Universal Ecological Fund
Press Release

Embargo: Hold for release until 12:00 noon US Eastern Time, Wednesday, September 27, 2017

The Economic Case for Climate Action in the United States *report is available for media preview online at: https://goo.gl/e4VAbx*
Interviews: Drs. Robert Watson and James McCarthy are available for advance interviews by phone.
Teleconference: Authors, Drs. Watson and McCarthy and Liliana Hisas will take part on a teleconference on Wednesday, September 27 at 12:00 noon US Eastern Time / 16:00h GMT / 17:00 British Time.
To join the teleconference via computer: https://bluejeans.com/4168788712
Via telephone +1.408.740.7256 , meeting ID: 4168788712#
Contact: Marshall Hoffman, H&H, +1 703 533-3535, + 1 703 801-8602 mobile, marshall@hoffmanpr.com
Video B-Roll is available at *https://goo.gl/1K9MV9*

Weather events intensified by climate change & health costs due fossil fuel burning stunt U.S. growth
Climate action outweigh the escalating economic losses and costs

Economic losses from Hurricanes Harvey, Irma and Maria and 76 wildfires in nine Western states, intensified by human-induced climate change, will be the most costly combined weather events in U.S. history.

When the final accounting is completed, the economic losses of these three hurricanes and the wildfires, which happened within one month, could cost nearly $300 billion in damage, 70 percent of the 92 weather events of at least $1 billion in the last decade (Figure 1).

Added to the damages of extreme severe storms, hurricanes, floods, droughts and wildfires are the enormous health expenses of burning fossil fuel, the main cause of climate change. Total cost on average is now $240 billion a year (Table 1), excluding the catastrophic events this August and September and excluding climate related economic losses in the agricultural sector and associated with heat stress on humans.

This annual average economic losses and health costs equal about forty percent of the current growth of the U.S. economy, according to a new report, **The Economic Case for Climate Action in the United States**, published online (https://feu-us.org) by the Universal Ecological Fund.

In the next decade, these economic losses and health costs are projected to reach at least $360 billion annually equal to an estimated 55 percent of the U.S. growth. These escalating costs are due to the continued use of fossil fuels triggering the climate to continue to change.

“Burning fossil fuels comes at a giant price tag which the U.S. economy cannot afford and not sustain,” says Sir Robert Watson, coauthor of the report and former Chair of the Intergovernmental Panel on Climate Change, the leading scientific body on climate change.

"The evidence is undeniable. These recent extreme weather events are a continuation of a three decades trend of increasing numbers, intensities and costs of severe storms, hurricanes, flooding, droughts and wildfires. Simply, the more fossil fuels we burn, the faster the climate continues to change and cost. Thus, transitioning to a low-carbon economy is essential for economic growth and is cheaper than the gigantic costs of inaction."

These massive costs fall mainly on individuals and families, not the Government or the private sector, says the new report.

"We can expect extreme weather events and economic losses and costs associated with them to continue increasing unless we make dramatic reductions in greenhouse gas emissions," says James McCarthy, Ph.D., coauthor of the report and Professor of Oceanography, Harvard University. "The Trump Administration is determined to maximize the use of America's fossil fuels –coal, oil and natural gas— as well as to cut energy industry regulations. This is taking us the opposite direction."

Alternatively, addressing this problem can ensure economic growth and create jobs.

"Clean and sustainable energy just requires smart decisions and smarter investments," says Liliana Hisas, Executive Director of Universal Ecological Fund (UEF) and coauthor of the report.

Soaring number of extreme weather events

"Weather events are the result of natural factors. However, human-induced climate change has altered their intensity and frequency substantially and measurably," explains Dr. Watson, Director of Strategic Development at the U.K's Tyndall Center for Climate Change Research.

For example: the number of extreme weather events with at least $1 billion in economic losses and damages have increased by almost 2.5 fold, totaling 92 in the last decade (2007-2016), compared to 38 in the 1990s and by more than 4 fold, compared to 21 in the 1980s according to the National Oceanic and Atmospheric Administration National Centers for Environmental Information.

In the latest 10-year span, the economic losses from these extreme weather events – droughts, wildfires, severe storms, hurricanes and flooding—have almost doubled, from $211.3 billion in the 1990s to $418.4 billion in the last decade.

In the latest 10 years, weather events of less than $1 billion are estimated at about $100 billion in damages or $10 billion for 80 events a year, compared to $50 billion or $5 billion for 60 events a year in the 1990s.

Hardest hit states by extreme weather events

Not all states are impacted in the same way by extreme weather events.

Texas had 49 events that contributed to or exceeded $1 billion in economic loss, since 2007. Hurricane Harvey is the most damaging of all these events (Map and Table 2).

The states impacted with economic losses of at least $1 billion from extreme weather events in the last decade are:

- **Severe storm:** Texas (32, a more than a four-fold increase, compared to the 1990s), Kansas (24, a six-fold increase, compared to the 1990s), Oklahoma and Illinois (23 each, a more than a four-fold and almost a six-fold increase respectively, compared to the 1990s), Missouri (21, a more than a five-fold increase, compared to the 1990s) and Tennessee (18, more than a four-fold increase, compared to the 1990s).
- **Hurricane:** Alabama, Louisiana and Virginia (4 each, a two-fold increase, compared to the 1980s); Pennsylvania, New York, Maryland and Connecticut (3 each, a 50 percent increase compared to the 1990s); North Carolina (3); and Mississippi and New Jersey (3 each, a three-fold increase, compared to the 1990s).
- **Flooding,** as a result of severe storms and hurricanes: Louisiana and Missouri (4 each, a four-fold increase, compared to the 1990s); Texas (3); and Arkansas, Illinois, Indiana, Kansas and Iowa (3 each, a three-fold increase, compared to the 1990s).
- **Drought**: California (8, with no billion-dollar droughts in the 1990s or 1980s), Idaho (7, with no billion-dollar droughts in the 1990s), Oregon and New Mexico (6, a six-fold increase, compared to the 1990s), Oklahoma (6, a two-fold increase compared to the 1990s), Kansas (6, a three-fold and two-fold increase respectively, compared to the 1990s and 1980s) and Texas (6, a three-fold increase, compared to the 1990s).

- **Wildfire**: California (6, a two-fold increase, compared to the 1990s), Arizona and Oregon (6, a six-fold increase, compared to the 1990s), Idaho (6, with no billion-dollar wildfire events in the 1990s), Texas, Nevada, Washington and Colorado (5 each, a five-fold increase compared, to the 1990s) and Montana (5,with no billion-dollar events in the 1990s).

The economic impact for a single state can be severe. For example, in August, 2016, 30 inches of rainfall fell in a few days, flooding southern Louisiana. As a result, more than 50,000 homes, 100,000 vehicles and 20,000 businesses were damaged or destroyed. The economic losses due to the floods in Louisiana were $10 billion. Some 75 percent of those affected by the record Louisiana rainfall were uninsured.

In these severe storms, hurricanes, flooding, droughts and wildfires, many individuals, families and businesses lost everything.

Impact on agriculture

Climate change is changing rain patterns. Because agricultural production in the U.S. mainly depends on rain, farmers are especially being hit. Since 2012, farmers across the Central and Western U.S. have suffered $56 billion in economic losses, due to the persistent drought.

The production of corn and soybean –the largest crops in the U.S.—could experience a 20 to 30 percent decrease within the next three decade, if action to address climate change is not taken. Thus, corn and soybean producers could potentially lose $17 to $25 billion annually.

Unhealthy air

Combined with weather events are unhealthy air costs, caused by fossil fuel burning. More than 43 million Americans live in an area with unhealthy air pollution. These costs due to air pollution exposure caused by energy production in the U.S. were estimated at about $188 billion in 2011.

Emissions regulations on the energy sector reduced air pollution health damages by 35 percent or almost $67 billion a year –from $255 billion in 2002.

"The costs of health damages due to air pollution exposure caused by energy production will increase without regulations to the energy industry," says Dr. Watson. "Individuals and families will have to pay these health costs, either directly or through increased insurance premiums."

Coastal Cities

Coastal cities such as Miami, Boston, New York, Seattle and San Diego are at most risk due to sea level rise, caused by climate change.

"The question is when and how much sea level will rise," says Dr. McCarthy. "Lives and almost $1 trillion worth of real estate in coastal areas are at stake.

"The quantity of greenhouse gases that has accumulated in the atmosphere increase global temperature, and in turn warm the oceans. Hurricanes, like Harvey, Irma and Maria, gain strength and moisture traveling over warmer water, making them larger, stronger and more intense, especially endangering coastal cities."

Fossil fuels account for 80 percent of U.S. energy

Coal, oil and natural gas currently account for just over 80 percent of the primary energy generated and used in the U.S. This percentage has decreased slightly over the last two decades. As a result, 82 percent of America's greenhouse gas emissions are solely from carbon dioxide (CO_2) from fossil fuel burning. It is these CO_2 emissions, driving the observed climate changes.

Despite the escalating costs and economic losses on U.S. lives, health, homes, businesses and livelihoods, the U.S continues to rely on fossil fuels to produce energy, which includes electricity, fuel and natural gas.

"Every time you turn on the light on or start your car, you are contributing to climate change," says Ms. Hisas. "Everyone is part of the problem and everyone is part of the solution."

Economic growth and job creation with climate action

Securing sustained economic growth and job creation –a priority for the current Administration for the next four years in the U.S.– requires generating energy differently, according to the new report. It also requires a more efficient use of energy in all sectors –residential, commercial, and industrial and transportation.

Relying on fossil fuels for economic growth was how many economies grew in the 19th and 20th centuries. More than a century ago, the consequences of burning fossil fuels were not known and understood; they were not appreciable then either. Today, however, they are.

Climate action can provide economic growth and job creation in these ways:

Changing the energy equation

Carbon-free and sustainable energy can provide the additional energy needed in the U.S. Clean energy can also significantly increase the energy employment, now employing 1.9 million workers, via:

Renewable Energy. 10 percent of the energy (or 15 percent of electricity generation) used in the U.S. currently comes from renewables –solar, wind, bioenergy, hydropower and geothermal (Table 3).

Half of the electricity generated by renewables are solely from solar and wind, or about 7 percent of the electricity used in the U.S. These technologies provide almost 500,000 jobs, including manufacturing, construction, project development, operations and maintenance. Jobs in the solar industry grew 17 times faster than the overall job creation in the U.S. economy. In 2016, the solar workforce increased by 25 percent, accounting for 374,000 jobs or more than 40 percent of the employment in the generation of electricity in the U.S.

While a major transition to renewable energy is required, even doubling the solar and wind generation capacity will create 500,000 new jobs. It will also provide sustainable clean electricity, only requiring an initial investment in installation, but there will be significant savings for users in the long-term, due to low operating costs.

Most importantly, doubling the solar and wind generation capacity will reduce the share of electricity generation from fossil fuels (natural gas and coal) by 23 percent –from the current 65 to 50 percent.

The expansion of these renewable technologies will, in turn, make their costs much more competitive and accessible.

Workers in the extraction of natural gas and coal in Illinois, Kentucky, Louisiana, Oklahoma, Pennsylvania, Texas, West Virginia and Wyoming can with training and investments greatly benefit from these new jobs in renewable energy.

Nuclear. Electricity produced with nuclear power accounts for 9 percent of America's energy (or 20 percent of electricity generation). Nuclear power provides carbon-free energy and is now safer.

Sixty nuclear power plants in the U.S. employ about 70,000 workers. Two new nuclear reactors are planned for Georgia and an additional four new nuclear power plants are to be built in Florida,

North Carolina, Virginia and Texas. These new plants will provide at least 10,000 new jobs in the generation of electricity.

Using fossil fuels responsibly

Fossil fuel power plants can be consistent with job creation and a low-carbon economy.

Currently, fossil fuel power plants generate 65 percent of the electricity used in the U.S., contributing 39 percent of the U.S. CO_2 emissions. Natural gas and coal are the main sources of electricity generation, accounting for 34 and 30 percent respectively.

The 220,000 workers employed by these fossil fuel power plants may feel threatened by the need to switch the generation of energy to address climate change. However, carbon capture and storage (CCS) technologies which bury CO_2 deep underground would allow the continuing burning of fossil fuels to responsibly meet America's energy needs.

Of the 16 large-scale CCS plants in operation in the world, eight are in the U.S. An additional CCS plant will be operational this year, placing the U.S. at the top of technological innovation in using fossil fuels responsibly.

Power generation with CCS is still in its infancy and still requires more research and development for its large-scale deployment, according to Dr. Watson. More pilot programs will need to be implemented, since more than 1,000 electric power plants burn fossil fuels in the U.S. (256 use coal and 816 use natural gas).

The research, construction and maintenance of CCS plants could double the current number of workers in energy construction, creating 250,000 additional jobs, while securing the jobs of those currently employed by fossil fuel power plants.

Fusion is an example of new technology being tested to generate electricity. Fusion is the human replication of the mass-to-energy conversion of hydrogen in the core of the Sun that gives the Earth light and warmth. This highly complex process has been duplicated at facilities in San Diego, Princeton, Russia, U.K., Germany and South Korea.

Right now, the International Fusion Energy Organization (ITER), a collaboration of 35 countries, is constructing the largest controlled fusion device ever built in France to prove the viability of fusion.

Fusion is clean, abundant, safe and economic. ITER estimates that the first fusion plants will start coming on line in the mid-2040s.

Innovation and new technologies

New technologies to produce carbon-free energy will also have to be tested and deployed, such as locally produced advanced biofuels from forest and crop residues or municipal and construction waste, and biofuels derived from algae with subsequent sequestration of CO_2.

Currently, about 300,000 workers dedicated to research, architecture, and engineering to support energy generation technologies. An additional 50,000 jobs will accelerate the identification, testing and deployment of innovative technologies to generate sustainable clean energy.

Using energy more efficiently

Reducing fossil fuel use will be easier and faster in some sectors of the economy than others. Thus, promoting energy efficiency in those sectors is a key element of ensuring economic growth while taking climate action.

For example, a critical sector of the economy is transportation. Gasoline, diesel and jet fuel –all petroleum-based fuels— account for 92 percent of the energy used in the transportation sector; natural gas is another 3 percent. The remaining 5 percent is biofuels –ethanol and biodiesel—that is added to gasoline and diesel fuel.

These fuels are used in 263 million cars, trucks, motorcycles; 6,676 aircrafts (passenger and cargo), 132,500 transit and commuter buses and rail cars; 397,500 freight trains and locomotives; 11.8 million recreational boats and 465 vessels (tankers, passenger and cargo ships) to transport individuals, passengers and goods throughout the U.S.

Using transportation more efficiently and promoting vehicle performance improvements will ensure that travelling and trade meets needs and demands, while using less fuel.

"This is why it is essential that the Trump Administration support, or ideally, strengthen the 2025 fuel efficiency standards negotiated between the Obama Administration and the automobile industry," says Dr. McCarthy.

"Reducing the 95 percent fossil fuel use for transportation will require more research to develop alternative biofuels on a large-scale, without compromising food production," says Dr. Watson. "It also requires electric cars powered by renewable energy."

Programs to provide consumers with financial incentives to purchase electric cars will make the transition faster and more accessible.

Other sectors that can greatly benefit from energy efficiency include:

- 136 million U.S. homes and buildings where 324 million people live.
- Offices, hospitals, schools, police stations, places of worship, warehouses, hotels, shopping malls and industries (manufacturing, agriculture, and construction) where 160 million people work in the U.S.

Generating strategic investments

Transitioning to a low-carbon economy and increasing the efficient use of energy in all sectors will require strategic investments. Much of the revenue for these investments could come from a carbon tax.

The aim of a carbon tax is to reduce emissions, promote a more efficient use of energy and encourage the transition away from fossil fuels.

The potential revenues from a tax on carbon emissions could be up to $200 billion in the U.S. within the next decade, according to Intergovernmental Panel on Climate Change.

A carbon tax will increase the cost of gasoline for fuel users. However, a carbon tax will promote a much more efficient use of vehicles and stimulate the transition to electric cars.

“Protecting Americans from the escalating economic losses and costs due to the impacts of climate change can happen. It will require increased efficient use of energy in all sectors, the share of carbon-free electricity to doubled or tripled, and fossil fuel generation with CCS to expanded, along with installing a carbon tax,” says Dr. Watson.

* * *

Figure 1

Extreme weather events causing at least $1 billion in economic losses, by decade

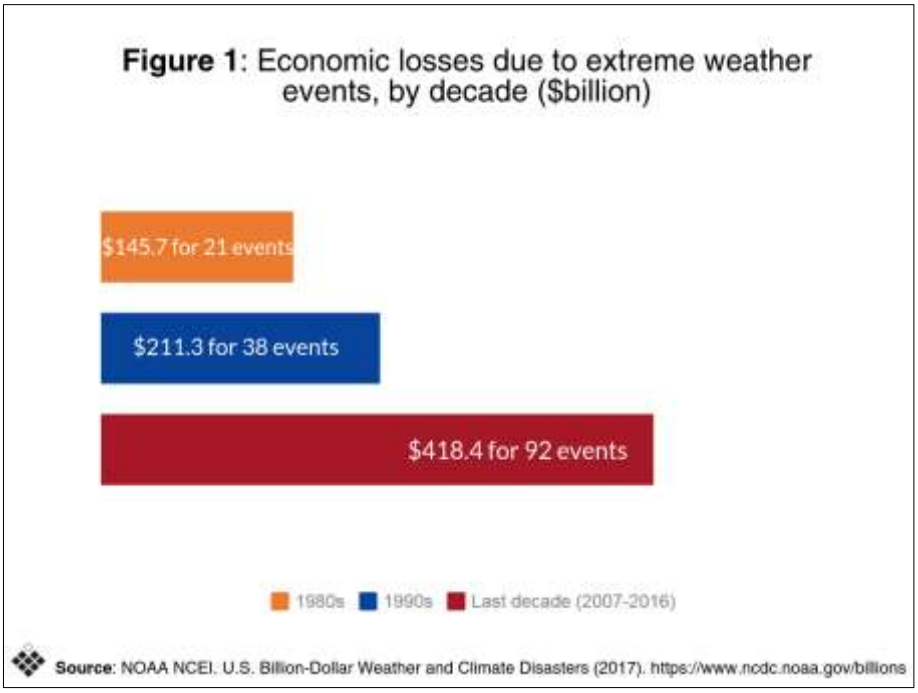

Table 1

Economic losses: weather events intensified by climate change & health costs from fossil fuel use during the last decade

Economic losses from extreme weather events	$42
Economic losses from frequent weather events	$10
Health costs due to air pollution caused by fossil fuel energy production	$188
Total	**$240**

Sources: National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI). U.S. Billion-Dollar Weather and Climate Disasters (2017). https://www.ncdc.noaa.gov/billions; Energy Policy: The International Journal of the Political, Economic, Planning, Environmental and Social Aspects of Energy, Air pollution emissions and damages from energy production in the U.S.: 2002–2011, Paulina Jaramillo (Department of Engineering and Public Policy, Carnegie Mellon University) and Nicholas Z. Muller (Department of Economics, Middlebury College)

Map

Number of extreme weather events causing more than $1 billion in economic losses, by state

The map shows the increasing frequency of billion dollar events (it does not indicate that each state impacted by multi-state extreme weather events has suffered $1 billion in losses for each event)

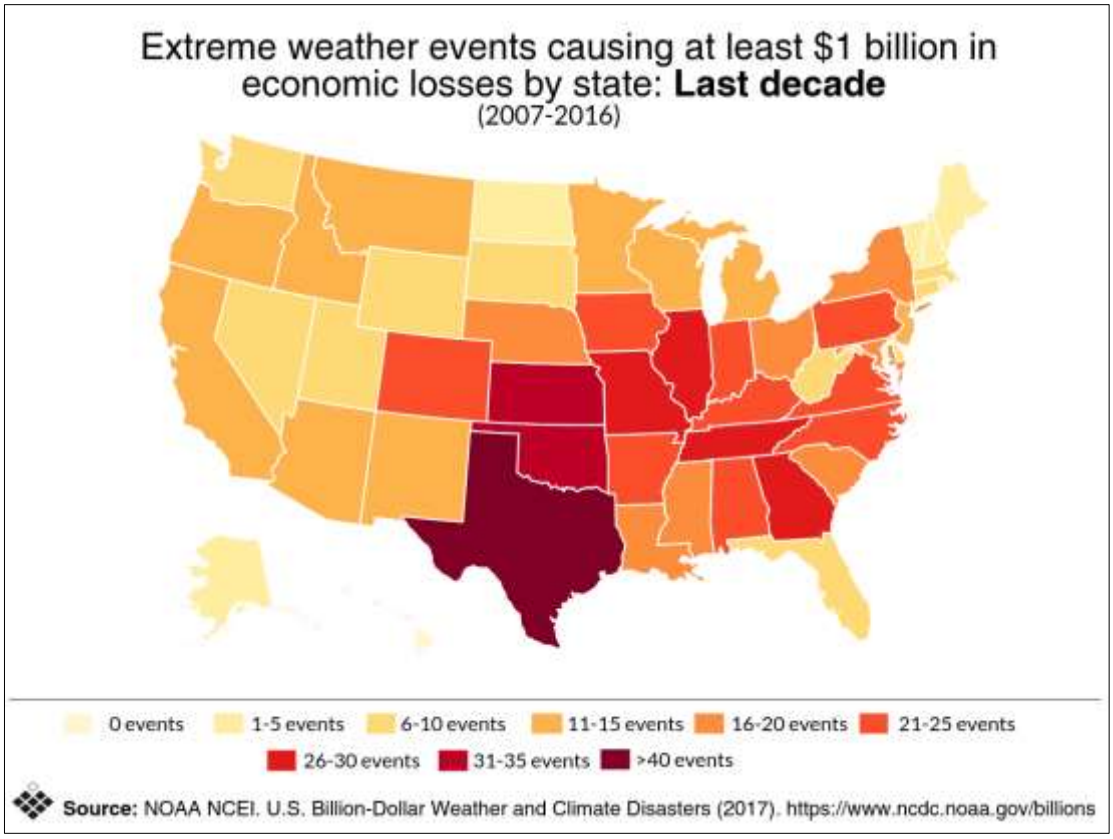

Table 2

Number of extreme weather events causing more than $1 billion in economic losses. by state & decade

The table shows the increasing frequency of billion dollar events (it does not indicate that each state impacted by multi-state extreme weather events has suffered $1 billion in losses for each event)

State	Drought			Wildfire			Severe Storm			Hurricane			Flooding		
	1980s	1990s	Last decade	1980s	1990s	Last decade	1980s	1990s	Last decade	1980s	1990s	Last decade	1980s	1990s	Last decade
Alaska	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
Alabama	**4**	**3**	5	0	0	1	2	3	12	**2**	3	**4**	**1**	0	1
Arkansas	**4**	2	4	0	0	0	2	3	14	0	0	2	**2**	1	**3**
Arizona	0	0	5	0	**1**	**6**	0	0	1	0	0	0	**1**	0	0
California	0	0	**8**	0	**3**	**6**	1	1	0	0	0	0	**1**	**2**	0
Colorado	1	1	4	0	**1**	**5**	**3**	2	11	0	0	0	0	0	2
Connecticut	0	0	1	0	0	0	2	1	4	1	2	**3**	0	0	1

Delaware	0	0	3	0	0	0	0	0	3	1	1	1	0	0	0
Florida	0	**3**	1	0	0	3	1	3	4	**2**	**4**	2	**1**	0	0
Georgia	**3**	**3**	5	0	0	2	2	4	16	0	2	2	0	0	2
Hawaii	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Iowa	3	1	3	0	0	0	2	2	15	0	0	0	0	1	**3**
Idaho	1	0	**7**	0	0	**6**	0	0	0	0	0	0	**1**	**2**	0
Illinois	**3**	1	3	0	0	0	**3**	4	**23**	0	0	1	0	1	**3**
Indiana	1	1	4	0	0	0	2	3	15	0	0	1	0	1	**3**
Kansas	**3**	2	**6**	0	0	0	**3**	4	**24**	0	0	0	0	1	**3**
Kentucky	**3**	1	4	0	0	0	2	4	16	0	0	1	0	0	1
Louisiana	**4**	2	2	0	0	0	**3**	4	6	**3**	2	**4**	**2**	1	**4**
Massachusetts	0	0	1	0	0	0	2	2	2	1	2	2	0	0	1
Maryland	1	2	4	0	0	0	1	1	10	1	2	**3**	0	0	2
Maine	0	0	1	0	0	0	0	1	1	1	1	0	0	0	0
Michigan	1	0	3	0	0	0	1	2	7	0	0	0	0	0	2
Minnesota	2	1	4	0	0	1	1	3	6	0	0	0	0	**2**	1
Missouri	**4**	1	3	0	0	0	**3**	4	**21**	0	0	1	0	1	**4**
Mississippi	**4**	2	5	0	0	0	2	4	11	**2**	1	**3**	**2**	1	1
Montana	2	0	3	0	0	**5**	0	0	2	0	0	0	**1**	**2**	1
North Carolina	**3**	**3**	5	0	0	2	2	**5**	12	**2**	**5**	**3**	0	0	1
North Dakota	**3**	0	3	0	0	1	0	0	0	0	0	0	0	2	1
Nebraska	**3**	0	2	0	0	1	1	2	11	0	0	0	0	1	2
New Hampshire	0	0	1	0	0	0	0	2	1	1	1	2	0	0	0
New Jersey	0	1	3	0	0	0	1	2	7	1	1	**3**	0	0	2
New Mexico	0	1	**6**	0	**1**	4	0	0	2	0	0	1	0	0	0
Nevada	1	0	5	0	**1**	**5**	1	0	0	0	0	0	0	1	0
New York	0	0	3	0	0	0	1	3	11	1	2	**3**	0	0	2
Ohio	1	2	3	0	0	0	2	4	11	0	1	2	0	0	2
Oklahoma	2	**3**	**6**	0	0	4	**4**	**5**	**23**	0	0	0	0	1	2
Oregon	0	1	**6**	0	**1**	**6**	1	0	0	0	0	0	**1**	**2**	0
Pennsylvania	0	2	3	0	0	0	2	3	16	1	2	**3**	0	0	1
Puerto Rico	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0
Rhode Island	0	0	1	0	0	0	1	1	1	1	2	2	0	0	1
South Carolina	**3**	**3**	3	0	0	0	**3**	3	12	1	**4**	1	0	0	2
South Dakota	**3**	0	2	0	0	1	1	2	4	0	0	0	0	**2**	1
Tennessee	**4**	**3**	4	0	0	1	1	4	**18**	0	1	1	0	0	2
Texas	3	2	**6**	0	**1**	**5**	**4**	**7**	**32**	**2**	0	2	0	**3**	**3**
Utah	1	0	4	0	**1**	3	0	0	0	0	0	0	**1**	0	0
Virginia	**3**	**3**	4	0	0	0	2	1	12	**2**	3	**4**	0	0	2
Vermont	0	0	1	0	0	0	0	2	1	1	1	1	0	0	0
Washington	0	1	5	0	**1**	**5**	0	0	0	0	0	0	**1**	**2**	0
Wisconsin	1	0	4	0	0	0	1	1	8	0	0	0	0	1	1

West Virginia	1	2	2	0	0	0	1	2	3	0	1	1	0	0	1
Wyoming	1	0	3	0	0	3	1	0	4	0	0	0	0	0	0

Source: National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI). U.S. Billion-Dollar Weather and Climate Disasters (2017). https://www.ncdc.noaa.gov/billions

Table 3

Energy use in the U.S. by source, 2016

	Share of Primary Energy Use (Electricity, fuel and natural gas)	**Electric Power Generation (39% of energy use)**	**Energy for Transportation* (29% of energy use)**
Petroleum	37%	1%	92%
Natural Gas	29%	34%	3%
Coal	15%	30%	--
Total fossil fuels	**81%**	**65%**	**95%**
Solar	10%	>1%	--
Wind		6%	--
Bioenergy		1.5% (Biomass)	5% (Ethanol and biodiesel)
Hydroelectric		6.5%	--
Geothermal		>1%	--
Total Renewables	**10%**	**15%**	**5%**
Nuclear	**9%**	**20%**	
Total	**100%**	100%	100%

***Less than 1 % of** electricity is used by public mass transit systems and by electric vehicles.

Source: U.S. Energy Information Administration, U.S. Department of Energy