

Renewables, gas and decarbonizing U.S. power

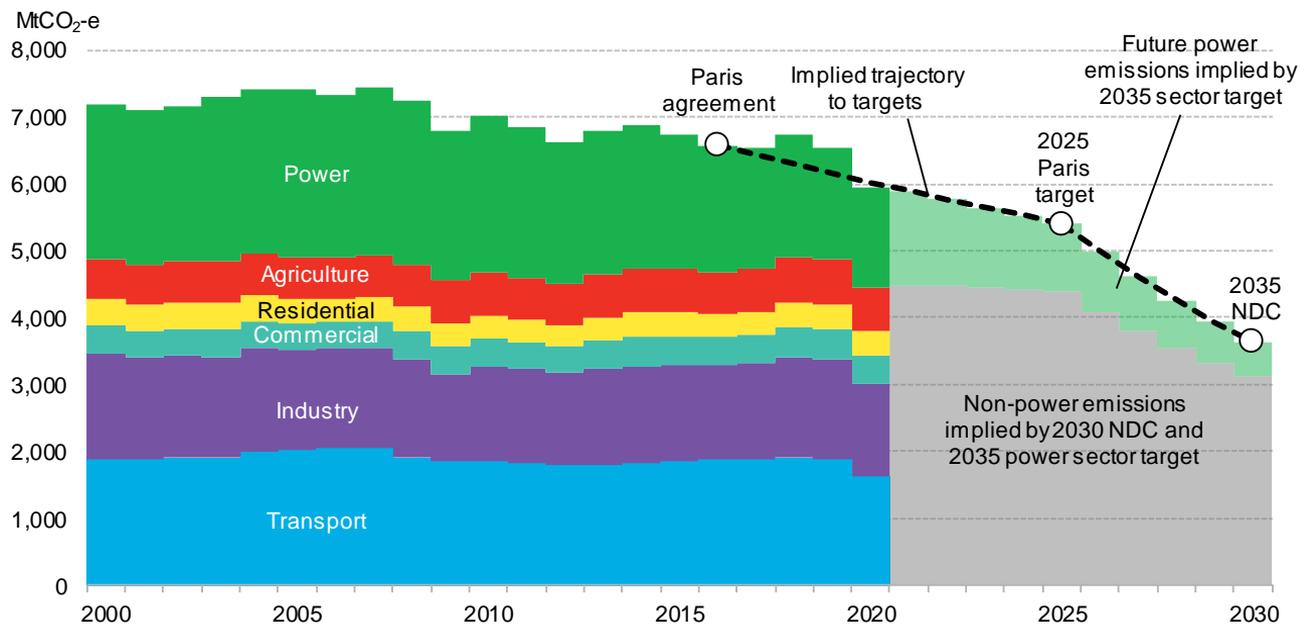
New York Energy Forum

Tom Rowlands-Rees

May 18, 2021

U.S. economy-wide emissions

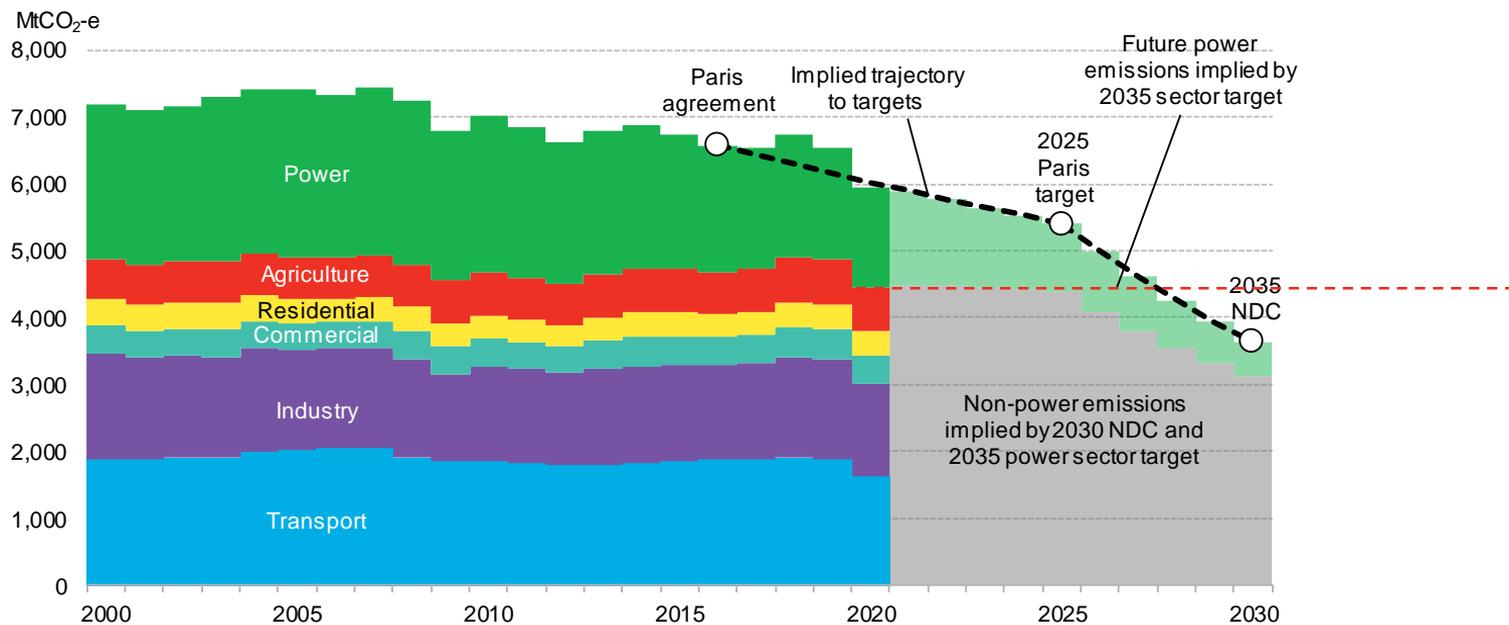
Historic and future, assuming various targets are achieved



Source: EIA, EPA, BloombergNEF

U.S. economy-wide emissions

Historic and future, assuming various targets are achieved



Source: EIA, EPA, BloombergNEF

The U.S. and Europe

The story of the 2010s



The U.S. and Europe

The story of the 2010s

U.S. power generation

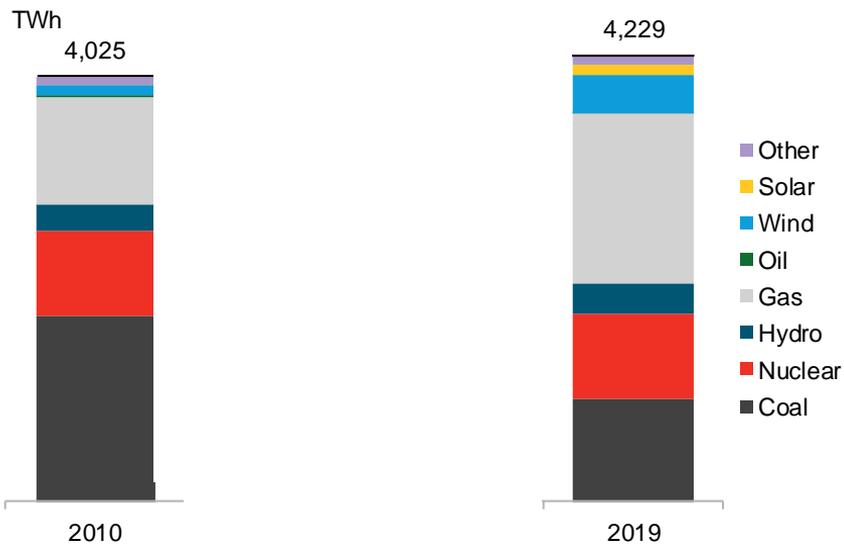


BloombergNEF

The U.S. and Europe

The story of the 2010s

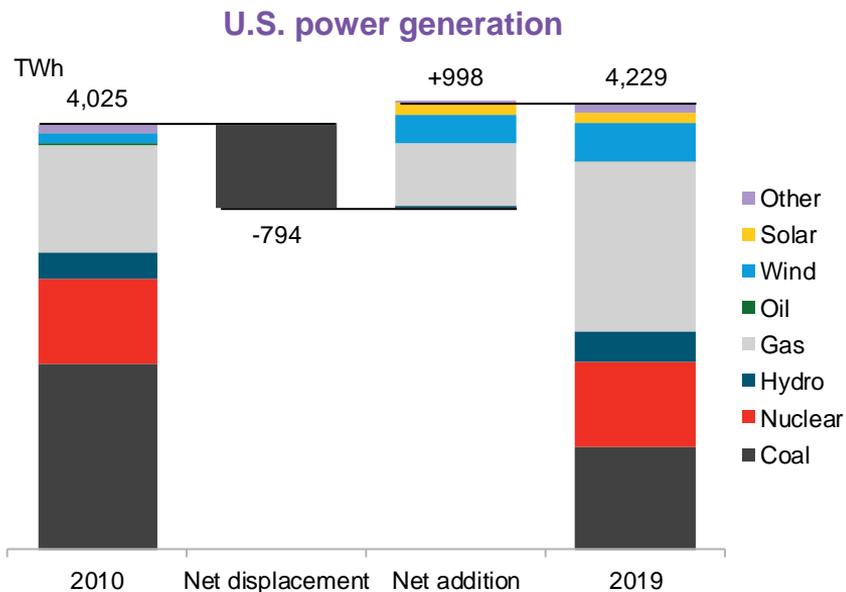
U.S. power generation



BloombergNEF

The U.S. and Europe

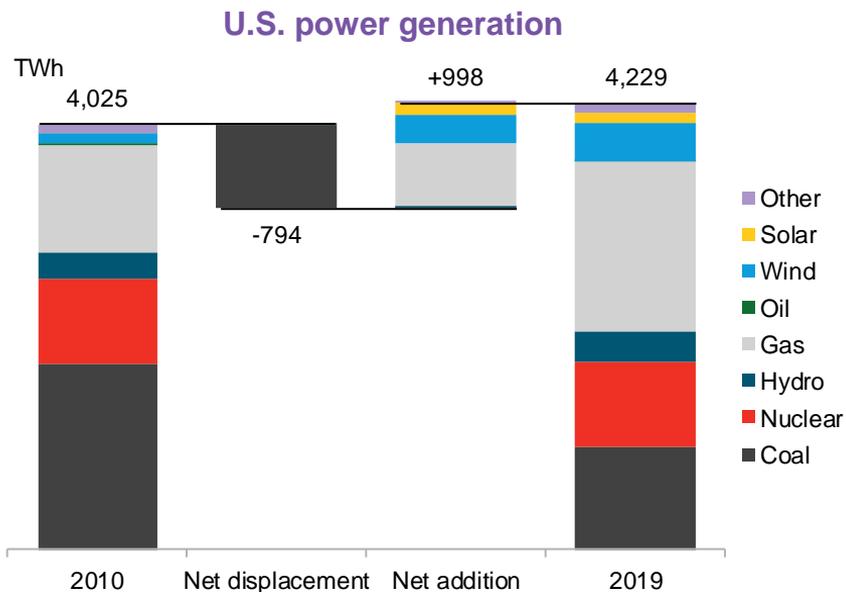
The story of the 2010s



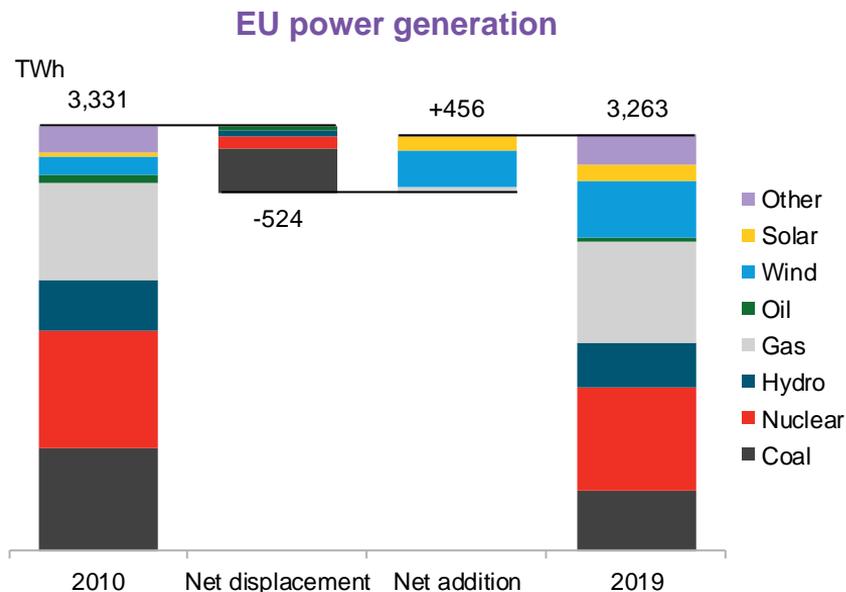
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The U.S. and Europe

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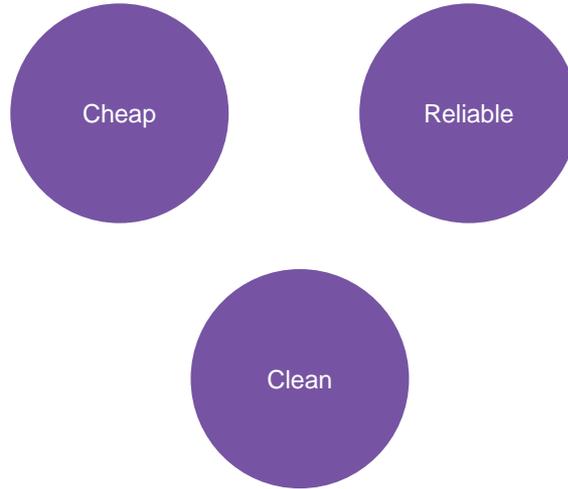
BloombergNEF



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The classic power trilemma

Ideally power should be...



The classic power trilemma

Ideally power should be...

Before the
2010s:

Coal the main source
of cheap kWh



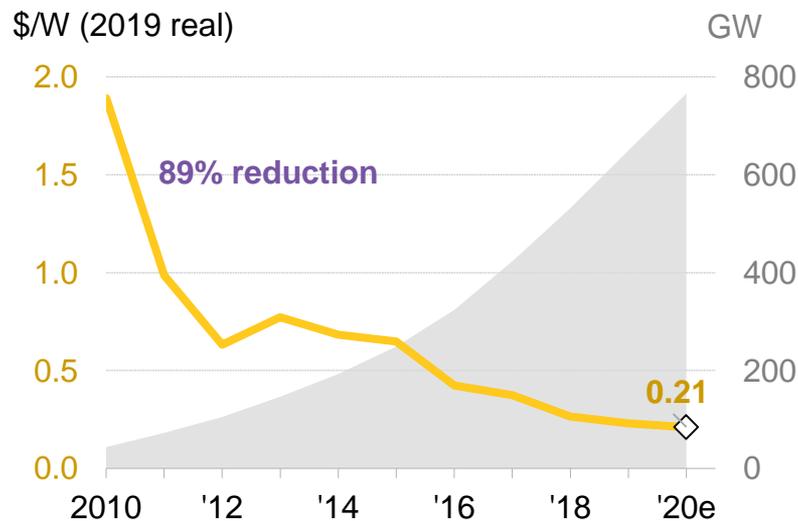
Gas was a flexible
resource



Low-carbon not a
priority

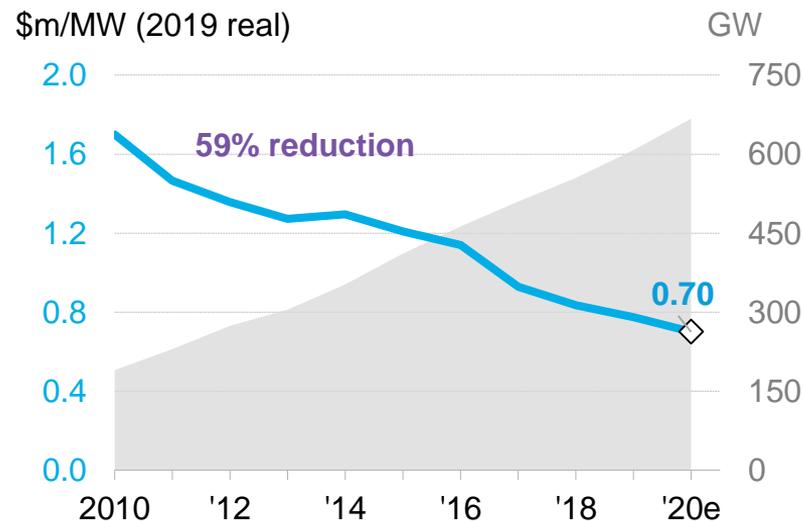
Economies of scale have driven down the cost of renewables dramatically

PV module price and cumulative installed capacity



Source: BloombergNEF

Onshore wind turbine price and cumulative installed capacity



The classic power trilemma

Ideally power should be...

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Gas was a flexible
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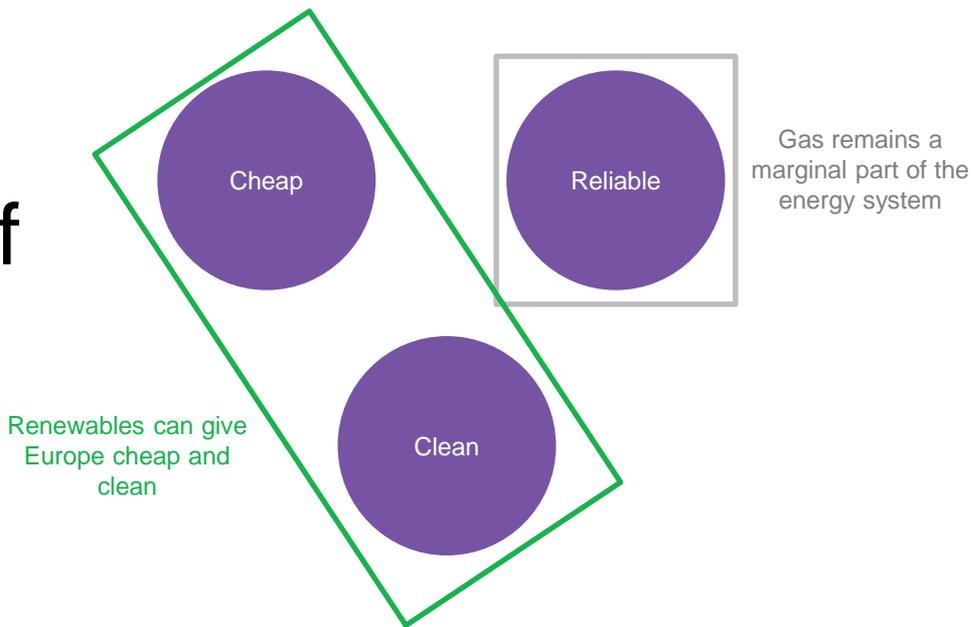


Low-carbon not a
priority

The classic power trilemma

Ideally power should be...

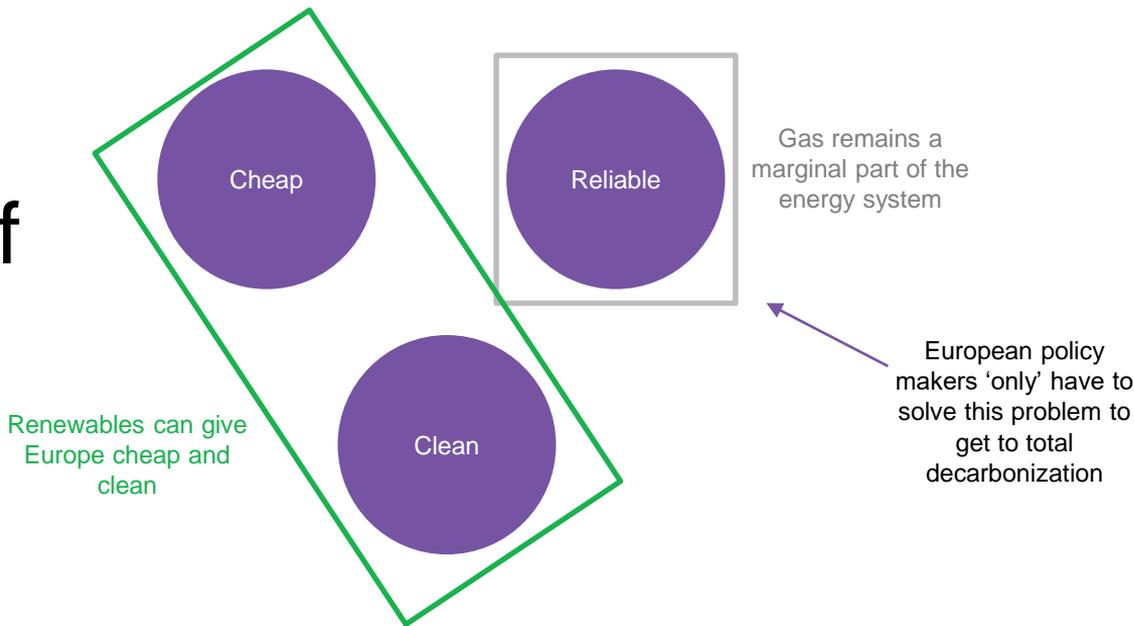
The
transition of
the 2010s
(**Europe**)



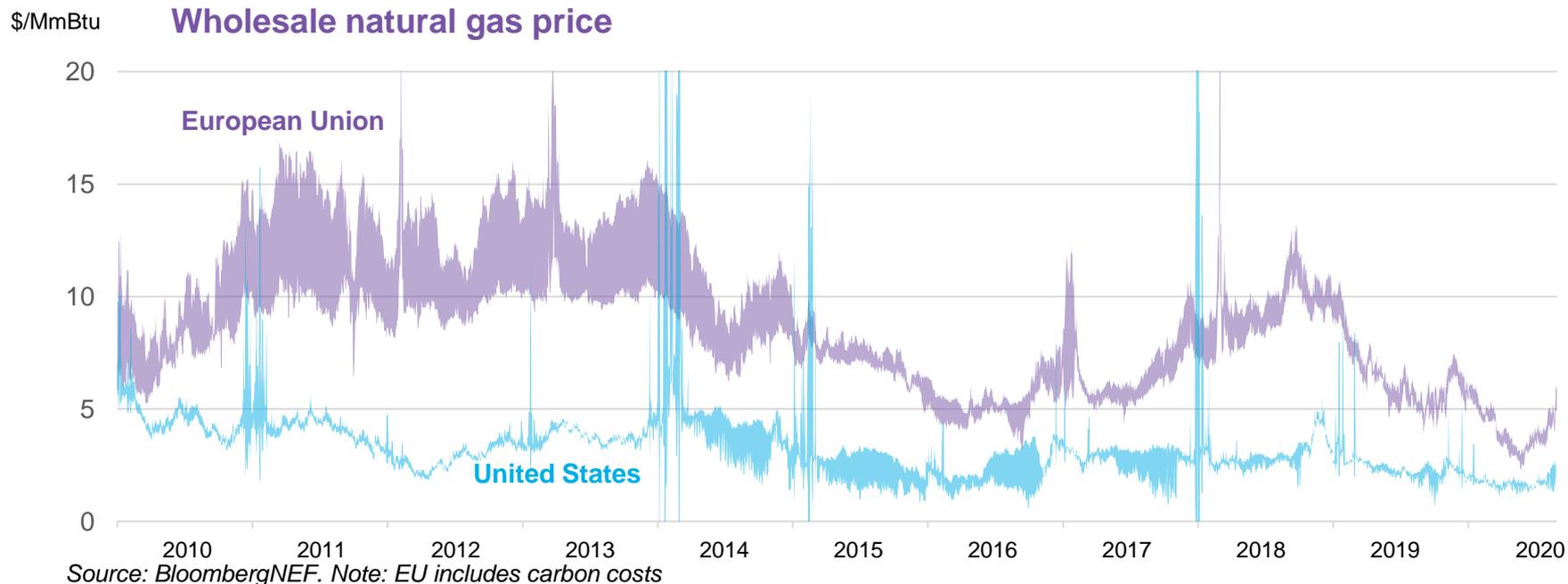
The classic power trilemma

Ideally power should be...

The transition of the 2010s
(Europe)



A decade of gas prices in Europe and the U.S.



The classic power trilemma

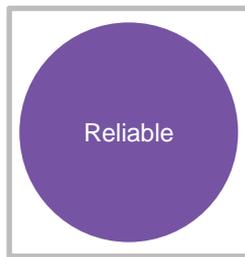
Ideally power should be...

Before the
2010s:

Coal the main source
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Gas was a flexible
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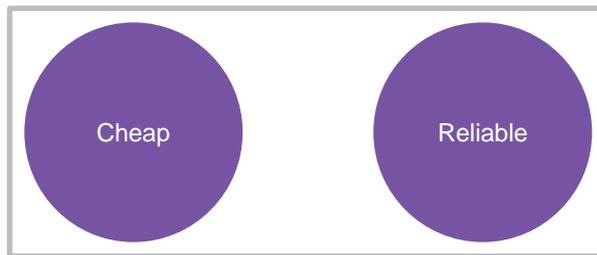


Low-carbon not a
priority

The classic power trilemma

Ideally power should be...

The
transition of
the 2010s
(U.S.)



Gas solves the
problem of cheap
AND reliable

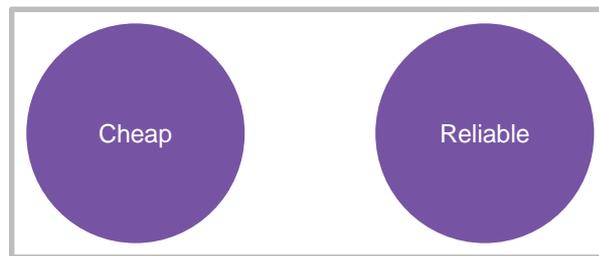


Renewables only
give the U.S. clean

The classic power trilemma

Ideally power should be...

The
transition of
the 2010s
(U.S.)



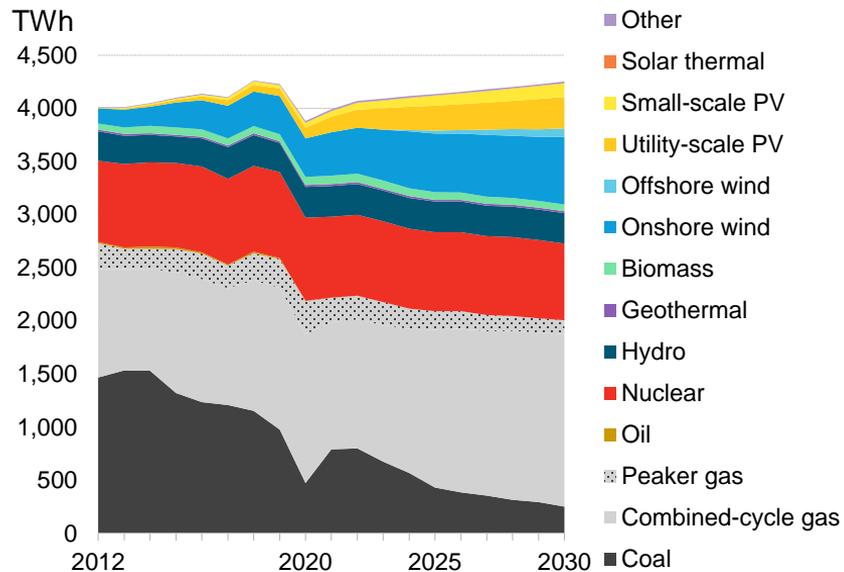
Gas solves the
problem of cheap
AND reliable

U.S. policy makers
face a bigger
challenge than their
European
counterparts if
they're serious about
decarbonization

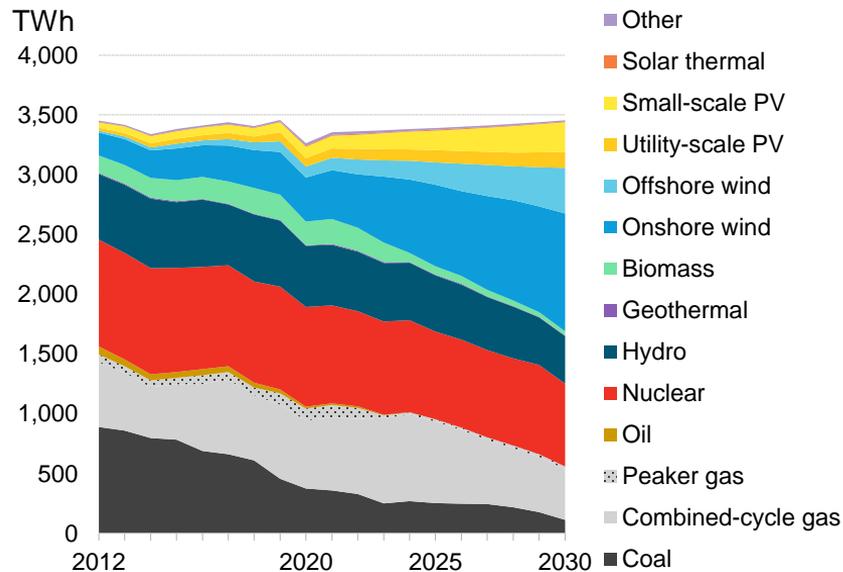
Renewables only
give the U.S. clean

Contrasting outlooks for power in the U.S. and Europe

U.S.



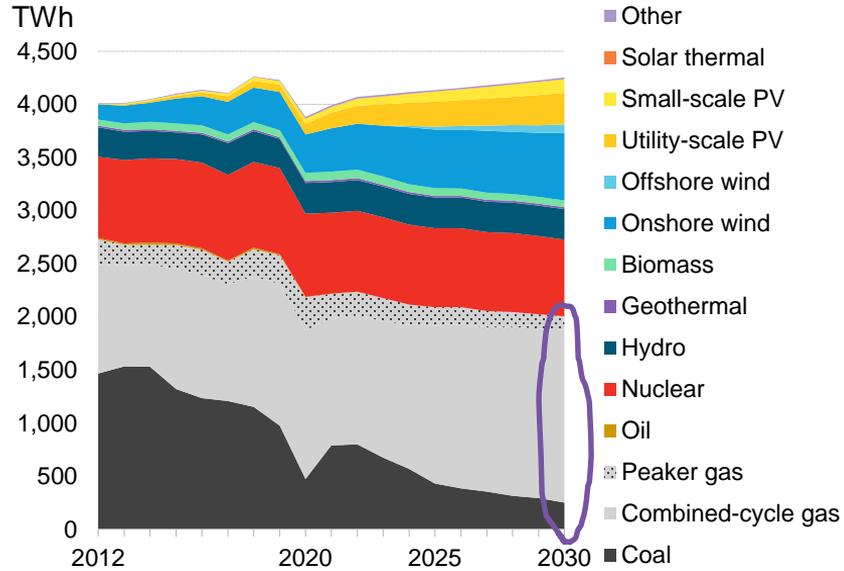
Europe



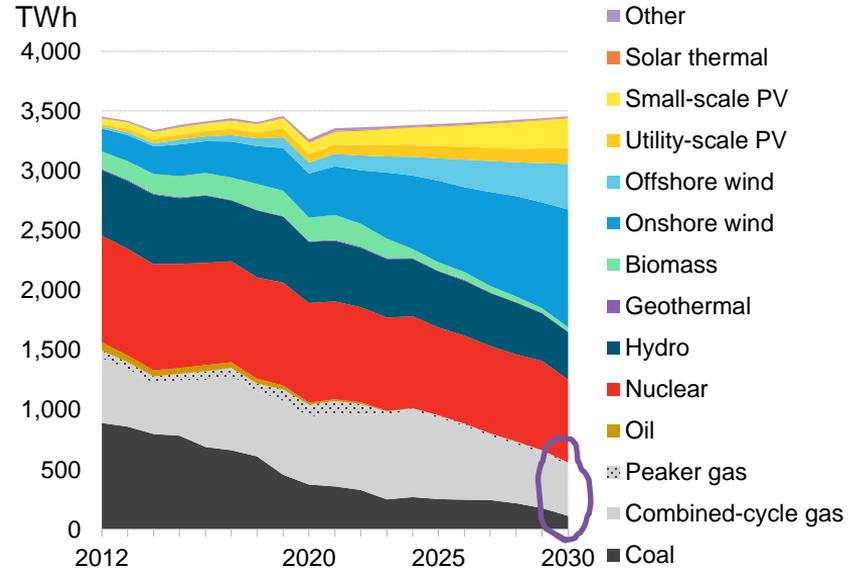
Source: BloombergNEF

Contrasting outlooks for power in the U.S. and Europe

U.S.

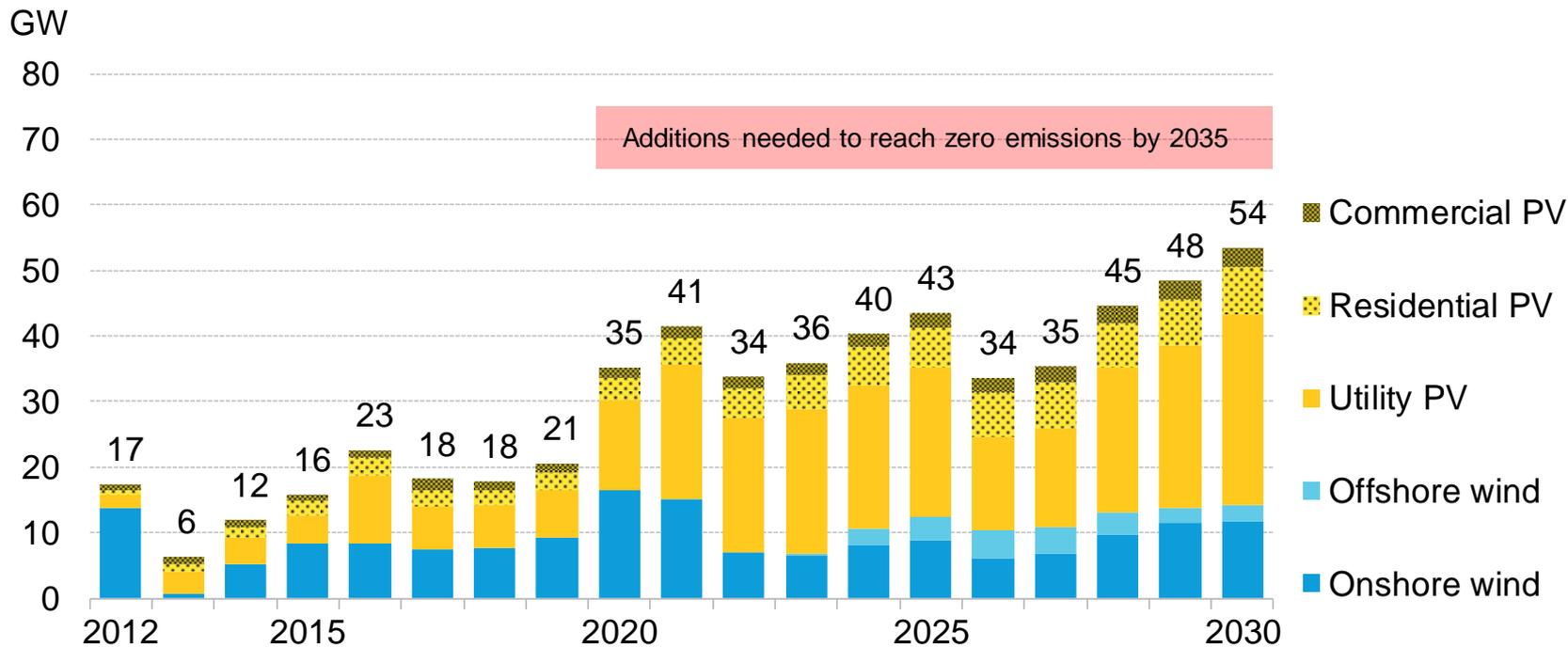


Europe



Source: BloombergNEF

U.S. wind and solar additions



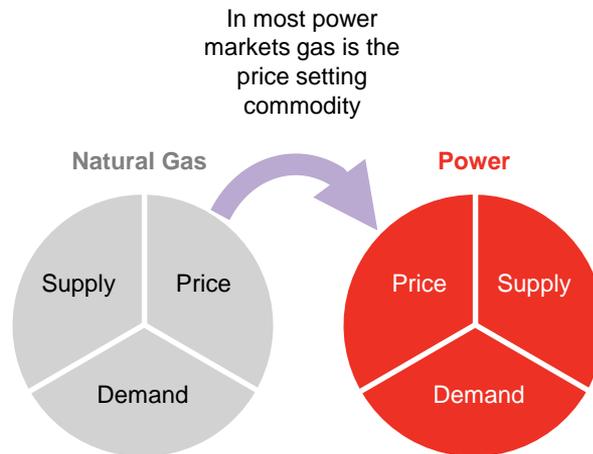
Source: BloombergNEF

Why is U.S. gas so cheap?

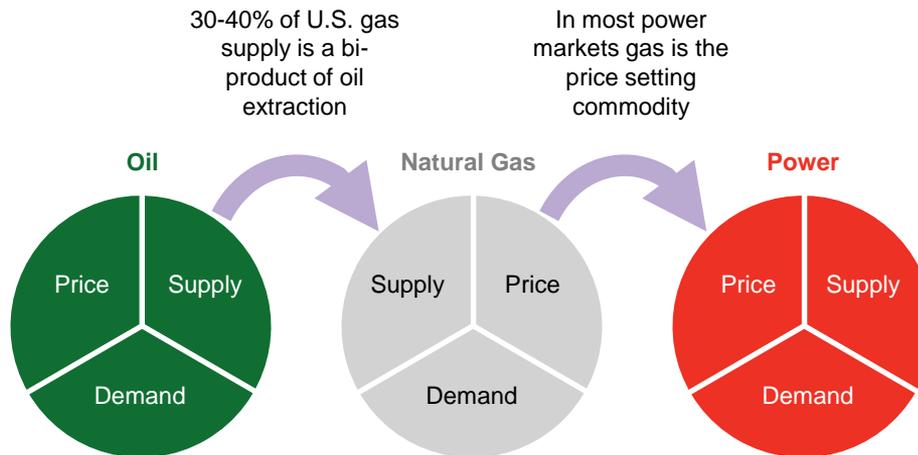
And will it always be that way?



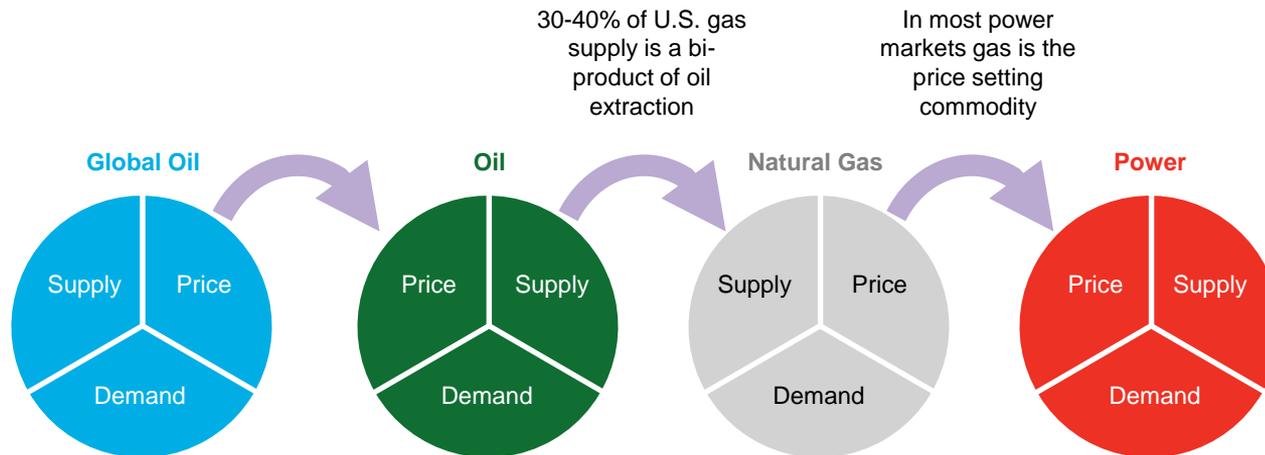
The oil-gas-power nexus



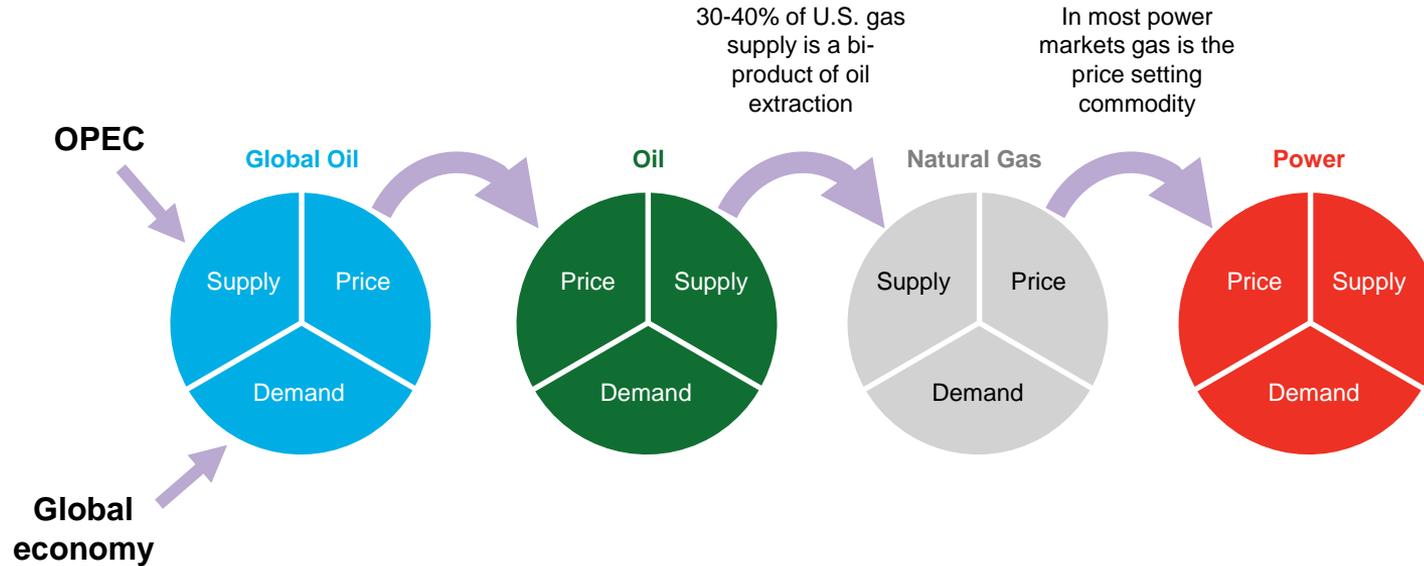
The oil-gas-power nexus



The oil-gas-power nexus



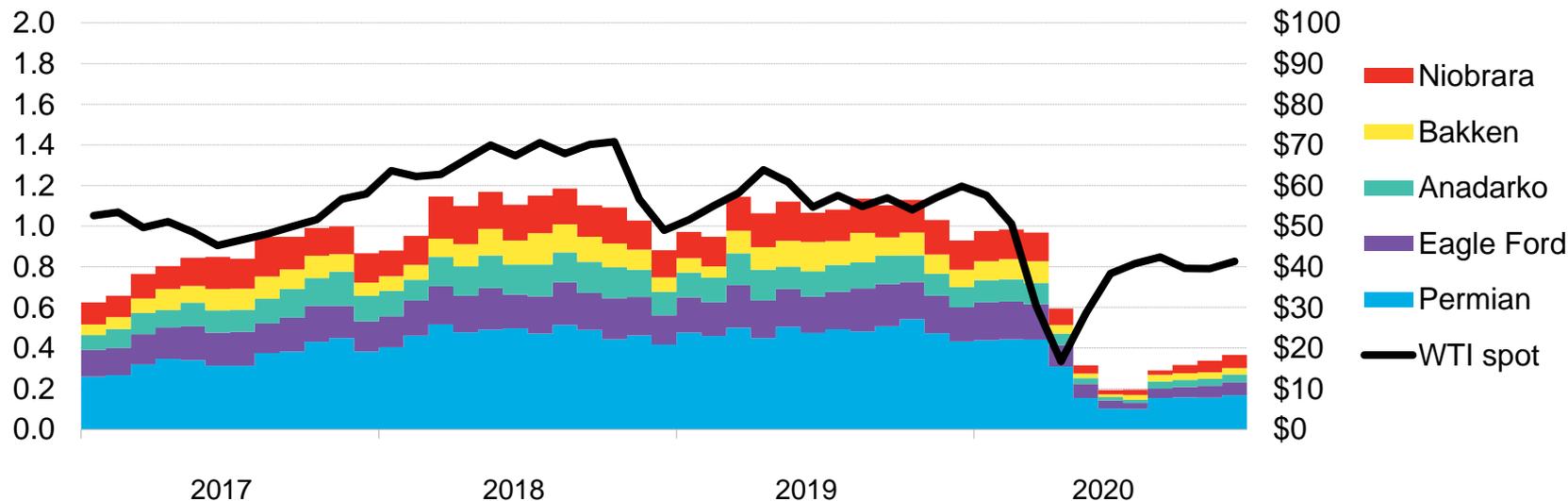
The oil-gas-power nexus



Well completions and WTI oil price

Thousand wells

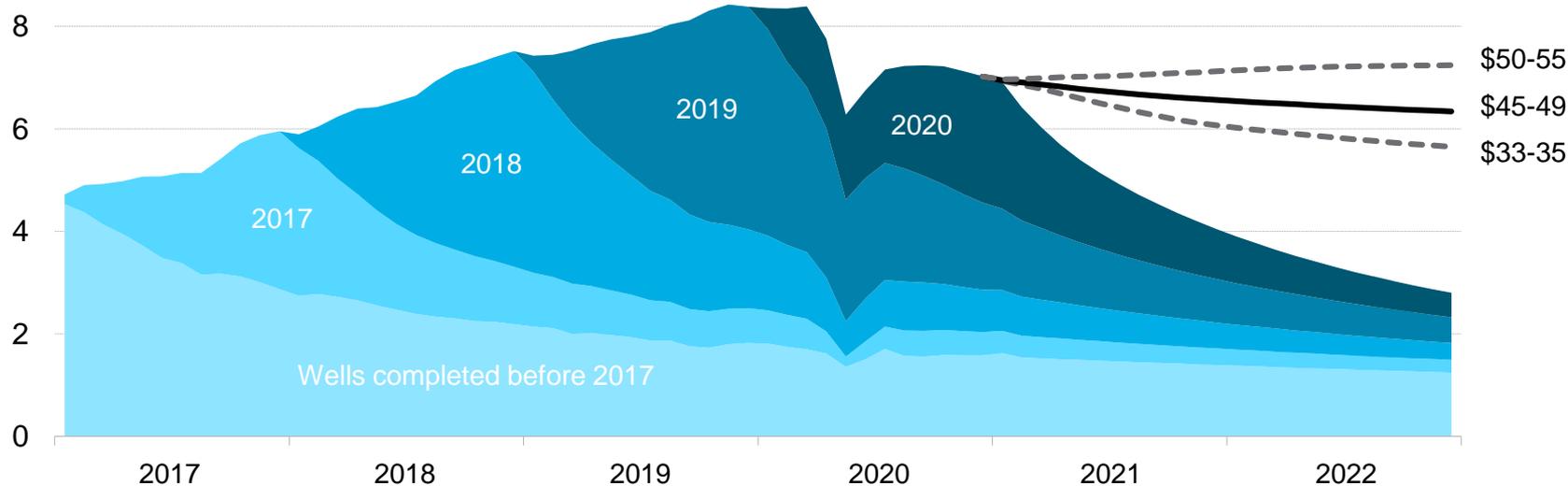
Spot WTI (\$/bbl)



Source: U.S. Energy Information Administration, BloombergNEF

Shale oil production outlook

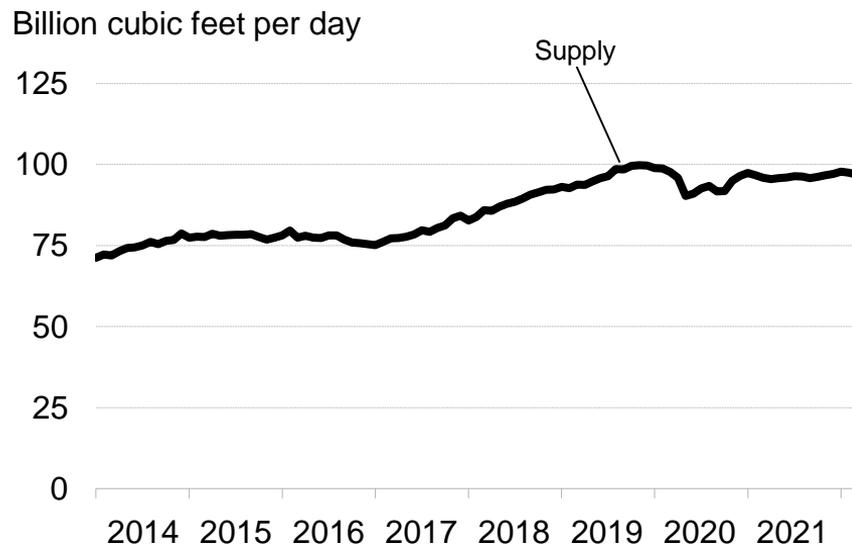
Million barrels per day



Source: Enverus, BloombergNEF estimates. Note: \$-values indicate price per barrel of under different scenario assumptions

Could the U.S. run out of gas in early 2022?

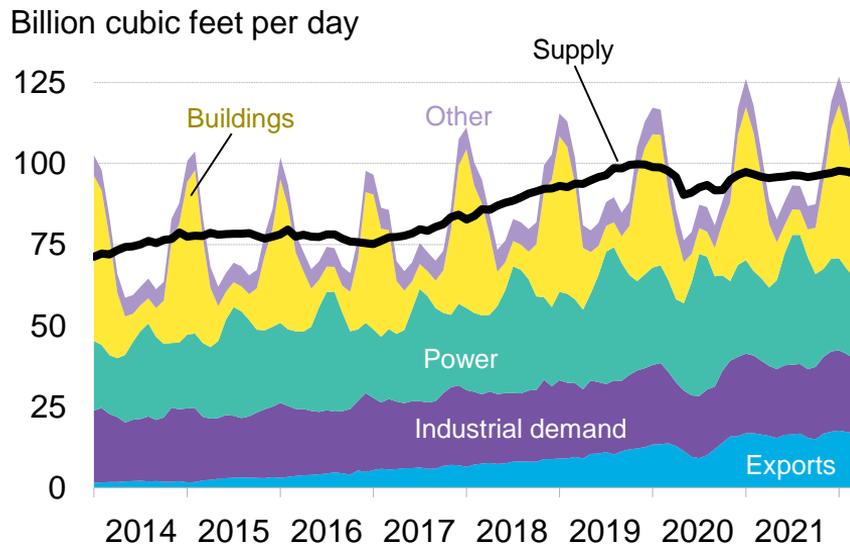
U.S. natural gas demand-supply balance



Source: BloombergNEF Note: 2021 data in both charts represent our base scenario

Could the U.S. run out of gas in early 2022?

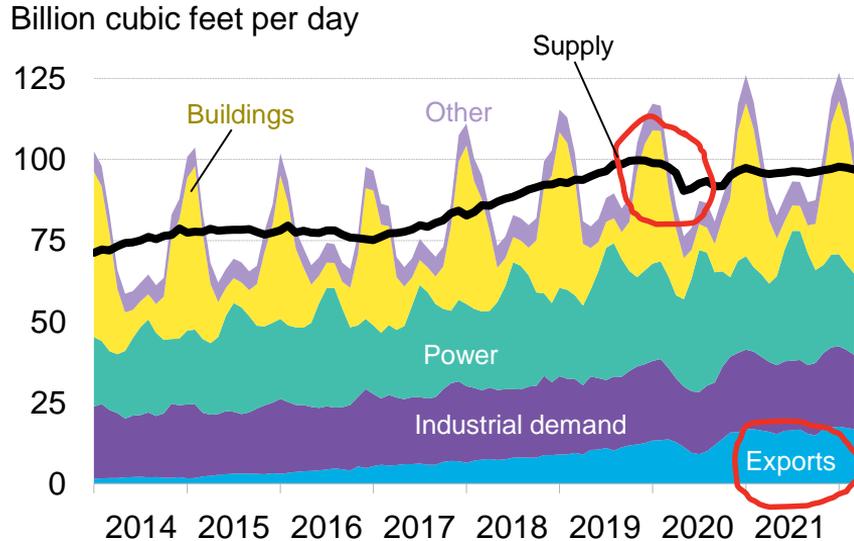
U.S. natural gas demand-supply balance



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Could the U.S. run out of gas in early 2022?

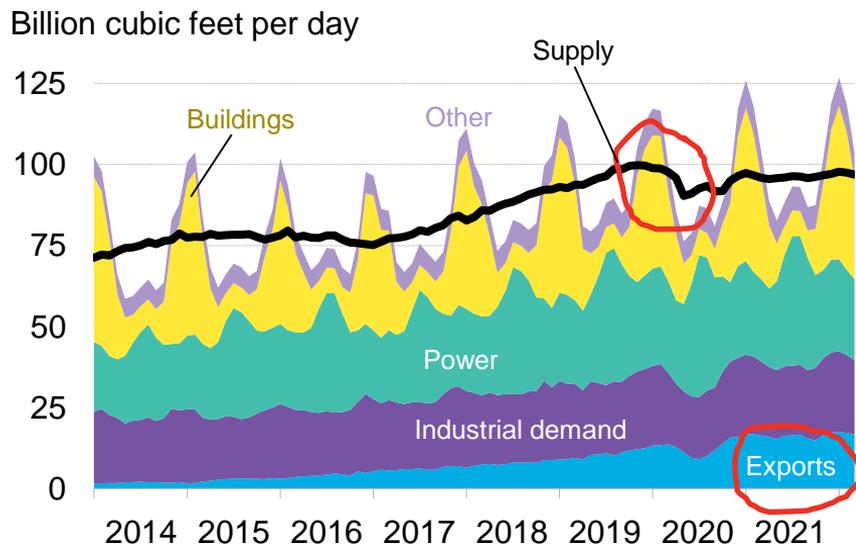
U.S. natural gas demand-supply balance



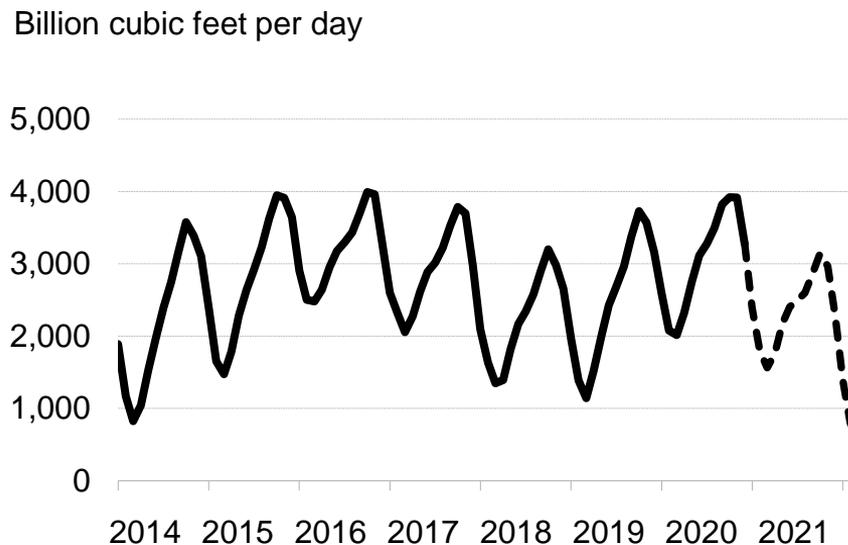
Source: BloombergNEF Note: 2021 data in both charts represent our base scenario

Could the U.S. run out of gas in early 2022?

U.S. natural gas demand-supply balance



U.S. natural gas storage level



Source: BloombergNEF Note: 2021 data in both charts represent our base scenario

What policies can help? And which are realistic?



Strengths and weaknesses of assorted policy levers for incentivizing wind and solar build

Ready to go

Politically viable

Targeted

Incentivize clearly

Federally applicable

Source: BloombergNEF Green = Strength, Yellow = Neutral, Red = Weakness

Strengths and weaknesses of assorted policy levers for incentivizing wind and solar build

	Carbon policies	
	Tax	Market
Ready to go	Red	Yellow
Politically viable	Red	Red
Targeted	Red	Green
Incentivize clearly	Green	Red
Federally applicable	Yellow	Yellow

Source: BloombergNEF Green = Strength, Yellow = Neutral, Red = Weakness

Strengths and weaknesses of assorted policy levers for incentivizing wind and solar build

	Carbon policies		State policies	
	Tax	Market	Auctions	RPS
Ready to go	Red	Yellow	Green	
Politically viable	Red		Yellow	
Targeted	Red	Green	Green	
Incentivize clearly	Green	Red	Green	Yellow
Federally applicable	Yellow		Red	

Source: BloombergNEF Green = Strength, Yellow = Neutral, Red = Weakness

Strengths and weaknesses of assorted policy levers for incentivizing wind and solar build

	Carbon policies		State policies		Federal policies	
	Tax	Market	Auctions	RPS	RPS	Tax credit
Ready to go	Red	Yellow	Green	Green	Red	Green
Politically viable	Red	Red	Yellow	Yellow	Red	Yellow
Targeted	Red	Green	Green	Green	Green	Yellow
Incentivize clearly	Green	Red	Green	Yellow	Yellow	Green
Federally applicable	Yellow	Yellow	Red	Red	Green	Green

Source: BloombergNEF Green = Strength, Yellow = Neutral, Red = Weakness

Strengths and weaknesses of assorted policy levers for incentivizing wind and solar build

	Carbon policies		State policies		Federal policies		Regulatory
	Tax	Market	Auctions	RPS	RPS	Tax credit	Market design
Ready to go	Red	Yellow	Green	Green	Red	Green	Yellow
Politically viable	Red	Red	Yellow	Yellow	Red	Yellow	Yellow
Targeted	Red	Green	Green	Green	Green	Yellow	Green
Incentivize clearly	Green	Red	Green	Yellow	Yellow	Green	Green
Federally applicable	Yellow	Yellow	Red	Red	Green	Green	Yellow

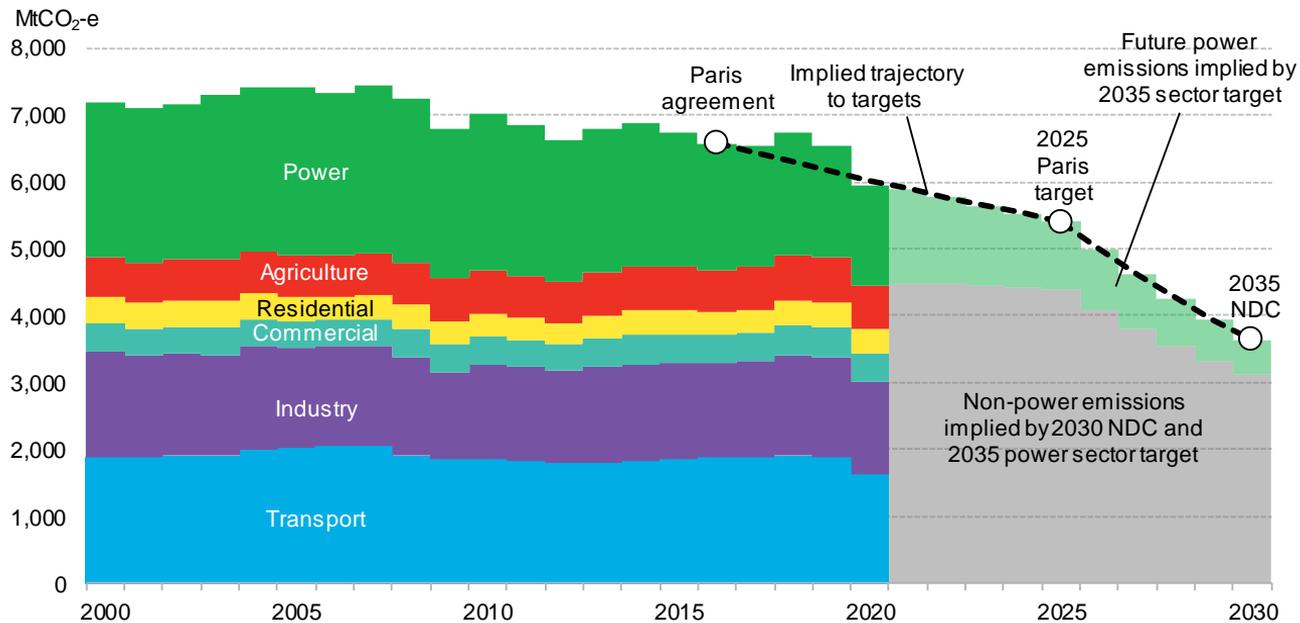
Source: BloombergNEF Green = Strength, Yellow = Neutral, Red = Weakness

Going back to the big picture...



U.S. economy-wide emissions

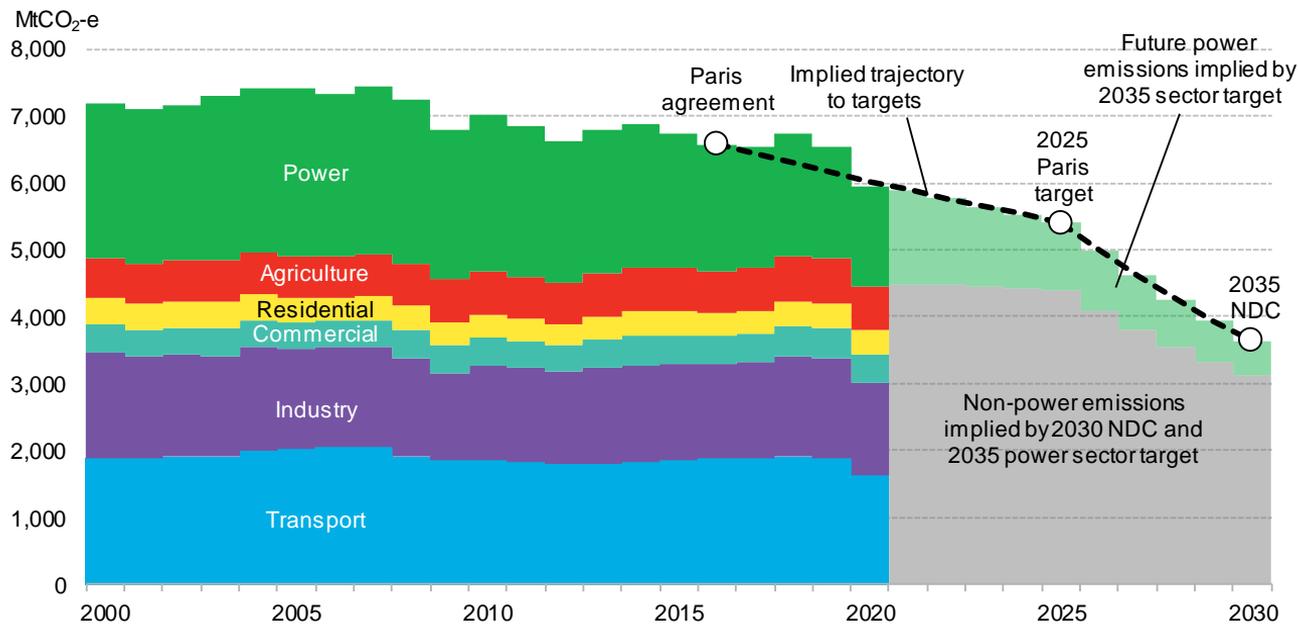
Historic and future, assuming various targets are achieved



Source: EIA, EPA, BloombergNEF

U.S. economy-wide emissions

Historic and future, assuming various targets are achieved

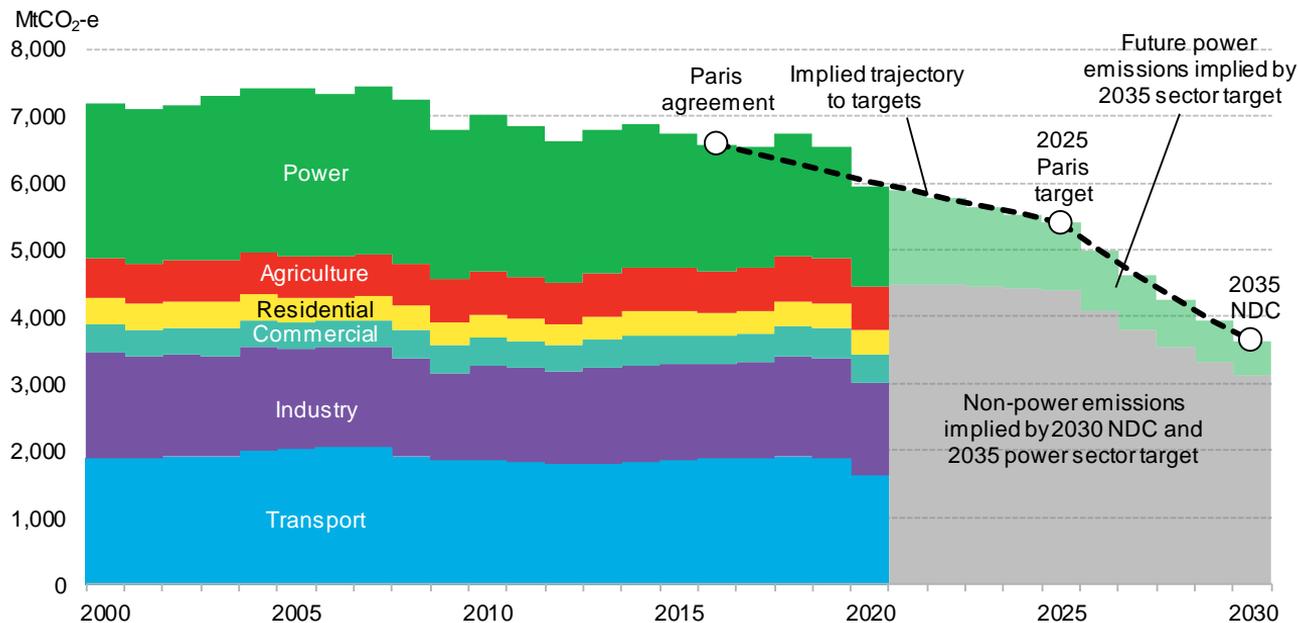


Decarbonizing power is the first and 'easiest' leg of the decarbonization journey...

Source: EIA, EPA, BloombergNEF

U.S. economy-wide emissions

Historic and future, assuming various targets are achieved



Decarbonizing power is the first and 'easiest' leg of the decarbonization journey...

...and I've been speaking about the first and 'easiest' step of that journey

Source: EIA, EPA, BloombergNEF

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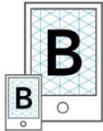
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