

16. The United States: Domestic Transitions and International Leadership Towards Low-Carbon Energy



Karoline Steinbacher¹

As the world's second largest energy consumer and emitter of greenhouse gases, one of its most important producers of oil and gas and home to the second largest capacity of renewable energy, the United States is a central actor in global energy governance. Energy policy in the United States has been characterised by an open approach with regard to the choice of energy sources and is aimed at reaching a target triangle comprising economic competitiveness and employment; energy security; and the development and deployment of low-carbon energy sources. This “all-of-the-above strategy” is reflected not only in domestic energy policy, where state initiatives also decisively shape the policy landscape for sustainable energy, but also in US international energy activities.

The United States energy mix: trends and status quo

The US energy mix is dominated by fossil sources and has been undergoing fundamental changes. For 2015, the US Energy Information Administration (EIA) reports that 29 percent of primary energy consumption came from natural gas, whose share is still on the rise given record domestic production, low gas prices and more stringent emission requirements (EIA, 2016a). Coal accounted for 16 percent of primary energy use, two percentage points less than a year before and the lowest share since 1982 (EIA, 2016a). The largest share of primary energy consumption was covered by petroleum (36%), whose utilisation was on the rise due to increased vehicle use linked to lower gasoline and diesel prices. Nuclear remained stable with a share of nine percent and hydroelectricity declined slightly because of low precipitation. In total, renewables accounted for 10 percent of primary energy consumption (of which 49% was biomass including biofuels, 25% hydroelectricity,

19% wind, 6% solar and 2% geothermal) (EIA, 2016b). With 39 percent, electric power generation is the largest energy consuming sector, followed by transport (28%), industry (22%) and commercial and domestic use (EIA, 2016a).

In the electricity sector, about two thirds of generation was based on fossil sources in 2015. Coal still accounted for about one third of electricity generation in the US, despite significant declines in production over recent years (Davis, 2016). Natural gas accounted for another third of electricity generation, while 20 percent came from nuclear, six percent from hydropower and seven percent from other renewables (of which 1.6% biomass, 0.4% geothermal, 0.6% solar and 4.7% wind) (EIA, 2016c). In a global context, in 2015, the US ranked second behind China for investment in renewable energy capacity, first for biodiesel and fuel ethanol production and was ranked second for wind and geothermal capacity additions (REN21, 2016). Overall, the US currently has the second largest installed capacity of renewable energy

¹ Associate, Belfer Center for Science and International Affairs, Harvard Kennedy School.

irrespective of whether hydro is included (REN21, 2016). The US ranks first globally for geothermal and biopower capacity, second for total wind and concentrated solar power (CSP) capacity and fourth for solar photovoltaics (PV) (REN21, 2016).

The US energy landscape has undergone significant changes in recent years, mainly related to the resurgence of domestic light tight oil and shale gas production (IEA, 2014). In 2015, the US came a close third in global oil production (OECD, 2016), but remained one of the world's biggest net importers of petroleum and the eighth most important importer of natural gas (OECD/IEA, 2015). Domestic oil production in the US has increased tremendously since the beginnings of the 2000s, rising by 30 percent between 2003 and 2013 (IEA, 2014). Starting in the middle of the 2000s, with improvements in hydraulic fracturing technology and the discovery of some of the world's largest gas fields, the US has become the world's largest producer of natural gas (OECD/IEA, 2015). Although the increase in shale gas and domestic oil production has slowed since mid-2014 amidst the global slump in the oil price, the overall trend of the US reducing net import dependency for natural gas is set to continue (EIA, 2016d). However, a decision taken by Congress in late 2015, to lift a 40-year-old restriction on crude oil exports, has not yet significantly affected net imports, given low global oil market prices (PennEnergy, 2016).

Another fundamental shift in the US energy landscape concerns coal. Domestic coal production was down about one third in the first half of 2016 compared to 2015, due to a combination of policy-driven (i.e., emission limits for power plants) and market-driven (abundant domestic gas) developments (Davis, 2016). Traditional coal-mining counties have seen challenges in structural adjustments and job losses, which have entered the national political debate on energy policy (Sussman, 2016). President-elect Trump has repeatedly promised to put coalminers back to work, including by repealing emission regulations enacted under the Obama administration – where possible, with immediate effect through executive orders.

Sustainable energy policy in the US: the federal level

The United States was an early leader in the development of renewable energy technologies. The first guaranteed tariffs for producers of electricity from renewable sources (an early version of so-called feed-in tariffs or FiT) was introduced through the Public Utility Regulatory Policies (PURPA) Act in 1978. In particular, the state of California's interpretation of the act led to a rapid increase in wind power capacity in the state, solar energy still being too expensive for rapid deployment at the time (Hirsh, 1999). While renewable energy efforts slowed noticeably over the course of the 1990s amidst decreasing natural gas prices and industry restructuring, policy innovation at the level of states – especially renewable portfolio standards and net metering schemes – led to a resurgence of sustainable energy leadership in the US from the late 1990s (Martinot et al., 2005).

Advancing US climate and sustainable energy policy has been a main objective of the Obama administration. This ambition is prominently reflected in President Obama's 2013 Climate Action Plan, which proposes, by 2020, to double solar and wind capacity and reduce emissions by 17 percent compared to 2005 levels (Executive Office of the President, 2013). The US Intended Nationally Determined Contribution (INDC) submitted ahead of the 2015 Paris climate talks increased this goal to 26–28 percent reduction compared to 2005 levels by 2025, with “best efforts” to reach 28 percent. Against the background of frequent tensions between the executive and the legislative branches of government, major energy and climate legislative proposals, such as the 2010 Waxman–Markey Bill on cap-and-trade, failed to be adopted. As a result, sustainable energy policy in the US today resembles a mosaic of local, state and federal initiatives, and the lack of cohesive overall strategies has been pointed out by the IEA (2014).

Fierce opposition to climate and sustainable energy initiatives in the US Congress during the Obama presidency led to increasing reliance on alternative regulatory instruments to reduce greenhouse gas emissions in the US (IEA, 2014; Leggett, 2015). A recent important example is the Clean Power Plan, presented in summer 2015, which is based on provisions from the 1970 Clean Air Act. The plan deter-

mines emission limits for gas- and coal-fired power plants and provides a range of alternatives to the states (e.g., introducing mass- or rate-based emissions limits, linking systems), which are responsible for implementing the Clean Power Plan through concrete policy action (DeBellis, 2015). An unprecedented verdict by the US Supreme Court on 9 February 2016, to stay the Clean Power Plan until a further decision is reached on the plan's substance, has halted its implementation over doubts regarding the Environmental Protection Agency's (EPA) mandate and interpretation of provisions from the Clean Air Act (Freeman, 2016). The prospects of the Clean Power Plan being implemented have, however, become highly unlikely under a Trump administration. Throughout his election campaign, Donald Trump made it clear that he would block the Clean Power Plan and drastically reduce EPA competencies. The appointment of Myron Ebell, a prominent climate sceptic, to lead the EPA transition team, is unambiguous evidence of the major reshaping of US environmental and climate policy to be expected in the coming years. Other policy instruments, in particular production tax credits and investment tax credits for solar and wind projects, which were prolonged in late 2015 by a Republican-led Congress, could nevertheless mitigate the lack of a federal framework for sustainable energy by encouraging investment in renewable energy sources (Linn et al., 2016).

At the federal level, sustainable energy policy under the Obama administration placed particular emphasis on innovation, research and development, particularly through the Department of Energy's Advanced Research Projects Agency-Energy. The agency's mission is to fund selected "high-potential, high-impact energy technologies that are too early for private-sector investment", an aim towards which it had invested USD 1.3 billion by early 2016. The prospects for the program are also unclear following the November 2016 election.

A heterogeneous energy policy landscape across states

Individual states have wide-ranging competencies in the definition of energy policies, including their own energy mix (Elliott, 2013). The degree of ambition, policy framework and actual increases in renewable energy capacity therefore vary widely between states.

The importance of state-level initiatives in sustainable energy is set to increase dramatically, given president-elect Trump's pledge to repeal federal regulations in this field.

As of June 2016, 29 states as well as Washington D.C. and three US territories had renewable energy portfolio standards in place (DSIRE, 2016a). In 41 states, as well as in Washington D.C. and three territories, net metering schemes were implemented (DSIRE, 2016b). In addition to policy-driven deployment of renewables, in particular in states such as California, purely market-driven additions of renewable energy capacity prevail in some states including Texas. In 2016, the EIA expects 9.5 GW of new solar capacity to be added by electricity generating facilities across the US – almost three times as much as in 2015 – of which 3.9 GW are to be added in California alone, followed by North Carolina (1.1 GW) and Nevada (0.9) (EIA, 2016d). Most of the 8.1 GW of wind capacity to be added in 2016 will be located in a corridor ranging from North and South Dakota and Minnesota, to Texas and eastern New Mexico (EIA, 2016d). California is pursuing a 50 percent renewables goal by 2050 through its Renewables Portfolio Standard (RPS), has set a target of 1.5 million electric vehicles and has launched its first electricity storage mandate of 1 325 MW; in contrast, other states almost entirely lack policy frameworks for sustainable energy.

A recent report by the American Council for Energy Efficiency (ACEEE) ranks the US 8th in the world in terms of energy efficiency ambitions and achievements. Again, a look at the individual states provides a heterogeneous picture, with frontrunners including Massachusetts, California, Vermont and Oregon, and laggards comprising North and South Dakota, Wyoming and states in the South (ACEEE, 2016a). At the federal level, promoting energy efficiency is a cornerstone of the American Recovery and Reinvestment (ARRA) Act of 2009, which provided USD 17 billion for investments in energy efficiency, including for programmes at the state level (IEA, 2014). Policy measures at this level mainly concern standards for new buildings as well as vehicle fuel efficiency (IEA, 2014).

Although the policy landscape for renewable energy and efficiency is highly heterogeneous, similar lines of debate emerge across states. The growing share of

decentralised renewable energy installations such as solar rooftops is increasingly challenging the business models of traditional utilities, as are energy efficiency mandates such as Energy Efficiency Resource Standards (ACEEE, 2016b). In addition to challenges to incumbents' business models, growing shares of intermittent renewable energy capacity – both utility scale and residential – are creating new issues in terms of grid infrastructure, management and dispatch (IEA, 2014). One response has been to consider greater regional cooperation. Another area, identified by the Department of Energy's first Quadrennial Energy Review in 2015, is the modernisation of transmission and distribution grids across the country in order to make them ready for transformed needs (IEA, 2014; US Department of Energy, 2015).

US initiatives for international energy cooperation

President Obama's 2013 Climate Action Plan establishes the aim of "leading international efforts to combat global climate change and prepare for its impacts" as a central pillar of the administration's climate and sustainable energy strategy. International energy cooperation currently reflects the country's domestic "all-of-the-above" strategy by supporting all types of energy. Under a Trump administration, dramatic changes are also to be expected in this area, as Donald Trump has pledged to "cancel" US participation in the Paris Climate Agreement and revoke funding promises for international climate finance.

Two important US-led initiatives, the Major Economies Forum on Energy and Climate, and the Clean Energy Ministerial (CEM) were established in 2009. The Major Economies Forum, which includes 17 major emitters, has resulted in Technology Action Plans for different sectors accounting for 80 percent of global emissions, and has identified opportunities for collaboration among its member countries on these technologies. The CEM, which brings together governments from 23 countries and the European Commission, is organised around a series of initiatives (e.g., an Electric Vehicles Initiative or a Multilateral Solar and Wind Working Group) that governments may join, depending on their interest, to exchange experiences and further thinking.

In the framework of the G20, the United States pushed for a commitment at the Pittsburgh G20 summit in 2009 to "rationalize and phase out over the medium term inefficient fossil fuel subsidies that encourage wasteful consumption" (G20, 2009).

Multilateral energy partnerships driven by the United States include the US–Africa Clean Energy Finance Initiative (ACEF), the US–Asia Pacific Comprehensive Energy Partnership, the Clean Energy Finance Facility for the Caribbean and Central America (CEFF-CAA), and the US–Africa Clean Energy Development and Finance Center, which supports project development and implementation "while promoting US private sector participation" and contributes to implementing the goals of the Africa Clean Energy Finance Initiative (USTDA, 2014). US support for energy infrastructure also takes place in the framework of the Power Africa initiative carried out by the US Agency for International Development (USAID), with the goal of creating sixty million new electricity connections on the continent.

In addition to the mostly renewable-energy-focused initiatives mentioned above, the Unconventional Gas Technical Engagement Program, created as the Global Shale Gas Initiative in April 2010, provides policy support and resource assessments to partner countries. Countries including Botswana, Morocco, South Africa, who wish to "utilize their unconventional natural gas resources – shale gas, tight gas and coal bed methane" are supported in order to allow them to "identify and develop [resources] safely and economically" (US Department of State, 2010). The initiative's current level of activity is unclear, and the programme has faced criticism regarding potential pressure on partner countries to create enabling frameworks for shale gas development (Fang & Horn, 2016). In the field of nuclear energy, the US provides policy advice and training through its Nuclear Regulatory Commission and the Department of Energy, and entertains bilateral partnerships with more than 20 countries worldwide (Kerr et al., 2014). In the area of coal, the US is leading the so-called Carbon Sequestration Leadership Forum, which facilitates research activities and includes 24 member countries as well as the European Commission (CSLF, 2016).

One of the most recent international energy and climate initiatives launched by the US is Mission Innovation. Announced in the framework of COP21 in Paris in 2015, it led 20 countries to pledge a doubling of their governmental research and development spending on clean energy in the next five years. Linked to this is the Breakthrough Energy Coalition, a commitment by private sector investors to support action taken by Mission Innovation countries by providing patient capital for early-stage clean energy investments.

In addition to activities in multilateral fora, the US has also reinforced bilateral energy and climate cooperation during the Obama administration. Behind Germany, Japan and France, the US is the world's fourth largest bilateral donor in the energy sector and spent more than USD 350 million in this area in 2014 (own calculations, based on OECD Stats, 2016). Agreements were recently reached with major greenhouse gas emitters among emerging countries, including China, India, Brazil and Mexico. The most widely noted of these bilateral statements was announced in November 2014, between President Obama and President Xi Jinping of China. In the joint announcement, the US committed to reducing its carbon emissions by 26–28 percent below 2005 levels by 2025, and China pledged to undertake “to peak its carbon emissions by 2030 or earlier”. Throughout his electoral campaign, president-elect Trump has questioned the reality of anthropogenic climate change, and recent appointments within his transition team also suggest a major redefinition of the US' role in international climate and sustainable energy efforts, as in foreign policy in general.

Impulses

Domestic leadership in sustainable energy has faced numerous challenges at the federal level in the US and is fundamentally under question from the incoming Trump presidency. Nevertheless, a multitude of cities and states have taken pioneering action in renewable energy and energy efficiency, creating laboratories for policy development and experimentation that can offer valuable lessons for other subnational entities and countries globally. The US “all of the above” approach to sustainable energy, which is reflected in its international outreach activities, means that dialogue can be established on a wide variety of energy issues with partner countries pursuing very different energy strategies themselves. Recent initiatives led by the US, such as Mission Innovation and the Breakthrough Energy Coalition, but also domestic experiences with R&D for sustainable energy, underline the strong role of private sector involvement in US sustainable energy efforts, which can potentially serve as an impulse for measures emanating from the G20 and are likely to continue regardless of the major changes to be expected in US environmental, energy and climate policy.

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