ENVIRONMENTAL JUSTICE AND THE TRANSITION FROM FOSSIL FUELS TO RENEWABLE ENERGY

by Barry E. Hill

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SUMMARY

This Article explores the environmental justice, climate justice, and sustainable development implications of the recently enacted Inflation Reduction Act, which encourages domestically produced and processed minerals for the country's energy transition from fossil fuels. It examines (1) the resulting need for a resurgence of mining in Indian Country; (2) the use of those minerals in lithium-ion batteries for electric vehicles; and (3) how disposal of those batteries could have disproportionate impacts on people of color and/or low-income communities in the United States, as well as marginalized communities in less affluent countries across the globe. It contrasts this federal framework with New York's new environmental rights constitutional amendment, as well as the state's environmental justice law and climate change law. It concludes that New York's framework provides guardrails while the federal government currently offers few or no banisters for disproportionately affected redlined communities.

Unquestionably, the existential threat of climate change is shaping our world. As we move forward in the United States with the transition to clean energy, however, we must be diligent in addressing, at the same time, the overarching issues of environmental justice,[1] climate justice,[2] and sustainable development.[3]

1. Environmental justice, as a public policy issue in the United States, addresses the human health concerns and the environment of all communities, regardless of the race and/or the economic status of the residents. The U.S. Environmental Protection Agency (EPA) defines the term as follows:

> *Environmental Justice* is the *fair treatment* and *meaningful involvement* of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. *Fair Treatment* means that no group of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state and local, and tribal environmental programs and policies. *Meaningful Involvement* means that: (1) potentially affected community residents have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health; (2) the public's contribution can influence the regulatory agency's decision; (3) the concerns of all participants involved will be considered in the decision-making process; and (4) the decision-makers seek out and facilitate the involvement of those potentially affected.

U.S. EPA, Toolkit for Assessing Potential Allegations of Environmental Injustice (2004) (EPA 300-R-04-002), https://www.epa.gov/sites/default/files/2015-02/documents/ej-toolkit.pdf. A special concern of EPA is the adverse impact on the health of community residents who have been environmentally overburdened and who are, consequently, exposed disproportionately to environmental harms and risks in comparison to other communities.

2. "Climate justice" is a term that acknowledges that climate change can have differing social, economic, public health, and other adverse impacts on indigenous, minority, and/or low-income populations in the United States. According to a September 2021 peer-reviewed EPA study titled "Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts," the researchers concluded that certain vulnerable populations face disproportionate risks from moderate and severe warming, ranging from increased mortality, loss of employment, and damages to health and quality of life. The researchers determined that race is by far the strongest indicator for heightened climate risk, based upon the Agency's analysis of 49 U.S. cities.

Further, the researchers found that African Americans were 40% more likely to die from higher temperatures than the general population if global warming was kept to 2 degrees Celsius. If the world warmed to 4 degrees Celsius on average compared with pre-industrial levels, Black Americans would be 59% more likely to die than the general population of the continental United States. Additionally, Black children were 34% more likely to experience asthma exacerbated by climate change. Moreover, Latin Americans and Native Americans could lose more employment opportunities than the general population. And finally, Hispanics and Latin Americans, and Native Americans were 43% and 37% more likely to live in places where climate change threatened labor opportunities, potentially endangering livelihoods. U.S. EPA, Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts (2021) (EPA 430-R-21-003), https://www.epa.gov/system/files/documents/2021-09/climate-vulnerability_september-2021_508.pdf.

3. Closely related to the issue of environmental justice is the issue of sustainable development. The 40-plus-year history of the development of the concept of sustainable development is as follows:

> • United Nations (U.N.) Conference on the Human Environment (1972) (Stockholm, Sweden)—At this conference, the U.N. examined, for the first time, the effect of human activity on the environment, and the tension between economic development and environmental protection.

For years, climate scientists have consistently warned of global warming of the planet, and the resulting environmental, public health, and economic crises. With these crises now here, extreme weather conditions are occurring with greater frequency in the United States. The resulting changes in global temperatures, according to the U.S. Environmental Protection Agency (EPA), are, in turn, causing:

- Increases to the frequency, intensity, and duration of heat waves, which can pose health risks, particularly for young children and the elderly;
- Impacts to human health by worsening air and water quality, increasing the spread of certain diseases, and altering the frequency or intensity of extreme weather events;
- Changes to ecosystems, which influence geographic ranges of many plant and animal species and the timing of their life-cycle events, such as migration and reproduction;
- Increases in the frequency and intensity of extreme weather events, such as heat waves, droughts, and floods, which can increase losses to property, cause costly disruptions to society, and reduce the affordability of insurance;
- Changes in the patterns and amount of rainfall, as well as changes in the timing and amount of stream flow, which can adversely affect water supplies and water quality, as well as the production of hydroelectricity; and
- Rising sea levels resulting in flooding and damage to coastal communities and ecosystems.[4]

To address these environmental, public health, and economic issues, the federal government has determined that, among other things, new mining is needed to power the transition from fossil fuels. This new mining for a variety of metals is needed since electric cars, wind turbines, and solar panels are made from such minerals. The transition to renewable energy will require substantial amounts of metals. Arguably, this resurgence in American mining will exacerbate existing environmental injustices in Indian Country.[5]

With respect to mining for electric vehicle (EV) metals:

> The United States has enough reserves of lithium, copper and other metals to build millions of its own electric vehicles (EVs), but rising opposition to new mines may force the country to rely on imports and delay efforts to electrify the nation's automobiles.
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> ***
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> A Reuters analysis found that proposed U.S. mining projects could produce enough copper to build more than 6

• Brundtland Commission Report—The report, "Our Common Future," of the World Commission on Environment and Development (1987) introduced the widely accepted definition of "sustainable development," which is: "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Sustainable development, thus, basically means that (1) today's progress must not come at tomorrow's expense; and (2) human progress must be sustained not just in a few places for a limited number of years, but for the entire planet into the distant future.

• Earth Summit (1992) (Rio de Janeiro, Brazil)—The Rio Declaration on Environment and Development (Agenda 21) introduced a plan for achieving sustainable development in the 21st century and was intended to foster international cooperation to promote sustainability and environmentally sound development. Major world leaders recognized sustainable development as the considerable challenge it remains today.

• World Summit on Sustainable Development (2002) (Johannesburg, South Africa)—The World Summit was attended by 191 national governments, U.N. agencies, multilateral financial institutions, and other major groups to assess progress since the 1992 Rio Conference. The Johannesburg Declaration on Sustainable Development introduced a plan ("Plan of Implementation of the World Summit on Sustainable Development") that was intended to foster international cooperation to promote, among other things, good environmental governance to implement the vision of sustainable development.

• U.N. Conference on Sustainable Development (Rio+20 Conference) (2012) (Rio de Janeiro, Brazil)—The objective of the conference, according to the U.N. Conference Secretariat, was "to secure renewed political commitment for sustainable development, assess the progress to date and the remaining gaps in the implementation of the outcomes of the major summits on sustainable development, and address new and emerging challenges."

• U.N. Sustainable Development Summit (2015) (New York)—The 193 Member States of the U.N. issued the historic new agenda, titled "Transforming Our World: The 2030 Agenda for Sustainable Development," which included 17 Sustainable Development Goals (SDGs). Over the next 15 years, the 193 Member States determined that these 17 SDGs would universally apply to all countries and will mobilize efforts to end all forms of poverty, fight inequalities, and tackle climate change, while ensuring that no country is left behind. Although not legally binding, governments are expected to take ownership and establish national frameworks for achieving the 17 SDGs. Barry E. Hill, Environmental Justice: Legal Theory and Practice 6-8 (Env. L. Inst. 5th ed. 2022).

Community-based environmental justice organizations in the United States, and their international counterparts, have recognized the similarities between the three pillars of environmental justice and sustainable development: economic growth, environmental protection, and social equity. In sum, since the concepts of environmental justice and sustainable development are based on a social equity dimension, as well as environmental protection and economic development for all, they are, indeed, synonymous.

4. U.S. EPA, *Impacts of Climate Change*, https://www.epa.gov/climatechange-science/impacts-climate-change (last updated Dec. 30, 2022).

5. According to EPA:

> The term Indian country is defined in 18 U.S.C. §1151 and 40 C.F.R. §171.3 as:
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> a. all land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation;
> b. all dependent Indian communities within the borders of the United States whether within the original or subsequently acquired territory thereof, and whether within or without the limits of a state; and
> c. all Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same.
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> Consistent with the statutory definition of Indian country, as well as federal case law interpreting this statutory language, lands held by the federal government in trust for Indian tribes that exist outside of formal reservations are informal reservations and, thus, are Indian country.

U.S. EPA, *Definition of Indian Country*, https://www.epa.gov/pesticide-applicator-certification-indian-country/definition-indian-country (last updated Apr. 14, 2022).

> million EVs, enough lithium to build more than 2 million EVs and enough nickel to build more than 60,000 EVs.
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> The estimates are based on the volume of minerals used to make a Tesla Inc (TSLA.O) Model 3, the world's most popular EV, according to a study by Benchmark Mineral Intelligence. Other types of EVs use different amounts, depending on design.
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> "If we don't start getting some mining projects under construction this coming year, then we will not have the raw materials domestically to support EV manufacturing," said James Calaway, executive chairman of ioneer Ltd (INR.AX).
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> Biden in August issued an executive order[6] aimed at making half of all new vehicles sold in 2030 electric.[7]

A typical lithium[8] car battery weighs about 1,000 pounds, broken down as follows:

> Such a battery typically contains about 25 pounds of lithium, 30 pounds of cobalt, 60 pounds of nickel, 110 pounds of graphite, 90 pounds of copper, about 400 pounds of steel, aluminium, and various plastic components.
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> From these figures and average ore grades, one can estimate the typical quantity of rock that must be extracted from the earth and processed to yield the pure minerals required to produce an electric vehicle battery.
>
> Lithium brines typically contain less than 0.1 percent lithium, meaning some 25,000 pounds of brines to get the 25 pounds of pure lithium. Similarly cobalt ore grades average about 0.1 percent, nearly 30,000 pounds of ore per battery. Nickel ore grades average about 1 percent, thus about 6,000 pounds of ore per battery. Graphite ore is typically 10 per cent, thus about 1,000 pounds per battery. Copper at about 0.6 percent in the ore, thus about 25,000 pounds of ore per battery.
>
> In total then, acquiring just these five elements to produce the 1,000-pound EV battery requires mining about 90,000 pounds (over 40 tonnes) of ore.
>
> It only gets worse.
>
> When accounting for all the earth moved (i.e., the materials first dug up to get to the ore), one battery requires digging and moving between 200,000 and 1,500,000 pounds (or between 90 and 680 tonnes) of earth per battery.[9]

As a result of understanding the amount of critical raw materials needed for producing a lithium-ion battery[10] for a single EV, the following questions are posed: Mining for many of these minerals can be not only dangerous,[11] but also extremely environmentally sensitive,[12] so what safeguards are in place? What legal frameworks exist at the federal level or at the state level that provide such safeguards? What legal frameworks exist at the federal level or at the state level that address the overarching issues of environmental justice, climate justice, or sustainable development from the mining of those metals, the use of those metals in EV batteries, and the ultimate disposal of EV batteries made from those metals because of "planned obsolescence"?[13] What legal frameworks exist that appear to work more effectively in achieving the federal government's or a state's goals in transitioning to a clean energy economy? How can we change the existing legal structure on the federal level to ensure clean land, clean air, and clean water for all communities in a clean energy economy?

To answer those questions, this Article is organized as follows. Part I contrasts the existing legal frameworks for environmental justice of the federal government and the state of New York, including their constitutions, legislation, and climate-specific laws. It highlights the recently enacted Inflation Reduction Act of 2022,[14] which reflects

6. Exec. Order No. 14037, Executive Order on Strengthening American Leadership in Clean Cars and Trucks (Aug. 5, 2021). This Executive Order states:
   > Section 1. Policy. America must lead the world on clean and efficient cars and trucks. That means bolstering our domestic market by setting a goal that 50 percent of all new passenger cars and light trucks sold in 2030 be zero-emission vehicles, including battery electric, plug-in hybrid electric, or fuel cell electric vehicles. My Administration will prioritize setting clear standards, expanding key infrastructure, spurring critical innovation, and investing in the American autoworker. This will allow us to boost jobs—with good pay and benefits—across the United States along the full supply chain for the automotive sector, from parts and equipment manufacturing to final assembly.
7. Ernest Scheyder, *U.S. Faces Tough Choices in 2022 on Mines for Electric-Vehicle Metals*, Reuters (Dec. 22, 2021), https://www.reuters.com/markets/commodities/us-faces-tough-choices-2022-mines-electric-vehicle-metals-2021-12-22/.
8. Lithium is the lightest metal on the periodic table and can store a lot of energy relative to its mass. Lithium is a soft, silvery-white alkali metal. Under standard conditions, it is the least dense metal and the least dense solid element. Wikipedia, *Lithium*, https://en.wikipedia.org/wiki/Lithium (last edited Feb. 11, 2023).
9. Advance Australia, *Up to 680 Tonnes of Earth Mined to Produce One Electric Vehicle Battery*, https://www.advanceaustralia.org.au/up_to_680_tonnes_of_earth_mined_to_produce_one_electric_vehicle_battery (last visited Feb. 11, 2023).
10. A lithium-ion battery is a type of rechargeable battery that uses the reversible reduction of lithium ions to store energy. Wikipedia, *Lithium-Ion Battery*, https://en.wikipedia.org/wiki/Lithium-ion_battery (last updated Feb. 28, 2023).
11. *See* Evan Halper, *EV Supply Chains Have a Human Rights Problem. Can Tech Fix It?*, Wash. Post (Oct. 20, 2022), https://www.washingtonpost.com/business/2022/10/20/ev-supply-chain-battery-tracking/.
12. Mine exploration, construction, operation, and maintenance may result in land-use change, and may have associated negative impacts on environments, including deforestation, erosion, contamination and alteration of soil profiles, contamination of local streams and wetlands, and an increase in noise level, dust, and emissions. *See* Neal R. Haddaway et al., *Evidence of the Impacts of Metal Mining and the Effectiveness of Mining Mitigation Measures on Social-Ecological Systems in Arctic and Boreal Regions: A Systematic Map Protocol*, 8 Env't Evidence J. 9 (Feb. 21, 2019), https://environmentalevidencejournal.biomedcentral.com/articles/10.1186/s13750-019-0152-8.
13. *See* Iberdrola, *Planned Obsolescence and Its Environmental Impact*, https://www.iberdrola.com/sustainability/planned-obsolescence (last visited Feb. 11, 2023).
14. Inflation Reduction Act of 2022, Pub. L. No. 117-169, 136 Stat. 1818.

the federal government's decision to encourage domestically produced or processed minerals for the country's energy transition from fossil fuels. According to the U.S. Department of Energy's (DOE's) website, the Inflation Reduction Act makes the single largest investment in climate and energy in American history, enabling the United States to tackle the climate crisis, advancing environmental justice, securing America's position as a world leader in domestic clean energy manufacturing, and putting the United States on a pathway to achieving the Joseph Biden Administration's climate goals, including a net-zero economy by 2050.[15]

The law tied a $7,500 tax credit for buying an EV to the origins of the vehicle's parts. Thus, if a taxpayer wanted to use the full credit, the EV's battery would need minerals from the United States or a country with a U.S. trade agreement.[16] Moreover, the EV could not include any parts from minerals mined in China or Russia. Additionally, the law provides incentives for mining in the United States. Thus, any mining operation digging up rocks desired by green technology manufacturers will receive a 10% tax break.

Part II examines the resulting need for a resurgence of mining in Indian Country to produce these domestic EV car minerals.

Part III examines the issue of environmental justice and the history of uranium ore mining on the Navajo Nation, and the environmental and public health problems that ensued.[17] Many of the environmental and public health problems experienced by the Navajo people are manifested in the recently settled litigation *United States v. Cyprus Amax Minerals Co. & Western Nuclear, Inc.*[18] The geologic reality is that many of the minerals that will be sought for making EVs are located on Native American reservations. Unless the federal government adopts an entirely different approach to the present and future mining operations that will support the resurgence of mining in Indian Country, the environmental and public health problems that resulted from uranium mining on the Navajo Nation will pale in comparison.

Part IV discusses EPA's troubled enforcement of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA),[19] related to uranium mining on the Navajo Nation. Moreover, EPA intends to increase its use of technology to transform its moribund enterprise information programs to ensure better, more data-driven enforcement decisions to protect human health and the environment. Unfortunately, as will be discussed, there are biases in the algorithms of artificial intelligence (AI) that support those enforcement decisions.

Part V discusses how the disposal of EV batteries as e-waste could have disproportionate impacts on some communities in the United States (and elsewhere). E-waste is a popular, informal name for electronic products nearing the end of their useful lives (e.g., computers, televisions, VCRs, stereos, copiers, and fax machines are common electronic products). Many of these products can be reused, refurbished, or recycled.[20] This part concludes with a discussion of U.S. EV batteries as e-waste eventually being disposed of in marginal communities in Africa, which creates problems contrary to sustainable development.

Part VI offers some conclusions regarding how New York's Environmental Rights Amendment, its environmental justice law, and its climate change law provide guardrails while the federal government's current legal framework offers few or no banisters for disproportionately affected redlined communities.

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15. *See* Loan Program Office, DOE, *Inflation Reduction Act of 2022*, https://www.energy.gov/lpo/inflation-reduction-act-2022 (last visited Feb. 11, 2023).
16. The United States, for example, has trade agreements with Mexico, Taiwan, Vietnam, Europe, South Korea, the Dominican Republic, the European Union, and others, pursuant to the Trade Agreements Act (TAA) of 1979, 19 U.S.C. ch. 13. According to Washington, D.C.-based law firm Steptoe & Johnson:
    > The TAA applies a rule-of-origin requirement to the end product being supplied and requires that end products acquired by the Government must be "wholly the growth, product or manufacture" of the U.S. or of a designated country, or "substantially transformed [in the U.S. or a designated country] . . . into a new and different article of commerce with a name, character, or use distinct from that of the article or articles from which it was transformed.

    See Thomas Barletta et al., Steptoe & Johnson LLP, The Basics of the Trade Agreements Act (2005), https://www.steptoe.com/a/web/645/1062.pdf.
17. The Navajo Nation is a Native American reservation in the United States. It occupies portions of northeastern Arizona, northwestern New Mexico, and southeastern Utah, at roughly 17,544,500 acres (27,413 square miles). The Navajo Nation is the largest land area held by a Native American tribe in the United States, exceeding 10 U.S. states. In 2010, the reservation was home to 173,667 out of 332,129 Navajo tribal members; the remaining 158,462 tribal members lived outside the reservation, in urban areas (26%), border towns (10%), and elsewhere in the United States (17%). The seat of government is located in Window Rock, Arizona.
18. No. CV-17-00140-PHX-DLR, 2017 U.S. Dist. LEXIS 85246 (D. Ariz. May 22, 2017). *See also* Navajo Nation v. Cyprus Amax Mins. Co., No. CV-17-08007-PCT-DLR, 2017 U.S. Dist. LEXIS 77568 (D. Ariz. May 22, 2017).
19. 42 U.S.C. §§9601-9675, ELR Stat. CERCLA §§101-405. CERCLA is aimed at cleaning up sites contaminated with hazardous wastes, as well as preventing contamination of future sites by assigning joint and several liability to parties involved as owners, arrangers, and transporters. The liability requires the parties to pay damages for the cleanup of sites. CERCLA involves theories and elements of environmental law, property law, and tort law. EPA is responsible for enforcing CERCLA.
20. According to the U.N. Environment Programme (UNEP):
    > As humanity's desire for new technology grows, so do the mountains of potentially toxic electronic waste. Some 54 million metric tonnes of phones, computers and other so-called e-waste are produced a year . . . . That is equivalent to 7 kilogrammes for every person on Earth; a number predicted to double by 2050 if nothing is done. Only 17 per cent of e-waste is recycled. The rest is dumped, often to be sifted through in low-income countries by informal workers, including children, seeking to extract valuable materials at grave risk to their health.

    How Disposable Tech Is Feeding an E-Waste Crisis, UNEP (Nov. 21, 2022), https://www.unep.org/news-and-stories/story/how-disposable-tech-feeding-e-waste-crisis.

I. Existing Legal Frameworks for Ensuring Environmental Justice for All Communities

A. Constitutions

It is a simple fact that there is no constitutional right, protected by the federal government, to be able to breathe clean air, or to live in a clean, safe, and healthy neighborhood, or to have access to clean water and sanitation for all communities. It is clearly not an expressed right in the U.S. Constitution and its Bill of Rights.[21] According to retired University of Virginia Law Professor Jonathan Z. Cannon, the Constitution is "pre-ecological."[22] Nor is there a U.S. Supreme Court decision declaring that it falls within a *penumbral right*—a right that could be derived from other rights explicitly protected in the Bill of Rights—as the Supreme Court has declared for the right to privacy in *Griswold v. Connecticut*[23] or the right for same-sex couples to marry in *Obergefell v. Hodges*.[24]

Whereas, on November 2, 2021, 70% of the voters of New York, via a ballot measure, overwhelmingly added to the New York State Constitution an Environmental Rights Amendment, Article I, §19, which reads: "Each person shall have a right to clean air and water, and a healthful environment." This language is plain and straightforward, and was placed in the Bill of Rights section of the constitution. These rights augment the commitments already set forth in Article XIV—the conservation provisions of the constitution—which have provided great protection for New York's cherished forest preserve.

The first decision under Article I, §19, was *Fresh Air for the Eastside, Inc. v. New York*.[25] The plaintiffs challenged the operation of a landfill in Monroe County, and claimed that odors, fugitive emissions, and climate change impacts from the operation of High Acres Landfill violated the environmental rights of nearby property owners and residents. The plaintiffs filed suit against New York City (which sends garbage to the landfill), Waste Management of New York, LLC (the private waste management company that operates the landfill), and the New York State Department of Environmental Conservation (DEC), whose purpose, under state law, is to "conserve, improve and protect [New York's] natural resources and environment."[26]

On December 7, 2022, New York Supreme Court Judge John J. Ark dismissed the claims against Waste Management and New York City, but denied DEC's motion to dismiss. Importantly, the judge interpreted the constitutional right to be self-executing and to provide substantive and procedural protections beyond those afforded under existing state environmental statutes.

B. Environmental Justice Legislation

Enacting comprehensive environmental justice legislation was the dream of the late civil rights icon Rep. John Lewis (D-Ga.), who through his 60-plus years of fearless activism was the unquestioned "conscience of [the U.S.] Congress."[27] He introduced the Environmental Justice Act of 1992, which was designed for the first time in this nation's history to address racial discrimination in the enforcement of environmental laws, and the development and implementation of regulations and policies by EPA and other federal agencies and departments. Since 1992, there have been more than 50 environmental justice-related bills introduced in the U.S. House of Representatives or the U.S. Senate. In fact, Representative Lewis dutifully reintroduced his bill each year for more than a dozen years thereafter. Not one of the bills has become law.

Meanwhile, the environmental and public health problems of millions of people living in "sacrifice zones"[28] continue to get worse. And according to numerous independent studies, people of color and/or low-income communities have contributed the least to the environmental and public health problems in those sacrifice zones—but suffer the most.[29]

Whereas, on January 1, 2020, New York added a new Article 48 to the Environmental Conservation Law,[30] which established, by §48-0105, a permanent 17-member Environmental Justice Advisory Board.[31] Importantly, the law declared that it is now state policy that "all people, regardless of race, color, religion, national origin or income, have a right to fair treatment and meaningful involvement in the development, implementation and enforcement of laws, regulations and policies that affect the quality of the environment."[32] Moreover, it is now state policy that "no group of people, including a racial, ethnic or socioeconomic group of people, should be disproportionately exposed to

21. *See* Barry E. Hill, *Environmental Justice for All Must Be a Human Right Enforceable in U.S. State Constitutions*, *in* A Better Planet: 40 Big Ideas for A Sustainable Future 183 (Daniel C. Esty ed., Yale Univ. Press 2019).
22. Jonathan Z. Cannon, Environment in the Balance: The Green Movement and the Supreme Court 29 (2015).
23. 381 U.S. 479 (1965).
24. 574 U.S. 1118 (2015). On June 26, 2015, the Supreme Court struck down all state bans on same-sex marriage and legalized it in all 50 states and required states to honor out-of-state same-sex marriage licenses in the *Obergefell* case. On December 13, 2022, President Biden signed the Defense of Marriage Act (Pub. L. No. 117-228, 136 Stat. 2305) into law, enshrining protection for same-sex and interracial marriages in federal law.
25. No. E2022000699, 2022 N.Y. Mis. LEXIS 8394 (N.Y. Dec. 7, 2022).
26. N.Y. Env't Conserv. Law §§1-0101, 3-0101.
27. *See* Katherine Tully-McManus, *John Lewis, Civil Rights Hero and "Conscience of Congress," Dies at 80*, Roll Call (July 18, 2020), https://rollcall.com/2020/07/18/john-lewis-civil-rights-hero-and-conscience-of-congress-has-died/.
28. According to Steve Lerner, "sacrifice zones" are often "fenceline communities" of low-income and people of color; or "hot spots" of chemical pollution where residents live immediately adjacent to heavily polluted industries or military bases. Steve Lerner, Sacrifice Zones: The Front Lines of Toxic Chemical Exposure in the United States (2010).
29. *See* Barry E. Hill, *Sacrifice Zones*, 38 Env't F. 26 (2021).
30. N.Y. Env't Conserv. Law art. 48 (2020) (§§48-0101 to 48-0113), *available at* https://law.justia.com/codes/new-york/2020/env/article-48/.
31. The 17 members are appointed as follows: seven appointed by the governor; four appointed by the Senate majority leader; four appointed by the speaker of the Assembly; one appointed by the minority leader of the Senate; and one appointed by the minority leader of the Assembly.
32. N.Y. Env't Conserv. Law §48-0101, ¶ 1.

pollution or bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal or commercial operations, or the execution of federal, state, local, and tribal programs and policies."[33]

Among other things, the environmental justice law requires DEC to examine closely the cumulative pollution burdens that a neighborhood would face before granting any permits for facilities to operate in that community. Moreover, the law prohibits DEC from carrying out any actions or approving any permits that might cause or contribute to a "disproportionate or inequitable" pollution burden on a community that has a large percentage of minority or low-income residents, who are economically distressed, or who are already experiencing high rates of pollution.

C. *Climate Change Laws*

The Inflation Reduction Act is a $750-billion piece of legislation that addressed healthcare and tax reform. However, nearly $350 billion in spending in the Act is earmarked for EVs, clean energy, carbon removal, environmental justice, and nature protection.[34] The Act seeks to drive a 40% reduction in U.S. carbon emissions by 2030, as compared to 2005 levels. Unquestionably, the success of the Act will be underpinned by a secure supply of minerals (copper, iron, aluminum, and rare earths) required for the clean energy technologies it promotes. According to an October 3, 2022, article titled "What's in the Inflation Reduction Act for Miners?":

> The act names 50 "applicable critical minerals" for the energy transition in section 45X(c)(6). Most of these will hold few surprises for miners; the list includes battery metals cobalt and lithium, as well as several other s-block metals such as caesium and beryllium. The list also specifies almost all rare earths metals, including neodymium, which is used in powerful turbine magnets.
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> Aluminium, tin, nickel, graphite, and chromium also make the cut, with the US apparently eager to enshrine its new mineral priorities into law.
>
> Mining companies excavating these metals will be able to seek production credit equal to 10% of production costs. The extracted minerals must meet defined purity thresholds to qualify for the credit, as laid out in the act.[35]

And the EV tax credits are only applicable if a percentage of the lithium-ion battery minerals are sourced or processed in the United States or by one of its free trade agreement partners. The author continued in his thoughtful article:

> Manufacturers of EVs will be able to apply for a tax credit if their vehicles meet minimum amounts of US-manufactured components. For miners, this indirectly creates a market for battery metals from US-allied countries.
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> Page 386 of the act specifies the minimum thresholds of minerals contained in US-manufactured EV batteries to qualify for the tax credit. After passage of the act, at least 40% of critical minerals in US-made EV batteries must come [from] US miners or recycling plants, or mines in countries with free trade deals with the US.
>
> This requirement will then rise by 10% each calendar year, to a maximum of 80% in 2027.
>
> The act also sets minimum percentages for the value of battery components sourced from North America required for a project to receive tax credits. Before 2024, at least 50% of the value of a US-made battery's components must come from North America. This rises to 60% in 2024 and 2025, 70% in 2026, and then 10% more each year until reaching 100% in 2029.
>
> Representatives of the car manufacturing industry have criticised [sic] the credit for its high thresholds. After the bill passes, only 21 models of the electric vehicle will qualify for the subsidy, out of 72 available EV models. When criteria increase at the end of 2022, some of these will likely become ineligible, and while the impacts on the automotive industry more broadly are unclear, this rising threshold could push domestic mines to increase production in the short-term.[36]

This combination of trade and geopolitical considerations excludes important reserves from the tax credits, such as Indonesia's nickel or Argentina's lithium. Moreover, the lithium-ion batteries cannot be sourced, processed, or recycled in a "foreign country of concern," such as China, which houses nearly 60% of the world's lithium processing capacity. In short, the industry of making batteries is primarily in Asia, whereas the U.S. domestic supply chain is in its infancy.[37]

Meanwhile, on July 18, 2019, New York enacted Senate Bill S6599, the Climate Leadership and Community

33. N.Y. Env't Conserv. Law §48-0101, ¶ 2.
34. Moreover, the bipartisan Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, 135 Stat. 429 (2021), committed billions of dollars to research, development, and demonstration for EVs and critical minerals funding: $7 billion was allocated to fund improvements in the nation's battery supply chain; $320 million was the amount of funding allocated for critical minerals mapping; and $140 million was the amount committed for funding the nation's first rare element and critical minerals extraction and separation refinery.
35. Matt Farmer, *What's in the Inflation Reduction Act for Miners?*, Mining Tech. (Oct. 3, 2022), https://www.mining-technology.com/analysis/whats-in-the-inflation-reduction-act-for-miners/.
36. *Id.*
37. *See* Li-Bridge, Building a Robust and Resilient U.S. Lithium Battery Supply Chain (2023), https://naatbatt.org/wp-content/uploads/2023/02/Final-ACCESS_Li-Bridge-Industry-Report_pages_R6-for-print-1.pdf. In early 2022, DOE identified and brought together the leading experts in lithium-ion battery technology from across the industry in a project called Li-Bridge. The purpose of Li-Bridge is to develop a strategy for establishing a robust and sustainable supply chain for lithium-ion battery technology in North America. Li-Bridge is a public/private partnership.

Protection Act. This law became effective on January 1, 2020, and represented the most ambitious and comprehensive climate and clean energy legislation by any state in the United States. The law sets forth the following directives[38]:

- 40% reduction in greenhouse gas emissions from 1990 levels by 2030
- 85% reduction in greenhouse gas emissions from 1990 levels by 2050
- Net-zero emissions statewide by 2050
- 100% zero emission electricity by 2040
- 70% renewable energy by 2030
- Requires the state to install
  - 9,000 megawatts of offshore wind energy by 2035
  - 6,000 megawatts of solar energy by 2025
  - 3,000 megawatts of energy storage by 2030

In sum, it represents how New York will reduce greenhouse gas emissions and achieve zero emissions and increase renewable energy usage.

Moreover, the law ensures that frontline and otherwise underserved communities benefit from the state's historic transition to cleaner, greener sources of energy, reduced pollution and cleaner air, and economic opportunities. The law requires that the state invest or direct resources in a manner designed to ensure that disadvantaged communities receive at least 35%, with the goal of 40%, of overall benefits of spending. Thus, there is a strong focus on disadvantaged communities in that the legislation includes a just transition to a low-carbon economy for disadvantaged communities. The law established a Climate Justice Working Group, which is responsible for developing criteria to identify disadvantaged communities to ensure frontline communities benefit from the state's clean energy transition.

Finally, the law established a Climate Action Council to develop New York's Scoping Plan, which was issued on December 19, 2022.[39] The Climate Action Council worked closely with the Climate Justice Working Group to ensure that the state's transition to a low-carbon, clean energy economy addressed the health, environmental, and energy burdens that disproportionately impacted disadvantaged communities.

II. The Need for a Resurgence of Mining in Indian Country

As stated above, the geologic reality is that many of the minerals that will be sought for supporting electrifying the United States' transportation grid and making EVs are located on Native American lands. Per a March 2022 National Public Radio (NPR) report:

> VICKY PEACEY: The world is making a transition, and the world wants to make a transition quickly, right? And the Biden administration has these very ambitious goals so we can address climate.
>
> KIRK SIEGLER: This is Vicky Peacey in Rio Tinto's Phoenix headquarters. The company has been trying to develop its Resolution Copper mine near here for more than two decades. Lately, copper is in high demand. Think electric vehicle batteries. And with global supply chain disruptions, they see a window.
>
> PEACEY: To have a domestic source of copper that could help fuel the low carbon economy in this energy transition, I think, is really important.
>
> SIEGLER: Peacey says the mine would meet up to a quarter of current U.S. copper demand, and the tribes will benefit. But as opponents point out, the ore would be exported for processing. Large amounts of water would also be needed in one of the hottest places in the world, only getting drier with climate change.
>
> ***
>
> SIEGLER: Members of the San Carlos Apache Tribe marched through the town of Globe, Ariz., near Oak Flat, where the mine is planned. It's a 45-mile march and run from their isolated reservation to their ancestral land of Oak Flat, an important ceremonial site. Twenty-two-year-old Naelyn Pike worries the war in Ukraine will be used as an excuse to fast-track the mine.
>
> NAELYN PIKE: If you're going to say you're going to go green, then do things that are green. And by doing the largest copper mine in North America, extracting it the most detrimental way to harm our environment, that's telling you that's not going green at all.
>
> SIEGLER: The tribes are behind a legal challenge to halt a federal land swap passed during the Obama administration that allows the copper mine to finally be developed. Western Apaches say the U.S. government has broken treaties meant to protect their sacred lands.
>
> ***
>
> President Biden is in a bind. He's promised a transition to cleaner fuels but also pledged to right the wrongs in Indian Country. He recently ordered more tribal consul-

38. DEC, *Climate Change Statutes, Regulations, and Policies*, https://www.dec.ny.gov/energy/126504.html (last visited Feb. 11, 2023).
39. New York State, *Climate Act—New York's Scoping Plan*, https://climate.ny.gov/resources/scoping-plan/ (last visited Feb. 11, 2023).

> tation on the Arizona land swap. A federal appeals court is expected to rule on the tribe's challenge to the mine any day now.[40]

Although the raw metals lie on land considered sacred to Native Americans, the demand for these metals may be too great. According to Samuel Block, vice president of ESG Research:

- Many of the remaining untapped deposits of the metals critically needed for U.S. energy to transition from fossil fuels are located either near or within areas of cultural and environmental importance to Native Americans.

- Among these key energy-transition metals, 97% of nickel, 89% of copper, 79% of lithium and 68% of cobalt reserves and resources in the U.S. are located within 35 miles of Native American reservations.

- Mining companies have already faced opposition to mine development in many of these areas, reflecting the heightened risk to companies and investors arising from these conflicting priorities.

  With the Biden administration seeking to slash U.S. greenhouse-gas emissions and support a rapid move to electric vehicles and renewable-energy technology, many investors are looking closely at the metals needed in new energy technologies. Copper is one key metal, and its demand may rise as much as 350% by 2050, according to one estimate. For investors looking through an ESG [environmental, social, and governance] lens, however, not all metal mines are created equal or pose the same risks. Some mining projects, while providing metals key to addressing the global challenge of transitioning away from fossil fuels, may face strong and increasing opposition from Native Americans for threatening sacred areas or traditional ways of life.[41]

The Biden Administration recently faced considerable opposition from the Paiute and Shoshone tribes in federal court in Reno over the proposed $1.2 billion Lithium Nevada mining project in northern Nevada on 5,700 acres of federal government land, which would require 1,000 people to build and 200 people to operate near Thacker Pass, about 25 miles south of the Oregon border.[42] According to one report:

> BLM [Bureau of Land Management] fast-tracked the project's approval during the final days of the [Donald] Trump administration in 2021. The Biden administration continues to embrace the mine as part of the president's "clean" energy agenda intended to combat climate change.
>
> Demand for lithium is expected to triple by 2030 from 2020, and Lithium Nevada says its project is the only one on the drawing board that can help meet the demand.[43]

And per another report: "Over its 41-year projected lifespan, Lithium Nevada expects the Thacker Pass mine to generate up to 80,000 tons of lithium carbonate a year—equal to roughly a fifth of global lithium production in 2020."[44]

If approved, the Thacker Pass mine will be America's largest lithium mine, but according to Arlan Melendez, chair of the Reno-Sparks Indian Colony, a tribe in Nevada whose members have cultural ties to Thacker Pass: "Annihilating old growth sagebrush, Indigenous peoples' medicines, food, and ceremonial grounds for electric vehicles isn't very climate conscious."[45]

In the litigation brought by nearby indigenous communities, environmental groups, and a local rancher, Chief U.S. District Court Judge Miranda M. Du refused twice to grant temporary injunctions sought by the tribal leaders who argued that the proposed mine was on sacred land, citing the cultural, historical, and spiritual significance of the land, as well as concerns over environmental impacts, and a lack of tribal consultation.[46] The trial took place in January 2023, before Chief Judge Du, whose ruling was issued on February 6.[47] She upheld BLM's approval of the largest lithium mine in the United States which, consequently, will help the nation's transition away from gasoline-powered cars by giving automakers a domestic supply of lithium needed for the batteries of EVs.[48] Further, in an Order dated February 24, Chief Judge Du refused to issue an injunction to halt the construction of the Thacker Pass mine, determining that the challengers "failed to make a

40. Kirk Siegler, *Raw Materials Needed for Energy Have Been Found on Native Americans' Sacred Land*, NPR (Mar. 17, 2022), https://www.npr.org/2022/03/17/1087137564/raw-materials-needed-for-energy-have-been-found-on-native-americans-sacred-land.
41. Samuel Block, *Mining Energy-Transition Metals: National Aims, Local Conflicts*, MSCI (June 3, 2021), https://www.msci.com/www/blog-posts/mining-energy-transition-metals/0231033947 (citations omitted).
42. Bert Johnson, *Past, Future Collide in Dispute Over Northern Nevada Lithium Mine*, KNPR's State Nev. (Aug. 26, 2021), https://knpr.org/show/knprs-state-of-nevada/2021-08-26/past-future-collide-in-dispute-over-northern-nevada-lithium-mine.
43. Associated Press, *Biden's Agenda, Lithium Mine, Tribes, Greens Collide in Reno*, E&E News (Jan. 5, 2023), https://subscriber.politicopro.com/article/eenews/2023/01/05/bidens-agenda-lithium-mine-tribes-greens-collide-in-reno-00076536.
44. Maddie Stone, *Native Opposition to Nevada Lithium Mine Grows*, Grist (Oct. 28, 2021), https://grist.org/protest/native-opposition-to-nevada-lithium-mine-grows/.
45. *Id.*
46. *See* Bartell Ranch LLC v. McCullough, No. 3:21-cv-00080-MMD-CLB, 2022 U.S. Dist. LEXIS 33542 (D. Nev. Jan. 13, 2022); Bartell Ranch LLC v. McCullough, 558 F. Supp. 3d 974 (D. Nev. 2021).
47. Bartell Ranch LLC v. McCullough, No. 3:21-cv-00080-MMD-CLB, 2023 U.S. Dist. LEXIS 19280, 53 ELR 20023 (D. Nev. Feb. 6, 2023).
48. *See* David Ferris, *Battery Industry to Uncle Sam: We Still Need Help*, E&E News (Feb. 21, 2023), https://subscriber.politicopro.com/article/eenews/2023/02/21/battery-industry-to-uncle-sam-we-still-need-help-00083510. *See also* Hannah Northey, *Ford to Build EV Battery Plant in Michigan, Use Chinese Tech*, E&E News (Feb. 13, 2023), https://www.eenews.net/articles/ford-to-build-ev-battery-plant-in-michigan-with-chinese-partner/.

clear showing of entitlement to the extraordinary remedy of an injunction pending appeal."[49]

III. Uranium Ore Mining Operations on the Navajo Nation

In Act 2, Scene 1 of the play *The Tempest*, William Shakespeare (1564-1616) wrote: "What's past is prologue." In contemporary use, the phrase stands for the idea that history sets the context for the present.[50]

Briefly stated, uranium mining operations started with the increased demand for atomic weapons after World War II:

> Almost a year after World War II ended, Congress established the United States Atomic Energy Commission to foster and control the peacetime development of atomic science and technology. Reflecting America's postwar optimism, Congress declared that atomic energy should be employed not only in the Nation's defense, but also to promote world peace, improve the public welfare, and strengthen free competition in private enterprise. After long months of intensive debate among politicians, military planners and atomic scientists, President Harry S. Truman confirmed the civilian control of atomic energy by signing the Atomic Energy Act on August 1, 1946.[51]

Although the federal government was the sole purchaser of uranium by way of the Atomic Energy Commission through 1966, commercial sales would lead to private entities overwhelming the uranium-rich 27,000-square-mile Navajo Nation such that, according to EPA, more than 500 abandoned uranium mines (AUMs) are on the Navajo Nation.[52] Although the last uranium mine was closed in 1986, between 1944 and 1986, nearly 30 million tons of uranium ore were extracted.[53] The Cyprus Amax Minerals Company and the Western Nuclear, Inc. mines were in operation from the 1940s to 1985. According to EPA, many Navajo people worked in the mines, often living and raising families near the mines and mills. Adverse health effects include lung cancer from the inhalation of radioactive particles, as well as bone cancer and impaired kidney function from exposure to radionuclides in drinking water.[54]

The Navajo suffered tremendously from exposure to uranium radiation.[55] The extent of the adverse health impacts was also captured by NPR:

> The federal government is cleaning up a long legacy of uranium mining within the Navajo Nation—some 27,000 square miles spread across Utah, New Mexico and Arizona that is home to more than 250,000 people.
>
> Many Navajo people have died of kidney failure and cancer, conditions linked to uranium contamination. And new research from the CDC [Centers for Disease Control and Prevention] shows uranium in babies born now.
>
> Mining companies blasted 4 million tons of uranium out of Navajo land between 1944 and 1986. The federal government purchased the ore to make atomic weapons. As the Cold War threat petered out the companies left, abandoning more than 500 mines.
>
> Maria Welch is a field researcher with the Southwest Research Information Center, which is working with the federal Centers for Disease Control and Prevention and state and local groups to gauge the impacts of uranium on Navajo families today. She surveys Navajo families for the Navajo Birth Cohort Study, which has 599 participants so far.
>
> On a recent day in Flagstaff, Ariz., she asks a mother about feeding practices for her baby. Forty percent of the tribe lacks running water. Welch learns that the mother mixes baby formula with tap water.
>
> One of the study's findings: 27 percent of the participants have high levels of uranium in their urine, compared to 5 percent of the U.S. population as a whole.
>
> ***
>
> The U.S. Justice Department has recently gone after some of the mining companies. Since 2008, the Environmental Protection Agency has hauled away thousands of cubic yards of mine waste and has rebuilt nearly 50 contaminated homes, says EPA Regional Administrator Jared Blumenfeld. But there's still much more to be done.
>
> "We're spending a lot of time making sure that the polluters pay, so it isn't the federal taxpayer," he says.

49. Bartell Ranch LLC v. McCullough, No. 3:21-cv-00080-MMD-CLB, 53 ELR 20033 (D. Nev. Feb. 24, 2023).
50. The full quotation is by the character Antonio who says: "Whereof what's past is prologue; what to come, in yours and my discharge." William Shakespeare, The Tempest act 2, sc. 1, *available at* http://shakespeare.mit.edu/tempest/full.html.
51. *See* Alice Buck, DOE, The Atomic Energy Commission (1983), https://www.energy.gov/sites/prod/files/AEC%20History.pdf.
52. *See* U.S. EPA, *Navajo Nation: Cleaning Up Abandoned Uranium Mines*, https://www.epa.gov/navajo-nation-uranium-cleanup/abandoned-mines-cleanup (last updated Jan. 11, 2023).
53. *Id.*
54. *Id.*
55. *See also* Yvette Cabrera, *Radioactive Waste Sickened His Community. Then It Caught Up With Him*, High Country News (Dec. 2, 2022), https://www.hcn.org/articles/pollution-radioactive-waste-sickened-his-community-then-it-caught-up-with-him; Mark Olalde & Maya Miller, *A Uranium Ghost Town in the Making*, ProPublica (Aug. 8, 2022), https://www.propublica.org/article/new-mexico-uranium-homestake-pollution; Miacel Spotted Elk, *Two Southwest Tribes Raise Concerns Over Uranium Storage*, High Country News (May 10, 2022), https://www.hcn.org/articles/indigenous-affairs-pollution-two-southwest-tribes-raise-concerns-over-uranium-storage.

> One company, Anadarko Petroleum, and its subsidiary Kerr-McGee recently paid $1 billion to the Navajo Nation for cleanup and as compensation to people living with the effects of uranium contamination.
>
> But one-third of the mining companies have shut down or have run out of money. The federal government knew about some of the dangers decades ago, but only started the cleanup in recent years.
>
> ***
>
> And the uranium issue on the Navajo Nation is part of a much bigger problem. Across the western United States there are more than 160,000 abandoned hardrock mines—thousands of which continue to pollute.[56]

It has taken the federal government and mining corporations nearly five decades to address the long-standing health and environmental issues impacting those who worked and lived near the mines in dangerous proximity to radioactive materials. EPA, the Bureau of Indian Affairs (BIA) of the U.S. Department of the Interior, DOE, the Department of Health and Human Service's Indian Health Service, and the Nuclear Regulatory Commission have collaborated to address contamination on the Navajo Nation, investing $130 million since 2008.[57] EPA created a list of 46 "priority mines" for cleanup, 10 included in the *United States v. Cyprus Amax* settlement.

The *Cyprus Amax* settlement will address 94 mines on the Navajo Nation reservation—almost 20% of the Navajo Nation's AUMs. The work is subject to oversight by EPA, in collaboration with the Navajo Nation EPA. Through the settlement, the federal government will pay for a portion of all costs through a $335 million trust fund; however, the total cost of remediation is approximately $600 million with work to be performed over many years, including detailed assessments of mines to evaluate for cleanup.

On April 30, 2005, then-Navajo Nation President Joe Shirley Jr. signed into law the Diné[58] Natural Resources Protection Act,[59] which banned uranium mining and processing on Navajo Nation land. At the signing ceremony, he said:

> As long as there are no answers to cancer, we shouldn't have uranium mining on the Navajo Nation. . . . I believe the powers that be committed genocide on Navajo land by allowing uranium mining. . . . I don't want to subject any more of my people to exposure, to uranium and the cancers that it causes. I believe we reinforced our sovereignty today.[60]

IV. EPA's Troubled Enforcement of CERCLA on the Navajo Nation

The AUMs on the Navajo Nation were established as a Superfund site in 1994 in response to a congressional hearing initiated by the Navajo Nation on November 4, 1993. This hearing included EPA, DOE, and BIA. Nearly four years after the congressional hearing, EPA announced its first helicopter survey of the AUMs in September 1997. On June 9, 2008, EPA announced its five-year plan for the cleanup of uranium contamination on the Navajo Nation.[61] This five-year plan contained nine specific objectives for 2008-2012.

On May 13, 2011, however, the Eastern Navajo Diné Against Uranium Mining (ENDAUM), a group representing Navajo communities, filed its final petition[62] with the Inter-American Commission on Human Rights (IACHR)[63] based in Washington, D.C. The ENDAUM argued that when the U.S. government sanctioned uranium mining on Navajo Nation land, it violated Article I (right to life and personal security), Article XI (right to health and well-being), Article XIII (right to the benefits of culture), and Article XXIII (right to property) of the American Declaration of the Rights and Duties of Man. The petition stated:

> The Navajo Nation hosts 520 abandoned uranium mine sites and three uranium mill sites that are Superfund sites. These sites are the source of contamination for tens of millions of gallons of groundwater and countless acres of land.
>
> These sites are also the cause of significant illnesses and death in the indigenous communities located nearby. Exposure to uranium and its decay products causes an array of adverse health effects, from kidney disease to birth defects to cancer. In New Mexico, a disproportionate number of unremediated uranium mine sites are located on lands traditionally used and occupied by the Navajo. Additionally, a disproportionate amount of pol-

56. Laurel Morales, *For the Navajo Nation, Uranium Mining's Deadly Legacy Lingers*, NPR (Apr. 10, 2016), https://www.npr.org/sections/health-shots/2016/04/10/473547227/for-the-navajo-nation-uranium-minings-deadly-legacy-lingers.
57. Alysa Landry, *Navajo Nation Abandoned Uranium Mines Cleanup Gets $600 Million*, Indian Country Today (Sept. 13, 2018), https://indiancountrytoday.com/archive/navajo-abandoned-uranium-mines-600-million.
58. The Indigenous people of the Navajo Nation refer to themselves as Diné. Diné is the word for Navajo in the traditional Navajo language.
59. Resolution of the Navajo Nation Council, an Act Relating to Resources, and Diné Fundamental Law; Enacting the Diné Natural Resources Protection Act of 2005; Amending Title 18 of the Navajo Nation Code (Apr. 29, 2005), https://www.nrc.gov/docs/ML0723/ML072340482.pdf.
60. Press Release, Navajo Nation, Navajo Nation President Joe Shirley Jr. Signs Diné Natural Resources Protection Act of 2005 (Apr. 30, 2005), https://www.nrc.gov/docs/ML0723/ML072340429.pdf.
61. U.S. EPA Region 9, *Addressing Uranium Contamination on the Navajo Nation*, https://archive.epa.gov/region9/superfund/web/html/5-yr-plan-2008.html (last updated Feb. 21, 2016).
62. Petition by ENDAUM et al. on Their Own Behalf Against the United States of America (Petition 654-11) (May 13, 2011), https://nmelc.org/wp-content/uploads/2021/07/endaum_final_petition_with_figures-1.pdf.
63. The mission of the Organization of American States (OAS) is to promote and protect human rights in the American hemisphere. The IACHR is a principal and autonomous organ of the OAS that receives, analyzes, and investigates individual petitions alleging violations of specific human rights protected by the American Convention on Human Rights. OAS, *What Is the IACHR?*, https://www.oas.org/en/IACHR/jsForm/?File=/en/iachr/mandate/what.asp (last visited Feb. 11, 2023).

> lution from uranium mill sites occurs in Navajo communities. Consequently, the Navajo bear a disproportionate number of health problems that are a direct result of the State's past and ongoing acts and omissions.
>
> Despite the ongoing public health and environmental crises that have resulted from the State's failure to reasonably regulate the uranium mining and milling industry in the past, the State continues to license uranium operations that it acknowledges will contaminate natural resources within the Navajo Nation.[64]

On March 28, 2021, the IACHR issued Report No. 67/21[65] and determined that the case against the U.S. government was admissible, and notified the parties that it will schedule a merits hearing.

Unlike other federal pollution control statutes that allow tribes to seek treatment as a state, CERCLA automatically treats tribes as states (42 U.S.C. §9626(a)). EPA, however, retains primary enforcement authority under CERCLA for sites within the jurisdiction of Indian tribes. The Agency, unfortunately, has had a troubled history in enforcing CERCLA in Indian Country in general, and on the Navajo Nation land in particular, because of, among other things, poor consultation with tribes.

Tribal consultation is mandated throughout CERCLA's remediation process. The government-to-government consultation is a separate requirement from community involvement, which is also mandatory under CERCLA. Since 1984, EPA's policy has been to work directly with tribal governments on a one-to-one, government-to-government basis.[66] This initial policy suggested that to comply with the federal trust responsibility, the Agency addresses tribal concerns and interests whenever its actions might affect reservation environments in that:

> EPA recognizes that a trust responsibility derives from the historical relationship between the Federal Government and Indian Tribes as expressed in certain treaties and Federal Indian Law. In keeping with that trust responsibility, the Agency will endeavor to protect the environmental interests of Indian Tribes when carrying out its responsibilities that may affect the reservations.[67]

In Executive Order No. 13175 (2000), Consultation and Coordination With Indian Tribal Governments, the U.S. government continues to recognize the government-to-government relationship, requiring federal agencies to obtain meaningful and timely input from tribal officials regarding regulatory policies or actions that have tribal implications.[68]

Statutory mandates for consultation requirements are unfortunately vague, but have been somewhat clarified through agency guidance such as the May 4, 2011, *EPA Policy on Consultation and Coordination With Indian Tribes*.[69] This guidance, however, does not have the force of law. According to EPA's policy guidance regarding working with tribal governments at CERCLA sites, consultation requires "meaningful and timely" communications between the Agency and tribal government officials when developing actions that impact tribes. This should include information-sharing, the review of tribal views, consideration of tribal views in decisionmaking, and respect for tribal self-governance and sovereignty. Consultation is also intended to occur early enough in the remediation process for EPA to consider the input and communicate the outcome.

Tribal participation in the remediation process has proven unsatisfactory. Effective tribal participation in the remediation program has developed in fits and starts over the past 40 years since CERCLA was enacted in 1980, and the 1986 amendments clarified the roles of tribal governments and formally recognized that tribes are natural resource trustees. However, according to a thoughtful 2007 article by the director of the Eight Northern Indian Pueblos Council Environment Department:

> EPA/OSWER [Office of Solid Waste and Emergency Response] has begun to take some steps to address shortcomings regarding tribal government roles in Superfund. In 2006, OSWER published its first strategy for including tribal programs in the Superfund processes. EPA/OSWER is preparing to release its *Beginner's Guide for Working With Tribes at Superfund Sites*. While such steps are being taken late in the game, there remains much work to be done under CERCLA. Twenty-six years after CERCLA was enacted, and twenty years after it was amended to treat tribes as states, contaminated sites still exist and uncontrolled releases still occur. Tribal governments must have opportunities to participate in cleanup and restoration decisions.[70]

Undoubtedly, the Agency has had problems enforcing CERCLA on the Navajo Nation. The question is whether EPA's intention to use AI and machine learning (ML) will improve its enforcement record for future mining projects in Indian Country. The Agency has already announced that it is using AI in the targeting of inspections, as follows: "EPA's Office of Compliance, in partnership with the University of Chicago, built a proof-of-concept to improve enforcement of environmental regulations through facility inspections by the EPA and state partners. The resulting

64. Petition by ENDAUM et al., *supra* note 62.
65. IACHR, Report No. 67/21, Petition 654-11 Admissibility: Navajo Communities of Crownpoint and Church Rock, United States of America (2021), https://www.oas.org/en/iachr/decisions/2021/USAD654-11EN.pdf.
66. *See* U.S. EPA, EPA Policy for the Administration of Environmental Programs on Indian Reservations (1984), https://www.tribalconsultation.arizona.edu/docs/EPA/EPA%20Policy%20Admin%20Enviro%20Programs%20on%20Reservations.1984.pdf.
67. *Id.*
68. Exec. Order No. 13175, Consultation and Coordination With Indian Tribal Governments, 65 Fed. Reg. 67249 (Nov. 9, 2000).
69. U.S. EPA, EPA Policy on Consultation and Coordination With Indian Tribes (2011), https://www.epa.gov/sites/default/files/2013-08/documents/cons-and-coord-with-indian-tribes-policy.pdf.
70. *See* Lisa Gover, *Twenty Years Later—Tribes and the Superfund Program*, 21 Nat. Res. & Env't 48 (2007).

predictive analytics showed a 47% improvement of identifying violations of the Resource Conservation and Recovery Act."[71]

EPA and its enforcement partners (state and local government regulators) are exploring how mobile inspections, remote inspections, unmanned aerial systems, AI and ML, and integrated solutions can serve as force multipliers for the environmental enforcement community. A February 2022 study argued:

> Today, inspections are routinely scheduled as a result of evidence of a possible violation, in response to a citizen or employee complaint, or due to other factors such as time elapsed since last inspection. A risk-based, data-driven model, powered by AI could replace, or augment, this reactive approach.
>
> Tapping into the wealth of information available in past inspection reports, photos and videos, satellite images and sensor data, enforcement agencies could apply AI and ML to identify trends and prioritize inspection activities according to risk. By combining data from various sources—such as air sensor data and satellite imagery—inspectors can proactively identify potential non-compliance that requires human follow-up. AI-based complexity scoring can assist agencies in assigning the most appropriate personnel to a given inspection or investigation.[72]

As the Agency moves forward in exploring the use of AI and ML with respect to enforcement and compliance, EPA must consider, as discussed in these pages, that:

> [m]istaken evaluations of a data set's or variable's relevance or reliability can result in AI systems that produce discriminatory results; they can also produce results that are more broadly inconsistent with the values of developers, users, stakeholders, or members of the community—for instance, with the value of environmental conservation. Mistakes can arise because of a
>
> - lack of diversity on development teams;
> - failure to train the AI system on broad, representative data sets;
> - failure to consult users and stakeholders throughout the development process;
> - limited testing; and/or
> - failure on the part of development teams to consider, at the outset of the development process, whether the data, variables, decision parameters, and so on, that they have identified are implicitly discriminatory, biased, or incomplete in some way.[73]

The authors went on to state, as an example:

> Because Black Americans have much lower levels of family and intergenerational wealth than white Americans, the burdens of relocation will not only be racially distributed, but will also fall on those less able to afford them. Thus, a superficially race-neutral climate adaptation decision support system could easily fuel racially discriminatory policy, with huge environmental and racial justice consequences—all because developers and stakeholders did not adequately interrogate the relevance and reliability of data sets, variables, and decision rationales.
>
> Public awareness of discriminatory bias by AI systems is growing and the legal community is taking note, especially in criminal contexts. However, there is still little discussion of the role that *environmental values* should play in the decisionmaking and decision-supportive AI systems that will become ubiquitous in our everyday life.[74]

A March 2021 article[75] pointed out how EPA was embracing ML and engaged academic research labs to test its use in support of an important national initiative to reduce Clean Water Act (CWA)[76] violations. The authors evaluated prototypical risk prediction models that could support compliance interventions and demonstrate how critical algorithmic design choices can generate or mitigate disparate impacts in environmental enforcement. The study illustrated that as ML enters the federal government's enforcement operations, algorithmic design can both embed and elucidate sources of administrative policy discretion with discernable distributional consequences.

In sum, unless great care is taken early in developing these algorithms, there is the real probability of discriminatory bias in the context of CERCLA enforcement of future mining operations in Indian Country. There have already been, unfortunately, credible examples of discriminatory bias by AI systems in a variety of instances in American society, as compiled below.[77]

V. EV Batteries as E-Waste

According to the well-respected German company Statista, a leading provider of market and consumer data, e-waste is discarded electronic devices with a battery or plug that are no longer wanted, not functional, or obsolete. There are six main categories of e-waste:

71. U.S. EPA, *EPA Artificial Intelligence Inventory*, https://www.epa.gov/data/epa-artificial-intelligence-inventory (last updated Dec. 8, 2022).
72. Greg Slusher & Vivek Mehta, *5 Technologies to Improve Environmental Regulatory Enforcement*, GCN (Feb. 25, 2022), https://gcn.com/state-local/2022/02/5-technologies-improve-environmental-regulatory-enforcement/362473/.
73. Henry Gunther & Julietta Rose, *Governing AI: The Importance of Environmentally Sustainable and Equitable Innovation*, 50 ELR 10888 (Nov. 2020).
74. *Id. See also* Gabbrielle M. Johnson, *Are Algorithms Value-Free? Feminist Theoretical Virtues in Machine Learning*, J. Moral Phil. (Special Issue) (forthcoming); Aaron Roth & Michael Kearns, The Ethical Algorithm: The Science of Socially Aware Algorithm Design (2019).
75. Elinor Benami et al., Presentation at the Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency, The Distributive Effects of Risk Prediction in Environmental Compliance: Algorithmic Design, Environmental Justice, and Public Policy (Mar. 1, 2021), https://dl.acm.org/doi/10.1145/3442188.3445873.
76. 33 U.S.C. §§1251-1387, ELR Stat. FWPCA §§101-607.
77. *See* Appendix to this Article.

- Lamps
- Small information technology and telecom equipment
- Screens and monitors
- Temperature exchange equipment
- Large equipment
- Small equipment

By weight, small equipment accounts for the largest share of e-waste produced and includes products such as microwaves, vacuum cleaners, and kettles. More than 50 million metric tons of e-waste is generated globally every year, averaging some seven kilograms of e-waste per capita.[78]

On October 10, 2022, Statista reported that e-waste generation continues to grow exponentially because rapidly advancing technologies, rising consumer demand for electronics, and shorter product life cycles have made e-waste one of the fastest-growing waste streams in the world. Between 2010 and 2019, e-waste generation increased by roughly 60%, and this growth shows no signs of slowing down. By 2030, annual e-waste production is on track to reach a staggering 75 million metric tons. Asia accounts for almost one-half of global e-waste, with the majority of this produced in China, the world's largest e-waste producer. While Asia generates far more e-waste than other regions in total, it produces almost three times less e-waste per capita than Europe.[79]

Further, Statista reported that with respect to how e-waste is managed, global e-waste is thought to hold roughly $60 billion worth of raw materials such as gold, palladium, silver, and copper. However, just 17% of global e-waste is documented to be collected and properly recycled each year. The fate of the remaining waste is mostly unknown, meaning huge amounts of valuable recoverable raw materials are likely dumped and burned.[80]

Finally, Statista reported that many wealthy countries like the United States deal with their e-waste by exporting large amounts to developing regions that lack proper waste management, such as Africa. Electronics can be composed of toxic substances like mercury, arsenic, and flame retardants, which leach into the environment when not properly managed. This is becoming a growing health and environmental issue, especially in Ghana, where one of the world's largest e-waste sites is located.

To combat hazardous e-waste exports to developing countries, amendments to the Basel Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal,[81] effective since 1992, were agreed upon that will ensure that the transboundary movement of hazardous and nonhazardous e-waste will either be banned or at a minimum require notification by the exporting country and consent by the importing country.[82] The Basel Convention, which was ratified by 98 countries, including the United States, covers toxic, poisonous, explosive, corrosive, ecotoxic, and infectious wastes.

While there is currently no federal law that requires the recycling of e-waste or that prohibits it from being exported to developing countries, the Resource Conservation and Recovery Act (RCRA),[83] does cover some toxic e-waste, including cathode ray tubes (CRTs). RCRA encourages recycling and reuse of used CRTs and CRT glass, and spells out specific requirements for used CRTs and CRT glass exported for reuse and recycling.

Meanwhile, New York has a vibrant e-waste law, the Electronic Equipment Recycling and Reuse Act of 2010,[84] which requires manufacturers to provide free and convenient recycling of e-waste to most consumers in the state. Beginning January 1, 2012, except for individual and household consumers, all other New York State consumers—including businesses, private or public corporations, not-for-profit corporations, government entities, and so on—could not dispose of, or place for a collection intended for disposal, e-waste at a solid or hazardous waste management facility in the state. And since January 1, 2015, the individual and household disposal ban became effective. No entity could dispose of e-waste as trash in New York.

Batteries, including lithium-ion batteries, are included as e-waste, and it is illegal to discard all rechargeable and most single-use batteries in the trash or recycling. Otherwise, the consumer must bring the battery to a special waste drop-off site. Moreover, used vehicle batteries must be recycled in facilities that are properly equipped to handle them. In general, this means a scrap metal facility, a garage, or a local recycling center.

Electric car batteries are recyclable under New York law. Once the materials have been recovered, they can be processed and used in the manufacturing of new lithium-ion batteries.

At the California Environmental Protection Agency, used EV car batteries are considered hazardous waste, according to Caroline Godkin, deputy secretary for environmental policy and emergency response. In fact, California is currently testing the reuse systems to head off the anticipated flood of retired EV batteries.[85]

78. Ian Tiseo, *Global E-Waste—Statistics & Facts*, Statista (Feb. 8, 2023), https://www.statista.com/topics/3409/electronic-waste-worldwide.
79. *Id.*
80. *Id.*
81. U.N. Environment Programme, Basel Convention on the Control of Transboundary Movements of Hazardous Wastes (2011), https://www.unep.org/resources/report/basel-convention-control-transboundary-movements-hazardous-wastes.
82. *Id.* See also the staggering statistics of global e-waste volumes offered by the Arizona-based company Earth911.com. *20 Staggering E-Waste Facts in 2021*, Earth911 (Oct. 11, 2021), https://earth911.com/eco-tech/20-e-waste-facts/.
83. 42 U.S.C. §§6901-6992k, ELR Stat. RCRA §§1001-11011.
84. N.Y. Env't Conserv. Law §§27-2601 to 27-2621, *available at* https://www.dec.ny.gov/docs/materials_minerals_pdf/ewastelaw2.pdf.
85. Thomas Fudge, *California Is Testing Reuse Systems to Head Off Anticipated Flood of Retired Electric Car Batteries*, KPBS (Mar. 3, 2022), https://www.kpbs.org/news/local/2022/03/03/california-is-testing-reuse-systems-to-head-off-anticipated-flood-of-retired-electric-car-batteries.

VI. Conclusion

"The more things change, the more they stay the same"[86] is a famous 1849 quote from Jean-Baptiste Alphonse Karr, a French critic, journalist, and novelist who lived from November 24, 1808, to September 29, 1890.[87] It can be applied to many circumstances, and I have been reflecting on how it could be applied to the legal frameworks of the federal government and state governments regarding environmental rights constitutional amendments, environmental justice laws, and climate change laws, and the overarching issues of environmental justice, climate justice, and sustainable development. I have concluded that, as "laboratories of democracy,"[88] the real action is in the 50 states because they, not the federal government, engineer consistently creative ideas as related to environmental rights, laws, and policy.

To test this conclusion, there have been numerous studies that have highlighted the serious environmental and public health problems of disproportionately impacted minority and/or low-income communities because of air pollution. For example, the authors of a March 9, 2022, EPA-financed study[89] concluded that urban communities that were redlined[90] by federal officials in the 1930s tended to have higher levels of harmful air pollution eight decades later. The authors demonstrated that historically redlined neighborhoods are more likely to have high populations of Black, Latino, and Asian residents than white areas. In short, this study revealed how racist housing policy contributed to enduring inequalities across the United States.

First, unfortunately, there is currently no environmental justice law or implementing regulations at the federal level that could regulate the siting of more pollution-generating facilities in those already disproportionately impacted redlined communities. Although more than 50 environmental justice-related bills have been introduced in Congress since 1992, no Republican has ever co-sponsored an environmental justice bill, and it does not appear that a Republican-controlled House will foster such legislation in the current 118th Congress.[91]

Thus, the federal government must instead rely on presidential executive orders, which do not have the force of law, to address the issue of environmental injustice in those redlined communities. Briefly stated, acting in their capacity as head of the executive branch, presidents have issued signed, written, and published directives in the *Federal Register* directing a federal official or administrative agency to engage in a course of action or refrain from a course of action.[92] Executive orders are enforceable to the extent that they represent a valid exercise of the president's constitutional authority. Moreover, every executive order states categorically that it is not intended to, and does not create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person. Every president since George Washington has issued executive orders.

On February 11, 1994, President William Clinton issued Executive Order No. 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,[93] which directed federal agencies to:

- Identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and/or low-income populations, to the greatest extent practicable and permitted by law.
- Develop a strategy for implementing environmental justice.
- Promote nondiscrimination in federal programs that affect human health and the environment, as well as provide minority and/or low-income communities access to public information and public participation.

86. *Plus ça change, plus c'est la même chose*: "the more things change, the more they stay the same."
87. Wikipedia, *Jean-Baptiste Alphonse Karr*, https://en.wikipedia.org/wiki/Jean-Baptiste_Alphonse_Karr (last edited Oct. 14, 2022).
88. This concept explains how within the federal framework there exists a system of state autonomy where state and local governments act as social laboratories, where laws and policies are created and tested at the state level of the democratic system, in a manner similar (in theory, at least) to the scientific method. Wikipedia, *Laboratories of Democracy*, https://en.wikipedia.org/wiki/Laboratories_of_democracy (last edited Nov. 23, 2022).
89. Haley M. Lane et al., *Historical Redlining Is Associated With Present-Day Air Pollution Disparities in U.S. Cities*, 9 Env't Sci. & Tech. Letters 345 (2022).
90. In the United States, "redlining" can be defined as a discriminatory practice, in which services (credit and insurance, healthcare, and the development of food deserts) are denied from potential customers who reside in neighborhoods classified as "hazardous" to investment; these neighborhoods have significant numbers of racial and ethnic minorities, and low-income residents. As described in a *New York Times* article:

    > Neighborhoods were ranked from least risky to most risky—or from "A" through "D." The federal government deemed "D" areas as places where property values were most likely to go down and the areas were marked in red—a sign that these neighborhoods were not worthy of inclusion in homeownership and lending programs. Not coincidentally, most of the "D" areas were neighborhoods where Black residents lived.
    >
    > Though the maps were internal documents that were never made public by the federal government, their ramifications were obvious to Black homeowners who could not get home loans that were backed by government insurance programs. Usage of the term redlining became more common during the Civil Rights movement, especially in the era leading up to the passage of the Fair Housing Act of 1968, which prohibited housing discrimination, and the Home Mortgage Disclosure Act of 1975, which required the release of lending data.

    Candace Jackson, *What Is Redlining?*, N.Y. Times (Aug. 17, 2021), https://www.nytimes.com/2021/08/17/realestate/what-is-redlining.html.
91. *See* Nico Portuondo, *Republicans Erase "Environmental Justice" From Documents*, E&E News (Feb. 3, 2023), https://www.eenews.net/articles/republicans-erase-environmental-justice-from-documents/.
92. *See What Is an Executive Order?*, Am. Bar Ass'n (Jan. 25, 2021), https://www.americanbar.org/groups/public_education/publications/teaching-legal-docs/what-is-an-executive-order-/.
93. Exec. Order No. 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 59 Fed. Reg. 7629 (Feb. 16, 1994).

This Executive Order also established the Interagency Working Group on Environmental Justice chaired by the EPA Administrator and composed of the heads of 11 departments or agencies and several White House offices.

The 1994 Order was amended by President Biden when he issued on January 27, 2021, Executive Order No. 14008, Tackling the Climate Crisis at Home and Abroad,[94] which created the White House Environmental Justice Advisory Council and the White House Environmental Justice Interagency Council, in addition to the creation of the Justice40 Initiative.[95]

Further, President Biden issued, on January 20, 2021, Executive Order No. 13985, Advancing Racial Equity and Support for Underserved Communities Through the Federal Government,[96] which was designed to combat discrimination and advance equal opportunity, including by redressing unfair disparities and removing barriers to federal government programs and services to underserved communities.

Finally, on February 16, 2023, President Biden signed his second racial equity executive order and issued Executive Order No. 14091, Further Advancing Racial Equity and Support for Underserved Communities Through the Federal Government,[97] which expanded on his Administration's earlier efforts to ensure that federal agencies tackled "systemic racism and persistent poverty." This Executive Order requires agencies to produce annual plans to ensure that underserved communities can benefit from their policies, and also requires agencies to designate senior leaders who are accountable for advancing equity. Moreover, this Executive Order placed the assistant to the president for domestic policy in charge of the new White House Steering Committee on Equity, which will coordinate governmentwide equity initiatives.

Governors have also issued several well-intentioned executive orders in an effort to address the issue of environmental justice in their states. For example, in New Jersey, on January 19, 2004, Gov. James McGreevey issued Executive Order No. 96 to establish a statewide environmental justice policy.[98] On February 5, 2009, Gov. Jon S. Corzine issued Executive Order No. 131, which created the Environmental Justice Advisory Council that was to operate until December 31, 2013.[99] On April 20, 2011, Gov. Chris Christie issued Executive Order No. 60, which established a three-year pilot project to reduce emissions from nonroad diesel-powered equipment used in selected publicly funded state construction projects in urban areas.[100] On April 20, 2018, Gov. Phillip D. Murphy issued Executive Order No. 23, which directed "all of the various departments, agencies, boards, and commissions comprising the Executive Branch of State government [to] consider Environmental Justice in implementing their diverse statutory and regulatory responsibilities."[101]

Realizing, however, the ineffectiveness of executive orders that do not have the force of law, on September 18, 2020, Governor Murphy signed Senate Bill 232 into law,[102] which requires the New Jersey Department of Environmental Protection (NJDEP) to identify the state's overburdened communities and imposes new requirements on permits for certain facilities located within the same census tract as those redlined communities, including facilities that are major sources of air pollution, incinerators, sludge processing facilities, sewage treatment plants, and landfills. On September 20, 2021, NJDEP Commissioner Shawn M. LaTourette issued Administrative Order No. 2021-25,[103] which is designed to provide guidance regarding NJDEP's expectations for facilities located or seeking to be located in overburdened redlined communities prior to the implementation of rules for the new law. NJDEP is in the process of developing regulations and policy to implement the law.[104]

Second, as stated previously, there is no environmental rights amendment to the U.S. Constitution, which is the supreme law of the land. No federal or state law may violate it. Thus, no citizen living in those disproportionately impacted redlined communities could have the constitutional right to clean air, clean land, or clean water enforced by the federal government in any federal court.

Whereas, in addition to the 2021 amendment to the New York Constitution, the following states have amended their constitutions to include environmental rights:

- Illinois: Article XI, §§1 and 2 (1970)
- Pennsylvania: Article I, §27 (1972)
- Montana: Article II, §3 (1972)
- Massachusetts: Article XLIX (1972)
- Hawaii: Article XI, §9 (1978)
- Rhode Island: Article I, §17 (1987)

Further, there is a concerted effort led by the nongovernmental organization Green Amendments for the Generations to sweep the nation to secure a constitutional right to pure water, clean air, a stable climate, and healthy

94. Exec. Order No. 14008, Tacking the Climate Crisis at Home and Abroad, 86 Fed. Reg. 7619 (Feb. 1, 2021).
95. *See* Barry E. Hill, *An Amended Environmental Justice Executive Order Is Not the Answer*, ELI: Vibrant Env't Blog (Feb. 2, 2021), https://www.eli.org/vibrant-environment-blog/amended-environmental-justice-executive-order-not-answer.
96. Exec. Order No. 13985, Advancing Racial Equity and Support for Underserved Communities Through the Federal Government, 86 Fed. Reg. 7009 (Jan. 25, 2021).
97. Exec. Order No. 14091, Further Advancing Racial Equity and Support for Underserved Communities Through the Federal Government, 88 Fed. Reg. 10825 (Feb. 22, 2023).
98. N.J. Exec. Order No. 96 (Jan. 19, 2004), https://nj.gov/infobank/circular/eom96.htm.
99. N.J. Exec. Order No. 131 (Feb. 5, 2009), https://nj.gov/infobank/circular/eojsc131.htm.
100. N.J. Exec. Order No. 60 (Apr. 20, 2011), https://nj.gov/infobank/circular/eocc60.pdf.
101. N.J. Exec. Order No. 23 (Apr. 20, 2018), https://nj.gov/infobank/eo/056murphy/pdf/EO-23.pdf.
102. S.B. 232, 2020-2021 Leg., Reg. Sess. (N.J. 2020), *available at* https://www.nj.gov/dep/ej/docs/ej-law.pdf.
103. N.J. Admin. Order No. 2021-25 (Sept. 20, 2021), https://www.nj.gov/dep/ej/docs/njdep-ao-2021-25-environmental-justice.pdf.
104. *See* NJDEP, *Environmental Justice Law, Rules, and Policy*, https://dep.nj.gov/ej/policy/ (last updated Dec. 28, 2022).

environments, for all people, including future generations, regardless of race, ethnicity, religion, or income:

> The goal of the Green Amendments For The Generations is to advance a Green Amendment movement that sweeps the nation and secures for all people constitutional recognition and protection of their inalienable rights to pure water, clean air, a stable climate and healthy environments. We seek to inspire and support pursuit and passage of self-executing, environmental rights amendments in the Bill of Rights section of every state constitution across the U.S. and ultimately at the federal level. Once accomplished, we will work with communities to ensure their strong and meaningful implementation and enforcement.[105]

The following states have very active campaigns to amend their constitutions: Arizona, Colorado, Connecticut, Delaware, Florida, Iowa, Kentucky, Maine, Maryland, Michigan, New Jersey, New Mexico, Oregon, Vermont, Washington, and West Virginia.[106] Redlined communities will benefit from these environmental rights-amended state constitutions.

Third, in addition to New York, the following states have enacted climate change laws: California,[107] Hawaii,[108] Illinois,[109] Massachusetts,[110] New Mexico,[111] Oregon,[112] Rhode Island,[113] and Washington.[114] Moreover, there are 24 states plus the District of Columbia that have adopted specific greenhouse gas reduction targets to address climate change.[115]

Fourth, there is no federal e-waste law that could control the recycling and reuse or exportation of e-waste to a less wealthy nation. Fortunately, in addition to New York, there are several states that have extensive e-waste and recycling laws, including California,[116] Connecticut,[117] Indiana,[118] Minnesota,[119] Missouri,[120] New Jersey,[121] Oklahoma,[122] Oregon,[123] and Pennsylvania.[124] Currently, there are 19 states and the District of Columbia that have an express landfill or disposal ban on electronic devices.[125]

In sum, New York's Environmental Rights Amendment, its environmental justice law, its climate change law, and its e-waste law, as well as the laws and policies of other states, provide guardrails while the federal government's current legal framework offers little to no banisters for disproportionately affected redlined communities.

Indeed, contrary to the Bible's Ecclesiastes 1:9,[126] there is something "new under the sun" as far as state environmental laws and policies are concerned.

105. Green Amendments for the Generations, *Home Page*, https://forthegenerations.org/ (last visited Feb. 11, 2023).
106. *See* Green Amendments for the Generations, *Active States*, https://forthegenerations.org/active-states/ (last visited Feb. 11, 2023).
107. Global Warming Solutions Act of 2006, A.B. 32, 2013-2014 Leg., Reg. Sess. (Cal. 2014), *available at* https://ww2.arb.ca.gov/resources/fact-sheets/ab-32-global-warming-solutions-act-2006.
108. A Bill for an Act Relating to Greenhouse Gas Emissions, H.B. 226, 24th Leg. (Haw. 2007), *available at* https://www.capitol.hawaii.gov/sessions/session2007/bills/GM1005_.PDF.
109. Climate and Equitable Jobs Act, S.B. 2408, 102d Gen. Assemb. (Ill. 2021), *available at* https://www.ilga.gov/legislation/billstatus.asp?DocNum=2408&GAID=16&GA=102&DocTypeID=SB&LegID=135062&SessionID=110. *See also* Press Release, Office of Illinois Governor Pritzker, Gov. Pritzker Signs Transformative Legislation Establishing Illinois as a National Leader on Climate Action (Sept. 15, 2021), https://www.illinois.gov/news/press-release.23893.html.
110. An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy, 2021 Mass. Acts ch. 8, *available at* https://malegislature.gov/Laws/SessionLaws/Acts/2021/Chapter8.
111. Energy Transition Act of 2019, S.B. 489, 2019 Reg. Sess. (N.M. 2019), *available at* https://www.nmlegis.gov/Legislation/Legislation?Chamber=S&LegType=B&LegNo=489&year=19.
112. Relating to Clean Energy, and Prescribing an Effective Date, H.B. 2021, 2021 Reg. Sess. (Or. 2021), *available at* https://olis.oregonlegislature.gov/liz/2021R1/Measures/Overview/HB2021.
113. 2021 Act on Climate, 42 R.I. Gen. Laws ch. 6.2 (2021), *available at* http://webserver.rilin.state.ri.us/Statutes/TITLE42/42-6.2/INDEX.htm.
114. Climate Commitment Act, S.B. 5126, 67th Leg., 2021 Reg. Sess. (Wash. 2023), *available at* https://lawfilesext.leg.wa.gov/biennium/2021-22/Pdf/Bills/Senate%20Passed%20Legislature/5126-S2.PL.pdf.
115. *See* Center for Climate and Energy Solutions, *State Climate Policy Maps*, https://www.c2es.org/content/state-climate-policy/ (last visited Feb. 11, 2023).
116. Cal. Pub. Res. Code §§42460-42486.
117. Conn. Gen. Stat. §§22a-629 to 22a-640.
118. Ind. Code §§13-20.5-1-1 to 13-20.5-10-2.
119. Minn. Stat. §§115a.1310 to 115a.1330.
120. Mo. Rev. Stat. §§260.1050 to 260.1101.
121. N.J. Rev. Stat. §§13:1E-99.94 to 13:1E-99.114.
122. Okla. Stat. tit. 27A, §§2-11-601 to 2-11-611.
123. Or. Rev. Stat. §§459a.300 to 459a.365.
124. 35 Pa. Cons. Stat. §§6031.101 to 6031.702.
125. *See* ERI, *U.S. Landfill Ban*, https://eridirect.com/sustainability/us-landfill-ban/ (last visited Mar. 1, 2023).
126. According to *Ecclesiastes* 1:9, http://web.mit.edu/jywang/www/cef/Bible/NIV/NIV_Bible/ECC+1.html: "What has been will be again, what has been done will be done again; there is nothing new under the sun."

Appendix

Environmental Law Institute Research Associate Georgia Ray compiled the following "Examples of Discriminatory Bias by AI Systems":

- **Allegheny Family Screening Tool** is a predicative risk modeling tool for child welfare in Allegheny County, Pennsylvania. It uses data to generate a "'Family Screening Score' that predicts the long-term likelihood of future involvement in child welfare."[127] Its stated goal is to link parents to support services before maltreatment occurs. In reality, it has been shown to target poor families.[128] This is not the only child welfare algorithm in place. There was also a report from Broward County, Florida, where a child welfare algorithm led to "more black and Hispanic families . . . being investigated than white families."[129] In that case, datapoints considered in making the algorithm's decision were Medicaid enrollment and other federal assistance programs as well as mental health and substance abuse treatment records. Once a parent is deemed high risk by an algorithm, it is a label that can be hard to overcome.
- **AMZN.O** was an Amazon recruiting algorithm intended to cull the initial pool of applicants to Amazon jobs, indicating who was qualified to proceed to next rounds and interviews. Intended to remove the innate human bias of recruiters, it ended up being biased against women itself.[130] This bias was likely baked into the algorithm as it was trained on previous hiring data where humans had exhibited bias against women. Recruiters had been mostly men. The algorithm downgraded those resumes containing the word "women" and those from two all-women colleges.
- **Beauty.AI** was an algorithm designed to remove subjectivity in the judging of beauty contests. However, it seemed that all the winners had one thing in common: light skin.[131] As *The Guardian* reported, "Out of 44 winners, nearly all were white, a handful were Asian, and only one had dark skin."[132] Again, the problem was identified as the data set. Apparently, the data introduced to the algorithm had not included enough people of color.
- **COMPAS** (Correctional Offender Management Profiling for Alternative Sanctions) is used to predict which criminals are most likely to re-offend. Its results influence sentencing and bail-setting. The core finding of its bias is that "black defendants were far more likely than white defendants to be incorrectly judged to be at a higher risk of recidivism, while white defendants were more likely than black defendants to be incorrectly flagged as low risk."[133] One *Atlantic* headline claims that the algorithm was no better at predicting recidivism than random people.[134]
- **Credit scores** are one thing that AI models hope to automate and optimize. However, as with many of the examples on this list, those automation attempts have been built on flawed data. For lower-income families and people of color, "data is less accurate in predicting creditworthiness for those groups, often because those borrowers have limited credit histories."[135] Structural inequalities contribute to this less accurate data, as lower-income individuals are less likely to have multiple lines of credit.[136] While the automation in this case does not exacerbate that bias (as it has always existed in credit-predicting algorithms), it also does not help combat it.

127. Allegheny County, *The Allegheny Family Screening Tool*, https://www.alleghenycounty.us/Human-Services/News-Events/Accomplishments/Allegheny-Family-Screening-Tool.aspx (last visited Feb. 21, 2023).
128. Elizabeth Brico, *How an Algorithm Meant to Help Parents Could Target Poor Families Instead*, Talk Poverty (Nov. 26, 2019), https://talkpoverty.org/2019/11/26/algorithms-parents-target-low-income/index.html; *Pittsburgh's Child Welfare Agency Goes Full Orwell*, NCCPR Child Welfare Blog (Oct. 7, 2019), https://www.nccprblog.org/2019/10/pittsburghs-child-welfare-agency-goes.html.
129. Elizabeth Brico, *New Algorithms Perpetuate Old Biases in Child Welfare Cases*, Undark (Sept. 20, 2018), https://undark.org/2018/09/20/new-algorithms-perpetuate-old-biases-in-child-welfare-cases/.
130. Jeffrey Dastin, *Amazon Scraps Secret AI Recruiting Tool That Showed Bias Against Women*, Reuters (Oct. 10, 2018), https://www.reuters.com/article/us-amazon-com-jobs-automation-insight/amazon-scraps-secret-ai-recruiting-tool-that-showed-bias-against-women-idUSKCN1MK08G; Cathy O'Neil, *Amazon's Gender-Biased Algorithm Is Not Alone*, Bloomberg (Oct. 16, 2018), https://www.bloomberg.com/opinion/articles/2018-10-16/amazon-s-gender-biased-algorithm-is-not-alone; Maude Lavanchy, International Institute for Management Development, Amazon's Sexist Hiring Algorithm Could Still Be Better Than a Human, https://www.imd.org/contentassets/7bcfa11250bc43c994c4975c50f13f8f/tc061-18-print.pdf.
131. Naomi Appelman, *Racist Technology in Action: Beauty Is in the Eye of the AI*, Racism & Tech. Ctr. (June 10, 2022), https://racismandtechnology.center/2022/06/10/racist-techology-in-action-beauty-is-in-the-eye-of-the-ai/.
132. Sam Levin, *A Beauty Contest Was Judged by AI and the Robots Didn't Like Dark Skin*, Guardian (Sept. 8, 2016), https://www.theguardian.com/technology/2016/sep/08/artificial-intelligence-beauty-contest-doesnt-like-black-people.
133. Jeff Larson et al., *How We Analyzed the COMPAS Recidivism Algorithm*, ProPublica (May 23, 2016), https://www.propublica.org/article/how-we-analyzed-the-compas-recidivism-algorithm; Aria Khademi & Vasant Honavar, *Algorithmic Bias in Recidivism Prediction: A Causal Perspective (Student Abstract)*, 34 Proc. AAAI Conf. on A.I. 13839 (2020), *available at* https://ojs.aaai.org/index.php/AAAI/article/view/7192 (reexamines the ProPublica data using FACT, reaching the same conclusion); Andrew Lee Park, *Injustice Ex Machina: Predictive Algorithms in Criminal Sentencing*, UCLA L. Rev. (Feb. 19, 2019), https://www.uclalawreview.org/injustice-ex-machina-predictive-algorithms-in-criminal-sentencing/. Note: There are several academic articles published regarding COMPAS written by those affiliated with Northpointe, the company that created the COMPAS algorithm, that attempt to undercut the ProPublica analysis, with an obviously biased incentive to do so.
134. Ed Yong, *A Popular Algorithm Is No Better at Predicting Crimes Than Random People*, Atlantic (Jan. 17, 2018), https://www.theatlantic.com/technology/archive/2018/01/equivant-compas-algorithm/550646/.
135. Edmund L. Andrews, *How Flawed Data Aggravates Inequality in Credit*, Stan. U. Hum.-Centered A.I. (Aug. 6, 2021), https://hai.stanford.edu/news/how-flawed-data-aggravates-inequality-credit.
136. Laura Blattner & Scott Nelson, *How Costly Is Noise? Data and Disparities in Consumer Credit* (May 5, 2021), https://arxiv.org/pdf/2105.07554v1.pdf; Will Douglas Heaven, *Bias Isn't the Only Problem With Credit Scores—And No, AI Can't Help*, MIT Tech. Rev. (June 17, 2021), https://www.technologyreview.com/2021/06/17/1026519/racial-bias-noisy-data-credit-scores-mortgage-loans-fairness-machine-learning/.

- **Giggles** was an app created for girls-only networking. It used AI biometric gender verification software to determine whether a potential user was a woman. Deliberately excluding trans women, the algorithm was also reported to exclude some women of color.[137] The algorithm was designed with Eurocentric features in mind, so those women that did not fit the app's mold were denied access.
- **Google has had various problems with photo recognition software**. In 2015, software developer Jacky Alcine went viral on Twitter after calling out Google for categorizing pictures of his Black friends as gorillas. Google apologized and removed "gorilla" as a possible categorization from this algorithm.[138] Notably, they did not address the implicit bias that caused this categorization, but opted for a workaround that would inhibit it from happening again.[139] Similarly, more recently, Google's Cloud Vision categorized a temperature check gun (popularized amid the COVID pandemic) held by a person with darker skin as a gun.[140] It categorized the same photo, photoshopped to have lighter skin, as an electronic device (a monocular, to be exact).
- **Google Translate** has come under fire for imbuing masculinity into its translations when none exists in the origin language. Google Translate is designed to translate one language to another, but runs into problems when having to translate into gendered languages, like German or Spanish, often falling into stereotypes.[141] For example, "When translating from English to German, translation tools have to decide which gender to assign English words like 'cleaner'. Overwhelmingly, the tools conform to the stereotype, opting for the feminine word in German."[142] Similarly, the translation service has been examined for assuming that all doctors are male and all nurses female in similar translation situations. It is also not just Google. Microsoft Bing's translation services have incorporated similar bias.
- **Healthcare algorithms** are being used to help diagnose patients, prioritize the severity of patients, and more. One study from Berkeley found that one such algorithm is biased against Black people, writing, "high-risk health care management programs routinely let[ ] healthier whites into the programs ahead of blacks who are less healthy."[143] This decision directly relates to the level of treatment that patients receive and their ultimate health outcomes. The algorithm encodes healthcare costs when determining a patient's risk and because of structural inequalities imbedded in the healthcare system, Black patients generally receive lower-cost (and lower-quality) healthcare, influencing the "score" they receive in the program and lessening the likelihood that they be considered high-risk.[144]
- **IDEMIA facial recognition software** scans faces, and is used by police in the United States, Australia, and France. Among other uses, it is used to check entrants to the United States against Customs and Border Protection records. The problem: it is much more likely to misidentify Black women's faces (more so than white women, Black men, or white men). This follows a trend in facial software recognition technology of lessened accuracy when considering faces with darker skin tones.[145] On the other hand, white men are the demographic least likely to be misidentified. These types of facial recognition software are used at border entry points (as aforementioned), to identify criminals in video footage, to find undocumented immigrants, and more. IDEMIA has been working on this issue, and in September 2022 "show[ed] near-identical false match rates between different demographic groups, topping the 100 most accurate algorithms in fairness."[146] While a positive update for

137. Connor Perrett, *A Social Media App Just for "Females" Intentionally Excludes Trans Women—And Some Say Its Face-Recognition AI Discriminates Against Women of Color, Too*, Insider (Jan. 23, 2022), https://www.businessinsider.com/giggle-app-uses-ai-to-exclude-trans-women-ceo-says-2022-1; Zoe Schiffer, *This Girls-Only App Uses AI to Screen a User's Gender—What Could Go Wrong?*, Verge (Feb. 7, 2020), https://www.theverge.com/2020/2/7/21128236/gender-app-giggle-women-ai-screen-trans-social.

138. *Google Apologises for Photos App's Racist Blunder*, BBC (July 1, 2015), https://www.bbc.com/news/technology-33347866; James Vincent, *Google "Fixed" Its Racist Algorithm by Removing Gorillas From Its Image-Labeling Tech*, Verge (Jan. 12, 2018), https://www.theverge.com/2018/1/12/16882408/google-racist-gorillas-photo-recognition-algorithm-ai.

139. Tom Simonite, *When It Comes to Gorillas, Google Photos Remains Blind*, Wired (Jan. 11, 2018), https://www.wired.com/story/when-it-comes-to-gorillas-google-photos-remains-blind/.

140. Nicolas Kayser-Bril, *Google Apologizes After Its Vision AI Produced Racist Results*, AlgorithmWatch (Apr. 7, 2020), https://algorithmwatch.org/en/google-vision-racism/.

141. Parmy Olson, *The Algorithm That Helped Google Translate Become Sexist*, Forbes (Feb. 15, 2018), https://www.forbes.com/sites/parmyolson/2018/02/15/the-algorithm-that-helped-google-translate-become-sexist/#7b743b97daa2; Ritika Sagar, *Google Translate Has Gender Bias. And It Needs Fixing*, Analytics India Mag. (June 30, 2021), https://analyticsindiamag.com/google-translate-has-gender-bias-and-it-needs-fixing/; Johanna Järvelä (@johannajarvela), Twitter (Mar. 9, 2021, 2:12 AM), https://twitter.com/johannajarvela/status/1369184338684874758?ref_src=twsrc%5Etfw%7Ctwcamp%5Etweetembed%7Ctwterm%5E1369184338684874758%7Ctwgr%5E0cc8248b75e69a096a2695369e781b02c32cd6a8%7Ctwcon%5Es1_&ref_url=https%3A%2F%2Fscroll.in%2Farticle%2F991275%2Fgoogle-translate-is-sexist-and-it-needs-a-little-gender-sensitivity-training.

142. Stefanie Ullmann & Danielle Saunders, *Google Translate Is Sexist. What It Needs Is a Little Gender-Sensitivity Training*, Scroll.in (Apr. 5, 2021), https://scroll.in/article/991275/google-translate-is-sexist-and-it-needs-a-little-gender-sensitivity-training.

143. Kara Manke, *Widely Used Health Care Prediction Algorithm Biased Against Black People*, Berkeley News (Oct. 24, 2019), https://news.berkeley.edu/2019/10/24/widely-used-health-care-prediction-algorithm-biased-against-black-people/; Linda Carroll, *Widely-Used Healthcare Algorithm Racially Biased*, Reuters (Oct. 24, 2019), https://www.reuters.com/article/us-health-administration-bias/widely-used-healthcare-algorithm-racially-biased-idUSKBN1X32H8.

144. Starre Vartan, *Racial Bias Found in a Major Health Care Risk Algorithm*, Sci. Am. (Oct. 24, 2019), https://www.scientificamerican.com/article/racial-bias-found-in-a-major-health-care-risk-algorithm/.

145. Tom Simonite, *The Best Algorithms Struggle to Recognize Black Faces Equally*, Wired (July 22, 2019), https://www.wired.com/story/best-algorithms-struggle-recognize-black-faces-equally/.

146. Chris Burt, *Idemia Claims Fairest Facial Verification Among Most Accurate Algorithms in Latest NIST Test*, BiometricUpdate (Sept. 15, 2022), https://

IDEMIA specifically, this statistic is worrying in its implication that 99-plus algorithms are consistently seeing false matches in higher rates based on racial demographics.[147]

- **Job recruitment ads** from Facebook and Google are built on the same mechanisms that all targeted ads are—they attempt to get to know users and target them with products that would be most appealing. However, when it comes to job advertisements, a sexist underbelly appeared. A study by Carnegie Mellon found that for Google ads, "significantly fewer women than men were shown online ads promising them help getting jobs paying more than $200,000."[148] Facebook's transgression was even more overt as it was sued for allowing advertisers to purposefully target based on race, gender, and religion. However, this overt discrimination was not needed, as a study about their algorithms showed that "postings for preschool teachers and secretaries, for example, were shown to a higher fraction of women, while postings for janitors and taxi drivers were shown to a higher proportion of minorities. Ads about homes for sale were also shown to more white users, while ads for rentals were shown to more minorities."[149]
- **Kronos** is another AI algorithm, aimed to mathematically sift through those candidates that would best fit certain jobs. It relies on a personality questionnaire and has been called out for a bias against those with mental health conditions. Namely, one Vanderbilt grad brought the issue to light as he struggled to gain employment in minimum wage jobs.[150] He hypothesized that the algorithms were picking up on his bipolar diagnosis, as they asked questions similar to that which led to his initial diagnosis.[151]
- **Lending** is one area that has been widely discussed in terms of AI bias.[152] One study showed that AI bias was responsible for 80% of Black mortgage applicants being denied.[153] Additionally, "40% of Latino applicants, and 70% of Native American applicants are likely to be denied."[154] This, on top of an already disproportionate number of homeowners in the United States being white. The mortgage lending industry has tried to explain this bias away, citing other reasons for the supposed racial disparities in lending. However, a 2019 investigation by the *Markup* controlled for these differences and still found that "lenders were 40 percent more likely to turn down Latino applicants for loans, 50 percent more likely to deny Asian/Pacific Islander applicants, and 70 percent more likely to deny Native American applicants than similar White applicants. Lenders were 80 percent more likely to reject Black applicants than similar White applicants."[155] These algorithms are also proprietary and therefore not publicly available to be studied. It is still unclear what data are being used, factors considered, and assumptions made as part of its predictive ability. It cannot be ruled out that race is an explicit variable.
- **Medical data to screen for skin cancer only using lighter skinned examples**. While no algorithm has been put into practice to screen for skin cancer, those that are currently being developed are based largely on data from one subset of the population: those people with lighter skin.[156] It is challenging to attain data for training these systems in the first place, and those data sets that are available "have very few images of people with dark skin."[157] This discrepancy, if implemented in an actual healthcare setting, could exacerbate an existing issue where people with darker skin are far more likely to die from skin cancer than those with lighter skin because of inaccurate diagnoses (a continuation of a current problem, with doc-

www.biometricupdate.com/202209/idemia-claims-fairest-facial-verification-among-most-accurate-algorithms-in-latest-nist-test.

147. Patrick Grother et al., National Institute of Standards and Technology, NISTIR 8280, Face Recognition Vendor Test (FRVT) Part 3: Demographic Effects (2019), https://nvlpubs.nist.gov/nistpubs/ir/2019/NIST.IR.8280.pdf; David Leslie, Alan Turing Institute, Understanding Bias in Facial Recognition Technologies (2020), https://arxiv.org/ftp/arxiv/papers/2010/2010.07023.pdf.
148. Byron Spice, *Questioning the Fairness of Targeting Ads Online*, Carnegie Mellon U. (July 7, 2015), https://www.cmu.edu/news/stories/archives/2015/july/online-ads-research.html.
149. Muhammad Ali et al., *Discrimination Through Optimization: How Facebook's Ad Delivery Can Lead to Biased Outcomes*, 3 Proc. ACM on Hum.-Comput. Interaction 199:1 (2019), *available at* https://www.ccs.neu.edu/~amislove/publications/FacebookDelivery-CSCW.pdf; Karen Hao, *Facebook's Ad-Serving Algorithm Discriminates by Gender and Race*, MIT Tech. Rev. (Apr. 5, 2019), https://www.technologyreview.com/2019/04/05/1175/facebook-algorithm-discriminates-ai-bias/.
150. Cathy O'Neil, *How Algorithms Rule Our Working Lives*, Guardian (Sept. 1, 2016), https://www.theguardian.com/science/2016/sep/01/how-algorithms-rule-our-working-lives.
151. *See also* Isabel Straw & Chris Callison-Burch, *Artificial Intelligence in Mental Health and the Biases of Language Based Models*, 15 PLoS One e0240376 (2020), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7745984/.
152. Adam Zewe, *Fighting Discrimination in Mortgage Lending*, MIT News (Mar. 30, 2022), https://news.mit.edu/2022/machine-learning-model-discrimination-lending-0330.
153. Kori Hale, *A.I. Bias Caused 80% of Black Mortgage Applicants to Be Denied*, Forbes (Sept. 2, 2021), https://www.forbes.com/sites/korihale/2021/09/02/ai-bias-caused-80-of-black-mortgage-applicants-to-be-denied/?sh=3c8216df36fe.
154. *Id.*
155. Emmanuel Martinez & Lauren Kirchner, *The Secret Bias Hidden in Mortgage-Approval Algorithms*, Markup (Aug. 25, 2021), https://themarkup.org/denied/2021/08/25/the-secret-bias-hidden-in-mortgage-approval-algorithms.
156. Angela Lashbrook, *AI-Driven Dermatology Could Leave Dark-Skinned Patients Behind*, Atlantic (Aug. 16, 2018), https://www.theatlantic.com/health/archive/2018/08/machine-learning-dermatology-skin-color/567619/; Lisa N. Guo et al., *Bias In, Bias Out: Underreporting and Underrepresentation of Diverse Skin Types in Machine Learning Research for Skin Cancer Detection—A Scoping Review*, 87 J. Am. Acad. Dermatology 157 (2022), *available at* https://pubmed.ncbi.nlm.nih.gov/34252465/.
157. Nicola Davis, *AI Skin Cancer Diagnoses Risk Being Less Accurate for Dark Skin—Study*, Guardian (Nov. 9, 2021), https://www.theguardian.com/society/2021/nov/09/ai-skin-cancer-diagnoses-risk-being-less-accurate-for-dark-skin-study.

tors being less trained for darker-skinned patients, often misdiagnosing them).

- **Nikon blinking technology** was implemented into Nikon's cameras to detect when subjects were blinking, aimed to encourage a retake if someone in the frame was blinking. The problem: it categorized many Asian faces as always blinking.[158] This example speaks to a common problem when AI algorithms are coded based on data that are not representative of the entire population. Because the blinking algorithm had not been exposed to enough Asian faces in its development, it could not accurately identify when they were blinking.
- **PredPol** attempts to predict where crimes will occur in the future based on previous crime data (i.e., arrest counts). The algorithm was initially posited as a solution for human bias in police departments, but engaged in a dangerous feedback loop where areas were marked as higher-risk if more police reports were made there.[159] However, initial numbers of police reports in an area were based on previous human bias. And once this system was implemented, over-policing in those areas only increased as they were identified as higher-risk by the algorithm. This prediction thereby inspired higher police presence, which naturally entails more police reports, and the cycle restarts. Suffice to say the areas where this feedback loop was most harmful were minority communities that had histories of high police presence before the algorithm was instituted. The algorithm also seemed to be biased along class lines, "often recommend[ing] daily patrols in and around public and subsidized housing, targeting the poorest of the poor."[160]
- **Rekognition** is Amazon's brand of facial recognition software. As with the others on this list, it has been used in police departments and "had trouble discerning gender and skin tone when the individual was a woman, or had darker colored skin."[161] This gender and race-based inconsistency could lead to greater misidentifications for Black women, people of color more generally, and women more generally. The finding led to a call from civil rights organizations for Amazon to stop selling the software to law enforcement agencies. It is also important to note that this biased facial recognition software came to light a year after the others on this list (i.e., those produced by Microsoft and IBM). Amazon actively argued against the results of a study that demonstrated this bias.
- **Word embeddings** are an ML framework that represent English words using vectors. They are used as part of natural language processing, to better understand semantics. Generally, these word embeddings follow societal shifts and the biases that coincide with said shifts. Researchers found that "European-American names are more similar to pleasant (vs. unpleasant) words than are African-American names, and male names are more similar to career (vs. family) words than are female names."[162] These biases are some of many gender and ethnic stereotypes baked into the word-embedding framework, a system designed to position words as society does.

158. Adam Rose, *Are Face-Detection Cameras Racist?*, Time (Jan. 22, 2010), http://content.time.com/time/business/article/0,8599,1954643,00.html.
159. Annie Gilbertson, *Data-Informed Predictive Policing Was Heralded as Less Biased. Is It?*, Markup (Aug. 20, 2020), https://themarkup.org/the-breakdown/2020/08/20/does-predictive-police-technology-contribute-to-bias; Randy Rieland, *Artificial Intelligence Is Now Used to Predict Crime. But Is It Biased?*, Smithsonian Mag. (Mar. 5, 2018), https://www.smithsonianmag.com/innovation/artificial-intelligence-is-now-used-predict-crime-is-it-biased-180968337/; Danielle Ensign et al., *Runaway Feedback Loops in Predictive Policing*, 81 Proc. Mach. Learning Rsch. 1 (2018), *available at* https://arxiv.org/pdf/1706.09847.pdf.
160. Aaron Sankin et al., *Crime Prediction Software Promised to Be Free of Biases. New Data Shows It Perpetuates Them*, Gizmodo (Dec. 2, 2021), https://gizmodo.com/crime-prediction-software-promised-to-be-free-of-biases-1848138977.
161. Nicole Karlis, *Researchers Find Gender and Racial Bias in Amazon's Facial Recognition Software, Widely Used by Cops*, Salon (Jan. 27, 2019), https://www.salon.com/2019/01/27/researchers-find-gender-and-racial-bias-in-amazons-facial-recognition-software-widely-used-by-cops/; Kyle Wiggers, *MIT Researchers: Amazon's Rekognition Shows Gender and Ethnic Bias (Updated)*, VentureBeat (Jan. 24, 2019), https://venturebeat.com/ai/amazon-rekognition-bias-mit/; Joy Buolamwini, *Response: Racial and Gender Bias in Amazon Rekognition—Commercial AI System for Analyzing Faces*, Medium (Jan. 25, 2019), https://medium.com/@Joy.Buolamwini/response-racial-and-gender-bias-in-amazon-rekognition-commercial-ai-system-for-analyzing-faces-a289222eeced; James Vincent, *Gender and Racial Bias Found in Amazon's Facial Recognition Technology (Again)*, Verge (Jan. 25, 2019), https://www.theverge.com/2019/1/25/18197137/amazon-rekognition-facial-recognition-bias-race-gender.
162. Nikhil Garg et al., *Word Embeddings Quantify 100 Years of Gender and Ethnic Stereotypes*, 115 PNAS E3635 (2018), *available at* https://www.pnas.org/doi/10.1073/pnas.1720347115; Mascha Kurpicz-Briki & Tomaso Leoni, *A World Full of Stereotypes? Further Investigation on Origin and Gender Bias in Multi-Lingual Word Embeddings*, 4 Frontiers Big Data 625290 (2021), https://www.frontiersin.org/articles/10.3389/fdata.2021.625290/full.