# 2022 IN REVIEW: A YEAR OF FEDERAL CLIMATE INVESTMENTS

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# Contents



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# Executive Summary

In 2022, implementation of the Infrastructure Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA) began in earnest. As the funding goes out, there is considerable interest in what the funding will enable and where it will go. This report begins to answer those questions by focusing on six programs, updates on key tax credits, other implementation efforts and an overview of the tracking and modeling to understand the climate, economic, and health benefits of the two laws.

To better answer these questions moving forward, we made six recommendations on data quality, including that:

- agencies release all funding data in a tabular format,
- the General Services Administration expand its centralized data collection effort,
- agencies publish more spatially explicit data,
- agencies release data dictionaries,
- there is clarity on the tax credits, and
- agencies clearly report funding sources when publishing funding data.

## Funding Analysis

We tracked six programs (four pre-existing and two new). We looked at where funding went, how it compared with existing funding, and the types of projects funded. The pre-existing programs all saw large funding injections in 2022, and the new programs will support investments in crucial policy areas to reduce emissions and improve health outcomes.

**Tribal Climate Resilience Program** – this existing Department of the Interior program provides funds to help tribal communities plan for and begin relocation due to climate risks. The program's $160 million in total funding in 2022 included:

- $45 million in adaptation planning to 124 tribes.
- Three $25 million demonstration grants for relocation activities.
- Eight $5 million relocation planning grants.

**Clean School Bus Program** - this Environmental Protection Agency (EPA) program provides funding for low-emitting or zero-emission school buses. The program announced $939.5 million in 2022 that:

- Funded more than 400 school districts and 2,543 buses (95 percent were electric).
- Deployed the first electric school buses in 17 states.
- Distributed $64.8 million to South Carolina, third only to California and New York.

**The Brownfields Program** – the EPA has funded nearly $1.7 billion in Brownfields projects since 1994. Through IIJA, there will be $1.2 billion in direct project funding available, plus another $300 million for the Brownfields State & Tribal Response Programs. In 2022 funding included:

- $150 million across 254 new grants to projects around the country.
- Job training for 1,300 people and job placement for at least 800 people.
- No funding in Arkansas, Delaware, Nebraska, North Dakota, and South Dakota.

**The Rebuilding America's Infrastructure with Sustainability and Equity (RAISE) Program** – this pre-existing Department of Transportation (DOT) program funds surface transportation projects. Notably, funding for road projects dropped to 55 percent—from 76 percent during the Trump Administration—and funding for active transportation, transit, and electric vehicles grew. Funding in 2022 included:

- $2.245 billion for surface transportation projects.
- A record $123.8 million to Tribal Governments.
- 48 percent of funding went to disadvantaged communities.[1]

**The Orphaned Well Program** – Administered by the EPA, this program will put a dent in more than 120,000 documented orphaned wells (abandoned oil and gas extraction sites) although it will also likely lead to states identifying and documenting more orphaned wells. In 2022:

- The EPA awarded $560 million to plug at least 9,832 wells in 24 states.
- The EPA will invest a further $33 million to remediate 277 wells on public lands across nine states (more than half will be in Louisiana).

**The Low or No Emission Vehicle Program** – In the program's history, the DOT has awarded $700 million for transit decarbonization. In 2022:

- The DOT awarded $1.1 billion.
- The proportion of funding for electric buses dropped to 75 percent because of a rule resulting from IIJA negotiations (down from 92 percent in 2021).

**Tax credits** will make up a significant proportion of the funding, though the total cost will depend on uptake as tax credits are not capped. Of the 10 most valuable climate tax credits, Treasury has only issued guidance on two: the Clean Electricity Investment Credit and the Clean Vehicle Credit. Treasury has also issued guidance on the energy community bonus, which will impact the uptake of various tax credits.

[1] According to the Climate and Economic Justice Screening Tool (CEJST).

## Implementation

The Biden Administration has also guided implementation of IIJA and IRA funds through executive orders and through initiatives, including Justice40 and Buy America. On Justice40, the Administration's CEJST identified that 33 percent of the population is living in a disadvantaged community (DAC). The Administration's decision not to factor in cumulative burden when identifying DACs disadvantages Black and Latino communities.[2] On Buy America, the Biden Administration laid out domestic content requirements for federal procurement and in February 2023, the Administration released guidance on the standards and the conditions under which an item is deemed to be made in the United States.

States have mobilized funding to assist in implementation. Connecticut, Minnesota, Colorado, Massachusetts, Utah, and Kentucky have all appropriated matching funds to support future implementation.

## Forecasting Outcomes

Finally, there have been multiple complementary efforts to track or forecast the impact of the laws over the next few years, including projects already announced. Tracking and modeling of the impacts of the two laws thus far reveals:

- More than 92,000 announced EV manufacturing jobs and $95.6 billion in announced investments tracked since IIJA was passed.
- Estimated $150 billion and 18,000 jobs in announced grid scale manufacturing facilities since IRA was passed.
- Forecasted 39-40 percent greenhouse gas (GHG) emissions reductions.

Analyses also emphasized the importance of state agency decision-making to achieve greater emissions reductions, especially for transportation funding and the need for complementary action by federal, state, and local entities to hit decarbonization targets.

[2] According to analysis from the World Resources Institute (WRI)

# Introduction

The climate investments from the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA)[3] have the potential to not just significantly alter the greenhouse gas emissions trajectory of the United States but also to deliver good jobs, public health benefits, and targeted investments in disadvantaged communities. However, to ensure these outcomes, the provisions of these laws must be implemented and executed well.

The scope of this report, just as the scope of the two laws, is broad. It tracks actions through the end of 2022 (though updates from 2023 are incorporated where available). There are of course developments not captured here and so further analysis is required to uncover important funding trends in both the programs covered here and from other programs.

We organized the report into three sections:

1. **The Funding Analysis section** is focused on six case studies of programs that have issued funding. This section also includes a summary of the tax credits available to deliver climate outcomes.
2. **The Implementation Actions section** tracks federal actions alongside state-level activity to assist in implementation.
3. **The Forecasting Outcomes section** summarizes research on the potential outcomes (including emissions, employment, economic and health outcomes) from the two laws and the key recommendations from that research to help shape implementation efforts.

# Section One: Funding Analysis

There are hundreds of programs with climate impacts in the two laws. As it is not possible to provide in-depth updates on all programs, this report focuses on the potential climate impacts of six programs that released funding in 2022. We selected these programs based on four primary criteria: the programs are discretionary, the administering agency has released funding information with sufficient granularity, the programs are large, and the programs are priorities for many in the climate community.

1. Tribal Climate Resilience Programs

[3] We refer to IRA and IIJA collectively as the laws. IIJA is also referred to as the Bipartisan Infrastructure Law.

2. Clean School Bus Program
3. Brownfields Program
4. Rebuilding America's Infrastructure with Sustainability and Equity
5. Orphaned Well Program
6. Low or No Emission Vehicle Program

### About the Data

The analyses in this report are based on publicly available data. These data cover funding for programs through the end of 2022, though important developments from 2023 are also noted where available. Data analyses contained throughout are dependent on the quality and comprehensiveness of the data released by agencies. Across agencies, this varies significantly. The funding summarized here includes IRA and IIJA funding but in some instances, the administering agency also incorporated other sources of funding.

## Recommendations for Collecting and Sharing Data

For future tracking of funding from IIJA and IRA, it is important that agencies better report awards data. This will ensure greater accountability, allow a more comprehensive understanding of what the laws have funded and enable better planning for the remaining funds. Based on the data collection activity we carried out to inform this report, we propose the following recommendations:

1. Data format: We encourage agencies to release all data in a tabular format (such as a spreadsheet or a comma-separated values file) for ease of use in analysis (as well as other formats like PDF).
2. Centralization: The General Services Administration's (GSA) Bipartisan Infrastructure Law (BIL) Maps Dashboard is a valuable resource [1]. We hope to see this resource expanded. We encourage GSA to publish IRA funding data also. Further, we encourage agencies to regularly share data with GSA to ensure a whole of government record and ensure that the GSA records are as accurate and timely as possible. Finally, we encourage GSA to add more data fields including the date of announcement, date of update, relevant data on units funded (for instance, number of buses funded), and more granular geographic information about the funding recipient where possible.
3. Spatially Explicit Data: We encourage agencies to publish address or coordinate data for award recipients to allow for a greater understanding of where funding flows at a more granular level.
4. Data dictionary: We encourage agencies to publish a data dictionary on their awards and program data (including data field changes over time) so that the data can be easily interpreted.

5. Data on tax credits: The amount of data that will be published on tax credits remains unclear. Given the importance of these tax credits for climate action in the Inflation Reduction Act, we encourage the Administration to publish data on tax credit uptake. We encourage the Department of the Treasury to ensure that future tax credit data provides greater disaggregation of data than existing publicly available tax credit data (for instance, data by state and the data broken down by sub-types of tax credit).
6. Data source: Where reporting awards data, we encourage agencies to note where other funding sources are included (aside from funds appropriated for IIJA and IRA).

# Case Study One: Tribal Climate Resilience

There are two main programs within Tribal Climate Resilience—the existing Adaptation Planning Program and the new Community Relocation Program. The Department of the Interior (DOI) will administer these programs. The funding for this program includes:

1. $216 million in funding available through Tribal Climate Resilience from IIJA including:
    a. $86 million through the Adaptation Planning program,
    b. And $130 million through Community Relocation [2].
2. $220 million available for Tribal Climate Resilience from IRA [2] including:
    a. DOI expects to spend $40 million of this funding on Community Relocation [2].

Between these two programs, the DOI made $160 million available in 2022, per Table 1. The Department of the Interior's Bureau of Indian Affairs (BIA) will administer this funding and the programs are covered under the Justice40 Initiative.

Table 1: Tribal Climate Resilience Funding Types and Sources

| Program | New or Existing? | Source of Funding | Funding in FY2022 |
|---|---|---|---|
| **Community Relocation** | New | IIJA and IRA | $115M[4] |
| **Adaptation Planning** | Existing | IIJA | $45M |

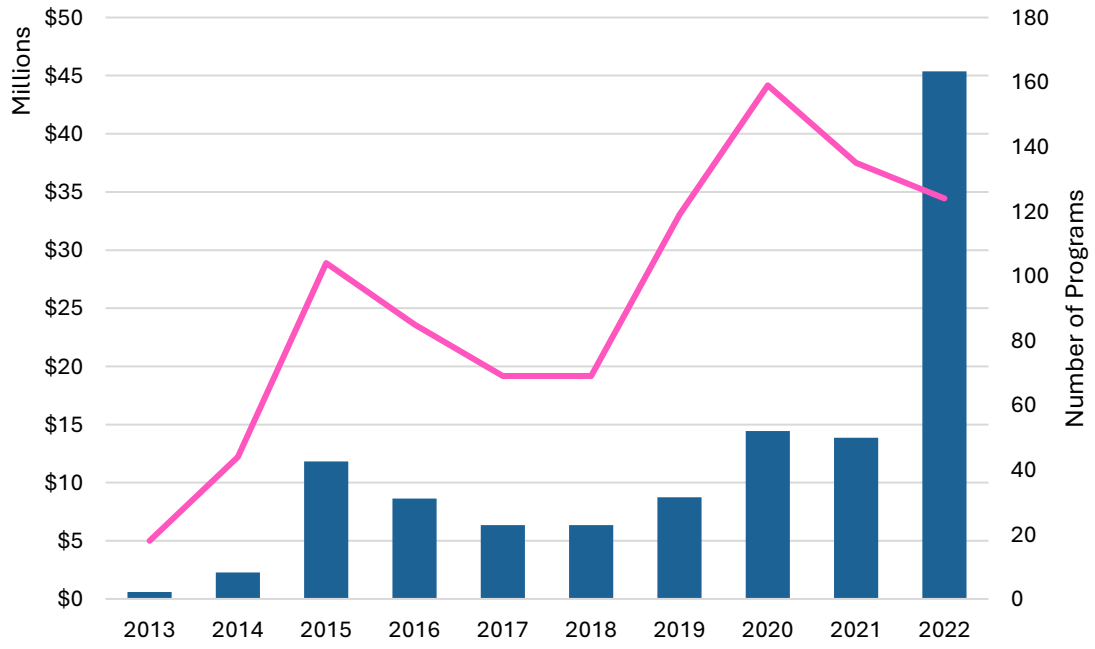
Source: [2]

[4] The Federal Emergency Management Administration will also invest $17.7 million to assist the three relocation grant recipients (not included in the $115 million).

## Tribal Climate Resilience: Adaptation Planning

The Branch of Tribal Climate Resilience was established in 2011 within BIA and administers this program [3]. The program was renamed the Tribal Resilience Program by the Trump Administration and is now called the Tribal Climate Resilience Program. In 2022, there was a sharp uptick in the amount of annual funding announced. The total, $45 million from the IIJA, was easily the largest to date [4]. The number of grants has stayed relatively constant since 2018, indicating a larger average size grant in 2022. Five tribal governments received funding of more than $2 million for relocation and managed retreat activities.

Figure 1: Funding and Grants for Adaptation Planning in the Tribal Climate Resilience Program from 2013 to 2022




Note that the funding in 2017 and 2018 was bundled due to program changes brought about by the Trump Administration. We took the total and averaged it across those two years. In 2022, there was 124 programs and $45.4 million in funding.

Source: [5]

## Tribal Climate Resilience: Community Relocation

The Voluntary Community-Driven Relocation program awarded $115 million to 11 tribes in 2022 [6]. This program supports community relocations caused by climate threats and awarded two types of grants in 2022 – relocation and planning grants. There was no formal application process, instead the Bureau of Indian Affairs based its decision on five criteria,

including current risk, readiness to move and whether the tribe had chosen an alternative site [7].

More than 55 percent of the $115 million in funding went to tribes in Alaska, due in large part to two $25 million relocation grants made to the Native Village of Napakiak and Newtok Village. Quinault Indian Nation (Washington state) was also awarded $25 million. These three projects will serve as "demonstration projects… demonstrating the success of a consolidated and coordinated interagency approach to relocation and managed retreat. The demonstration projects will focus on the relocation and establishment of core infrastructure identified by the communities to create a center of gravity for full community relocation." [6] All three communities have received program funding in prior years.

The funding from this program will only cover a small fraction of the need to support the relocation of tribes. The plan for the Napakiak community (population 354) stated the cost of relocation would be $200 million over the next 50 years [8]. The Napakiak community lost 100 feet of land to erosion in a single year. Meanwhile, in Newtok, Alaska, the rapid rate of erosion means that the only viable option for the community is to relocate from Newtok to Mertarvik, a site nine miles away. By 2019, erosion meant that the community's drinking water was no longer usable [9]. A report from 2020 by the Department of the Interior found the need to be nearly $5 billion for "unmet relocation infrastructure needs" over the next 50 years, much of which would be in Alaska [10].

Eight other communities received $5 million grants for planning – four in Alaska, as well as the Havasupai Tribe (Arizona), the Yurok Tribe (California), the Chitimacha Tribe (Louisiana), and the Passamaquoddy Indian Tribe (Maine). The extent of the loss of land among these tribes to date is considerable. Take the Isle de Jean Charles in Louisiana as an example. The island is occupied by two tribes including the Chitimacha Tribe and has lost 98 percent of its landmass since 1955 [10]. This community was awarded a grant of $48 million from Housing and Urban Development in 2016 to relocate. Funding was awarded in 2016, but it wasn't until August 2022 that the first 12 residents were able to move into a new community [11]. The delays in the process demonstrate the challenges of relocation. This community received $5 million in this round of funding.

The Inflation Reduction Act also made $25 million available for Native Hawaiian Climate Resilience.

# Case Study Two: Clean School Bus Program

The Clean School Bus program is a new program, created in IIJA and administered by the Environmental Protection Agency (EPA). The Clean School Bus program is covered under

the Justice40 Initiative. The program makes available $5 billion over five years to replace diesel school buses with cleaner alternatives. The funding is split evenly between:

- Zero-emission, battery electric[5] school buses
- Alternative fuel (propane, compressed natural gas) *or* zero-emission, battery electric buses.

EPA may administer funding through grants, rebates, or contracts and the EPA expects to issue grants and rebates in 2023 [12]. In 2022, EPA launched a rebate competition. Under 2022 program rules, school districts could apply to replace up to 25 school buses. Rebates for electric school buses, which will be delivered to school districts after they submit a purchase order but before they pay, ranged from $190,000 to $375,000 plus $13,000 to $20,000 for charging infrastructure. Rebates for propane and natural gas buses ranged from $15,000 to $45,000. The rebate amount varied based on bus size, fuel type, and whether the school district was a priority district. Funding was decided through a lottery system.

School districts were assigned priority status based on three indicators – "high need local educational agencies", Tribal schools, and rural areas. EPA determined the high need school districts using the Small Area Income and Poverty Estimates (SAIPE) dataset but lowered the "threshold from 30% of students in poverty to 20% of students in poverty in the SAIPE dataset," effectively expanding the pool of priority school districts to include relatively more advantaged communities [12]. Priority school districts received prioritization in the lottery process and increased rebate amounts.

According to a February 2023 report from the EPA to Congress, the Agency "received about 2,000 applications requesting approximately $4 billion to replace more than 12,000 buses", far outstripping the $500 million in announced funding available for 2022 [12]. Given the large response, EPA increased the funding available to $965 million. Since then, the number of awards available has shifted as some school districts have dropped out and been replaced by some of the 1,546 waitlisted school districts. As of April 4, 2023, $939.5 million was set to be awarded to more than 400 applicants representing a total of 2,543 buses.

The Clean School Bus Program represents a sea change in the electrification of school buses in the U.S. The 2,406 electric school buses funded in just the first year of the program represent nearly two times the number of electric school buses on order, delivered, or operating in the United States, prior to the announcement [13]. Further, the

[5] Does not apply to hydrogen fuel cell bus powertrains since none are available in the school bus market

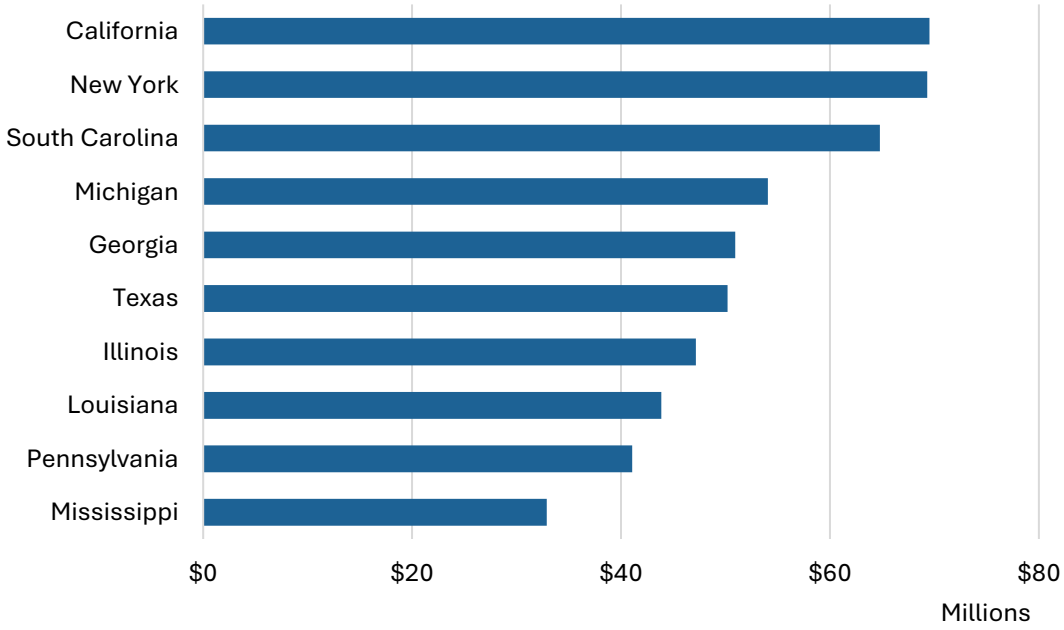
program represents the only source of public funding for electric school buses to date in 17 states (including Washington DC) [14].

Electric buses accounted for about 95 percent of funded buses (propane made up around five percent and natural gas buses the remainder), and an estimated 99 percent of the total funding. IIJA mandated that at least 50 percent of funding go to electric school buses, though electric school buses are eligible for the full amount. School districts could withdraw until the purchase orders were due by the end of April 2023, and so this list will continue to shift. In Maine, one school district withdrew due to concerns about operating costs, the ability for the buses to travel longer trips and operate in cold weather [15]. Some school districts have had their concerns assuaged and are moving forward with the program, while others, such as the Anniston school district in Alabama—which expressed concerns about bus range and reliability—have tabled the decision [16], [17].

Rebates were awarded to every state, the District of Columbia, and several Tribes and U.S. territories. California and New York led the way, each with $69 million, closely followed by South Carolina ($64.8 million). Georgia, Texas, Louisiana, and Mississippi were all in the top 10. South Carolina took a unique approach, with all school districts applying through the South Carolina Department of Education because the state owns the buses (rather than individual school districts).[6] The approach proved to be effective for South Carolina with the state securing $65 million for 164 electric buses, more than any other state outside of California and New York. Florida, on the other hand, significantly underperformed due to a lack of applications, despite being third largest state by population, receiving just $15 million and ranking 19th in terms of total funding. Per the EPA report, $71.7 million was awarded to tribal governments to purchase 209 buses, of which 184 were electric (88 percent) [12].

[6] Delaware also adopted this strategy.

Figure 2: Top 10 States for Funding from the 2022 Clean School Bus Program




Data sourced as of April 4, 2023. This funding is for buses of all fuel types.

Source: [18]

The program overwhelmingly funded priority school districts. Just 31 out of 2,543 buses went to school districts that were not designated as a priority district. These buses went to three school districts in Hawaii, Delaware, and Wyoming, likely due to the EPA's goal to fund buses in each state so long as an eligible application was received. The merits of the priority designation have been contested. An open letter from environmental justice advocacy organizations and clean transportation groups argued that the awards were not targeted enough and encouraged the EPA to consider air quality indicators, different indicators for low-income schools (the proportion of students that receive free and reduced lunch) and race to further narrow priority districts [19]. In total, 7,676 districts were designated as priority districts, representing more than half of all eligible school districts around the country.[7]

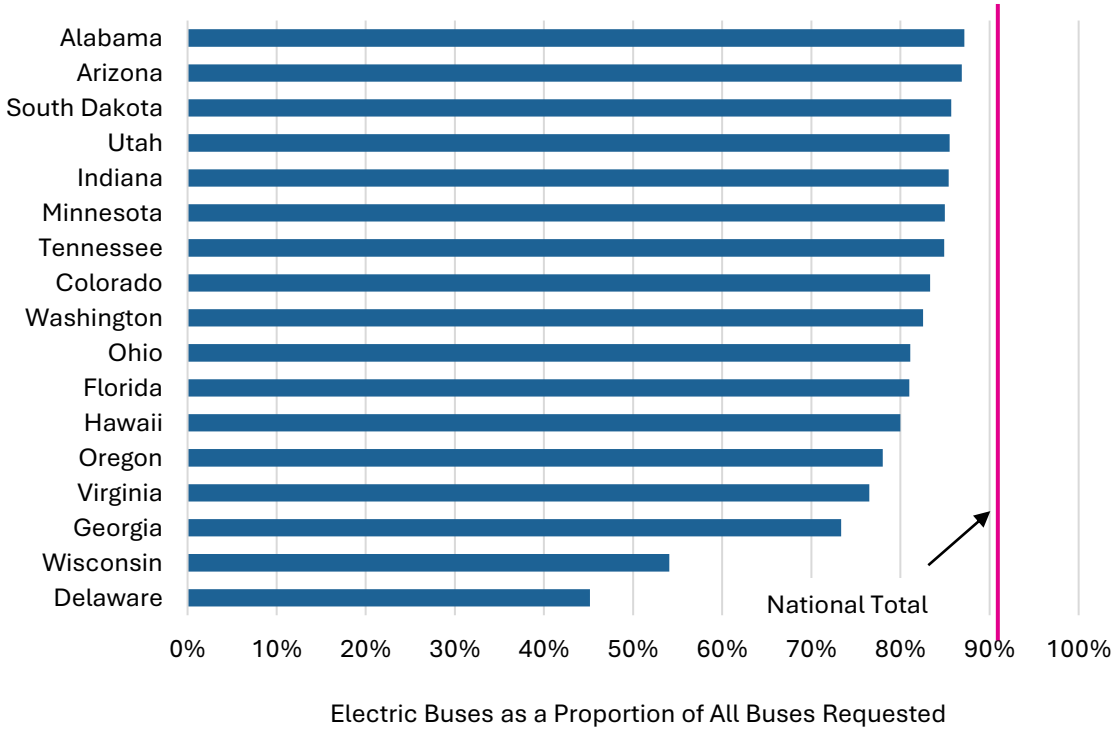
Another challenge was for those school districts that do not own their own buses and therefore would not be able to meet the requirement that diesel buses would be scrapped once replaced. Seattle Public Schools did not apply for funding, as it loans buses, and several Chicago areas schools were not able to apply for funding for the same reason [20].

[7] Priority school districts from EPA List of Priority School Districts. Total school districts from NCES [22].

The EPA explained that this rule prevents buses replaced through the program from being moved to another school district to continue polluting, potentially in environmental justice communities [21]. As of May 1, 2023, the issue is ongoing, but the EPA is allowing those districts to request waivers, providing they can demonstrate their use of a contractor and that their provider is unwilling or unable to secure the funding.

To understand the demand for the program from school districts, we analyzed all the requests for the program (including both buses awarded and the waitlist). Of all requests, 90.7 percent were for electric school buses. Per Figure 3, around the country, school districts in 17 states requested a lower proportion of electric school buses than the national total, with school districts in Delaware and Wisconsin trailing all states. In those states, it appears there was less of a push among school districts to prioritize electric school buses in the application process. Most of the non-electric requests were for propane buses.

Figure 3: States with a lower proportion of requested Electric Buses than the National Total

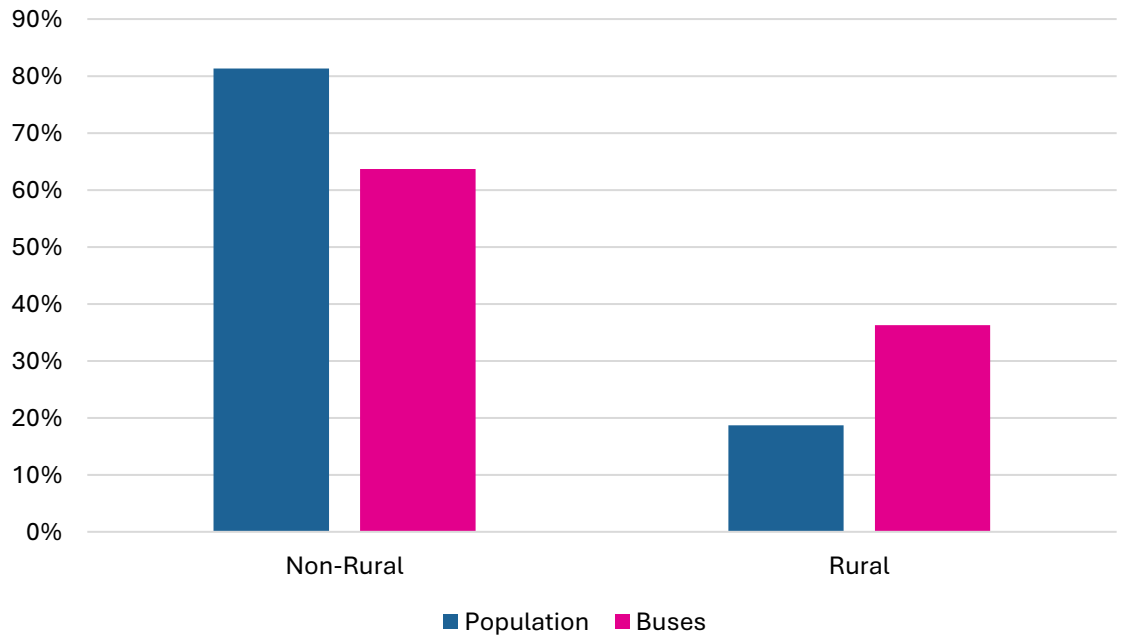



This data includes all school bus requests – both those awarded and from the waitlist. These 17 states requested a lower proportion of electric school buses than the national total of 90.7 percent. Data sourced as of April 4, 2023.

Source: [18]

When we break down the data by non-rural (town, suburban, and city) and rural school districts, we see most funding (64 percent) went to non-rural school districts and the remainder (36 percent) went to rural districts. Given that just 18.7 percent of public-school students were enrolled in a rural school district per NCES data from 2015-16, rural school districts received twice the amount of funding that we may anticipate due to enrollment share, which reflects the preference for rural districts in priority district designation [22]. In 15 states, all the funding went to rural schools, per the NCES designation.

Figure 4: Funding from 2022 that went to Non-Rural and Rural School Districts Compared with Proportion of Students Enrolled




Funding data sourced as of April 4, 2023. Enrolment data is NCES data from 2015-16 for public schools.

Source: [18], [22]

# Case Study Three: Brownfields Program

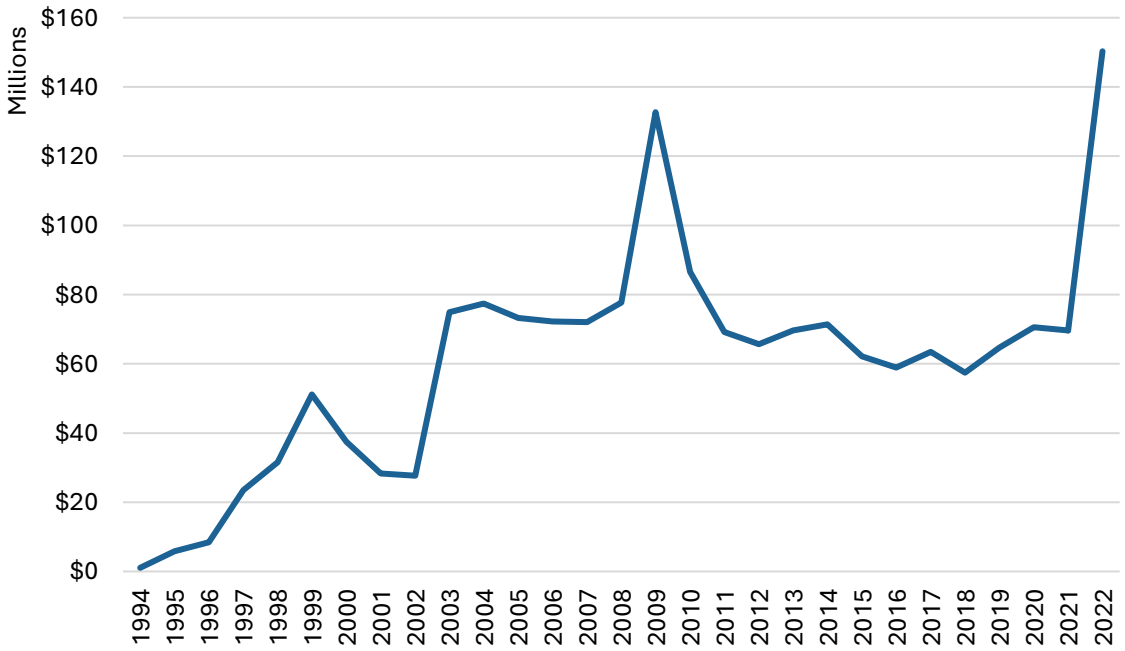
Brownfields are properties that may be contaminated by “a hazardous substance, pollutant, or contaminant” [23]. The Brownfields program provides funding to assess or clean up a site, or to provide job training, and is administered by the EPA. This program is covered under the Justice40 Initiative. From 2006 to 2018, most reports to the EPA from brownfields clean ups were for lead, petroleum, and then asbestos contamination [24]. Per

correspondence with the EPA in April 2023, it takes approximately 2.6 years on average from cleanup start to completion.

The first Brownfields site assessment was conducted in September 1993 [25]. Before IIJA, the program had funded nearly $1.7 billion in projects since 1994. IIJA alone will make $1.2 billion in funding available until expended (as a point of comparison, over the past five years the program awarded $325.6 million in funding). There is no non-federal cost share required. In 2022, the EPA awarded over $150 million across 254 grants to projects around the country. This is the most funding in a single year in the history of the program and eclipses the high from 2009, when the program received a boost from American Recovery and Reinvestment Act (ARRA) funds [26].

A further $300 million is available for the State and Tribal Brownfields Response Program. FY2022 and FY2023 funds ($57.9 million per year has been allocated to the States, Territories, and Tribes that requested funds). The EPA also administered $107 million of supplemental funding in 2022 to “39 high-performing Revolving Loan Fund (RLF) Grant recipients to help communities … Supplemental funding for Revolving Loan Fund Grants is available to recipients that have depleted their funds and have viable cleanup projects ready for work” [27]. Maine, Montana, and Oklahoma were the three largest recipients of this RLF funding. Neither of those funding totals is included in the analysis below.

Figure 5: New Brownfields Grant Funding by Year from 1994 to 2022

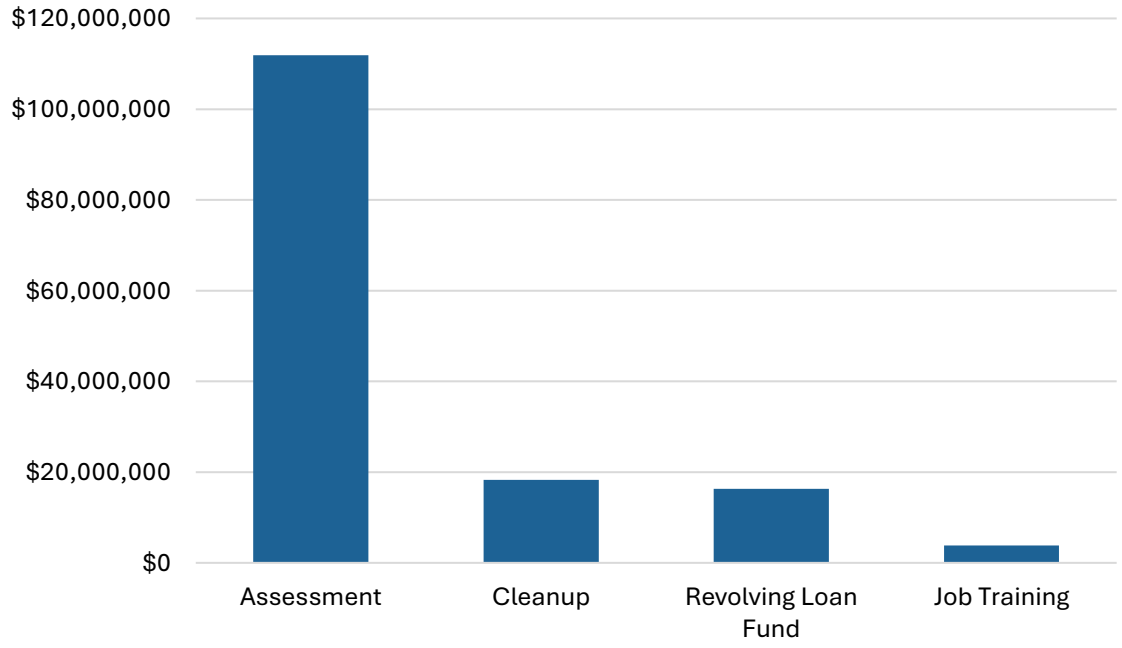



The Brownfields program received a significant boost in 2009 through American Recovery and Reinvestment Act (ARRA) funding, though the funding in 2022 is the largest to date. This does not include the State and Tribal Brownfields Response Program or the Revolving Loan Fund supplemental funding.

Source: [28]

The Program funds five competitive grant programs: Multipurpose Grants, Assessment Grants, Revolving Loan Fund Grants, Cleanup Grants, and Environmental Workforce Development and Job Training Grants. In 2022, most of the funding went to assessments (74 percent), reflecting the need for sites to be assessed before further actions may be taken.

Figure 6: Grant Funding by Project Type for 2022




Of funding in 2022, 74 percent went to Assessment grants.

Source: [28]

The following were the main types of grants funded in 2022[8] [29]:

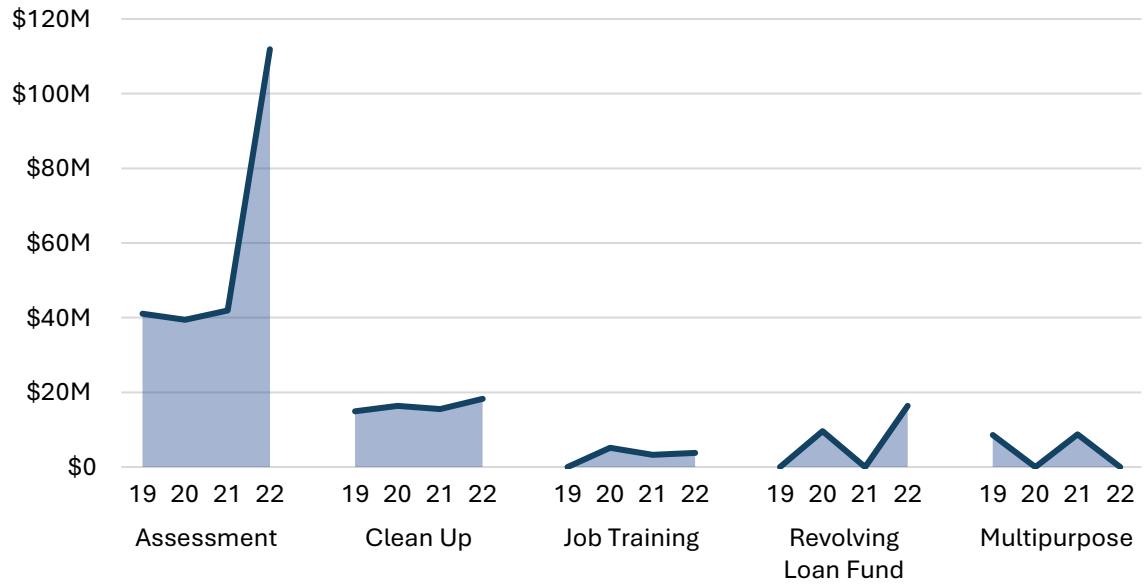
- Assessment grants "provide funding for brownfield inventories, planning, environmental assessments, and community outreach." For instance, the North Carolina Department of Environmental Quality received $2 million for an assessment grant to "develop an inventory of brownfield sites for all communities in the target areas and conduct 40 Phase I and 20 Phase II environmental site assessments. Grant funds also will be used to support reuse planning and community outreach activities... Priority sites include a former tannery, a 32-acre vacant parcel historically occupied by defunct industrial and agricultural industries, a 6-acre former boat salvage and repair facility, and a bulk oil plant" [30].
- In another example of an assessment grant, Aguas Buenas, Puerto Rico, received $400,100 for an assessment grant "to develop an inventory of brownfield sites... Grant funds also will be used to develop up to 10 cleanup plans and to support

[8] Entities receive multiple forms of funding, including some funding for an assessment grant and some funding for job training for instance.

community outreach activities… Priority sites include a former school, a vacant gas station, a former electronic components manufacturer, an apartment building, and a former public housing complex" [31].

- Cleanup grants "provide funding to carry out cleanup activities at brownfield sites owned by the applicant" [29]. In 2022, Asbury Park, New Jersey received a grant for $500,000 [32]. The grant will clean up four sites along the Springwood Avenue Corridor. The sites have been vacant for the past two decades given contamination.
- Revolving Loan Funds "provide funding to capitalize loans that are used to clean up brownfield sites." In 2022, $1 million was awarded to Tucson, Arizona "to capitalize a revolving loan fund from which the City of Tucson will provide six loans and two subgrants to support cleanup activities. Grant funds also will be used to support community engagement activities… Priority sites include a vacant former fueling station, a vacant former private school, and a transit center and its adjacent parking lot" [33].
- Job training grants support both training and placement in employment. For example, in FY 2022, the Program awarded $3.8 million to 19 job training projects around the country. This funding will train over 1,300 people and place at least 800 people in environmental jobs. Some funding has been released for 2023 already, including $14.3 million for 29 Job Training grants.

Figure 7: There was a Large Increase in Brownfields Assessment Funding in 2022, While Other Types Remained Consistent




The program saw a significant increase in Assessment grants in 2022 as well as an increase in Revolving Loan Funds.

Source: [28]

In 2022, five states did not receive any Brownfields program funding — Arkansas, Delaware, Nebraska, North Dakota, and South Dakota.[9] Washington DC also did not receive any funding. In fact, from 2018 through 2023 awards, Nebraska and South Dakota have only received one grant each.

# Case Study Four: Rebuilding America's Infrastructure with Sustainability and Equity

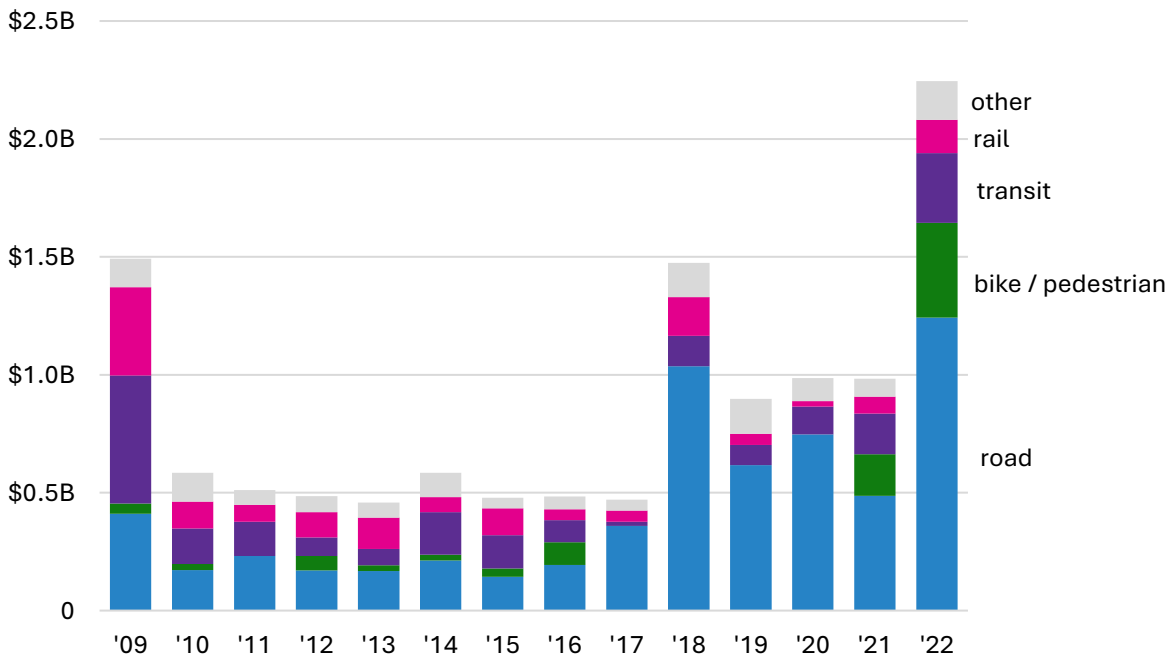
Rebuilding America's Infrastructure with Sustainability and Equity (RAISE) is an existing program administered by the Department of Transportation and funded by IIJA. This program is covered under the Justice40 Initiative. There is a total of $7.5 billion in funding available for RAISE over four years. Per Figure 8, the total funding awarded in 2022 was the largest to date. RAISE funding may support surface transportation infrastructure projects to

[9] Including new grant funding and supplemental revolving loan funding (RLF) from 2022, New Mexico did not receive any new grant funding but received supplemental RLF.

improve safety, environmental sustainability, quality of life, mobility and community connectivity, economic competitiveness, and opportunity, including tourism, state of good repair, partnership and collaboration, and innovation [34].[10]

The program was created as part of the American Recovery and Reinvestment Act (ARRA) of 2009 as the Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grant Program and was originally implemented to improve transportation infrastructure and quickly stimulate the economy [35]. Since then, the program has evolved and became BUILD (Better Utilizing Investments to Leverage Development) under the Trump Administration and now under the Biden Administration, it is RAISE.

Figure 8: Program Awards by Financial Year and Primary Project Type




The Other category includes Port, Maritime and Aviation funding. In 2018, the Democratic Party took control of the House and supported increases in the program budget [35].

Source: [36]

[10] Per the 2023 NOFO, this includes highway, bridge or other road, public transit, passenger and freight rail, port infrastructure, surface transportation for an airport, intermodal, preventing stormwater runoff, projects on Tribal lands, and any other surface transportation projects deemed necessary by the Secretary of Transportation [120].

RAISE has the potential to achieve important climate outcomes through the preference of low or zero-emission transportation modes like walking and cycling over higher emission activities like driving. Agency decisions can also prioritize projects that incorporate climate outcomes such as transportation electrification, transit projects, and delivering funds to support road repairs rather than road widening.

Funding of $2.245 billion was released in August 2022 for FY 2022. This funding went to all 50 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands for a total of 166 awards. The Northern Mariana Islands received its first award in 2022, leaving American Samoa as the only state or territory that has not received funding through the program [35]. The largest funding by state went to California, Texas, and Minnesota, see Figure 9 for more. No state is able to claim more than 15 percent of the program funds. Awards may be as large as $25 million and the average award in FY2022 was $13.5 million (this was relatively consistent across project type ranging from $11.8 million for bicycle and pedestrian projects to $16.4 million for maritime projects).

Figure 9: Top 10 States for RAISE Awards in 2022

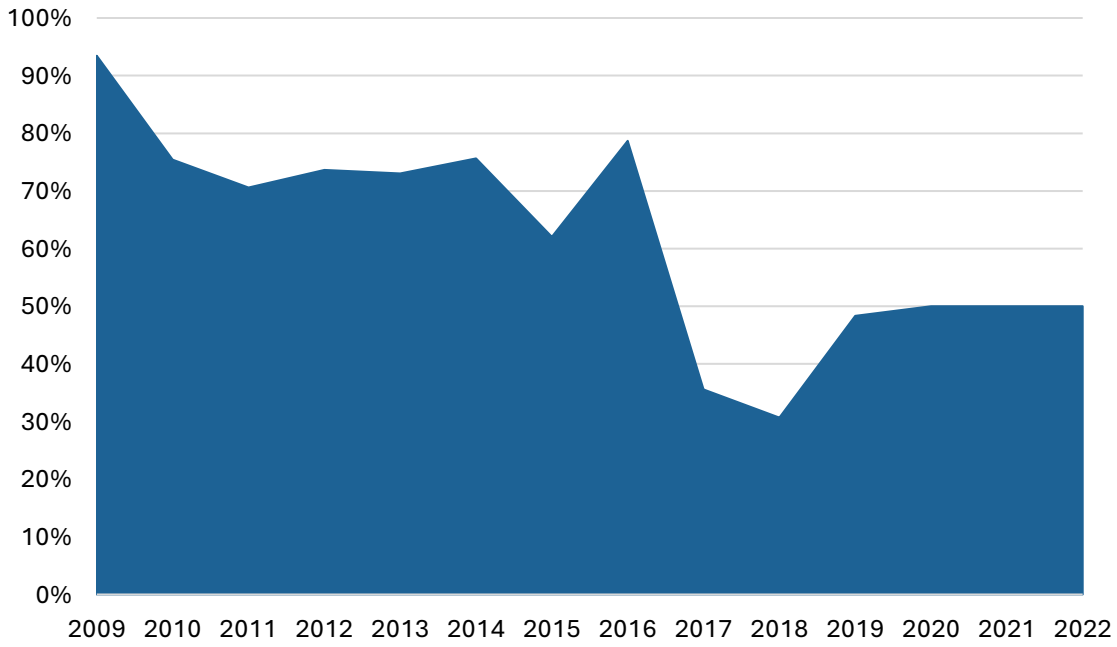
| State | Grant Amount | Project Count |
|---|---|---|
| **California** | $119,613,600 | 8 |
| **Texas** | $101,580,730 | 6 |
| **Minnesota** | $99,414,144 | 6 |
| **Washington** | $97,739,221 | 7 |
| **Florida** | $85,797,297 | 5 |
| **Illinois** | $83,516,189 | 4 |
| **Arizona** | $75,250,150 | 4 |
| **Virginia** | $64,207,045 | 6 |
| **Louisiana** | $63,143,406 | 5 |
| **Tennessee** | $63,071,636 | 3 |

No single state can receive more than 15 percent of funds [37].

Source: [36]

The funding was split in 2022, with exactly half going to rural and half going to urban communities – which has received criticism given the majority of Americans live in urban communities [38]. In 2018, the Trump Administration directed 69 percent of funds to rural areas and so in response, Congress introduced a 50 percent cap and changed the definition of rural and urban communities, such that "some areas that in previous rounds of applications would have been considered urban areas would now be considered rural" [35].

Figure 10: Percent of Award Funding to Urban Communities




Rural and urban classification developed by the Department of Transportation. Note the shift in 2017 as funding shifted to a greater proportion of rural projects. The FY2017 awards were the first administered by the Trump Administration [39]. The definition of rural and urban communities has also shifted over time [35].

Source: [36]

Projects were designated by the DOT based on the primary project type. In the FY2022 grant awards, most of the funding went to roads (55 percent), though program categories do not differentiate between road expansion and road repairs. In total, 34 projects were designated as pedestrian and bicycling, surpassing all categories except roads. This funding will support $401 million in projects. During the Trump Administration, the proportion of Bicycle and Pedestrian projects dropped precipitously to zero and Road Funding projects as a percentage of funding rose sharply. In 2022, levels of funding

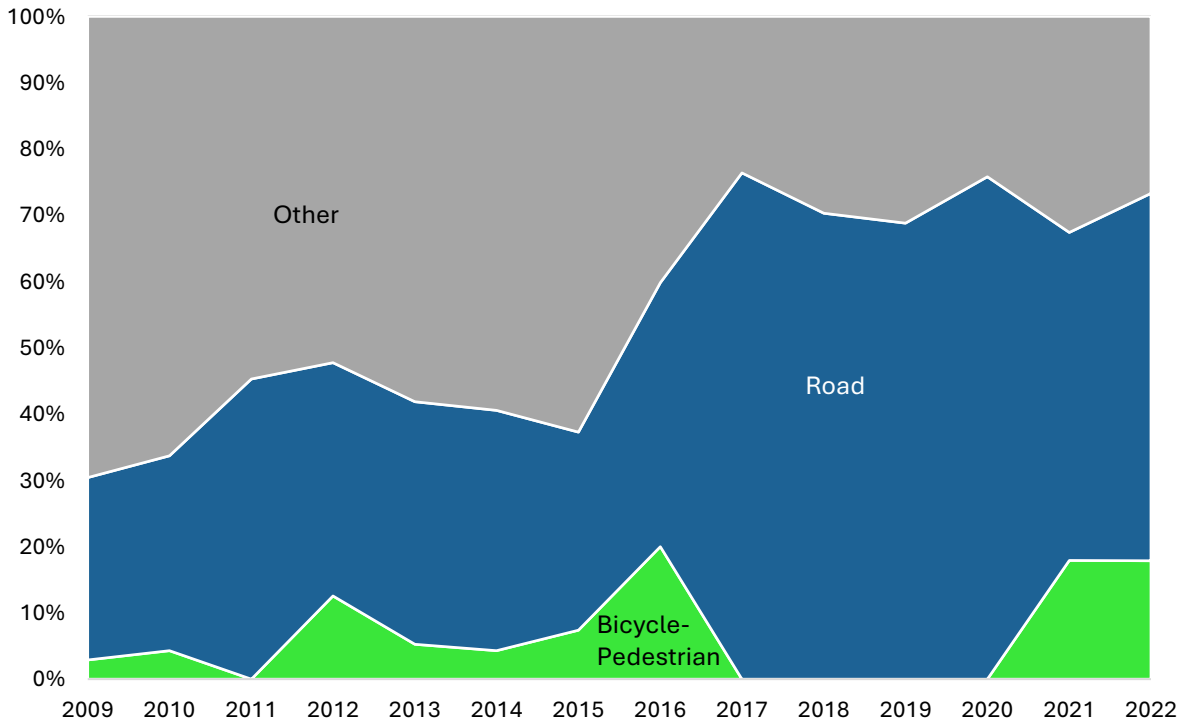
invested in Bicycle and Pedestrian (18 percent) plateaued and are still shy of the high from 2016 (20 percent).

Road funding may include other types of support also, for instance four of the road projects mentioned EV or e-mobility charging stations (in total, nine projects include EV elements, and another project is geared towards hybrid electric ferry services). Note that road projects may also include funding for bicycle or pedestrian improvements or other more climate friendly modes of transportation. Fourteen of the road projects (worth more than $202 million in 2022) mentioned Complete Streets design in their project description.[11] In an analysis from the first year of awards under the revised program (2021), Yonah Freemark at the Urban Institute broke the projects down further to capture the nuance of the projects funded. For instance, while the DOT data indicated that 50 percent of funding went to road projects in 2021, Freemark found that just 16 percent of funding went to either new roads and interchanges or expanded road capacity and that the proportion of projects marked as pedestrian and bicycle infrastructure undercounted the actual funding that flowed to those projects [40].

Federally recognized tribal governments were beneficiaries in 2022 compared with earlier years. Of the funding awarded in 2022, $123.8 million went to Tribal Governments, slightly more than a third of all funding that has gone to Tribal Governments over the history of the program. Based on the Climate and Economic Justice Screening Tool (CEJST) Version 1.0, 48 percent of award funding went to disadvantaged communities. It is worth noting that this assumes that a RAISE project is a benefit to a community and not a disbenefit (many argue, for instance, that a road widening is not a benefit to a community).

[11] Complete Streets aim to serve all users and ensure safety, connectivity, equity, and climate [119].

Figure 11: Proportion of Program Grant Funds by Primary Project Type Over Time




In the first year of the Trump Administration in FY2017, the proportion of road projects increased significantly, while other project types dropped. In 2010 and 2014, Planning was a project type, covering over $59 million in awards.

Source: [36]

# Case Study Five: Orphaned Well Program

The Orphaned Wells Program was created in IIJA and is administered by the Department of the Interior (DOI). The program will administer $4.7 billion in funding to plug, remediate, and restore orphaned oil and gas wells on either public or private land [41]. Orphaned wells are wells that no longer produce oil and/or gas and where the site owner is insolvent. Orphaned wells can leak pollutants, including arsenic, formaldehyde, and benzene and can also emit methane, a potent greenhouse gas. Without a responsible party, remediation of those orphaned wells falls on the government. The program is covered under the Justice40 initiative.

Table 2: Orphaned Well Program Components

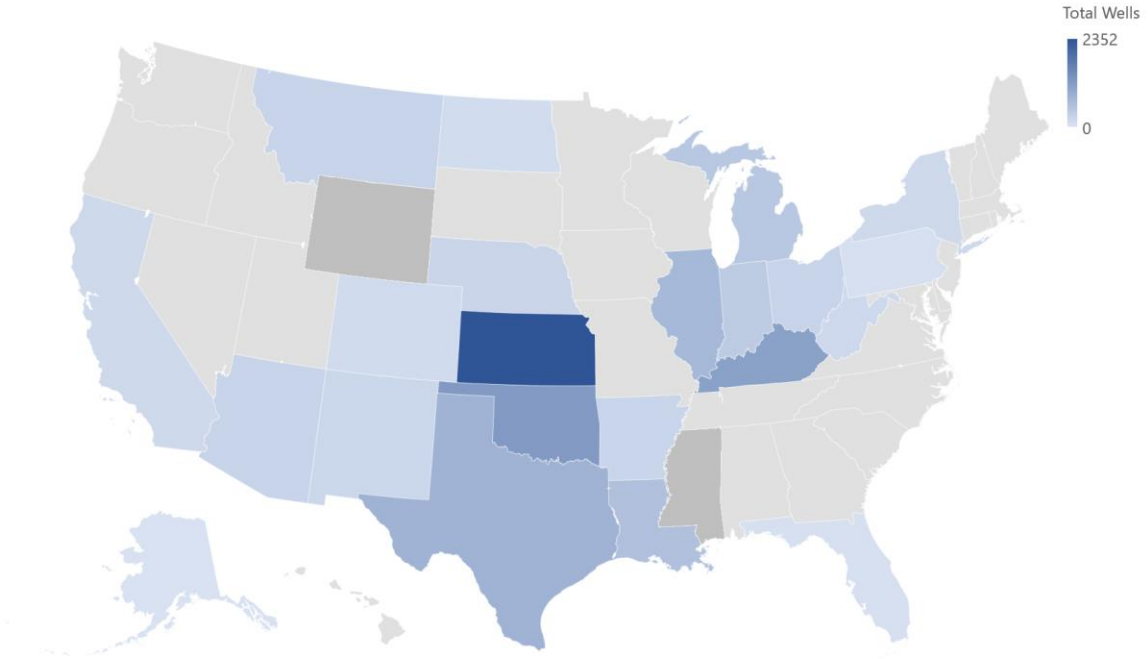
| Program | Status | Funding |
|---|---|---|
| **State Formula Grants** | $500 million announced in 2022 [42] | $2 billion |
| **State Performance Grants** | No funding announced | $1.5 billion |
| **Initial State Grants** | $560 million awarded in 2022 [43] | $775 million |
| **Programs on Federal Land** | $33 million announced in 2022 [44] | $250 million |
| **Tribal Program** | No funding announced, final guidance released in November 2022 [45] | $150 million |

In August 2022, the DOI made the first tranche of initial state grant funding available. DOI awarded $560 million to plug at least 9,832 wells in 24 states [43].[12] The Department of the Interior initially released a list of 26 states that submitted a notice of intent. Three states on that list did not receive funding - Alabama, Missouri, and Utah - while Florida was added. Further, two states that were initially slated to receive $25 million – Mississippi and Arkansas – received only $5 million. The Department of the Interior also announced $500 million in formula funding eligibility. The formula for this funding was based on "the number of oil and gas job losses in each state from March 2020 through November 2021" [46]. Texas, Pennsylvania, and Ohio are set to be the greatest recipients of phase one formula funding if states access all the funding for which they are eligible.

The cost of plugging a well varies considerably. Analysis by Resources for the Future (RFF) released in July 2021 based on historical data of 19,500 wells in four states indicated that the average cost per well was $76,000 for plugging and remediation [47]. RFF found costs can vary from as little as $1,000 to as much as $1 million per well for plugging and remediation. RFF also indicated that older and deeper wells were more expensive, and that gas wells were slightly more expensive than oil wells. This is reflected in the funding allocation through the Initial State Grants. While most states received the same $25 million award, the number of wells that states pledged to plug and remediate ranged from 12 to 18 in Alaska to 2,352 wells in Kansas. The average number of wells per state was 447 wells.

[12] Note where states provided a range, we took the midpoint of the range. Wyoming and Mississippi did not identify the number of wells they will plug.

Figure 12: Wells to be Plugged through the Initial State Grants

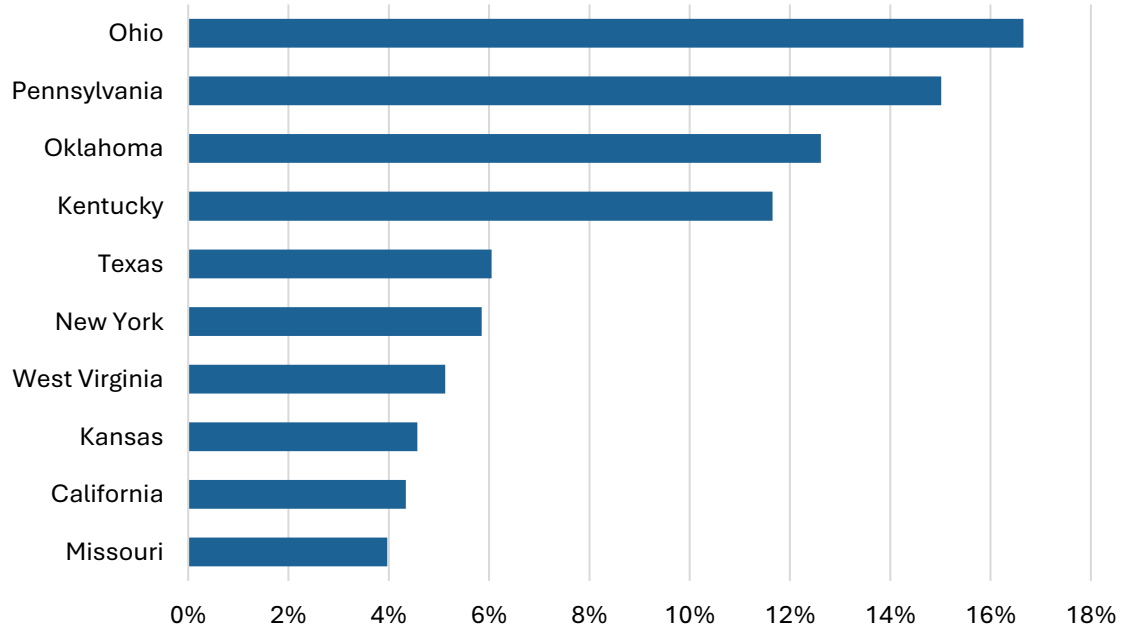



Note that Mississippi and Wyoming (dark grey) did not state the number of wells they would plug through this round of funding.

Source: [43]

In May 2022, the DOI announced that it would spend $33 million to remediate a further 277 wells on public lands across nine states [44]. More than half of the wells covered by this funding are in Louisiana, including the Darbonne National Wildlife Refuge and Upper Ouachita National Wildlife Refuge.

Figure 13: Ten States Home to 86 Percent of All Documented Orphaned Wells

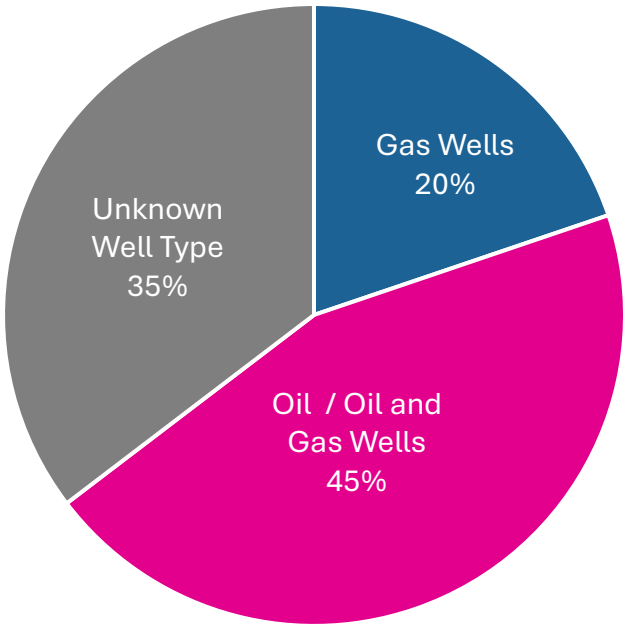



Source: [48]

Environmental Defense Fund (EDF) and McGill University found in research released in April 2022, there were 123,318 documented orphaned wells in 30 states around the country and that 56 percent of those wells were in just four states – Ohio, Pennsylvania, Oklahoma, and Kentucky [48]. This count relies on data that states continue to update. For instance, just a few months earlier in September 2021, the same researchers estimated there were 81,857 documented orphaned wells. To explain this rapid increase in the number of documented orphaned wells, researchers pointed to both the announcement of funding through IIJA prompting states to do further research, as well as bankruptcies "which may be related to oil and gas prices." Indeed, reporting from December 2022 appears to confirm the former hypothesis [49]. As of April 2022, 45 percent of the documented wells were oil or oil and gas wells, 20 percent were gas wells, and for as many as 35 percent of the orphaned wells that were documented, the well types were unknown, per Figure 14.

Alongside documented orphaned wells, the EDF and McGill University study authors also noted the large number of undocumented orphaned wells. They estimated that the number of undocumented orphan wells numbers in the hundreds of thousands, if not millions in the United States.

Figure 14: Type of Documented Orphaned Wells (per April 2022)




For a large proportion of documented orphaned wells, the well type is not known.

Source: [48]

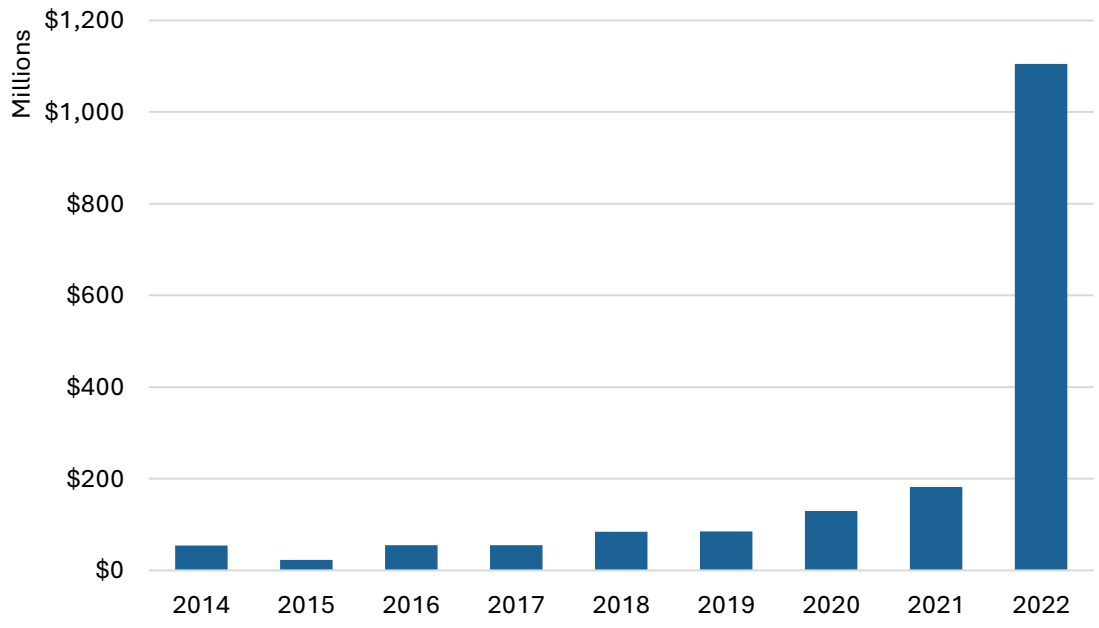
Plugging wells may also lead to considerable job opportunities. Analysis from July 2020 by researchers at Columbia University and Resources for the Future (when the documented number was lower), estimated that to plug the 56,600 documented orphaned wells would create 13,500 jobs (for one year) [50]. To develop this estimate, the researchers drew on labor estimates for similar existing programs from regulators in Colorado, Pennsylvania, and Alberta, Canada.

Analysis by the Center for American Progress released in April 2023 indicated that states have already plugged wells [51]. Kentucky for instance has already plugged 350 wells, Illinois has plugged 103 wells and Kansas has plugged 453 wells.

# Case Study Six: Low or No Emission Vehicle Program

The Low or No Emission Vehicle Program (Low No) is a competitive grant program that assists state, local, and tribal governments in procuring low-emission and electric transit buses, as well as related facilities [52]. This program is covered under the Justice40 Initiative. IIJA included $5.5 billion over five years for the Low or No Emission Bus program. Since the first awards were announced for FY2013-14, the Federal Transit Administration (FTA) has awarded $1.8 billion for transit decarbonization, including $1.1 billion to the program for fiscal year 2022 alone, an enormous injection of funds compared with previous years, per Figure 15. In 2022, the program funded 100 projects around the country. In 2022, the program also added new requirements for zero-emissions vehicle projects (ZEV) including that five percent of an award should go to workforce development "to retrain the existing workforce and develop the workforce of the future, including registered apprenticeships and other joint labor-management training programs" [53]

Figure 15: Low No Program Funding Over Time

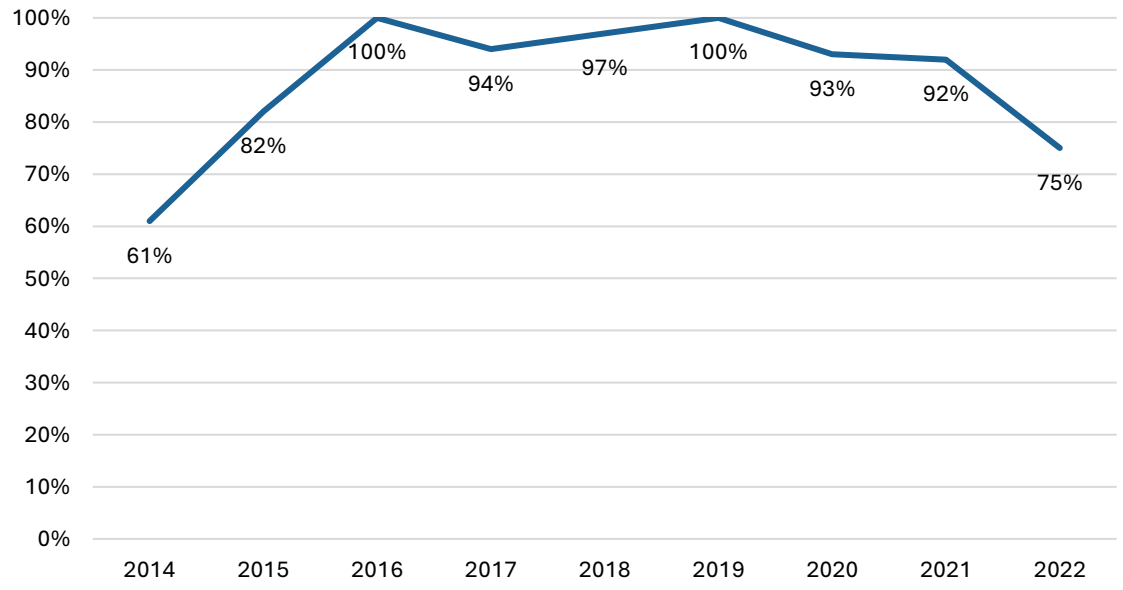



Data from 2014 also includes data from 2013 as the two years were bundled.

Source: [54]

The proportion of funding that went to electric buses dropped in 2022, even as the funding program saw a record injection of funds. In 2021, 92 percent of buses awarded were electric and 100 percent were electric in both 2016 and 2019. Per new statutory requirements, a maximum of 75 percent of the funding could go to electric buses and so natural gas and hybrid electric buses saw large increases in funding in 2022 [55].[13] The cap on the number of zero-emissions buses came out of bipartisan IIJA negotiations [56].

Figure 16: Proportion of All Low No Awards that were Electric by Year



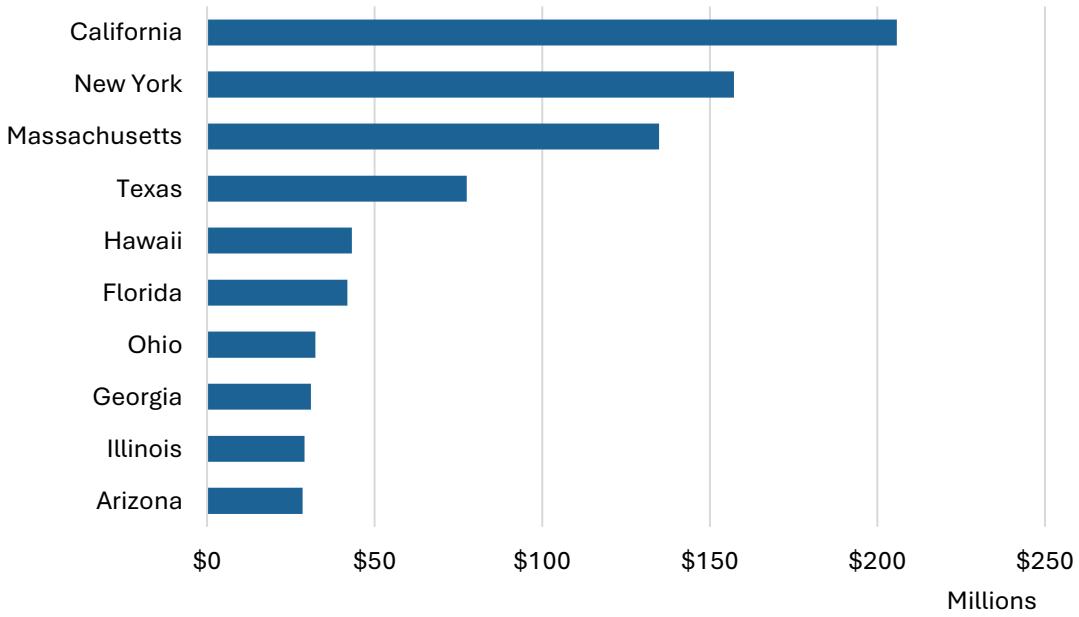

In 2022, 75 percent of funding went to non-electric buses, per a statutory requirement. Data from 2014 also includes data from 2013 as the two years were bundled.

Source: [54]

California, New York, and Massachusetts led all states in total funding. A number of states did not receive any Low-No funding including Connecticut, Delaware, North Dakota, Nebraska, New Hampshire, New Jersey, Rhode Island, Utah, West Virginia, and Wyoming.

[13] This does not apply to the Bus and Bus Facilities Program.

Figure 17: Top 10 Largest Recipient States of Funding in 2022




California led all states in 2022 for funding from the Low-No program.

Source: [54]

The three largest projects awarded in 2022 went to Massachusetts, New York, and California respectively, per Table 3. The Massachusetts Bay Transportation Authority will purchase 85 buses the MTA will purchase 230 buses, and LA Metro will purchase 160 electric buses with the funding [57], [58], [59]. These projects will support workforce development and other site upgrades. These three projects were much larger than any other project funded in 2022. The next largest project was in Lubbock, Texas, for $39.6 million to purchase hybrid electric buses [54]. To put the size of these projects into perspective, prior to 2022 there had not been any project awards at or over $10 million. In 2022, there were 25 such awards.

Table 3: The Three Largest Low or No Emission Vehicle Program Grants Awarded in 2022

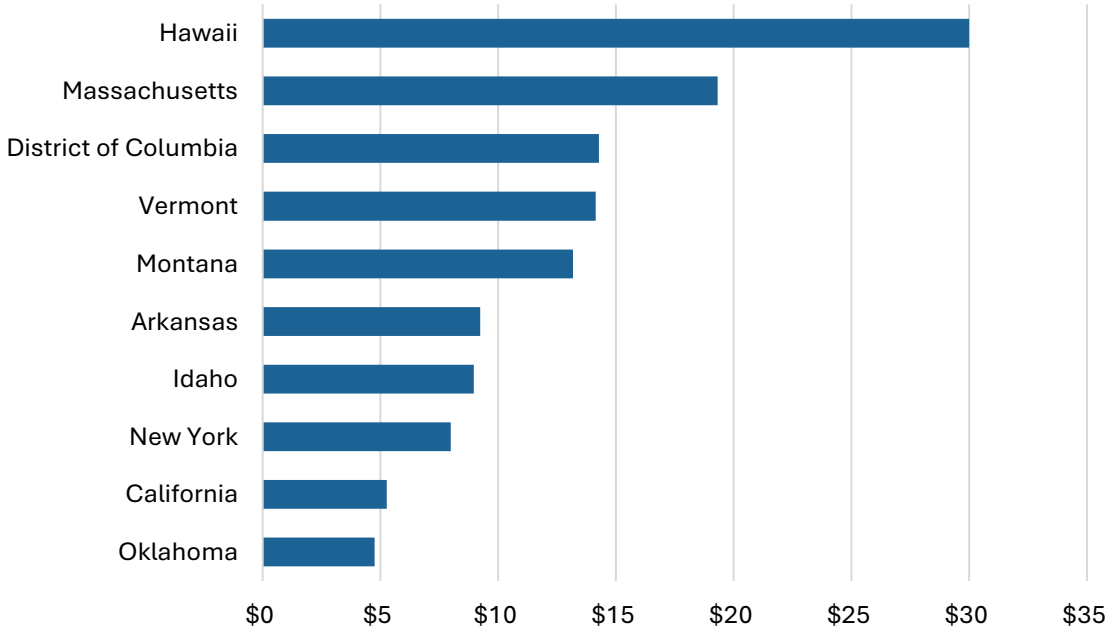
| State | Project Sponsor | Funding Description | Electric Buses | Funding |
|---|---|---|---|---|
| **NY** | Metropolitan Transportation Authority | For battery electric buses to replace older diesel buses and a workforce training and development program. New buses will electrify 4 percent of the fleet. | 230 | $116,000,000 |
| **MA** | Massachusetts Bay Transportation Authority | For battery-electric buses to replace older diesel buses and a workforce development program to support training and safety efforts. | 85 | $116,000,000 |
| **CA** | Los Angeles County Metropolitan Transportation Authority | For new battery-electric buses and charging equipment to replace older compressed natural gas buses. Supports LA Metro's goal to transition its fleet to zero-emissions by 2030. | 160 | $104,160,000 |

Source: [54]

Further, when the data are broken down on a per capita basis by state, the picture shifts slightly and highlights the significant investments in Hawaii, Massachusetts, DC, Vermont, Montana, and Alaska for instance.

The FTA awarded a further $551 million through the companion Bus and Bus Facilities competitive program [14]. Sixty-six percent of that funding, or $363 million, went to projects to upgrade facilities to support the electrification of transit buses, including installing charging infrastructure.

Figure 18: Top 10 Recipient States by Per Capita Funding in 2022




Population data by state from 2022.

Source: [54], [60]

# Tax Credit Updates

There are more than 20 climate tax credits from the Inflation Reduction Act. These tax credits comprise a significant portion of the climate funding from the two laws. Therefore, guidance from the Department of the Treasury on these tax credits will shape the effectiveness of the laws in reducing carbon emissions and delivering other key outcomes.

Some of these tax credits are new and some are extensions and modifications of existing tax credits. It is worth highlighting several important concepts that will shape the uptake and implementation of the tax credits. First, the notion of bonuses. Applicants may be eligible for base tax credits, and then are able to stack bonuses on top of that tax credit if applicable. There are three key bonuses that may apply:

1. 10 percent bonus for projects that meet labor requirements: workers must be paid a prevailing wage and apprentices must work on the project [61]. Guidance was released in November 2022 [62].
2. 10 percent bonus for projects that meet domestic manufacturing requirements.

3. 10 percent bonus for projects located within an *energy community*. In April 2023, Treasury released guidance on the energy community bonus [63]. The guidance clarifies that *energy communities* include:
    a. coal communities (where a coal mine closed since 1999 or a coal fired power plant closed since 2009),
    b. communities that derive a significant proportion of their revenue from fossil fuels,
    c. or brownfields.

The law also provides stackable credits for solar and wind projects in low-income communities, under Section 48C [64]. This tax credit includes "an additional 10 percent credit if located in a low-income community or on Indian land, or an additional 20 percent credit if such project is part of a qualified low-income residential building project or qualified low-income economic benefit project" [65]. Treasury released guidance on 48C in February 2023 [66].

Analysis from ICF released in September 2022, anticipated that the labor requirements would be the easiest to meet and the domestic manufacturing would be the most difficult to meet of the bonuses noted here [67].

Aside from bonuses, it is also worth highlighting tax credit refundability and transferability [68]:

- *Refundability* (Direct Pay): allows entities or individuals that do not owe federal taxes to receive a direct payment instead of a credit against taxes owed. Some but not all the clean energy tax credits are eligible for direct pay. Further, several tax credits are only eligible for direct pay for tax exempt entities, for example public entities, nonprofits, or churches. This allows tax exempt entities to compete with private sector and for-profit organizations without outside financial support and incentivizes ownership of clean energy projects.
- *Transferability*: a new provision that allows entities to transfer certain tax credits to third parties in exchange for cash. This provision could help project developers with limited federal tax liability monetize their tax credits. Some provisions have special rules around transferability. For example, the clean vehicle tax credits only allow taxpayers to transfer the credit to the dealer that sold them the vehicle.

Much of the guidance for the tax credits is still pending, per Table 4. In a speech in March 2023, Assistant Secretary for Tax Policy at the Department of the Treasury Lily Batchelder said, "In the coming months, Treasury will issue guidance on the clean vehicle credit, the energy community bonus, the domestic content bonus, direct pay and transferability, and the prevailing wage and apprenticeship standards required to receive full credits" [69]. As

of April 22, 2023, Treasury has issued guidance on the clean vehicle credit and the energy community bonus [70].

Table 4: Top 10 Largest Climate Tax Credits in the Inflation Reduction Act

| Title | Description | Update | Cost Estimate |
|---|---|---|---|
| **Extension and Modification of Credit for Electricity Produced from Certain Renewable Sources (45 PTC)** | Extends the tax credit for applicable renewable energy sources through 2024 and revives the credit for solar facilities. Credit is available to wind, solar, geothermal, landfill gas, municipal solid waste, qualified hydropower, and marine facilities. | No guidance released yet | $51B |
| **Clean Electricity Investment Credit (48E)** | Provides a clean electricity investment credit for clean electricity generating facilities and energy storage technology. | Released March 2023 | $51B |
| **Advanced Manufacturing Production Credit (45X)** | Establishes a new Advanced Manufacturing Production Credit, including for PV cells and modules, inverters, wind energy technology, critical minerals, and battery technology. | No guidance released yet | $31B |
| **Zero-Emission Nuclear Power Production Credit (45U)** | Provides a credit for existing nuclear facilities of $0.015/kWh for projects meeting prevailing wage and apprenticeship requirements. | No guidance released yet | $30B |
| **Residential Clean Energy Credit (25D)** | Extends the Residential Clean Energy Credit over ten years for the following target technologies: solar electric systems, solar hot water, fuel cells, small wind, and geothermal heat pumps. | No guidance released yet | $22B |
| **Extension and Modification of Energy Credit (48 ITC)** | Restores the clean electricity investment credit and expands it to include energy storage. | No guidance released yet | $14B |
| **Extension, Increase, and Modification of Nonbusiness** | Extends and amplifies the Energy Efficient Home Improvement Credit, increasing the percent households can deduct from their taxes for energy efficiency improvements | No guidance released yet | $12B |

| Title | Description | Update | Cost Estimate |
|---|---|---|---|
| **Energy Property Credit (25C)** | from 10 to 30 percent, for a period of ten years. Improvements such as the installation of windows, doors, insulation, service panel upgrades, heat pumps, and heat pump water heaters are eligible. | | |
| **Clean Electricity Production Credit (45Y)** | Creates a new emissions-based, technology-neutral clean electricity production tax credit to replace 45 PTC starting in 2025. | No guidance released yet | $11B |
| **Clean Hydrogen (45V)** | Establishes a new clean hydrogen production credit. | No guidance released yet | $8B |
| **Clean Vehicle Credit (30D)** | Provides tax credit up to $7,500 for the purchase of new clean vehicles. | Released March 2023 | $8B |

Note there were no tax credits in the Infrastructure Investment and Jobs Act. Cost estimate for tax credits is from estimates from the Congressional Budget Office released in September 2022, however the total cost will depend on uptake as tax credits are not capped.

Sources: [71], [72]

# Section Two: Implementation

## Executive Orders

The Biden Administration has used executive orders to guide implementation of the two laws, including those summarized in Table 5.

Table 5: Important Executive Orders Issued by the Biden Administration that will Shape Implementation

| Date | Executive Order | Description |
|---|---|---|
| **January 25, 2021** | E.O. 14005, Ensuring the Future Is Made in All of America by All of America's Workers | Directed the federal government to maximize the use of goods, products, and materials produced in the United States [73]. |

| Date | Executive Order | Description |
|---|---|---|
| **January 27, 2021** | E.O. 14008: Tackling the Climate Crisis at Home and Abroad | Laid out the Justice40 Initiative and established the Climate Policy Office, now headed by Ali Zaidi [74], [75] . |
| **August 5, 2021** | E.O. 14037: Strengthening American Leadership in Clean Cars and Trucks | Set a target that "50 percent of all new passenger cars and light trucks sold in 2030 be zero-emission vehicles" EV sales by 2030 [76]. |
| **November 18, 2021** | E.O. 14052: Implementation of the Infrastructure Investment and Jobs Act | Described the goals of IIJA, implementation priorities for federal agencies, and established the Infrastructure Implementation Task Force (made up of Agency heads) [77]. |
| **December 8, 2021** | E.O. 14057: Catalyzing America's Clean Energy Industries and Jobs through Federal Sustainability | Directed the "federal government to use its scale and procurement power" to achieve 100 percent carbon pollution-free electricity by 2030, 100 percent zero-emission vehicle (ZEV) acquisitions by 2035 and a net-zero emissions building portfolio by 2045 [78]. |
| **September 16, 2022** | E.O. 14082: Implementation of the Energy and Infrastructure Provisions of the Inflation Reduction Act of 2022 | Implemented the energy and infrastructure provisions of the Inflation Reduction Act (IRA) and among other things, established the White House Office on Clean Energy Innovation and Implementation to carry out the energy and infrastructure provisions of the Act, and expanded interagency coordination efforts through the National Climate Task Force [79]. |
| **February 16, 2023** | E.O. 14091: Further Advancing Racial Equity and Support for Underserved Communities Through the Federal Government | Called for agencies to submit an Equity Action Plan. The Annual Plan will include the "agency's performance on the annual Environmental Justice Scorecard established pursuant to section 223 of Executive Order 14008, as applicable" [80]. |
| **April 21, 2023** | E.O 14096: Revitalizing Our Nation's Commitment to Environmental Justice for All | Laid out the Biden-Harris Administration's efforts to advance environmental justice and ensure that "every person has safe, clean, and affordable options for housing, energy, and |

| Date | Executive Order | Description |
|---|---|---|
| | | transportation" and established a White House Office of Environmental Justice [81] |

## Justice40 Initiative

The federal government established the Justice40 Initiative with Executive Order 14008 to ensure disadvantaged communities see the benefits of federal spending. The initiative directs that 40 percent of the overall benefits from federal climate investments go to disadvantaged communities (DACs), specifically investments in "clean energy and energy efficiency, clean transit, affordable and sustainable housing, training and workforce development, remediation and reduction of legacy pollution, and the development of critical clean water and wastewater infrastructure" [82].

There are two important components to deliver on this directive. The first is to define disadvantaged communities. The Council on Environmental Quality (CEQ) in the White House developed the Climate and Economic Justice Screening Tool (CEJST) to assist federal and state agencies to define DACs. The Biden Administration released CEJST 1.0 in November 2022, nearly two years after the enactment of Executive Order 14008 and following the release of a beta version of the tool in February 2022 [83]. CEJST identifies DACs across the U.S. at the census tract level. The tool classifies census tracts as disadvantaged if they meet 90th percentile thresholds for any of the 30 indicators and are "in the 65th percentile or above for number of households with income less than twice the federal poverty level" [84]. Furthermore, all communities that are within Federally Recognized Tribes are classified as DACs. Likewise, all communities that are "completely surrounded by other disadvantaged communities" and meet the 50$^{th}$ percentile of the low-income threshold are considered DACs.

In a March 2023 analysis, the World Resources Institute found that the updated version of the tool covers 33 percent of the population (up from 29 percent in the beta version) [85]. While the tool does not account for race, WRI unpacks the implications of the tool for different racial groups. WRI found first that the updated tool included a larger share of white citizens. WRI also found that not factoring in cumulative burden when identifying DACs disadvantages Black and Latino communities.[14] Some designated census tracts meet one indicator threshold while others meet thresholds for all 18 of the indicators. To illustrate the significance of cumulative burden, 45 percent of those residing in DACs that

[14] Per the WRI analysis, cumulative burden refers to the "total harm to communities that occurs due to a combination of environmental, socioeconomic and health-related burdens."

meet one of the indicator thresholds are white. In contrast, only 8.5 percent of those residing in DACs that meet 18 indicator thresholds are white (over 92 percent are either Black or Hispanic/Latino).[15] A failure to account for cumulative burden may undermine efforts to target funds to the most disadvantaged communities.

As agencies were waiting on CEJST, they released interim tools to guide decision-making. These tools will now be grandfathered out over time. States may use state-level tools to supplement CEJST 1.0. As part of its push to center environmental justice in Federal policy, the White House Council on Environmental Quality is developing a scorecard to define the benefits that will flow to DACs, though at present they have only released the first phase.

## Buy America

The Buy America Requirement clause in IIJA amended the Federal Acquisition Regulation to increase the domestic content requirements for federal procurements [86]. To pass the domestic content test:

- For products that are not predominantly iron or steel, 60 percent of costs for component parts of manufactured goods must be from domestically sourced components (increased from 55 percent originally) [87]. This will increase to 65 percent in 2024, and 75 percent in 2029.
- For products that are predominantly iron or steel, 95 percent of component costs must be from domestic iron and steel.
- End products and construction materials must be manufactured in the United States.

Federal agencies are eligible for a waiver if the materials are not available, if there is an unreasonable cost (i.e., if the overall project costs increase by more than 25 percent), or if enforcement of the requirement is found to be at odds with the public interest.

The Biden Administration released guidance in February 2023 on the standards and the conditions under which an item is deemed to be made in the United States [88]. The same month, the Federal Highway Administration enacted the Waiver for Buy America Requirements related to Electric Vehicle Chargers [89]. This rule exempts EV chargers, for which final assembly took place in the United States, from domestic content requirements starting March 23, 2023, and ending June 30, 2024. Starting July 1, 2024, the rule waives Buy America rules of origin for EV chargers with 55 percent American components, if final assembly took place in the United States. The Administration has denied waivers in other

[15] Per the WRI analysis, "Population data exceeds 100% due to the overlap between Hispanic/Latino individuals with other race/ethnicity groups."

cases, for instance in February 2023, the Department of Transportation rejected a waiver request from ports to import “dock cranes, trucks, boat lifts and similar equipment” [87].

## State Legislation

States have implemented legislation to assist implementation efforts. Given the match funding requirements for most of the non-tax credit programs, states have appropriated match funding to assist in implementation. State match funding is the “portion of the project’s cost … not paid by Federal funds” and “typically stated as a percentage of the total project cost” [90].

In May 2022, Connecticut enacted SB 4 which requires the Commissioner of Energy and Environmental Protection to establish and administer a grant program to provide matching funds [91]. These funds may be necessary for municipalities, school districts, and school bus operators to submit federal grant applications to maximize federal funding for the purchase or lease of zero-emission school buses. The state allocated $20 million to implement SB 4.

In June 2022, Colorado enacted SB22-215 to create a cash fund to be used for match funding requirements [92]. The Act requires the state treasurer to transfer $80.25 million to the fund. The money is annually appropriated to the Office of the Governor and to departments [92]. The money will be used to fund infrastructure projects under IIJA, including the following allocations: transportation projects (35 percent), water, environmental, and resiliency projects (25 percent), power, grid, and broadband projects (25 percent), local match support (10 percent) and grant writing support, administrative support, and project planning (five percent).

Other states, including Massachusetts and Kentucky also appropriated funds that could be used as matching funds. In April 2023, lawmakers in Minnesota passed a $115 million competitiveness fund to support match funding [93], [94]. In February 2023, the Utah Legislature provided about $4.3 million in state matching grants for the IIJA Grid Resilience Formula Grant Program [95].

## Memorandums of Understanding (MOU)

Many states have already issued Clean Hydrogen Hub MOUs. These states will compete for $8 billion in IIJA funding to develop regional clean hydrogen hubs for the Regional Clean Hydrogen Hubs (H2Hubs). The H2Hubs are intended to connect potential clean hydrogen producers and consumers. The first hub partnership, Western Inter-States Hydrogen Hub, was formed in February 2022 as a partnership between Colorado, New Mexico, Utah, and Wyoming [96]. The Northeast Regional Clean Hydrogen Hub is comprised of seven states and has grown over time, including Connecticut, New York, New Jersey, and Massachusetts (March 2022), Maine and Rhode Island (August 2022), and Vermont

(February 2023) [97]. Around the country, multiple other regional, inter-state partnerships have formed. Likewise, non-state entities have also signed MOUs to develop clean hydrogen hubs.

DOE reported receipt of 79 concept papers for the H2Hubs Program. Per the DOE, 33 of the applicants were encouraged to proceed to a full application [98]. The full application was due by April 7, 2023.

### Utility Proceedings

At least two states published utility proceedings related to IIJA and/or IRA in 2022. On April 19, 2022, the Public Utilities Commission of Nevada issued an order asking for utility feedback by August 1st on federal funding opportunities under IIJA (Docket 22-04022) [99]. On May 12, 2022, the Michigan Public Utilities Commission issued an order requesting comments from rate-regulated utilities on federal funding opportunities related to the IIJA (Docket U-21227) [100]. The Commission in both states identified a list of grants, loan programs, funds, and assistance available to utilities in IIJA. These include grants to:

- Deploy EV infrastructure, hydrogen fueling infrastructure, propane fueling infrastructure, and natural gas fueling infrastructure.
- Advance grid resiliency; facilitate transmission facilitation.
- Create a Smart Grid Investment Matching Grant Program.
- Facilitate hydropower projects; and
- Additional funding for energy storage demonstration projects.

# Section Three: Forecasting Outcomes

Several groups and initiatives from academia, government, NGOs, and private industry have developed models to forecast the potential climate and energy impacts of the two laws. Georgetown Climate Center released analysis on the impact of transportation programs in IIJA. Meanwhile, Energy Innovation, Princeton University, Rhodium Group, Resources for the Future, America Is All In and the National Renewable Energy Laboratory (NREL) modeled the IRA's impacts in the electricity sector through 2030, though with varying scopes. The analyses all found emissions reductions from IRA but were more circumspect on emissions reductions from IIJA and cost savings at a household level, among other benefits. The extent of these emissions reductions depends on the implementation decisions by various actors (federal, state, local governments, utilities,

and other actors). The power and transportation sectors will drive much of the emissions reductions per these analyses.

## Estimating the Greenhouse Gas Impact of Federal Infrastructure Investments in the IIJA

On December 16, 2021, the Georgetown Climate Center (GCC) released an analysis of the potential impact of IIJA's $600 billion in surface transportation funding programs on U.S. greenhouse gas (GHG) emissions [101]. The GCC found that "the percentage of funding invested in highway expansion relative to other strategies is the main driver of emissions outcomes." In sum, if states opt for a fix-it-first approach to roads (that is, repairing infrastructure that is already there rather than building new structures) and greater investments in transit and EV friendly funding, then it will move closer to the low-emission scenario. The researchers anticipate that the most likely outcome will be somewhere between these two bounds. In March 2023, the GCC and RMI released a follow-up analysis that underscored the importance of state-level decision-making and added a new scenario, very low emissions (where no IIJA funding goes towards highway expansion) [102]. GCC found that various low-carbon investment strategies including light-duty vehicle electrification, truck and bus electrification, investments in charging infrastructure, transit, and active transportation can be combined to reduce emissions [102]. State DOTs, which oversee statewide transportation plans, will be instrumental in achieving emissions reductions in transportation, and states like Colorado have pioneered a model for linking transportation planning to emissions reductions [103]. These agencies will also need to coordinate transportation planning with housing and land use policy to enable reductions in vehicle miles traveled, which several states have recognized as critical to meeting climate goals.

## The Climate and Energy Impacts of the Inflation Reduction Act of 2022

The Princeton University-led Rapid Energy Policy Evaluation & Analysis Toolkit (REPEAT) Project released an analysis in August 2022, and an update in April 2023, that modeled the energy and greenhouse gas emissions impacts of the current policy settings, including the Inflation Reduction Act [104]. The REPEAT Project update from April 2023 found that by 2030, the IRA could cut emissions by 37 to 41 percent below 2005 levels compared with the no new policies scenario of 28 percent and the IIJA-only scenario of 28 percent. The updated analysis revised down the potential emissions reductions slightly from the preliminary analysis due to "constraints on supply chains and other rate limiting factors." REPEAT's analysis found that emissions reductions from IRA would fall short of the Net Zero Pathway (51 percent below 2005 levels) although given IRA's cost cutting potential, actions from states and other actors could drive emissions even lower. Like other analyses, the researchers found that the power and transportation sectors will drive emissions

reductions, amounting to about 50 percent of reductions under IIJA and IRA. In the analysis released in August 2022, the researchers noted constraints that may hinder decarbonization that are difficult to incorporate into the model, including the "ability to site and permit projects at requisite pace and scale, expand electricity transmission and CO2 transport and storage to accommodate new generating capacity, and hire and train the expanded energy workforce to build these projects." In the initial analysis, the researchers also noted the potential for other IRA provisions not included in the modeling to reduce emissions – for instance, the $27 billion Greenhouse Gas Reduction Fund as well as billions of dollars of other program funding.

In September 2022, REPEAT released an analysis on the risk of slow transmission expansion [105]. The researchers found "over 80% of the potential emissions reductions delivered by IRA in 2030 are lost if transmission expansion is constrained to 1%/year." (i.e., the recent pace of transmission expansion). Transmission is crucial for wind and solar projects and enables other forms of decarbonization.

### A Turning Point for US Climate Progress: Assessing the Climate and Clean Energy Provisions in the Inflation Reduction Act

On August 12, 2022, Rhodium Group released an analysis of the key energy and GHG emission impacts of the IRA in electric power, industry, and transportation [106]. Rhodium found that IRA "drives U.S. net GHG emissions down to 32–42% below 2005 levels in 2030, compared to 24–35% without it." The range depends principally on "uncertainty around economic growth, clean technology costs, and fossil fuel prices." Rhodium Group found that the IRA reduces household energy costs by $112 per household on average in 2030 – mainly because of the efficiency of EVs and heat pumps. Rhodium estimated that household energy costs would decrease by $51 for electricity, $13 for home energy, and $48 for mobility (under the low-emissions scenario). The law will also lead to other benefits including the reduction of air pollution from electric power by up to 82 percent compared to 2021 levels.

### Implementing the Inflation Reduction Act: A Roadmap for State Electricity Policy

Energy Innovation released an analysis in October 2022 on the IRA's electricity sector provisions [107]. These include IRA's clean energy tax credits, energy infrastructure reinvestment financing, manufacturing credits, and transmission provisions. Energy Innovation found that "the IRA can cut U.S. electricity sector emissions 72 to 86 percent relative to 2005" by 2030, mainly due to lower costs for carbon-free electricity technologies. This could also "cut household energy bills by hundreds of dollars annually ($270–$320), roughly triple annual wind and solar capacity investments through 2030, create more than a million jobs across the country (1.2–1.4 million jobs) and put U.S.

climate goals within reach." Energy Innovation also highlighted the role that state governments and utilities will play in the implementation of this Act and provided recommendations for how these groups can secure IRA's benefits. Some of these include passing clean electricity standards, passing utility storage mandates, creating a transmission authority, providing funding and resources for community transition, and increasing interagency coordination to drive clean energy deployment.

### Beyond Clean Energy: The Financial Incidence and Health Effects of the IRA

The Resources for the Future (RFF) analysis, published in October 2022, "examines the emissions, health, and financial impacts" of the IRA [108]. The researchers estimated that electricity sector emissions will fall 61–68 percent below 2005 levels by 2030 as clean electricity sources rise to 69–75 percent of the United States' energy generation mix in 2030 (up from 38 percent), displacing natural gas and coal. As with other analyses, RFF found cost savings at a household level, though they found that savings depended on the household income level. The transition to clean energy will result in a reduction in net annual household costs of $66 to $123 among the three lowest income quintiles though an increase in costs of $1,014 for the top income bracket due to a higher tax burden to pay for the Act. RFF also found reductions in sulfur dioxide emissions of 36–53 percent by 2030 and reductions in premature mortality by 692-1,300 lives by 2030 – particularly in the Midwest and Southeast regions.

### An "All In" Pathway to 2030: The Beyond 50 Scenario

In November 2022, America Is All In, a partnership of the Center for Global Sustainability at the University of Maryland, RMI and the World Resources Institute, released an analysis that estimated a 39 percent drop in emissions from 2005 levels by 2030 in the Existing Policy scenario (including IIJA and IRA) and the potential for "at least 50–52% emissions reductions" with a series of additional policies in place [109]. Those policies would be led by federal government, states, cities and businesses and include utility resource investment and planning to ensure full phaseout of coal generation by 2030, climate-leading cities implementing clean electricity goals targeting 100 percent of demand by 2030, major auto manufacturers on-track to 100 percent ZEVs for new light-duty vehicle sales by 2035, and more stringent EPA regulations on oil and gas facilities.

### Power-Sector Transitions: Potential Near-Term Impacts of the Inflation Reduction Act and Bipartisan Infrastructure Law

On March 15, 2023, the National Renewable Energy Laboratory (NREL) released analysis on the impacts of IRA and IIJA on the power sector, including resulting emissions reductions, system cost reductions and health benefits [110]. NREL found that power system emissions are set to drop by 84 percent in 2030 relative to 2005 levels. These

emissions reductions are the result of significant growth in clean electricity production. In 2022, 41 percent of electricity came from clean electricity.[16] This rises to 52 percent under a no new policy scenario in 2030 and around 81 percent under the IRA and IIJA scenario. NREL also found that power sector air pollution reductions as a result of IRA and IIJA – including nitrogen oxide (NOx), sulfur dioxide (SO2) emissions, and particulate matter (PM) – will prevent between 11,000 to 18,000 premature deaths through 2030.

According to the analyses described above, IRA and IIJA can significantly reduce GHG emissions across the nation's highest polluting sectors. The REPEAT Project and Rhodium Group both found that the IRA could cut emissions (across power, industry, transportation, and carbon removal) by 39 percent and 40 percent respectively below 2005 levels in 2030.[17] The production of cleaner electricity drives a large part of these emissions reductions. Energy Innovation, RFF, and NREL looked specifically at the electricity sector and estimated emissions reductions of up to 86 percent, 68 percent, and 84 percent by 2030, respectively. As GHG emissions go down, the analyses indicated that this will also reduce household energy costs by hundreds of dollars per year. State, local, and federal governments could drive emissions down even further by implementing policies that help mitigate GHG emissions.

## Jobs and Investment Tracking

Several reports have tracked employment announced since the passage of one or both of the laws. They each incorporate different methodologies to track new jobs and find that the two laws will bring billions of dollars in new investments. The Clean Energy Boom report by Climate Power tracked 101,036 announced new jobs (including temporary and permanent jobs) in 31 states since the passage of the IRA through January 31, 2023, leading to $89.5 billion in new investments [111]. These jobs largely come from wind, solar, batteries, electric vehicles, and storage projects. As of April 25, 2023, the Clean Energy Projects Tracker, also managed by Climate Power, and which fed into the Report, has tracked more than 102,000 permanent jobs across 191 projects [112].

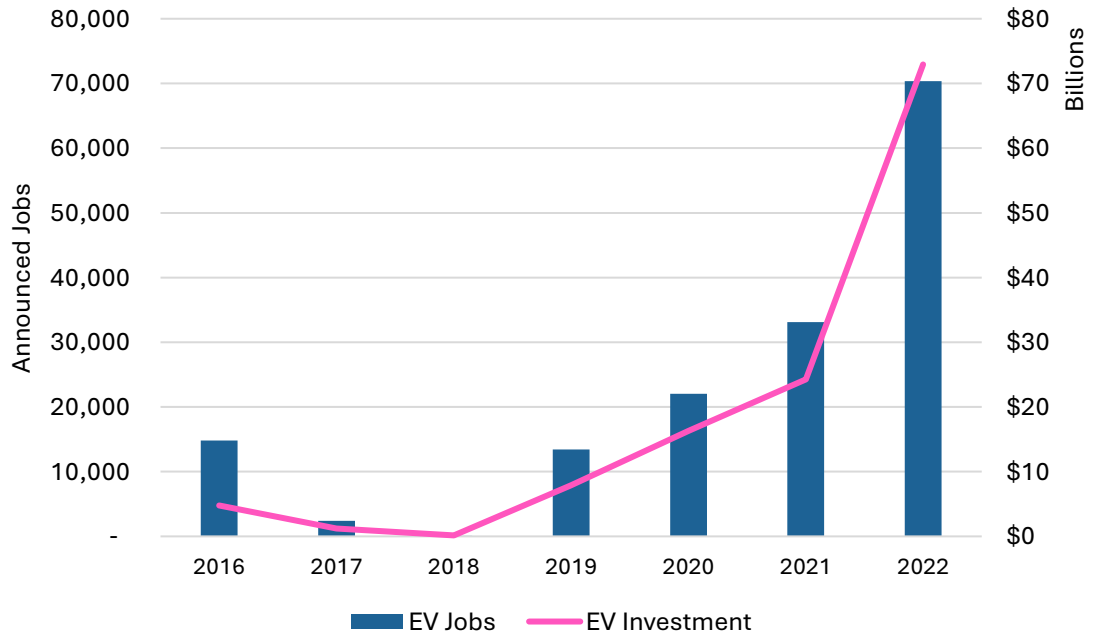
In the Clean Energy Investing in America report released in April 2023, the American Clean Power Association tracked 46 new grid scale manufacturing facilities (solar, grid-scale battery storage and wind power) in the period from August 16, 2022 to March 31, 2023 which will produce nearly 18,000 new jobs and an estimated $150 billion in investment [113]. Meanwhile, Atlas EV Hub tracks jobs in EV manufacturing including battery

[16] Included in clean technologies per this analysis are "nuclear, fossil generation with carbon capture and storage (CCS), and renewable technologies, including wind, solar, hydroelectric, geothermal, landfill gas, and biomass."

[17] Taking the midpoint of the range from the REPEAT project and the Central scenario from Rhodium analysis.

production, battery recycling, vehicle assembly, and EV charging manufacturing [114]. In the period since the Infrastructure Investment and Jobs Act was signed through to the end of March 2023, Atlas tracked 92,887 announced jobs and $95.6 billion in announced investments.

Figure 19: Announced EV Manufacturing Jobs and Investment in the United States




Data includes announced facilities for EV assembly, battery manufacturing, battery recycling and EV charging manufacturing.

Source: [14]

In June 2022, DOE released the 2022 U.S. Energy and Employment Report (USEER), which tracked employment trends in 2021 across the energy sector and within key energy technologies [115]. DOE found that the total number of energy sector jobs increased to 7.8 million in 2021. Furthermore, energy sector jobs grew four percent from 2020 to 2021, outpacing United States employment growth overall, which rose 2.8 percent. The USEER covers five major energy industries: electric power generation, motor vehicles, energy efficiency, transmission, distribution, and storage, and fuels. All industries, except for fuels, experienced net-positive growth in 2021. Most notable were EV jobs and hybrid EV jobs which increased by 26.2 percent (21,961 new jobs) and 19.7 percent (23,577 new jobs), respectively. There was slower growth in wind and solar jobs. For wind energy jobs, the

largest job gains were in the professional services industry. For solar energy jobs, the largest job gains were in the construction industry.

## Jobs and Investment Modeling

Researchers in academia, nonprofits and government have published forecasts of employment potential attributable to IIJA and IRA. In January 2023, Data for Progress measured the average annual employment effects of the climate and energy provisions in the IRA using the Data for Progress Jobs Model [116]. Based on their measurements, the IRA would create or preserve an average of around one million jobs annually between 2023 to 2032. Nearly 50 percent of these jobs would be concentrated in construction, manufacturing, science, agriculture, and environmental remediation. Most of the jobs would be either indirect or induced jobs (84 percent of total).[18]

The Political Economy Research Institute (PERI) at the University of Massachusetts Amherst, commissioned by the BlueGreen Alliance, modeled the potential employment impacts from the climate elements in the Inflation Reduction Act. Their analysis, released in August 2022, found that the "IRA will generate an average of about 912,000 jobs per year through combined annual public and private investments at $98 billion" over the next decade [117]. This translates to a total approximate public investment from the IRA of $406 billion. Most of the jobs they estimated will be in the electricity sector. They also found that the Lands and Agriculture programs from the IRA produced the most jobs per public dollar spent. These programs include Public Lands Conservation Investments, Coastal Climate Resilience Investments, Non-Federal Forest Grants, and Agricultural Conservation Technical Assistance Grants.

The Nature Conservancy also engaged BW Research to look at employment impacts from the Inflation Reduction Act. The analysis, released July 2022 prior to the passage of the law, focused on six policy areas: power, buildings, transportation, industrial, agriculture and forestry, and environmental justice and local communities [118]. The researchers estimated that federal policies, especially the IRA, will invest over $412 billion over a 10-year period and support 676,000 jobs annually for ten years.

These reports anticipate that the two laws will produce a significant number of new jobs and investments. The biggest job growth is expected to be in construction, manufacturing, and transportation. Some of the numbers mentioned – from Climate Power, American Clean Power Association, DOE, and Atlas EV Hub – come from announced investment and

[18] According to the report, "direct jobs are those created through hiring by recipients of appropriated funds, indirect jobs are those created along the supply chains that support the work of the direct hires, and induced jobs are those stemming from the economic stimulus provided by the spending of workers in the first and second categories."

jobs linked to particular facilities. Other analyses, including those from Data for Progress, PERI and the Nature Conservancy with BW Research, project job estimates into the future based on expected spending patterns shaped by the legislation. Further, some of this data covers a specific sector; for instance, Atlas EV Hub only covers some portions of the EV manufacturing industry, while other data incorporates multiple clean energy sectors (i.e., DOE).

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