



Climate Change – Armageddon or Opportunity?

2020 Gas/Electric Partnership Conference

February 5-6, 2020

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Delivering Energy to Improve Lives and Create a Better World

Kinder Morgan is an energy infrastructure company focused on the transportation and storage of energy products across North America. Our pipelines transport natural gas, refined petroleum products, crude oil, condensate, and CO2. Our terminals primarily store and handle petroleum products, chemicals and bulk products.

Making a Difference

We believe that natural gas will be part of the solution in the reduction of the world's greenhouse gas emissions. With about half of the CO2 emissions of coal, natural gas is playing a significant role in providing cleaner energy to the world. We are proud to be part of the effort to reduce greenhouse gas emissions by delivering natural gas - a lower-carbon fuel for electricity generation and an excellent complement to renewable energy sources.

One potential drawback to natural gas is the methane emissions associated with the production, transportation, storage and distribution of natural gas.



World's largest asset manager BlackRock joins \$41 trillion climate-change investing pact

Published: Jan 14, 2020 8:55 a.m. ET



'We believe evidence of the impact of climate risk on investment portfolios is building rapidly'

ENERGY & ENVIRONMENT

Trump cautions Davos against heeding 'prophets of doom' on climate change

The president's remarks represent yet another high-profile moment in the relationship between the administration and the international community.



Oil stocks are the new tobacco, in 'death knell phase,' says Jim Cramer

Published: Feb 1, 2020 8:48 a.m. ET



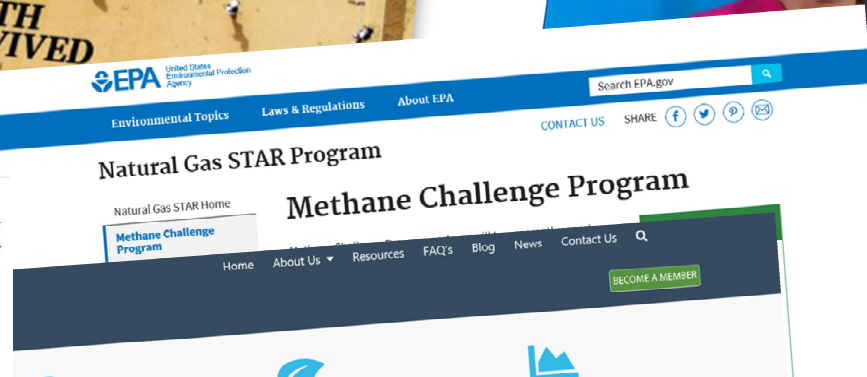
Investor says on CNBC that solid yield, buybacks not enough for Chevron, Exxon



By RACHEL KONIG BEALS, NEWS EDITOR

CNBC analyst Jim Cramer, shown during a previous broadcast, warns Friday that he's done with fossil-fuel stocks.

Oil stocks are in 'the death knell phase... You're seeing divestiture by a lot of different funds. It's going to be a parade. It's going to be a parade.



Committing to carbon negative by 2030

By 2030, Microsoft will be carbon negative. By 2050, Microsoft will remove all of the carbon it has emitted since it was founded in 1975

Virginia Natural Gas part of first contract to reduce methane emissions from wells to customer

By MICHAEL MARTZ Richmond Times



Your carbon footprint is shrinking.

We've cut our carbon emissions by 38%, but we're not stopping there. We're aiming to achieve 100% carbon-free electricity by 2050.



Background: facts that matter to our discourse

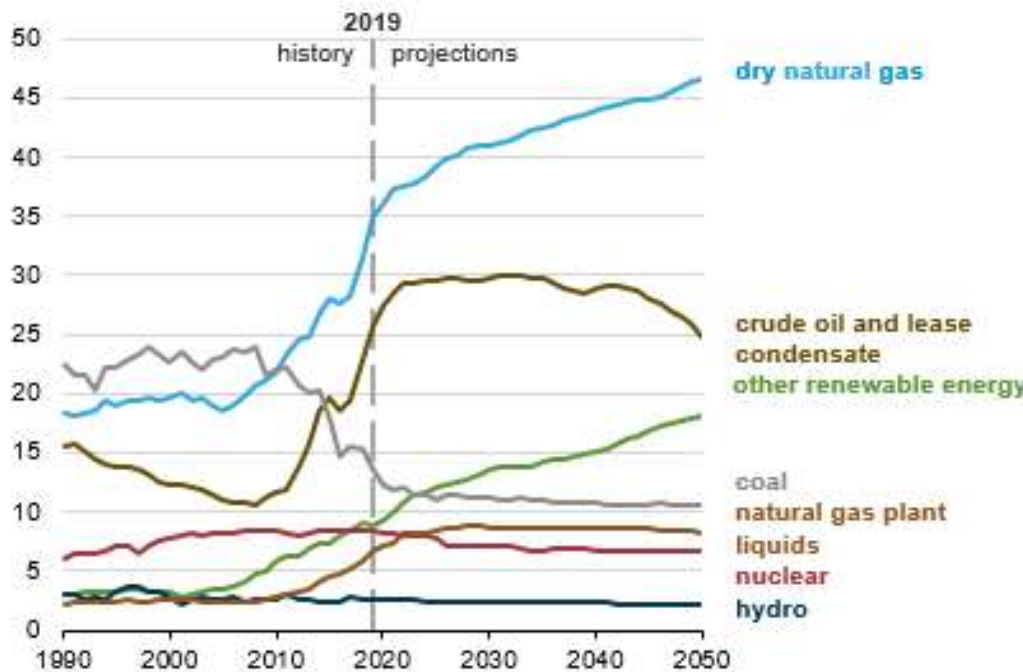
U.S. Energy Production and Consumption

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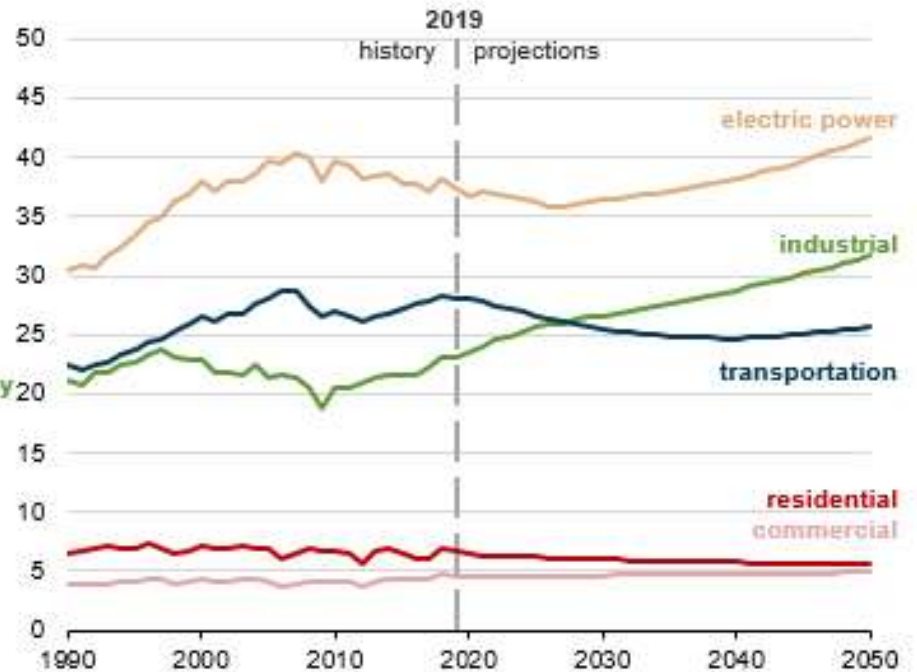


U.S. energy production grows significantly, but consumption grows moderately under the AEO2020 Reference case assumption of current laws and regulations

Energy production (AEO2020 Reference case)
quadrillion British thermal units



Energy consumption by sector (AEO2020 Reference case)
quadrillion British thermal units



U.S. energy-related Carbon Dioxide Emissions Increase

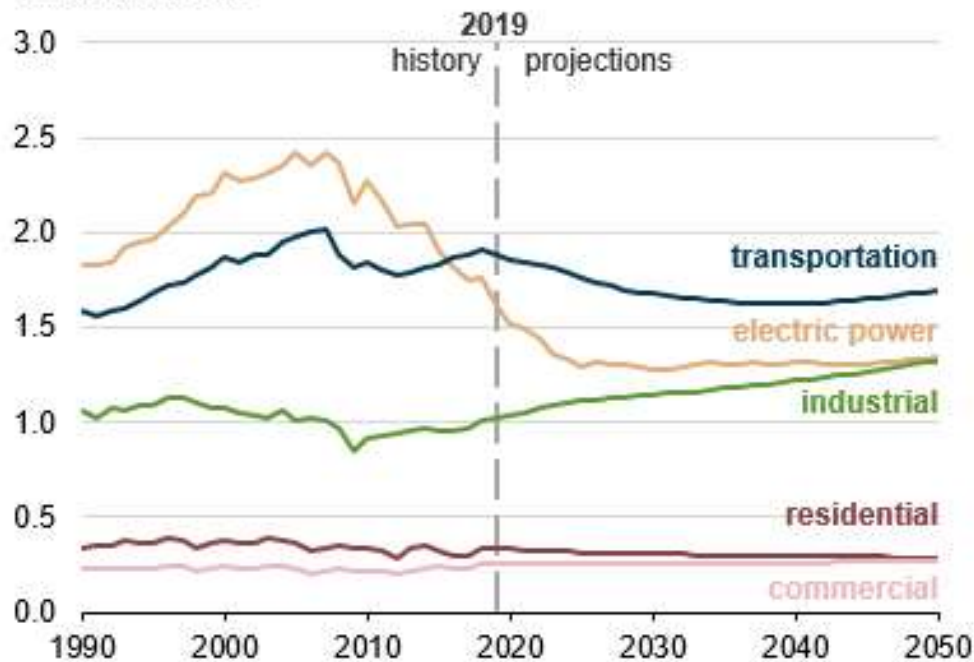
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AEO2020 energy-related carbon dioxide emissions increase in the industrial sector, increase as a result of natural gas consumption, but remain relatively flat in other sectors and fuels through 2050

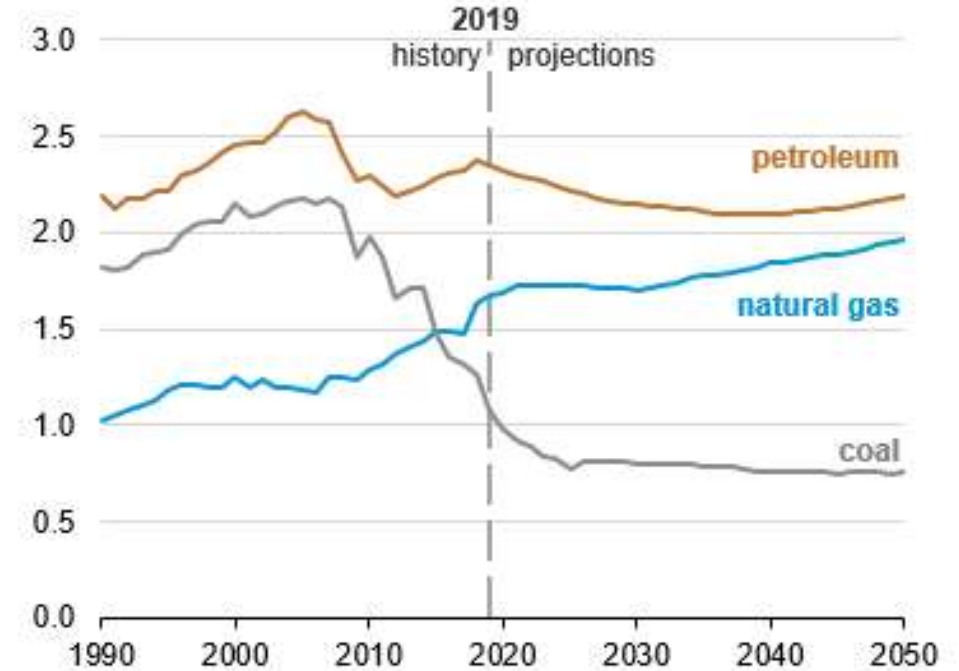
Energy-related CO2 emissions by energy sector (AEO2020 Reference case)

billion metric tons



Energy-related CO2 emissions by fuel (AEO2020 Reference case)

billion metric tons

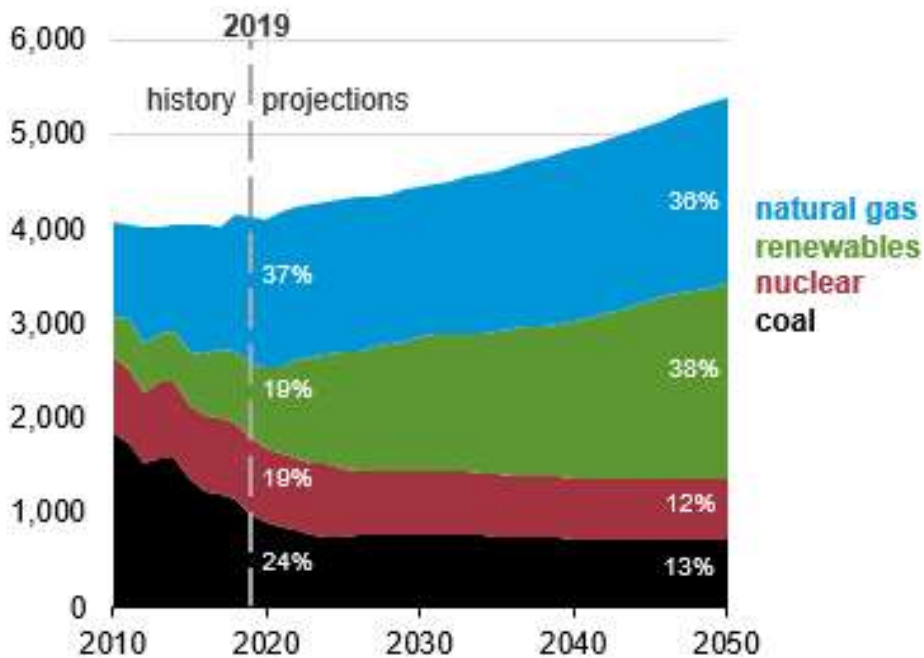


U.S. electricity generation sources

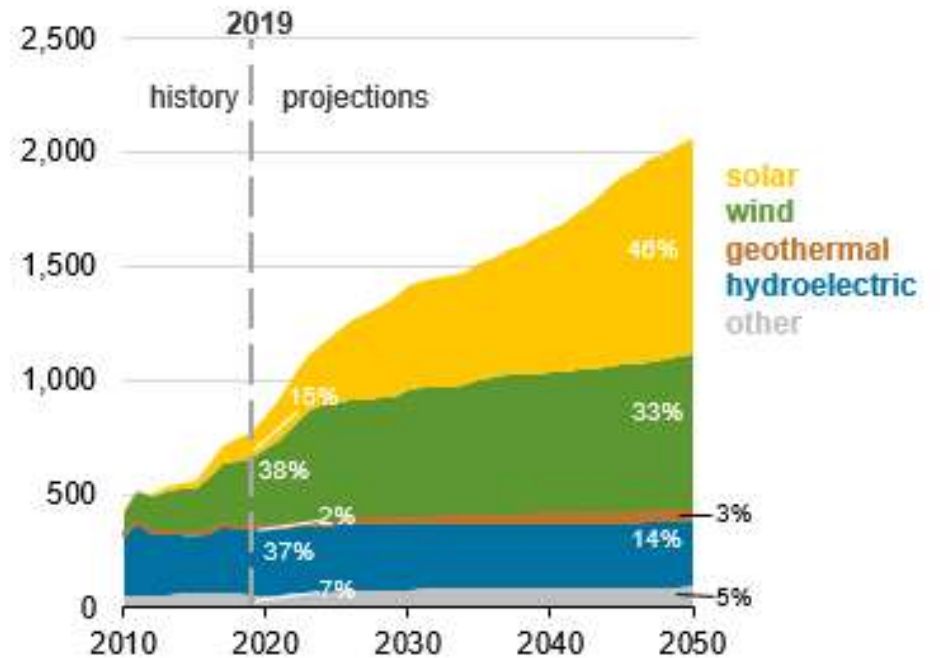
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Electricity generation from natural gas and renewables increases as a result of lower natural gas prices and declining costs of solar and wind renewable capacity, making these fuels increasingly competitive

Electricity generation from selected fuels
(AEO2020 Reference case)
billion kilowatthours



Renewable electricity generation, including end use
(AEO2020 Reference case)
billion kilowatthours



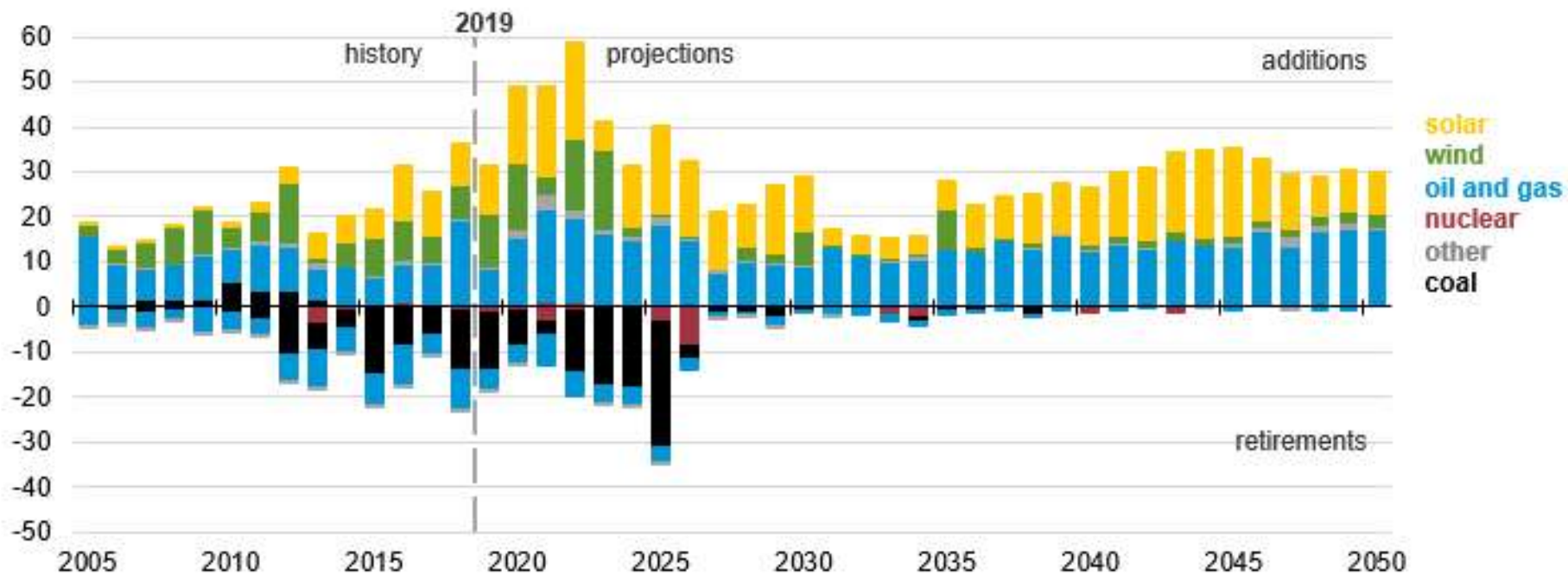
U.S. electricity generating capacity additions & retirements

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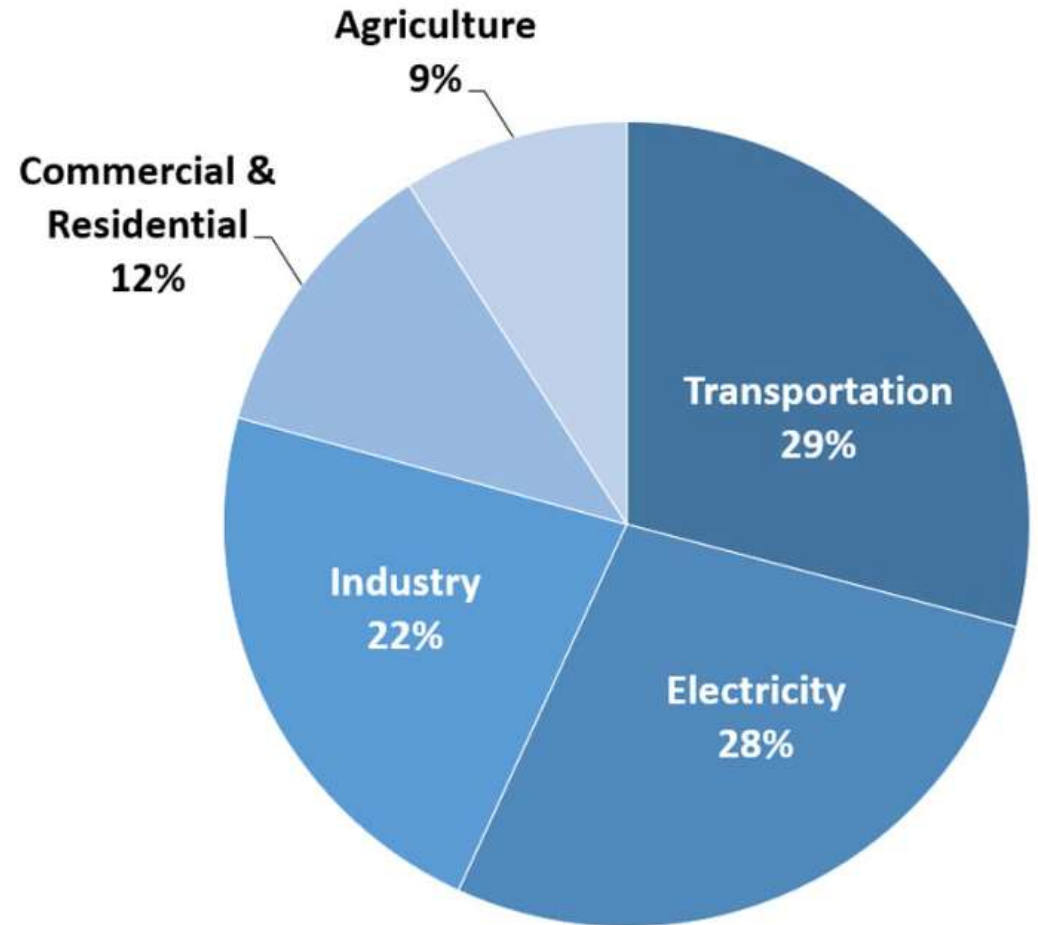
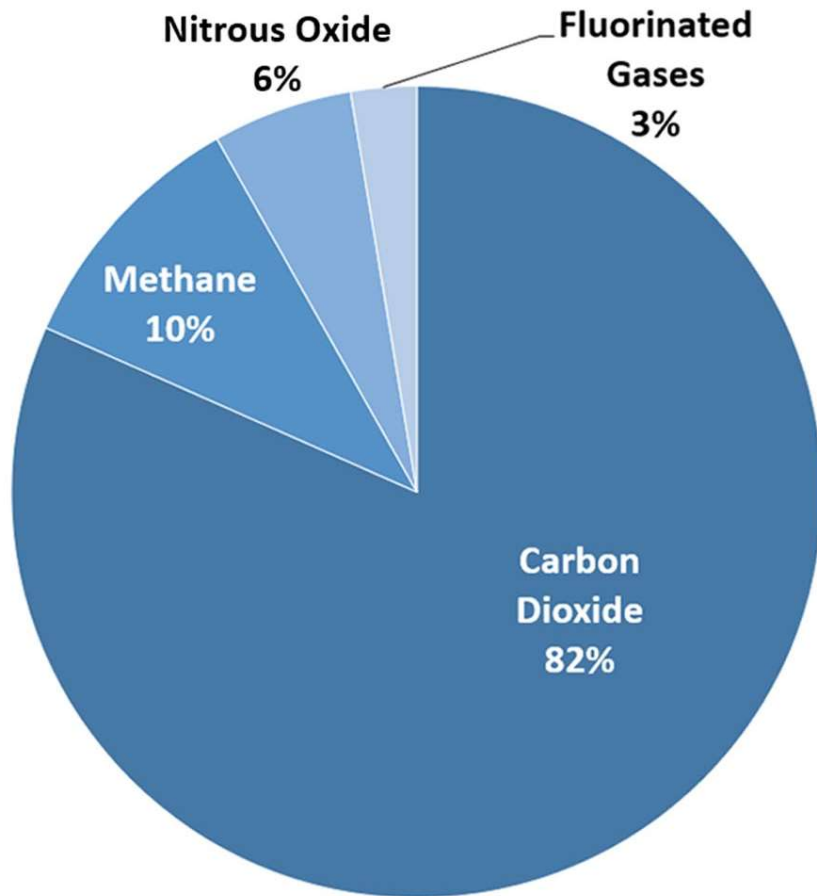
Expected requirements for new generating capacity will be met by renewables and natural gas in the AEO2020 Reference case—

Annual electricity generating capacity additions and retirements (Reference case)
gigawatts



2017 U.S. Greenhouse Gas Emissions

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U.S. Environmental Protection Agency (2019). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2017

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Public Opinion on Climate Change^a

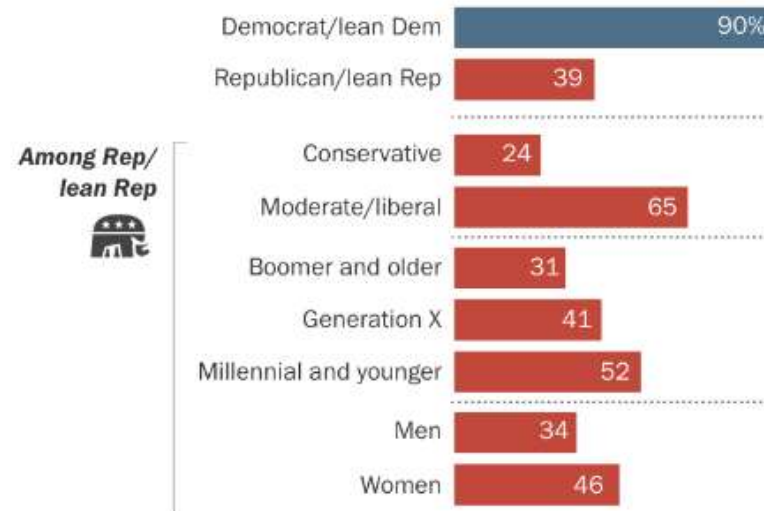
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Majorities of Americans say the federal government is not doing enough to protect the climate, environment

% of U.S. adults who think the federal government is doing too little to ...



% of U.S. adults who think the federal government is doing too little to reduce the effects of climate change



Note: Respondents who said the federal government is doing about the right amount or doing too much and those did not give an answer are not shown.

Source: Survey conducted Oct. 1-13, 2019.

"U.S. Public Views on Climate and Energy"

PEW RESEARCH CENTER

^a <https://www.pewresearch.org/science/2019/11/25/u-s-public-views-on-climate-and-energy/>

the carbon dioxide problem (a view from 1969)^a

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MEMORANDUM

THE WHITE HOUSE
WASHINGTON

(E)

September 17, 1969

FOR JOHN EHRLICHMAN

As with so many of the more interesting environmental questions, we really don't have very satisfactory measurements of the carbon dioxide problem. On the other hand, this very clearly is a problem, and, perhaps most particularly, is one that can seize the imagination of persons normally indifferent to projects of apocalyptic change.

The process is a simple one. Carbon dioxide in the atmosphere has the effect of a pane of glass in a greenhouse. The CO₂ content is normally in a stable cycle, but recently man has begun to introduce instability through the burning of fossil fuels. At the turn of the century several persons raised the question whether this would change the temperature of the atmosphere. Over the years the hypothesis has been refined, and more evidence has come along to support it. It is now pretty clearly agreed that the CO₂ content will rise 25% by 2000. This could increase the average temperature near the earth's surface by 7 degrees Fahrenheit. This in turn could raise the level of the sea by 10 feet. Goodbye New York. Goodbye Washington, for that matter. We have no data on Seattle.

It is entirely possible that there will be countervailing effects. For example, an increase of dust in the atmosphere would tend to lower temperatures, and might offset the CO₂ effect. Similarly, it is possible to conceive fairly mammoth man-made efforts to countervail the CO₂ rise. (E. g., stop burning fossil fuels.)

^a <https://www.nixonlibrary.gov/sites/default/files/virtuallibrary/documents/jul10/56.pdf>

Overcoming Extreme Poverty

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■ \$1.90 per day^a

■ We are living in a period of tremendous economic change

- Global economic production value has doubled in less than a generation
- Over 900 million people have joined the \$10 per day group in less than 10 years
- However, 500 million people projected to still live in extreme poverty in 2030

■ This economic success creates additional need for energy:

- A family living in extreme poverty in India will want to connect to the electric grid
- A young child growing up poor in Africa will want her family to buy a car

■ Opportunity to deliver energy, improve lives and create a better world^b

- What we do (here in the U.S.) matters:
 - LNG Exports (to help replace less efficient energy options – dung, wood, coal)
 - Creating technology solutions that matter
 - Embracing a sustainable lifestyle

^a University of Oxford – Our World in Data
(<https://ourworldindata.org/extreme-poverty>)

^b Kinder Morgan vision statement: Delivering Energy to Improve Lives and Create a Better World
(<https://kmionline.kindermorgan.com/pages/values/default.aspx>)

Opportunity

- Reducing our Carbon Footprint
- Reducing Methane Emissions
- ❖ **Between 1995-2015: Natural Production increased 50% while (natural gas industry) Methane Emission fell 16.3%**
- ❖ **However, flaring and venting of Natural Gas is A BIG problem in the Permian^b**
 - 2019 Q1: 661 million cubic feet/day
 - 2019 Q3: 752 million cubic feet/day
 - Air quality problems
 - Adding to GHG emissions
- **Add to natural gas pipeline infrastructure**
 - Texas become a leader in Wind energy^c by developing needed infrastructure
 - Added 464 miles of transmission lines in 2005
 - Produces over 25,000 MW of wind energy
 - Biggest generator of wind power in the U.S.

a Problem - West Texas Flaring^a

The screenshot shows the top portion of a news article from Texas Climate News. The article title is "Climate-changing methane emissions climb in West Texas, other oil/gas areas" and it is dated January 5, 2020. The author is Jillian Mock. The article text begins with "An oil rig bobs diligently up and down, up and down, on a patch of dirt in West Texas. As far as the eye can see, other rigs dip in the same fluid motion. It's a familiar sight for most Texans. What we can't see, however, are the gases swirling invisibly around the rigs, pipes, and storage tanks, adding potent greenhouse gases to the atmosphere." To the right of the text is a photograph of a natural gas flare at Balmorhea, Texas, showing a tall black pipe with a bright orange flame at the top against a clear blue sky.

^a <http://texasclimatenews.org/?p=17226>

^b Emissions Soar As Permian Flaring Frenzy Breaks New Records (Yahoo Finance December 19, 2019)

^c As climate threat looms, Texas republicans have a solution: giant wind farm everywhere (USA TODAY, October 18, 2019)

Climate Change Opportunity

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■ The CH4 opportunity

- Growing consensus to solve this issue across the natural gas value chain
 - Efforts to standardize measurement and reporting (NGSI, One Future, other)
 - Find/Fix Leaks (including, minimize or eliminate Flaring)
 - Enhance Maintenance Practices (with a lower CH4 footprint)
 - New Technology (from hand held cameras to fixed sensors to satellites)

■ The GHG opportunity

- A low emissions future will necessitate fundamental changes in how energy is produced, managed, transported and used
 - Policy development by embracing partnerships (Industry-Government-Public)
 - Regulations, Carbon Taxes
 - Improve Efficiency
 - Bio-Energy^a
 - A switch away from Coal based power generation (natural gas & renewables)

■ Creative destruction^b

- Net-Zero Emissions^c
- Carbon Capture, Use & Storage (Example: NRG Parish Petra Nova Project)
- Carbon neutral pipelines
- Energy Storage
- Carbon Tax and Finance
- Transitioning to “low emissions” living

^a *Uncommon Knowledge The Economist Explains* by Tom Standage (page 216)

^b *Capitalism in America: An Economic History* of the United States by Alan Greenspan

^c http://www.ipieca.org/media/2747/exploring_low-emissions_pathways_2016.pdf