-Assessment-Fact-Sheet/.

42 U.S. Interior Department, "Record of Decision, Atlantic OCS Proposed Geological and Geophysical Activities, Mid-Atlantic and South Atlantic Planning Areas, Final Programmatic Environmental Impact Statement." July 18, 2014. http://www.boem.gov/Record-of-Decision-Atlantic-G-G/.

and economically and environmentally effective activities should leasing and development ultimately take place in this area. For seismic activity to take place, however, companies must first receive various permits from federal agencies. Nearly three years after applications were filed seeking permits to conduct underwater seismic airgun surveys in the Mid- and South Atlantic, the Interior Department denied the applications.[43]

In addition to permitting concerns, and in the absence of congressional authorization and funding, implementation of President Obama's July 2010 National Ocean Policy Executive Order[44] has already created another regulatory process and layer with which regulated entities must contend and could result in the establishment of de facto protected areas. Related activities such as the Administration's Integrated Arctic Management initiative[45] continue to cause significant uncertainty about future access to offshore energy exploration, production and associated activities.

Concerns about new potential access restrictions are compounded by President Obama's use of executive authority to establish areas where offshore energy development is outright prohibited or made more difficult. In addition to taking executive actions under the Antiquities Act in the U.S. Pacific[46] and U.S. Atlantic[47] to create marine monuments where commercial activities are prohibited, President Obama took action five times to indefinitely remove nearly 187 million acres off Alaska and the Atlantic from consideration for oil and natural gas leasing, including nearly the entire U.S. Arctic.[48]

43 Importantly, several seismic airgun surveys conducted for scientific research purposes have taken place in the Atlantic in recent years, all without incident or any evidence of harm to marine life or the environment. See e.g. http://www.nmfs.noaa.gov/pr/permits/incidental/research.htm#usgs2014 and Lamont-Doherty/National Science Foundation Marine Seismic Survey in Atlantic Ocean off North Carolina.

44 https://www.whitehouse.gov/administration/eop/oceans.

45 U.S. Interior Department, "New National Arctic Strategy Adopts Integrated Arctic Management."May 10, 2013.http://www.doi.gov/news/doinews/new-national-arctic-strategy-adopts-integrated-arctic-management.cfm.

46 The White House, "President Obama to Designate Largest Marine Monument in the World Off-Limits to Development."September 24, 2014.http://www.whitehouse.gov/the-press-office/2014/09/24/fact-sheet-president-obama-designate-largest-marine-monument-world-limit.The White House, "Fact Sheet: President Obama to Create the World's Largest Marine Protected Area," August 26, 2016.https://www.whitehouse.gov/the-press-office/2016/08/26/fact-sheet-president-obama-create-worlds-largest-marine-protected-area.

47 The White House, "Presidential Proclamation – Northeast Canyons and Seamounts National Monument."September 2016.https://www.whitehouse.gov/the-press-office/2016/09/15/presidential-proclamation-northeast-canyons-and-seamounts-marine.The White House, "Presidential Proclamation – Papahanaumokuakea Marine National Monument Expansion.August 2016.https://www.whitehouse.gov/the-press-office/2016/08/26/presidential-proclamation-papahanaumokuakea-marine-national-monument.The White House, "Presidential Proclamation – Pacific Remote Islands Marine National Monument Expansion." September 2014. https://www.whitehouse.gov/the-press-office/2014/09/25/presidential-proclamation-pacific-remote-islands-marine-national-monumen.

48 The White House, "Presidential Memorandum – Withdrawal of Certain Portions of the United States Arctic Continental Shelf from Mineral Leasing." December 2016. https://www.whitehouse.gov/the-press-office/2016/12/20/presidential-memorandum-withdrawal-certain-portions-united-states-arctic. The White House, "Presidential Memorandum – Withdrawal of Certain Areas off the Atlantic Coast on the Outer Continental Shelf from Mineral Leasing." December 2016. https://www.whitehouse.gov/the-press-office/2016/12/20/presidential-memorandum-withdrawal-certain-areas-atlantic-coast-outer. The White House, "Executive Order – Northern Bering Sea Climate Resilience" (see Sec. 3 for withdrawal of Norton Basin Planning Area and partial withdrawal of St. Matthew-Hall Planning Area). https://www.whitehouse.gov/the-press-office/2016/12/09/executive-order-northern-bering-sea-climate-resilience. The White House, "Presidential Memorandum – Withdrawal of Certain Areas of the United States Outer Continental Shelf Offshore Alaska from Leasing Disposition." January 2015. https://www.whitehouse.gov/the-press-office/2015/01/27/presidential-memorandum-withdrawal-certain-areas-united-states-outer-con. The White House, "President Obama Protects Alaska's Bristol Bay from Future Oil and Gas Drilling." December 16, 2014. http://www.whitehouse.gov/the-press-office/2014/12/16/president-obama-protects-alaska-s-bristol-bay-future-oil-and-gas-drillin.

Through the National Oceanic and Atmospheric Administration (NOAA), in a move in which the agency acknowledged could make access to the region's oil and gas resources "more difficult or costly,"[49] President Obama proposed to expand the Flower Garden Banks National Marine Sanctuary in the Gulf of Mexico, significantly exceeding the 2007 recommendation by the Sanctuary's Advisory Council. This action followed an expansion of marine sanctuaries off California that removed access to an estimated 700 million barrels of oil and 700 billion cubic feet of natural gas.[50] The administrative creation of new non-extraction marine protected areas in U.S. waters threatens to significantly set back efforts to explore for and develop domestic energy resources.

Furthermore, the DOI continues to lack sufficient resources to efficiently regulate an evolving offshore industry. While the reorganization of the former Minerals Management Service has begun to address some of the problems related to insufficient staffing, much more can be done to ensure regulators have adequate resources to properly enforce environmental regulations and carry out leasing and permitting duties.

49 NOAA, Draft Environmental Impact Statement: Sanctuary Expansion Volume I: Chapters 1-6, June 2016, http://flowergarden.noaa.gov/doc/fgbnmsexpansiondeis.pdf.

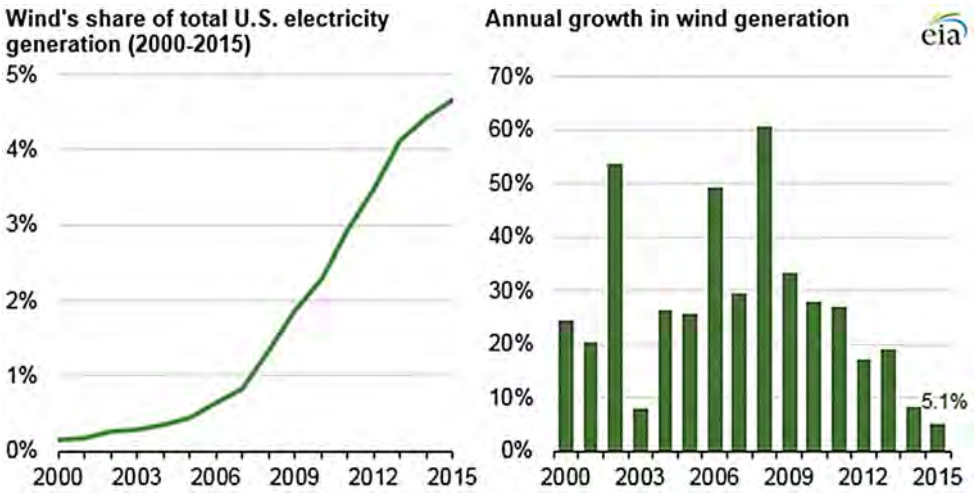
50 NOAA, March 12, 2015 Press Release, "NOAA expands Cordell Bank and Gulf of the Farallones national marine sanctuaries off northern California," http://sanctuaries.noaa.gov/news/press/2015/california-expansion.html. U.S. Interior Department, Bureau of Ocean Energy Management, Comments on Proposed Expansion of Cordell Bank and Gulf of the Farallones National Marine Sanctuaries, https://www.regulations.gov/contentStreamer?documentId=NOAA-NOS-2012-0228-0162&attachmentNumber=1&disposition=attachment&contentType=pdf.

Chapter 4
WIND ENERGY

Recommendations:

- Stronger coordination amongst federal and state agencies involved in permitting wind installations and transmission lines to limit the potential for delays.
- Engage with communities to gain local support for wind projects and mitigate potential public opposition.
- Continue efforts to develop technology that allows wind power to compete with other energy resources.

Wind's share of total U.S. electricity generation has increased every year since 2001.[51] While wind energy accounted for only around 4.7 percent of net electricity generation in 2015, this level represents a doubling of wind's generation share since 2010 when the share was 2.3 percent.[52] Onshore and offshore wind installations continue to increase, with the first offshore wind farm opening off the coast of Rhode Island in December 2016.[53]



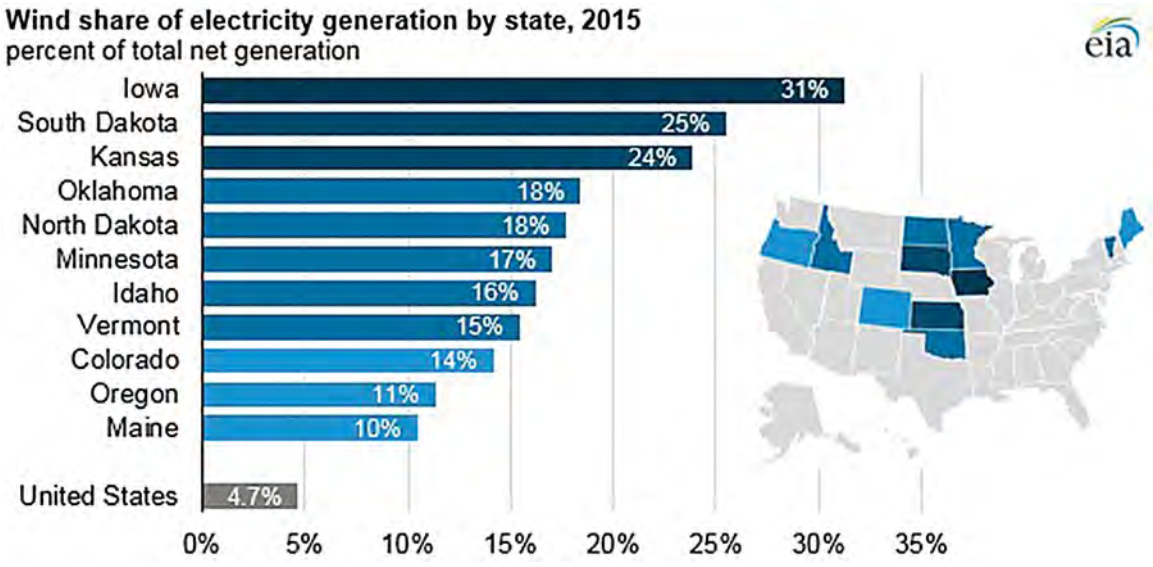
SOURCE: U.S. Energy Information Administration, http://www.eia.gov/todayinenergy/detail.php?id=25912

51 Energy Information Administration, "Wind Generation Share Exceeded 10% in 11 States in 2015," Oct. 26, 2016, http://www.eia.gov/todayinenergy/detail.php?id=28512.

52 U.S. Department of Energy, Energy Information Administration, "Electricity Data Browser," http://www.eia.gov/electricity/data.cfm.

53 Kayana Szymczak, "America's First Offshore Wind Farm Spins to Life," New York Times, Dec. 14, 2016, http://www.nytimes.com/2016/12/14/science/wind-power-block-island.html.

The increase of wind power in the U.S. has been driven by improved technology, significant decreases in production costs, as well as policy changes at both the federal and state levels. Federal policies such as the Federal Production Tax Credit (PTC) and the Investment Tax Credit (ITC) have led states to build more wind capacity. The PTC grants a federal tax credit on wind generation, while the ITC allows federal tax credits on wind farm-investments.[54]



SOURCE: U.S. Energy Information Administration, http://www.eia.gov/todayinenergy/detail.php?id=28512

In addition to federal policies, 29 states and the District of Columbia have state-level renewable portfolio standards (RPS), which require that a minimum percentage of electricity generation comes from renewable energy.[55] Besides RPS, many states provide incentives – such as mandated purchases and an exemption from property tax – to encourage wind power in their states.[56] Such policies have dramatically increased the share of wind generation in certain states, such as Iowa, South Dakota and Kansas, which now generate more than 20 percent of their electricity from wind.[57]

Wind power provides an opportunity to diversify sources of electricity generation, but the expansion of this resource and its ability to compete with more popular fuels for electricity face challenges. First, the areas of greatest potential – the windier plains of the Mid-Continent – exist far away from the populous coastal centers where electricity demand is highest. Better capitalization of these resources will require significant transmission infrastructure to efficiently transport supplies to centers of demand and the construction of large, battery-like storage systems. Continued development of offshore wind farms, particularly in the North- and Mid-Atlantic and the Pacific Northwest, could alleviate some of the transmission limitations.

54 Energy Information Administration, "Wind Generation Share Exceeded 10% in 11 States in 2015," Oct. 26, 2016, http://www.eia.gov/todayinenergy/detail.php?id=28512.

55 Energy Information Administration, "Wind Generation Share Exceeded 10% in 11 States in 2015," Oct. 26, 2016, http://www.eia.gov/todayinenergy/detail.php?id=28512.

56 Ibid.

57 Ibid.

Second, public opposition to wind farms exacerbate technical challenges and threaten both onshore and offshore wind farm development. In terms of onshore development, the wind industry increasingly faces opposition from communities unwilling to site wind farms and permit right-of-ways for large transmission lines that traverse their local areas. Specific issues with wind farms include the noise produced by turbines, the visual impacts on the surrounding areas, bird and bat deaths caused by turbines and the potential for turbines to interfere with radar and telecommunication facilities.[58] As for offshore development, many communities are concerned that the turbines may obstruct ocean views and decrease property values.[59]

Third, utilities and grid operators face challenges caused by the intermittency of wind energy. Both utilities and grid operators need to prepare for and manage the variability of wind power on the grid. This will be particularly critical as grid managers and regulators prepare for the reliability challenges that may come as coal-fired and nuclear power plants retire prematurely and intermittent resources expand.

Finally, the wind industry also faces long-term uncertainty about federal financial incentives, particularly the federal Production Tax Credit, which was set to expire at the end of 2014, but was recently extended through 2019. Many lawmakers question the efficacy of a long-term tax credit, yet the variable extensions also create uncertainty for the growing industry. Wind producers and manufacturers could benefit from greater certainty and avoid a boom-bust cycle if policy makers instituted a long-term plan for wind energy support that evaluates current and future incentives and standards (including federal air emission regulations) at the state and federal levels and balances this against the industry's needs for greater commercialization. Ultimately, consumers and taxpayers could benefit from a more competitive, cost-effective renewable electricity resource.

58 Wind Energy Development Programmatic EIS, "Wind Energy Development Environmental Concerns," http://www.windeis.anl.gov/guide/concern/index.cfm.

59 Diane Cardwell, "Off Long Island, Wind Power Tests the Waters," Jan. 21, 2017, https://www.nytimes.com/2017/01/21/business/energy-environment/offshore-wind-energy-long-island.html?_r=0.

Chapter 5
SOLAR ENERGY

Recommendations:

- Ensure that continued growth in distributed energy is balanced against the need to maintain resources for the electric grid and to maintain reasonable prices for all consumers.
- Engage in a dialogue with states about the challenges of net-metering and grid reliability and work to ensure an equitable system for all consumers.
- Recognize costs for solar energy are decreasing and opportunities are increasing.

Solar technology is currently changing the face of modern electricity generation. From rooftop, to community, to utility-scale projects, consumers across the country are realizing the potential that solar brings in the form of clean, affordable and reliable energy.

The steadily declining costs per kilowatt hour of solar photovoltaic systems and the expansion of solar panel leasing programs are contributing factors in solar becoming to a more sizable portion of renewable electricity generation. While still a small proportion of overall electricity generation, adoption of solar power is growing rapidly now and will continue to do so in the coming years.

The Solar Energy Industries Association reports that in the first half of 2016 alone the solar industry installed over 4 gigawatts of solar - up 45 percent over the previous year - making the total installed solar capacity nearly 32 gigawatts. Furthermore, the residential market for rooftop solar has grown by at least 50 percent in each of the past few years.[60]

According to data from the EIA, solar power accounted for 5 percent of renewable energy consumption in 2015[61]– up 1.7 percent from 2013 – and contributed to 0.6 percent of utility-scale electricity generation in the United States.[62]

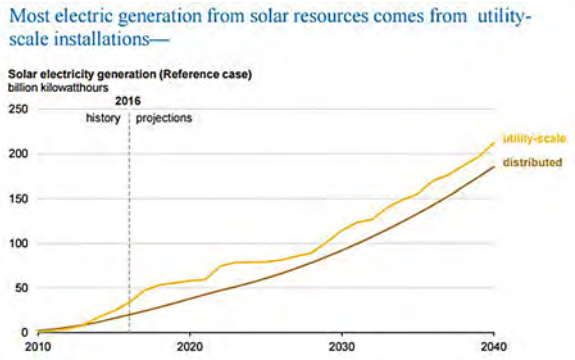
This trend is expected to continue as EIA projections show that both utility-scale and rooftop solar installations will continue to grow over the next several years. Utility-scale solar installations are expected to

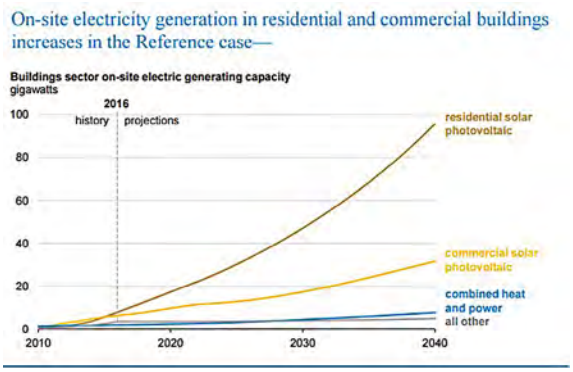
60 Solar Energy Industries Association, “Solar Industry Data,” http://www.seia.org/research-resources/solar-industry-data.

61 U.S. Energy Information Administration, “Sources of U.S. Electricity Generation,” http://www.eia.gov/totalenergy/data/annual/index.cfm#renewable.

62 U.S. Energy Information Administration, “Energy in Brief.” http://www.eia.gov/energy_in_brief/article/renewable_electricity.cfm.

produce the largest amount of solar power by 2040.[63] EIA further projected that residential and commercial buildings will continue to increase installation of solar power every year through 2040.





SOURCE: U.S. Energy Information Administration, Annual Energy Outlook 2017

As adoption of distributed generation grows, many states are examining how this growth affects the grid and the resources needed to support this critical infrastructure.[64] State-level public utility commissioners are grappling with two particular challenges.

First, most states have adopted net-metering programs that incentivize distributed generation systems by allowing owners to sell unused electricity back to the grid, resulting in a credit on their utility bill. In some states, the utility is paying a higher cost for this excess energy and these higher costs can be redistributed to

Table 1. Summary of Policy Actions (Q2 2016)

Policy Type	# of Actions	% by Type	# of States
Residential fixed charge increase	42	35%	25 + DC
Net metering	37	31%	24
Solar valuation or net metering study	16	13%	15 + DC
Community solar	12	10%	11
Residential solar charge	8	7%	6
Third-party ownership of solar	3	2%	3
Utility-led rooftop PV programs	3	2%	3
Total	**121**	**100%**	**42 States + DC**

Note: The "# of States/ Districts" total is not the sum of the rows, as some states have multiple actions.

SOURCE: https://www.greentechmedia.com/articles/read/42-states-took-policy-action-on-distributed-solar-in-q2-2016

non-rooftop solar owners in the form of higher rates. Second, the two-way flow of power on and off the grid has increased the maintenance needed to ensure the grid remains reliable.

While much of this policy making occurs at the state and local level, federal lawmakers should be aware of how these opportunities and challenges affect the future growth of solar power and engage in a dialogue with local leaders about how to ensure an equitable system for all consumers.

63 U.S. Energy Information Administration, "Annual Energy Outlook 2017," January 5, 2017.

64 The 50 States of Solar report by the NC Clean Energy Technology Center, https://www.greentechmedia.com/articles/read/42-states-took-policy-action-on-distributed-solar-in-q2-2016

Chapter 6
ADDITIONAL RENEWABLE ENERGY RESOURCES

Recommendations:

- Support advanced biofuels through more targeted research, development and demonstration programs that would lead to more effective and cost-competitive advanced biofuel production.
- Ensure the Federal Energy Regulatory Commission (FERC), the Department of Energy (DOE) and other federal agencies continue to implement legislation that seeks to expand the development of new hydroelectric power from small hydropower projects and from existing dams.

Additional renewable energy resources – including geothermal, biomass, biofuels and hydroelectric power – increasingly play a strong role in the nation's energy mix and demonstrate potential to increase the use of low-carbon energy in America. This chapter will review the main sources of renewable energy in use today, the opportunities and challenges facing these resources and policy recommendations that will ensure increased utilization of these resources benefits energy consumers, national security and the environment.

Biomass & Biofuels

Biomass – mostly wood, landfill gas, municipal solid waste and other organic waste – accounted for approximately 1.6 percent of electricity generation in 2015.[65] For industrial consumers, biomass offers an alternative source of readily accessible electricity or heating for facilities with large operations proximate to sufficient biomass supplies. In particular, paper, chemical and food processing industries can utilize the biomass waste produced during operations to generate electricity, heat and steam for on-site facilities.

Biofuels account for a sizable portion of the transportation fuel pool, due primarily to the federal Renewable Fuel Standard (RFS), which is examined in Chapter 9. Ethanol derived from renewable, organic matter accounts for nearly 10 percent of U.S. gasoline consumption, and biodiesel accounts for about 2 percent of distillate consumption.[66] EIA forecasted production of ethanol would average 990,000 barrels per day in 2016 and experience very modest growth in production in the coming years.[67] EIA estimated that biodiesel production would average 99,000 barrels per day in 2016, up from 82,000 barrels per day in 2015.[68]

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65 U.S. Department of Energy, Energy Information Administration, "Energy in Brief." http://www.eia.gov/energy_in_brief/article/renewable_electricity.cfm.

66 U.S. Department of Energy, Energy Information Administration, "Biofuels Issues and Trends," October 2012. http://www.eia.gov/biofuels/issuestrends/pdf/bit.pdf.

67 U.S. Department of Energy, Energy Information Administration, "Short-Term Energy Outlook: Renewables and CO2 Emissions," September 2016. http://www.eia.gov/forecasts/steo/report/renew_co2.cfm?src=Environment-b1.

68 Ibid.

The current biofuel market remains dominated by ethanol from corn and sugarcane and biodiesel from soy, rapeseed, and palm oil.[69] Advanced cellulosic ethanol – transportation liquids derived from non-food feedstocks such as agricultural waste and switchgrass – have not been available in significant commercial quantities, even though the federal RFS requires utilization of cellulosic ethanol. However, a number of companies are aggressively moving forward to develop and market a number of advanced second-generation biofuels.[70] In fact, according to the EPA, just over 1 million gallons of cellulosic ethanol were produced during the first quarter of 2016 alone. This is a significant increase when compared to 2015, when 2.2 million gallons of cellulosic ethanol were produced for the entire year.[71]

In order to continue to boost production of cellulosic fuels as required by the RFS, the federal government should realign funding support mechanisms to focus more on the research, development and demonstration phase in order to ensure that biofuels can be produced commercially in the quantities necessary and at a competitive price.

Hydroelectric

Hydroelectric power constitutes the largest source of renewable electricity, representing 6 percent of total U.S. electricity generation in 2015.[72] Hydropower's greatest advantages are its consistency as a baseload source of power and its affordability for current consumers, as many of the best sites have been dammed.

Despite the advantages of hydroelectric power, the United States is not fully utilizing its hydropower resources. Estimates show there are over 65 gigawatts of potential new hydropower development across more than 3 million U.S. rivers and streams without dams.[73] Furthermore, about 80,000 dams exist in the United States, yet only 3 percent of dams (approximately 2,400) currently produce electricity.[74] According to the DOE, since many of the monetary costs and environmental impacts of dam construction have already occurred at these non-powered dams, adding power to these existing dam structures could be achieved at a lower cost, with less risk and in a shorter timeframe than development requiring new dam construction.[75] Transforming qualified non-producing dams into power generators could add 12 gigawatts of new generating capacity.[76]

69 Environmental and Energy Study Institute, "Bioenergy (Biofuels and Biomass)," http://www.eesi.org/topics/bioenergy-biofuels-biomass/description.

70 Ibid.

71 Robert Rapier, "A Cellulosic Ethanol Milestone," Forbes Magazine, April 2016. http://www.forbes.com/sites/rrapier/2016/04/26/a-cellulosic-ethanol-milestone/#184bd5a367c0.

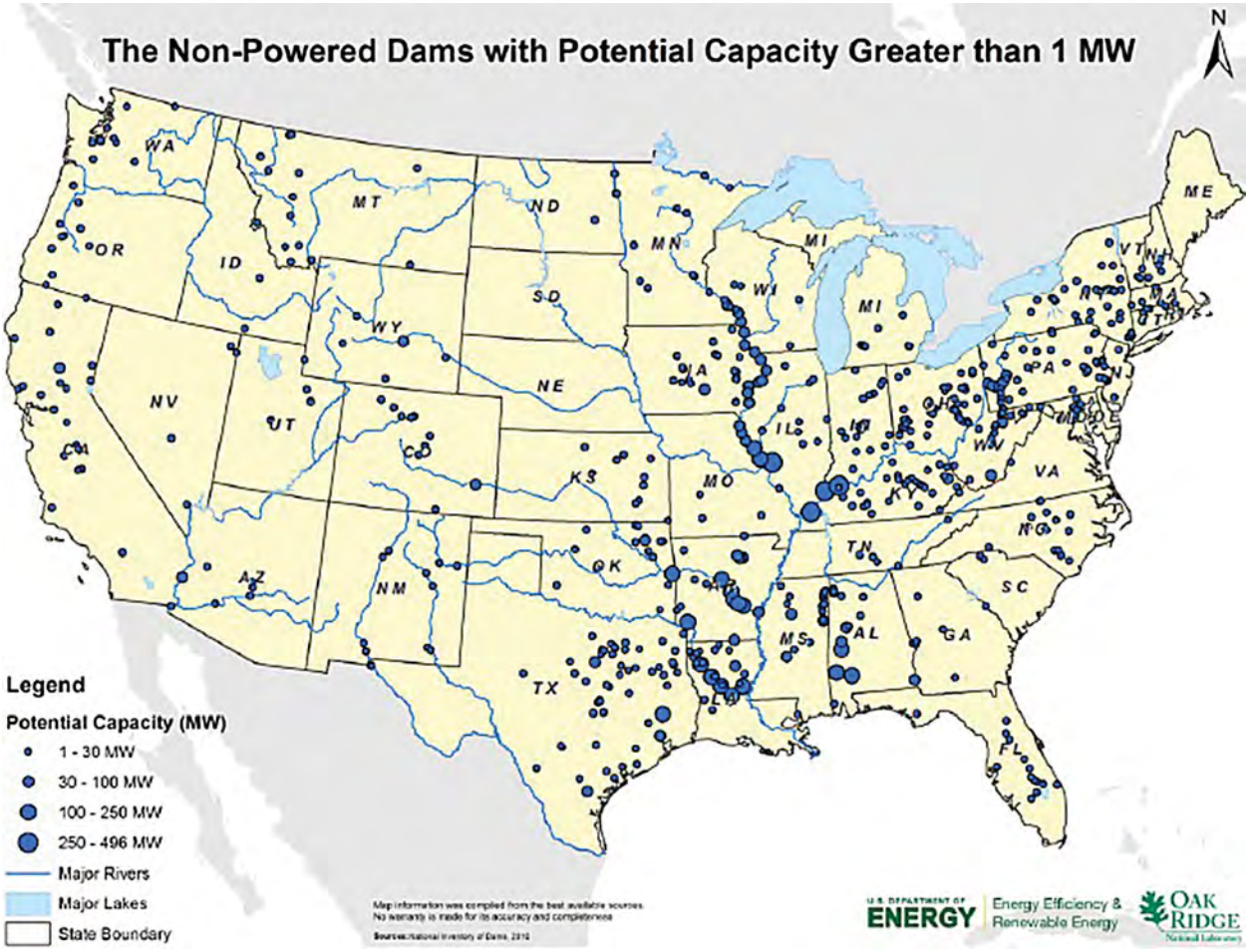
72 U.S. Department of Energy, Energy Information Administration, "Energy in Brief." http://www.eia.gov/energy_in_brief/article/renewable_electricity.cfm.

73 National Hydropower Asset Assessment Program, "New Stream-Reach Development Resource Assessment." April 2014, http://nhaap.ornl.gov/nsd.

74 U.S. Department of Energy, Energy Efficiency and Renewable Energy, "Types of Hydropower Plants." http://energy.gov/eere/water/types-hydropower-plants.

75 U.S. Department of Energy, Energy Efficiency and Renewable Energy, "An Assessment of Energy Potential at Non-Power Dams in the United States." April 2012. http://www1.eere.energy.gov/water/pdfs/npd_report.pdf.

76 Ibid.



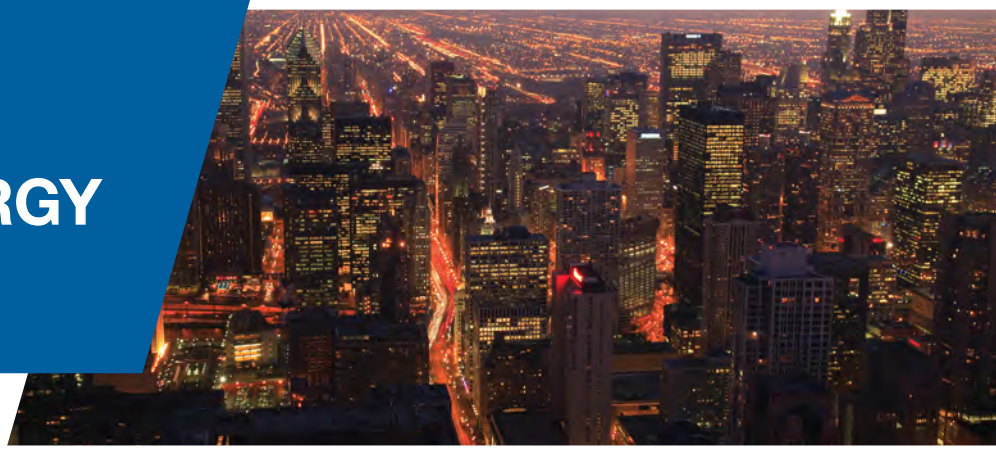
SOURCE: Oak Ridge National Laboratory

One of the main hurdles to expanding hydropower at existing facilities is the lengthy permitting process, which is overseen by the FERC. The 113th Congress acted in a bipartisan manner to pass the Hydropower Regulatory Efficiency Act of 2013 (Public Law 133-23), which includes charges to streamline the permitting process for converting existing dams into electricity generators. Since converting existing dams into power generators is a low-cost, low-risk way to increase electricity generation, it is in the best interest of consumers to ensure a streamlined permitting procedure that takes into account that much of the environmental impacts associated with damming the waterway have already occurred.

In the 114th Congress, several bills were introduced attempting to streamline the licensing procedures for the construction of dams, conduits and reservoirs in order to increase hydropower development in the United States. While many of the bills did not advance, the North American Energy Security and Infrastructure Act of 2016 passed both the House and the Senate, but remained in conference for the duration of the session. The bill would have amended the Energy Policy Act of 2005 to modernize hydropower licensing and adds a section dedicated to the promotion of hydropower development at existing non-powered dams.[77]

77 S. 2012, North American Energy Security and Infrastructure Act of 2016, https://www.congress.gov/bill/114th-congress/senate-bill/2012/text?q=%7B%22search%22%3A%5B%22hydropower%22%5D%7D&r=55.

Chapter 7
NUCLEAR ENERGY



Recommendations:

- Create affirmative steps to ensure against nuclear retirements.
- In order to extend the longevity of these resources, rule and policy makers must account for the contributions of nuclear power to zero-carbon electricity generation and work to prevent unnecessary plant closures.
- Develop and implement a viable program using current technology for the long-term management and disposal, storage and transportation of nuclear waste.
- Ensure continued support for the DOE's SMR Licensing Technical Support Program to assist the commercialization and deployment of small modular reactors.

There are currently 99 operable commercial nuclear reactors at 61 nuclear power plants across the United States.[78] The Tennessee Valley Authority's Watts Bar Unit 2 began commercial operation in October 2016. Southern Nuclear's Vogtle Units 3 and 4 in Georgia, as well as SCE&G's Virgil C. Summer Units 2 and 3, in South Carolina, are currently under construction.

As nuclear energy expands in the Southeast, other parts of the country have experienced the premature closure of nuclear facilities due mostly to poor market conditions and onerous regulations. Since 2013, nuclear plant owners have closed or announced closures of 16 reactor units.[79] These shutdowns require regulators and utilities to quickly replace the supply, oftentimes with more costly interim solutions that have raised prices for consumers.

Nuclear Waste Management

Existing nuclear facilities also face challenges regarding the management and disposal of nuclear waste. As stipulated by the Nuclear Waste Policy Act of 1982, the federal government is responsible for providing a place for the permanent disposal of high level radioactive waste and spent nuclear fuel. Under the law, nuclear

78 U.S. Department of Energy, Energy Information Administration, "How many nuclear power plants are in the U.S. and where are they located?" http://www.eia.gov/tools/faqs/faq.cfm?id=207&t=21.

79 Beyond Nuclear, "Reactors Are Closing," http://www.beyondnuclear.org/reactors-are-closing/.

utilities were also required to pay 1/10th of a cent per kilowatt hour of electricity generated at nuclear power plants plus interest into the Nuclear Waste Fund to expense disposal. Amendments to the law provided for the DOE to investigate a possible permanent disposal site at Yucca Mountain, Nevada. For years, opposition to the site kept Yucca from moving forward. In 2009, the Obama administration announced that it would not proceed with construction and operation of the Yucca Mountain as a used fuel repository project. At this time, nearly all commercial used fuels are in temporary storage at individual reactor sites.[80]

In May 2014, following a lawsuit filed by the nuclear industry, and with no long-term plan for a nuclear waste repository, the DOE ceased collecting fees for the Nuclear Waste Fund. The current balance of the Nuclear Waste Fund exceeds $30 billion and remains unspent to date.

In response to the final recommendations issued by the 2012 Blue Ribbon Commission on America's Nuclear Future, the DOE released its "Assessment of Disposal Options for DOE-Managed High-Level Radioactive Waste and Spent Nuclear Fuel." The report recommends that DOE "begin implementation of a phased, adaptive, and consent-based strategy" to develop a separate repository for nuclear waste.[81]

The obstacles to construction of new nuclear facilities remain substantial: cost estimates for a new nuclear plant range from $6 billion to $8 billion, an extremely high price tag for most of the relatively small U.S. electric companies, and the regulatory process for approval can take years.[82] Programs intended to reduce the financial risk of new construction, including federal loan guarantees and state-based Construction Work In Progress (CWIP) laws, have not been effectively applied in all cases and isolated incidents have increased the public scrutiny of these financial tools. Compounding financing concerns, new facilities increasingly face litigation from opposition groups.

Since financing and construction of new reactors remains uncertain, nuclear producers are examining the potential to expand nuclear power with Small Modular Reactors (SMR). An SMR is smaller in size than current nuclear power facilities, provides less than 300 megawatts of power and requires substantially less capital investment.[83] One of the biggest advantages of an SMR is that manufacturers can build them at a central location before shipping the reactor via rail or barge for on-site assembly. Additionally, the SMR design includes an underground radiation-containment structure, which is meant to be safer and less expensive than containment structures at larger facilities. DOE has placed a high priority on accelerating the timelines for commercialization and deployment of SMR technologies through its SMR Licensing Technical Support Program. This program aims to advance the certification and licensing of domestic SMR technologies that are relatively mature and will be ready for deployment within the next decade.[84]

80 Nuclear Energy Institute, "Nuclear Waste Fund Fee Suspended." http://www.nei.org/Master-Document-Folder/Multimedia/Infographics-Database/Nuclear-Waste-Fund-Fee-Suspended.

81 U.S. Department of Energy, "Assessment of Disposal Options for DOE-Managed High-Level Radioactive Waste and Spent Nuclear Fuel," October 2014. http://energy.gov/sites/prod/files/2014/10/f18/DOE_Options_Assessment.pdf.

82 Nuclear Energy Institute. "FAQ About Nuclear Energy: New Reactor Cost." http://www.nei.org/Knowledge-Center/FAQ-About-Nuclear-Energy.

83 U.S. Department of Energy, Office of Nuclear Energy, "Small Modular Nuclear Reactors." http://www.energy.gov/ne/nuclear-reactor-technologies/small-modular-nuclear-reactors.

84 Ibid.

Chapter 8
ELECTRICITY GENERATION AND DISTRIBUTION

Recommendations:

- Establish rigorous standards for cost-benefit analyses by federal agencies to develop realistic, legitimate estimates with repeatable results confirmed by third-parties on rules affecting the cost and delivery of energy to consumers.
- Require accountability from EPA and other regulators on any rulemaking that would negatively impact the ability of families, small businesses and other energy users to pay utility bills or would disrupt their power delivery.
- Eliminate barriers for more transmission and new operating procedures in order to maintain electric grid reliability. Regions that may undergo a large shift in their energy resource mix will be expected to require transmission enhancements to maintain electric reliability.
- Provide adequate resources to federal agencies, including the DOE's Office of Electricity Delivery and Energy Reliability, to continue to identify threats to electricity reliability and to research technologies and behaviors that could improve the reliability of the nation's electric system.
- Eliminate barriers for already complex siting issues surrounding renewable energy transmission lines.

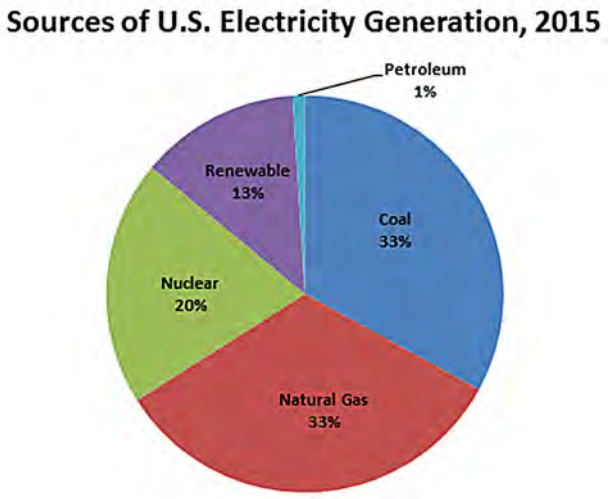
The United States produces electricity from a diversity of sources, with coal, natural gas, nuclear and hydroelectric power accounting for a vast majority of electricity generation.[85] Diversification reduces some of the price and supply vulnerabilities that can result with over-reliance on one form of energy for electricity generation. Much of the diversification in U.S. generation, however, is simply a consequence of geography and local market conditions, and as a result has been taken for granted.

CEA cannot be clearer – it supports an all of the above energy policy that will provide families, households, small businesses and those living on the margins of society with the affordable and reliable electricity they need to heat and cool their homes while being able to support themselves and those that depend on them. Americans need a diverse supply of resources – including expanding renewables and increasing our use of emissions-free nuclear power, and traditional baseload power provided by clean natural gas and coal -

85 U.S. Department of Energy, Energy Information Administration, "What is U.S. electricity generation by source?" https://www.eia.gov/tools/faqs/faq.cfm?id=427&t=3.

that can provide them optionality as well as the transmission necessary to get the supplies to markets and populations centers.

This chapter specifically focuses on coal-fired power and electricity distribution. For information and policy recommendations on natural-gas fired power generation, renewable electricity or nuclear energy, visit Chapters 2 and 4 through 7 of this briefing document.



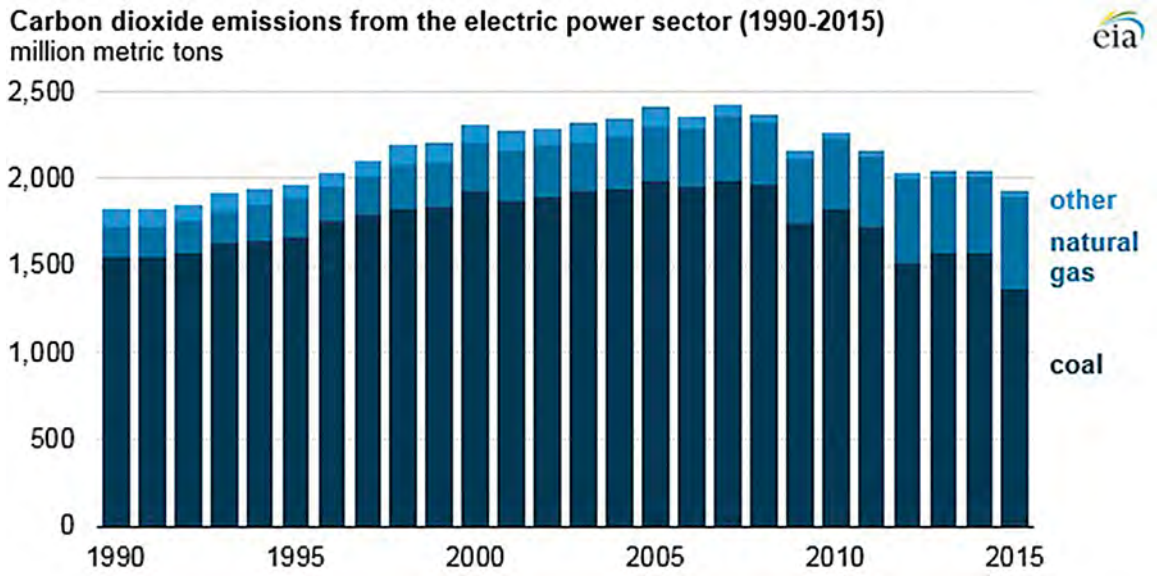
SOURCE: U.S. Energy Information Administration

Coal-Fired Electricity Generation

Coal is one of the most abundant domestic resources available to produce electricity cost-effectively, and its utilization continues to account for a significant part of U.S. electricity generation. However, concerns have been expressed about the impacts of coal use on public health and the environment. While alternative energy and natural gas have begun to play an increasing role in electricity generation, the United States should continue to thoughtfully utilize coal, striving to ensure its development and use occur in the most responsible manner available. Our goal should be finding ways to use our abundant natural resources in the cleanest and most cost-efficient manner possible rather than abandoning these assets altogether like many extreme activists have encouraged.

In August 2015, the Obama administration unveiled the final Clean Power Plan (CPP) to require existing coal-fired power generators, as well as natural gas-fired combined cycle facilities, to cut carbon emissions by 32 percent from 2005 levels by the 2030. These rules will significantly reduce the use of coal-fired electricity based on its greenhouse gas emissions and pose serious consequences for American consumers, particularly as it relates to affordable electricity and grid reliability. Implementation of the rule was stayed by the Supreme Court in February 2016.

In May of 2016, the EIA found that greenhouse gas emissions from the U.S. utility sector were at their lowest levels since 1994 and 21 percent lower than in 2005 – all without imposing the CPP.



Furthermore, EPA's own data confirms, "(between 1980 through 2014), national concentrations of air pollutants improved 98 percent for lead, 85 percent for carbon monoxide, 80 percent for sulfur dioxide (1-hour), 60 percent for nitrogen dioxide, and 33 percent for ozone. Fine particle concentrations (24-hour) improved 36 percent and coarse particle concentrations (24-hour) improved 30 percent between 2000, when trends data begins for fine particles, and 2014."[86]

The CPP also impacts the wallets of families trying to make ends meet and the reliability of our critical electric grid. Increased expenditures for compliance with the rule would cost the energy sector $220 to $292 billion from 2022 through 2033. Average annual retail electricity rates would increase 11 to 14 percent per year, with consumer losses ranging from $64 billion to $79 billion during the same time period.[87]

Electricity Distribution

The nation's electrical transmission grid, or "grid," is the interconnected group of power lines and associated equipment that transports electric energy at high voltage between points of supply and points at which it is delivered to other electric systems or transformed to a lower voltage for delivery to customers. Investor-owned utilities own nearly 80 percent of transmission and consumer-owned utilities own the remaining 20 percent.[88] To ensure the efficient operation of the grid, independent system operators and regional transmission organizations monitor system loads, operate transmission facilities and direct generation

86 U.S. Environmental Protection Agency, "Progress Cleaning the Air and Improving People's Health," https://www.epa.gov/clean-air-act-overview/progress-cleaning-air-and-improving-peoples-health.

87 NERA Economic Consulting, "Energy and Consumer Impacts of EPA's Clean Power Plan," November 7, 2015. http://www.americaspower.org/wp-content/uploads/2015/11/NERA-CPP-Final-Nov-7.pdf.

88 Ibid.

and oversee other critical functions, while reliability coordinators also help develop and enforce safety and reliability standards.

If implemented, the CPP would significantly reduce generation capacity from coal-fired units. A potential base-load reduction of this magnitude will result in an unprecedented restructuring of electricity markets and will require extensive capital investment as well numerous hurdles related to permitting and infrastructure. Additionally, changing the resource mix on the grid increases the chance for power disruptions during extreme conditions.

To ensure reliability practices align with the realities of the current electricity market, the DOE's Office of Electricity Delivery and Energy Reliability oversees a range of initiatives that develop and recommend electricity policy that could better provide consumers with reliable electricity now and in the future. Some of the current and future challenges that the Agency examines include emergency planning and response, cybersecurity threats and coordination of federal and state policy.

Distributed power options and the information technology revolution are continuing to push the boundaries and limitations of the traditional electricity delivery model that has largely been in place for decades. Customers are demanding increased optionality and installation of renewable generation from federal and state incentives as well as declining capital costs mean significant continued installation of wind and solar. As the new resources come online, the need for transmission lines to bring the resources to population centers is becoming more acute.

Chapter 9
TRANSPORTATION FUELS

Recommendations:

- Ensure the U.S. Environmental Protection Agency conducts objective cost-benefit analyses to determine whether proposed changes to existing regulations and proposed new regulations affecting domestic refineries will produce significant health and environmental benefits.
- Pursue reform efforts to amend the federal Renewable Fuel Standard to account for the realities of renewable fuel markets, vehicle technologies, fuel demand and issues encountered with the use of fuels containing more than 10 percent ethanol.
- Support polices that foster the growth of advanced biofuels through more targeted research, development and demonstration programs that would lead to more effective, cost-competitive, advanced biofuel production.

Refining

The U.S. transportation sector – cars, trucks, planes, ships and trains – consume nearly 72 percent of U.S. oil demand.[89] U.S. refineries have an operating capacity of more than 18.3 million barrels of oil per day. In addition to transportation fuels, refineries utilize oil and natural gas to manufacture petrochemical products, which form the building blocks for countless consumer products, including, but not limited to plastics, fertilizer, food preservatives, candles, paint, cosmetics and laundry detergent. America's refineries also manufacture home heating oil, asphalt and a variety of lubricants that keep mechanical devices running smoothly.

In 2015, the EPA finalized rulemaking that will increase hazardous air emission control requirements for petroleum refineries. The EPA could also move to enact greenhouse gas emission standards for refineries, similar to the rules proposed for existing power plants. New and expanded regulations will affect the ability of refiners to affordably manufacture fuels and petrochemical products. Refiners have invested significantly to

89 U.S. Department of Energy, Energy Information Administration, "Oil: Crude and Petroleum Products Explained – Crude oil and petroleum statistics." http://www.eia.gov/energyexplained/index.cfm?page=oil_home#tab3.

minimize the environmental impact of their operations. However, with a slate of more stringent environmental regulations proposed by federal regulators, the U.S. refining industry may be required to further increase investments in emission control technologies or shutter its facilities, either of which could lead to significant added costs for consumers.

Renewable Fuel Standard

Fuel standards can also affect the availability and affordability of fuel. One such federal standard is the Renewable Fuel Standard (RFS), which seeks to increase the volume of renewable fuels – such as corn ethanol and advanced cellulosic ethanol – blended into the nation's fuel pool. The EPA is responsible for revising and annually promulgating the volumetric blending requirements in accordance with the law and its views on the projected market availability of various renewable fuels.

As Americans continue to reduce their fuel use, due in part to greater vehicle efficiency standards, the RFS's increasingly higher renewable blending requirements have posed a challenge for U.S. refiners, motorists and fuel retailers. First, in order to accommodate future RFS mandates, gasoline must be blended with higher ethanol content. In 2014, the nation reached the 10 percent ethanol (E10) blend-wall as a result of the RFS's increased blending requirements. Unfortunately for consumers, a large number of vehicles on the road today (including most 2001 to 2013 models) cannot handle higher ethanol blends without risking significant mechanical problems. Additionally, the nation's fueling infrastructure is incompatible with higher ethanol blends.

Current and projected levels of commercially available cellulosic ethanol have not been nor will be sufficient to meet the standard. The U.S. Government Accountability Office (GAO) released a report in November 2016 stating the RFS program is not likely to meet its targets. In its report, the GAO notes that "the cellulosic biofuel blended into the transportation fuel supply in 2015 was less than 5 percent of the statutory target of 3 billion gallons."[90] Due to these shortfalls, the EPA has been forced to reduce RFS targets through waivers for the past four years.

The long-term RFS volumetric blending requirements will, unless modified, result in unintended consequences for energy consumers. The U.S. Congress should undertake reasonable reform measures now to protect American fuel consumers without damaging America's renewable fuel industry. A successful reform effort should amend the program to account for the realities of renewable fuel markets, existing vehicle technologies, fuel demand and issues arising from the use of gasoline containing more than 10 percent ethanol in order to ensure that the RFS properly incentivizes renewable transportation fuels. Specifically, any RFS reform effort must take into account the reality that neither the American vehicle fleet nor its fueling infrastructure are currently capable of handling fuels with more than 10 percent ethanol without risking vehicle damage or voiding vehicle warranties. Moreover, the federal government should focus efforts on supporting research, development and demonstration of advanced biofuels to ensure their commercial viability.

90 U.S. Government Accountability Office, "Renewable Fuel Standard Program Unlikely to Meet Its Targets for Reducing Greenhouse Gas Emissions," November 2016, http://www.gao.gov/assets/690/681252.pdf.

Chapter 10
ENERGY TAXES AND REVENUE

Recommendations:

- Recognize the strong economic contributions of domestic energy production and avoid proposing or accepting legislative changes to the existing tax code that could result in higher energy prices and lower energy output for consumers.
- Support and sign federal legislation that allows all participating states and coastal communities to receive an appropriate share of the royalty revenues generated by energy production in their adjacent waters.
- Support development of a diverse energy portfolio, including expanded development and use of alternative and renewable energy resources, by ensuring greater proportions of reasonable federal support are allocated at the research, development and demonstration phase.

Energy resource development contributes significantly to the U.S. economy. Not only does every sector of the U.S. economy rely on energy to power its operations, the economy also benefits directly from the significant amount of jobs and revenue energy production generates. The oil and natural gas sector alone annually contributes more than $1.2 trillion to the U.S. economy.[91]

Federal tax and budget policy greatly influences nearly every step in the process of energy development and consumption, affecting the cost of energy, the types of energy available and how industry produces and delivers energy. For the purposes of simplicity, this chapter separately examines those policies that affect the taxation of energy and those policies that utilize a series of financial tools to promote domestic energy development.

Natural resource development provides substantial federal revenues from royalties, rents and lease payments from resource extraction on federal land as well as from corporate, income and other taxes. The Office of Natural Resources Revenue in the U.S. Department of the Interior oversees the collection of federal and Native American royalties and other monies owed for the utilization of public resources in the production of conventional and renewable energy and mineral resources. In Fiscal Year 2016, the Office disbursed over $6

91 American Petroleum Institute, "Oil and Natural Gas Stimulate American Economic and Job Growth." http://www.api.org/policy-and-issues/policy-items/jobs/oil-and-natural-gas-stimulate-american-economic-and-job-growth.

billion in revenues to the U.S. Treasury, federal agencies, 37 states, 34 Native American Tribes and over 35,000 individual Native American mineral owners.[92] Of the revenues collected, royalties for oil, natural gas and coal production accounted for nearly $5 billion. In addition to these revenues, energy producers and providers pay corporate taxes, employ millions of people who pay federal income taxes, produce products such as gasoline that are federally taxed and pay a series of other federal, state and local taxes.

Reported Revenues to the Office of Natural Resources Revenue[93]

Fiscal Year	Federal Revenue
2016	$5,968,142,654.25
2015	$9,634,231,135.15
2014	$13,179,995.664.65
2013	$14,387,309,770.99
2012	$11,976,472,570.58
Five-Year Period (2012-2016)	**$55,146,151,795.62**

SOURCE: U.S. Department of the Interior, Office of Natural Resources Revenue

The federal government utilizes some of the monies generated from resource development to fund regulation of production; research, development and demonstration of various energy resources; infrastructure development and maintenance; and programs to further environmental objectives. One such program is the sharing of revenues generated from federal OCS development.

In 2006, the U.S. Congress passed the Gulf of Mexico Energy Security Act (GOMESA) directing that the states of Texas, Louisiana, Mississippi and Alabama receive 37.5 percent of all royalties from new oil and natural gas development in adjacent federal waters.[94] The intent of GOMESA is to ensure states have adequate resources to fund coastal restoration, conservation initiatives and hurricane protection projects. As such, on top of the 37.5 percent of revenues distributed to the GOMESA states, 12.5 percent of revenues are allocated to the federal Land and Water Conservation Fund. Currently, federal OCS revenue-sharing as provided under GOMESA only extends to the four states included in the original legislation. States such as Alaska, Virginia,

92 U.S. Department of the Interior, Office of Natural Resources Revenue, "ONRR Overview." http://www.onrr.gov/About/default.htm. U.S. Department of the Interior, "Interior Disburses $6.23 Billion in FY 2016 Energy Revenues." http://www.onrr.gov/about/pdfdocs/20151125a.pdf.

93 U.S. Department of the Interior, Office of Natural Resources Revenue, "Statistical Information." http://statistics.onrr.gov/ReportTool.aspx.

94 U.S. Department of the Interior, Bureau of Ocean Energy Management, "Gulf of Mexico Security Act (GOMESA)."http://www.boem.gov/Revenue-Sharing/.

North Carolina, South Carolina and Georgia that are either developing offshore resources or have expressed interest in doing so will not be eligible for revenue-sharing under current law.

The U.S. House passed legislation in 2013 and again in 2014 that would expand revenue-sharing to all states with oil and natural gas activity in adjacent federal waters and raise the existing annual cap applicable to the four Gulf Coast states.[95] Legislation that would expand revenue-sharing has also been introduced in the U.S. Senate by Republicans and Democrats in 2013, 2015, and 2016[96] – with the U.S. Senate falling nine votes short of the 60 needed to proceed to a vote on the revenue-sharing legislation introduced in 2016[97] – and Democrat, Republican and Independent governors from coastal states across the country have urged the Obama administration to expand offshore revenue-sharing beyond the four Gulf Coast states and modify the existing structure for the Gulf states.[98]

However, the Obama administration declined to support such legislation,[99] and in 2015 and again in 2016 went so far as to propose the repeal of revenue-sharing with the Gulf Coast states as required under GOMESA.[100]

In terms of encouraging energy development through federal budget and tax policy, tax credits and deductions, loan guarantees and federal grants can be useful financial tools to stimulate development of energy resources and technology, provide greater certainty to all energy producers and stabilize prices for consumers. Nearly every source of energy benefits from some type of federal support – whether it is a tax credit to promote production or a grant to research technologies to mitigate environmental impacts or increase cost competitiveness. However, the proportion of federal support allotted varies greatly on the energy source or technology as well as the point of assistance, such as direct expenditures to producers or consumers or grants to academic institutions to research and develop various technologies.

As researchers from the Brookings Institute, Breakthrough Institute and World Resources Institute referenced in a 2012 analysis examining federal policies and programs supporting the "clean tech" sector, optimal annual

95 H.R. 4899 ("Lowering Gasoline Prices to Fuel and America That Works Act of 2014), passed June 26, 2014; and H.R. 2231 ("Offshore Energy and Jobs Act"), passed June 28, 2013.

96 S. 1024 ("Virginia Outer Continental Shelf Energy Production Act of 2013"), introduced May 22, 2013; S. 1273 ("Fixing America's Inequities with Revenues Act of 2013"), introduced July 10, 2013; S. Amdt. 102 ("Atlantic OCS Access and Revenue Share Act of 2015"), proposed Jan. 29, 2015; and S. 3110 "(American Energy and Conservation Act of 2016"), introduced June 29, 2016.

97 Nov. 17, 2016 Roll Call Vote 153 on the Motion to Invoke Cloture on the Motion to Proceed to S. 3110 ("American Energy and Conservation Act of 2016").

98 March 30, 2015 Letter from Governors Pat McCrory (R-NC), Phil Bryant (R-MS), Paul LePage (R-ME), Robert Bentley (R-AL), Terry McAuliffe (D-VA), and Nikki Haley (R-SC) to U.S. Interior Secretary Sally Jewell, available at http://ocsgovernors.org/wp/wp-content/uploads/2015/04/FINAL-OCSGC-Letter-on-DPP-2017-2022-03-30-15.pdf; and Feb. 24, 2015 Remarks by Governor Bill Walker (I-AK), available at http://gov.state.ak.us/Walker/press-room/full-press-released09b.html?pr=7089.

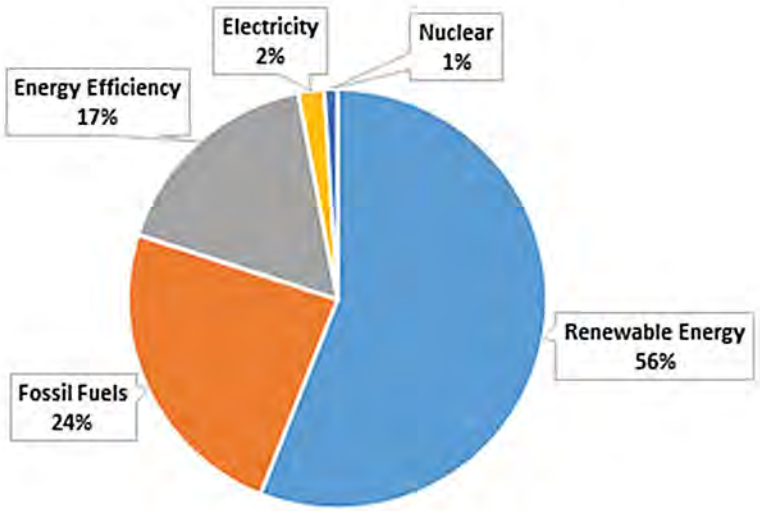
99 Prepared Statement of Pamela Haze, U.S. Interior Department Deputy Assistant Secretary for Budget, Finance, Performance and Acquisition, U.S. Senate Energy and Natural Resources Committee Hearing on S. 1273 (The FAIR Act of 2013), available at https://www.gpo.gov/fdsys/pkg/CHRG-113shrg85874/html/CHRG-113shrg85874.htm.

100 U.S. Interior Department Fiscal Year 2016 Budget in Brief, Page DH-62, available at https://www.doi.gov/sites/doi.gov/files/migrated/budget/appropriations/2016/highlights/upload/2016_Highlights_Book.pdf; Fiscal Year 2017 Budget in Brief, Page DH-68, available at https://www.doi.gov/sites/doi.gov/files/uploads/2017_Highlights_Book.pdf.

clean energy research, development and demonstration funding levels recommended by business leaders, researchers and national science advisors range from $12 billion to as much as $30 billion.[101]

A September 2014 GAO report identified ~$153.07 billion in federal spending between fiscal years 2000 and 2013 on tax expenditures ($119.36 billion), outlays ($19.95 billion), royalty relief (~$12 billion from 2000-2012) and estimated loan guarantee costs ($1.76 billion) in support of fossil, nuclear and renewable energy. Total identified dollars spent were allocated as follows: $84.25 billion to renewables, $60.92 billion to fossil energy and $7.9 billion to nuclear. As to federal spending not targeted specifically at fossil, nuclear or renewable energy production and consumption but that may have influenced energy production and consumption between fiscal years 2000 and 2013, GAO identified ~$117.26 billion in spending on tax expenditures ($65.44 billion), outlays ($50.82 billion) and estimated loan guarantee costs ($~1 billion).

Allocation of Energy-Related Tax Preferences in 2015, by Type of Fuel or Technology



SOURCE: Congressional Budget Office, "Federal Support for the Development, Production, and Use of Fuels and Energy Technologies, November 2015. https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/50980-Energy_Support.pdf.

At the same time, the GAO report identified $22.22 billion in federal research and development spending related to fossil, nuclear and renewable energy over the same time period, of which $8.65 billion was allocated to fossil energy, $7.86 billion to renewables and $5.71 billion to nuclear (some outlays associated with these programs may not be related to R&D).[102] Essentially, 15 percent of expenditures were allocated to

101 Jesse Jenkins, "Beyond Boom & Bust: Putting Clean Tech on a Path to Subsidy Independence." April 2012. http://www.brookings.edu/~/media/Research/Files/Papers/2012/4/18%20clean%20investments%20muro/0418_clean_investments_final%20paper_PDF.PDF.

102 Government Accountability Report to the Ranking Member, Committee on Energy and Natural Resources, U.S. Senate, "Information on Federal and Other Factors Influencing U.S. Energy Production and Consumption from 2000 through 2013." September 2014. http://www.gao.gov/assets/670/666270.pdf.

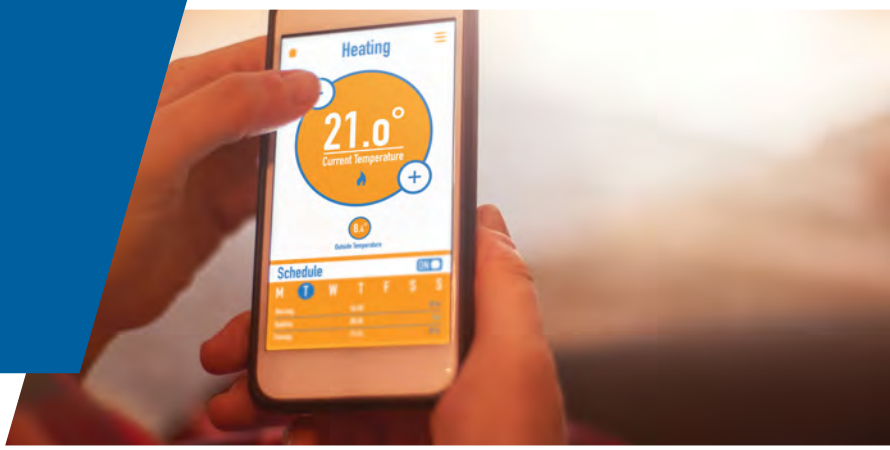
research and development. While this is higher than the U.S. government's FY 2016 10.2 percent allocation of non-defense discretionary spending for R&D,[103] it is far below what experts believe is necessary to spur significant innovations in the energy sector.[104]

While all reasonable measures should be taken to promote domestic energy development and efficiency, greater proportions of government support should be allocated at the research, development and demonstration phase to help determine the viability and commercialization potential of energy resources and technologies and to possibly discover new resources or technology that can meet our nation's energy needs affordably and sustainably.

103 American Association for the Advancement of Science, "Historical Trends in Federal R&D," R&D as a Percent of Discretionary Spending, 1962-2017, http://www.aaas.org/page/historical-trends-federal-rd.

104 Jesse Jenkins, "Beyond Boom & Bust: Putting Clean Tech on a Path to Subsidy Independence." April 2012. http://www.brookings.edu/~/media/Research/Files/Papers/2012/4/18%20clean%20investments%20muro/0418_clean_investments_final%20paper_PDF.PDF.

Chapter 11
ENERGY INFRASTRUCTURE



Recommendations:

- Continue to provide rigorous oversight of PHMSA and other federal agencies that are aiming for new, more prescriptive regulations. All operators must be held to a high standard, but policymakers must ensure that new safety directives maintain the agency's performance-developed regulatory standard and avoid putting consumer benefits at risk by unnecessarily shutting production and modes of delivery to markets, households, and businesses.
- Review the administrative authority to implement actions that curb the development of energy infrastructure and jeopardize jobs and private investment.
- Provide additional oversight of the environmental review process by federal agencies. Activist groups are abusing the consultation process established by federal statutes such as the National Environmental Policy Act to keep projects in regulatory limbo.
- Reform and rein in tactics utilizing the federal permitting and review process as a weapon to enact the agendas of activist organizations.

Our nation's energy infrastructure is world-class and the envy of producing nations across the globe. America has more than 2.6 million miles of pipeline infrastructure that safely deliver energy products and feedstocks that are turned into the consumer staples, home heating, electricity and transportation fuels we use each day.[105]

More must be done to ensure this critical infrastructure continues to be built, replaced and upgraded without the increasing interference of anti-energy groups intent on choking off the benefits families, seniors, and small businesses are enjoying from the energy renaissance. Congress recently passed a pipeline reauthorization bill and it is expected that significant attention and new regulatory directives are expected to come out of the Pipelines and Hazardous Materials Safety Administration (PHMSA).

105 U.S. Government Accountability Office, "Pipeline Safety: Department of Transportation Needs to Complete Regulatory, Data, and Guidance Efforts," September 29, 2015. http://www.gao.gov/assets/680/672809.pdf.

The Obama administration's rejection of widely-supported, safe, and vital energy pipelines like the Keystone XL Pipeline and more recently the Dakota Access Pipeline show how unfairly politicized the federal permitting and siting process has become. As to the latter, the Obama administration took the unprecedented step of issuing executive action through the Departments of Justice and Interior in spite of a federal court ruling approving the project, which had received all of its required state and federal permits.

Anti-energy groups are increasingly turning their attention to proceedings before the FERC. Not only are they using the FERC review and docket process for protest purposes, they are physically showing up at Commissioners' homes and utilizing intimidation tactics to try and deny every aspect of midstream projects. These groups are using FERC's voluminous and thorough docket process as a larger proxy fight against fossil fuels and trying to force FERC to become a greenhouse gas emissions regulator focused on climate efforts – rather than an independent body that, according to its mission statement, is to "assist consumers in obtaining reliable, efficient and sustainable energy services at a reasonable cost through appropriate regulatory and market means."[106]

Another tactic being pursued by anti-development organizations is the creation of a new office at FERC that could be used to generate citizen-suits and frivolous litigation, much like the abused authorities in the Endangered Species Act, where professional environmental trial attorneys can have their legal costs billed to the U.S. taxpayer.

106 Federal Energy Regulatory Commission, "Strategic Plan FY 2014-FY 2018," https://www.ferc.gov/about/strat-docs/strat-plan.asp.

Chapter 12
EFFICIENT ENERGY USE

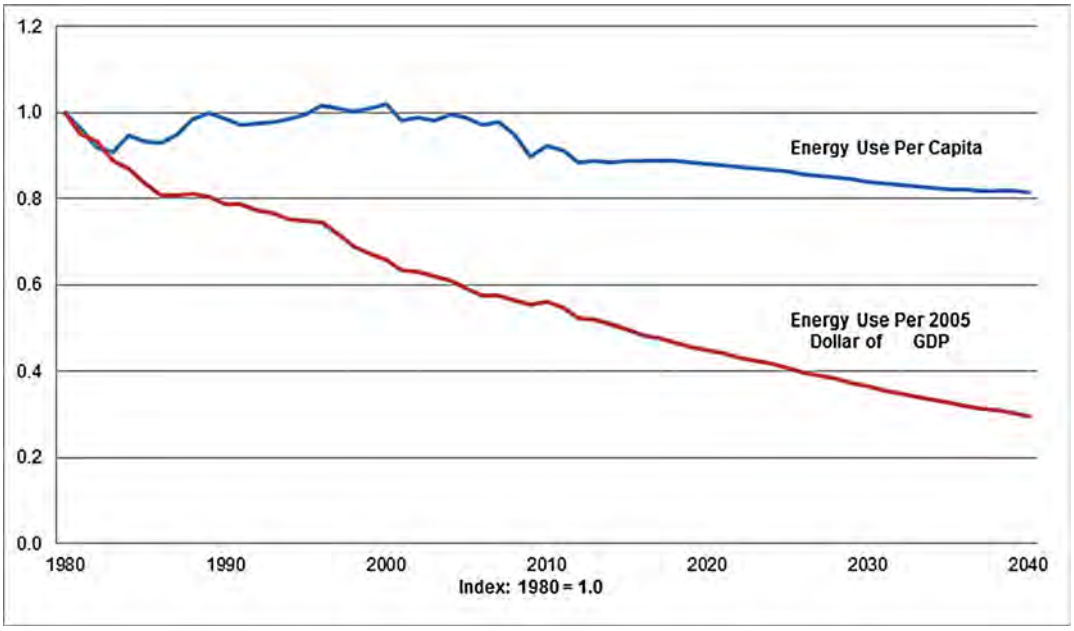
Recommendations:

- Facilitate interconnection of Combined Heat and Power (CHP) systems and ensure CHP can be utilized as a tool to meet carbon emission standards for power plants.
- Provide resources to the U.S. DOE's Office of Electricity Delivery and Energy Reliability and the Office of Energy Efficiency and Renewable Energy to continue research, development and deployment efforts for technologies that can help improve grid efficiency.
- Provide support to establish and expand voluntary, public-private partnerships to make energy efficiency and conservation more accessible and affordable for consumers and more attractive for homebuilders, manufacturers and building owners.
- Ensure all products, homes or retrofits labeled by ENERGY STAR undergo regular audits to guarantee consumers are receiving maximum value for their investment in energy-efficient technologies.
- As automakers work to comply with the standards, Congress and the Administration should actively monitor the cost impacts of Corporate Average Fuel Economy (CAFE) standards on consumers and seek remedies if compelling evidence suggests that the new standard is unachievable without economic harm to consumers.
- Focus federal support at the research, development and demonstration phase to help overcome common barriers to commercialization for alternatively fueled and electric-vehicle technologies, namely cost-differentials in manufacturing, costs and accessibility of refueling infrastructure and depreciation of vehicle value, in order to address the viability of large-scale commercialization of electric vehicles.
- Ensure the Federal Aviation Administration (FAA) remains accountable for effective, timely and sound implementation of the NextGen program and ensure the NextGen program provides flexibility for operators to cost-effectively participate in the program.

As the United States seeks to stabilize energy prices and enhance energy security, energy efficiency, conservation and sustainable practices remain effective tools in helping to meet society's expanding energy needs. Sustainable practices extend beyond environmental stewardship. Energy efficiency and conservation produce significant cost savings for consumers and make American businesses more competitive globally.

Although the EIA projects that total energy consumption will increase by 0.4 percent per year from 2012 to 2040, energy use per capita will decrease due to advancements in energy efficient technologies, efficiency practices by the electric power sector, expanded use of fuel-efficient vehicles and additional changes in consuming behavior.[107] Furthermore, energy use per dollar of gross domestic product will decline significantly over the same time period.

Energy Use Per Capita and Per Dollar of GDP (1980-2040)



SOURCE: U.S. Energy Information Administration, http://www.eia.gov/forecasts/aeo/MT_energydemand.cfm#declines

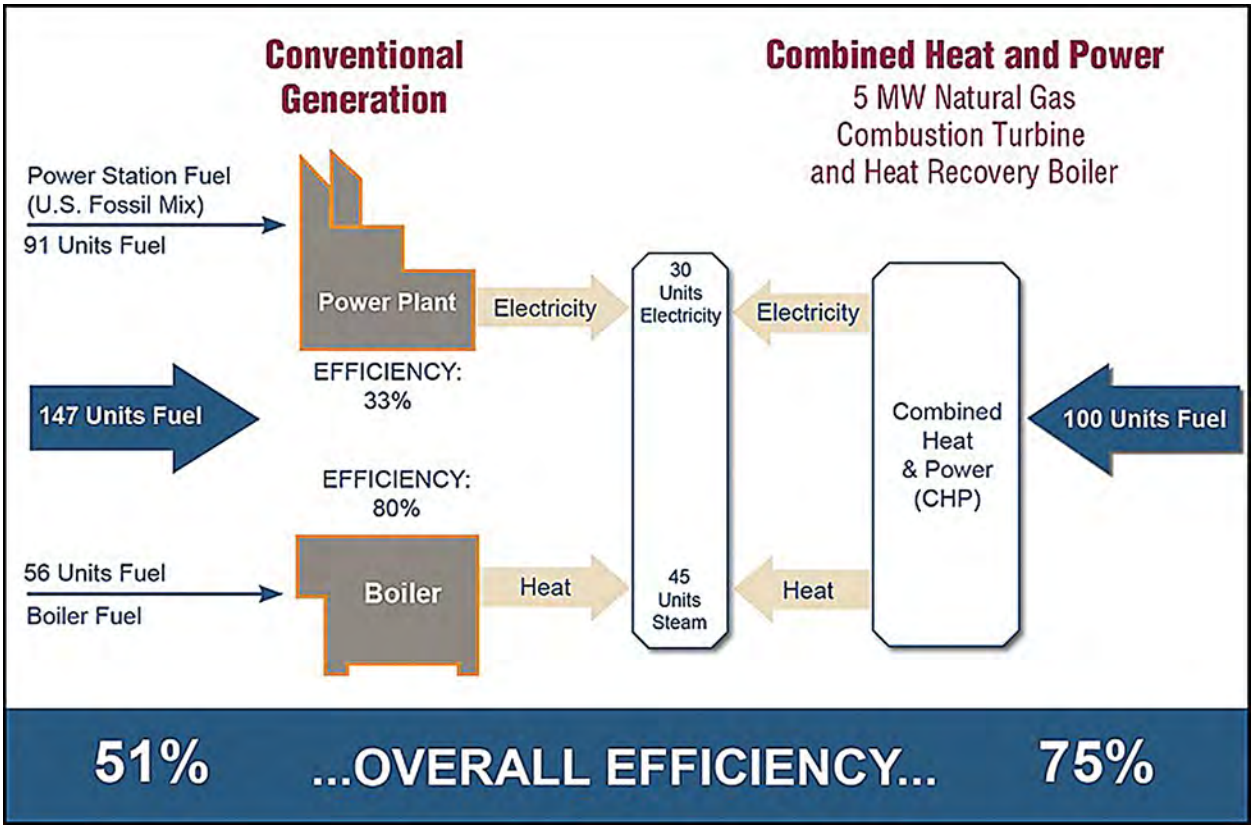
Efficiencies in Electricity Generation & Distribution

Increased efficiencies in electricity generation and improvements to the grid can conserve substantial quantities of energy. For electricity generation, one of the more promising technologies is CHP systems, oftentimes referred to as cogeneration systems. CHP systems generate electricity and thermal energy in a single, integrated system. Rather than a single technology, CHP systems use a variety of fuels to provide reliable electricity, thermal power and mechanical power for factories, hospitals, universities and commercial buildings. Since they are utilized as on-site power sources, CHP systems may lower demand on the electrical grid, reduce reliance on traditional energy supplies and lower business costs.

By recovering and utilizing heat that is typically wasted in traditional electricity generation, CHP systems are more energy efficient than separate electricity generation and thermal production. CHP systems also produce energy savings by eliminating the electricity losses that normally occur in the transmission and distribution of electricity from a power plant to a user because the systems are located at or near the point of use. In 2012,

107 U.S. Department of Energy, Energy Information Administration, "Annual Energy Outlook 2014," http://www.eia.gov/forecasts/aeo/MT_energydemand.cfm#declines.

President Obama issued an Executive Order establishing a new national goal of 40 gigawatts of new CHP capacity by 2020 – a 50 percent increase. A report for the DOE forecasts that achieving this goal would save energy users $10 billion per year compared to current energy use.[108]



SOURCE: U.S. Environmental Protection Agency, https://www.epa.gov/chp/chp-benefits

In addition, there are steps that can be taken to improve the efficiency in the transmission and distribution of electricity. According to the EIA, annual electricity and distribution losses average about 6 percent of the electricity that is transmitted in the United States.[109] Monitoring and automation technologies could help reduce the amount of transmission and distribution losses across the grid. As authorized by the Energy Independence and Security Act of 2007, Section 1303 established the Smart Grid Advisory Committee and the Federal Smart Grid Task Force. One of the objectives of these initiatives is to coordinate with state and regional officials as well as with the private sector on matters affecting the effectiveness and the efficiency of electricity transmission and distribution, regionally and nationally. Several bills were introduced during the 114th Congress to build upon these initiatives – such as the Smart Grid Act of 2015 – but did not advance out of committee.[110]

108 U.S. Department of Energy, Energy Efficiency & Renewable Energy, "Benefits of Combined Heat and Power," http://energy.gov/eere/amo/benefits-combined-heat-and-power.

109 U.S. Department of Energy, Energy Information Administration, "How much electricity is lost in transmission and distribution in the United States?" http://www.eia.gov/tools/faqs/faq.cfm?id=105&t=3.

110 Smart Grid Act of 2015, https://www.congress.gov/bill/114th-congress/senate-bill/1232.

Continued congressional and federal support for these initiatives and general support for the DOE offices tasked with improving electricity efficiency and reliability is necessary to continue improvements in grid efficiency. In January 2016, the Department of Energy announced the release of a comprehensive new $220 million Grid Modernization Multi-Year Program plan that will serve as a blueprint for modernizing the grid, subject to congressional appropriation.[111] Efforts such as this – and other efforts by these offices to coordinate with state governments and regional grid operators – are increasingly important as states continue to devise and implement plans to meet EPA's standards for power plants.

Efficiencies in Electricity Consumption

For individual consumers, new energy-efficient appliances, building materials and practices and electricity-consumption monitoring technologies can enable consumers to decrease their electricity consumption. Increased utilization of energy-efficient appliances and practices is an effective and practical way for individual consumers to reduce utility expenses.

Buildings in particular continue to consume energy inefficiently, despite the proliferation of state and federal programs to boost smarter building practices and to retrofit inefficient buildings. Commercial buildings consume 20 percent of U.S. energy, yet government estimates show that commercial buildings waste 30 percent of their energy use.[112] Landlords and building owners should recognize the cumulative value of small, incremental improvements – such as programmable lights and thermostats – that cost little but can easily save 10 percent or more in electricity costs.

One of the most well-known energy-efficiency programs, ENERGY STAR, is a successful voluntary, public-private partnership to identify and brand energy-efficient appliances, building materials and homes. According to ENERGY STAR, the program has saved families and businesses $430 billion on utility bills, while reducing greenhouse gas emissions by 2.7 billion metric tons, since 1992.[113] The EPA has certified more than 45,000 individual products and more than 1.6 million homes, and the program continues to work with manufacturers and contractors to increase the marketability of energy-efficient technologies.[114]

Efficiencies in Transportation Fuel Consumption

The transportation sector accounted for 28 percent of primary energy consumption in 2015.[115] Given that gasoline and diesel prices have remained low since 2014, consumer demand for fuel-efficient vehicles has

111 U.S. Department of Energy, "DOE Announces $220 Million in Grid Modernization Funding," https://energy.gov/articles/doe-announces-220-million-grid-modernization-funding.

112 ENERGY STAR, "Improve energy use in commercial buildings," http://www.energystar.gov/buildings/about-us/how-can-we-help-you/improve-building-and-plant-performance/improve-energy-use-commercial.

113 U.S. Department of Energy, ENERGY STAR, "Overview of 2015 Achievements," https://www.energystar.gov/index.cfm?fuseaction=home downloadfile&file=F84267790DF5B5F22EB9D715BC7BEC4F2E6F21C078AD0D8DB716916D20CB04C3778CC40ABE8B9DBF508BE-77DAD
9A753D5EAA2CFC510D5530702AC176F23ACA67F51939211384A8256F097182F6234B80CC51C3BB639D51552DAB56D4A-545B4EC0A18
34599E2CC67FED80CAC1E997504293B84EC41C9D129FBE039474F3C98A8321B1284EE9213E9B9B52BC5BDE81FBE6&app_code=publications&env_name=other.

114 Ibid.

115 U.S. Department of Energy, Energy Information Administration, "Energy Use for Transportation," http://www.eia.gov Energyexplained/?page=us_energy_transportation.

tapered off slightly.[116] Long-term, however, the trend towards more fuel-efficient vehicles continues to be influenced by consumer demand and government policy.

CAFE standards, periodically revised and promulgated by the Department of Transportation (DOT) and EPA, seek to increase the number of miles that a vehicle can travel while consuming one gallon of gasoline. In 2012, the Obama administration finalized the most substantial increase in CAFE standards for cars and light-duty trucks, requiring a fuel economy equivalent of 54.5 miles per gallon for cars and light-duty trucks by Model Year 2025.[117] DOT estimates that the new standards will result in an average fuel savings of more than $8,000 by 2025 over the lifetime of the vehicle.[118] Yet, DOT and EPA also estimate that the incremental, first-year cost of a new vehicle will increase by $2,000 to account for the development of new fuel-saving technology.[119] DOT and EPA finalized the rule for medium- and heavy-duty vehicles in August 2016. The final standards are expected to lower CO2 emissions by approximately 1.1 billion metric tons, save vehicle owners fuel costs of about $170 billion and reduce oil consumption by up to 2 billion barrels of over the lifetime of the vehicles sold under the program. The new rule covers model years 2021-2027, and apply to semi-trucks, large pickup trucks and vans and all types and sizes of buses and work trucks.[120] The new standards will begin to take effect in 2018.[121]

The Obama administration has not expressed an interest in revisiting the standards in the context of lower oil prices and continues to underscore the long-term benefits of the standards for energy security and environmental protection.

Alternative vehicles – including compressed natural gas, plug-in electric, flex fuel, hydrogen, propane, liquefied natural gas and gasoline- or diesel-powered hybrids – have faced impediments to successful commercialization. For many of these vehicle types, cost differentials between internal-combustion-engine vehicles and accessibility and costs of refueling infrastructure remain significant hurdles for some consumers. Notwithstanding, a suite of state and federal incentives and policies, including CAFE standards, and consumer education has led to a steady increase in the use of alternative vehicles. In 2014, the DOE estimated that approximately 17 million (6.7 percent) of the estimated 253 million registered vehicles on the road were alternative fuel, advanced efficiency and hybrid vehicles. Hybrid vehicles in particular have grown in popularity, and in 2016 the fleet of hybrid vehicles in the United States grew to over 4 million units, the second largest in the world after Japan.[122] In order to increase the commercial viability of alternatively fueled vehicles,

116 Mark Huffman, “Low gas prices painting automakers into a corner,” Consumer Affairs, August 23, 2016, https://www.consumeraffairs.com/news/low-gas-prices-painting-automakers-into-a-corner-082316.html.

117 National Highway Traffics Safety Administration, “Obama Administration Finalized Historic 54.5 mpg Fuel Efficiency Standards,” http://www.nhtsa.gov/About+NHTSA/Press+Releases/2012/Obama+Administration+Finalizes+Historic+54.5+mpg+Fuel+Efficiency+Standards.

118 Ibid.

119 Federal Register. Volume 77, No. 199. Book 2 of 2 Books. October 15, 2012.

120 U.S. Environmental Protection Agency, “EPA and DOT Finalize Greenhouse Gas and Fuel Efficiency Standards for Heavy-Duty Trucks,” August 16, 2016. https://www.epa.gov/newsreleases/epa-and-dot-finalize-greenhouse-gas-and-fuel-efficiency-standards-heavy-duty-trucks-0.

121 Ibid.

122 Jeff Cobb, “Americans Buy Their Four-Millionth Hybrid Car,” Hybrid Cars, June 6, 2016, http://www.hybridcars.com/americans-buy-their-four-millionth-hybrid-car/.

the federal government should focus support at the research, development and demonstration phase to help overcome common barriers to these new technologies, namely cost-differentials in manufacturing, costs and accessibility of refueling infrastructure and depreciation of vehicle value.

In aviation, commercial airlines and other aviation entities, including the U.S. military, have advanced new technologies and behaviors in an effort to conserve fuel and increase the efficiency of operations. Since jet fuel remains the greatest and most volatile cost for many operators, commercial airlines have invested significant resources to increase fuel efficiency and reduce fuel costs. Despite an estimated 21 percent increase in the volume of passengers and cargo transported, the Bureau of Transportation Statistics found that U.S. airlines in 2015 consumed almost 9 percent less fuel than in 2000.[123]

These efficiency gains will continue to increase with additional efforts by the federal government to improve the nation's air traffic control system. The U.S. Federal Aviation Administration (FAA) has begun implementing the Next Generation Air Transportation System (NextGen), which will transform the nation's air traffic control system from a ground-based system to a satellite-based system. Implementation of new air traffic control technologies could reduce traffic delays, shorten routes and encourage other efficient behaviors that can help reduce fuel usage. The FAA is in the process of implementing the system across the United States, with a goal of full implementation by 2025.[124]

123 U.S. Department of Transportation, "Airline Fuel Cost and Consumption January 2000-July 2016," http://www.transtats.bts.gov/fuel.asp.

124 U.S. Federal Aviation Administration, "NextGen," August 2016, https://www.faa.gov/nextgen/.

Chapter 13
ENERGY CONSERVATION

Recommendations:

- Develop policies that incentivize all sectors of the economy to make changes that will conserve energy

Energy conservation is any behavior that results in the use of less energy.[125] With a population of more than 300 million people[126] consuming energy every day, change in individual behavior is one of the most effective and direct ways to stabilize energy prices and promote sustainability, making energy conservation an important element of any energy policy.[127] While the EIA predicts energy consumption across all sectors of the economy will increase through the year 2040, total energy use per capita has been decreasing due to changes in consuming behavior.[128]

Conservation in the Transportation Sector

Changes in behavior in the transportation sector can conserve substantial quantities of energy. Approximately 28 percent of total U.S. energy is used for transportation,[129] with much of the energy used for commuting or personal automobile use.[130] In 2013, about 86 percent of all workers commuted to work by private vehicle, either driving alone or carpooling, and the number has remained relatively stable.[131]

125 U.S. Energy Information Administration, "Use of Energy in the United States Explained," http://www.eia.gov/energyexplained/index.cfm?page=about_energy_efficiency.

126 U.S. Census Bureau, "U.S. and World Population Clock," https://www.census.gov/popclock/.

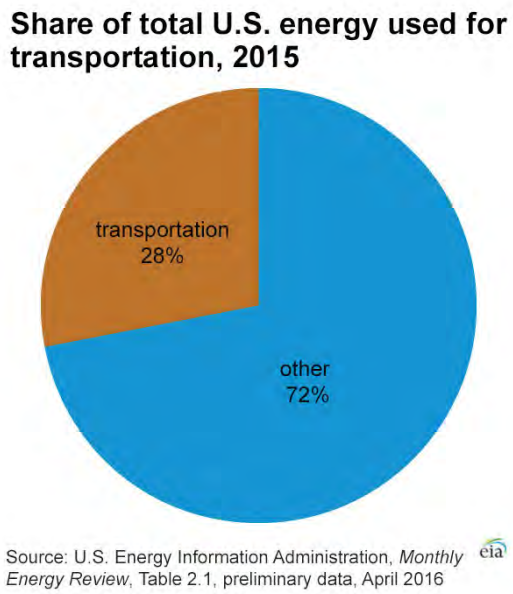
127 Dixon, Robert K. et al., "U.S. Energy Conservation and Efficiency Policies: Challenges and Opportunities," Nov. 2010, http://www.sciencedirect.com/science/article/pii/S0301421510000637.

128 U.S. Energy Information Administration, "Annual Energy Outlook 2017," http://www.eia.gov/outlooks/aeo/pdf/0383(2017).pdf.

129 U.S. Energy Information Administration, "Use of Energy in the United States Explained: Energy Use for Transportation," http://www.eia.gov/energyexplained/?page=us_energy_transportation.

130 McKenzie, Brian "Who Drives to Work? Commuting by Automobile in the United States: 2013," U.S. Census Bureau, August 2015, https://www.census.gov/hhes/commuting/files/2014/acs-32.pdf.

131 Ibid.



SOURCE: U.S. Energy Information Administration, http://www.eia.gov/energyexplained/?page=us_energy_transportation

From opting to carpool or ride public transportation, to simply reducing the number of miles driven, there are many ways Americans can conserve energy in the transportation sector. Fuel economy-maximizing behaviors are also effective.[132] Aggressive driving – or speeding, rapidly accelerating and braking – can lower gas mileage by 15 to 30 percent at highway speeds and 10 to 40 percent in stop-and-go traffic.[133] As such, some of the most effective fuel economy-maximizing behaviors are moderate driving, driving at lower speeds, using cruise control and turning of the vehicle's engine at stops rather than idling.[134]

Conservation in the Residential Sector

The residential sector consumes approximately 20 percent of energy in the U.S.[135] Energy use in this sector varies significantly across the country due to regional climate differences.[136] On average, about 60 percent of the energy used in U.S. homes is expended on space conditioning, e.g.., heating and cooling.[137]

While space conditioning technology has become more efficient over the years, many American lifestyle changes have placed higher demands on heating and cooling resources.[138] For example, the average size of

132 U.S. Department of Energy, "Driving More Efficiently," https://www.fueleconomy.gov/feg/driveHabits.jsp.

133 Ibid.

134 Ibid.

135 U.S. Energy Information Administration, "Energy Consumption by Sector," https://www.eia.gov/totalenergy/data/annual/pdf/sec2.pdf.

136 Hamilton, Michael W., "Energy Policy Analysis: A Conceptual Framework," 2015.

137 Ibid.

138 Ibid.

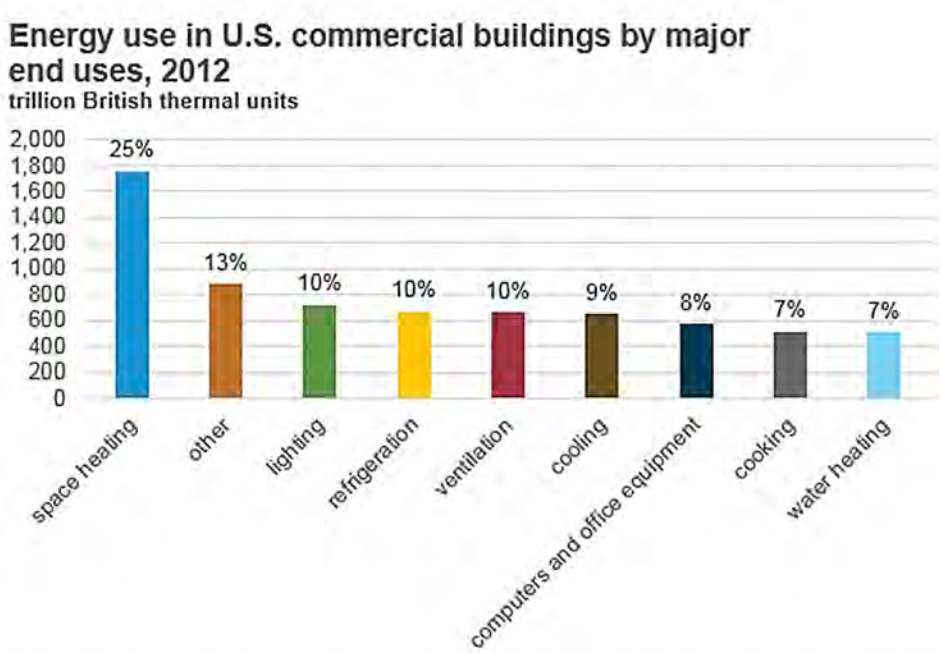
homes built in the U.S. has increased from 1,600 square feet in 1973 to 2,300 square feet in 2010.[139] Single-person households have also become more common.[140]

To reduce residential energy consumption, homeowners can take a variety of steps. Not only can the homeowner choose to install more energy efficient technology – such as ENERGYSTAR appliances, as discussed in Chapter 12 – but also by making structural improvements to their homes to improve the building envelope, such as sealing and adding more insulation and replacing windows.

Furthermore, studies suggest that an effective way to enhance energy conservation is to provide real-time feedback to homeowners so that they can alter their consumption. Other studies suggest that power consumption can be cut by 2 percent or more simply by changing the way power bills are worded so that consumers are informed of how their usage compares to that of their neighbors.[141]

Conservation in the Commercial Sector

Like in the residential sector, space conditioning is the single biggest energy consumption area in the commercial sector, although improved efficiency of key energy-consuming equipment is decreasing



Source: U.S. Energy Information Administration, *2012 Commercial Buildings Energy Consumption Survey: Energy Usage Summary*, Table 5 (March 2016)

SOURCE: U.S. Energy Information Administration, http://www.eia.gov/energyexplained/index.cfm/data/index.cfm?page=us_energy_commercial

139 U.S. Census Bureau, "Median and Average Square Feet of Floor Area in New Single-Family Houses Completed by Location," https://www.census.gov/const/C25Ann/sftotalmedavgsqft.pdf.

140 Davis, Lucas W., "Air Condition and Global Energy Demand," Energy Institute at HAAS, April 27, 2015, https://energyathaas.wordpress.com/2015/04/27/air-conditioning-and-global-energy-demand/.

141 Lane, Earl, "Changing Consumer Behavior is Crucial to Reducing Energy Use, Baird Says at AAAS," May 12, 2009, https://www.aaas.org/news/changing-consumer-behavior-crucial-reducing-energy-use-baird-says-aaas.

demand.[142] Unlike in the residential sector, lighting is also a large consumption area, and it is considered the most wasteful component of energy use in the commercial sector.[143]

Encouraging occupants to turn off lights when space is not in use is one way to reduce energy consumption in commercial space. Advances in technology, such as fluorescent lighting, programmed lighting controls, thermostats and occupancy sensors that turn off lights when spaces are unoccupied, are also common means to conserving energy in the commercial sector.

Conservation in the Industrial Sector

Energy use in the industrial sector accounts for about one-third of the energy used in the U.S.[144] Among the most energy-intensive industries are aluminum, chemicals, forest products, glass, metal casting, mining, petroleum refining and steel.[145]

Many advancements in energy efficient industrial equipment have helped mitigate energy consumption in the industrial sector. Furthermore, industrial facilities and manufacturing plants can engage in a variety of practices to conserve energy, such as conducting energy assessments to determine where energy efficiency opportunities exist and changing how the energy in managed.[146] Finally, on top of following federal and state standards, facilities could voluntarily opt to follow the International Organization for Standardization's framework – ISO 50001 – for managing and improving energy performance in industrial plants.[147]

142 U.S. Energy Information Administration, "2012 Commercial Buildings Energy Consumption Survey: Energy Use Summary," March 18, 2016, https://www.eia.gov/consumption/commercial/reports/2012/energyusage/.

143 U.S. Energy Information Administration, "Energy Use in Commercial Buildings," http://www.eia.gov/energyexplained/index.cfm/data/index.cfm?page=us_energy_commercial.

144 U.S. Energy Information Administration, "Energy Use in Industry," http://www.eia.gov/energyexplained/index.cfm/data/index.cfm?page=us_energy_industry.

145 Office of Energy Efficiency & Renewable Energy, "Industrial Energy Efficiency Basics," https://energy.gov/eere/energybasics/industrial-energy-efficiency-basics.

146 Alliance to Save Energy , "Industrial Energy Efficiency 101: The Basics of How Industry Uses and Conserves Energy," https://www.ase.org/resources/industrial-energy-efficiency-101-basics-how-industry-uses-and-conserves-energy.

147 International Organization for Standardization, "ISO 50001 – Energy Management," http://www.iso.org/iso/home/standards/management-standards/iso50001.htm.

Chapter 14
ENERGY EDUCATION

Recommendations:

- Continue work to inform the public not only about the importance of Science, Technology, Engineering and Math (STEM) education for our country, but also the high paying jobs available to those individuals who have developed these skill sets.
- Discuss the fact that there is a STEM education issue. Share some of the statistics with colleagues and constituents to illustrate why STEM education must be a priority.
- Collaborate with industry and government agencies including the National Science Foundation and Change the Equation to support existing paths to a solution. Employ lessons learned from resources such as the Toshiba / National Science Teacher Association ExploraVision program.

The United States has plentiful natural resources, monetary wealth and the best university system in the world. Yet, there are still serious shortcomings in the basic science and technology literacy of the average American citizen. Standardized testing results show that U.S. students' scores in math and science are just average. When it comes to math in particular, the U.S. is slightly below average, ranking behind Latvia, Portugal, Italy, Russia and Slovakia.[148]

"The future of the economy is in STEM," says James Brown, the executive director of the STEM Education Coalition in Washington, D.C. "That's where the jobs of tomorrow will be." Data from the U.S. Bureau of Labor Statistics (BLS) support that assertion. Employment in occupations related to STEM—science, technology, engineering and mathematics—is projected to grow to more than 9 million between 2012 and 2022. That is an increase of about 1 million jobs over 2012 employment levels.[149]

There is further compelling evidence that the U.S. educational system is not making the grade:

- U.S. students recently finished **27th in math and 20th in science** in the ranking of **34 countries** by the Organization for Economic Cooperation and Development.

148 Pew Research Center, "U.S. students improving – slowly – in math and science, but still lagging internationally," February 2, 2015, http://www.pewresearch.org/fact-tank/2015/02/02/u-s-students-improving-slowly-in-math-and-science-but-still-lagging-internationally/

149 U.S. Bureau of Labor Statistics, "STEM 101: Intro to tomorrow's jobs, Available at Occupational Outlook Quarterly, Spring 2014," www.bls.gov/ooq

- The U.S. may be short as many as **3 million high-skilled workers by 2018**. Two-thirds of those jobs will require at least some post-secondary education.
- The World Economic Forum ranks the U.S. as **No. 48** in quality of math and science education.
- **25 years ago**, the U.S. led the world in **high school and college graduation rates**. Today, the U.S. has dropped to **20th and 16th**.[150]
- Energy education is essential for both the formulation and the implementation of a balanced energy policy for America. To formulate sound policy, lawmakers and voters alike should be educated enough to understand the strengths and weaknesses of various energy sources. For example, evidence suggests that many voters do not understand the basics of how electricity is generated or delivered to their homes, the difference between fuels for electricity generation and transportation fuels or the need for dependable baseload power sources.
- At the same time, a lack of sufficient energy education impairs our ability to carry out energy solutions. For example, companies including oil and gas producers, electricity producers and utilities that are in the business of producing energy and supplying it to consumers are also struggling to find a sufficient number of sufficiently trained workers with the technical expertise to staff their companies, especially as it relates to jobs that require technical expertise, such as engineers, geologists and other technicians.
- The lack of sufficient energy education – and specifically STEM education – also affects overall economic competitiveness, the ability to supply affordable and reliable energy to consumers and finally, the ability of policy makers and citizens to outline a balanced energy policy for America.

The U.S. Bureau of Labor Statistics projects that, during the period 2010–2020, employment in science and engineering occupations will grow by 18.7 percent, compared to 14.3 percent for all occupations.

Source: National Science Foundation

The consequences of these shortcomings are serious. STEM skills are necessary for today's energy sector workforce. However, the U.S. is not able to provide an adequate number of skilled workers and professionals to meet the needs of America's energy industry. These industries produce and deliver the electricity and transportation fuels that power the United States.

Energy education is essential for both the formulation as well as the execution of a balanced energy policy for America. Policy makers and voters should be informed about the costs, benefits and implications of using various types of energy sources. Of course, there are tradeoffs when using any type of energy, and educating decision-makers on what those tradeoffs actually are is important. In turn, a technically proficient work force in place to execute policy and to serve the energy industry.[151]

150 National Math and Science Initiative, "Challenges Facing STEM Education Today," https://www.nms.org/AboutNMSI/TheSTEMCrisis.aspx

151 Note: Technology development, especially innovations, can also drive policy development.

About Consumer Energy Alliance

Consumer Energy Alliance (CEA) brings together families, farmers, small businesses, distributors, producers and manufacturers to support America's energy future. With more than 450,000 members nationwide, our mission is to help ensure stable prices and energy security for households across the country. We believe energy development is something that touches everyone in our nation, and thus it is necessary for us to actively engage in the conversation about how we develop our diverse energy resources and energy's importance to the economy.

To learn more about Consumer Energy Alliance and to see a full list of its members, please visit **http://consumerenergyalliance.org/about/our-members/**.

CONSUMER ***ENERGY*** ALLIANCE

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