The Strategic Energy Reserve & The New Energy Economy

Prof. James W. Coleman • @EnergyLawProf

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Today

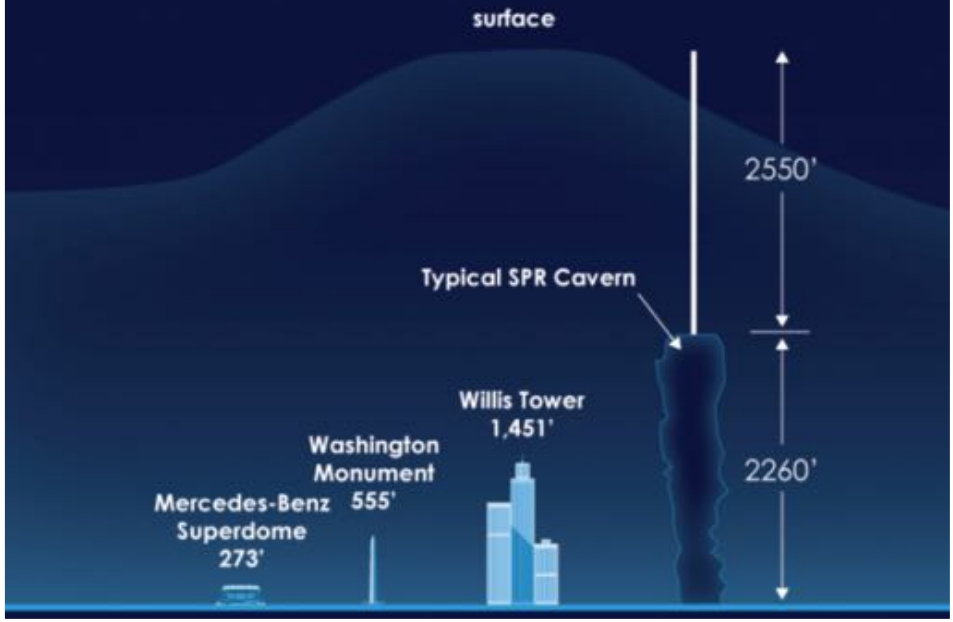
- The Strategic Petroleum Reserve:
  Its Purpose, Use, and Shortcomings
- Move to Cleaner but More Fragile Energy Sources
  Creates Pressing Need for Gas & Electricity Storage
- Building a Strategic Energy Reserve to Secure an
  Affordable and Reliable Energy Future

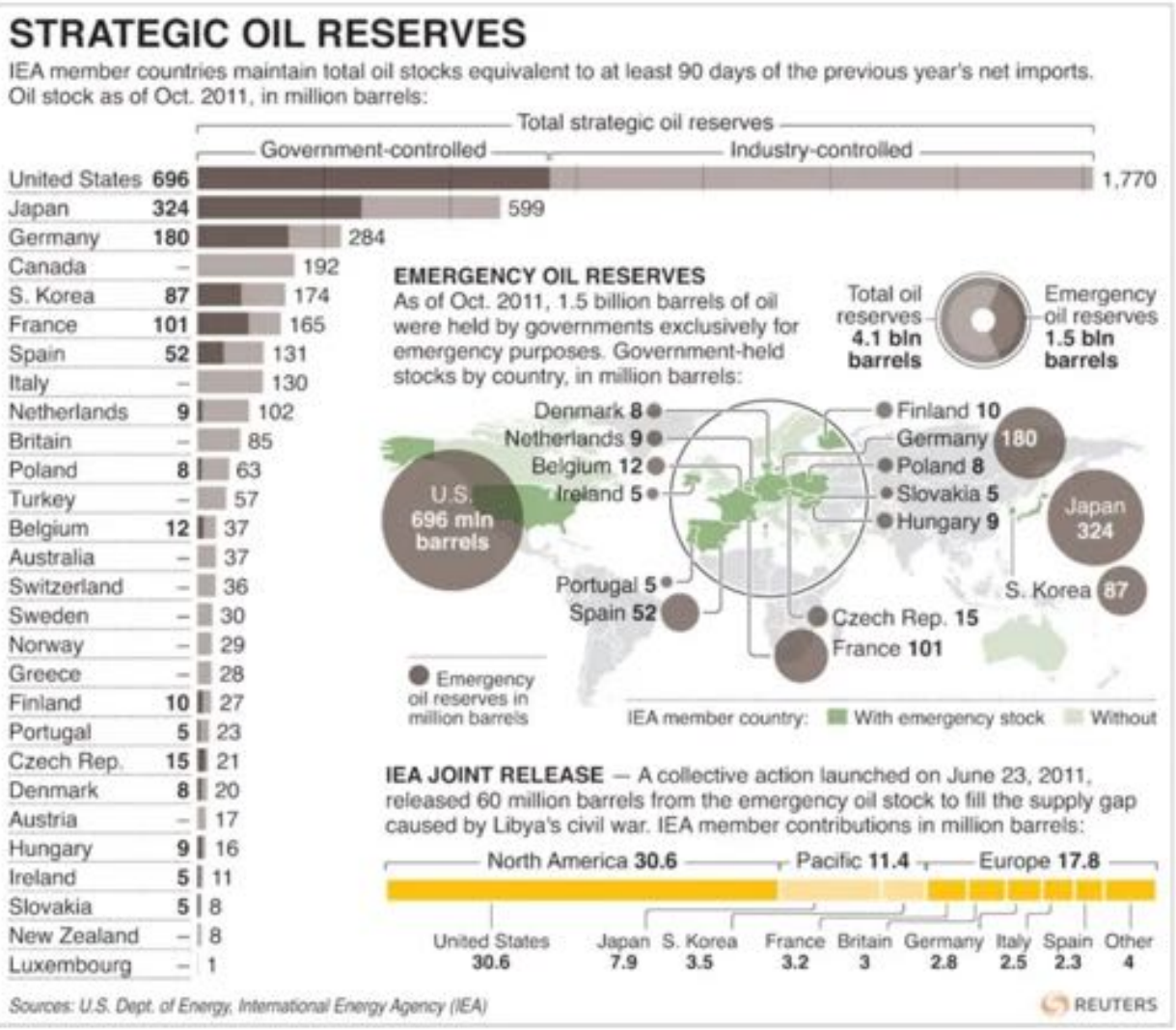
The Strategic Petroleum Reserve: Its Purpose, Use, and Shortcomings

Strategic Petroleum Reserve: The Basics

The Strategic Petroleum Reserve (SPR) is the world's largest supply of emergency crude oil. Administered by the U.S. Department of Energy, these federally-owned oil stocks are stored in massive underground salt caverns along the Texas and Louisiana coastlines of the Gulf of Mexico.

The SPR comprises 60 salt caverns. Each cavern is roughly cylindrical in shape with an average diameter of about 200 feet and a height of 2,550 feet, which is large enough for Chicago's Willis Tower to fit inside with room to spare.





United States' Petroleum Reserve Is World's Biggest By Far

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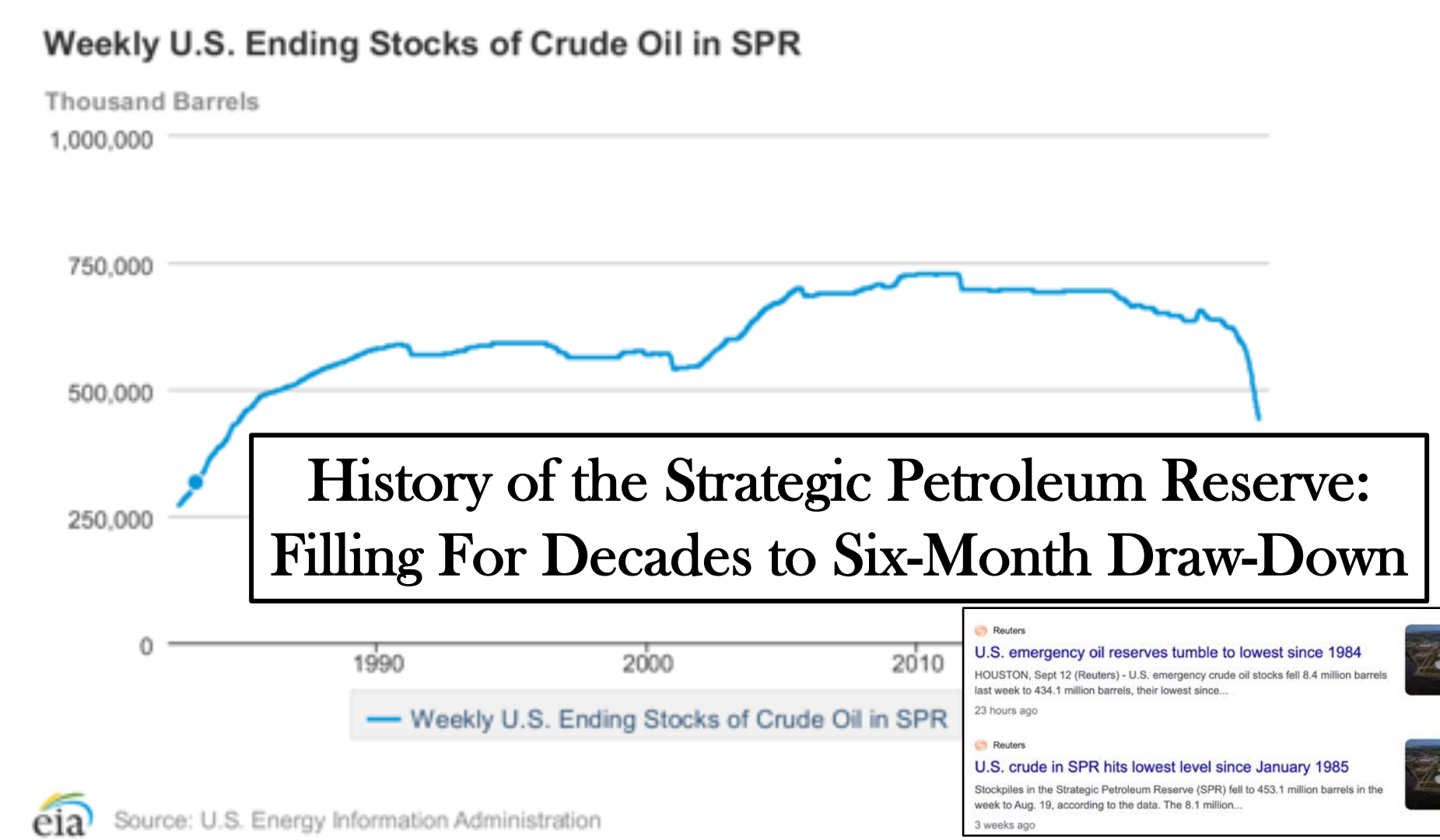
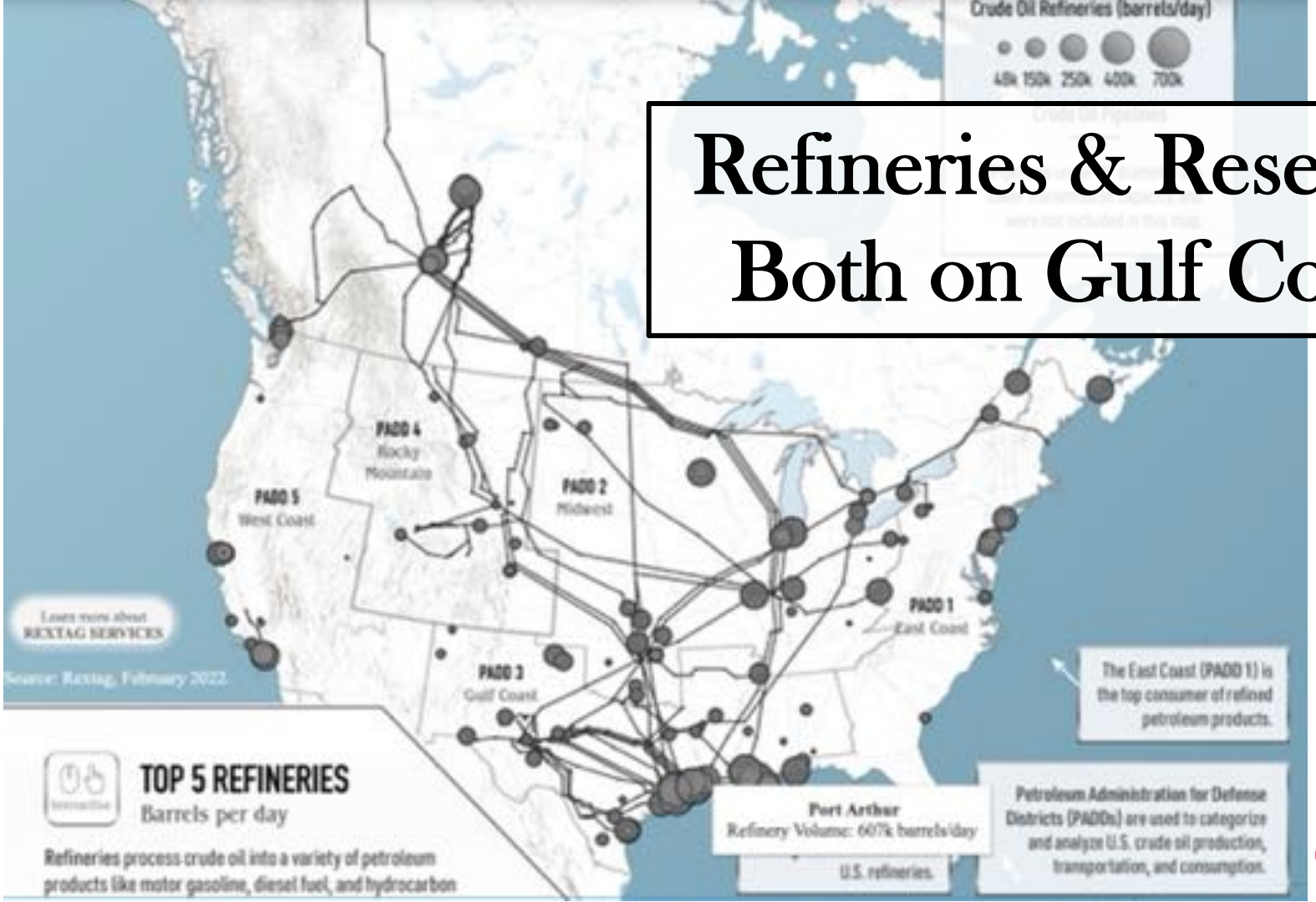

Weekly U.S. Ending Stocks of Crude Oil in SPR
Thousand Barrels
1,000,000
750,000
500,000
250,000
0
1990
2000
2010
Weekly U.S. Ending Stocks of Crude Oil in SPR
History of the Strategic Petroleum Reserve:
Filling For Decades to Six-Month Draw-Down
Reuters
U.S. emergency oil reserves tumble to lowest since 1984
HOUSTON, Sept 12 (Reuters) - U.S. emergency crude oil stocks fell 8.4 million barrels last week to 434.1 million barrels, their lowest since...
23 hours ago
Reuters
U.S. crude in SPR hits lowest level since January 1985
Stockpiles in the Strategic Petroleum Reserve (SPR) fell to 453.1 million barrels in the week to Aug. 19, according to the data. The 8.1 million...
3 weeks ago
eia
Source: U.S. Energy Information Administration

Refineries & Reserves Both on Gulf Coast



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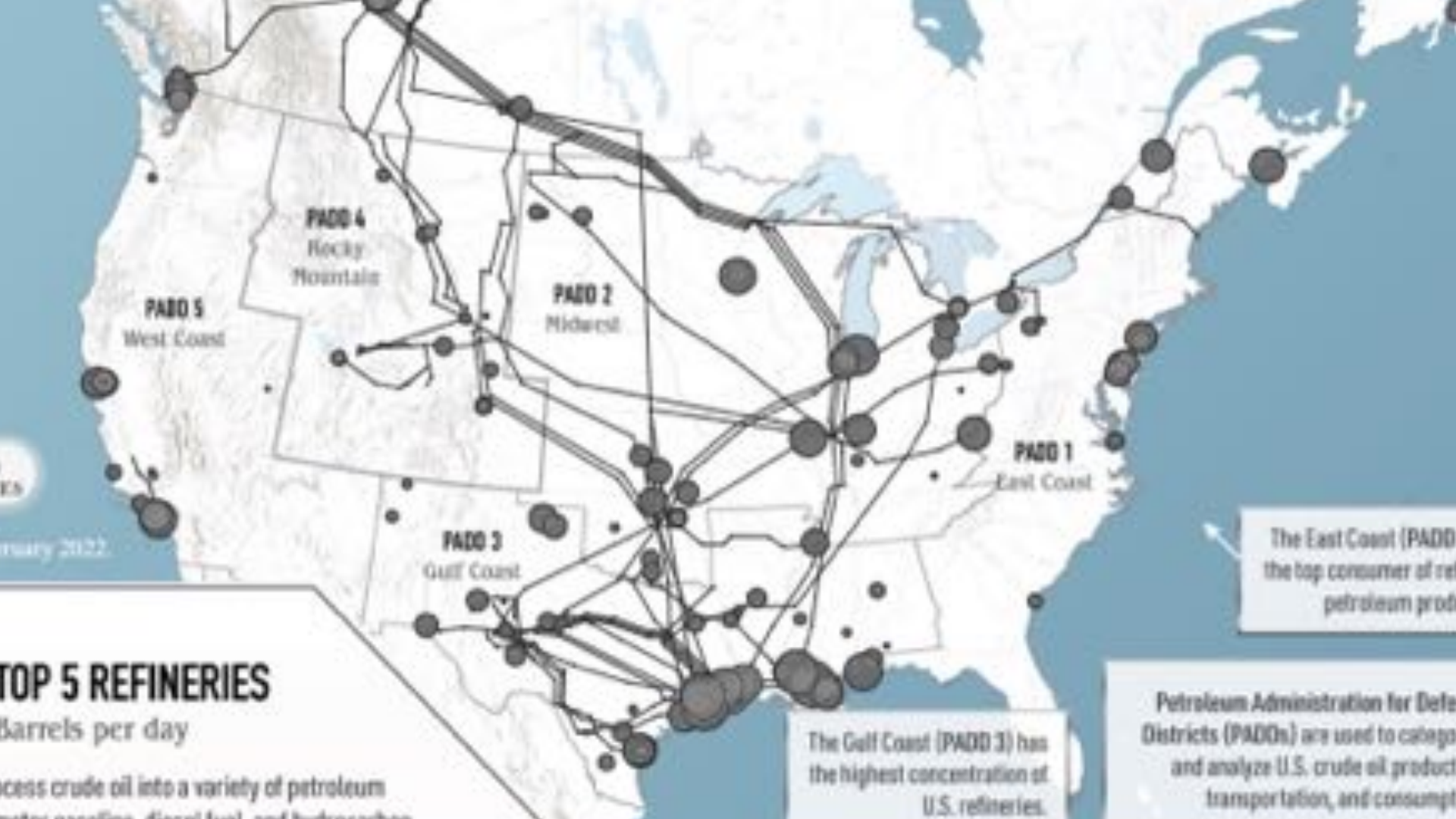
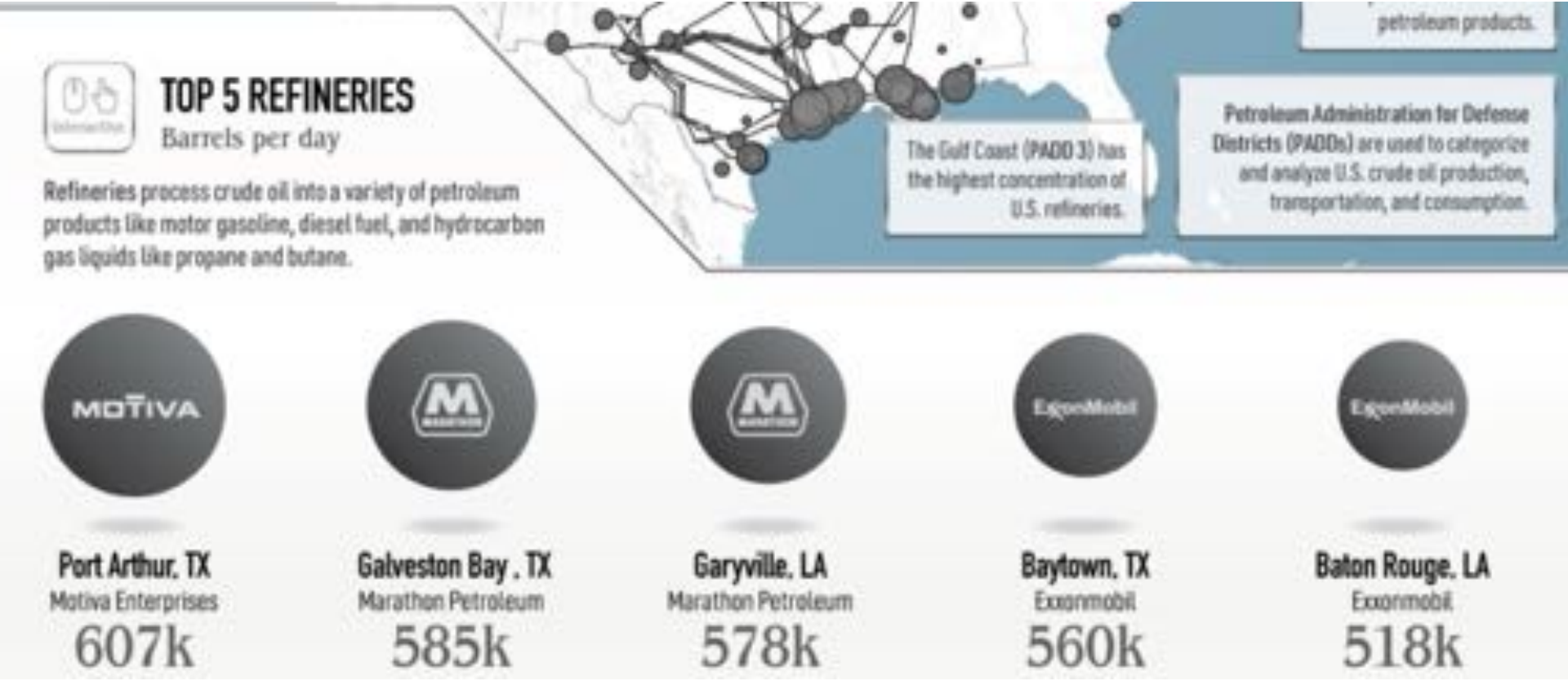
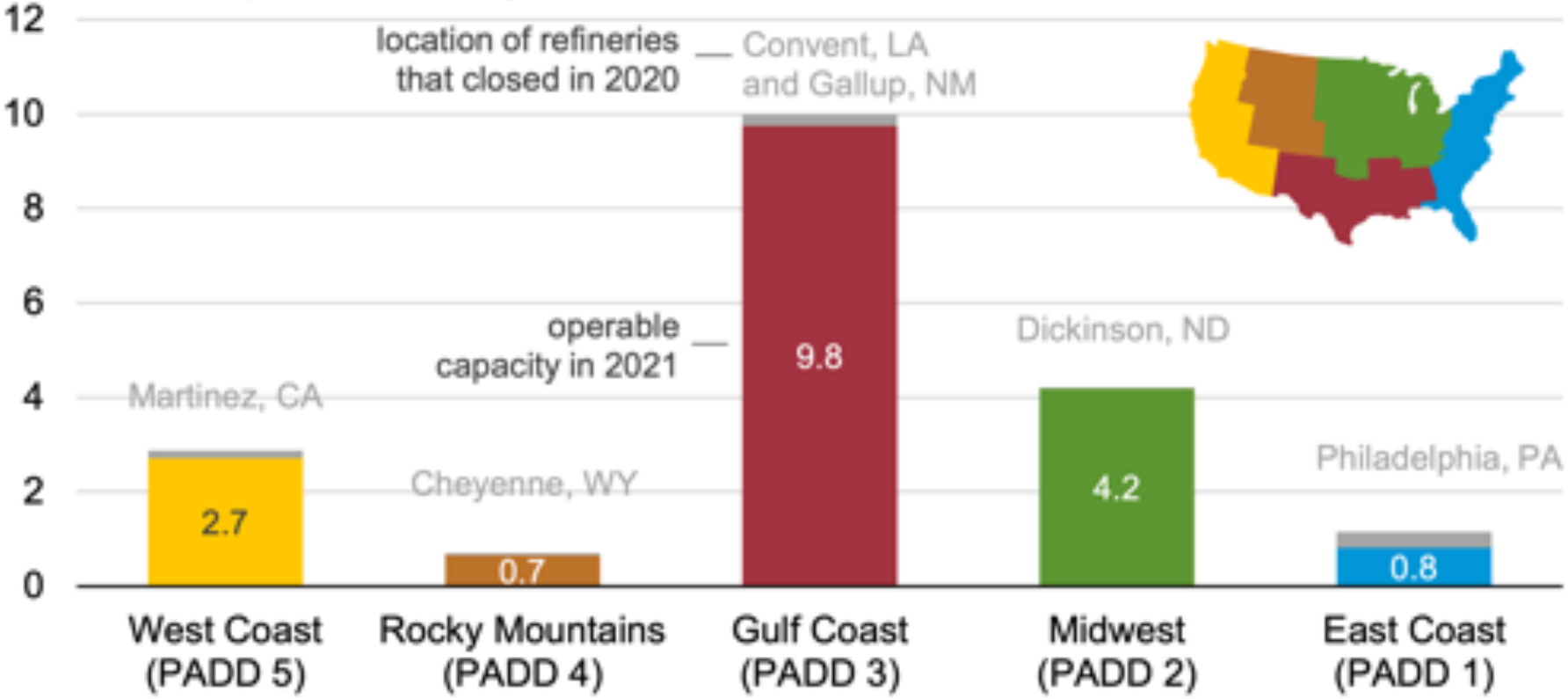

PADD 4
Rocky
Mountain
PADD 5
West Coast
PADD 2
Midwest
PADD 1
East Coast
PADD 3
Gulf Coast
The East Coast (PADD
the top consumer of re
petroleum prod
TOP 5 REFINERIES
Barrels per day
ocess crude oil into a variety of petroleum
The Gulf Coast (PADD 3) has
the highest concentration of
U.S. refineries.
Petroleum Administration for Defe
Districts (PADDs) are used to catego
and analyze U.S. crude oil product
transportation, and consumpt


TOP 5 REFINERIES
Barrels per day
Refineries process crude oil into a variety of petroleum products like motor gasoline, diesel fuel, and hydrocarbon gas liquids like propane and butane.
The Gulf Coast (PADD 3) has the highest concentration of U.S. refineries.
Petroleum Administration for Defense Districts (PADDs) are used to categorize and analyze U.S. crude oil production, transportation, and consumption.
petroleum products.
MOTIVA
Port Arthur, TX
Motiva Enterprises
607k
Galveston Bay , TX
Marathon Petroleum
585k
Garyville, LA
Marathon Petroleum
578k
ExxonMobil
Baytown, TX
Exxonmobil
560k
ExxonMobil
Baton Rouge, LA
Exxonmobil
518k

U.S. atmospheric crude distillation capacity by region (2021)
million barrels per calendar day



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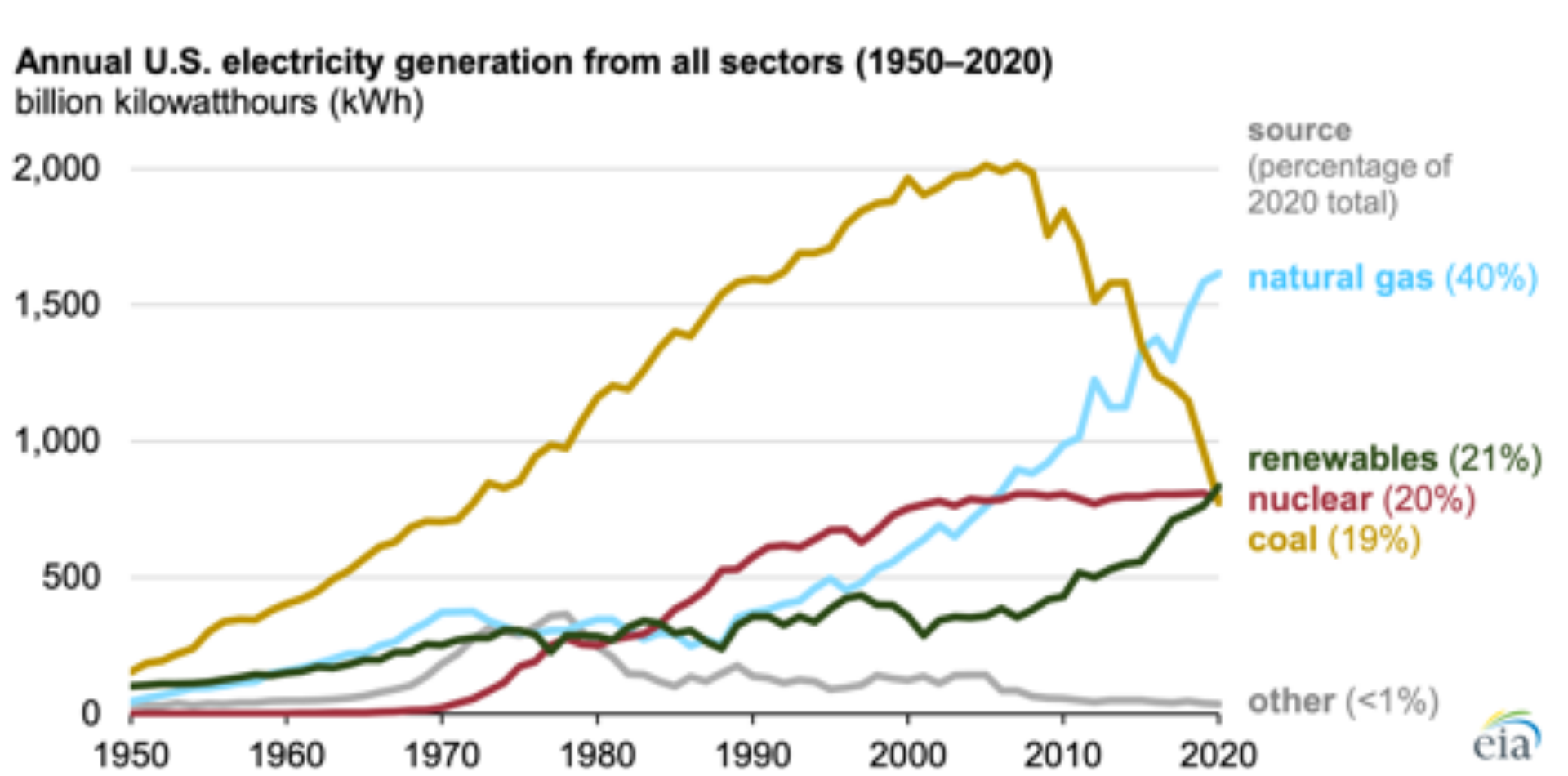
Move to Cleaner but More Fragile Energy Sources Creates Pressing Need for Gas & Electricity Storage



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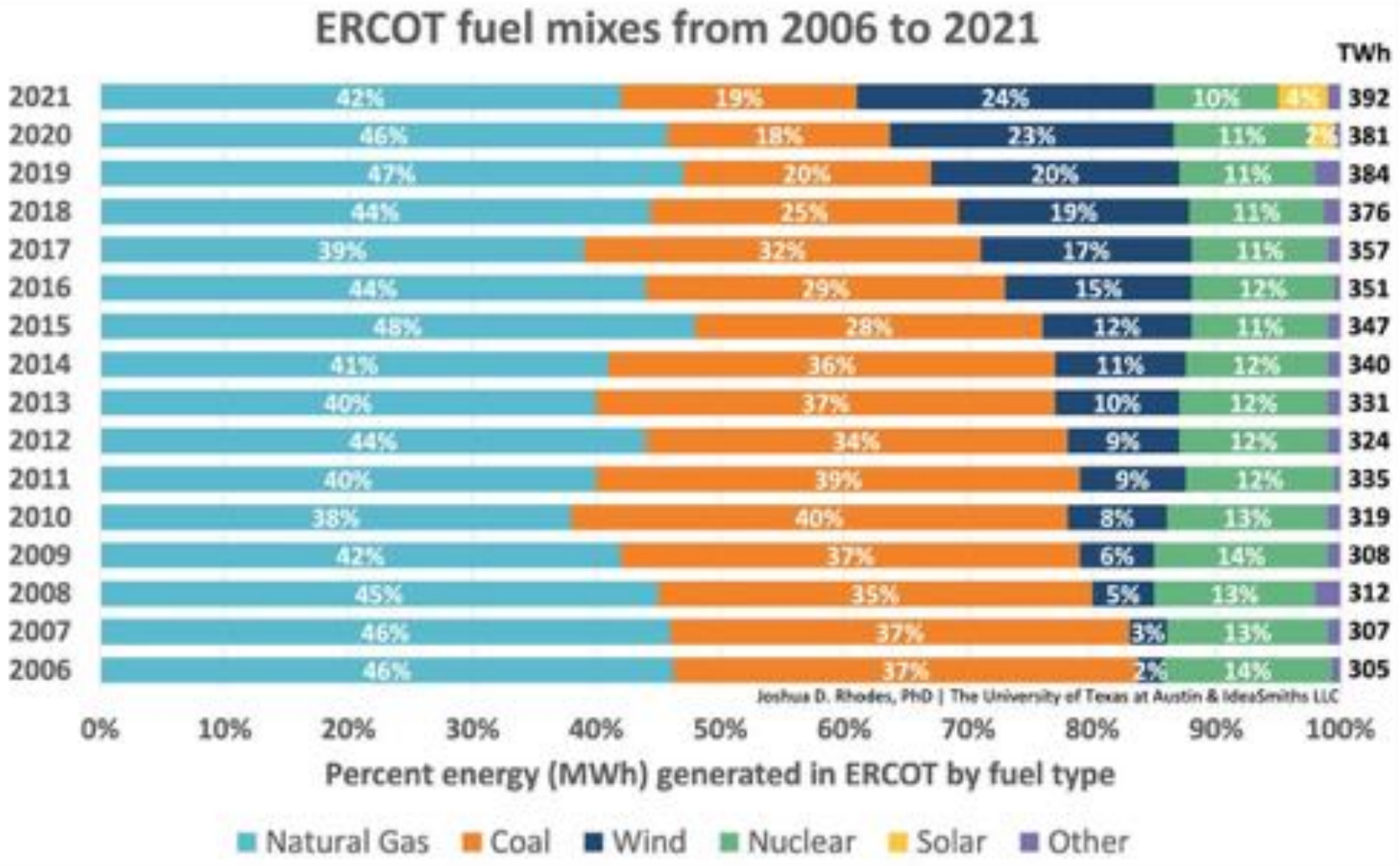
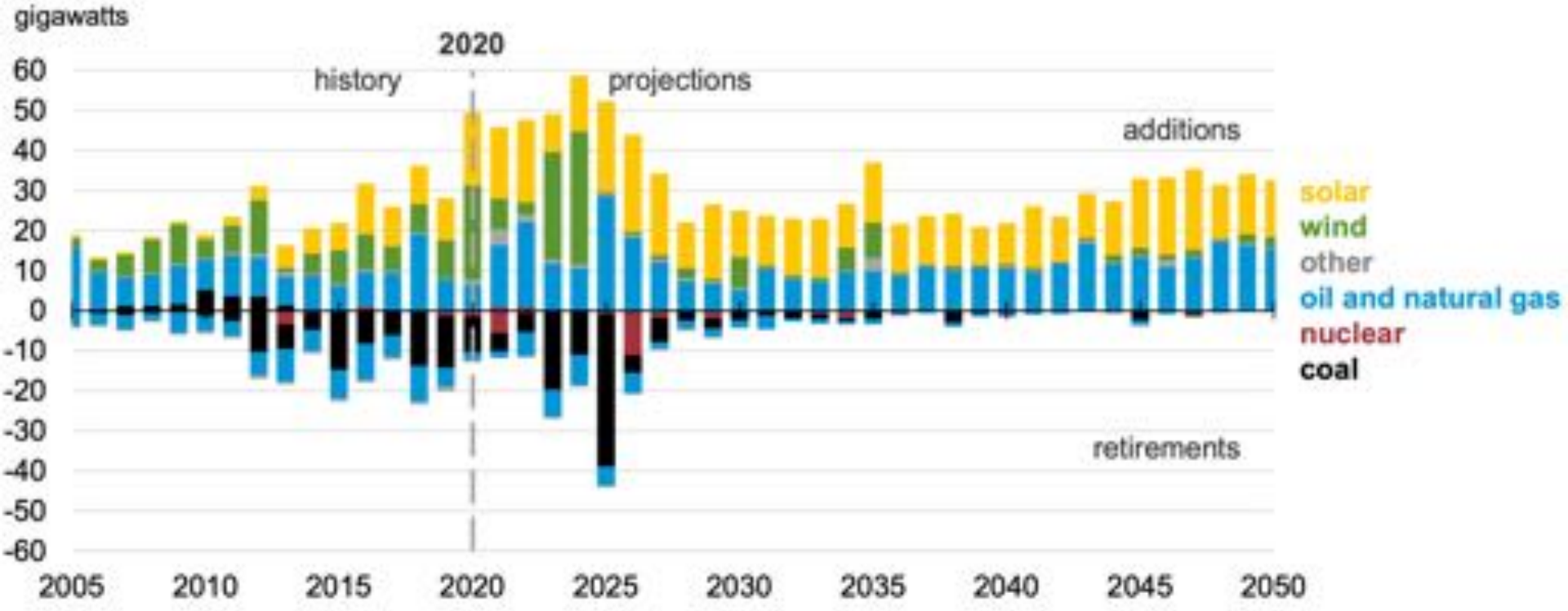

ERCOT fuel mixes from 2006 to 2021
TWh
2021 42% 19% 24% 10% 4% 392
2020 46% 18% 23% 11% 2% 381
2019 47% 20% 20% 11% 384
2018 44% 25% 19% 11% 376
2017 39% 32% 17% 11% 357
2016 44% 29% 15% 12% 351
2015 48% 28% 12% 11% 347
2014 41% 36% 11% 12% 340
2013 40% 37% 10% 12% 331
2012 44% 34% 9% 12% 324
2011 40% 39% 9% 12% 335
2010 38% 40% 8% 13% 319
2009 42% 37% 6% 14% 308
2008 45% 35% 5% 13% 312
2007 46% 37% 3% 13% 307
2006 46% 37% 2% 14% 305
Joshua D. Rhodes, PhD | The University of Texas at Austin & IdeaSmiths LLC
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Percent energy (MWh) generated in ERCOT by fuel type
Natural Gas
Coal
Wind
Nuclear
Solar
Other

U.S. retiring and new generating capacity

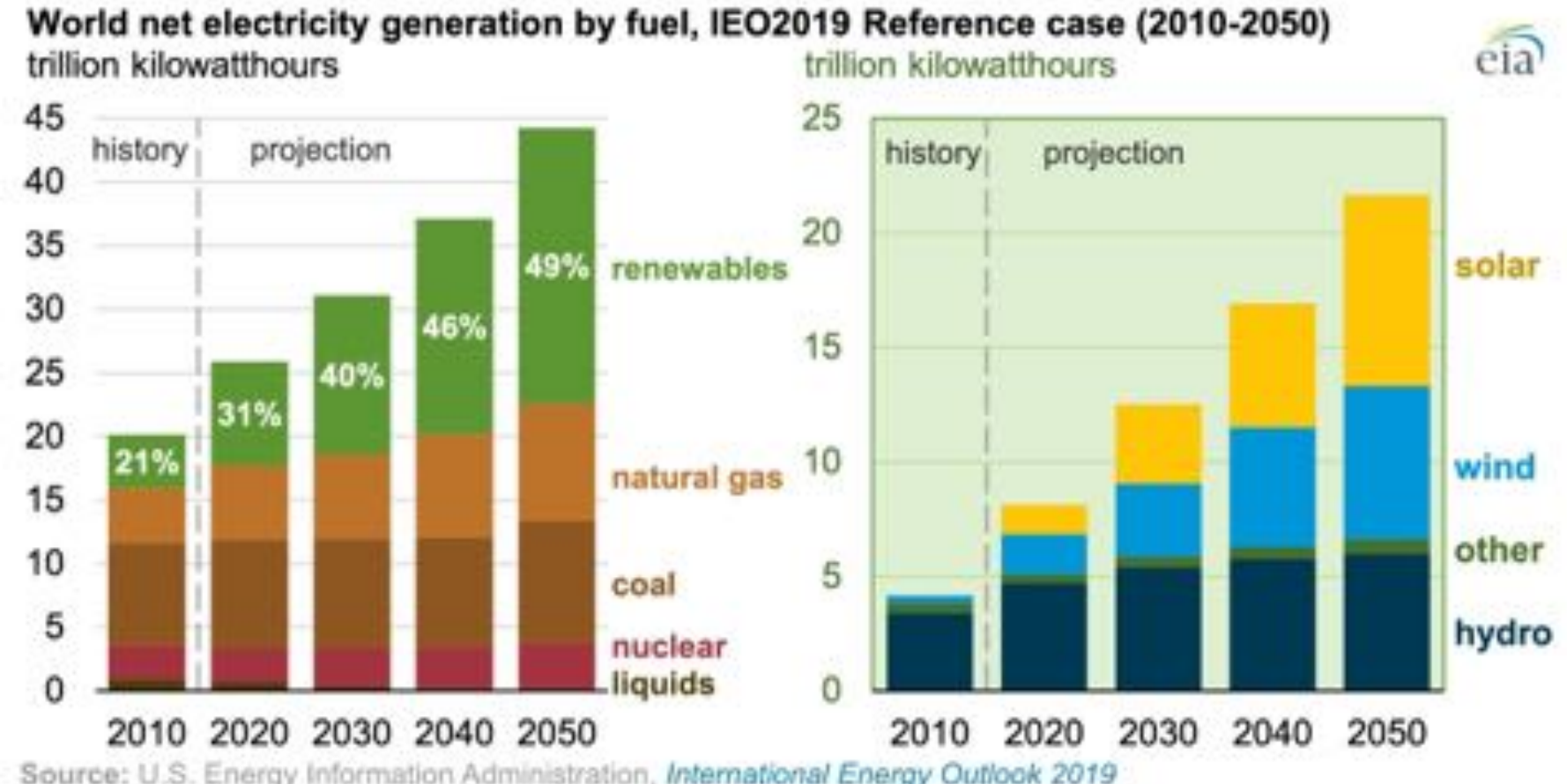
Annual electricity generating capacity additions and retirements

AEO2021 Reference case



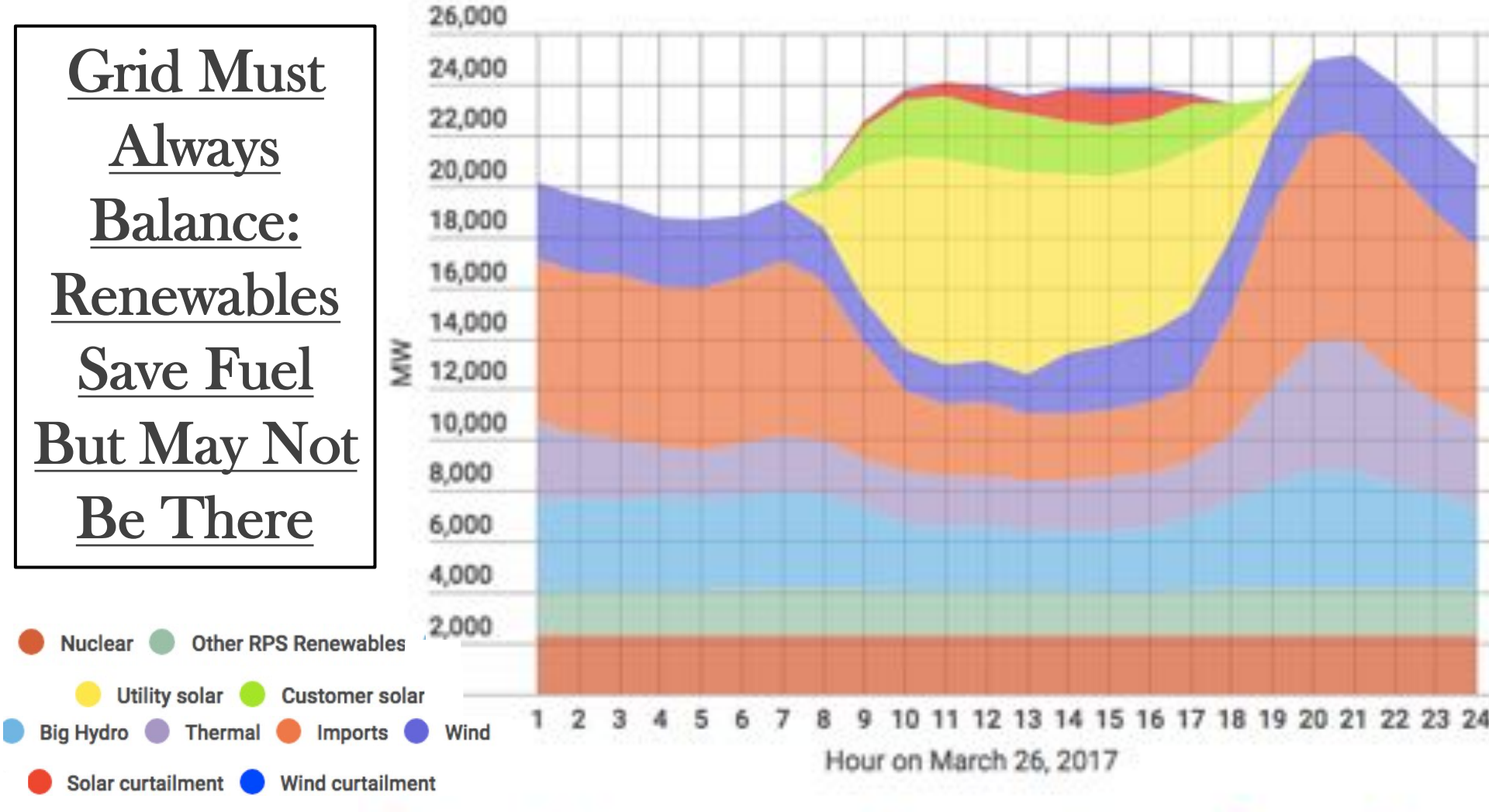
Source: Form EIA-860M, *Monthly Update to the Annual Electric Generator Report*, July 2020

Similar Expectations for World Power



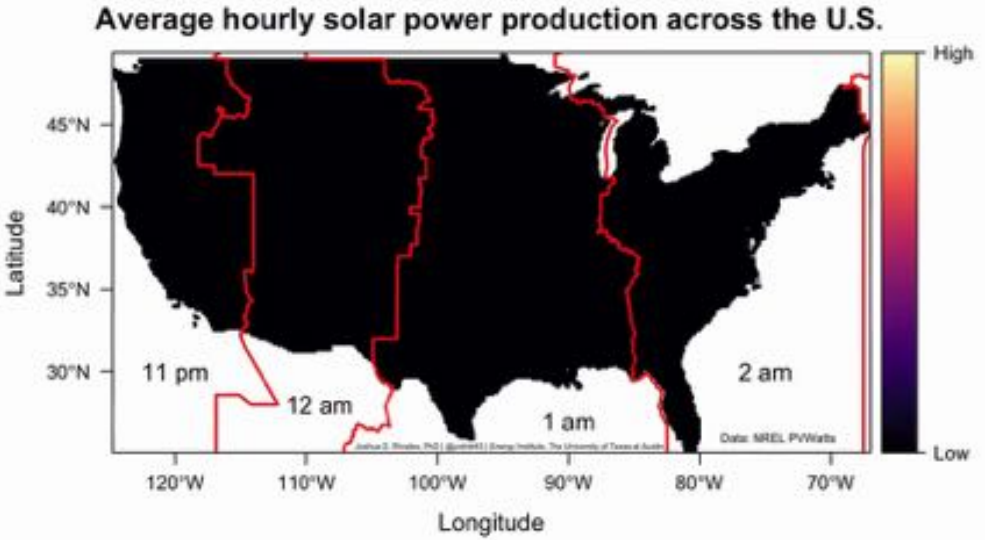
Source: U.S. Energy Information Administration, *International Energy Outlook 2019*

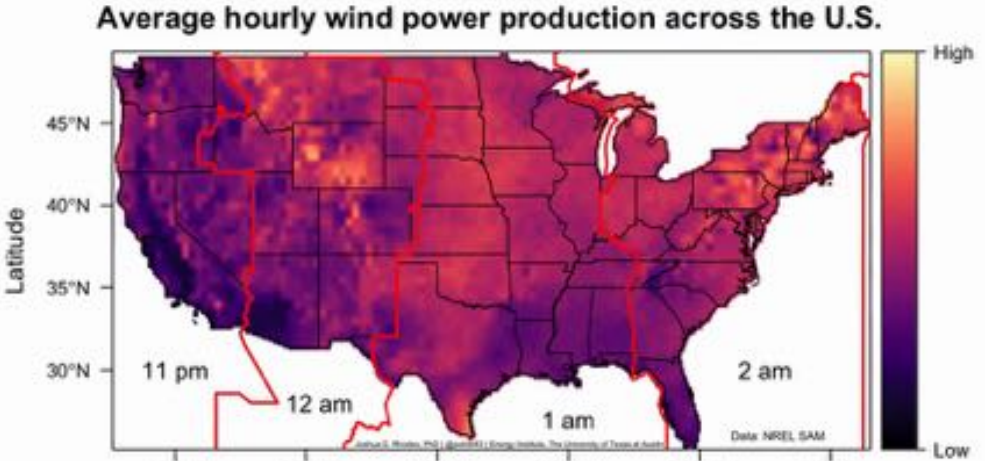
Grid Must Always Balance: Renewables Save Fuel But May Not Be There



Wind & solar power vary over the day...

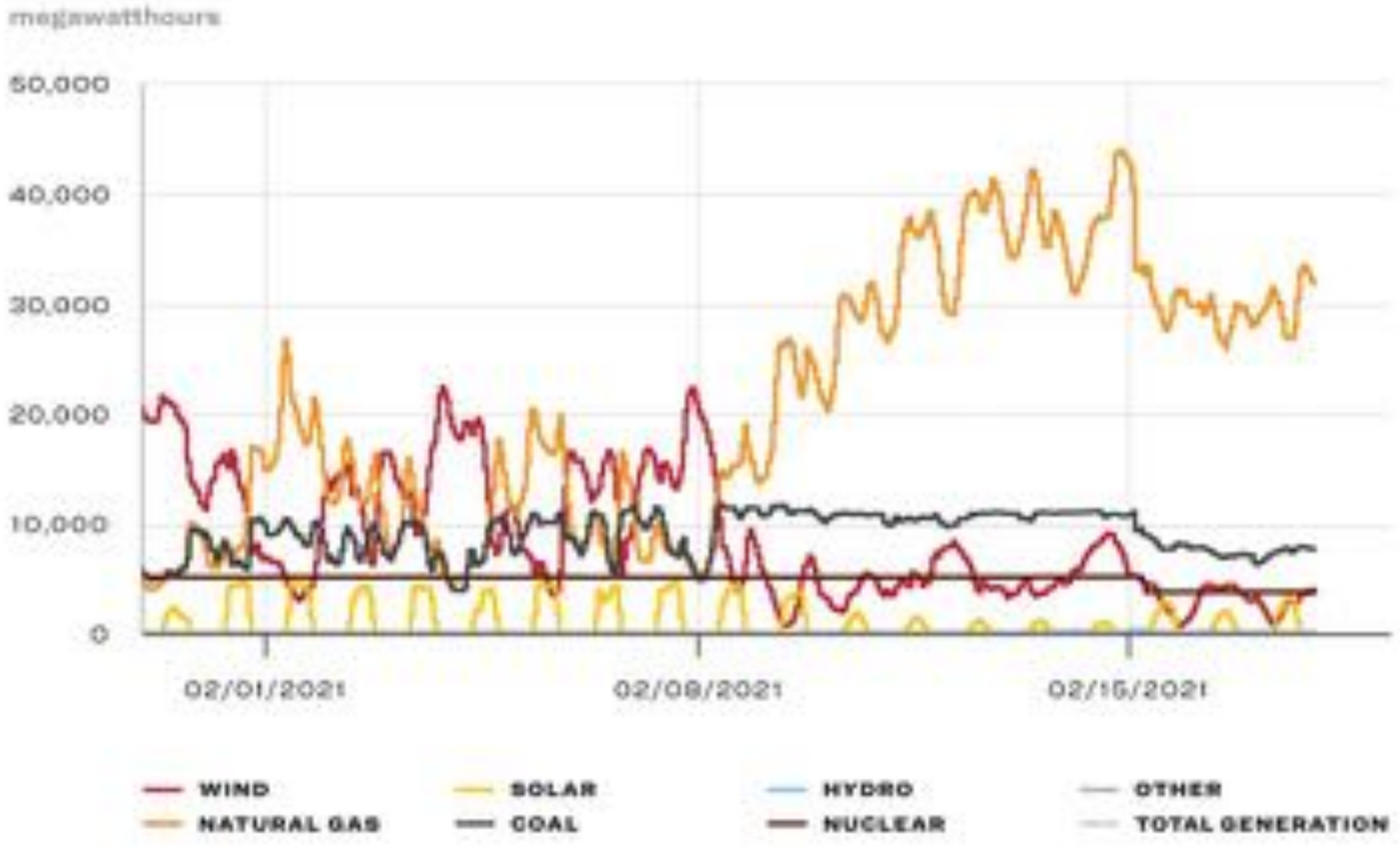
Neither is particularly strong during peak power consumption (early evening)





TEXAS REGION ELECTRICITY GENERATION BY ENERGY SOURCE

(1/30/2021 - 2/18/2021, Central Time)



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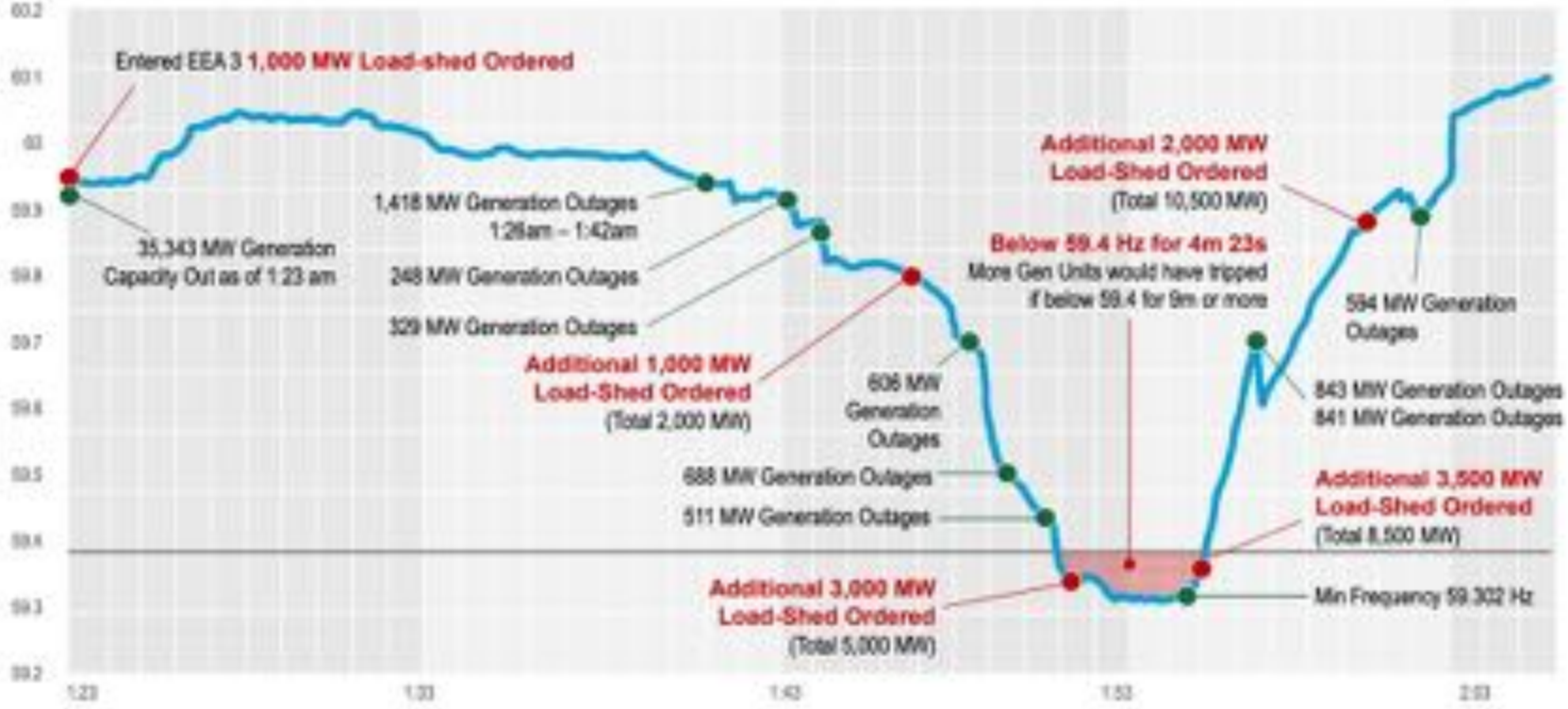
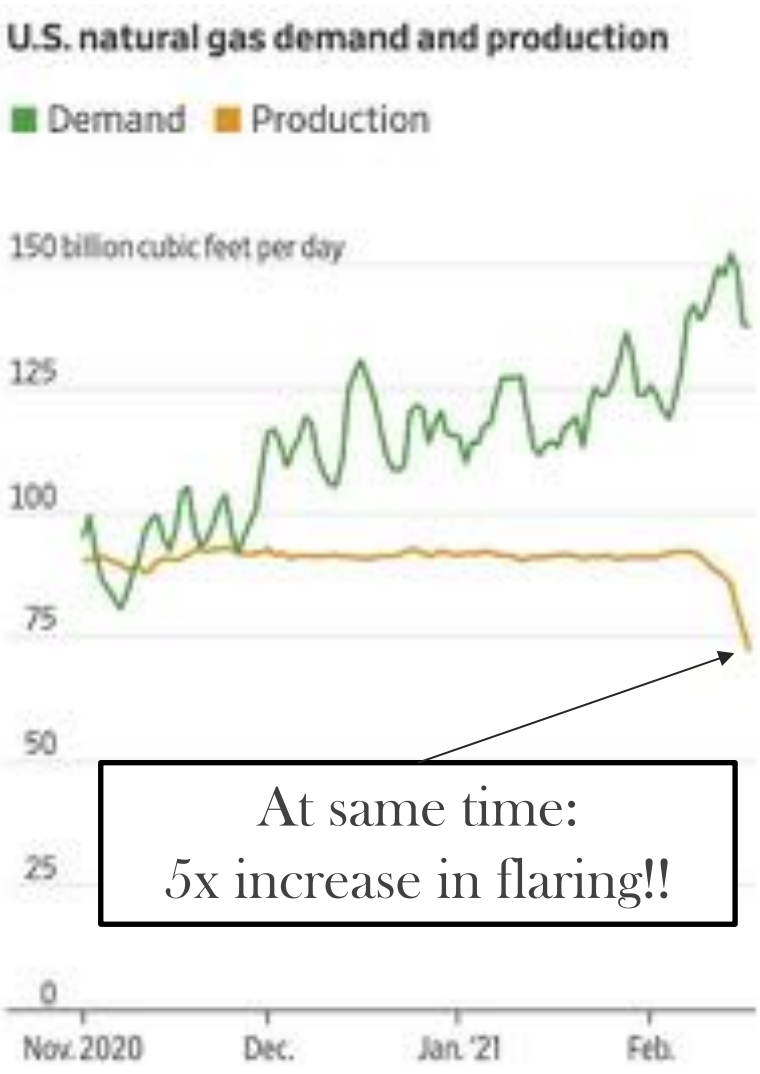
Rapid Decrease in Generation Causes Frequency Drop





The World's #1 Natural Gas Producer & The World's 4th Biggest Net Exporter

...

Consuming Double its Production

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Direct Use of Natural Gas

From the place where it is extracted from the ground, to appliances in your home, natural gas achieves **91% energy efficiency.**

SOURCE ENERGY	EXTRACTION, PROCESSING & TRANSPORTATION	GENERATION	DISTRIBUTION	DELIVERED TO CUSTOMER
100 MMBtu	92 MMbtu	No energy conversion necessary, therefore no energy is lost	91 MMbtu	91 MMbtu

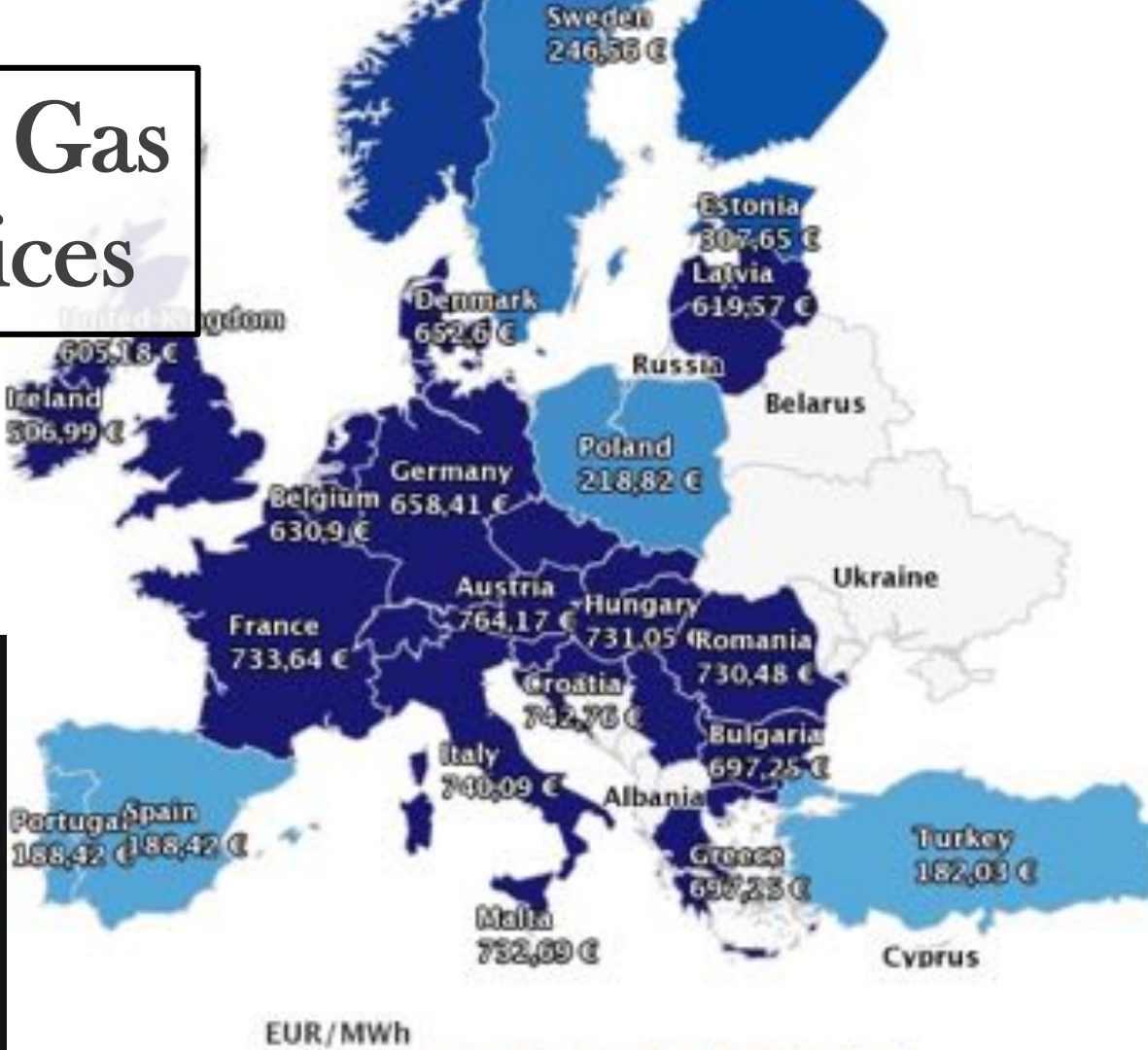
Converting to Electricity

Converting natural gas into electricity to power comparable electric end-use products only maintains 36% of usable energy. This is because of the significant amount of energy lost on the journey from production to customer.

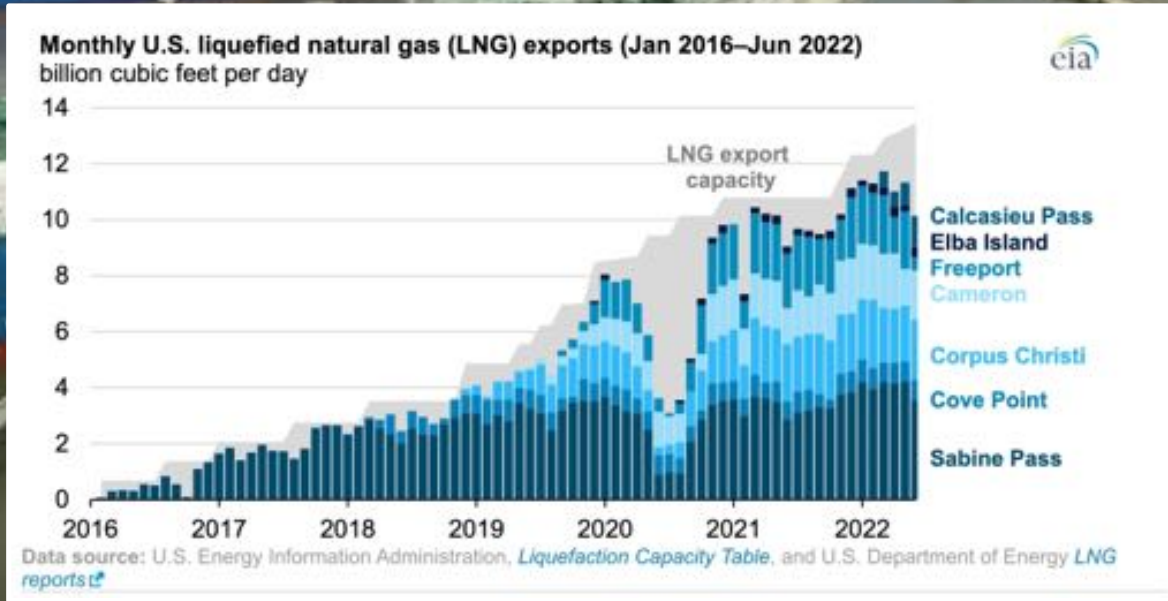
SOURCE ENERGY	EXTRACTION, PROCESSING & TRANSPORTATION	GENERATION	DISTRIBUTION	DELIVERED TO CUSTOMER
100 MMBtu	95 MMbtu	34 MMbtu	32 MMbtu	36 MMbtu

Europe: Record Gas & Electricity Prices

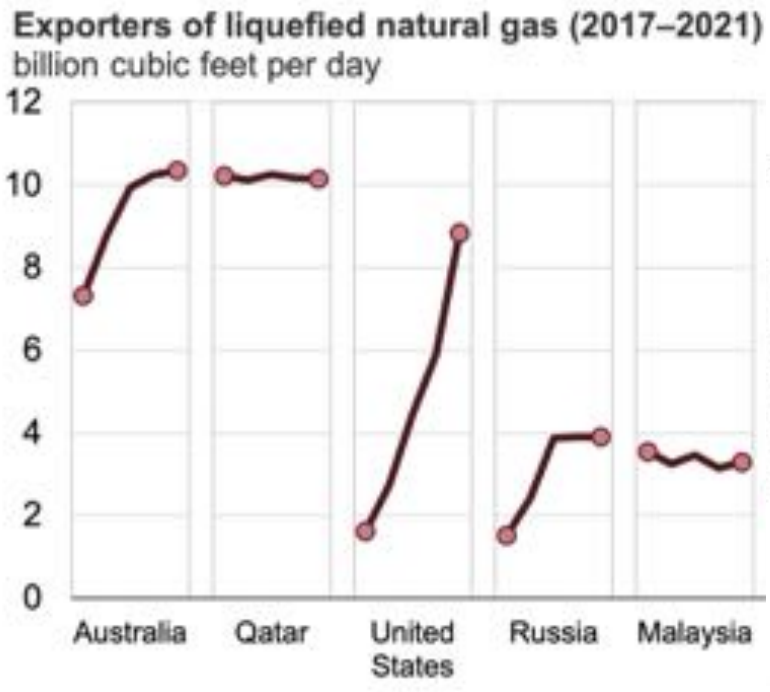
More than 10x past years' prices



Sabine Pass – Louisiana



U.S.: World's #1 LNG Exporter & Promising More



THE WHITE HOUSE
WASHINGTON

FOR IMMEDIATE RELEASE
March 25, 2022

FACT SHEET:
United States and European Commission Announce Task Force to Reduce Europe's Dependence on Russian Fossil Fuels

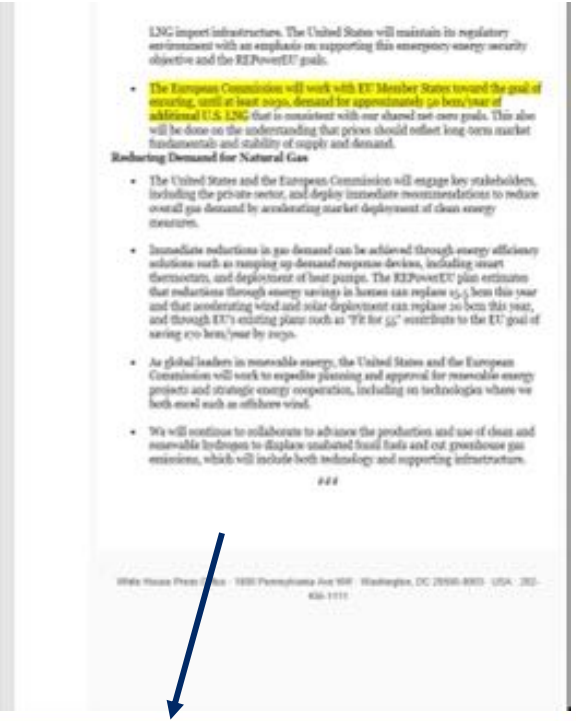
Today, President Joe Biden and European Commission President Ursula von der Leyen announced a joint Task Force to reduce Europe's dependence on Russian fossil fuels and strengthen European energy security as President Putin wages his war of choice against Ukraine.

This Task Force for Energy Security will be chaired by a representative from the White House and a representative of the President of the European Commission. It will work to ensure energy security for Ukraine and the EU in preparation for next winter and the following one while supporting the EU's goal to end its dependence on Russian fossil fuels.

The Task Force will organize its efforts around two primary goals: (1) Diversifying liquefied natural gas (LNG) supplies in alignment with climate objectives; (2) Reducing demand for natural gas.

Diversifying LNG Supplies in Alignment with Climate Objectives

- The United States will work with international partners and strive to ensure additional LNG volumes for the EU market of at least 15 bcm in 2022, with expected increases going forward.
- The United States and the European Commission will undertake efforts to reduce the greenhouse gas intensity of all new LNG infrastructure and associated pipelines, including through using clean energy to power onsite operations, reducing methane leakage, and building clean and renewable hydrogen-ready infrastructure.
- The European Commission will prepare an upgraded regulatory framework for energy security of supply and storage, as well as working with EU Member States to accelerate regulatory procedures to review and determine approvals for



LNG import infrastructure. The United States will maintain its regulatory environment with an emphasis on supporting this emergency energy security objective and the REPowerEU goals.

- The European Commission will work with EU Member States toward the goal of ensuring, until at least 2030, demand for approximately 50 bcm/year of additional U.S. LNG that is consistent with our shared net-zero goals. This also will be done on the understanding that prices should reflect long-term market fundamentals and stability of supply and demand.

Reducing Demand for Natural Gas

- The United States and the European Commission will engage key stakeholders, including the private sector, and deploy immediate recommendations to reduce overall gas demand by accelerating market deployment of clean energy measures.
- Immediate reductions in gas demand can be achieved through energy efficiency solutions such as ramping up demand response devices, including smart thermostats, and deployment of heat pumps. The REPowerEU plan estimates that reductions through energy savings in homes can replace 15.5 bcm this year and that accelerating wind and solar deployment can replace 20 bcm this year, and through EU's existing plans such as "Fit for 55" contribute to the EU goal of saving 100 bcm/year by 2030.
- As global leaders in renewable energy, the United States and the European Commission will work to expedite planning and approval for renewable energy projects and strategic energy cooperation, including on technologies where we both excel such as offshore wind.
- We will continue to collaborate to advance the production and use of clean and renewable hydrogen to displace unabated fossil fuels and cut greenhouse gas emissions, which will include both technology and supporting infrastructure.

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Building a Strategic Energy Reserve to Secure an Affordable & Reliable Energy Future

Building a Strategic Energy Reserve

- A month of storage of actual consumer fuels—gasoline, diesel, jet fuel—plus optimized rotation & use of futures
- Roughly a month of natural gas storage to provide similar security to gas & electricity system
- Move towards hours, then days, then weeks of electricity storage
- Distribute storage geographically & ensure gas & power transmission to provide nationwide security

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Blog: EnergyLawProf.com

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Interviews: EnergyTradeoffs.com

Slides available: http://bit.ly/StrategicEnergyReserve