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Keynote Address for the Cox International Law Center Conference

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KEYNOTE ADDRESS FOR THE COX INTERNATIONAL LAW CENTER CONFERENCE[†]

SEPTEMBER 28, 2023

Remarks prepared and delivered by James Chen (Law '91)^{††}

Thank you, Dean Scharf. It is an honor to be here this evening and to be able to talk about the challenges facing our nation, indeed the world, as we address the global challenge of climate change.

The transportation industry is a good example of where we face new challenges but develop and implement positive solutions. From the outset, I note that the transportation industry is going through a sea change in how we move people and goods throughout the world.¹ Whereas innovation in motor vehicle technology over the last 100 years was typically evolutionary, with incremental improvements in the core technology of internal combustion engine power,² the current shift in transportation is revolutionary. Quite simply, we are overturning the paradigm of how we power transportation—from an individual, fossil fuel-based, unit approach,³ to a system approach—powered by electrification based on centralized power generation.⁴ This portends not only shifts in the transportation industry, but also in energy

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1. See Bernard Marr, *The 3 Biggest Future Trends in Transportation and Mobility*, FORBES (Jan. 20, 2022, 12:34 AM), <https://www.forbes.com/sites/bernardmarr/2022/01/20/the-3-biggest-future-trends-in-transportation-and-mobility/?sh=5ed401013783> [https://perma.cc/3ZPB-QXHKfn].
2. See Rokon Zaman, *Car Evolution—Competitive Race in Incremental Innovation*, THE WAVES, <https://www.the-waves.org/2022/02/22/car-evolution-competition-race-in-incremental-innovation/> [https://perma.cc/33B4-HE3P] (Dec. 17, 2022).
3. See HARRISON JOHN BHATTI ET AL., A SYSTEM APPROACH TO ELECTRIFICATION OF TRANSPORTATION – AN INTERNATIONAL COMPARISON 25–26 (Sweden-China Bridge 2022).
4. *Id.* at 12.

generation and management, and the technology driving both of those sectors.⁵

This revolution cannot happen quickly enough. Electrification of transportation provides a host of benefits as we shift from a technology that relies upon consumption of a finite, emission-heavy, resource (namely oil) to one that can be transformative, sustainable, and zero-emission.⁶ The advantages of electrification are numerous: electricity can be generated locally from a variety of sources that are more easily regulated versus the millions of individual engines powering the transportation fleet.⁷ And, as the world's electricity generation shifts to alternatives that trend away from fossil-fuel-burning and pollution-emitting power plants to more sustainable options, such as hydroelectric, nuclear, solar, and wind power, our transportation choices become cleaner as well.⁸ A modern electric vehicle utilizing energy generated from hydroelectricity, wind, or solar power is truly zero emission from an energy generation-to-road basis.⁹ Even today, numerous studies have demonstrated that because of the inherent energy efficiency of electric vehicles, modern electric vehicles have a lower emissions profile than their gasoline powered counterparts – even when that electricity comes almost exclusively from fossil fueled power plants.¹⁰

The environmental advantages of this transition cannot be understated. Based on the work of scientists in the United States and around the world, through organizations such as the United Nation's

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5. *See The Impact of Electric Car Adoption on Energy Demand Forecasting: Transforming Energy Landscape*, CYBER SWITCHING (Sept. 6, 2023), <https://cyberswitching.com/the-impact-of-electric-car-adoption-on-energy-demand-forecasting/> [<https://perma.cc/HU3R-SAKM>].
 6. *Electrification of Transportation Accelerating the Renewable Energy Transition*, UTILITIES ONE (Oct. 11, 2023), <https://utilitiesone.com/electrification-of-transportation-accelerating-the-renewable-energy-transition> [<https://perma.cc/X6PQ-K3KX>].
 7. *See id.*
 8. JEREMY MARTIN, FUELING A CLEAN TRANSPORTATION FUTURE: SMART FUEL CHOICES FOR A WARMING WORLD 4 (2017); Renewable Energy and Electricity, WORLD NUCLEAR ASSOC., <https://world-nuclear.org/information-library/energy-and-the-environment/renewable-energy-and-electricity.aspx> [<https://perma.cc/M3PE-RTRF>] (Aug. 2021).
 9. *Zero-emission Driving: How Renewable Energy Can Fuel the Future of Electric Vehicles*, ENERGY5 YOUR WAY (Sept. 30, 2023), <https://energy5.com/zero-emission-driving-how-renewable-energy-can-fuel-the-future-of-electric-vehicles> [<https://perma.cc/K5MU-TWVAfn>].
 10. *Emissions of Carbon Dioxide in the Transportation Sector*, CONG. BUDGET OFF., <https://www.cbo.gov/publication/58861> [<https://perma.cc/TA6X-8SKX>].

Intergovernmental Panel on Climate Change (IPCC),¹¹ the National Oceanic and Atmospheric Administration (NOAA),¹² the National Aeronautics and Space Administration (NASA),¹³ and the U.S. Environmental Protection Agency (EPA),¹⁴ there is broad consensus regarding the adverse human-caused impacts from climate change.¹⁵ With the global average temperature already having increased nearly 2°F from 1901 to 2016,¹⁶ the impacts of this change are evident in the stronger hurricanes forming in the Atlantic,¹⁷ unprecedented rain events in the Northeast,¹⁸ intense wildfires in Hawaii,¹⁹ “an unexpected tropical storm in California,”²⁰ and most recently, life-threatening, record-breaking heat waves consuming the United States, including the eastern half of the United States with the hottest September ever recorded.²¹

11. See generally Intergovernmental Panel on Climate Change [IPCC], *Climate Change 2023 Synthesis Report: Summary for Policymakers* (Hoesung Lee et al. eds., 2023).
12. *Climate*, NAT’L OCEANIC & ATMOSPHERIC ADMIN [NOAA], <https://www.noaa.gov/climate> [<https://perma.cc/6Q6W-GS3U>].
13. See, e.g., *How Do We Know Climate Change Is Real?*, NASA, <https://climate.nasa.gov/evidence/> [<https://perma.cc/J49L-DKW6>].
14. See, e.g., *Climate Change*, U.S ENV’T PROT. AGENCY, <https://www.epa.gov/climate-change> [<https://perma.cc/U3LB-TJ5T>].
15. *Scientists Agree: Global Warming Is Happening and Humans Are the Primary Cause*, UNION OF CONCERNED SCIENTISTS, <https://www.ucsusa.org/resources/global-warming-happening-and-humans-are-primary-cause> [<https://perma.cc/5H2L-NGJA>] (Jan. 9, 2018).
16. *Impacts of Climate Change*, EPA (Dec. 30, 2022), <https://www.epa.gov/climatechange-science/impacts-climate-change> [<https://perma.cc/X255-PEUB>].
17. Emily Barone, *Why Atlantic Hurricanes Are Getting Stronger Faster Than Other Storms*, TIME (Sept. 30, 2022, 3:31 PM), <https://time.com/6218869/why-atlantic-hurricanes-are-getting-stronger/> [<https://perma.cc/43WM-VEL9>].
18. Joe Hernandez, *Heavy Rains Produce Major Floods in Vermont, New York and Other Parts of the Northeast*, NPR (July 11, 2023, 1:48 PM), <https://www.npr.org/2023/07/11/1187012088/floods-vermont-new-york-new-england> [<https://perma.cc/6JGN-JW8F>].
19. Benji Jones, *How Maui’s Wildfires Became So Apocalyptic*, VOX, <https://www.vox.com/climate/2023/8/9/23826015/maui-fire-2023-lahaina-hawaii-cause> [<https://perma.cc/9B3B-ALQE>] (Aug. 14, 2023, 10:32 AM).
20. Amanda Shendruk, *Opinion: Tired of Feeling Hopeless About Climate Change? Take a Look at These Charts.*, WASH. POST (Sept. 6, 2023, 3:55 PM), <https://www.washingtonpost.com/opinions/2023/09/06/climate-change-charts-data-optimism/> [<https://perma.cc/DWR7-EW2Y>].
21. Ian Livingston, *Record-breaking Heat Wave Peaking in Eastern U.S. with Highs Near 100*, WASH. POST, <https://www.washingtonpost.com/weather/2023/09/05/heatwave-midwest-northeast-midatlantic-records/> [<https://perma.cc/87NX-MNWX>] (Sept. 6, 2023, 10:50 AM).

And those are only the most recent impacts seen.²² As the oceans continue to warm and become more acidic, and the glaciers melt over a continuously warming planet, natural disasters, disease, droughts, and their attendant negative impacts to food supplies, water, health, and a livable environment increase.²³

The transition to transportation electrification is an important part of reducing the carbon footprint of human activity.²⁴ In the United States, transportation accounts for twenty-eight percent of all greenhouse gas emissions.²⁵ According to the EPA, passenger cars and light trucks (which include SUV's, pickup trucks and minivans) are the largest sources of transportation-related greenhouse gas emissions.²⁶ Interestingly, electricity generation is the second largest source—accounting for twenty-five percent of greenhouse gas emissions.²⁷ However, since 1990, with the shift in generation to lower and non-emitting sources of electricity generation and an increase in energy efficient end-uses, that amount has decreased by over fifteen percent to its present value.²⁸ Even China, a large emitter of pollutants from coal-fired power,²⁹ has increased its use of renewable energy by nearly four hundred percent since 2015,³⁰ while taking steps to reduce the amount of electricity produced by coal.³¹ What this demonstrates is that shifting

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22. See Shendruk, *supra* note 20.
23. *Climate Impacts on Agriculture and Food Supply*, EPA, <https://climate.change.chicago.gov/climate-impacts/climate-impacts-agriculture-and-food-supply> [<https://perma.cc/X8DA-G7RJ>].
24. Luke Tonachel, *Study: Electric Vehicles Can Dramatically Reduce Carbon Pollution from Transportation and Improve Air Quality*, NRDC (Sept. 17, 2015), <https://nrdc.org/bio/luke-tonachel/study-electric-vehicles-can-dramatically-reduce-carbon-pollution-transportation> [<https://perma.cc/U3NG-VBQ2>].
25. *Sources of Greenhouse Gas Emissions*, EPA, <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions> [<https://perma.cc/T6ZV-92ZL>].
26. *Id.*
27. *Id.*
28. *Id.*
29. Michael Standaert, *Despite Pledges to Cut Emissions, China Goes on a Coal Spree*, YALE ENV'T 360 (Mar. 24, 2021), <https://e360.yale.edu/features/despite-pledges-to-cut-emissions-china-goes-on-a-coal-spree> [<https://perma.cc/3PAV-M5LHfn>].
30. John Kemp, *China's Power Consumption Shows Moderate Growth*, REUTERS (May 18, 2023, 9:00 PM), <https://www.reuters.com/markets/commodities/chinas-power-consumption-shows-moderate-growth-2023-05-18/> [<https://perma.cc/BRJ4-KA5V>].
31. Keith Bradsher, *Why Heat Waves are Deepening China's Addiction to Coal*, N.Y. TIMES (July 20, 2023), <https://www.nytimes.com/2023/07/20/business/china-coal-climate-change.html> [<https://perma.cc/D344-E26Z>].

transportation—particularly the consumer side—to more efficient and ever-increasing cleaner electricity generation, can have a substantial impact on lowering overall greenhouse gas emissions.

Consumers worldwide are understanding and appreciating the benefits of electric transportation. With the United States as an example, sales of electric vehicles continue to grow.³² By the end of the second quarter of 2023, Americans purchased over 550,000 electric vehicles—a pace that will put the United States on track for the sale of over one million electric vehicles in 2023.³³ Compare that figure to 2022, where electric vehicle sales accounted for about 918,000 of the nearly fourteen million vehicles sold that year.³⁴ Electric vehicles now account for over seven percent of all new vehicle sales – compared to 3.2% just two years ago.³⁵ In fact, last week, a Washington Post article noted that the United States is at the tipping point, with seven percent of all new vehicles sales being electric.³⁶ The figures are even more compelling in Europe and China, where electric vehicle sales in 2022 represented nearly a quarter of all new vehicle sales in Europe and a nearly third in China.³⁷ All of these trends demonstrate an increase in consumer acceptance and sale of electric vehicles.

The growth of the electric vehicle industry, however, is not without its own set of challenges. With the increasing demand for electric vehicles comes the increased demand for batteries, motors, and the unique resources required to produce the products that meet this demand.³⁸ Electric vehicles require different types and quantities of

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32. Christopher Hickey, *Electric Cars Are Breaking Sales Records, but Here's Why They're Not Replacing Gas Cars Anytime Soon*, CNN (Aug. 20, 2023, 4:00 AM), <https://www.cnn.com/2023/08/20/cars/electric-cars-sales-gas-cars-dg/index.html> [<https://perma.cc/3YZR-Z6F2>].
 33. *Id.*
 34. Mathilde Carlier, *Electric Vehicles in the United States – Statistics & Facts*, STATISTA (Dec. 18, 2023), <https://www.statista.com/topics/4421/the-us-electric-vehicle-industry/> [<https://perma.cc/9B9R-YGWB>].
 35. Javier Colato & Lindsey Ice, *Charging into the Future: The Transition to Electric Vehicles*, 12 BEYOND THE NUMBERS, 2023.
 36. Shannon Osaka & Emily Guskin, *America Passed the EV 'Tipping Point'—but Many Buyers Still Want Gas*, WASH. POST (Sept. 18, 2023, 6:30 AM), <https://www.washingtonpost.com/climate-solutions/2023/09/15/ev-tipping-point-electric-poll/> [<https://perma.cc/LV8H-K2F9>]. This speech took place on September 28, 2023. *Climate Change and International Law at a Crossroad*, CASE W. RES. U., <https://case.edu/law/our-school/events-lectures/climate-change-and-international-law-crossroad> [<https://perma.cc/D6U3-QJ2W>].
 37. *Global EV Market Grew 55% in 2022 with 59% of EVs Sold in Mainland China*, CANALYS (Mar. 15, 2023), <https://www.canalys.com/newsroom/global-ev-sales-2022> [<https://perma.cc/HJ65-5CLH>].
 38. Colato & Ice, *supra* note 35; *Mineral Content of Battery Electric Vehicles Compared to Conventional Vehicles as of 2022, by Type*, STATISTA (Oct. 30, 2023), <https://www.statista.com/statistics/1315839/mineral-content->

minerals versus conventional, gas-powered vehicles. Although some elements are similar, such as copper and manganese, which are used in both types of vehicles, electric vehicles require significantly higher quantities of both minerals to support the batteries used as energy storage devices for those vehicles.³⁹ Other elements are wholly unique to electric vehicles, such as Lithium, Nickel, Cobalt, Graphite, Zinc, Silicon, and Rare-Earth minerals.⁴⁰ As the major manufacturers shift their production to battery-electric vehicles, a race has commenced to capture these natural resources and the processing operations needed to convert raw materials into useable products. Major manufacturers such as GM, Ford, Tesla, VW, Hyundai, and Nissan have established or announced soon-to-be established partnerships with battery cell manufacturers—many in the United States.⁴¹ Those battery/cell manufacturers have, in turn, started a new global resources race to capture sourcing and processing capability.⁴²

The problem lies in where those minerals and processing capabilities exist—and the attendant environmental issues that arise from the mining and processing of those minerals. For example, the Democratic Republic of Congo produces sixty percent of the world's cobalt.⁴³

of-ev-versus-conventional-vehicles-by-mineral-type/ [https://perma.cc/3GPQ-ARNE].

39. *Mineral Content of Battery Electric Vehicles Compared to Conventional Vehicles as of 2022*, *supra* note 38.
40. *Minerals Used in Electric Cars Compared to Conventional Cars*, IEA, <https://www.iea.org/data-and-statistics/charts/minerals-used-in-electric-cars-compared-to-conventional-cars> [https://perma.cc/ZXR3-TFSQ] (May 5, 2021).
41. Michael Wayland, *Automakers Are Spending Billions to Produce Battery Cells for EVs in the U.S.*, CNBC (Oct. 19, 2021, 2:04 PM), <https://www.cnbc.com/2021/10/19/automakers-are-spending-billions-to-produce-battery-cells-for-evs-in-the-us.html> [https://perma.cc/9ZT8-E3FJ]; Camila Domonoske, *Automakers Partner with Mines as Electric Cars Rely on Raw Materials for Batteries*, NPR (Mar. 11, 2022, 5:13 AM), <https://www.npr.org/2022/03/11/1085670133/automakers-partner-with-mines-as-electric-cars-rely-on-raw-materials-for-batteries> [https://perma.cc/9Z8L-RLT9]; GM, *Hyundai Announce EV Battery Plants for the US*, THE VERGE (Apr. 25, 2023, 1:04 PM), <https://www.theverge.com/2023/4/25/23697335/gm-hyundai-ev-battery-factory-samsung-sk-on> [https://perma.cc/VG9E-2CFE]; Nissan Soon to Announce US Battery Supplier for Next-Gen EVs, INSIDEEVS (May 19, 2022, 12:41 PM), <https://insideevs.com/news/586894/nissan-soon-announce-new-us-battery-supplier/> [https://perma.cc/A9FC-S6RU].
42. *How the Battery Materials Sector Can Meet the Soaring Demand in a Decarbonizing World?*, WORLEY (Sept. 20, 2022), <https://www.worley.com/en/insights/our-thinking/resources/decarbonization-understanding-the-challenges-and-opportunities-for-battery-materials-producers> [https://perma.cc/JWC6-3TCZ].
43. Patrick Hillberg & Sawyer Hall, *How Carmakers' Switch to Electric Vehicles Will Strain Supply of Battery Minerals*, WORLD ECON. F. (June

Current and increasing demand for this mineral will result in the depletion of reserves by 2030.⁴⁴ Moreover, Amnesty International⁴⁵ has linked cobalt mining to human rights issues, especially in the area of child labor.⁴⁶

Lithium, another key mineral, is found predominantly in South America, including Chile and Bolivia, as well as the Congo.⁴⁷ All three countries face challenges in mining those resources in a way that is not only environmentally responsible, but avoids human rights abuses, including the exploitation of or displacement of indigenous peoples.⁴⁸

Nickel mining, yet a third example, suffers from a very poor environmental track record, laying waste to entire forests in Indonesia as demand soars.⁴⁹ And the demand for nickel is expected to grow by at least sixty-five percent by 2030, according to the International Energy Agency.⁵⁰

Sourcing alone is not the only issue. Currently three-quarters of the market for minerals essential to batteries is controlled by China.⁵¹ As part of its Belt and Road Initiative—a plan by the Chinese Central

25, 2021), <https://www.weforum.org/agenda/2021/06/carmakers-switch-to-electric-vehicles-strain-supply-of-battery-minerals/> [https://perma.cc/YQ3R-NMKP].

44. *Id.*

45. AMNESTY INT'L, <https://www.amnesty.org/en/> [https://perma.cc/D9LK-GKDM].

46. See Richard Kent, *Corruption and Child Labor Have No Place in the Energy Transition*, AMNESTY INT'L (Feb. 26, 2021), <https://www.amnesty.org/en/latest/news/2021/02/corruption-and-child-labour-have-no-place-in-the-energy-transition/> [https://perma.cc/G2AF-VPQT].

47. See generally Nat. Res. Div. of the Econ. Comm'n. For Latin Am. and the Caribbean [ECLAC], *Lithium Extraction and Industrialization: Opportunities and Challenges for Latin America and the Caribbean* 14 (2023).

48. See Samar Ahmad, *The Lithium Triangle: Where Chile, Argentina, and Bolivia Meet*, HARV. INT'L REV. (Jan. 15, 2020), <https://hir.harvard.edu/lithium-triangle/> [https://perma.cc/E47T-NNGP].

49. Hannah Brown, *'The Trees Were All Gone': Indonesia's Nickel Mines Reveal the Dark Side of Our Electric Future*, EURONEWS (Mar. 15, 2023, 13:58 PM), <https://www.euronews.com/green/2023/03/15/the-trees-were-all-gone-indonesias-nickel-mines-reveal-the-dark-side-of-our-electric-future> [https://perma.cc/GMA4-AYTB].

50. Valdy Baraputri, *The Rush for Nickel: 'They are Destroying Our Future'*, BBC (July 9, 2023, 8:20), <https://www.bbc.com/news/world-asia-66131451> [https://perma.cc/GNX8-2UJ2].

51. Camila Domonoske, *How a Handful of Metals Could Determine the Future of the Electric Car Industry*, NPR (Mar. 13, 2022, 5:00 AM), <https://www.npr.org/2022/03/13/1085707854/how-a-handful-of-metals-could-determine-the-future-of-the-electric-car-industry> [https://perma.cc/5L5Y-GC4W].

Government to be the leader in all world resources—⁵² China set out intentionally to monopolize the processing of minerals critical to electric vehicles as part of the Central Government's overall plan to be the dominant player in electric vehicles.⁵³ Between 2009 and 2017, China subsidized its electric vehicle industry to the tune of sixty billion dollars.⁵⁴ Domination of this magnitude by a single country does not bode well for accessibility or worldwide distribution. Just a few years ago, during a U.S.-China trade war, China threatened to heavily tax or cut off the supply of these critical minerals to the United States, which would have devastating effects to domestic manufacturing, technology development, and the economy.⁵⁵

And the environmental and human rights impacts are not confined to electric vehicle batteries alone. The motor, charging system, and battery thermal management systems all require significantly greater numbers of integrated circuits and computer chips to operate.⁵⁶ These chips and circuits have a giant carbon footprint, requiring substantial quantities of water.⁵⁷ Taiwan manufactures two-thirds of the world's semi-conductors⁵⁸ and is facing a drought, causing farmers and other water users to fear for sufficient allocations.⁵⁹ Semi-conductor manufacturers are building new facilities, but have landed in places like

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52. See Yu Jie & Jon Wallace, *What is China's Belt and Road Initiative (BRI)*, CHATHAM HOUSE (Sept. 13, 2021), <https://www.chathamhouse.org/2021/09/what-chinas-belt-and-road-initiative-bri> [<https://perma.cc/N7TY-5T6N>].
 53. See *Examining the Potential for Export of Chinese Electric Cars to Other Countries*, ENERGY5 (Aug. 23, 2023), <https://energy5.com/examining-the-potential-for-export-of-chinese-electric-cars-to-other-countries> [<https://perma.cc/W87Q-N6G3>].
 54. Karl Mathiesen & Joshua Posaner, *How China Schooled the West on Climate Change*, POLITICO (Sept. 15, 2023, 6:28 PM), <https://www.politico.eu/article/china-west-climate-change-electric-car-battery/> [<https://perma.cc/L8P3-ESC3>].
 55. Kieth Johnson & Elias Groll, *China Raises Threat of Rare-Earths Cutoff to U.S.*, FOREIGN POL'Y (May 21, 2019, 4:39 PM), <https://foreignpolicy.com/2019/05/21/china-raises-threat-of-rare-earth-mineral-cutoff-to-us/> [<https://perma.cc/R6HB-RBZ5>].
 56. See *How Many Chips Are in Our Cars?*, ELECTRONICS SOURCING (May 4, 2022), <https://electronics-sourcing.com/2022/05/04/how-many-chips-are-in-our-cars/> [<https://perma.cc/C2EJ-574S>].
 57. See Raymond Zhong & Amy Chang Chien, *Taiwan's Drought Pits Chip Makers Against Farmers*, N.Y. TIMES, <https://www.nytimes.com/2021/04/08/technology/taiwan-drought-tsmc-semiconductors.html> [<https://perma.cc/2X2Q-TLF3fn>] (Apr. 13, 2021).
 58. Yen Nee Lee, *2 Charts Show How Much the World Depends on Taiwan for Semiconductors*, CNBC (Mar. 15, 2021, 8:37 PM), <https://www.cnbc.com/2021/03/16/2-charts-show-how-much-the-world-depends-on-taiwan-for-semiconductors.html> [<https://perma.cc/93RA-5QBRfn>].
 59. See Zhong & Chien, *supra* note 57.

the West and Southwest areas of the United States, where climate change has caused longer and more severe mega droughts—threatening water access to farmers, residents, and Native American tribes in the region.⁶⁰ Clearly, challenges abound as we face mitigating the classic causes of climate change in transportation through new technologies that bring their own unique set of challenges.

Fortunately, the news is not all bad. And, in fact, we stand on the edge of the ability not only to mitigate the harm of new technology, but to actually harness the promise of new technology to ensure we do not travel down the same path of environmental degradation and destruction wrought by the traditional drill-and-burn approach of the past-approaches that required the United States to enact a slew of environmental laws to turn around these excesses. Perhaps one of the most glaring examples was the enactment of the Clean Water Act in 1972 due,⁶¹ in part, to the infamous fire on the Cuyahoga River in 1969.⁶²

Electric vehicle technology and the attendant energy storage developments are a net positive in that the challenges to the mineral resource issue,⁶³ and the attendant impacts to indigenous, low-income, and disadvantaged communities are not indefinite.⁶⁴ Unlike fossil fuels, which must be extracted, refined, and then consumed, only to require replenishment from new sources,⁶⁵ the minerals that are utilized in

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60. Alex Irwin-Hunt, *Thirsty Chip Facilities Under Scrutiny in Water Stressed Areas*, FDI INTELLIGENCE (Aug. 10, 2023), <https://www.fdiintelligence.com/content/feature/thirsty-chip-facilities-under-scrutiny-in-water-stressed-areas-82810> [<https://perma.cc/ST4R-5Y8G>]; Christopher Flavelle & Kalen Goodluck, *Dispossessed, Again, Climate Change Hits Native Americans Especially Hard*, N.Y. TIMES, <https://www.nytimes.com/2021/06/27/climate/climate-Native-Americans.html> [<https://perma.cc/DQN2-KEVH>] (June 22, 2023).
61. Federal Water and Pollution Control Act Amendments of 1972 § 101(a), 33 U.S.C. § 1251.
62. *History of the Clean Water Act (CWA)*, EPA, https://cfpub.epa.gov/watertrain/moduleFrame.cfm?parent_object_id=2571 [<https://perma.cc/XL6S-BA58>].
63. Jim Motavalli, *Building Out the EV Battery-Recycling Ecosystem*, TECH BRIEFS (Mar. 1, 2023), <https://www.techbriefs.com/component/content/article/tb/supplements/bet/features/articles/47648> [<https://perma.cc/X6UZ-BSEN>].
64. See KREIGER ET AL. ENERGY STORAGE PEAKER PLANT REPLACEMENT PROJECT, PHYSICIANS, SCIENTISTS, AND ENGINEERS FOR HEALTHY ENERGY 2 (2020); Christopher Flavelle & Kalen Goodluck, *Displaced, Again: Climate Change Hits Native Americans Especially Hard*, N.Y. TIMES, <https://www.nytimes.com/2021/06/27/climate/climate-Native-Americans.html> [<https://perma.cc/EW87-RR4N>] (June 22, 2023).
65. Melissa Denchak, *Fossil Fuels: Dirty Facts*, NAT'L RES. DEF. COUNCIL (June 1, 2022), <https://www.nrdc.org/stories/fossil-fuels-dirty-facts> [<https://perma.cc/C5LX-N8K9>].

battery-electric technology are not depleted.⁶⁶ In fact, the minerals can be recaptured from spent batteries, utilizing existing methods of chemical and mechanical extraction to be re-used over and over again without fear of degradation.⁶⁷ Such technology served by a closed loop capture and recycling system could become self-sustaining over time.⁶⁸ Several promising new companies, such as Redwood Materials out of Nevada (founded by former Tesla Chief Technology Officer and co-founder, Jeffrey Brian Straubel) and NorthVolt, out of Sweden, have formed to take advantage of the inherent benefits of lithium-ion battery technology—with substantial strides being made in the efficiency and effectiveness of these recycling efforts.⁶⁹ Existing companies such as Ford, Volvo, and Volkswagen are also looking into the promise of battery recycling and initiating their own efforts or partnering with new companies.⁷⁰

On the policy side, gatherings such as this Conference can help us identify how to resolve these concerns and heighten the policy discussion of how to address these new challenges as we seek to shift away from a drill-and-burn economy to a more sustainable approach. These, in turn, can support the awareness of such considerations so that policy makers, legislators, and world leaders can incorporate environment, social, and governance issues into solutions, through updates in current environmental laws, enacting new legislation where needed, and finding creative solutions to resource generation and recovery.

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66. See Morgan Korn, *Electric Vehicle Batteries Require Precious Minerals. That Old Cellphone May be the Solution*, ABC NEWS (Feb. 12, 2023, 6:10 AM), <https://abcnews.go.com/Business/electric-vehicle-batteries-require-precious-minerals-cellphone-solution/story?id=96977978> [<https://perma.cc/76S3-QEQU>].
67. See generally Mengmeng Wang et al., *Recycling Spent Lithium-Ion Batteries Using a Mechanochemical Approach*, 1 ECON. 1 (2022).
68. See John Voelcker, *Everything You Need to Know About EV Battery Disposal*, CAR & DRIVER (June 10, 2023), <https://www.caranddriver.com/features/a44022888/electric-car-battery-recycling/> [<https://perma.cc/7EHW-S8HJ>].
69. Stephanie Leonida, *Redwood Materials Launches First EV-Battery Recycling Program in California*, EE POWER (Mar. 11, 2022), <https://ee-power.com/news/redwood-materials-launches-first-ev-battery-recycling-program-in-california/> [<https://perma.cc/T93G-X2Y7>].
70. *Redwood Materials Creates the First Pathway for End-of-Life Electric Vehicles in California*, REDWOOD MATERIALS (Feb. 17, 2022), <https://www.redwoodmaterials.com/news/electric-vehicle-and-hybrid-battery-recycling-california/> [<https://perma.cc/KT5J-P5R3>]; *Redwood Materials and Volkswagen Group of America Announce Partnership*, REDWOOD MATERIALS (July 12, 2022), <https://www.redwoodmaterials.com/news/redwood-and-volkswagen-partnership/> [<https://perma.cc/D2MK-TXSN>].

As we look to support responsible environmental protections, we can take into account environmental justice issues, and the adverse impacts that technology can inadvertently generate. The Inflation Reduction Act⁷¹ (“IRA”) passed last year and signed into law by President Biden a little over a year ago, is an excellent example of support of these principles. The IRA specifically lowers healthcare costs and expands insurance coverage, benefitting low-income Americans.⁷² More directly, the IRA makes home-efficiency upgrades more affordable and creates economic opportunities and jobs in the new technology and energy economy.⁷³ The IRA expressly recognizes that climate change disproportionately impacts low-income communities and communities of color by creating Environmental Justice Block Grants⁷⁴—a dedicated program to tackle pollution in port communities where pollution is particularly dense and low-income communities traditionally exist.⁷⁴ And it lowers the cost for small businesses to invest in sustainable energy generation as well as subsidizing energy efficient upgrades.⁷⁵

The IRA is not the only action taken in the United States. As Congress considers updates to laws such as the 1872 mining law,⁷⁶ we have an opportunity to modernize those laws taking into account environmental and social concerns. I had the honor of testifying on

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71. Press Release, White House, Fact Sheet: One Year in, President Biden’s Inflation Reduction Act is Driving Historic Climate Action and Investing in America to Create Good Paying Jobs and Reduce Costs (Aug. 16, 2023), <https://www.whitehouse.gov/briefing-room/statements-releases/2023/08/16/fact-sheet-one-year-in-president-bidens-inflation-reduction-act-is-driving-historic-climate-action-and-investing-in-america-to-create-good-paying-jobs-and-reduce-costs/> [https://perma.cc/P8RQ-KV5V].
 72. *Anniversary of the Inflation Reduction Act: Update on CMS Implementation*, CTR. FOR MEDICARE & MEDICAID SERV. (Aug. 16, 2023), <https://www.cms.gov/newsroom/fact-sheets/anniversary-inflation-reduction-act-update-cms-implementation> [https://perma.cc/SFH3-PQ4T].
 73. See Inflation Reduction Act § 13302, 26 U.S.C. § 55 (2022).
 74. See 26 U.S.C. § 55; see also Fact Sheet: How the Inflation Reduction Act Builds a Better Future for Young Americans, THE WHITE HOUSE (Aug. 16, 2022), <https://whitehouse.gov/briefing-room/statements-releases/2022/08/16/fact-sheet-how-the-inflation-reduction-act-builds-a-better-future-for-young-americans/> [https://perma.cc/F34F-DSGR].
 75. 26 U.S.C. § 55; Press Release, White House, Fact Sheet: How the Inflation Reduction Act Will Help Small Businesses (Sep. 12, 2022), <https://www.whitehouse.gov/briefing-room/statements-releases/2022/09/12/fact-sheet-how-the-inflation-reduction-act-will-help-small-businesses/> [https://perma.cc/AKK4-5WVR].
 76. See *Mining Law Reform*, U.S. DEP’T OF THE INTERIOR (May 12, 2022), <https://doi.gov/ocl/mining-law-reform> [https://perma.cc/743Y-W77T].

behalf of my former employer, Rivian Automotive, LLC (Rivian),⁷⁷ in September of 2019 before the House Science, Space and Technology Subcommittee on Investigations and Oversight.⁷⁸ At that hearing, Rivian supported increasing domestic mineral production, but not at the expense of our wild and scenic spaces, the health of indigenous and rural communities, nor as a compromise to our bedrock environmental laws.⁷⁹ My testimony noted specific solutions as part of proposed updates to the 1872 mining law that included increasing support for Federal Agencies charged with review of mining permits, consultation with indigenous peoples ensuring their voice is heard on mining projects impacting their homes, looking to new methods of mineral resourcing such as geothermal brine and rare-earth element recovery from abandoned mines, and supporting new laws that promoted transportation electrification and technology.⁸⁰

The abandoned mine recovery approach is an excellent example of solutions that can benefit a wide swath of stakeholders with bipartisan appeal.⁸¹ Traditional mining typically focuses on a single mineral (e.g., coal, gold, platinum, nickel).⁸² Off-casts from those operations are left as “tailings” once the mine’s focus is captured.⁸³ Often poorly stored or simply left on the ground, leachate from these tailings can contaminate the soil or local waterways.⁸⁴ However, the tailings often contain valuable minerals that can be captured and used as part of a clean-up effort.⁸⁵ Only last week, Colorado Senators Bennet and

77. “*The Next Mile: Technology Pathways to Accelerate Sustainability within the Transportation Sector*” Before the U.S. H.R. Comm. on Science, Space, and Tech. Subcomm. on Energy (2019) (written testimony of James C. Chen, Vice President of Public Policy, Rivian Automotive, LLC) [hereinafter *The Next Mile*.]

78. *Id.*

79. *Id.* at 2.

80. *Id.* at 2 -5.

81. *Abandoned Mine Land Reclamation Program*, U.S DEP’T OF INTERIOR, <https://revenuedata.doi.gov/how-revenue-works/aml-reclamation-program/> [https://perma.cc/T2SY-ASRP]; *Bipartisan Infrastructure Deal Will Clean Up Legacy Pollution, Protect Public Health*, U.S DEP’T OF INTERIOR (Nov. 9, 2021), <https://doi.gov/pressreleases/bipartisan-infrastructure-deal-will-clean-legacy-pollution-protect-public-health> [https://perma.cc/87X3-SS8R].

82. Sarah Vega, *Underground Mining Guide*, THE ASSAY, <https://www.theassay.com/articles/the-assay-insights/underground-mining-guide/> [https://perma.cc/DX9V-CAF5]; Baraputri, *supra* note 50.

83. ROBERT BURGIN, *THE NEXT MOVE: 50 YEARS OF THE JKMRC 160* (2021).

84. *GETTING UP TO SPEED: GROUND WATER CONTAMINATION*, U.S. EPA C4.

85. *What Are Tailings?*, SOC’Y FOR MINING, METALLURGY, & EXPLOR., <https://www.smenet.org/What-We-Do/Technical-Briefings/What-are-Tailings> [https://perma.cc/7DFR-PA7Z].

Hickenlooper joined New Mexico Senator Heinrich and Idaho Senator Risch in introducing a bipartisan bill to make it easier for “Good Samaritans” such as state agencies, local governments, nonprofits, Native American tribes, and other groups to clean up and improve water quality in and around hardrock mines.⁸⁶ The legislation would lower the liability risks for these “Good Samaritan” organizations from pre-existing pollution from those mines, while allowing clean-up under a pilot permitting program with federal oversight.⁸⁷

These examples are only the tip of the iceberg. As I also noted in my 2019 Congressional testimony,⁸⁸ the United States needs to take a strong leadership position on the world stage. Efforts must not only be focused on how we address issues at home, but also our influence overseas. This includes robust and continued participation in worldwide efforts to define solutions to climate change.

Transportation is an important sector – and one in which the U.S. can and should lead. And this leadership must continue across administrations, regardless of who is in the White House or in Congress. At the end of the day, climate change is not a one-country problem, and there most certainly is not a one-country solution. New technology, such as the support and promotion of transportation electrification, is one component of that battle against climate change.⁸⁹ Ensuring the benefits of the technology reach all sectors of our communities is another.⁹⁰

Solving these generational issues continues with us. As we look to new technology to help us there, let us do so in a manner that is responsible, inclusive, and global. Thank you for your time and attention this evening.

86. Press Release, James E. Risch U.S. Senator for Idaho, Risch, Heinrich Work to Cut Red Tape that Prevents Hardrock Mine Clean Up, (Sep. 13, 2023), <https://www.risch.senate.gov/public/index.cfm/2023/9/risch-heinrich-work-to-cut-red-tape-that-prevents-hardrock-mine-clean-up> [https://perma.cc/R44Z-GS5E].

87. *Id.*

88. *The Next Mile*, *supra* note 77, at 3.

89. Nadja Popovich & Brad Plumer, *A Key Part of America’s Plan to Slash Carbon Emissions*, N.Y. TIMES (Apr. 14, 2023), <https://www.nytimes.com/interactive/2023/04/14/climate/electric-car-heater-everything.html> [https://perma.cc/3MZ3-ZEYJ].

90. *Reforming the Mining Law of 1872 Before the H. Comm. on Natural Resources Subcommittee on Energy and Mineral Resources*, 4 (2022) (written testimony of James C. Chen, Vice President of Public Policy, Rivian Automotive, LLC) [https://perma.cc/V5HK-FK29].

