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Select Committee on the Climate Crisis

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"International Climate Challenges and Opportunities"

Questions for the Record

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<u>The Honorable Kathy Castor</u>

1. **We know that cutting methane emissions is a key way to slow global temperature rise and very often a win-win-win for industry, the climate, and our health. What specific opportunities does the United States have to lead on reducing methane emissions, and how would that benefit the climate?**

Methane is 86 times more potent than carbon dioxide over a 20-year period, so reducing methane is a very powerful tool to reduce near-term warming. The major sources of anthropogenic methane emissions are agriculture (farming and livestock), the energy sector (emissions from the production, transportation, and use natural gas, oil, and coal), and the decay of organic waste in municipal solid waste landfills and wastewater handling and treatment facilities. As one of the world's largest oil and gas producers, the US has both the responsibility and the opportunity to take action on methane.[1]

In the near term, the US can build on recent progress by addressing three critical priorities:

- Implementing the Methane Emissions Reduction Action Plan, including implementing the EPA's proposed rule for oil and gas facilities, addressing emissions from orphan wells and abandoned mines, and reducing emissions from landfills and agriculture
- Passing key provisions in the Build Back Better Act, including a methane fee, funding for methane monitoring and mitigation, and support for agricultural methane management
- Continuing to support global methane reduction efforts under the Global Methane Pledge

[1] Ross, Waskow, and Ge, "How Methane Emissions Contribute to Climate Change"

These three priorities would build on recent progress in the following areas:

Global Methane Pledge: Internationally, in September, the US and the EU launched the Global Methane Pledge, an international pledge with a collective aspiration to cut global methane emissions by 30% by 2030, relative to 2020. More than 100 countries have already joined the pledge.[2]

Methane Emissions Reduction Action Plan: Domestically, the White House released a U.S. Methane Emissions Reduction Action Plan in November, a comprehensive plan to address methane emissions from all major sources.[3]

Agriculture: The U.S. Department of Agriculture is working with U.S. farmers and ranchers to expand the voluntary adoption of climate-smart agriculture practices to reduce methane emissions from key agriculture sources. These practices include incentivizing the deployment of improved manure management systems, anaerobic digesters, and new livestock feeds, composting, among others.[4] The U.S. Congress is also considering supplemental funding that would support many of these efforts, including agriculture conversation investments in the House-passed Build Back Better Act.[5]

Waste: The Environmental Protection Agency (EPA) has taken steps to implement stronger pollution standards for landfills, including installing systems to capture methane and generate electricity.[6] Under the new U.S Action Plan, the EPA is boosting its voluntary landfill methane outreach program to achieve a national goal of 70 percent methane emissions capture for all landfills around the country.[7] The EPA is also ramping up an initiative to reduce the food loss and waste, which is a major contributor to landfill methane emissions.[8]

Energy: The EPA has proposed a new rule to reduce methane emissions from oil and gas production. The proposed rule includes standards for performance, standards to eliminate venting, and monitoring to identify methane leaks.[9] The proposal covers not just new but also existing operations, which will mean more rapid emission reductions. According to the EPA, the proposed regulations will reduce methane emissions from sources covered in the proposal by 74 percent by 2030, relative to 2005 levels.[10] . Further, the Department of Transportation in the process of finalizing rules that will extend federal pipeline safety standards and requires

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[2] Climate & Clean Air Coalition Secretariat, "Global Methane Pledge"
[3] White House, "U.S. Methane Emissions Reduction Plan"
[4] White House, "Joint US-EU Press Release on the Global Methane Pledge"
[5] White House, "Joint US-EU Press Release on the Global Methane Pledge"; Yarmouth, "H.R._To Provide for Reconciliation Pursuant to Title II of S. Con. Res. 14"
[6] U.S. Environmental Protection Agency, "Benefits of Landfill Gas Energy Projects"
[7] White House, "Fact Sheet: President Biden Tackles Methane Emissions, Spurs Innovations, and Supports Sustainable Agriculture to Build a Clean Energy Economy and Create Jobs"
[8] White House, "Fact Sheet: President Biden Tackles Methane Emissions, Spurs Innovations, and Supports Sustainable Agriculture to Build a Clean Energy Economy and Create Jobs"
[9] U.S. Environmental Protection Agency, "U.S. to Sharply Cut Methane Pollution that Threatens the Climate and Public Health"
[10] U.S. Environmental Protection Agency, "U.S. to Sharply Cut Methane Pollution that Threatens the Climate and Public Health"

operators to cut methane leaks.[11] The Infrastructure Investments and Jobs Act significantly increases federal resources to address methane emissions from abandoned mines and orphaned oil and gas wells.[12] In addition, the House included a methane fee and funding for methane monitoring and mitigation in its passage of the Build Back Better Act. If enacted into law, the fee would provide incentives to further reduce methane emissions.

The Methane Emissions Reduction Action Plan and proposed EPA rules are first steps in achieving serious cuts from methane emissions in the U.S.

Further progress is also possible in the following areas:

A recent study suggests that oil and gas methane emissions can be cut even further through more frequent inspections, greatly reduced venting and flaring at wellheads, and improvements to oil storage tanks, among other measures.[13] Many of these measures have now been put forth in EPA's latest proposed rule for new and existing sources, and the administration and congress should continue to support rapid and comprehensive reductions through complementary measures such as investment in RD&D, regulation of facilities located on federal lands, investment in plugging and remediation of abandoned sites, and partnership with industry to ensure rapid best practice adoption. New sensors and emerging monitoring technologies (for example, plane-mounted sensors and satellites) will also open up opportunities for more advanced leak detection and repair provide granular data to reveal the leakiest parts of the oil and gas system, to support quicker seals and remedial action.

Further advances can also be made in the agriculture sector. Enteric fermentation (cow burps), for example, is one of the largest contributors to methane emissions in the U.S. agriculture sector. Additional investments in RD&D of feed additives (which help to inhibit methane production and improve the productivity of ruminants), are important to scale up work in this area, firstly focused on longer-term trials and safety tests.[14] Improved feeding strategies for livestock will require coordinated activity, so the U.S. government could partner with the private sector to scale up production and distribution of better feeds and conduct innovative marketing campaigns.[15]

2. **Global accountability and transparency are critical for translating climate ambition and pledges into real emissions reductions and progress on adaptation and resilience. How do we keep track of real climate action around the world and how do we know that countries will deliver on their commitments under the Paris Agreement?**

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[11] White House, "Fact Sheet: President Biden Tackles Methane Emissions, Spurs Innovations, and Supports Sustainable Agriculture to Build a Clean Energy Economy and Create Jobs"
[12] White House, "Fact Sheet: President Biden Tackles Methane Emissions, Spurs Innovations, and Supports Sustainable Agriculture to Build a Clean Energy Economy and Create Jobs"
[13] Clean Air Task Force, "Reducing Methane from Oil and Gas"
[14] Searchinger et al., "Opportunities to Reduce Methane Emissions from Global Agriculture"
[15] Searchinger et al., "Opportunities to Reduce Methane Emissions from Global Agriculture"

The Paris Agreement has set out a robust transparency framework for the purpose of "building mutual trust and confidence" that each country is implementing and delivering on their commitments. As part of these transparency arrangements, each country will submit a report to the global community every two years, detailing their greenhouse gas emissions, progress made in implementing and achieving their commitments, adaptation efforts and needs, and the financial, technological, and capacity building support they have provided and mobilized (for developed countries) or support received and needed (for developing countries). At COP26 in Glasgow in November 2021, the United States worked diligently with partners to ensure that the information reported under the Paris Agreement would be in presented in a standardized manner so that it is possible to transparently and consistently track climate action and progress on commitments.

The Paris Agreement's transparency framework has also built-in accountability processes, where technical experts ensure that information reported is accurate and follows the latest and best-available science and where countries can ask questions of each other about their progress towards their commitments and to explore the opportunities, challenges, and experiences countries face.

The new rules established under the Paris Agreement, which will take effect by 2024, address weaknesses in the pre-Paris accountability system, including infrequent reporting by some countries and weaker requirements for developing countries than for developed countries. Now, under the Paris Agreement, all countries will be required to report on their progress every two years and do using the same strong standards.

Processes established under the Paris Agreement are critical for the global community to track climate actions, emissions reductions, adaptation efforts, and the support provided for and needed by developing countries for implementing climate actions. These processes will provide regular updates (every two years) on actions in each country and serve as the basis upon which we will know how countries are delivering on their commitments.

3. **How do you see clean technology deployment and innovation benefiting vulnerable communities, and what role do you see for the United States in both supporting deployment and innovation and in making sure developing countries around the world can access cheap clean energy technologies?**

As noted in my testimony, while ambitious near-term actions are possible with existing technologies, further innovation in clean technology can broaden our options for ultimately driving net global emissions down to zero, which we must achieve around mid-century to limit warming to 1.5◦C (2.7◦F).

Given that climate change disproportionally impacts vulnerable and marginalized communities – including the poor, largely in developing countries – innovation that helps realize ambitious global emissions goals is a critical part of reducing the climate impacts experienced by vulnerable communities and developing countries. Further, technological innovation is important to defining pathways towards low-emission and climate-resilient development throughout the world. Finally, the economic competitiveness, growth, and opportunity creation from clean technology innovation can be a driver of prosperity for developing nations. The deployment of innovative energy solutions can also bring clean energy to disadvantaged groups that generally face greater barriers to accessing these technologies and the benefits they provide.

The U.S. has an important role to play in innovation, as a nation leading the way on climate-smart technologies the U.S. can support innovation in developing countries through technology transfer, intentional partnership and collaboration, as well as international finance.

4. **What are the critical transitions that we need to make to limit warming to 1.5 degrees C, and what are the economic costs and benefits of making these transitions?**

To limit global temperature rise to 1.5°C above pre-industrial levels, the world must halve global greenhouse gas emissions by 2030 and reach net zero around mid-century. The sooner these emissions peak and the lower they are when they peak, the greater the likelihood of reaching net zero in time. The latest climate science from the IPCC makes clear that achieving these deep emissions reductions will require rapid, far-reaching transitions of unprecedented scale across power, transport, buildings, industry, land use, coastal zone management, and agriculture—as well as the immediate scale-up of carbon removal to compensate for the significant proportion of the carbon budget that we have already spent down and residual emissions that will prove difficult to eliminate entirely.[16]

A recent report from WRI translates these global systemwide transitions into concrete, actionable targets for 2030 and 2050,[17] including:

- **Power**
  - Reduce the carbon intensity of electricity generation to 50–125 gCO2/kWh by 2030 and to below zero in 2050.
  - Increase the share of renewables in electricity generation to 55–90% by 2030 and to 98–100% by 2050.
  - Lower the share of unabated coal in electricity generation to 0–2.5% by 2030 and to 0% by 2050.
- **Buildings**
  - Reduce the carbon intensity of operations in select regions by 45–65% in residential buildings and by 65–75% in commercial buildings by 2030, relative to 2015; reach near zero carbon intensity globally by 2050.
  - Decrease the energy intensity of residential building operations in key countries and regions by 20–30% by 2030 and by 20–60% by 2050, relative to 2015; reduce the energy intensity of commercial building operations in key countries and regions by 10–30% by 2030 and by 15–50% by 2050, relative to 2015.

[16] IPCC, "Global Warming of 1.5°C"
[17] Boehm et al.," State of Climate Action 2021"

    - Increase buildings' retrofitting rate to 2.5–3.5% annually by 2030 and to 3.5% annually by 2040; ensure that all buildings are well insulated and fitted with zero-carbon technologies by 2050.
- **Industry**
    - Increase the share of electricity in the industry sector's final energy demand to 35% by 2030, 40–45% by 2040, and 50–55% by 2050.
    - Reduce global cement production's carbon intensity by 40% by 2030 and by 85–91% by 2050, relative to 2015.
    - Reduce global steel production's carbon intensity by 25–30% by 2030 and by 93–100% by 2050, relative to 2015.
    - Build and operate 20 low-carbon commercial steel facilities, with each producing at least 1 Mt annually by 2030; ensure that all steel facilities are net-zero GHG emissions by 2050.
    - Boost green hydrogen production capacity to 0.23–3.5 Mt (25 GW cumulative electrolyzer capacity) by 2026 and to 500–800 Mt (2,630–20,000 GW cumulative electrolyzer capacity) by 2050.
- **Transport**
    - Reduce the percentage of trips made by private LDVs to between 4% to 14% below BAU levels by 2030.
    - Reduce the carbon intensity of land-based passenger transport to 35–60 gCO_2/pkm by 2030 and reach near zero by 2050.
    - Increase the share of EVs to 75–95% of total annual LDV sales by 2030 and to 100% by 2035.
    - Expand the share of EVs to account for 20–40% of total LDV fleet by 2030 and 85–100% by 2050.
    - Boost the share of BEVs and FCEVs to reach 75% of annual global bus sales by 2025 and to reach 100% of annual bus sales in leading markets by 2030.
    - Increase the share of BEVs and FCEVs to 8% of global annual MHDV sales by 2025 and to 100% in leading markets by 2040.
    - Raise the share of low-emissions fuels in the transport sector to 15% by 2030 and to 70–95% by 2050.
    - Increase SAF's share of global aviation fuel supply to 10% by 2030 and to 100% by 2050.
    - Raise ZEF's share of international shipping fuel to 5% by 2030 and to 100% by 2050.
- **Technological Carbon Removal**
    - Scale up technological carbon removal to 75 $MtCO_2$ annually by 2030 and to 4.5 $GtCO_2$ annually by 2050.
- **Land-Use and Coastal Zone Management**
    - Reduce the rate of deforestation by 70% by 2030 and by 95% by 2050, relative to 2018.
    - Reforest 259 Mha of land by 2030 and 678 Mha in total by 2050, relative to 2018. WRI

  - Remove 3.0 GtCO2 annually through reforestation by 2030 and 7.8 GtCO2 annually by 2050.
  - Reduce the degradation and destruction of peatlands by 70% by 2030 and by 95% by 2050, relative to 2018.
  - Restore 22 Mha of peatlands by 2030 and 46 Mha in total by 2050, relative to 2018.
  - Reduce the conversion of coastal wetlands by 70% by 2030 and by 95% by 2050, relative to 2018.
  - Restore 7 Mha of coastal wetlands by 2030 and 29 Mha in total by 2050, relative to 2018.
- **Agriculture**
  - Reduce agricultural production emissions by 22% by 2030 and by 39% by 2050, relative to 2017.
  - Increase crop yields by 18% by 2030 and by 45% by 2050, relative to 2017.
  - Increase ruminant meat productivity per hectare by 27% by 2030 and by 58% by 2050, relative to 2017.
  - Reduce share of food loss by 50% by 2030 and maintain this reduction through 2050, relative to 2016.
  - Reduce per capita food waste by 50% by 2030 and maintain this reduction through 2050, relative to 2019.
  - Reduce ruminant meat consumption in high-consuming regions to 79 kcal/capita/day by 2030 and to 60 kcal/capita/day by 2050.

Unfortunately, we do not have the luxury of picking and choosing among these targets – all must be achieved if we are to avoid the worst climate impacts. But the good news is that the benefits of climate action are enormous. A 2018 report from the Global Commission on the Economy and Climate, for example, estimates that, when compared to a business-as-usual scenario, ambitious climate action across these systems could generate $26 trillion in direct economic gains through 2030, as well as create 65 million additional low-carbon jobs in 2030 (NCE 2018). In the United States alone, Energy Innovation finds that a 1.5°C pathway could increase national GDP by $489 billion per year in 2030 and reach $997 billion in 2050 (a 2.6 percent annual GDP expansion).[18] And due to limitations in economic modeling, these estimates are likely conservative – they underestimate the benefits of climate action. Traditional economic models do not adequately account for the damage that climate change risks, which vary significantly in scale and nature, can wreak on the economy, nor do they reflect the full benefits of curbing greenhouse gas emissions, especially those related to improved air quality and health (NCE 2018).[19]

Financing these transitions globally, however, will require up-front investments that reach $5 trillion per year by 2030, with a public climate finance contributing roughly a quarter – or $1.25 trillion per year – of this total (Boehm et al. 2021). But it's clear that that such investments make

[18] Orvis, "A 1.5 Celsius Pathway to Climate Leadership for The United States"
[19] Saha and Jaeger, "America's New Climate Economy: A Comprehensive Guide to the Economic Benefits of Climate Policy in the United States"

good economic sense, and the costs of inaction are far outweighed by the risk posed by climate change.

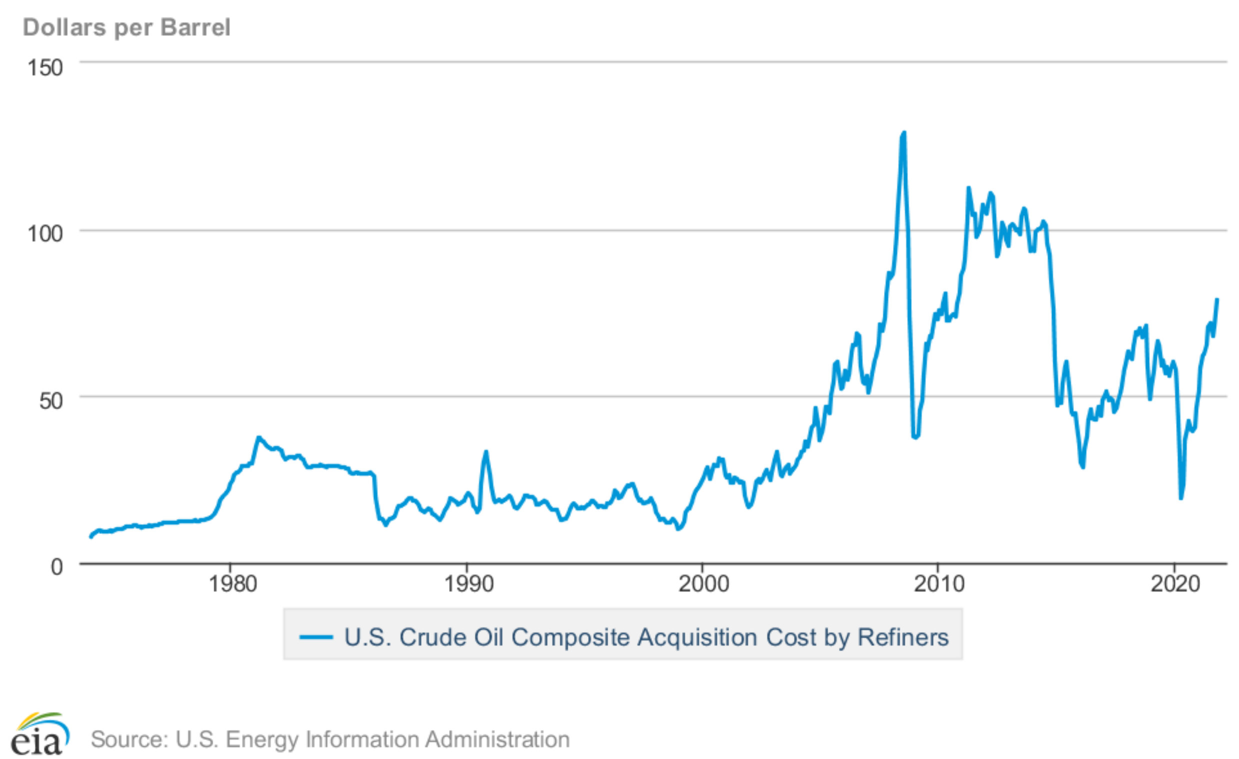
The U.S. is responsible for more cumulative carbon emissions than any other country, and it is also the world's largest economy. The U.S. can and must invest in transitions at home and abroad. Domestically, the U.S. needs live up to its commitment to halve emissions by 2030, and that means that congressional action, particularly passing the Build Back Better Act, is essential.[20] However, these required transformations are global, and domestic emission reductions along are not enough. Congress can enable the U.S. to lead on climate action globally by maintaining and increasing international funding for climate priorities like clean energy, resilience, and forest protection.[21] Finally, as leader in innovation, with congressional support, the U.S. can lead the research and development needed to fully decarbonize the economy.

5. **To what extent have President Biden's policies affected energy prices in global energy markets and here in the United States?**

Fossil fuel prices are volatile by nature. Over the past 15 years, we have seen 3 major spikes and 3 troughs in the price of oil – two caused by major global economic recessions (in 2008 and 2020), and one extended period of volatility from 2014-2017 caused by increased global supplies and OPEC production decisions (Figure 1). Price spikes often follow price troughs as periods of low prices discourage investment in production. Price spikes like the one we have seen in recent months have happened before and will happen again until the world transitions to clean energy and boosts the resilience of its energy systems.

[20] Kennedy et al, "Blueprint 2030: An All-In Climate Strategy for Faster, More Durable Emissions Reduction"; Larsen et al, "Pathways to Paris: A Policy Assessment of the 2030 US Climate Target"
[21] Thwaites, "4 Climate Finance Priorities for the Biden Administration"

Figure 1 | US Crude Oil Composite Acquisition Cost by Refiners



Source: Energy Information Administration, "U.S. Crude Oil Composite Acquisition Cost by Refiners (Dollars per Barrel)"

Understanding the impact of COVID-19 on domestic oil production requires understanding the investment cycles within the industry. In the years prior to 2020, low prices led to low investment in the sector and hesitancy to underwrite the large amounts of debt that more expensive shale production requires, particularly following the 2014-2017 trough, when the price of oil fell 70% over a year and a half due to a supply glut resulting from OPEC attempts to undercut US shale oil production.[22] During 2020, US petroleum demand recorded its largest annual decrease as consumption decreased to a 25-year low due to the pandemic.[23] When demand cratered, wells were shut in, rig counts plummeted, and many operators declared bankruptcy.[24] As demand rebounded strongly in 2021, this lower production capacity meant supply has been unable to ramp up again as quickly as needed

President Biden's policies, including revoking a cross-border permit for the Keystone XL pipeline and temporarily pausing new oil and gas leasing, are not responsible for the recent rise in energy prices. The Keystone XL pipeline would have transported an estimated 830,000 barrels of oil per day, compared to US petroleum product consumption of approximately 20 million barrels per day.[25] The Keystone XL pipeline was also less than 10% constructed at the

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[22] Stocker, Baffes, And Vorisek, "What triggered the oil price plunge of 2014-2016 and why it failed to deliver an economic impetus in eight charts"

[23] Energy Information Administration, "How much oil is consumed in the United States?"

[24] Cromwick and Myers Jaffe, "Energy Price Inflation at Our Doorstep"

[25] Energy Information Administration, "4a. U.S. Petroleum and Other Liquids Supply, Consumption, and Inventories"

time of President Biden's order and would not have been completed in time to deliver crude oil and affect prices during fall 2021.[26] The President's order to pause new oil and gas leasing was only in effect for 4.5 months, until a judge halted it[27]and more than half of the federal acres already leased are non-producing. Given the small share of production on federal leases and the substantial lag time involved in developing new federal leases into active operating wells, the President's pause on new oil and gas leasing did not substantially impact domestic oil production. In fact, domestic oil production has remained relatively constant since June 2020[28] with the two largest disruptions during this time coming from extreme weather events, namely the February 2021 winter freeze and Hurricane Ida in August 2021.

The current mismatch between energy supply and demand does not indicate we should slow the low-carbon transition – rather, it highlights its urgency. Shifting from gasoline-powered vehicles toward electric vehicles, public transit, and other alternative transportation modes would reduce oil dependence, protecting American consumers from price volatility and reducing reliance on imports. In addition, shifting from natural gas heating and new natural gas plants for electricity generation would also reduce volatility. The US homes that are heated primarily with natural gas are expected to have heating bills 30% higher than normal this winter, in contrast to only 6% higher for homes heated primarily with electricity.[29] According to the IEA, if the world invests enough in clean energy, average household energy bills in developed economies will be lower in 2030 and 2050 than they are today.[30]

Policies like the recently passed Infrastructure Investment and Jobs Act (IIJA) and the Build Back Better (BBB) legislation currently being debated by US Congress would help achieve this transformation. The BBB legislation would provide incentives to speed development of renewable energy generation, encouraging their development over new natural gas plants. Natural gas already accounts for 40% of electricity generation nationally and is also used extensively for home heating; any increases in reliance on gas would exacerbate future vulnerability to price spikes and supply issues. The IIJA includes substantial investments in electric vehicles, which would reduce reliance on oil, including billions for investments in electric vehicle charging infrastructure and electric buses. The BBB legislation would add additional incentives for other electric vehicles, further reducing reliance on price-volatile oil. Factoring in fuel and maintenance savings, an electric vehicle already costs one-sixth the amount of a gasoline-powered car.[31] Federal investments in these transformative pieces of legislation will extend the lower costs and clean air benefits of electric vehicles to more American households and protect consumers from the volatility and geopolitics of global oil markets.

6. **Some Members of Congress have described the anticipated impacts of 2.7 degrees C warming as "negligible." Can you describe the range of climate impacts the world**

[26] Reuters Fact Check, "Fact Check-Though Keystone XL Pipeline had secured most of its funding, it was only 8% constructed"
[27] U.S. Department of the Interior, "Report on the Federal Oil and Gas Leasing Program"
[28] Energy Information Administration, ""4a. U.S. Petroleum and Other Liquids Supply, Consumption, and Inventories"
[29] Energy Information Administration, "Winter Fuels Outlook, October 2021"
[30] International Energy Agency. "Prices and affordability – World Energy Outlook 2021"
[31] Gillis, "Investments in clean energy are the ideal response to high fossil fuel costs"

might experience as a result of 2.7 degrees C warming due to anthropogenic climate change? Would you consider those impacts to be "negligible"?

To date, global average surface temperature has risen 1.1°C (2.0°F) relative to pre-industrial levels. Current policies are expected to result in warming in the range of 2.7°C (4.9°F) by 2100. The projected impacts under this level of warming are significant, according to the IPCC AR6 WGI report released in August. The report assessed five scenarios for future warming, including one (SSP2-4.5) projected to result in 2.7°C by 2100. The impacts on the water, ocean, and cryosphere system of that scenario include:[32]

> *The Atlantic Meridional Overturning Circulation (AMOC) will very likely decline over the 21st century.... There is medium confidence that the decline will not involve an abrupt collapse before 2100.*
>
> *The Arctic Ocean will likely become practically sea ice–free during the seasonal sea ice minimum for the first time before 2050.*
>
> *Both the Greenland Ice Sheet (virtually certain) and the Antarctic Ice Sheet (likely) will continue to lose mass throughout this century.... The related contribution to global mean sea level rise until 2100 from the Greenland Ice Sheet will likely be ... 0.04–0.13 m ...while the Antarctic Ice Sheet will likely contribute...0.03–0.29 m.*
>
> *Glaciers lost 6200 [4600–7800] Gt of mass (17.1 [12.7–21.5] mm global mean sea level equivalent) over 46 the period 1993 to 2019 and will continue losing mass... (very high confidence).*
>
> *It is virtually certain that global mean sea level will continue to rise through 2100, because all assessed contributors to global mean sea level are likely to virtually certain to continue contributing throughout this century.*
>
> *At sustained warming levels between 2°C and 3°C, the Arctic Ocean will be practically sea ice–free throughout September in most years (medium confidence); there is limited evidence that the Greenland and West Antarctic Ice Sheets will be lost almost completely and irreversibly over multiple millennia; both the probability of their complete loss and the rate of mass loss will increase with higher temperatures (high confidence); about 50–60% of current glacier mass outside Antarctica will be lost (low confidence); Northern hemisphere spring snow cover extent will decrease by up to 30% relative to 1995–2014 (medium confidence); permafrost volume in the top 3 m will decrease by up to 75% relative to 1995–2014 (medium confidence). Committed GMSL rise over 2000 years will be about 4-10 m with 3°C of peak warming (medium agreement, limited evidence).*

A forthcoming (February 2022) IPCC report will provide further detail on the impacts of a 2.7°C future on ecosystems, water, food production, cities and infrastructure, health, poverty, and livelihoods. In the meantime, it is instructive to review the projected impacts of 1.5°C and 2°C of warming as a benchmark for 2.7°C (Figure 2).

[32] IPCC, "AR6 Climate Change 2021: The Physical Science Basis," direct quotes

Figure 2 | 1.5°C versus 2.0°C

Source: https://www.wri.org/insights/half-degree-and-world-apart-difference-climate-impacts-between-15c-and-2c-warming

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