Watts Up With That?

The world's most viewed site on global warming and climate change

Texas: Coal Did Not Get Blown Away By Wind

David Middleton / January 14, 2020

Guest "I told you so" by David Middleton

> "
>
> *Jan 13, 2020, 10:33am*
> ***Texas Power Generation: Did Coal Get Blown Away By Wind?***
>
> *University of Houston Energy Fellows Contributor Group*
> *We are thought leaders in energy from the University of Houston.*
>
> *Ramanan Krishnamoorti, Chief Energy Officer and Ed Hirs,*
> *Lecturer, Department of Economics*

The precipitous drop in coal-based power generation in Texas, from 32% of consumption in 2017 to 20% in 2019, has been hailed as the most significant step in decarbonizing electricity production in Texas. The narrative in the media has suggested that the rapid demise of coal has resulted from the growth of wind power.

The data suggest a more complex narrative. While wind has grown considerably, especially early in the last decade, the decline of coal has largely been due to a resurgent natural gas industry.

The data for Texas' power production over the last three years indicates that coal has instead been replaced largely through the growth of natural gas and only to a small extent due to wind. Specifically, the growth of high efficiency combined cycle natural gas production has driven most of the surge to replace aging coal assets. Coal-based power generation is expected to continue to slide as more coal-fired power plants are retired in favor of renewables (wind and solar) and, more frequently, natural gas-based power generation.

[…]

Understanding the transformation of the electrical mix is important: Natural gas derived from hydraulically fractured shale reservoirs has been a primary driver. Further, coupled with the oversupply of cheap natural gas, the displacement of many aging, low-efficiency single turbine natural gas plants by high-efficiency combined cycle plants has built the resurgence of natural gas based power by substantially lowering the cost of the electricity being produced.

[…]

— *Forbes*

Since 2017, gas has kicked @$$, while wind broke even in the Lone Star State…

Annual Distribution of Sources for Texas Electricity Production (percentage): Trends over the last three years (from ERCOT)			
	2017	2018	2019
Gas	39	42	47
Coal	32	25	20
Wind	17	19	20
Nuclear	11	11	11

"Annual Distribution of Sources for Texas Electricity Production (percentage): Trends over the last three years. ERCOT" Forbes

Annual Distribution of Sources for Texas Electricity Production (percentage) over 2007 - 2019 (from ERCOT)			
	2007	2013	2019
Gas	45	41	47
Coal	37	36	20
Wind	3	10	20
Nuclear	13	12	11

“Annual Distribution of Sources for Texas Electricity Production (percentage) over 2007-2019 RAMANAN KRISHNAMOORTI BASED ON INFORMATION FROM ERCOT” Forbes

Wind power basically grew from nothing to a consistent ±20% of Texas’ generating capacity for two (2) reasons:

1. Physical geography
2. A $7 billion “investment” in Competitive Renewable Energy Zones

Physical Geography: The Llano Estacado

> “
>
> ***LLANO ESTACADO***
>
> *Art Leatherwood*

> *The Llano Estacado, commonly known as the Staked Plains but perhaps more accurately interpreted as the "palisaded" plains in geological terms, is the southern extension of the High Plains of North America and lies south of the Canadian River in northwest Texas and northeast New Mexico. A high mesa sloping at a rate of approximately ten feet per mile toward the southeast, it is one of the largest tablelands on the continent. This high flat land is located approximately between 101° and 104° west longitude and 31° and 35° north latitude. It is distinctly bounded on the north by the southern escarpment of the Canadian River valley and on the east by the irregular and deeply incised Caprock escarpment. The western boundary is the Mescalero Escarpment east of the Pecos River valley of New Mexico. The southern end of the plateau lacks a distinct physical boundary; it blends into the Edwards Plateau, and the Johnson Creek branch of the Colorado River, east of Big Spring, is probably best considered its boundary. The Llano Estacado comprises all or part of thirty-three Texas and four New Mexico counties and covers approximately 32,000 square miles, a larger area than all of New England. It is part of what was known to early explorers and settlers as the Great American Desert, a semiarid region with average annual precipitation of eighteen to twenty inches. The soils are almost universally dark-brown to reddish brown sands, sandy loams, and clay loams.*
>
> *[…]*
>
> — *Texas State Historical Association*

Note the correlation of the Llano Estacado to Texas' wind resource.

Llano Estacado (Journeys)

– Fred Pearce *The Climate Files: The Battle for the Truth about Global Warming*

"...invaluable" – Steven F. Hayward, *The Weekly Standard*

"...changed the world and is one of the most influential resources on global warming. – Jonathon Moseley, *American Thinker*

"...flashy (apparently widely distributed)"– Michael E. Mann

Follow me on Twitter

My Tweets

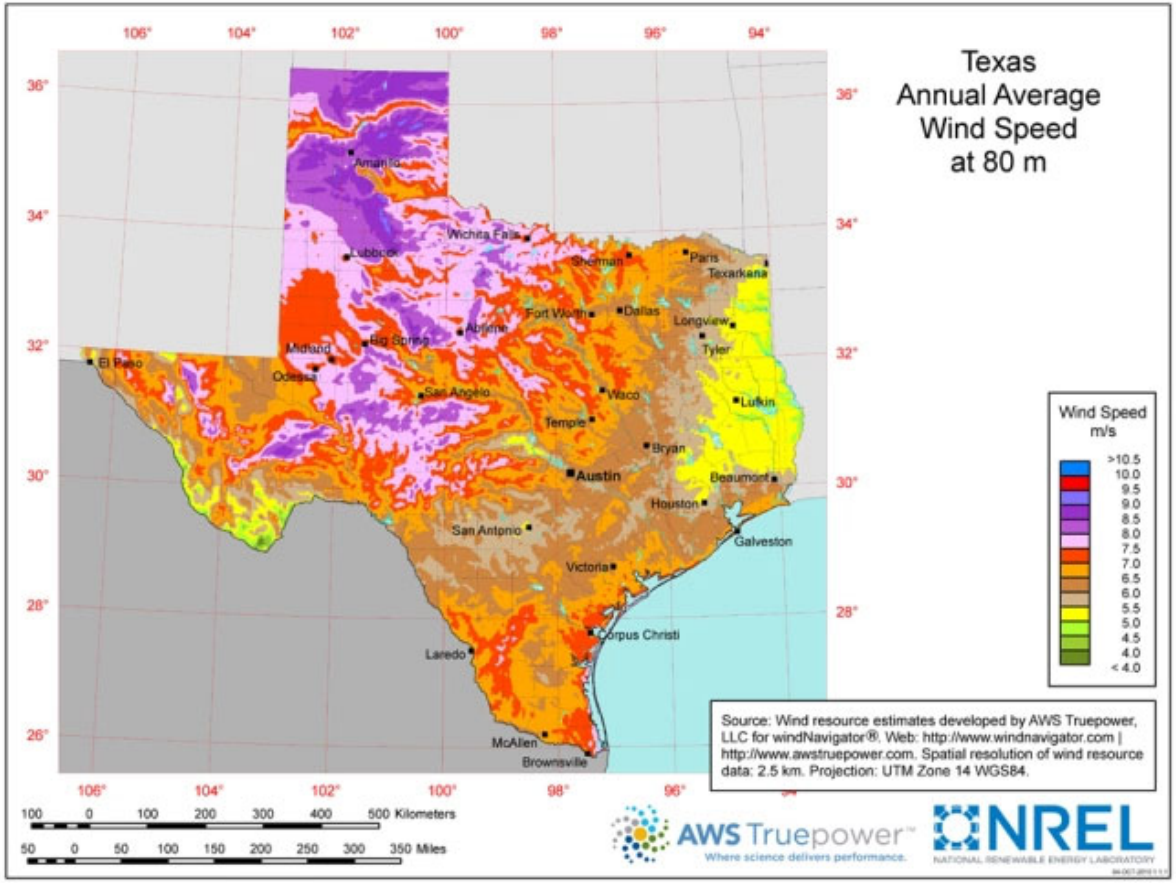
Follow WUWT via Email

You are following WUWT via email

Join 60,236 other subscribers

Email Address

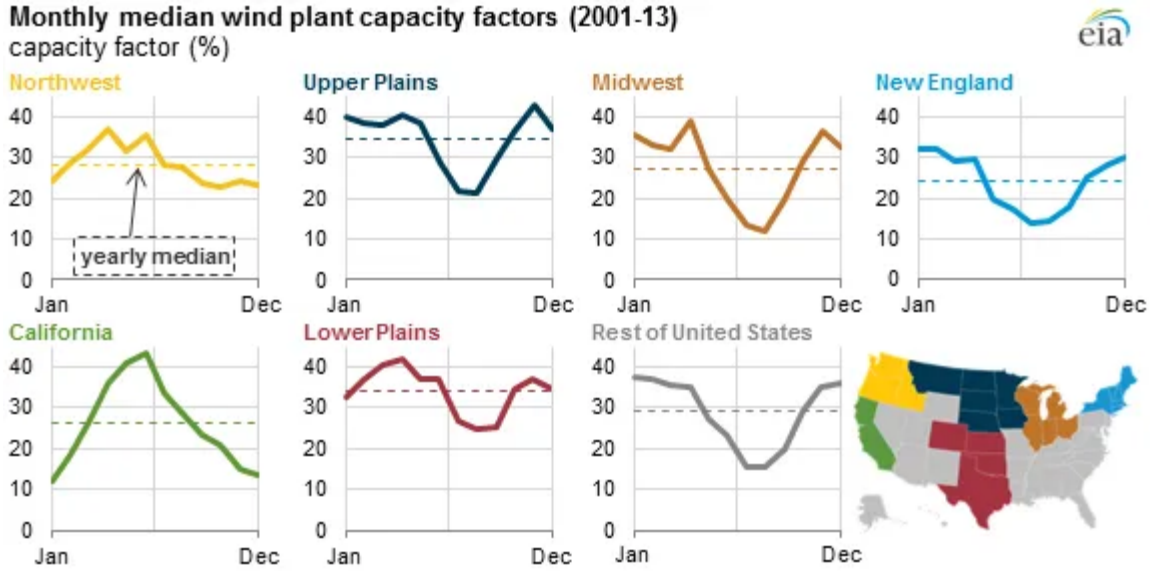
Follow



Texas 80-Meter Wind Resource Map (NREL)

The Llano Estacado and rest of the Lower Plains have the most consistent onshore wind resource in these tangentially United States.

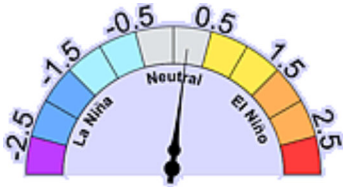
ENSO METER



Wind generation seasonal patterns vary across the United States (EIA)

Competitive Renewable Energy Zones

> *Moreover, the sharp decrease in the cost of installed wind capacity, along with the on-again off-again production tax credits (PTC) for wind, has been instrumental in the rise of wind power. In Texas, the foresight to authorize and pay almost $7 billion for the Competitive Renewable Energy Zones (CREZ) by state leaders and the Electric Reliability Council of Texas, or ERCOT, has been unprecedented. (ERCOT operates the majority of the Texas grid). Between 2006 and 2013, CREZ has enabled the construction of 2,400 miles of transmission lines to carry 18,500 megawatts of West Texas wind generation to major load centers in Dallas, San Antonio and Austin.*
>
> *[…]*
>
> — *Forbes*



Recent Posts

Origin of the Moon: New evidence in old rocks for Lunar impact theory

Rupert Darwall: Growth Will Be A Thing Of The Past If Businesses Choose ‘Net Zero’

Bennu’s Boulders Shine as Beacons for NASA’s OSIRIS-REx

‘This Is Masochism’: Russia Wages An Oil War Against Saudi Arabia, US Amid Coronavirus Concerns

Guardian Climate Crisis: Coal Use is Not Falling Fast Enough

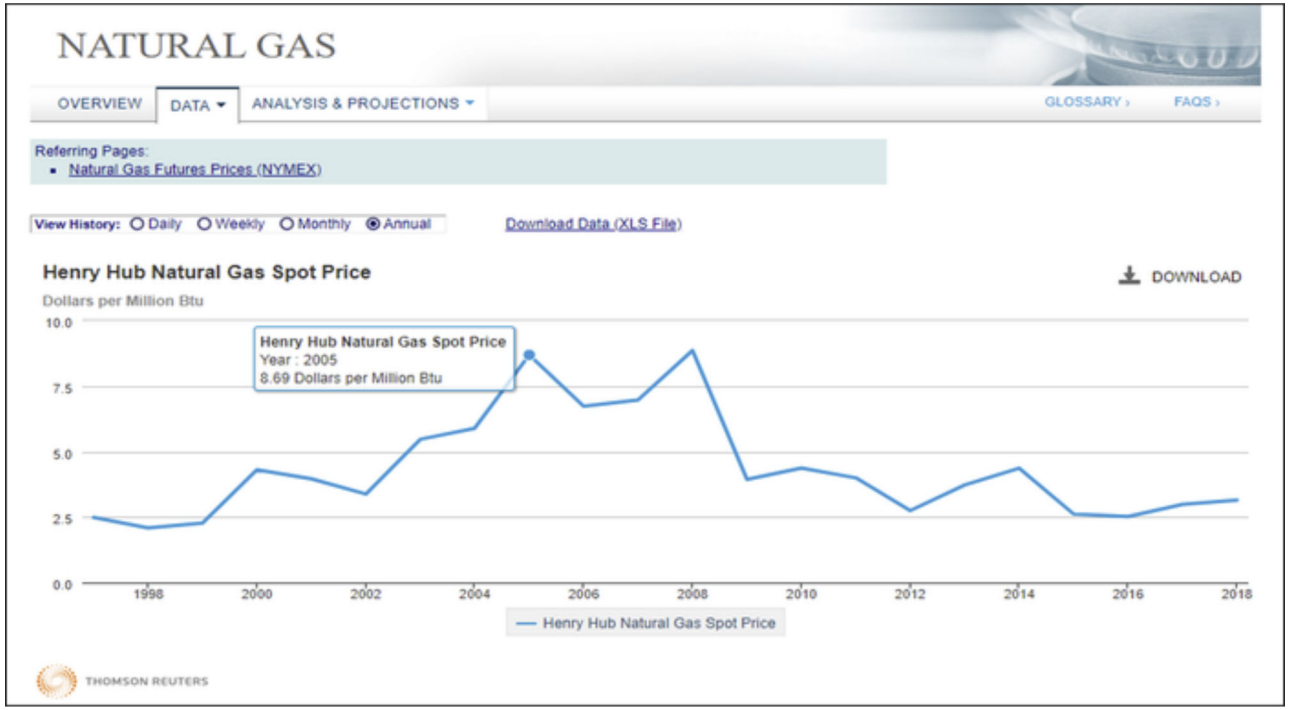
Covid-19 and Russia collusion to kill shale! Film at 11.

FAO: ‘…early indications point to a near-record wheat production in 2020’

Delingpole: Wikipedia Airbrushes List of Climate Sceptic Scientists Out of History

AFP: The “Silver Lining”

Irrespective of whether or not it was a good idea to make this "investment," it was made and it enabled the exploitation of Texas' vast wind resource. In the current era of cheap, abundant natural gas due to the "shale" revolution, it's easy to "Monday morning quarterback" this decision. However, at the time the Texas State Legislature approved the funding of CREZ (2005), natural gas was neither cheap, nor abundant. In 2005, we were building LNG import facilities.



U.S. Natural Gas Prices (EIA)

Despite incurring a $3-5/month additional fee, Texas residential electricity rates were not impacted by this "investment." Electricity was actually less expensive in July 2017 than it was in July 2005. Would our electricity be even less expensive today, if we didn't build out the wind power infrastructure and relied more heavily on natural gas and coal? Maybe… But you can't re-rack history. In Texas, gas kicks @$$ and wind breaks even.

Climate Benefits of Coronavirus will be Undone by Economic Stimulus Packages

Damaging impacts of warming moderated by migration of rainfed crops

Sad Climate Scientists: "I see a group of people sitting in a boat … floating right into a … waterfall"

Virginia passes bill to achieve 100% carbon-free power by 2045

Looking For Acceleration In All The Wrong Places

Weather Radar Shows Spring Bird Migration

NASA satellite offers urban carbon dioxide insights

Archives

Select Month

Categories

Select Category

Bookmarks

1000+ skeptical papers

A Walk On The Natural Side – Jim Steele

Then the wheel came off…

The University of Houston professors were doing just fine and then the wheel came off…

> *So with substantial growth in natural gas and wind over the past decade, what's the most likely source to fill this increased electricity demand in the future?*
>
> *Natural gas seems like an obvious answer, but despite its rapid growth over the past decade, continued growth is likely to slow, both because of public resistance to building new pipelines to bring gas from the state's shale drilling fields to its population centers and because of growing environmental concerns about damaging methane released by flaring. Additionally, the underlying technology of hydraulic fracturing that has enabled the shale revolution is under increased scrutiny.*
>
> *[…]*
>
> — *Forbes*

AccuWeather GW Blog
American Elephants
Andrew Bolt
Appinsys
Australian Climate Madness
Autonomous Mind
Bishop Hill
Bob Carter
C3 Headlines
Carlin Economics
Cartoons By Josh
Christopher Booker
Climate Abyss – John Nielsen-Gammon
Climate Audit
Climate Change 101
Climate Change Dispatch
Climate Conversation – NZ
Climate Debate Daily
Climate Depot
Climate Progress
Climate Realists
Climate Realists of Norway
Climate Resistance
Climate Sanity

Aeuhhh????

How can a paragraph be so totally wrong? Well, start off with a run-on sentence filled with *non sequitur* fallacies:

> *Natural gas seems like an obvious answer, but despite its rapid growth over the past decade, continued growth is likely to slow, both because of public resistance to building new pipelines to bring gas from the state's shale drilling fields to its population centers and because of growing environmental concerns about damaging*

Climate Science – Pielke Sr.
Climate Skeptic
Climate Views
CO2 Science
Collide-a-scape – Keith Kloor
Die Kalte Sonne
Digging in the Clay
Dr. Norman Page
Dr. Roger Pielke Jr.
Dr. Roy Spencer
Dr. Tim Ball
Ecotretas
EU Referendum – Richard North
Friends of Science
Green Hell Blog
Haunting the library
ICECAP
International Climate Science Coalition
James Delingpole @ Breitbart
Jennifer Marohasy
Jo Nova
Judith Curry
Lucia's The Blackboard
Marcel Crok – De staat van het

> *methane released by flaring.*

Natural gas does seem like the obvious answer because it is the answer. Growth will only slow because supply is exceeding demand. Public resistance to building new pipelines, to the extent it exists in Texas, is one of the reasons that so much gas is flared from Permian Basin oil fields… And methane isn't released by flaring. Flaring burns methane, making carbon dioxide.

Furthermore, pipeline construction is booming…

> "
> *January 2019 Vol. 74 No. 1*
> *FEATURES*
> ***North America Pipeline Construction Outlook***
>
> *Jeff Awalt | Executive Editor*
>
> *[…]*
>
> *The latest survey by sister publication Pipeline & Gas Journal, based on Energy Web Atlas data, indicates 145,353 miles of pipelines were planned or under construction worldwide at the start of the new year – and North America accounted for 36,087 miles of that total. The survey indicated that 9,542 miles of pipeline are under construction in North America and 26,545 are planned.*
>
> ***United States***
>
> *While pipeline construction has increased throughout North America, the heaviest activity has been concentrated around major U.S. shale plays with takeaway capacity constraints – most notably, the Permian Basin of West Texas and New Mexico and the*

klimaat
Master Resource
Moshtemp – Steve Mosher
NCDC Hi/Lo Records lookup
Niche Modeling – David Stockwell
No Frakking Consensus
No Tricks Zone
NYT Dot Earth – Revkin
Our World in Data
Planet Gore
Real Climate
scienceofdoom
Sea Level Info
Skeptical Science – John Cook
Small Dead Animals
SOHO solar images
Solar Cycle 24 Board
Stoat – Connolley
Surfacestations Gallery
Surfacestations Main
Susan Crockford – polarbearscience
Tallbloke's Talkshop
Tamino's Open Mind

Marcellus/Utica basins of Appalachia.

[…]

In the Permian Basin, more than 2 MMbpd of pipeline capacity has been proposed, and several of those projects have moved forward following successful open seasons that revealed strong customer interest. Production in the hottest U.S. shale oil play began pushing against takeaway capacity in 2017, causing tariffs to rise, and surpassed it during 2018.

A number of major Permian projects are scheduled for completion during 2019, including the 730-mile Epic crude oil pipeline to Corpus Christi, Texas, which is developing into a major crude and NGL export hub. The Epic crude line will add 590,000 bpd of takeaway capacity, following the path the Epic NGL pipeline which also is under construction.

Plains All American expects first flow on its Cactus II project in the second half of this year. Cactus II was proposed as a 585,000 bpd project linking Permian production to Corpus Christi/Ingleside via existing and two new pipelines. Due to customer interest, Plains conducted a successful second open season for expanded capacity. Cactus II is expected to start partial service in the third quarter of 2019, Plains is targeting full service on the 670,000 bpd line in April 2020.

Other notable Permian crude oil projects include the Phillips 66/Enbridge Gray Oak Pipeline to Corpus Christi, Freeport and Houston. Gray Oak, which is scheduled to begin service in the second half of this year, will have an initial capacity of 385,000 bpd.

Most recently, Houston-based Jupiter Energy Group commenced an

The Air Vent
The Chiefio – E.M. Smith
The Cosmic Tusk
The Daily Bayonet
The GWPF
The Hockey Schtick
The Lukewarmer's Way – Tom Fuller
The Next Grand Minimum
The Reference Frame
Thomas Fuller – 3000quads
Tom Nelson
Trust Yet Verify
UAH AMSU Daily Temps
Warren Meyer
Warwick Hughes
Weather Picture of the Day
WFT – Interactive Climate Graph Engine
William Briggs
World Climate Report

open season in December for a 650-mile, 36-inch crude oil pipeline with expected completion by the fourth quarter of 2020. The pipeline would have capacity up to 1 MMbpd with origination points near Crane and Gardendale/Three Rivers in West Texas and an offtake point in Brownsville, Texas. Privately held Jupiter said it also is constructing a crude upgrading, processing and export terminal capable of loading VLCCs in the Port of Brownsville.

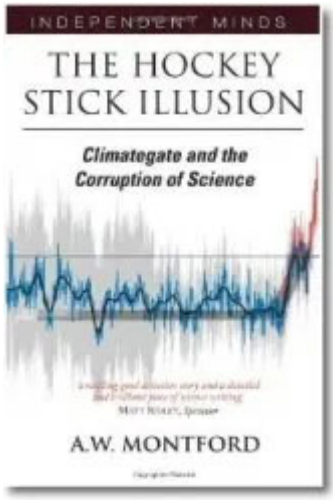
The Permian pipeline shortage is not limited to crude oil production, however. With associated gas accounting for about a third of the Permian output and regulations limiting the amount of gas that can be flared, natural gas pipeline constraints have also put a ceiling on oil production while pushing gas prices in West Texas down to the lowest of any major U.S. hub.

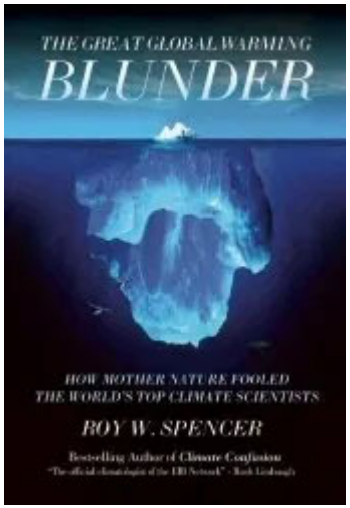
Fortunately, Mexico is providing a growing export market for piped gas from Texas, as its southern neighbor has been aggressively expanding its natural gas infrastructure.

Mexico

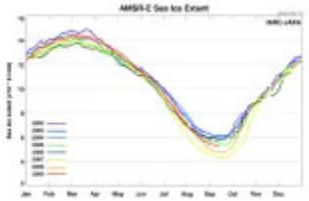
In 2012, according to Sener, the Mexican ministry of energy, there were 7,050 miles (11,347 km) of gas pipelines in Mexico, of which 5,665 miles (9,118 km) were operated by Pemex. Since then, 1,496 miles (2,410 km) of gas pipelines have been added to the national grid, and that total is expected to reach 5,420 miles (8,722 km) by the end of 2019.

The 13 existing natural gas interconnections from the United States have an import capacity of about 4.2 Bcf/d, according to the International Energy Agency (EIA), with four of them interconnected to the Integrated National Transportation and Storage System: El





Sea Ice Page



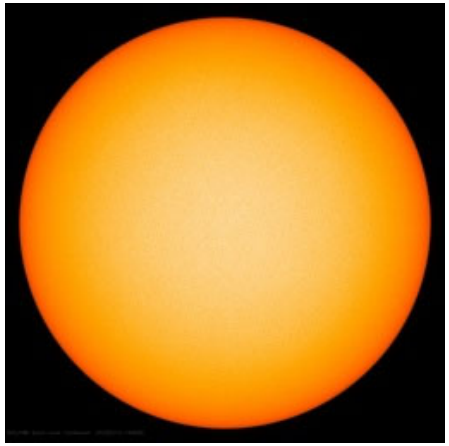
Solar Images & Data Page

> *Hueco, Cuidad Mier, Reynosa and Argüelles. By the end of this year, five additional interconnections are expected to start operations.*
>
> *A number of important gas pipelines from Texas and within Mexico have come on line over the past two years, including Enbridge's Valley Crossing Pipeline, a 168-mile system that added 2.6 Bcf/d of capacity when it entered service in October, and TransCanada's 348-mile, 670 MMcf/d El Encino-Topolobampo Pipeline, which began service in June.*
>
> *TransCanada has two more pipelines with expected completion this year: the 178-mile (287 km) Tuxpan-Tula, a $700 million project with a capacity of 886 MMcf/d, and the Tula-Villa de Reyes, a 36-inch, 260-mile (420 km) pipeline, supported by a 25-year service contract with the Comisión Federal de Electricidad (CFE), Mexico's state-owned power company. [For an in-depth review of projects in Mexico, see the Energy Web Atlas white paper, "Mexico's Infrastructure Expansion and Five-year Plan."]*
>
> *[…]*
>
> — *Underground Construction*

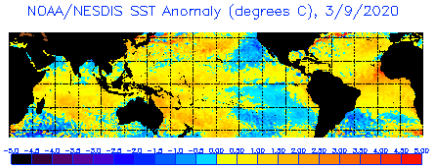
The *non sequitur* train was followed by this…

> "
> *Additionally, the underlying technology of hydraulic fracturing that has enabled the shale revolution is under increased scrutiny.*

Unmitigated horst schist! Texas isn't New York, New England or California.



ENSO/SST Page



WUWT Tag Cloud

Al Gore antarctica Arctic Australia Bill McKibben california Carbon dioxide climate climate change Climate model Climatic Research Unit email controversy Current sea level rise Earth El Niño-Southern Oscillation Energy environment Global warming Goddard Institute for Space Studies greenhouse gas greenland Heartland Institute Intergovernmental

Then the other three wheels came off...

After dismissing offshore wind, even though they don't seem to understand why it doesn't work...

> *[…]*
>
> *Offshore wind production from the Gulf of Mexico, on the other hand, is a slow work-in-progress and unlikely to compete with other sources of electricity for at least the next decade, as the cost of offshore wind remains substantially higher than onshore wind, solar and natural gas in Texas. This is in spite of significant expansions of offshore wind occurring in Europe, China and along the East Coast, and the favorable climate for offshore wind in Texas originating from excellent wind resources, a shallow shelf and existing infrastructure from ongoing oil and gas operations.*
>
> *[…]*
>
> — *Forbes*

They decided that the answer must be solar...

> *[…]*
>
> *The bet seems to be on solar power: utility-scale solar power, close to population centers and coupled with modest energy storage options.*
>
> *Solar power today accounts for less than 1% of Texas' energy mix, but the amount of installed solar power in the state is expected to almost triple by 2021.*

Panel on Climate Change IPCC James Hansen Judith Curry La Nina Little Ice Age Met Office Michael Mann NASA National Climatic Data Center National Oceanic and Atmospheric Administration National Weather Service NOAA Pacific Ocean Peter Gleick Polar ice packs Science & Environmental Policy Project Sea ice Steve McIntyre sun temperature Temperature record United States Watts Up With That?

Feed Me

RSS - Posts

RSS - Comments

> *With strong overlap between peak production and peak demand, especially in the summer, utility-scale solar is especially well-suited from a grid integration perspective. Moreover, with significantly lower soft costs as compared to rooftop and distributed solar, utility-scale solar combined with modest storage seems an attractive solution.*
>
> *[…]*
>
> — *Forbes*

With solar power accounting for less than "1% of Texas' energy mix," tripling the installed capacity will very likely not move it above "1% of Texas' energy mix."

Meta

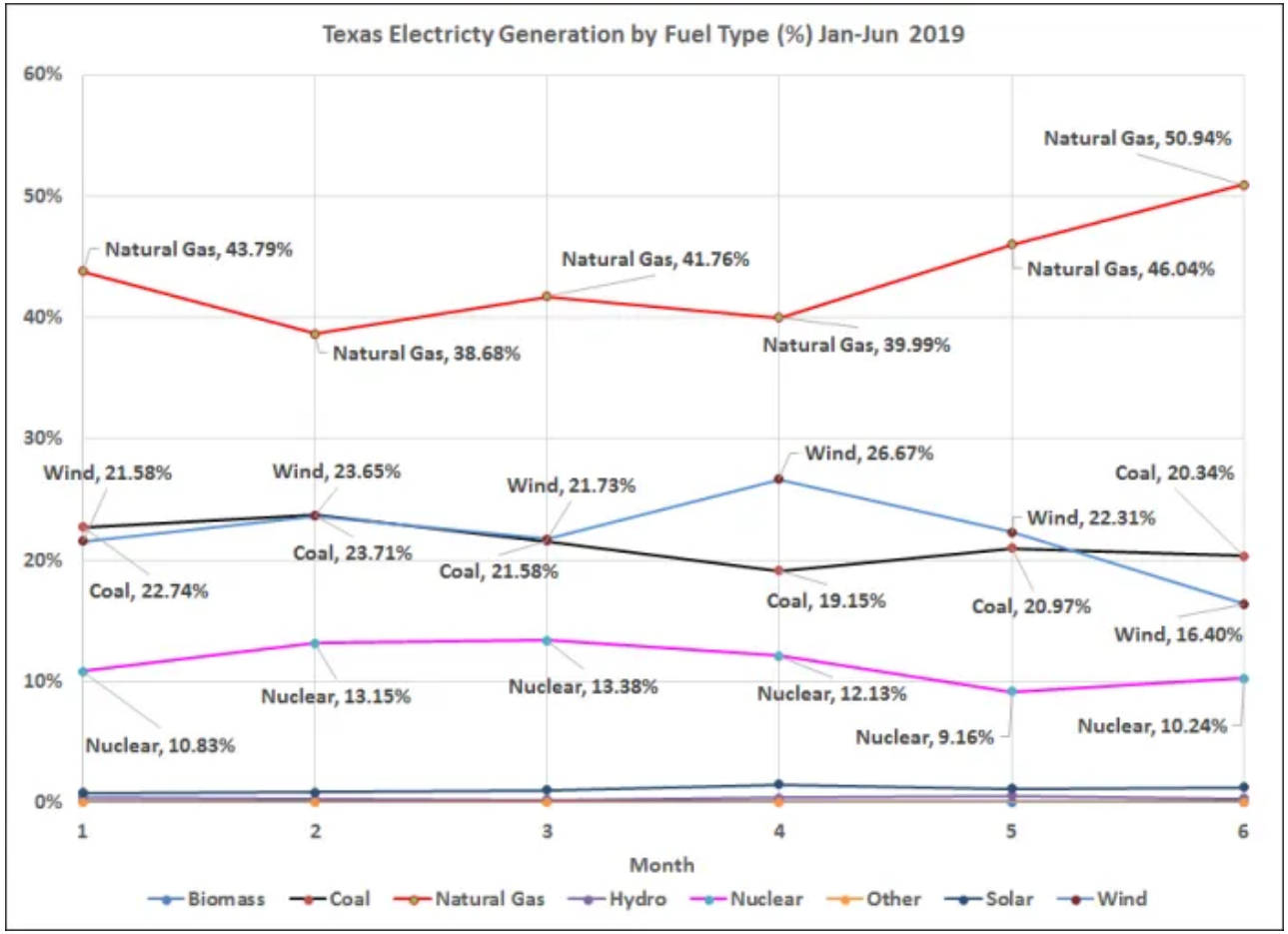
Log in

Entries feed

Comments feed

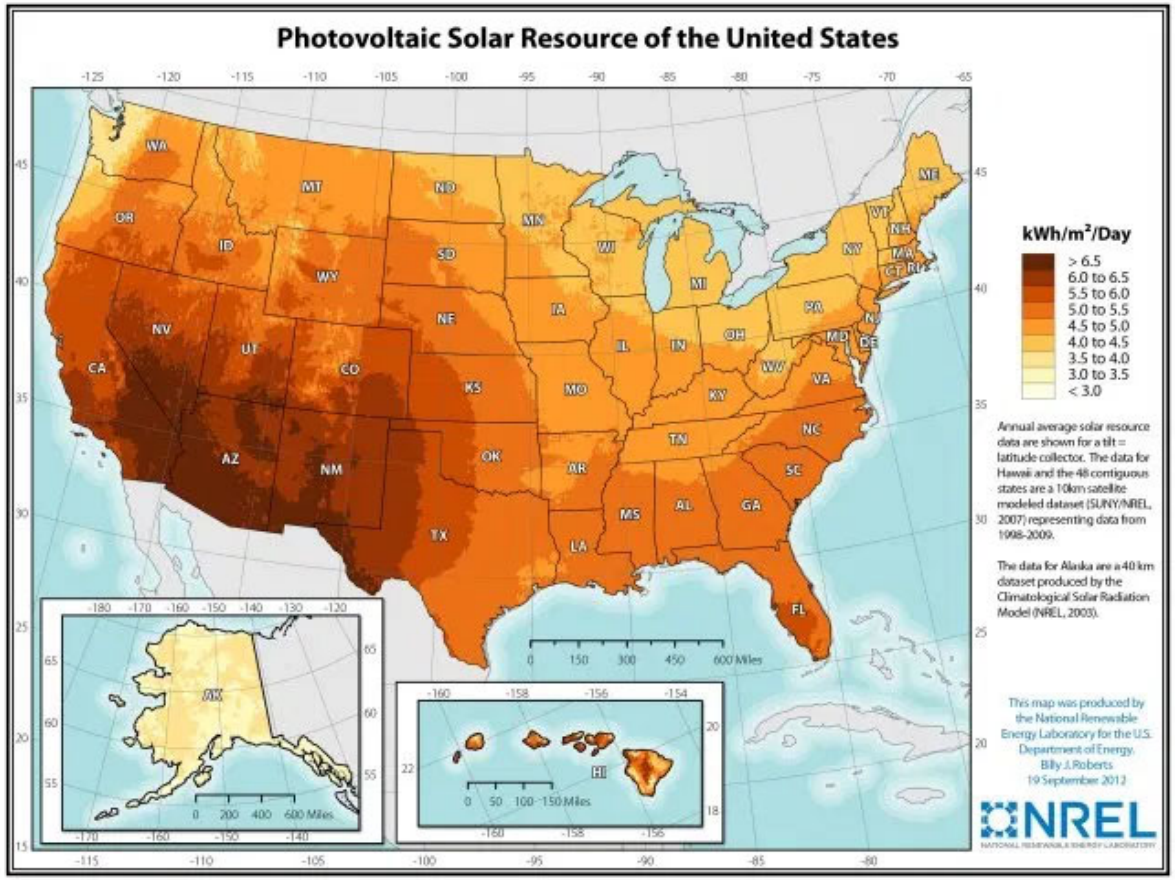
WordPress.org

Copyright Notice



Jan-Jun 2019 Demand and Energy Report (ERCOT)

Texas solar resource isn't actually that good and where it is pretty good, it's where most of the wind farms are. The CREZ transmission lines are already congested with excess electricity and the little bit of solar power already operating out there has made the congestion worse.



Photovoltaic solar resource map (NREL)

About the authors of the *Forbes* article…

> “
> ***Dr. Ramanan Krishnamoorti*** *is the chief energy officer at the University of Houston. Prior to his current position, Krishnamoorti served as interim vice president for research and technology transfer for UH and the UHSystem. During his tenure at the university, he has served as chair of the UH Cullen College of*

> *Engineering's chemical and biomolecular engineering department, associate dean of research for engineering, professor of chemical and biomolecular engineering with affiliated appointments as professor of petroleum engineering and professor of chemistry. Dr. Krishnamoorti obtained his bachelor's degree in chemical engineering from the Indian Institute of Technology Madras and doctoral degree in chemical engineering from Princeton University in 1994.*
>
> ***Ed Hirs** is BDO Fellow for Natural Resources and a UH Energy Fellow at the University of Houston, where he teaches energy economics. to undergraduate and graduate students.*
>
> *UH Energy is the University of Houston's hub for energy education, research and technology incubation, working to shape the energy future and forge new business approaches in the energy industry.*
>
> — *Forbes*

About the author of this WUWT post…

> "
> *I have been a geologist/geophysicist in the "climate wrecking industry" (oil & gas) since 1981, primarily working the Gulf of Mexico, the second most prolific oil play in these tangentially United States.*
>
> *As a proud member of the "climate wrecking industry", I am proud of our industry's accomplishments. I recently attended a salt tectonics conference at the University of Texas at Austin. The opening remarks were by Texas State Geologist and Director of the Bureau of Economic Geology, Scott Tinker. His remarks mostly focused on how oil & gas are integral components of lifting people out of energy*

poverty and he closed with, "When someone asks you what you do, reply with 'I work in the oil & gas industry, I lift people out of poverty. What do you do?'" The "Moral Case for Fossil Fuels" is undeniable.

I have a BS in Earth Science, with a geology concentration and minor in math, along with 38+ years of "OJT". I am a member of the Society of Exploration Geophysicists (SEG), American Association of Petroleum Geologists (AAPG) and Houston Geological Society (HGS). I live in Dallas with my wife (also a geo) and 11 dogs (9 rescues, mostly Pomeranians, & 2 Corgis, who we love almost as much as the rescues) and I work in Houston… My commute has a YUGE carbon footprint. MAGA!!!