

A dark blue world map is shown in the background, overlaid with a complex network of thin, light blue lines and small white dots, suggesting a global network or data flow. A thick white diagonal line runs from the bottom left towards the right, separating the map from the text area.

# President-Elect Biden and the Clean Energy Revolution

Sproule Special Report, in collaboration with Boost Energy Ventures

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## **Net-zero for the power sector by 2035, for the country by 2050**

- Core to President-elect Biden's plan is putting the United States on a path to achieve net-zero emissions by 2050, with the decarbonization of the power sector by 2035. To achieve this, \$2 trillion will be invested over his four-year term to create modern, sustainable infrastructure and build a clean energy future. From an implementation perspective, Biden's plan will likely only be possible if the Democratic party not only wins the White House and Senate but retains control of the House of Representatives. Nevertheless, the plans are ambitious and could mean near and long-term implications on U.S. energy systems.

## **Biden plan for energy Infrastructure**

- Create millions of jobs rebuilding America's infrastructure and electrifying major sectors of the economy. This includes roads, bridges, green spaces, water systems, electricity grids, and universal broadband.
- Invest in automobile infrastructure including, 500,000 electric vehicle charging stations, supporting vehicle electrification.
- Rescind Keystone XL pipeline presidential permit, oppose Dakota Access Pipeline operation during the environmental assessment, and increase the pipeline infrastructure approval process's stringency.
- Clean up local economies from the impacts of resource extraction including, abandoning and reclaiming millions of oil and gas wells.
- Provide all municipalities of more than 100,000 people with quality public transportation by 2030. Further electrify the rail system and revolutionize rail systems between major metropolitan areas.

## **Biden plan for power generation**

- Aim to achieve a carbon net-zero power sector by 2035, including limiting natural gas without Carbon Capture Utilization and Storage (CCUS) in the power mix.
- Transform the energy sources that power the transportation sector, making it easier for mobility to be powered by electricity and clean fuels.
- \$400 billion allotted in Biden's first-term to research and procure key clean energy inputs such as batteries.
- Create a new research agency focused on technologies such as advanced nuclear reactors and next generation electrolyzers, making green hydrogen cheaper than blue hydrogen.
- Reform and extend tax incentives to maximize investment in the clean energy revolution such as wind, solar, and battery storage.
- Double down on research in CCUS including lowering the cost of carbon capture retrofits for existing power plants.



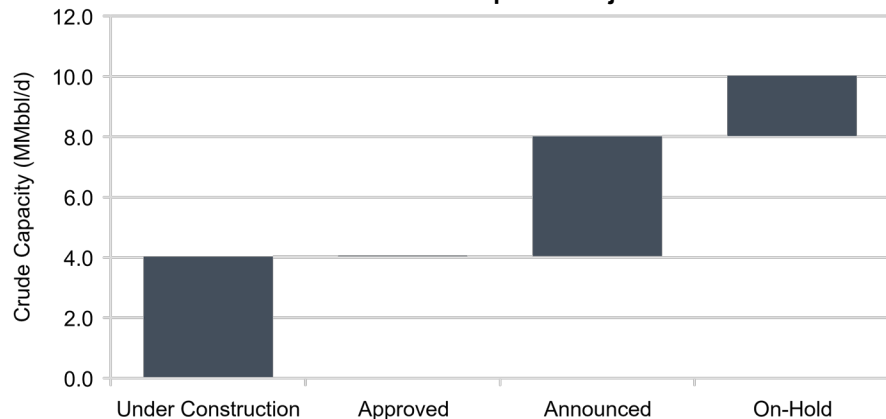
## Pipelines likely to face challenges under Biden's plan

- Biden's climate plan states that "...every federal infrastructure investment should reduce climate pollution, and require any federal permitting decision consider the effects of greenhouse gas emissions and climate change". There are currently 27 crude/batched liquid and 84 natural gas pipeline projects announced, on-hold, approved, or being constructed with total new or expansion capacities of 10 MMbbl/d and 72 Bcf/d, respectively, at-risk under the Biden administration. Most notably, the Keystone XL and Dakota Access Pipeline (DAPL) and expansion.
- 12 years, 2 Presidents, and 1 President-elect later, TC Energy's Keystone XL project has yet to be completed. The 830,000 bbl/d proposed line set to carry

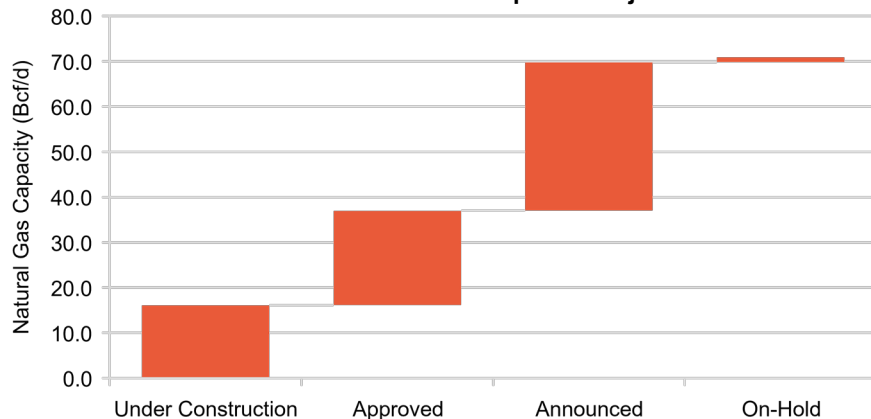
Alberta heavy crude to Gulf Coast refiners now faces another challenge under Biden, who has already publicly stated he would rescind the project's presidential permit granted by President Trump.

- Energy Transfer's DAPL (the largest single source of egress for Williston Basin crude production currently operating at close to 600,000 bbl/d throughput) is already facing challenges after U.S. courts determined it was operating without valid environmental permits this past summer. A Biden presidency could revoke authorization to operate while the U.S. Army Corps of Engineers performs the environmental assessment mandated by the courts, and there's no guarantee that the results of the new assessment will be favourable for the line's continued operation.

**New U.S. Crude Pipeline Projects**



**New U.S. Natural Gas Pipeline Projects**





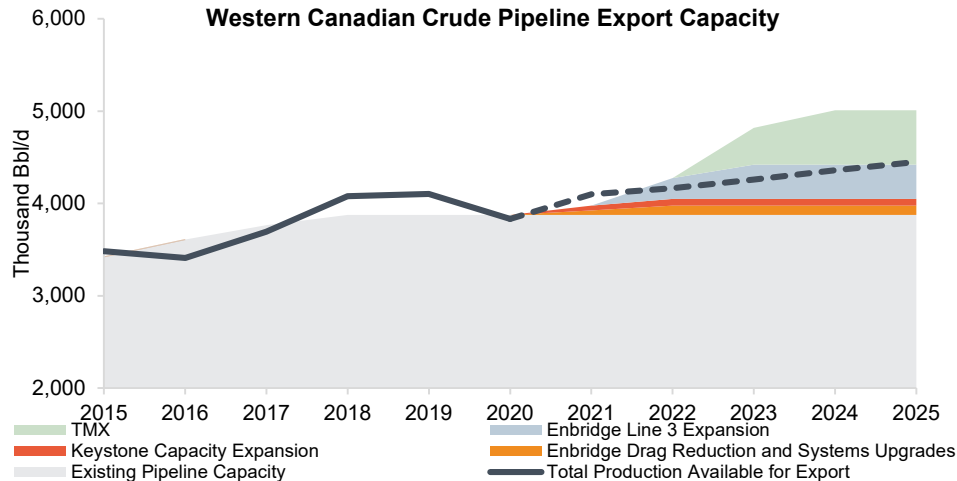
# Keystone XL and Dakota Access implications

## Long-term Canadian and Williston Basin excess capacity at risk

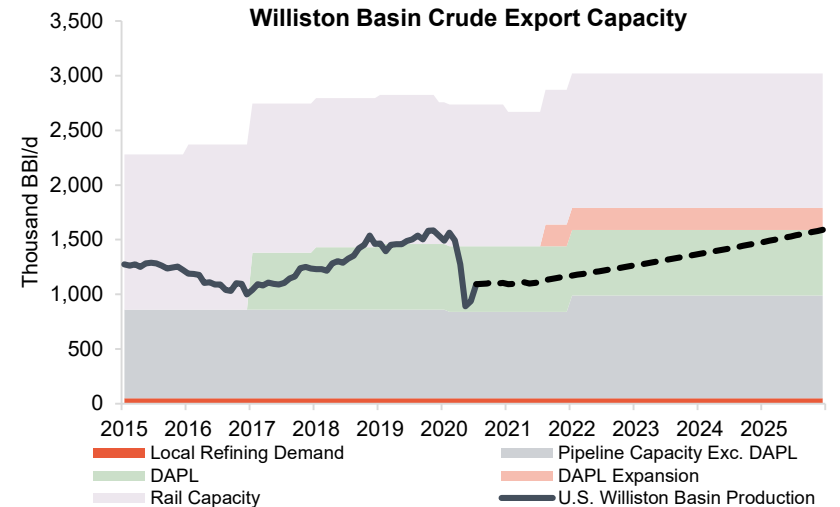
- The impact of cancelling Keystone XL for Canadian producers is likely minimal in the near-term from an excess pipeline capacity perspective. With Enbridge's Line 3 and TMX set to add almost 1 million bbl/d of new egress leaving Western Canada and limited green and brownfield oilsands projects in the hopper, Western Canadian production should remain at or below pipeline capacity over the near-term. That being said, with U.S. Gulf Coast refinery demand for Canadian heavy crudes increasing as supplies from other jurisdictions (Venezuela, Mexico) decline, Keystone XL would likely boost investment and activity levels for Canadian heavy oil producers in the medium-to long-term.
- Excess pipeline capacity for Williston Basin producers, on the other hand, hinges on the Dakota Access pipeline (DAPL). Without DAPL, producers would

be forced to utilize more expensive rail options to move crude out of North Dakota to downstream demand centers. In a region that already sees pricing discounts due to its distance away from key refining hubs, this added transportation cost could negatively impact well economics and subsequently limit production growth potential of the basin.

- Currently, DAPL is operating near capacity while undergoing a revised environmental impact and permitting process. As of Q3 2020, Energy Transfer (owner of DAPL), announced plans to expand DAPL by up to an additional 500 Mbbbl/d by the end of 2021. At this point, it seems unlikely that the expansion will receive approval and there is uncertainty around whether the existing DAPL system will be allowed to continue operating during and/or after the environmental review.



Source(s): Eight Capital, NEB, CAPP, Sproule/Boost Analysis



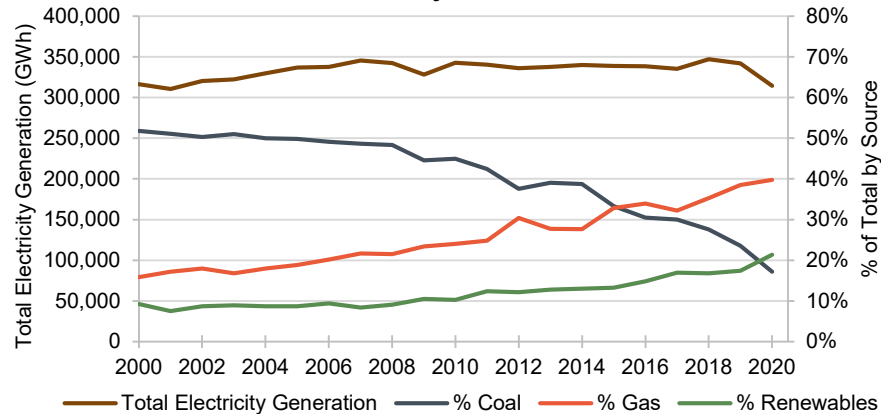
Source(s): U.S. EIA, ND Pipeline Authority, Sproule/Boost Analysis

# Power generation: where is the U.S. today?

## Natural gas dominates power generation, but renewables lead growth

- Total U.S. electricity consumption has stayed relatively stable since 2000 despite the population growing from 280 to 330 million, largely due to increasing end-use energy efficiency. However, the primary energy sources generating this electricity have undergone significant changes over the same time period.
- Taking over coal's number one position in 2015, natural gas is now the largest source of electricity with a CAGR of 5% over the last 5 years. Roughly one third of all natural gas produced in the U.S. (~30 bcf/d in 2019) is used to generate electricity.
- Renewables, led by solar and wind, have grown 8% per year since 2015, and are expected to surpass coal this year as the second largest contributor to U.S. power generation.

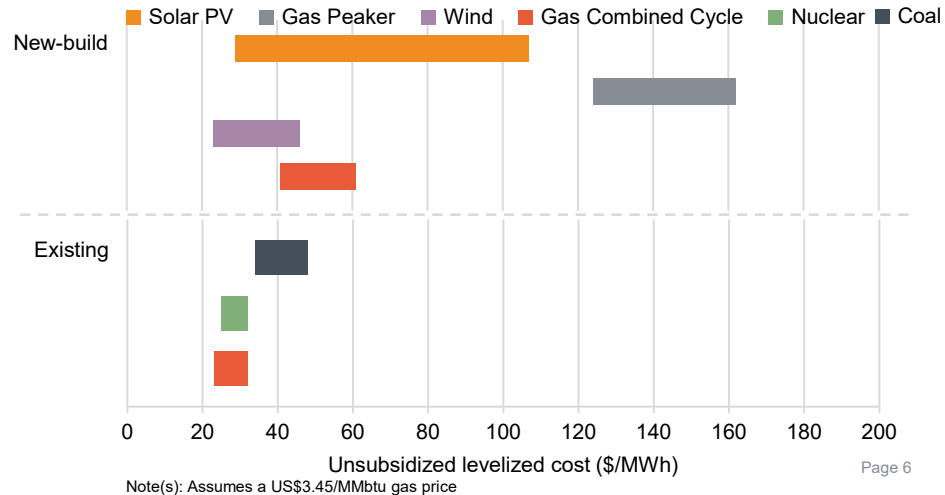
**U.S. Electricity Generation Mix**



## Renewables are now the lowest on the cost curve

- The levelized cost of electricity (LCOE) measures the cost competitiveness of different electricity-generating technologies. Understanding how solar, wind, natural gas, nuclear, and coal stack up from an economics perspective is key to anticipating the direction of power generation's future energy mix.
- With continued technological and cost improvements, the average LCOE of new-build solar PV and wind is often now lower than new-build natural gas plants. In fact, some new-build renewable technologies are now less expensive than the operating cost of existing coal and natural gas-powered electricity generation.
- Considering where renewables now fall on the cost curve, it is likely that renewables will comprise a major portion of the supply mix in the near future, even without Biden's plans for the future of U.S. power generation.

**Unsubsidized Levelized Cost of Electricity**

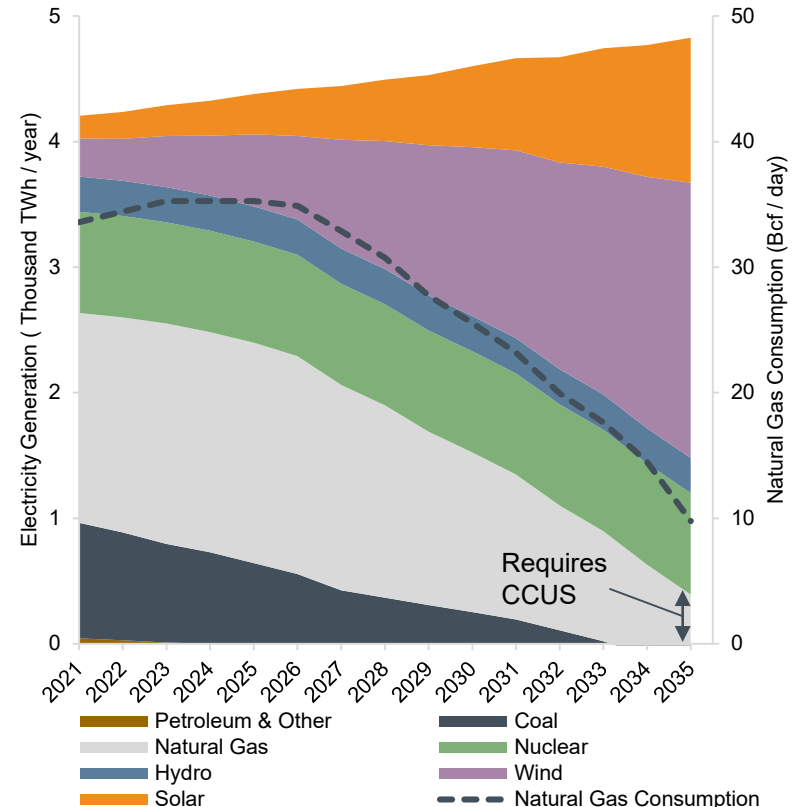


# Envisioning net-zero power generation by 2035

## Decarbonization is feasible; net-zero is uncertain

- An 80-90% clean power grid by 2035 is likely to be both technically feasible with existing technologies and potentially quite cost-effective. However, a 100% net-zero grid, as proposed in Biden's plan, will require significant technological improvements to meet electricity needs economically while preserving grid reliability.
- Renewables will comprise a major portion of the supply mix even without Biden's plan due to the declining cost structure. Wind and solar will compose most of the electricity supply in a net-zero grid, requiring a total combined investment of between US\$0.7T - \$1.5T.
- Battery storage will take a leading role in shifting renewable generation to match the timing of loads and in balancing intermittent wind & solar output.
- Prevalence of nuclear power presents a significant source of uncertainty:
  - Nuclear can provide reliable, carbon-free baseload power. Existing plants would likely need to be kept open to achieve the 2035 target; however, this may require policy action, given the high cost of nuclear refurbishment.
  - Future small modular reactors (SMRs) could prove cost-effective and could provide useful flexibility for the firming of renewables.
- Fossil fuel plants (particularly natural gas) could retain some market share with successful R&D on carbon capture, utilization & storage (CCUS) technology:
  - CCUS could either capture carbon upon combustion or remove carbon from ambient air. R&D is required to make CCUS cost-competitive.
  - Existing gas plants could play an important role in providing peaking / firming power & inertia services by 2035 (assuming cost-competitive CCUS). New plants may struggle to compete with low-cost renewables.

U.S. Power Supply Mix in the Net-Zero Scenario



# What is needed to achieve a net-zero grid?

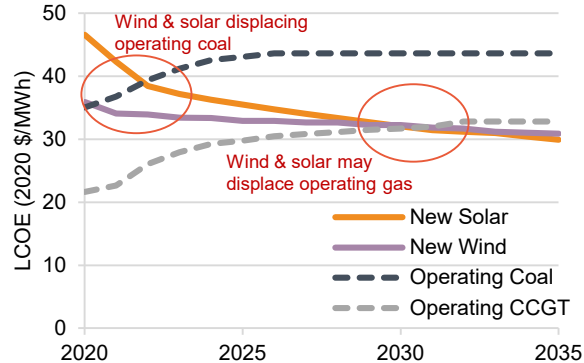
## Wind & solar set to outcompete fossil fuels; but policy needed to scale

- Market forces have already caused new solar & wind plants to outcompete new-build fossil fuel plants on cost.
- The cost of new wind & solar may not fall below the operating costs of existing gas plants on average until ~2030; therefore, policy mechanisms will be required for wind and solar to scale sufficiently to achieve Biden's plan, which could require ~1 TW or more of new wind & solar.
- Biden has discussed several possible policies to reach the 2035 target, which may include a "clean energy standard" mandate for states/utilities to procure specified volumes of clean energy, clean energy tax credits, or refinancing of existing coal & gas plants to facilitate early retirement.

## Scaling up battery storage to support timing of loads

- A major build-out of storage will be needed to shift renewable output to the timing of loads (>100 GW by 2035). Batteries appear likely to be the least-cost solution to meet this need, though they will struggle to compete with gas generation until late in the target window.
- A major reduction in battery costs would help facilitate an organic shift away from fossil fuels for peaking power purposes. The Biden plan includes a target reduction in battery costs to 1/10th current cost.
- Policy mechanisms may also still be needed to incentivize sufficient battery build by 2035, especially to go from 80-90% clean power to 100%.

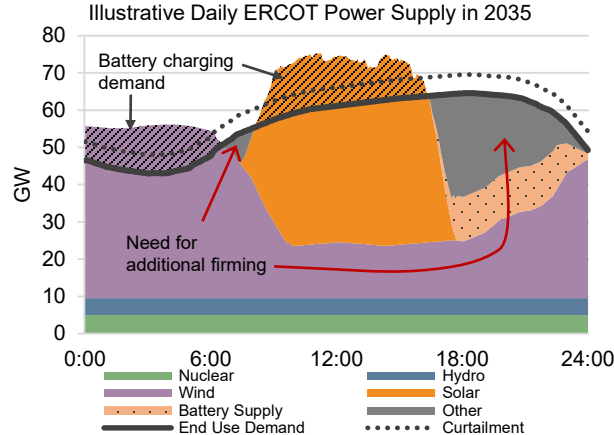
## New wind & solar already on track to compete with existing fossil fuel plants and supply the bulk of power by 2035 (unsubsidized)



Source(s): U.S. EIA, BloombergNEF, Sproule/Boost analysis

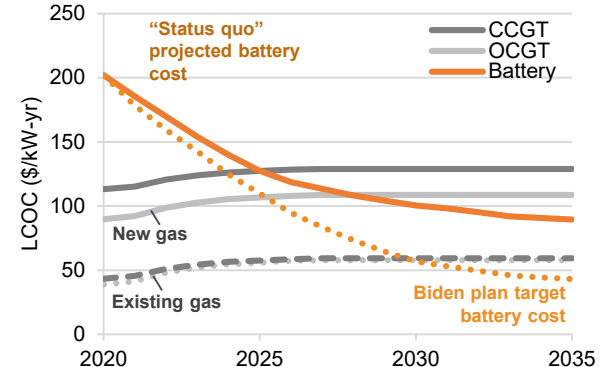
Note(s): Ranges exist around all estimates – chart lines represent indicative averages. Solar & wind LCOEs are sensitive to curtailment assumptions. Coal & CCGT LCOEs include assumption of decreasing utilization to 2035.

## Extensive firming resources will be needed to balance renewables intermittency at both short & long timescales



Note(s): Assumes 20 GW of 4-hr battery storage in ERCOT in 2035; batteries will also play role in regulating reserve / frequency response throughout the day.

## Batteries require policy incentives to compete with existing gas plants to provide firming resources at sufficient scale by 2035



Source(s): U.S. EIA, BloombergNEF, Sproule/Boost analysis.

Note(s): LCOCC = "Levelized Cost of Capacity". LCOCC above represents 4-hr peaking capacity.



# What is needed to achieve a net-zero grid? (cont'd)

## Long-duration firming needed for a mostly renewable electricity supply

- There is a need to firm up renewables supply on the scale of days, weeks, or months, such as during weeks with low wind or to accommodate seasonal variations in solar output.
- This could be provided by fossil fuel plants if combined with economical CCUS technology or by pumped hydro storage projects. It could also be provided by some new technology not currently deployed at-scale including chemical flow batteries, hydrogen storage to power, large-scale hydrogen fuel cells, or flexible nuclear technology.

## Distributed power generation could limit transmission investment required

- While transmission investment is needed to support a net-zero power system, this may be limited to spur lines connecting new wind & solar sites to existing bulk transmission lines.
- Future wind & solar will likely be cheaper to construct close to load centers rather than building new bulk transmission lines between regions.
- The distributed nature of renewables (especially solar) also mitigates the need for inter-regional bulk transmission, particularly if cost-effective firming power is available to balance intermittency locally. Without effective firming capacity, inter-regional energy transfers could become more important.
- Total transmission investment could exceed \$100B by 2035, even without major upgrades to bulk transmission lines.

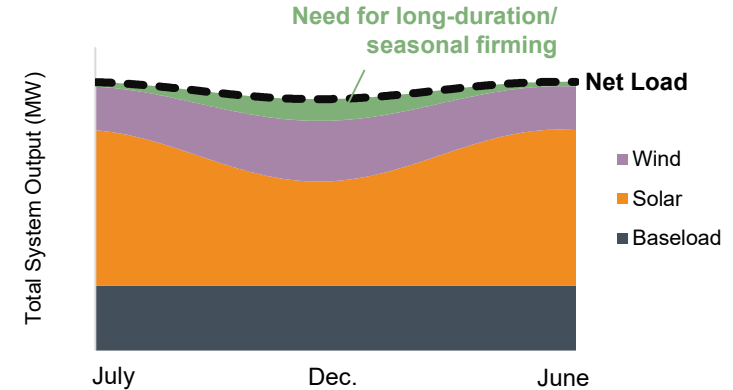
## Major growth in renewables presents challenges for grid reliability

- Challenges include providing adequate supply, maintaining sufficient inertia, local voltage control, and frequency regulation.
- New market mechanisms and products are needed to ensure sufficient grid capacity, operating reserves, frequency response, and other ancillary resources. The removal of many GW of large, rotating synchronous fossil fuel fired generating equipment presents a significant risk to grid stability which may require large-scale use of synchronous condensers to provide the inertia that wind & solar cannot.

## Flexible demand would help reduce peak loads and cushion the impact of renewables intermittency

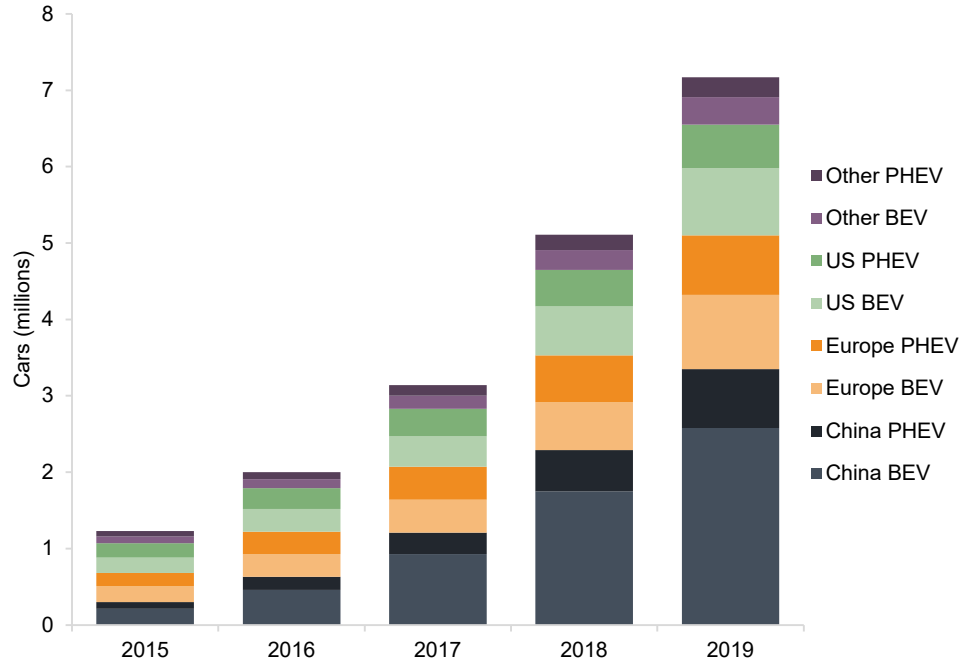
- Major growth in this area is expected with many private-sector solutions already being deployed at scale.
- Electric vehicle (EV) charging is an important area for smart, flexible algorithms which can mitigate peak load requirements. Once charged, EVs can also provide flexible supply back to the grid.

**Seasonal Variation in Renewables Illustrates Need for Long-Duration Firming**



# Biden sets sights on electrifying transportation

Global Electric Car Stock



## The Biden climate plan emphasizes decarbonizing the transportation sector, which comprises 28% of US carbon emissions

- Light duty vehicles represent the largest share of transportation emissions sources at 59% of sector emissions.
- The global electric vehicle fleet has grown rapidly in recent years, with China leading all other nations by a significant margin. In the U.S., Tesla currently takes a dominant share of new EV sales (78% of 2019 new battery electric vehicle sales)
- While EV sales still represent a small share of total new vehicle sales (~2%), adoption is likely to continue to increase over the next decade as key barriers to ownership continue to erode.
- Policy support for EVs is increasing as well. In addition to providing direct subsidies for EV purchases, governments are promoting EVs with a variety of other bold, assertive policies: mandated target dates for 100% new vehicle sales to be electric; bans on ICE vehicles in the cores of major cities; carbon taxes on motor fuels; and rigorous vehicle fuel economy standards

# EV plan paves the way for ongoing trends towards electric mobility

## The Biden plan uses rigorous fuel economy standards & rebates to foster a transition driven largely by existing trends

- EV costs continue to fall significantly, driven largely by reductions in battery costs.
- Cost parity with ICE vehicles on total-cost-of-ownership (TCO) basis is already occurring in many cases. Purchase price parity is also expected around mid-decade, a development that may trigger the large-scale shifting of personal vehicles to electric.

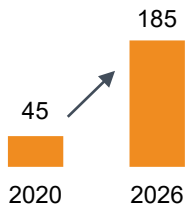
## Biden plan provides conditions for modest growth in EVs

- EVs may comprise 10-25% of new car sales by 2030 under Biden's plan, representing 1.5-5 million new EVs per year. The total EV fleet may include 10-23 million EVs by then.
- Vehicle-miles travelled are likely to increase at a faster rate as commercial, fleet, and ride-sharing vehicles transition earlier to benefit from the low mileage costs offered by EVs.

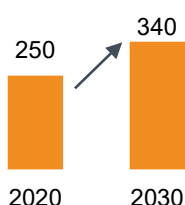
## Continued battery technology improvements are expected to lead to continued improvements in vehicle range, charging rate, and battery longevity

- The number of EV models offered by OEMs should continue increasing and new models will increasingly address the popular truck & SUV segments.

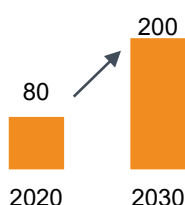
EV Models Offered



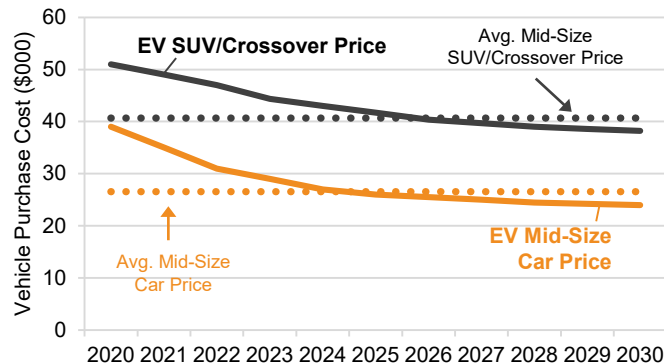
Avg. EV Range (miles)



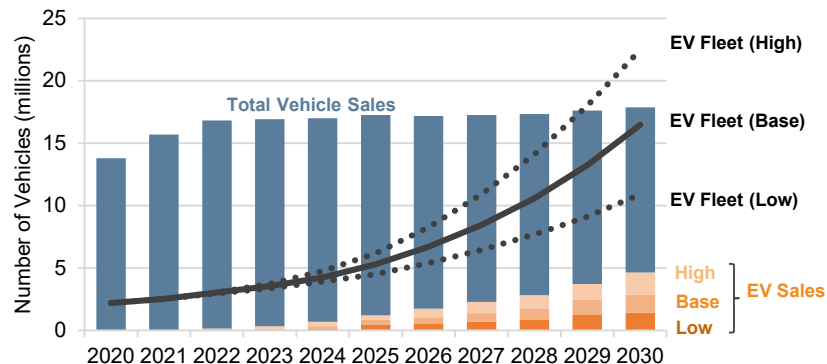
Avg. Charging Speed (kW)



## EV Purchase Price Parity Expected Mid-Decade



## EV Adoption to Increase Under Biden Plan



# Addressing EV infrastructure hurdles

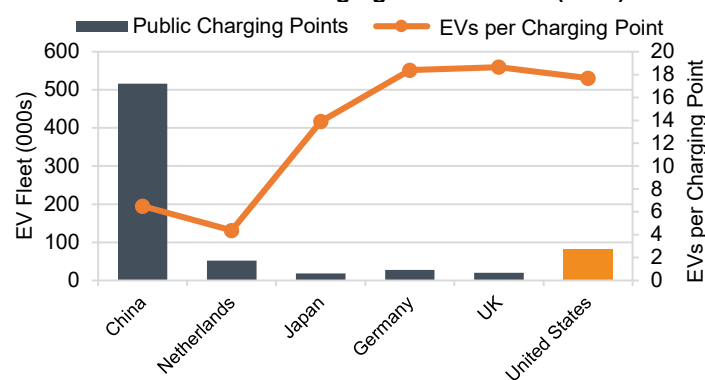
## Major charging infrastructure buildout required to enable sufficient availability of public charging

- Public chargers needed to mitigate “range anxiety” and provide primary charging locations for certain customer segments (e.g. multi-unit apartment residents).
- Biden plan’s proposed build out of 500,000 public EV chargers likely to mitigate key hurdle to EV adoption.
- Currently, there are ~13,000 public and workplace fast-chargers and 69,000 public and workplace Level 2 chargers in U.S.
- NREL has estimated that 27,500 public fast-chargers and ~600,000 public Level 2 chargers would be needed to serve a U.S. fleet of 15 million light duty EVs (~\$4B additional investment).
- Additional 10 million+ private chargers may also be needed to facilitate projected EV adoption in base case (~\$18B investment).

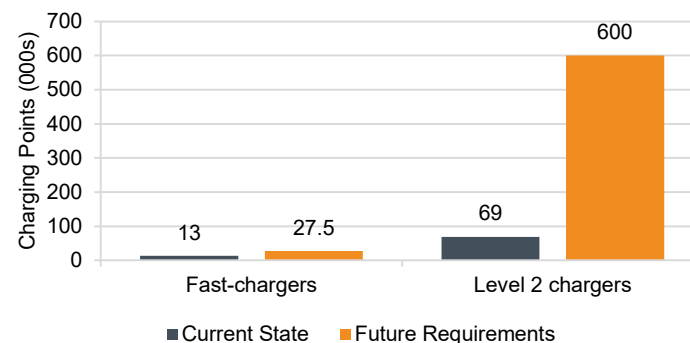
## Grid network upgrades needed to provide sufficient capacity to serve EV charging loads

- Smart charging management can mitigate the need for system upgrades by moderating peak charging loads.
- Greater use of fast-charging will increase the level of investment required.
- Upgrade investments may total anywhere between \$25B – 85B depending on the ability to optimize charging loads.

## Current Public Charging Infrastructure (2020)



## Major US Public Charging Investment Required

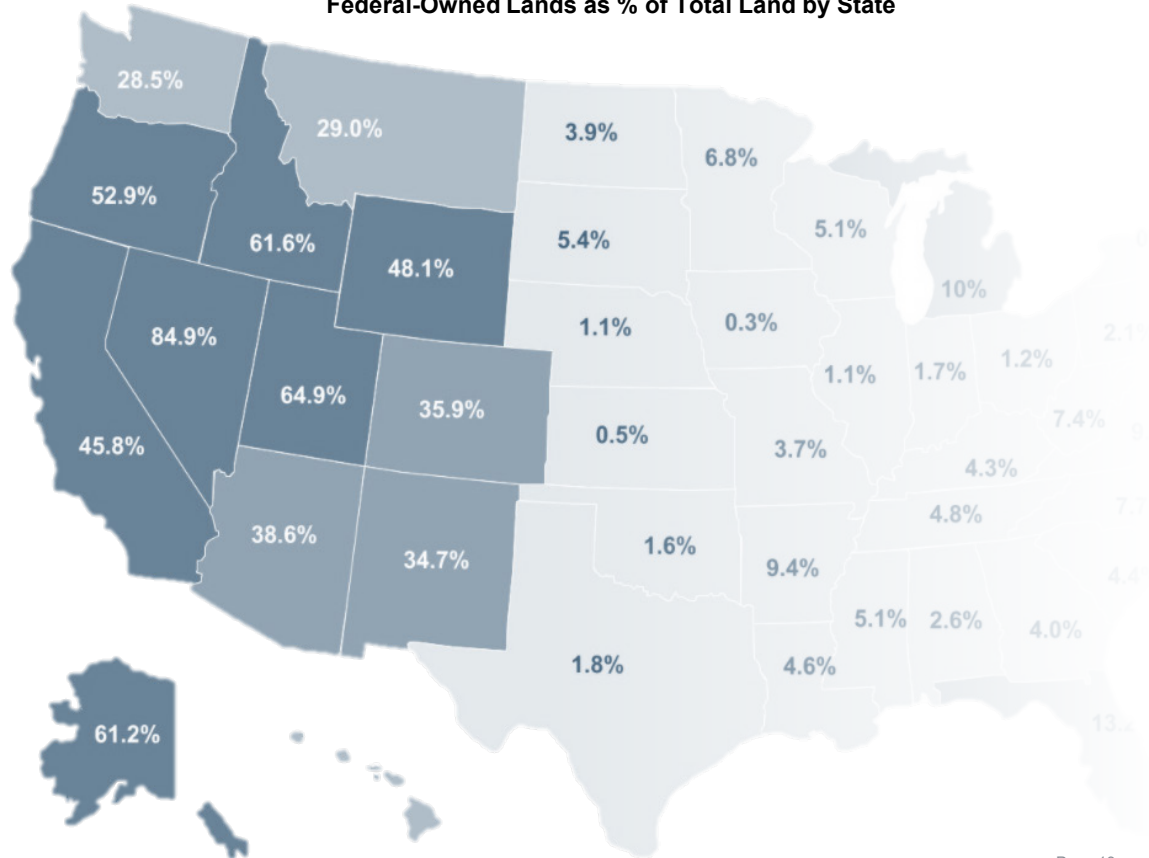


# Banning oil and gas permitting on federal lands: Highlights

## No new drilling leases on federal lands under Biden

- One of Biden's climate plan objectives is "...banning new oil and gas permitting on public lands and waters...". It is unclear whether this means eliminating the permitting of new leases only or if the plan also includes banning any future drilling on existing leases. Regardless, it will be important to understand the magnitude of development attributable to federal lands and any related implications.
- Federal lands accounted for 24% of the 2019 total U.S. crude production (3 million bbl/d) and 13% of 2019 total U.S. natural gas production (13 Bcf/d).
- The majority of federal land-related production comes from offshore development in the Gulf of Mexico (1.9 million bbl/d crude in 2019). Onshore production makes up the remainder, with New Mexico being the largest contributor at 550 thousand bbl/d, followed by Wyoming, North Dakota, and Colorado.
- The plan also includes a permanent ban on oil and gas development in Alaska's Arctic National Wildlife Refuge, a reversal of the August 2020 Trump administration approval of an oil and gas leasing plan for the Refuge.

Federal-Owned Lands as % of Total Land by State



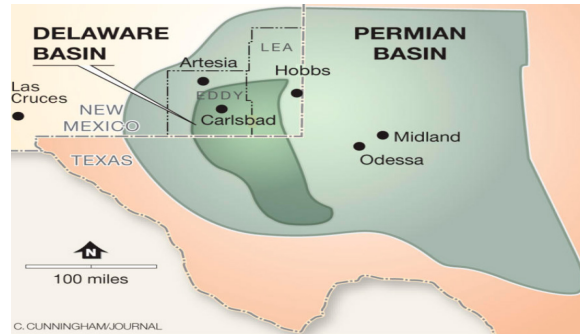


# No development, no problem for Permian production

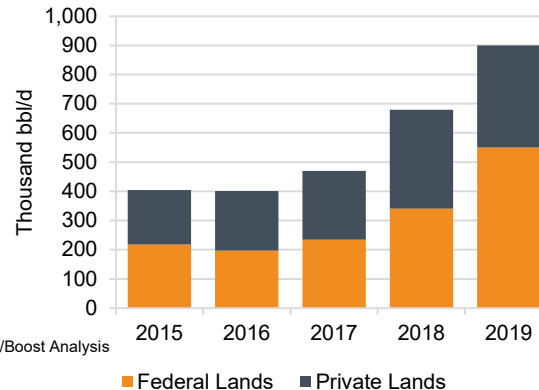
## Permian is resilient to the development ban on federal lands

- In 2019, New Mexico's federal land crude production averaged approximately 550 thousand bbl/d – 60% of total New Mexico production and 18% of total crude production from federal lands. Virtually all of this production comes from the Delaware Basin in Eddy and Lea counties, which have significant federal ownership.
- EOG is the largest Delaware Basin producer and has the highest federal land % of their total Permian acreage at 50%; other major producers are between 10% to 40% federal land positions. Throughout 2020, in an effort to hedge their federal land exposure against Biden's plans, Delaware Basin operators have aggressively grown their inventory of drilling permits. For example, EOG's New Mexico permitting in 2020 is 50% higher than all of 2019. EOG also has enough existing permits for four years of uninterrupted development on federal lands (assuming Biden does not cancel all new drilling on existing permitted lands).
- Ultimately, a federal lands drilling ban is more likely to result in a reallocation of capital within Delaware Basin operators' portfolios with minimal impact on total Permian production. While existing federal land production would decline rapidly given a 40% base decline rate in the Permian, near-term impact to total Permian production output is likely limited.
- From a political perspective, these planned bans are likely to face headwinds from not only Republicans but also Democrats. With oil and gas revenues making up one-third of New Mexico's state budget, perhaps the largest impact of these bans will be felt by New Mexico taxpayers. The Governor of New Mexico, Michelle Lujan Grisham (Democrat), has already announced she will be requesting a waiver to exempt New Mexico from these bans should they come into effect.

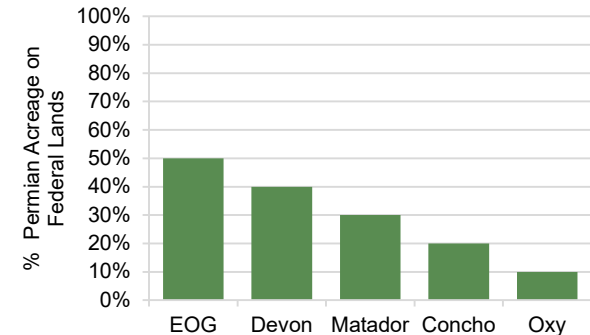
**New Mexico's Delaware Basin**



**New Mexico Crude Oil Production by Land Type**



**Delaware Basin Operator Exposure to Federal Lands**



# Near-term, ban consequences are minimal

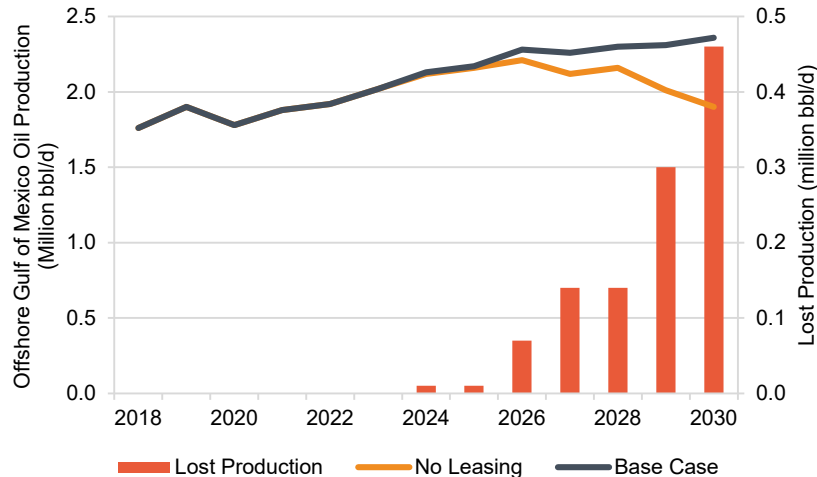
## Significant production impacts are likely not felt until mid-2020's

- With the Gulf of Mexico contributing to 60% of U.S. federal acreage oil production and 15% of total U.S. oil production in 2019, U.S. offshore production is most at risk from Biden's plans.
- There are sufficient existing permitted offshore leases to allow operators to grow Gulf of Mexico crude production to 2025. Under a new lease ban, production would begin to decline post-2025, with almost 500 thousand bbl/d of production lost due to these bans by 2030 (26% of 2019 output). A more extreme scenario not shown on the chart in the bottom left is if all new drilling was banned. This scenario would result in production falling starting in 2021 and a 1.6 million bbl/d reduction in the Gulf of Mexico crude production by 2030

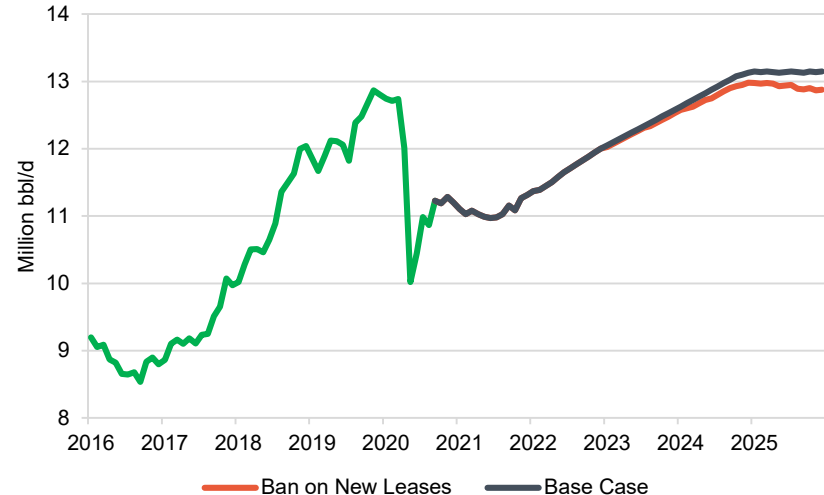
(85% of 2019 output).

- With both onshore and offshore operators having large inventories of permitted leases as well as DUCs, total U.S. crude output should see minimal impacts from a federal land leasing ban until at least 2025, assuming new drilling is still allowed on existing permitted leases. Over this time period, we expect crude prices and limited access to drilling capital to be the biggest factors influencing U.S. crude production output, rather than a ban on federal land leasing.

### Gulf of Mexico Crude Production Forecast to 2030



### Total U.S. Crude Production Forecast to 2025



# Key Takeaways: Biden Impacts on Oil and Gas from 2021 to 2025

## Near-term Oil and Gas Implications

- Much of the near-term impacts from a Biden presidency on oil and gas development in the U.S. will be related to pipeline project regulations and approvals.
- On the crude side, Keystone XL likely faces further delays or potential cancellation, while the Dakota Access pipeline may be at risk of shut-down pending results of the environmental assessment. Keystone XL is not immediately required for Canadian producers from an egress capacity perspective but cancelling the project would limit production growth from the mid-decade onwards. In contrast, a DAPL suspension or cancellation would be felt by Bakken operators immediately by way of higher transportation costs and higher price differentials.
- Gas pipelines are also at risk, with implications that are tied to the shifting energy mix in the U.S. As demand for natural gas increases in the near-term with coal-to-gas switching in the power sector and LNG export capacity expansion on the Gulf Coast, new pipeline infrastructure will be required to connect producing regions to emerging natural gas demand centers. Existing infrastructure in regions with significant gas demand growth will likely be strained as gas flows evolve, and regional pricing differentials may develop as a result of emerging gas pipeline bottlenecks.
- Banning new development permits on federal lands and waters are unlikely to have material impacts on supply in the near-to-medium term. The largest impacts will be felt regionally by states like New Mexico and Wyoming, who depend heavily on federal land oil and gas development for government revenues.



# Key Takeaways: Biden Impacts on Oil and Gas beyond 2025

## Medium-to-Long Term Oil and Gas Implications

- Achieving 80 to 90% net-zero power generation by 2035 is both technically and economically feasible with technology that exists today but becoming completely net-zero will require advancements in a variety of technologies such as storage, CCUS, hydrogen, and/or nuclear; significant grid system upgrades; and significant additional policy mechanisms. Nevertheless, it seems very likely that a significant amount of current U.S. natural gas demand from the power sector will be displaced towards the end of the 2020's and into the 2030's
- In the net-zero power generation case, natural gas use in power generation falls from 30 bcf/d in 2019 to 10 bcf/d in 2035, assuming advancements in CCUS technologies that allow some net-zero gas-fired power generation. At face value, losing 20 bcf/d demand (25% of total 2019 production) is significant, but with Gulf Coast LNG exports set to add 10 bcf/d of capacity between now and 2025 and an additional 16 bcf/d of project capacity currently approved not under construction, declining domestic demand impacts may be dampened by robust natural gas exports. The degree by which LNG exports dampen domestic demand reductions will hinge on natural gas consumption growth in Asia primarily, which is currently expected to grow by over 30% to 2040. These growth expectations, however, face some uncertainty due to competition with renewables.
- Electric vehicles are gaining momentum, and cost parity with internal combustion engine vehicles is already occurring. Biden's plans aim to accelerate these trends and facilitate EV adoption through fuel economy standards, rebates, and a significant build-out of public EV charging infrastructure. In a scenario where 10 to 25 million EVs are on the road in the U.S. by 2030, we estimate related demand disruption may range from 0.5 to 1.4 million bbl/d, or 2.5 to 6.9% of total U.S. crude consumption based on 2019 levels. While not negligible, crude demand displacement associated with EV adoption in the medium-term is unlikely to have enough of an impact to materially alter domestic and global crude prices.
- Roughly 60% of all U.S. natural gas production is consumed in the residential, commercial, and industrial sectors – all of which have varying degrees of uncertainty around the feasibility of achieving significant reductions in fossil fuel use by 2035 but would require drastic use reduction to achieve Biden's 2050 net-zero target for the U.S. economy. Biden's plan does address some of this uncertainty – net-zero standards for all new commercial buildings by 2030, for example – and a significant reduction in fossil fuel use in this sector could likely come from electrifying certain end uses.
- Deep decarbonization of the residential & commercial segments, however, will likely also require large-scale deployment of electric heat pumps & boilers, geothermal heating, and/or hydrogen-based heating, a roll-out which is not addressed explicitly in Biden's plans. Furthermore, decarbonizing the industrial segment would likely require both mass electrification and conversion of coal- and gas-fired industrial heating to some clean alternative (e.g. hydrogen). Reducing fossil fuel use in the industrial sector, which alone makes up 33% of U.S. gas consumption, is therefore contingent on R&D success in alternatives like hydrogen leading to an organic, market-driven transition from fossil fuels. Overall, while some reduction in fossil fuel usage in these sectors is likely under Biden's plan, there may be a limit on the extent of that reduction given the absence of specific mechanisms needed to encourage the key drivers of further reductions.



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ENERGY VENTURES

## About Sproule

A global energy consulting firm, Sproule provides technical and commercial knowledge to help clients discover value from energy resources around the world. Sproule is anchored by deep geotechnical and engineering expertise and a strong commercial understanding of energy markets and policy requirements. Sproule helps E&P companies, financial institutions, and governments minimize risk and optimize business decisions.

## About Boost

Boost Energy Ventures (Boost) is a boutique advisory, analytics, and software development firm focused on the electricity sector. Boost interprets data and distills complexity to help clients build successful businesses in the face of an emerging energy transition. Our team provides strategy, asset development support, market forecasting, transaction and valuation modeling, and market analytics.

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