

**CLIMATE
LEADERSHIP
COUNCIL**

POLICY ANALYSIS

JUNE 2018

A WINNING TRADE

**How Replacing the Obama-Era Climate Regulations
With a Carbon Dividends Program Starting at \$40/Ton
Would Yield Far Greater Emission Reductions**



**by
David Bailey
Greg Bertelsen**

CLIMATE LEADERSHIP COUNCIL

ABOUT THE AUTHORS



David Bailey is Research Director at the Climate Leadership Council. He has worked at every level of the coal and oil and gas industries, from the UK National Coal Board to head of climate policy at ExxonMobil.

Greg Bertelsen is Senior Vice President at the Climate Leadership Council. Previously, Mr. Bertelsen served as Senior Director, Energy and Resources Policy, at the National Association of Manufacturers (NAM).



ABOUT THE CLIMATE LEADERSHIP COUNCIL

The Climate Leadership Council is an international research and advocacy organization founded in collaboration with a who's who of business, opinion and environmental leaders to promote a carbon dividends framework as the most cost-effective, equitable and politically-viable climate solution.

Find out more at www.clcouncil.org.

4 PILLARS OF THE BAKER-SHULTZ CARBON DIVIDENDS PLAN

- I. A gradually rising and revenue-neutral carbon tax;
- II. Carbon dividend payments to all Americans, funded by 100% of the revenue;
- III. The phase-out of carbon regulations that are no longer necessary; and
- IV. Border carbon adjustments to level the playing field and promote American competitiveness.

EXECUTIVE SUMMARY

This report estimates the greenhouse gas (GHG) emission reductions of the carbon dividends plan put forward by the Climate Leadership Council compared to the reductions in 2025 that the U.S. committed to achieve under the Paris Agreement. It compares the Council's policy to two other policy paths: first, if all the Obama-era climate regulations had been left in place, and second, the current policies under President Trump, which assumes that most Obama-era regulations are repealed.

Modeling shows that U.S. emissions under the Baker-Shultz plan could be 32% below 2005 levels by 2025. This is more than three times the emission reductions from 2016 onwards that the Obama policies would have achieved.

Based on the EIA's latest Energy Outlook, together with recent modeling by Resources for the Future (RFF) and the Rhodium Group, current policies would likely result in U.S. emissions being 14% below 2005 levels by 2025. This would represent a small reduction in current emission levels, which EPA estimated to be already 12.5% below 2005 levels in 2016.

Had all the policies in place at the end of the Obama administration been allowed to continue, we estimate these reductions would have been around 18% below 2005 levels by 2025. Both these policy outcomes fall well

short of the U.S. Paris commitment of a 26-28% reduction in emissions by 2025.

Assuming the Council's carbon dividends plan – also known as the Baker-Shultz Plan – were implemented in 2021 with a starting carbon tax rate of \$40 per ton (2017\$), modeling shows that U.S. emissions could reasonably be around 32% below 2005 levels by 2025. As illustrated in the summary Chart 1, this is more than three times the emission reductions from 2016 onwards that the Obama policies would have achieved.

This also means that the Council's proposal, on its own, would exceed the high-end of the U.S. 2025 commitment under the Paris Agreement by a wide margin and would continue to generate substantial reductions beyond 2025. These significantly greater emission reductions demonstrate that trading carbon regulations for an ambitious carbon tax would be an overwhelming "winning trade" from an environmental perspective.

These significantly greater emission reductions demonstrate that trading carbon regulations for an ambitious carbon tax would be an overwhelming "winning trade" from an environmental perspective.

The Climate Leadership Council Proposal

This study assumes that the Council's carbon dividends plan would be legislated in 2019 and implemented in 2021. It would start at the rate of \$43/ton CO₂ in 2021 (which equates to a 2017 rate of \$40 per ton, adjusted for expected inflation). From there, the carbon tax rate would increase annually based on a standard escalator rate plus inflation as measured by the Consumer Price Index (CPI).

For illustration purposes, the RFF modeling described here includes 3% and 5% real escalation rates, with the 4% mid-point used in Chart 1. The Council has not yet settled on a final escalation rate.

The carbon tax would apply to all domestic fossil fuels and non-fuel CO₂ emissions, as well as imported fossil fuels, fossil fuel products and imported energy-intensive manufactured products. The carbon tax would be rebated for exports of these fuels and goods. The proposal would return the revenue raised from the tax directly to households through flat-rate quarterly or monthly dividend checks, likely administered by the Social Security Administration. There would also be a significant phase-out of carbon regulations that are no longer necessary.

This analysis shows how the U.S. emission reductions arising from the Council's proposal compare to:

1. A 2025 current policy baseline, which assumes the repeal of many major Obama-era carbon regulations;
2. Our assessment of the 2025 outcome assuming all Obama-era policies had remained in place, including implementing the Clean Power Plan (CPP) as per EPA's original schedule; and
3. The U.S. Paris commitment of 26-28% reduction in net greenhouse gases from 2005 levels by 2025.

Scope of Analysis

As described above, the Council's proposal would tax CO₂ emissions only. While CO₂ emissions (mostly

from burning fossil fuels) represent roughly 80% of greenhouse gas (GHG) emissions, for various reasons¹ a tax-based approach may not be as well suited or practical for the other gases such as methane and hydrofluorocarbons (HFCs). In this analysis we have sought to show how a range of assumptions about changes in the emission of the other GHG gases could affect the overall picture.

Where Are We Headed in 2025?

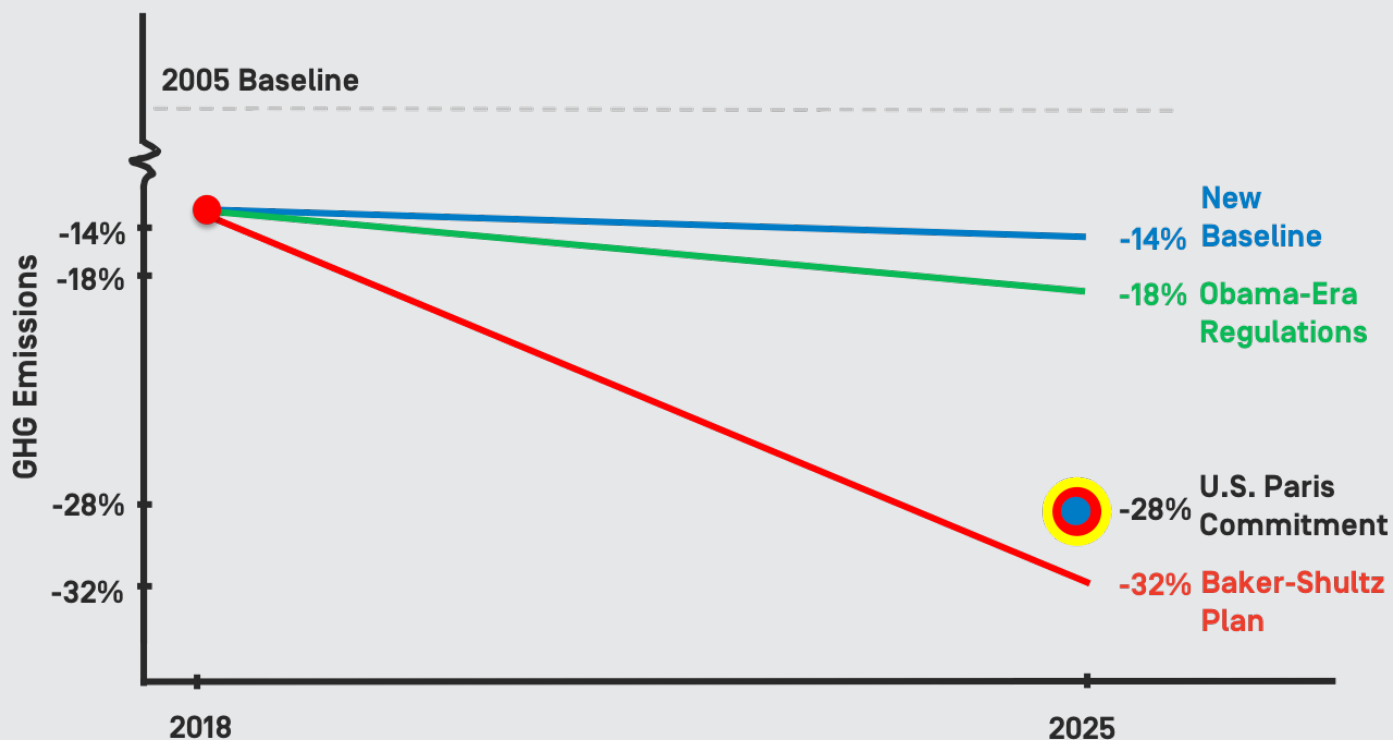
Our analysis draws on EIA's latest Energy Outlook (AEO 2018)² as well as modeling by Resources for the Future³ and the Rhodium Group's 2017 Taking Stock study⁴. The RFF model is one of the most widely-respected in the field. Rhodium's study is helpful in that it models the expected changes in non-CO₂ GHGs and sinks in a way few other studies have attempted. Some technical background on the RFF and Rhodium models is described in Annex 2.

The most comprehensive listing of current and historical GHG emission performance is the EPA's annual Inventory of Greenhouse Gas Emissions, the latest version covering emissions in 2016⁵. The previous administration's expectations for 2025 were contained in the U.S. government's last biennial report to the United Nations Framework Convention on Climate Change⁶. We have updated those projections for this study. The most recent data are summarized in Table 1, together with our assessment of the outlook for 2025 based on Obama-era policies and on current policy.

How Would the Council's Carbon Dividends Plan Reduce Emissions?

The carbon tax would increase the relative price of fossil fuels according to their CO₂ emissions. In 2021, bituminous coal without carbon capture technology, for example, would incur a tax of \$96 per ton of coal (around 200% of the average 2017 price); each thousand cubic feet (MCF) of natural gas would be taxed about \$2.28 (around 74% of the average 2017 Henry Hub wholesale price and around 20% of the average residential price); and each barrel of crude oil taxed about \$18 (around 35% of the 2017 average U.S. crude price)⁷.

Chart 1: Emission Reductions of the Baker-Shultz Plan vs. Other Policy Paths



While some of these increased costs of the tax would be borne by the producers, most would likely be reflected in the prices paid by consumers (the 2021 \$43/ton carbon tax could translate to approximately 38 cents per gallon of gasoline). These are substantial impacts at the wholesale level, and they would have three main effects:

1. The overall cost of fossil energy would increase, thereby encouraging **more efficient usage**.
2. The tax would encourage **fuel switching**. It would immediately increase the relative attractiveness of natural gas to coal in the power sector, and nuclear and renewables to all fossil fuel sources.
3. Over time, the most significant impact would be **increased investments** to reduce energy use and to replace facilities using higher carbon fossil fuels with those using lower- or zero- carbon fuels.

The relationship between reductions in emissions and the carbon tax rate is not linear. As the tax rate increases the percentage reduction for each additional dollar of tax is lower – mainly because the existing capital base becomes a bigger factor in changing fuel sources the greater the amount of emissions reduced. In addition, a much higher tax rate is needed to secure significant emissions reductions in the transport sector.

Impact on Emissions in 2025

To determine an indicative estimate of the impact of the Council’s carbon dividends plan on emissions in 2025 (the Paris target year) we commissioned new modeling by RFF.

The RFF modeling covered a range of possible escalation rates for a \$43/ton CO₂ (\$40 2017\$) tax taking effect in 2021. RFF only modeled a tax on energy-related CO₂ emissions. We show in Table 2

Table 1: U.S. Greenhouse Gas Emissions, Actual and Projected

	2005 Actual [baseline for U.S. Paris pledges] as updated in EPA 2018 GHG Inventory	2016 Actual	Obama Policy 2025 [assumes all Obama- era policies remained]	Current Policy 2025 [assumes most Obama-era policies are repealed] ⁸
Energy-related CO ₂	5,747	4,966	4,922 ⁹	5,031
Non energy related CO ₂	385	345	332 ¹⁰	444
Methane	689	657	608 ¹¹	632
Nitrous Oxide	358	370	345 ¹⁰	345
Fluorinated Gases	143	173	90 ¹²	90
Total Emissions	7,322	6,511	6,297	6,542
Sinks [Land Use, Land Use Change & Forestry Sequestration]	-699	-717	-870 ¹³	-870
Total Net Emissions	6,623	5,794	5,427	5,672
Change from 2005		-829	-1,164	-951
% Change from 2005	n/a	-12.5%	-18.1%	-14.4%

[All figures are in Millions of Metric Tons (MMT) CO₂-equivalent.]

Table 2: RFF Modeling of Energy-Related CO₂ Emissions from Council Plan

Escalation Rate	3%	4%	5%
Energy-related CO ₂ Emissions Reduction in 2025 (vs. 2005)	-34.1%	-34.7%	-35.3%

Table 3: Comparisons and Conclusions

The emissions “bottom lines” of these projections are summarized below.

	2025 Trump Baseline [Where We Are Headed]	Obama-Era Policies [Had They Remained]	Case 1: Council Plan¹⁴ with Rhodium Non- Energy CO₂ and Other GHGs	Case 2: Council Plan¹³ plus Council Non- Energy CO₂ Reductions and 10% Reduction in Other GHGs
Total Net 2025 Emissions	5,672	5,459	4,553	4,399
Change vs. 2005 Base	-14.4%	-18.1%	-31.3%	-33.6%
Change from 2016 Actual	-2.1%	-6.3%	-21.4%	-24.3%

Note - Sinks were standardized in each projection to the midpoint of the Rhodium estimates [see note 13]

the results for escalation rates 3, 4 and 5% above inflation each year.

In Chart 1 and the tables we use the 4% escalation rate emissions scenario as the basis for the overall assessment.

Other Emissions

In order to estimate the full effect of the Council's plan on overall U.S. emissions it is necessary to make assumptions about what will happen to non-energy CO₂ emissions and to the emissions of other GHGs. We propose two alternate scenarios of what to expect in these areas through 2025, one based largely on Rhodium estimates (essentially assuming President Trump continues to emphasize rollback of the Obama programs) and the other on application of comparable policies to the Council carbon tax to non-energy CO₂ emissions and other GHGs.

Non-Energy CO₂ Emissions

Rhodium forecast an increase in non-energy CO₂ emissions through 2025 from today's levels. In our first case in Table 3, we assumed these increases would occur.

The Council's carbon tax would also apply to non-energy CO₂ emissions. In our second case we therefore assumed that non-energy CO₂ emissions will be reduced from Rhodium's assumed higher 2025 levels at half of the rate of energy-related CO₂ reductions from 2016, reflecting pressure from both increased natural gas feedstock use and more expensive costs of emission reductions in this area.

Other Greenhouse Gases

The Rhodium study also developed estimates for the impact of the continuing Trump administration policy on other greenhouses gases, which we regard as credible. These gases are not currently addressed by the Council's tax proposal. The Council expects eventually to propose measures to cover other greenhouse gases. The nature of those proposals, whether tax, regulation or other means, has not yet been decided, and it is possible that they might not be implemented in time to have much impact in 2025.

In our first case in Table 3 we adopted the Rhodium Group estimates for 2025 methane, nitrous oxide and fluorinated gas emissions. As a relatively conservative alternative, in the second case in Table 3 we assumed that the Council's proposals would reduce these other greenhouse gases by 10% of Rhodium's forecast values in 2025.

Note on Climate Regulations

Some¹⁵ assume that the Trump administration has successfully repealed most if not all of the Obama-era climate regulations, but the reality is more nuanced. For the most part, what the Trump administration has done is telegraph its intention to repeal many of the regulations. It has begun that process through new regulatory proposals and executive orders.

Many of these actions are being opposed by environmental groups and, in some cases, state attorneys general in court. As a result, it may take years for many of these regulatory changes to work their way through the administrative process and/or the courts, with great uncertainty about the final outcome.

Obama's Clean Power Plan (CPP) – delayed for years while he was in office by equivalent challenges – provides a case in point. The fate of the CPP will once again be in the hands of the courts but not until final repeal and replace rules are issued. Thus, it is likely to take until at least 2019 for a final verdict on the CPP to be reached.

From the perspective of U.S. industry, this regulatory uncertainty represents the worst of all worlds. What businesses most want are predictable policies so that they can plan and invest for the long term. For all the ongoing legal fights and political controversy surrounding regulations such as the CPP, it is important to note that, even when combined, such regulations would not come close to achieving the emission reductions made possible by an ambitious carbon tax as proposed by the Council.

As the ongoing legal battles amply illustrate, the only way to permanently reduce climate regulatory uncertainty is through bipartisan legislation. That is why the Council proposes trading these

regulations for an ambitious carbon tax, as part of a comprehensive grand bargain that would benefit both the environment and American industry.

Comparisons and Conclusions

In our findings and in Chart 1, we take the mid-point (roughly 32%) between these two cases - Council's plan with Rhodium's non-energy CO₂ assumptions and with the more aggressive impact on non-energy CO₂ and other gases. We believe this provides a reasonable estimate of what the Council's carbon dividends plan can achieve.

Findings

The impact of a carbon tax at around these levels has been well studied¹⁶, making the findings of this report quite robust. The current analysis suggests that the effect of the Council's plan would be to deliver around a 32% reduction in overall emissions by 2025 from 2005 levels, well beyond the 28% high-end of the U.S. Paris Commitment and more than three times what the regulatory policies as of the end of the Obama administration would have achieved from 2016 to 2025. It is also many times more than what can be expected under the Trump administration policies, even if several of the Obama-era regulations on non-CO₂ GHGs are retained.

Conclusions

Our analysis leads to the following conclusions:

1. If all Obama-era regulatory measures had remained in place, that would likely have resulted in an 18.1% reduction in greenhouse gas emissions from 2005 levels by 2025;
2. Current policies will likely result in a 14% reduction in emissions below 2005 levels by 2025;
3. Compared to 2016, emissions would be 2.1% lower in 2025 under the current policies approach and 6.3% lower under the Obama-era policies; and
4. The Council's plan – based on a \$43/ton carbon tax, implemented in 2021 – would reduce emissions by around 32% compared to 2005 and about 23% compared to 2016, meaning the United States would exceed the upper end of its 2025 Paris commitment.

These findings strongly support the conclusion that trading most prior and future carbon regulations for a robust carbon tax would produce far greater emissions reductions in 2025, at a lower cost, while providing a more stable business environment.

ANNEX 1 - IMPORTANT ASSUMPTIONS

2025

We confined our analysis in this paper to the impact in one year – 2025 – because that is the year to which the U.S. Paris commitments apply.

Border Adjustments

We also assumed for simplicity that the border adjustments in the Council’s plan broadly negate each other in terms of emissions – i.e. emissions related to

U.S. exports for which the carbon tax is rebated are matched by emissions related to U.S. imports that are taxed when they enter the country.

Acknowledgement: Our thanks to Marc Hafstead and RFF for their help with the modeling in this paper. We also thank David Bookbinder of the Niskanen Center and Kevin Kennedy of the World Resources Institute for their peer review. Errors and omissions are ours alone.

ANNEX 2 - THE RFF AND RHODIUM MODELS

RFF Model

“The E3 CGE Model is an economy-wide model of the United States with international trade. Production is divided into 35 industries, with particular emphasis on energy-related industries such as crude oil extraction, natural gas extraction, coal mining, electric power (represented by four industries), petroleum refining, and natural gas distribution. The model is unique in its detailed tax treatment—it allows for interactions of environmental policy and preexisting taxes on capital and labor—and its attention to capital dynamics, which are important for analyzing how policies impact the economy over time. The model utilizes 2013 benchmark data and solves for impacts at one-year intervals beginning in 2013. Baseline technology and preference forecasts are calibrated to the EIA’s AEO2016.”

Confronting the Climate Challenge: U.S. Policy Options (Columbia University Press) by Lawrence Goulder and Marc Hafstead comprehensively describes the E3 model and evaluates a range of climate policy options.

Rhodium Model

Rhodium models the impact of current policy on U.S. GHG emissions using RHG-NEMS, a modified version

of the National Energy Modeling System used by EIA to produce its Annual Energy Outlooks augmented to project all GHG emissions, not just energy-related CO₂. For the Taking Stock Baseline Scenario, Rhodium uses the macroeconomic and oil and gas price assumptions from the EIA’s AEO 2017 reference case, with updates to account for recently announced coal and nuclear power plant retirements. For renewable energy technology costs, Rhodium uses NREL’s Annual Technology Baseline mid cost case.

For CO₂ emissions from sources other than fossil fuel combustion as well as all other GHG emissions contained in the baseline, Rhodium primarily relies on EPA best practice methods. Methane emission reductions from petroleum and natural gas systems from existing federal and state policy are derived from analysis conducted by the Clean Air Task Force. LULUCF sequestration projections are derived from the latest U.S. Biennial Report and calibrated to EPA’s latest inventory.

We understand Rhodium is planning to update its Taking Stock study in the next few months; this could slightly increase emissions in all the cases reviewed here but is unlikely to alter the overall picture.

Notes

1. Some of these reasons are described in *Methodology for Analyzing a Carbon Tax*, Treasury OTA Working Paper 115, 2017., pp. 8-9.
2. <https://www.eia.gov/outlooks/aeo>
3. <http://www.rff.org/blog/2017/introducing-e3-carbon-tax-calculator-estimating-future-co2-emissions-and-revenues>
4. http://rhg.com/wp-content/uploads/2017/05/RHG_ENR_Taking_Stock_24May2017.pdf
5. <https://epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2016>
6. Our projection of the Obama policies starts from the *Second Biennial Report of the United States of America Under the United Nations Framework Convention on Climate Change*, U.S. Department of State, 2016; available at: https://unfccc.int/files/national_reports/biennial_reports_and_iar/submitted_biennial_reports/application/pdf/2016_second_biennial_report_of_the_united_states_.pdf
7. Climate Leadership Council calculations, based on EIA data for carbon content at <https://www.eia.gov/tools/faqs/faq.php?id=73&t=11> and 2017 average fuel prices for petroleum and gas at <https://www.eia.gov/outlooks/steo/>
8. The Trump baseline forecast is based on EIA AEO 2018 energy CO₂ estimates net of international bunker fuels [-116.6MT, the 2016 value] and U.S. territories [+41.4MT, the 2016 value]. We also adjusted for the possible removal of the Federal 2022-2025 vehicle GHG standards [estimated at +54MT in 2025], discounting that reduction by 50% given the uncertainty of how this will turn out in practice. For all other sources we use Rhodium [2017].
9. Assumes energy CO₂ emissions in 2025 are in line with EIA AEO 2018 (including Clean Power Plan [CPP]) reference case, net of international bunker fuels [-116.6MT, the 2016 value] and U.S. territories [+41.4MT, the 2016 value].
10. Calculated from *Second Biennial Report* based on the split of total CO₂ between energy and non- energy sources in the latest data available when it was written, i.e. the 2014 EPA GHG inventory.
11. Rhodium [2017] forecast, reduced by expected impact of proposed Obama-era methane regulations [24MT]
12. We use the Rhodium [2017] numbers – which assume the Kigali Amendment and other HFC initiatives that remain in place will be effective. The Obama administration biennial report (in early 2016, pre-Kigali) expected a rapid increase in these emissions, to 264MTCO_{2e} by 2025.
13. The 2016 biennial report used a 2025 range of -908 to -1201 MT. This does not seem plausible. We took the midpoint of the range estimated by Rhodium (766 to 963MT) and held it constant in all our comparisons so it does not impact the conclusions. We are skeptical of the higher end of even this range. Since 1990 the actual sink number has varied between 685 and 830 MT.
14. In each case using RFF modeling for the 4% real escalation factor. As mentioned above, the Council has not arrived at a final conclusion on the escalation factor.
15. See for example: <https://www.cbsnews.com/news/trump-signs-executive-order-dismantling-obama-environmental-regulations/> or <https://www.theatlantic.com/science/archive/2017/10/the-trump-administration-repeals-obamas-central-climate-rule/542403/>
16. For example, as cited in the original “A Winning Trade”, *Using a Carbon Tax to meet U.S. International Carbon Pledges*, Chen & Hafstead, RFF 2016; *Analysis of the American Opportunity Carbon Fee Act of 2015*, Hafstead & Kopp, RFF 2016 and Treasury op cit [2017].

License

This report carries a Creative Commons, Attribution-Non-Commercial 4.0 International [CC BY-NC 4.0] license, which permits re-use of the Climate Leadership Council content when proper attribution is provided for non-commercial purposes only. This means you are free to share and adapt the Climate Leadership Council's work, or include our content in derivative works, under the following conditions:

Attribution. You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. **Non-Commercial.** You may not use the material for commercial purposes. For the full legal code of this Creative Commons license, please visit www.creativecommons.org. If you have any questions about citing or reusing Climate Leadership Council content, please visit www.clcouncil.org.

**CLIMATE
LEADERSHIP
COUNCIL**