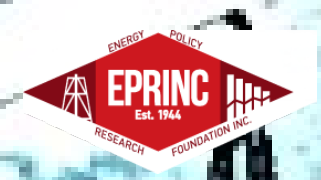




WCA Sustainable Business Conference

Moving New York to a Low-Carbon Future

How Can We Get There?



Max Pyziur
July 14, 2022

New York State Low-Carbon Future: The Law

New York Climate Leadership and Community Protection Act (s6599) - signed into law June 2019

- **By 2030, a minimum of 70% of electricity generation to be from renewable sources**
- **By 2040, 100% of electricity from non-hydrocarbon sources**
- **Formation of Climate Action Council tasked with publishing interim report within two years of passage, and then every five years afterword.**

In January 2019, Governor Cuomo called for the development by 2035

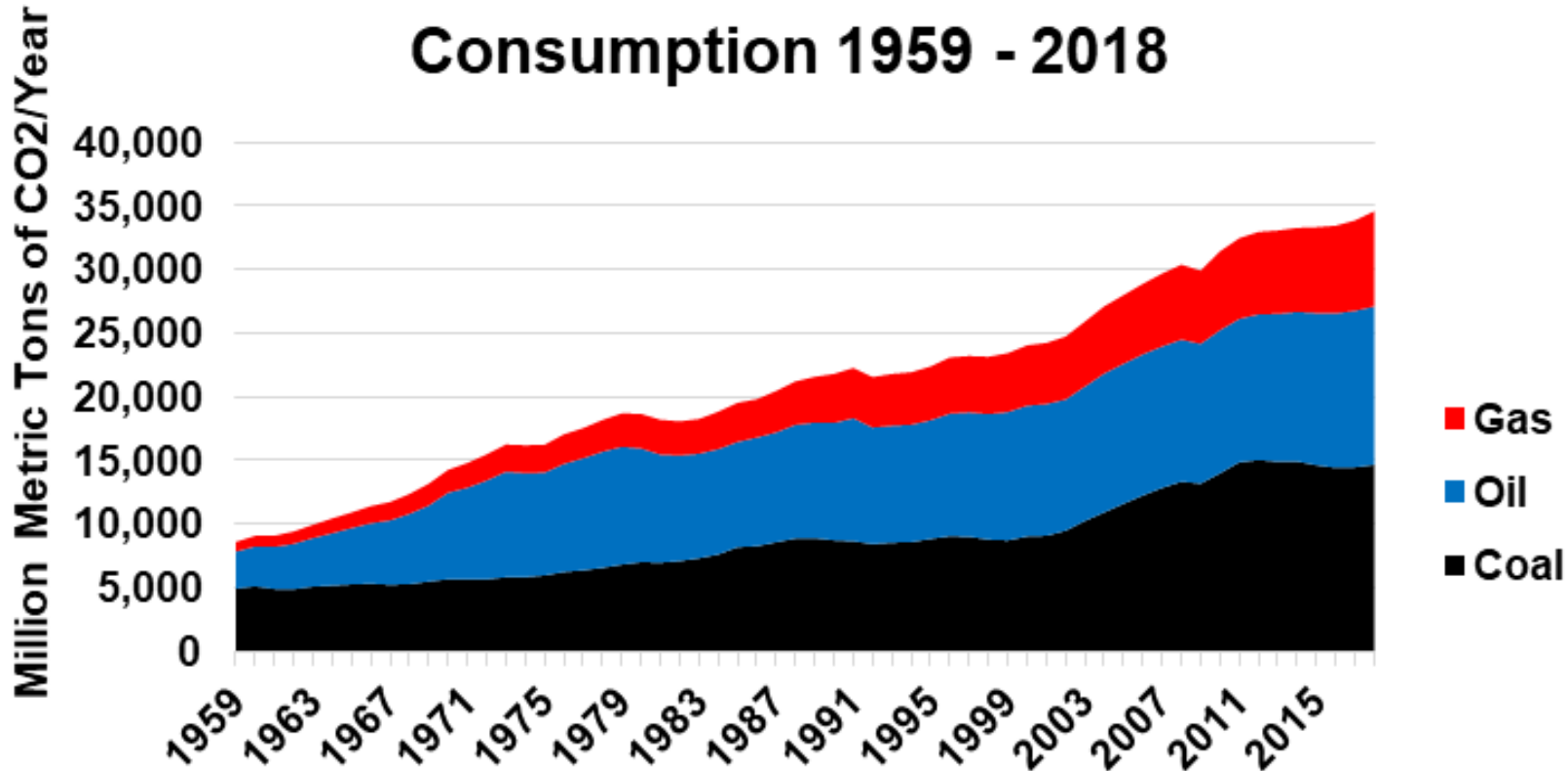
- **of 9,000 megawatts of offshore wind energy**
- **of 6,000 megawatts of solar energy**

Global Atmospheric Composition

Atmosphere composition (excluding water vapor)		
	Billion Metric Tons	Percentage
Nitrogen	4,015,440	78.00%
Oxygen	1,075,932	20.90%
Argon	47,876	0.93%
CO₂	2,111	0.04%
RoA	6,641	0.13%
	5,148,000	100.00%

Global Hydrocarbon Fuel CO₂ Emissions by Source

Global CO₂ Emissions From Fossil Fuel Consumption 1959 - 2018

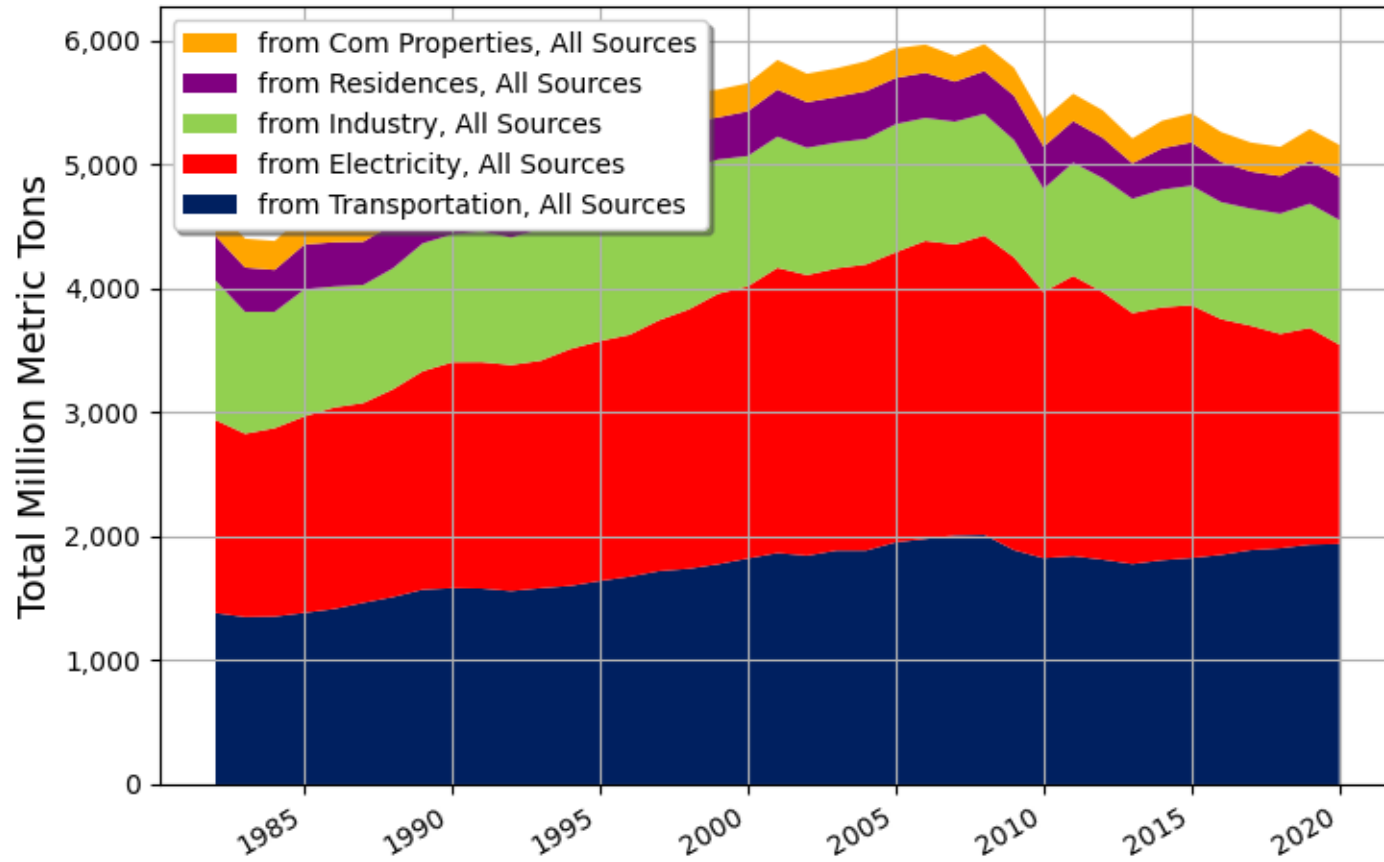


Analysis Based on sources collected by the Global Carbon Project

EPRINC

	Global CO ₂ Emissions by Fossil Fuel Group	
	Million Metric Tons	Percentage of Global CO ₂
Gas	7,485.2	0.35%
Oil	12,425.5	0.59%
Coal	14,680.4	0.70%
	36,441.2	1.73%

United States CO2 Emissions: from Transportation, All Sources, from Electricity, All Sources, from Industry, All Sources, from Residences, All Sources, from Com Properties, All Sources: 12/31/1981 to 12/31/2019

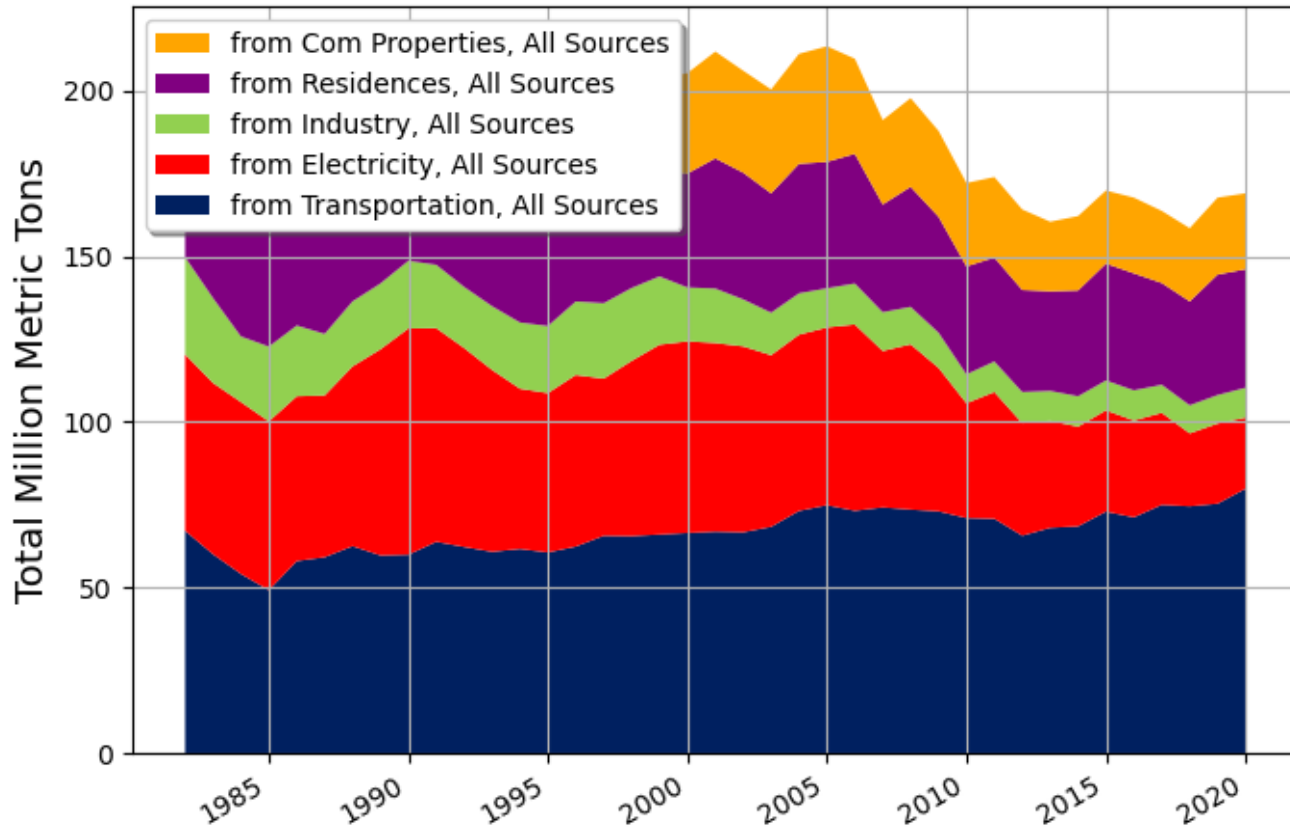


U.S. CO2 Emissions by Sector		
	Million Metric Tons	Percentage of Global CO ₂
Com	257.4	0.01%
Res	347.9	0.02%
Electricity	1,607.5	0.08%
Transportation	1,939.5	0.09%
Industry	1,006.6	0.05%
	5,158.8	0.24%

Analysis based on Annual EIA Data

EPRINC

New York CO2 Emissions: from Transportation, All Sources, from Electricity, All Sources, from Industry, All Sources, from Residences, All Sources, from Com Properties, All Sources: 12/31/1981 to 12/31/2019

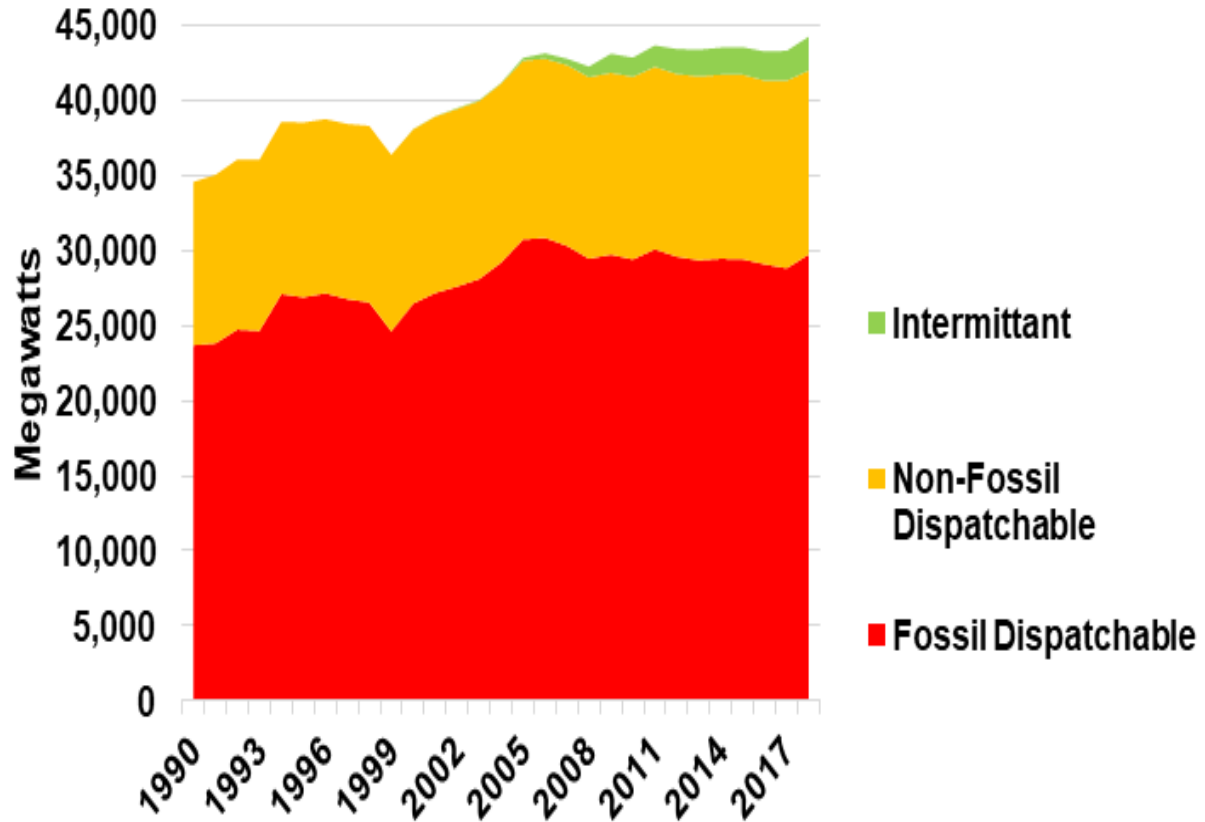


Analysis based on Annual EIA Data

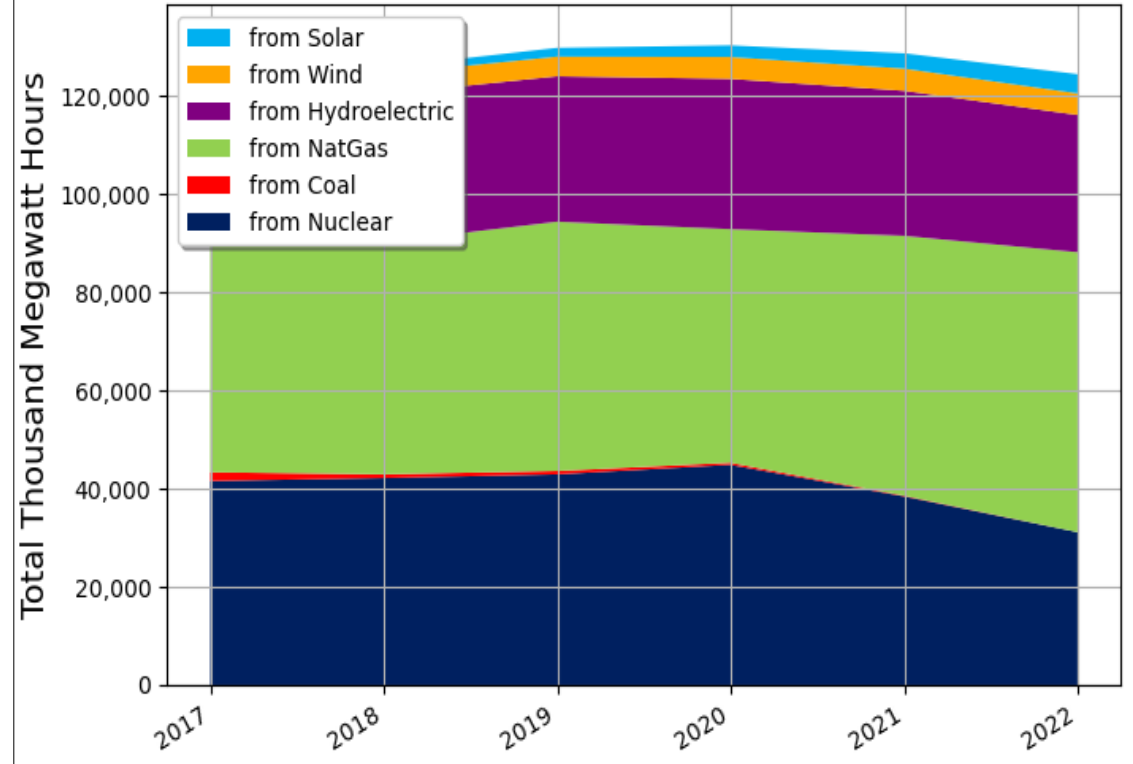
EPRINC

	Million Metric Tons	Percentage of Global CO ₂
Com	22.9	0.00%
Res	35.7	0.00%
Electricity	21.4	0.00%
Transportation	79.8	0.00%
Industry	9.0	0.00%
Total	169.0	0.01%

Installed In-State Capacity by Source Type



New York Electricity Production: from Nuclear, from Coal, from NatGas, from Hydroelectric, from Wind, from Solar: 02/01/2016 to 12/31/2021

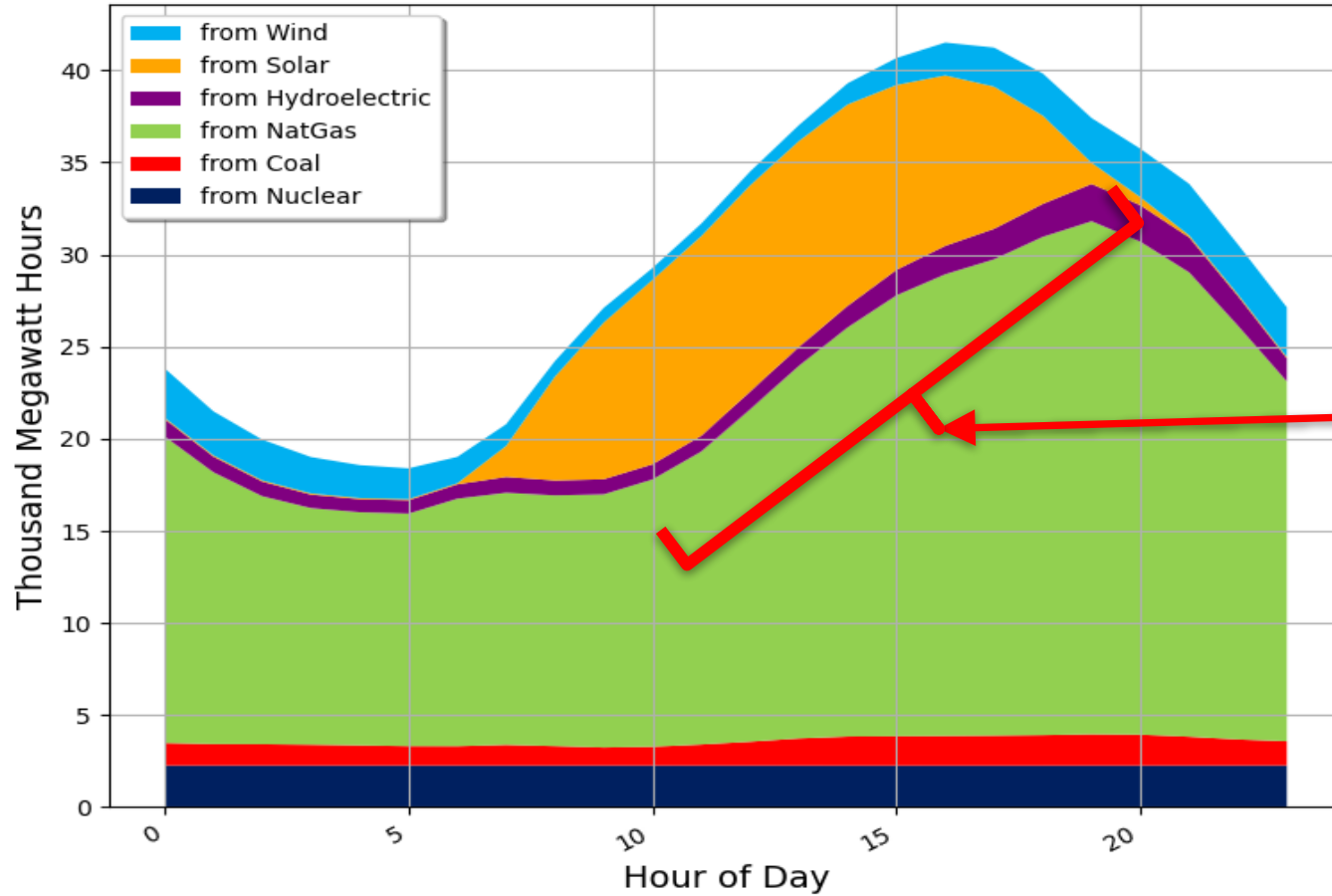


Analysis based on Annual EIA Data

@EPRINC_DC - Jul 07, 2022

California: Mid-August 2020 Power Generation Shortfall

California (primarily CAISO) Average Hourly Electricity Production: from Nuclear, from Coal, from NatGas, from Hydroelectric, from Solar, from Wind: from 08/10/2020 to 08/20/2020



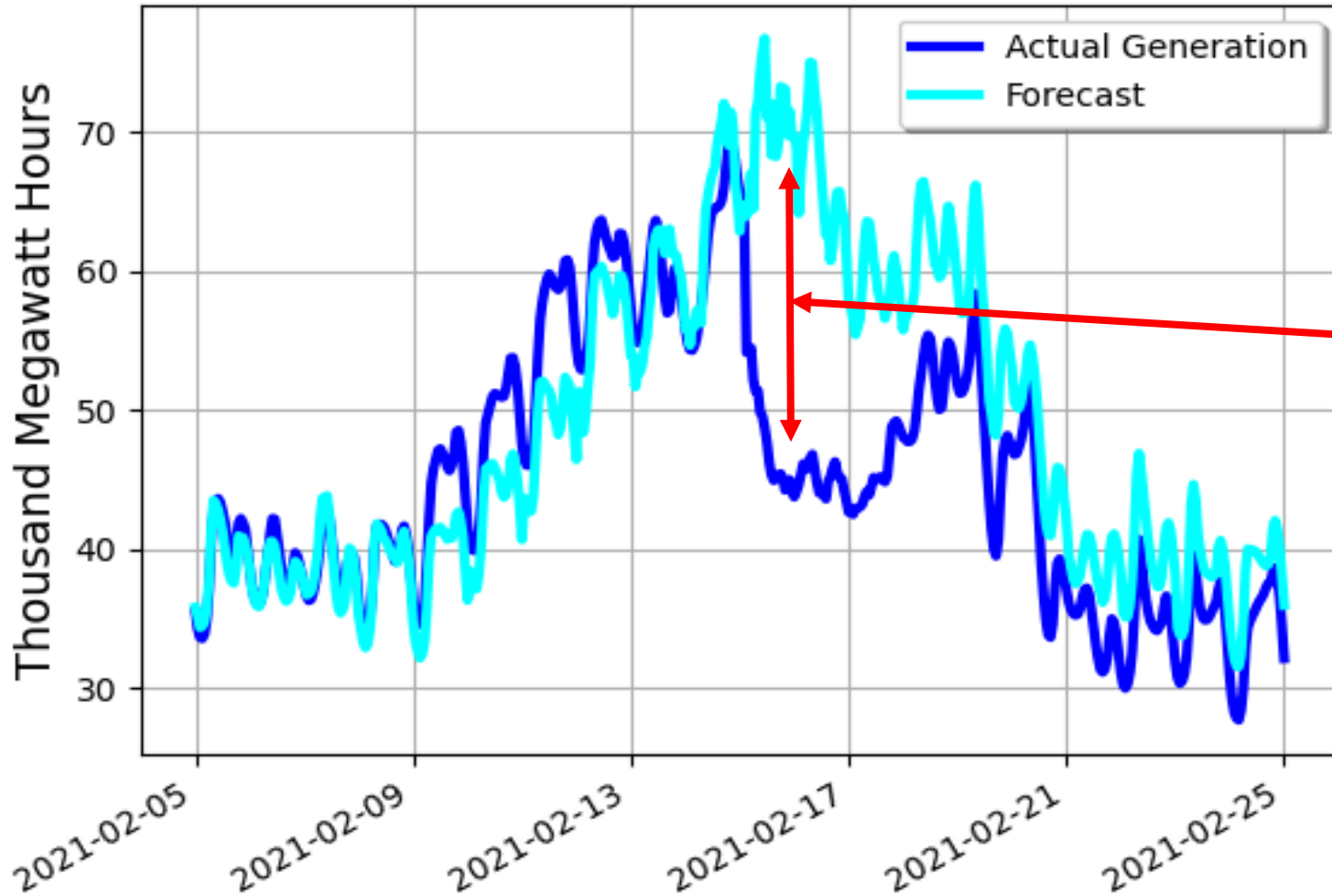
The (in)famous California PowerGen duck curve: late afternoon / evening demand requires a 16,000 MW ramp in seven hours. Or 40 MW/minute. Only natural gas power can deliver at this rate.

Analysis based on Hourly EIA Data

@EPRINC_DC - Jan 29, 2022

Texas: Feb 13, 2021 – Feb 17, 2021 Winter Storm Uri

Texas (primarily ERCOT) Electricity Generation vs Forecast
Requirement: 02/05/2021 to 02/25/2021

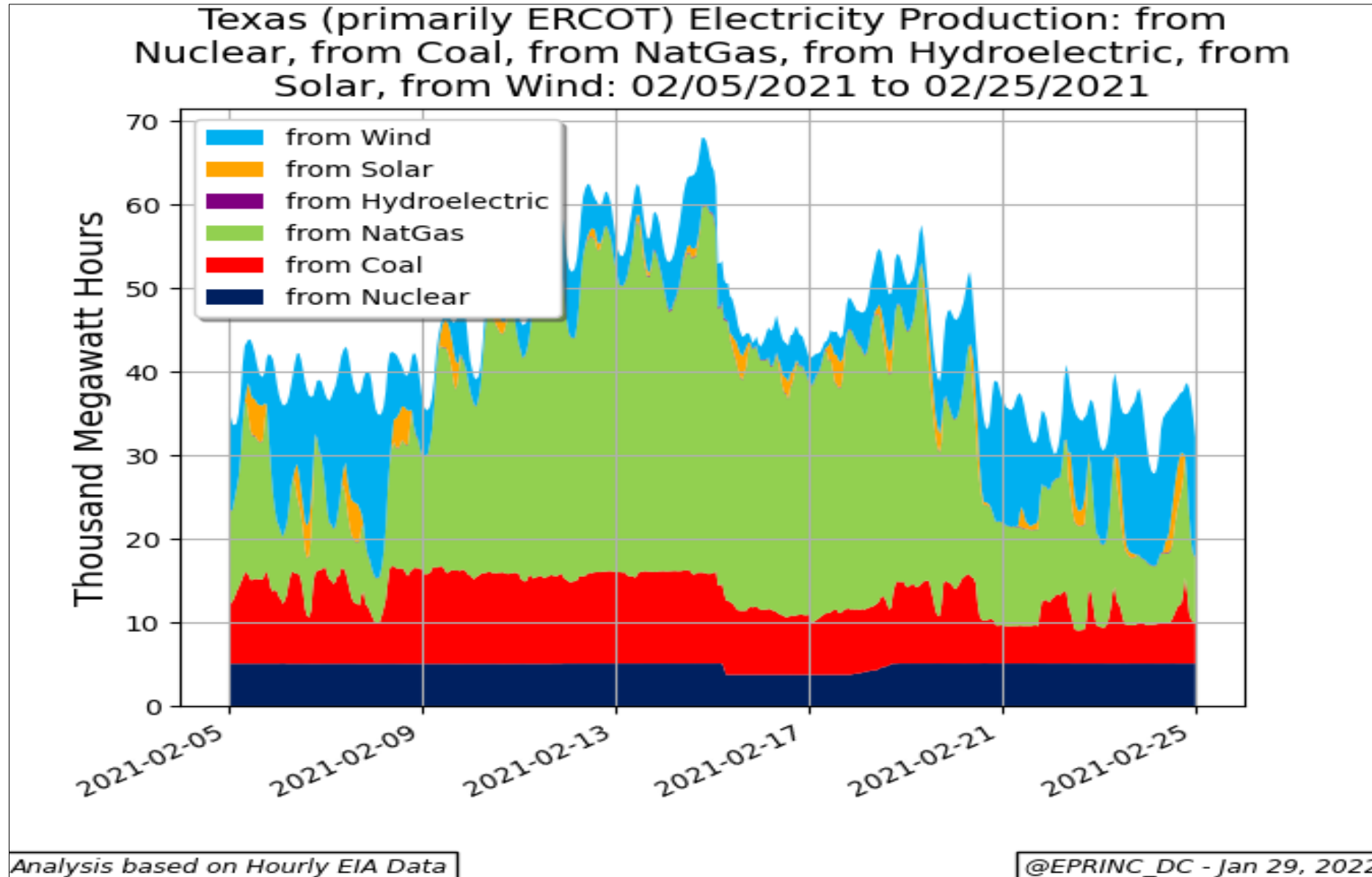


Over 25,000 megawatt hour shortfall in generation requirements at the peak of the crisis.

Analysis based on EIA Data

@EPRINC_DC - Jan 30, 2022

Texas: Feb 13, 2021 – Feb 17, 2021 Winter Storm Uri



Resilience

- **the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions**
- **The basis of statistics: what can be measured, can be improved. The absence of measurement, limits the effectiveness of governance. There is a great deal of research and numerous proposals. But there are no set electricity resilience standards.**

Local Events

Conclusion: In New York State will it be possible to continue to provide affordable and reliable electricity from a resilient grid generated by intermittent sources?